Replace lifters which are less than 1.710" in length after resurfacing. Check lifter clearance when reinstalled in engine. Lifter should slip into guide hole in block of own weight.

CAUTION—Do not use resurfaced lifters with new valves.

1939-48 MODELS

VALVE SEAT INSERTS: Special hard molybdenum-chrome alloy steel valve seat inserts are used for Exhaust or Intake and Exhaust valves on some engines. Reface any valve seats which show that valve has not been seating, or where seat width is greater than ⅛", or if new guides are installed. Replace all inserts that are loose in the cylinder block or cracked.

Seat Insert Removal & Installation: Use care not to damage cylinder block when removing old inserts. Clean up counterbore in cylinder block and machine to size providing .0015-.0030" press fit for new insert. Chill new insert in dry ice for at least 15 minutes, then install insert in block using a driver that will insure the insert being seated evenly in the block. Reface new inserts.

1939-48 V8 MODELS
1941-47 SIX CYL. "G" ENGINE

VALVE ASSEMBLY SERVICING: The complete valve assembly (valve, spring, and guide) should be removed and installed as a unit. Service these assemblies as follows:

VALVE ASSEMBLY REMOVAL: Use special bar type lifter V-78 inserting the end of lifter through valve spring coils to engage flanged lower end of guides, pull guide down slightly, withdraw 'C' type guide retainer, lift valve assembly out of engine.

Valve Assembly Dismantling:—Use special bench fixture Part No. V-130 (All Engines). Fixture consists of special press by which valve spring can be compressed to free spring retainer (fixture has stop which prevents excessive valve spring compression).

1949-51 V8 MODELS

VALVE ASSEMBLY SERVICING: The complete valve assembly (valve, spring, and guide) should be removed and installed as a unit. Service these assemblies as follows:

Valve Assembly Removal: Compress valve spring down against valve locks and remove valve guide retainer. Pry up on tappet end of valve spring to remove assembly.

Disassembly—Install valve assembly in tool No. 6513-P and compress spring and remove valve spring retainer locks. Remove valve spring retainer, valve spring, and valve guide.

Reassembly (Non-Rotatable Valves)—Install valve guide on valve, install spring and spring retainer and place assembly in compression tool No. 6513-P. Compress spring and install retainer locks with lock replacer.

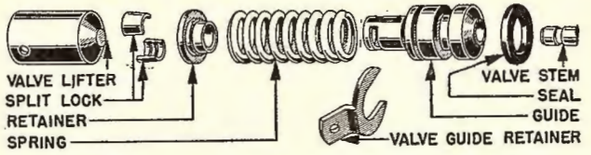
Reassembly (Rotatable Valves)—Place valve, spring, guide, and spring retainer in compressing tool. Place valve locks in valve retainer sleeve. Hold locks in the sleeve and start sleeve over end of valve, compress the valve spring and work sleeve and locks into place with fingers.

Valve Assembly Installation: Slide valve and spring assembly into valve chamber. Compress the valve spring and insert guide retainer in the groove provided in valve guide. Be sure retainer seats properly when spring is released.

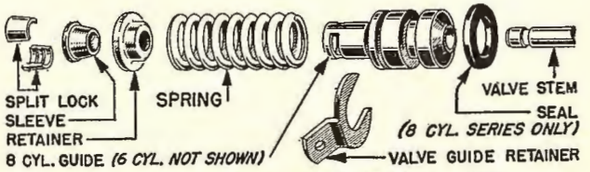
►***INTAKE VALVE GUIDE RUBBER SEAL CAUTION—Be sure rubber seal around guide starts evenly in valve guide opening.***

ROTATABLE VALVES: (1951 V8 Pass. Car Engines, "R" Series Truck Engine & 6 Cyl. "H" Engine—New two piece retainer and shorter valve spring used. Valve locks are same as previous types. Rotatable valves and parts can be installed in 1948-50 "R" Series engines, 1949-50 V8 Pass. Car engines and 1949-51 6 Cyl. "H" Series engines, by changing the spring retainer, valve spring, exhaust and intake valves.

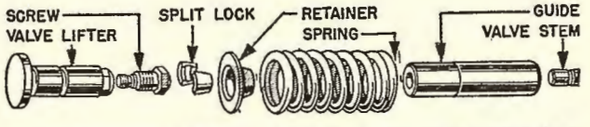
FREE TYPE VALVES: 6 Cyl. "M" Series Truck Engine Exhaust Valves—Consists of Valve Cap, Spring Retainer, Valve Lock and Valve. Free Type exhaust valve assemblies can be installed on 1948-51 6 Cyl. "H" engines by replacing the above parts.



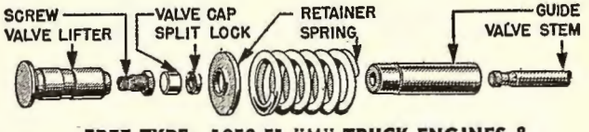
CONVENTIONAL TYPE—1949-50 V8 PASS. Car & "R" SERIES TRUCK ENGINE



ROTATABLE TYPE—1951 V8 PASS. CARS, "R" TRUCK & 6 CYL. "H" ENGINE



CONVENTIONAL TYPE—1948-50 6 CYL. "H" ENGINES & 1950-51 "M" TRUCK ENGINES



FREE TYPE—1950-51 "M" TRUCK ENGINES & 1948-50 6 CYL. "H" ENGINES

6 CYL. "M" & "H" ENGINE

VALVE ASSEMBLY SERVICING: Valve assemblies are not removed and installed as a unit. Service as follows:

Removal—Compress valve springs using Tool J-6513-R and remove valve spring retainer locks. Remove valve spring using Tool 6513-S. *NOTE*—For "Free Type" exhaust valves use Tool 6518 to remove special thin valve locks.

Installation (Conventional Valves)—Install spring retainer and valve spring (with tightly wound coils in the up position against the block) using Tool 6513-S. Compress the spring using Tool 6513-R and install the valve spring locks.

Installation (Rotatable Type)—Install spring retainer and valve spring (with tightly wound coils in the up position against the block) using Tool 6513-S. Compress the spring, lift the valve and align the retainer sleeve with the valve locks held in it under the valve. Then lower the valve and seat the locks with the fingers. Release spring slowly while holding locks in place.

Installation (Free Type Valves)—Install spring with tightly colied end up toward block, using Tool 6513-S, and install spring retainer. Compress valve spring and install the free valve cap in retainer recess. Insert valve in valve guide and align it in the cap. Install valve stem locks using Tool 6518 (Special thin type lock replacer).

Clearance (Free Type Valves)—.0002" to .004" between end of valve stem and inside of cap. This clearance can be measured after assembly in the engine by rotating crankshaft until valve is off the seat and free to rotate by hand. Locate a dial indicator on the head and note the reading when valve is moved vertically. If vertical movement exceeds .004", polish open end of cap on fine emery cloth until clearance is within limits. If clearance is less than .0002", grind off end of valve for proper clearance.

TAPPET CLEARANCE ADJUSTMENT

Valve Grinding and Tappet Clearance Note (for all V8 Models):—To perform these operations with minimum amount of hand cranking, note which valves are fully open (first column in table below), grind or check valves listed on same line of table—then turn shaft 'til next 'valve open' point reached.

Valves Open	Valves to Grind
1. 4X & 1N	3X, 8N, 6N, 7X, 3N, 2X
2. 3X & 8N	1X, 7N, 5X, 2N, 4X, 1N
3. 1X & 7N	8X, 5N, 6X, 4N
OR	
1. 8X & 5N	1X, 7N, 6N, 7X, 3N, 2X
2. 6N & 7X	5X, 2N, 4X, 1N, 8X, 5N
3. 5X & 2N	6X, 4N, 3X, 8N

NOTE—'X' Exhaust Valve. 'N' Intake Valve.

Tappet Clearance Checking (All Engines): Check tappet clearance when re-installing valves. Turn camshaft until lifter is on heel of cam, make certain that valve assembly is seated in block ("C" washer engaging the valve guide), then check the tappet clearance between the end of the valve stem and the top surface of lifter with a feeler gauge. If clearance less than minimum (see table below), install a shorter valve or grind off end of valve stem. If clearance greater than maximum, install longer valve, or reface valve or valve seat to lower the valve in the block.

1941-48 6 Cyl. & V8 Tappet Clearance

V8 Engine Intake Valves	.010" Min., .012" Max.
V8 Engine Exhaust Valves	.014" Min., .016" Max.
6 Cyl. Engine All Valves	.013" Min., .015" Max.

CONTINUED ON NEXT PAGE

TAPPET CLEARANCE ADJUSTMENT

CONTINUED FROM PRECEDING PAGE

1949-50 V8 Tappet Clearance
(with 8BA-6250 camshaft)

Intake Valves .....010" Min., .012" Max.
Exhaust Valves .....014" Min., .016" Max.

(with later 8BA-6250-B camshaft)①

Intake Valves .....014" (.013-.015")
Exhaust Valves .....018" (.017-.019")

①—Started part production with Eng. No. 8BA-622468. See "Tune-Up" or "Valve Timing" on 1949-50 Ford V8 car pages.

1949-51 SIX CYL. "H" ENGINE

VALVE TAPPET NOISE: Valve Tappet Clearance Springs, Ford Part No. 8HA-6550 can be used when valve tappets are noisy after they have been adjusted correctly. To install springs turn engine over to close valve and insert small end (bottom) of spring between tappet and tappet adjusting screw. Compress the large end (top) and seat against the valve spring retainer.

OIL PAN REMOVAL

1941-47 SIX CYL. MODELS

OIL PAN REMOVAL: Remove the engine from the chassis (see Engine Removal above). Then remove starter, take out oil pan capscrews and lift pan off.
Oil Pan Installation Note—Use new packing at front and rear ends of pan. CAUTION—Soak new packing in engine oil for 2 hours before using.

1939-42 V8 MODELS

OIL PAN REMOVAL: To remove oil pan, drain cooling system, disconnect upper and lower radiator hoses, disconnect exhaust pipe and remove cross-pipe, disconnect radius rods at rear end, push rear end of rods down and block in this position. Remove front engine support bolts, attach hoist and raise front end of engine. Remove oil pan screws, remove pan. NOTE—Pan removal will be facilitated by removing starter motor and engine side pans, disconnecting steering tie rod, and turning crankshaft so that #4 piston is at top dead center.
Oil Pan Installation Note—Use new packing at front end of pan. CAUTION—Soak new packing in engine oil for 2 hours before using.

1946-48 MODELS

OIL PAN REMOVAL: Remove oil pan drain plug and drain the oil. Disconnect steering drag link at steering gear pitman arm. Loosen clamp on exhaust cross-pipe, disconnect exhaust pipe at left exhaust manifold and remove cross-pipe. Take out capscrews in ball joint at rear end of front radius rods, lower rear end of rods to provide clearance (rods can be held down by wooden block inserted between radius rod ball and frame). Take out engine splash pan mounting screws, move pans to the side and out of the way. Remove starter by disconnecting brace at commutator end and taking out two through bolts on commutator end plate. Disconnect oil filter return line at oil pan connection, remove oil level indicator stick and tube. Take out oil pan capscrews and remove pan from beneath car. NOTE—Additional clearance can be secured by attaching hoist to front bumper bars (not axle) and raising front end of car slightly.
Oil Pan Installation Note—Use new gaskets and new packing at front end of pan. Soak new packing in engine oil for 2 hours before using.

1949-51 MODELS

6 **Cylinder:** Remove engine from chassis. Remove screws holding oil pan to engine rear plate, and screws holding pan to engine block and front cover plate. Remove pan from engine.
Installation—Soak new packing 2 hours in SAE 20 engine oil before installation. Install packing in retainer groove and roll it in place with a round bar, making sure the packing meets the pan gasket evenly. Mount pan on engine and install screws holding pan to engine block and front plate. Torque to 15-18 ft. lbs. (*NOTE*—Alignment of pan can be simplified by using two studs in opposite corners of block). Install screws holding oil pan to rear plate. Torque to 10-15 ft. lbs.

8 **Cylinder:** Drain crankcase, remove starter motor clutch spring and the flywheel housing front cover. Remove the road air breather duct and the bolts retaining steering gear idler arm to frame. Remove steering gear arm and drop idler and connecting rod until it hangs from spindle. Remove oil pan retaining screws and drop the oil pan. The two front screws on the pan can be reached through holes in frame front cross member. *NOTE*—On some engines it will be necessary to disconnect the front engine supports and raise front of engine.
Installation—Clean gasket surface of block and file off any burrs around bolt holes. Tie each half of pan gasket to pan through two of the holes to hold gasket while installing. Hold pan in place on block and install two screws finger tight in each side. Remove strings and install remaining screws, tightening them to 15-18 ft. lbs. Install road breather duct and flywheel housing front cover. NOTE—Align flywheel housing front cover by installing the two shoulder bolts in the top holes. Install starter motor, clutch return spring, steering idler arm support bracket and the steering idler arm. Fill crankcase with oil and run engine to check for oil leaks.

OIL PUMP

1939-48 V8 MODELS

OIL PUMP: Removal & Disassembly—To remove pump from engine, remove locking wire and take out mounting screw in pump mounting flange, pull pump down and out (NOTE—Pump body fits in recess in cylinder block and it may be necessary to jar it slightly to loosen it). To dismantle pump, remove strainer screen retainer spring, remove screen, take out screen cover mounting screws, remove screen cover and gasket. Take out four capscrews in pump cover, remove cover, lift out pump driven gear. If pump shaft and driving gear are to be removed, drive out pin in drive gear, place pump in arbor press with support under drive gear, press shaft and driving gear out through lower end of pump housing.
Oil Pump Relief Valve (Pressure Regulator) Note—On pumps with relief valve located on side of pump housing, remove locking wire, take out relief valve nut, spring, and valve plunger.

Servicing—Clean out all oil passages in pump housing with compressed air. Replace all worn parts when clearances exceed following limits:

Pump Shaft & Bushings—Shaft clearance in bushings should be .001-.003" and bushings should be replaced if clearance exceeds .005". Replace shaft if pump gear worn or if bearing surface worn to diameter of less than .497". Replace bushings if worn to inside diameter greater than .502". Remove old bushings with driver, press new bushings in place, line ream bushings to inside diameter of .500".

Pump Driven Gear & Shaft—Clearance between driven gear and stub shaft in pump housing should be .002-.0035". Replace shaft if clearance exceeds .005". To replace shaft, drive old shaft out of housing, press new shaft in place making certain that end of shaft will clear pump cover when it is installed.

Oil Pressure Regulator (Relief Valve)—Check relief valve spring tension and replace spring if tension is less than 78 ozs. or more than 87 ozs. when compressed to length of 1.380".

Pump Assembly—Insert pump shaft in housing, press drive gear on shaft until clearance between gear hub and end of housing (endplay) is .017", drill new 5/32" hole hrough shaft in line with hole in gear, install 5/32" pin and peen both ends of the pin to prevent loosening in service. Complete assembly by reversing disassembly directions above.

CAUTION—Make certain that relief valve nut and pump mounting screw are locked with wire and that lockwashers used under screw heads on pump cover and oil screen cover.

1939-48 V8 MODELS

OIL PUMP DRIVE (Camshaft Gear): Pump drive gear is pressed on rear end of camshaft. Remove old gear with gear puller, No. 6254-A, drive new gear on shaft with a fibre block (support shaft in vise with brass jaws). NOTE—Late design camshafts have flat on oil pump drive gear hub and gears have a similar flat to prevent the gear turning in service. These gears and camshaft must be used together and flats must be lined up when installing gear. Drive gear on shaft until it is firmly seated against the shoulder on the shaft.

Oil Pump Idler Gear: This gear located in rear end of cylinder block between camshaft gear and oil pump drive gear on pump shaft.

Removal & Disassembly—Take out capscrews in cover on rear face of cylinder block, lift off cover and gear assembly, and gasket.

Servicing—Replace all worn parts when clearances exceed following limits:

Idler Gear & Bushing—Clearance on shaft should be .001-.003". Replace bushing if worn to inside diameter greater than .752" or if clearance exceeds .005". To replace bushing, drive old bushing out, press new bushing in gear, ream bushing to provide shaft clearance of .001-.003".

Idler Gear Shaft—Replace shaft if scored or worn to diameter less than .747". To replace shaft, press old shaft out, press new shaft in cover until end of shaft is flush with face of cover.

1939-48 V8 MODELS

OIL PRESSURE REGULATOR (Relief Valve): Relief valves located under plug directly above front camshaft bearing (under valve cover) on all engines.

Engines with late type oil pump (41A-6600-A & B) have additional relief valve on side of pump housing. Check relief valve spring tension and replace springs which are not within limits listed below. CAUTION—Special type relief valve used on engines with oil pump relief valve. Correct type must be used in each engine.

Cylinder Block Relief Valve (Engines without Oil Pump Relief Valve)—Replace valve spring if tension less than 43 ozs. or more than 50 ozs. when compressed to length of 1.380".

Cylinder Block Relief Valve (Engines with Oil Pump Relief Valve)—Replace valve spring if tension less than 78 ozs. or more than 87 ozs. when compressed to length of 1.380".

Oil Pump Relief Valve—Replace valve spring if tension less than 78 ozs. or more than 87 ozs. when compressed to length of 1.380".

1937-48 "V8" MODELS

LOW OIL PRESSURE NOTE: Low oil pressure may be caused by fuel pump push rod bushing being worn through, permitting oil to escape from main oil channel. Replace bushing by driving old bushing out of cylinder block and driving new bushing in until top of bushing is flush with face of casting. New bushings need not be reamed.

1941-47 SIX CYL. "G" ENGINE

OIL PUMP: Removal & Disassembly. To remove pump from engine, take off Oil Pump Screen Cover assembly by removing lock wire and capscrew at rear intermediate main bearing cap and lock wire and three capscrews in cover on front main bearing cap. Remove front main bearing cap with oil pump body. To disassemble pump, lift out driven (idler) gear from stub shaft in body, press drive gear and shaft out of driving gear and body, using an arbor press.

Servicing—Clean out all oil passages in pump body with compressed air. Replace all worn parts when clearances exceed following limits:

Pump Shaft and Bushings—Replace shaft if fibre drive gear worn or if bearing surface worn to diameter of less than .560". Replace bushing in pump body if worn to inside diameter greater than .566". Remove old bushing with driver, press new bushing in place until inner edge flush with pump body, line ream bushings to inside diameter of .5625".

Pump Driven (Idler) Gear & Shaft—Clearance between driven (idler) gear and stub shaft in pump body should be .002-.0035". Replace shaft if clearance exceeds .005". To replace shaft, press old shaft out of body, press new shaft in place until outer end flush with body (inner end of shaft must clear cover when it is installed).

Pump Assembly—Insert pump shaft in body, press driving gear on shaft. Install driven (idler) gear on stub shaft in pump body.

1947-51 SIX CYL. "H" ENGINE

6 CYLINDER ROTOR TYPE OIL PUMP: Removal from Passenger Car. Remove the distributor cap turn engine over until #1 cylinder at firing position (rotor will point to oil hole in distributor), allow crankshaft to remain in this position while pump off engine. Remove front engine mounts-to-frame bolts. Loosen rear engine mounting. **Raise front of engine 2" and move ½" to left.** Remove distributor. Take out 3 pump mounting capscrews in pump cover, pull pump out.

Pump Disassembly—Remove cover and outer rotor (rotate drive gear to free rotor from pump body). Drive out pin in drive gear and press gear off shaft. Remove shaft and inner rotor. Clean all parts and check to specifications listed below.

Pump Specifications and Clearances—As follows:

Outer Rotor. Outside Diameter 2.249" (wear limit 2.245"). Clearance in Body .005-.010" (wear limit .012").

Pump Body. Inside Diameter 2.258" (wear limit 2.260").

Inner Rotor. Clearance in Outer Rotor .006" (wear limit .010").

Shaft. Outside Diameter .5175" (wear limit .5170"). Shaft Endplay .004-.008" (wear limit .010").

Pump Assembly—If new shaft installed, assemble shaft with inner rotor in pump. Press drive gear on end of shaft to obtain .004" clearance between gear and upper end of pump body. Drill pin hole in shaft. Install pin and peen both ends. Place outer rotor in body, install cover being sure to use new cover gasket.

Pump Installation—Reverse removal instructions listed above making certain distributor correctly positioned for proper ignition timing.

1949-50 SIX CYL. "H" ENGINE

(before Pass. Car 8HA-107555, Truck 7H-219349)

OIL PUMP DRIVEN GEAR: After above nos. cast-iron gear (7HA-6652) used together with new flame-hardened camshaft (7HA-6250-C—this no. cast between second and fourth cam lobes from rear end of camshaft).

Replacement of Oil Pump Driven Gear on Engines before Pass. Car No. 8HA-107555 and Truck No. 7H-219349. Bronze gear used on these engines. If pump replaced or if gear failure encountered, manufacturer recommends installation of cast-iron gear no. 7HA-6652. If this cast-iron gear fails prematurely, new flame-hardened camshaft no. 7HA-6250-C and new cast-iron gear should be installed. *CAUTION*—If oil pump being replaced, 8HA-6600 pump will require re-working by installation of cast-iron driven gear 7HA-6652.

Gear Installation Note. Must be .004-.008" shaft endplay. See Oil Pump Installation above.

RADIATOR

1946-48 MODELS

RADIATOR REMOVAL: Drain cooling system. Disconnect and remove upper and lower radiator hoses. On 6 Cyl. models, take out four capscrews and lockwashers mounting fan blade assembly on pulley, remove fan blades. On V8 models, remove two capscrews mounting fan bracket on generator bracket, slip off drive belt and remove fan and bracket assembly. Take out mounting bolts in radiator support flanges (at bottom on each side) and bolts in support bracket at each side. Lift radiator straight up and out.

CLUTCH NOTES

1949-50 FORD V8 PASS. CARS

V8 PASS. CAR FLYWHEEL RUBBING ON HOUSING COVER WHEN CLUTCH DISENGAGED: Due to distortion of cover on front side of flywheel housing being distorted at flywheel bolt circle. Correct by taking off cover (drops straight down after removing attaching bolts) and flattening. COVER MUST BE FLAT.

OVERDRIVE NOTES

1949 FORD PASSENGER CARS

OVERDRIVE NOISE (EARLY 1949 CARS): Can be caused by Overdrive case interference at Rear Engine Support at two points as follows:

1)—Rear Engine Support Bolt. Head of bolt may be interfering with underside of Overdrive Case. Correct by grinding off head of bolt (do not grind head to less than ⅛" thick). Thin head bolt No. 355519-S2 used on later cars in production.

2)—Overdrive Case. Grooves on underside of case at engine mounting too shallow so that flanges on engine support interferes with Overdrive case at this point. Correct by filing grooves in case and cleaning up ends of grooves if casting flash evident. Later cars used matched assemblies in production.

ELECTRICAL SYSTEM NOTES

1949-50 MODELS

STARTER MOTOR RUSTING (PASSENGER CARS & TRUCKS): Correct by enlarging drain hole to ⅜" in endplate on underside. This can be done from underneath with starter on engine. If performed on bench all drill chips must be removed from starter. Drill ⅜" hole ½" deep (DO NOT DRILL DEEPER THAN ½" OR FIELD COIL MAY BE DAMAGED).

TRUCK NOTE:—All Engine data below applies also to Ford Truck Models with '60' Engine. See Ford Truck article for all other Truck data.

MODEL IDENTIFICATION

Model	Year	Body Type
922A	1939	Passenger Cars
922C	1939	Commercial Chassis
022A	1940	Passenger Cars
022C	1940	Commercial Chassis

SERIAL & ENGINE NUMBER:—Stamped on top of clutch housing and on left frame side member in front of dash bracket.

TUNE-UP

COMPRESSION: Ratio—6.6-1 Std. No Optl. ratios. **Pressure**—158 lbs.at 2800 RPM max. or 116 lbs. at cranking speed of 100 RPM.

VACUUM READING:—Steady 18-20" at 5-7 M.P.H.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram for cylinder number and spark plug cable connections.

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. Gaps—.025"

IGNITION: See Coil, Condenser, and Distributor. Breaker Gap—.014-.016". **Cam Angle** 36° (closed—both sets operating together). **Automatic Advance**—8° max. at 950 RPM (distr.).

IGNITION TIMING: See Ignition Timing. Std. Setting—4° BTDC. No flywheel marks provided (see Ignition Timing for method of setting Ignition and also Vacuum Brake Adjustment).

CARBURETION: See Carburetor & Carb. Equipment. Idle Setting—Both idle screws ⅝-¾ turn open (Stromberg Carb.), ⅞ turn open (Chandler-Groves Carb.). Idle speed 5-7 MPH. **Float Level**—Fuel level 15/32" (Stromberg Carb.), 11/16" (Chandler-Groves Carb.) below top of bowl. **Accelerating Pump (Stromberg)**—Inner hole—Summer, Outer hole—Winter. **Accelerating Pump (Chandler-Groves Carb.)** Center hole Normal. Inner hole (Summer), Outer hole (Winter) for extreme hot and cold temperatures. **Fuel Pump Pressure:** 3½ lbs. maximum.

VALVES: See Valve Timing. Tappet Clearance—.011-.012". No adjustment.

STARTING: See Battery, Starter, Generator, and Regulator (when used).

IGNITION

Ignition Switch:—Oakes Steering Column & Ignition Lock Assembly. Part Nos. as follows:

1939 Types—Assy. 301665, Ford No. 81A-3676 (Pass. Cars); No. 301685, Ford No. 81-C-3676 (Comm'l. & 1 Ton); No. 301675, Ford No. 81-T-3676 (Trucks). Ignition Switch No. 301683 (all models).

1940 Types—Assy. No. 302110, Ford No. 01A-3676A (Std. Pass. Car); 302126, Ford No. 01A-3676B (Deluxe Pass. Car); 302120, Ford No. 01C-3676 (Comml., ¾, 1 Ton); Ford No. 81W-3676 (C-O-E Truck); 302122, Ford No. 01T-3676 (Other Trucks). Ignition Switch No. 301683 (All Models).

Lock Cylinder—Hurd or Briggs & Stratton No. 80935, Ford No. 91-A-3686-A (with 2 keys). **Key Series**—FK000 to FK999. Groove—No. 17.

COIL: Ford No. 78-12036 or 81A-12036 (Coil less Condenser). Mounted on ignition unit (part of ignition assembly).

Resistor Unit—Connected in coil primary circuit. Mounted on Fuse Block Assembly No. 91-A-12250 (passenger cars), 40-12250 (Comm'l. & Trucks). **Ignition Current**—4½-6 amperes (stopped). Ignition primary circuit resistance—1-1 1/3 ohms.

CONDENSER: Ford Part No. 78-12300 (78-12036 Coil), 81A-12300 (81A-12036 Coil). **Capacity**—.33-.36 microfarad.

DISTRIBUTOR: Ford Model 78-12127. (Less Coil, caps and distributor plates). Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake REPLACEMENT DISTRIBUTOR—Model No. 11A-12127 with different advance. See 1941 Ford V8 article for all data on this model. **Breaker Gap**—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016" step 'no go'. **Cam Angle**—36° closed, 9° open. For both sets operating together with correct coil-loading lead. **Breaker Arm Spring Tension**—20-24 ozs. **Rotation**—Clockwise viewed from drive end.

Automatic Advance
(High Vacuum or Vacuum Brake Inoperative)

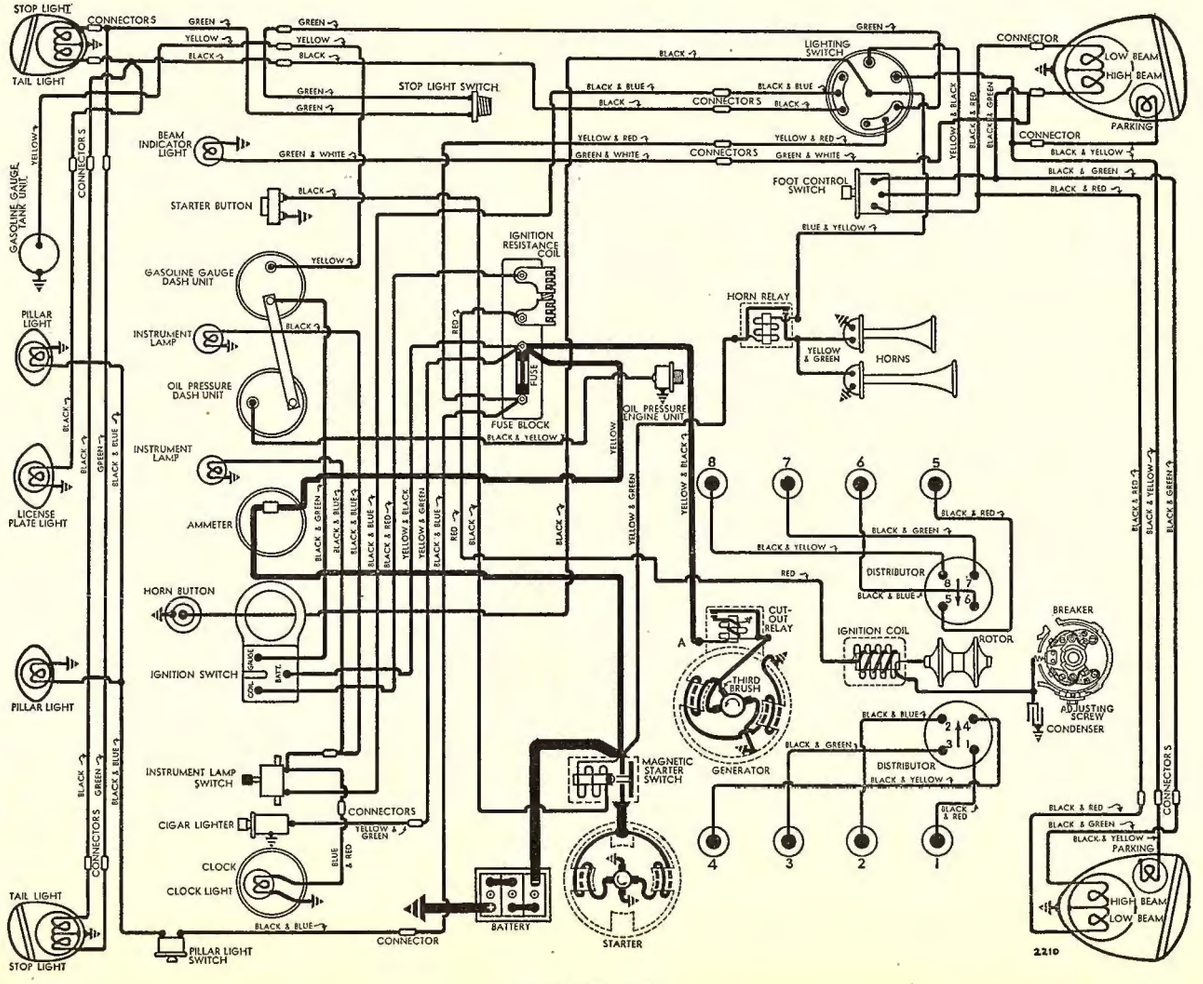
Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	200	0	400
2	300	4	600
3	375	6	750
5	600	10	1200
8	950	16	1900

Removal:—Ignition unit mounted on front of engine. To remove, disconnect vacuum line, take off caps, take out screws in mounting flange.

IGNITION TIMING

IGNITION TIMING:—For each engine as follows (see Vacuum Brake Setting below for adjustment depending on type of service and fuel used).

	Flywheel Degrees	Piston Position
'60' Engines	4° BTDC	.0048" BTDC.



1939 MODELS

Timing Note—Manufacturer recommends use of Laboratory Test Set with Stroboscope attachment or V-126 Timing Fixture for all ignition settings.

Timing (On Engine)—No flywheel marks provided and timing should be set with piston on top dead center. With #1 piston on top dead center entering power stroke, loosen timing adjusting screw on left hand side of ignition unit housing, place screw in retard position at lower end of slot, move screw slowly up until timing contacts begin to open, note graduation on plate under screw head which is in line with reference mark on housing, move screw up exactly one additional graduation, tighten screw. NOTE—Dead center position can be determined by inserting gauge rod in cylinder or by measuring to tops of #2 and #3 pistons (should be equal).

Vacuum Brake Setting:—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, turn screw in just enough to eliminate ping, tighten locknut. When adjusted on Stroboscope, vacuum brake should retard spark to peepsight (set at 2°) at 950 RPM. (78-12127 Distr.), 650 RPM. (11A-12127 Distr.).

CARBURETOR

Stromberg Model No. EE-7/8, Ford No. 52-9510-B, or Holley (Chandler-Groves) Model AA-7/8, Ford No. 922A-9510-A. Dual (double barrel) downdraft type. ***For complete data, refer to Carburetor Index.***

Idle Adjustment—With engine warm, choke valve wide open, and Fast Idle inoperative, set throttle lever stopscrew for 5-7 M.P.H. (350 R.P.M.) idling speed, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, out until engine begins to roll, finally turn screw in slowly until engine fires smoothly. Final setting should be approximately 5/8-3/4 turn (Stromberg), 7/8 turn (Chandler-Groves) from inner seated position. Readjust stopscrew for correct idling speed. NOTE—Vacuum gauge recommended for idling adjustment. Set for highest steady gauge reading.

Accelerating Pump Setting (Stromberg)—Two ball studs provided for pump link connection:
'S'—Minimum Stroke, Summer operation.
'W'—Maximum Stroke, Winter operation.

Accelerating Pump Setting (Chandler-Groves)—Three holes provided for pump link connection:
Inner (#1)—Min. stroke, Summer temperatures.
Center (#2)—Med. stroke, Winter temperatures.
Outer (#3)—Max. stroke, Extreme Cold weather.

Fast Idle (All Models):—Integral with carburetor. Operated by choke lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: AC No. 1528238 (1939), 1529224 (1940) oil-wetted type Std. Heavy duty oil-bath type Optl.

Gasoline Gauge: King-Seeley Electric. Ford Nos. Dash Unit—91A-9280A (1939 Std. Pass. Car, Comml., Trucks), 91A-9280B (1939 Deluxe Pass. Cars), 01A-9280A (1940 Std. Pass. Cars, Comml., Trucks), 01A-9280B (1940 Deluxe Pass. Cars).
Tank Unit—No. 01A-9275A (1939-40 Pass. Cars & Comml.), 01A-9275B (1940 Sedan Delivery), 01Y-9275 (122" Panel Delivery), 01T-9275 (Trucks exc. C-O-E), 81W-9275 (1939 C-O-E Trucks), 01W-9275 (1940 COE).
For complete data, refer to Carburetion Equip. Index.

Fuel Pump: AC Type R, No. 1523257, Ford No. 52-9350B. Diaphragm type.
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY (1939): Ford No. 81A-10655A. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Starting Capacity—126 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.3 minutes.
Grounded Terminal—Positive (+) grounded to dash. **Engine Ground**—Strap connector between right rear cylinder head stud and dash.
Dimensions—Length 10.5". Width 7.2". Height 7.1".
Location—On right hand side of cowl under hood.

BATTERY (1940): Ford No. 01A-10655A. 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Dimensions—Length 10.6". Width 7.3". Height 9.2".
Other Specifications—Same as 1939 (above).

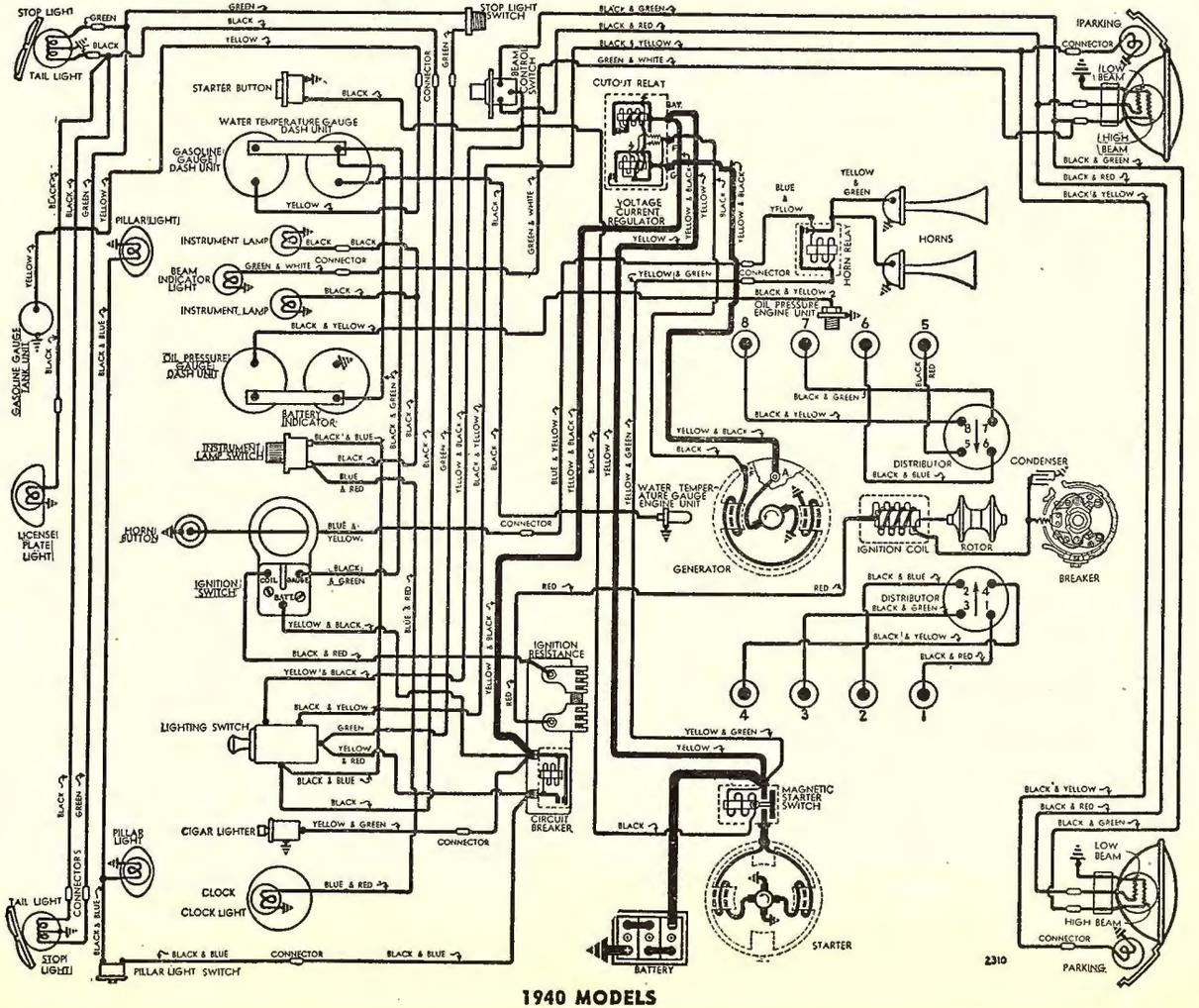
Battery Indicator (1940): King-Seeley Voltmeter type (used in place of Ammeter). Ford No. 01A-10844A (Std.), 01A-10844B (Deluxe & replacement unit for 01A-10844A).
For complete data, refer to Electrical Equipment Index.

STARTER

Ford No. 52-11002. Armature No. 52-11005.
Drive—Barrel type Bendix No. A-1806. Ford No. 52-11350-C.
See Electrical Equipment Section for data on Special Ford Barrel type Bendix Drive servicing.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500



1940 MODELS

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Starting Switch:—R.B.M. Model 2220, Ford No. 78-11450. Magnetic type mounted on right side of engine dash above starter. Controlled by pushbutton No. 91A-11500 (1939 Pass. Cars), 81A-11500 (1939 Others), 01A-11500A (1940 Std.), 01A-11500B (1940 Deluxe).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, take out through bolts on commutator end plate and free starter support brace, remove starter.

GENERATOR
THIRD-BRUSH TYPES

GENERATOR (STD.):—Model used on each car type shown in table below. All models third brush control type. Ventilated by fan on drive pulley.

922A, 922C, 92Y—60 Engine

Generator	Armature	Pulley Diam.
82A-10000-A	79-10005	3.71"

Charging Rate Adjustment—Remove commutator cover band, shift third brush by hand counter-clockwise to increase, or clockwise to decrease output (brush held in position by friction). Maximum rated output (shown in table below) secured with third brush set 1½ commutator bars from nearest (insulated) main brush. Set charging rate as low as possible to keep battery fully charged.
Maximum Charging Rate—See table below.

Performance Std.—82A-10000A

Amperes	R.P.M.
Start	500
17	1300
11	3000

Rotation—Counter-clockwise at commutator end.
Field Current—4.5-6.0 amperes at 6.0 volts (1.0-1.22 ohms resistance).
Brush Spring Tension—Approx. 28 ozs.

Removal:—Loosen nut on mounting bracket stud, remove drive belt, lift generator out.

Belt Adjustment:—Loosen nut on bracket mounting stud, raise generator up until side movement on belt between generator and water pump pulley is 1".

GENERATOR
TWO-BRUSH TYPES

GENERATOR (RADIO & SPECIAL EQUIP.):—Two brush (shunt) type with vibrating type voltage and current regulation. Ventilated by fan on drive pulley. Models used for each car as follows:

922-A, 922-C, 92-Y—60 Engine

Generator	Armature	Pulley Diam.
82A-10000-D	78-10005-A,C	3.58"
82A-10000-E①	78-10005-B,D	3.58"

022A, 022C

01A-10000-A,B	01A-10005	3.68"

①—Low Speed (Taxi, Door-to-door Delvry., etc.)

Charging Rate Adjustment—No adjustment at the generator. See Regulator data below.

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine at 1000 RPM. check output (see table below). After completing test, restore original connections. **Do not operate generator with terminals connected together. This eliminates all regulator action.**

Performance Data

82A-10000-D		82A-10000-E	
Amperes	R.P.M.	Amperes	R.P.M.
Start	500	Start	350
28	1250	20	1000
81-T-10000-A		**81-T-10000-B**	
Start	550	Start	350
28	1300	20	1050
01A-10000-A		**01A-10000-B**	
Amperes	Eng. R.P.M.	Amperes	Eng. R.P.M.
Start	580	Start	520
32	1100	30	1060
32	2500	30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.22 amperes at 6.0 volts (82A-10000-D,E—field resistance 2.7 ohms at 70°F), 2.86 amperes at 6.0 volts (01A-10000A—field resistance 2.1 ohms at 70°F), 2.1 amperes at 6.0 volts (01A-10000B—field resistance 2.88 ohms at 70°F).
Brush Spring Tension—Approx. 28 ounces.

Removal & Belt Adjustment:—Same as Std. (above).

CUTOUT RELAY

CUTOUT RELAY:—**No. B-10505 (Used on all Std. Generators above).** Mounted on generator. Generator field lead grounded to relay mounting screw.
Cuts In—5.8-6.3 volts, 400 Eng. RPM. (60 Pass. Cars
Cuts Out—2 amperes maximum discharge current.
Contact Gap—.015-.020".**Air Gap**—.010-.015"(closed).
NOTE—Relay case is sealed. No adjustment possible.

REGULATOR

REGULATOR:—**No. 91-A-10505-A. Used on all Special 2 Brush Generators (above).** ***See 1939-40 Ford "85" article (following) for all data on this regulator.***
NOTE—This type superseded by 01A-10505-C.

LIGHTING

LIGHTING:—**Headlamps.** Ford (Corcoran-Brown) Two-Lite, Pre-focused type (1939), Ford Sealed Beam type (1940). Upper and lower beams controlled by Beam Selector Switch on toeboard.

Headlamp Adjustment—With upper beams lighted, aim each headlamp straight ahead so that beam centered on vertical line directly ahead of lamp center. Upper edge of beam should be at lamp center height at 25 feet (1939 Pass. Cars & Comml.), center of beam hot spot should be on horizontal line 3" below lamp center height (1940 models).

Beam Indicator—In upper left hand corner of instrument panel. Lighted when upper beams in use.

Switches—1939

Lighting—R-B-M. Ford No. (Switch & Wiring Assembly) 91A-11653-A (Std. Pass. Cars), 91A-11653-B (Deluxe Passenger Cars), 91C-11653 (Commercial). Switch Body & Contact Assembly 81A-11657 (All).
Beam Selector—R-B-M. Ford No. 81-A-13532.

Switches—1940

Lighting—R-B-M No. 6425. Ford No. 01A-11652.
Beam Selector—R-B-M No. 2480. Ford No. 81A-13552.
Switch & Wiring No. 01A-11653A (Pass. Cars), 01C-11653 (Comml. & Truck except C-O-E).
Instrument—Ford No. 01A-13740A (Std.), 01A-13740B (Deluxe), 50-13740 (Trucks).
NOTE—Passenger Car Types replaced by 21A-13740.
Stop Light—Ford No. 91A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps (1939)	32-32	2330
Headlamps (1940)		Sealed Beam
Parking (Comm'l., Trucks)	3	63
Parking (Pass. Cars)	1½	55
Instr. ('39), License	3	63
Instr. ('40), Beam Ind.	1	51
Stop & Tail	21-3	1158

MISC. ELECTRICAL

LIGHTING CIRCUIT PROTECTION:—**Ford No. 91-A-12250 (Circuit Breaker) or No. 40-12250 (Fuse Block).** Mounted on rear of dash under cowl with Ignition Resistor as an assembly. Vibrating type circuit breaker serviced by No. 01-A-12250 (1940 type).
Fuse Capacity—20 amps. (for 40-12250 Fuse Block).

HORNS: Pass. Cars. Ford No. 91A-13832 (high note), 91A-13833 (low note). Twin horns with relay.
Commercial—Ford No. 78-13833A. Vibrator type. Horn Current 6-8 amperes.
Horn Relay: R-B-M. Ford No. 91A-13842.
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE SPECIFICATIONS:—**Own '60',** 8 Cylinder, 90° Vee, L head. Both banks & crankcase cast enbloc. **Bore**—2.6". **Stroke**—3.2". **Displacement**—136 cu. ins. **Developed H.P.**—60 at 3500 RPM. **Rated H.P.**—21.6. **Compression Ratio**—6.6-1 Std. No Optl. ratios. **Compression Pressure**—158 lbs. at 2800 R.P.M. max., or 116 lbs. at cranking speed of 100 RPM. **Vacuum Reading**—18-20" steady at 5-7 M.P.H.

OIL PAN REMOVAL: ***See Ford Shop Notes.***

CYLINDER HEAD: Tightening Torque and Cylinder Head Diagram—***See Ford Shop Notes.***

CYLINDER SLEEVES:—Hardened, dry type cylinder sleeves used on engines marked 'HS' on cylinder block beside inner front corner of left cylinder head.
Servicing:—***See Ford Shop Notes for complete data.***

PISTONS:—Steel alloy, light wgt., cam-ground. Recondition cylinders for finished replacement pistons. **Weight**—226-231 grams (without rings or pin). **Removal**—Pistons and rods removed from above. **Clearance**—See Fitting New Pistons.

Replacement Pistons:—***See Ford Shop Notes for data.***

Fitting New Pistons:—Use .002" feeler (.0025" feeler for engines with sleeves), .50" wide, inserted between piston and cylinder wall at right angles to pin. Pull to withdraw feeler—7-12 lbs.

PISTON RINGS:—Two compression, one oil ring, all above pin. Oil ring groove drilled with drain holes.
NOTE—Expander used with #2 Compr. and oil ring.

Ring	Width	End Gap	Side Clearance
Compr. #1	.092-.0925"	.012-.017"	.0025-.003"
Compr. #2	.092-.0925"	.012-.017"	.002-.0025"
Oil Cont.	.1535-.154"	.012-.017"	.0015-.002"

Replacement Rings:—***See Ford Shop Notes for data.***

ENGINE

CONTINUED FROM PRECEDING PAGE

PISTON PIN:—Diameter .6876-.6879". Length 2.368". Floating type (locking rings in piston at each end). Pin hole in connecting rod bronze-bushed.
Pin Fit in Piston—.0004" clearance.
Pin Fit in Rod Bushing—.0001" clearance. *See Ford Shop Notes for Pin Fitting Directions & Pin Oversizes.*
Replacement Pins:—Std. & .002" over- & under-size.

CONNECTING ROD:—**Length**—6.125" (all models).
Weight—271 grams (1939), 295 grams (1940).
Crankpin Journal Diameter—1.599" ('39), 1.699" ('40). Diameter on crankpin 1.800" ('39), 1.900" ('40).
Bearing Type—Steel-backed, special-alloy lined. Bearing floats in both rods (side-by-side mounting) with bearing surface on both inner and outer face.
Bearing Dimensions—Length 1.535" ('39), 1.403" ('40), .09995" thick. NOTE—'39 bearings only have end flanges.
Clearance—.0005-.002" (total diametrical).
Sideplay—.010-.022" (total).
Bearing Adjustment:—None (no shims). Do not file.
Replacement Bearings:—*See Ford Shop Notes for special bearings for Oversize Rods & Undersize Crankpins.*
Installing Rods:—Marks on rods and caps must be together and installed in same numbered cylinder with marks pointing down toward oil pan.

CRANKSHAFT:—3 bearing. Integral counterweights. 1940 NOTE—New type crankshaft used with larger main and connecting rod journals.
Journal Diameters—1.999" ('39), 2.099" ('40).
Bearing Type—Steel-backed, special-alloy lined.
Clearance—.001-.003" (or slight drag with .002" feeler assembled in bearing for clearance check).
Bearing Adjustment:—None (no shims). Do not file.
End Thrust:—Taken by rear bearing. Adjust by replacing bearing. **Endplay**—.002-.005".
Replacement Bearings:—*See Ford Shop Notes for Undersizes and special long bearings.*

CAMSHAFT:—Three bearings. Helical gear drive.
Bearing Diameters—1.498" (all bearings).
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.002".
End Thrust:—Taken by gear hub and cover plate. Adjusted by replacing coverplate. **Endplay**—.005-.015".
Timing Gears:—Cast alloy steel (crankshaft), Bakelized Fabric (Camshaft). **Backlash**—.004" max.
Camshaft Setting:—Mesh '0' marked tooth of crankshaft gear with '/' marked space on camshaft gear (this mark must line up with mark on gear hub).

VALVES:—	Head Diameter	Stem Diameter	Length
All Valves	1.281"	.2795"	4.375"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	.251"	.0015-.0035"

See Ford Shop Notes for Valve Servicing data.
NOTE—Inserts used for exhaust valves only.
Valve Guides:—Split type retained by 'C' washer and valve spring. *See Ford Shop Notes for servicing data.*
Valve Lifters:—Barrel type in reamed holes in block. **Diameter**—.8295". **Clearance**—.0005-.001".

Valve Springs:—	Pressure	Length
Valve Closed	26-30 lbs.	2.05"
Valve Open	48-52 lbs.	1.80"

VALVE TIMING

Tappet Clearance:—.011-.012". No adjustment.
Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 9½° BTDC. Close 54½° ALDC.
Exhaust Valves—Open 57½° BLDC. Close 6½° ATDC
To Check Valve Timing—No flywheel marks provided. If dead center point established for any cylinder on flywheel, intake valve for this cylinder should open approximately 3.22 flywheel teeth before this point with the piston .027" BTDC.

LUBRICATION

LUBRICATION:—Pressure. Gear type oil pump mounted on front main bearing cap in crankcase.
Normal Oil Pressure:—30 lbs. at 2000 R.P.M.
Oil Pressure Regulator:—Under plug above front camshaft bearing. Opens at 30 lbs. Not adjustable.
Oil Pressure Gauge:—King-Seeley Electric. Ford No. Dash Unit:—91A-9273A ('39), 01A-9273A ('40). Engine Unit: 48-9278 (all models).
See Miscellaneous Section for complete data.
Crankcase Capacity:—4 qts.

COOLING

COOLING SYSTEM:—**Capacity**—15 qts. (922A), 13 qts. (022A, 022C), 16 quarts (922C, 02D, 92Y, 02Y).
Water Pump:—Packless 2 used (1 for each bank).
See Water Pump Section for complete data.
Removal—Slack off belt adjustment, unscrew large mounting nut behind pulley, pull pump out.
Thermostat:—In each cylinder head outlet (2 used). **Setting**—Starts to open at 145°F. Fully open 180°.
Temperature Gauge:—**1939**—King-Seeley Liquid type, Ford Part No. 91A-10883-A. **1940**—King-Seeley Electric. Ford Nos. 01A-10883A (dash unit), 99A-10884 (engine unit).
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH: — Long Model 8½CB-CS (922A), Model 9CF-CS (all others). Single plate, dry disc type. 9CF-CS is semi-centrifugal type.
See Clutch Section for complete data.
Facings—Moulded type, 2 required. Inside Diam. 6" (8½CB), 5.76" (9CF). Outside Diam. 8.5" (8½CB), 9" (9CF). Thickness .125" (8½CB), .137" (9CF).
Adjustment:—Pedal free movement should be .75-1" (8½CB), 1.5-1.75" (9CF). To adjust, remove clevis pin at end of connector rod, turn clevis on rod.
Removal:—Slide rear axle and transmission to rear as a unit to expose clutch (see Transmission Removal (below), take out mounting screws in cover.

TRANSMISSION

TRANSMISSION:—**Own Make.** Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gears (pass. car), second & high gears only (on Commercial Transmission).
See Transmission Section for complete data.
Transmision Control (022A):—Remote steering column mounted, mechanical shift.
See Transmission Section for complete data.
Removal:—To remove, disconnect hand brake cable, hydraulic brake line at torque tube connection (bleed lines when re-connected), speedometer cable, shock absorber links. Disconnect rear spring at center frame connection. Take out universal joint ball housing screws, slide rear axle assembly back to disengage drive shaft at splined joint. Support engine at rear, take out rear engine mounting bolts, clutch housing screws, pull trans'm straight back. NOTE—Disconnect gear shifter rods from levers at transmission on 1940 passenger cars.

UNIVERSALS

UNIVERSAL JOINT:—**Spicer 7990-SF ('39), 202-7 ('40).** Steel bushing type. 1 joint to rear of transmission.
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—**Own Make.** ¾ floating, Spiral bevel gear type with Torque Tube drive.
See Rear Axle Section for complete data.
Ratio—4.44-1 Std. 4.55-1 Comm'l (1940).
Backlash—.012" maximum.
Removal:—Disconnect hand brake cables, hydraulic brake line at torque tube connection (bleed lines when re-connected), speedometer cable, shock absorber links. Disconnect rear spring at center frame connection. Take out universal joint ball housing mounting screws, pull axle assembly to rear to disengage drive shaft at splined joint.
Axle Shaft Removal—Axle must be dismantled and shaft removed through differential housing at inner end (side gear integral). *See Rear Axle Section for Ford Rear Axle article for complete data.*

SHOCK ABSORBERS

SHOCK ABSORBERS:—**Houde (Houdaille).** Front—BBDK (1939), BBDM (1940). Rear—BBDW (1939), BBDX (1940). Double acting, adjustable types.

FRONT SUSPENSION

Front Suspension:—Conventional 'I' beam section front axle with Reverse Elliott ends and transverse spring. Axle positioned by radius rods.
Kingpin Inclination—8° crosswise (all models).
Caster—9° Max., 4½° Min. (all models). Must be equal within ½°. Axle may be bent cold to correct caster if proper tools (wedges and blocks to prevent crushing axle flange) are used.
Camber—1° Max., ¼° Min. (all models). Must be equal within ¼°, right wheel must not exceed left. Adjust as for caster (see caster data above).
Toe In—1/16". Set at 1-10 ratio to Camber. Adjust by loosening clamp bolts and turning tie rod.
Steering Geometry (Toe out on turns)—Outer wheel turned 20°. Inner 23⅓°. Allowable variation ½°.

STEERING GEAR

Steering Gear: Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—**Service**—Lockheed Hydraulic, double anchor, non-energizing type. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Stepped or two-stage bore type: Front Wheel—Front cylinder 1.25". Rear 1.00". Rear Wheel—Front cylinder 1.125". Rear 1.00".
Drums—Cast iron. Diameter 12".
Lining—Woven type (forward shoe—all wheels), Moulded type (rear shoe—all wheels). Width 1.75". Thickness .20". Length per shoe 13.18" (forward shoe—all wheels), 10.1" (rear shoe—all wheels).
Clearance—Least possible amount without drag.
Hand Brake:—See Service Brakes above.

TRUCK NOTE:—All Engine data below applies also to Ford Truck Models with '85' Engine. See Ford Truck article (following) for other data.

MODEL IDENTIFICATION

Model	Year	Body Type
91A Std. & Deluxe	1939	Passenger Cars
91C① 99C②	1939	Commercial Chassis
01A Std. & Deluxe	1940	Passenger Cars
01C① 09C②	1940	Commercial Chassis

①—"85" Engine. ②—"95" Engine.

SERIAL & ENGINE NUMBER:—Stamped on top of clutch housing and on left frame side member in front of dash bracket.

TUNE-UP

COMPRESSION:—**Ratio**—6.2-1 Std. Cast iron or aluminum heads.
Pressure—140 lbs. max. at 2300 RPM. or 113 lbs. at cranking speed of 100 RPM.

VACUUM READING:—Steady 18-20" at 5 M.P.H.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram for cylinder numbering and spark plug cable connections.

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. **Gaps**—.025"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.014-.016" **Cam Angle** 36° (closed—both sets operating together).
Automatic Advance—8° max. at 950 RPM (distr.).

IGNITION TIMING: See Ignition Timing.
Std. Setting—4° BTDC. No flywheel marks provided (see Ignition Timing for method of setting Ignition and also Vacuum Brake Adjustment).

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Both idle screws ⅝-⅞ turn open. Idle speed 5-7 MPH.
Float Level—Fuel level 11/16" (21/32-23/32") below top edge of float bowl.
Accelerating Pump—Inner hole—Summer, Center hole—Winter. Outer hole—Extrame Winter temperatures.
Fuel Pump Pressure: 3½ lbs. maximum.

VALVES: See Valve Timing.
Tappet Clearance—.010-.012" Intake, .014-.016" Exhaust. No adjustment provided.

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Oakes Steering Column & Ignition Lock Assembly. Part Nos. as follows:
1939 Types—Assembly No. 301665, Ford No. 81A-3676 (Pass. Cars); No. 301685, Ford No. 81C-3676 (Comml. & 1 Ton); No. 301675, Ford No. 81T-3676 (Trucks). Ignition Switch No. 301683 (All Models).
1940 Types—Assembly No. 302110, Ford No. 01A-3676A (Std. Pass. Cars); 302126, Ford No. 01A-3676B (Deluxe Pass. Cars); 302120, Ford No. 01C-3676 (Comml., ¾ & 1 Ton); Ford No. 81W-3676 (C-O-F Trucks); 302122, Ford No. 01T-3676 (Other Trucks). Ignition Switch No. 301683 (All Models).
Lock Cylinder—Hurd or Briggs & Stratton No. 80935. Ford No. 91-A-3686-A (with keys). Key Series—FK000 to FK999. Groove—No. 17.

COIL: Ford No. 78-12036 or 81A-12036 (Coil less Condenser). Mounted on ignition unit (part of ignition assembly).
Resistor Unit—Connected in coil primary circuit. Mounted on Fuse Block No. 91-A-12250.
Ignition Current—4½-6 amperes (stopped). Ignition primary circuit resistance—1-1⅓ ohms.

CONDENSER: Ford Part No. 78-12300 (78-12036 Coil), No. 81A-12300 (81A-12036 Coil).
Capacity—.33-.26 microfarad.

DISTRIBUTOR: Ford Model 78-12127 (Less Coil, Caps, and distributor plates). Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake Control (see Ignition Timing for adjustment). Same design as used on preceding V8 models.
REPLACEMENT DISTRIBUTOR—Model No. 11A-12127 with different advance. See 1941 Ford V8 Passenger Car article for all data on this model.
Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016" step 'no go'.
Cam Angle—36° closed, 9° open. For both sets operating together with correct coil-loading lead.
Breaker Arm Spring Tension—20-24 ozs.
Rotation—Clockwise viewed from drive end.

Automatic Advance
(High Vacuum or Vacuum Brake Inoperative)

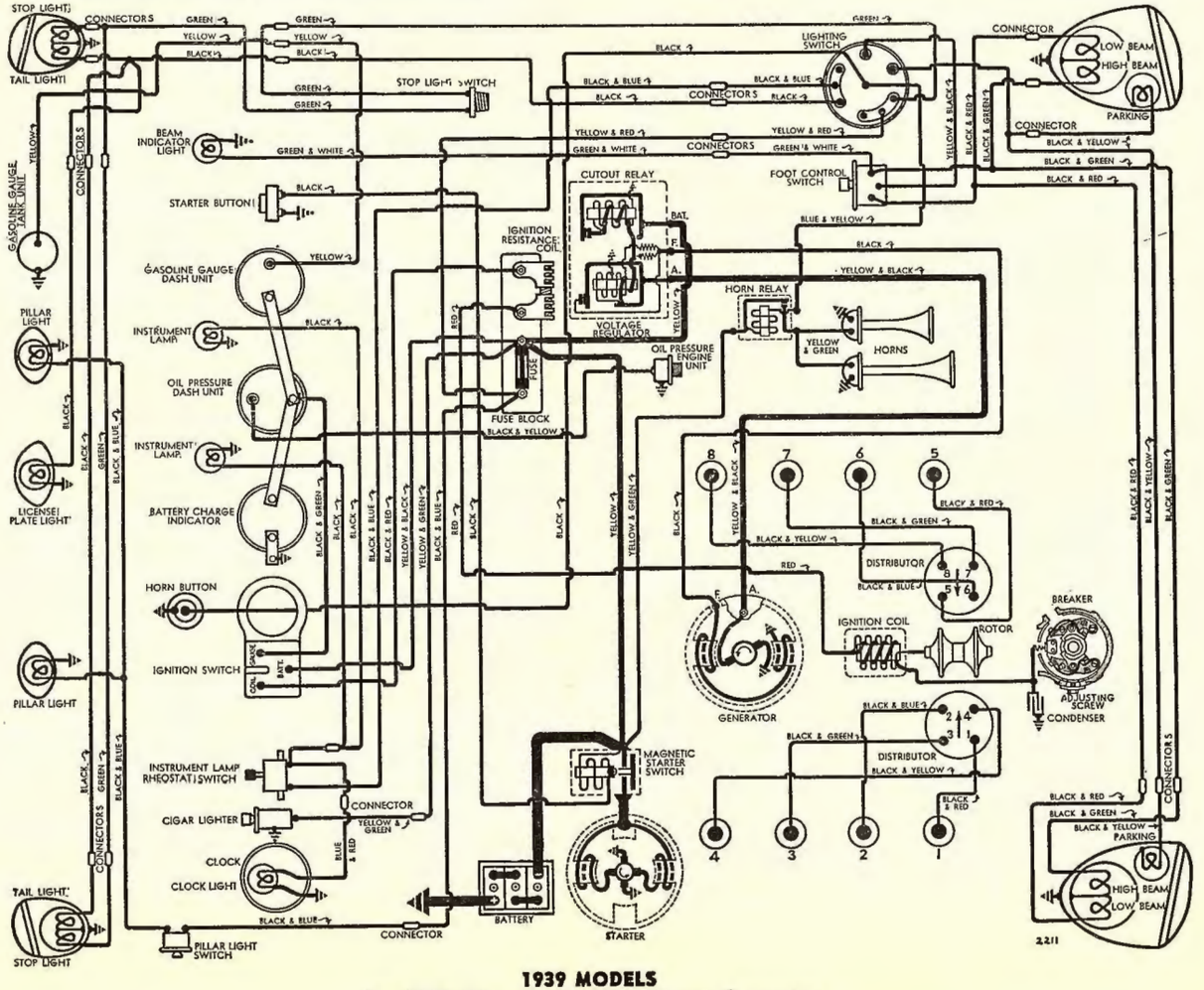
Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	200	0	400
2	300	4	600
3	375	6	750
5	600	10	1200
8	950	16	1900

Removal:—Ignition unit mounted on front of engine. To remove, disconnect vacuum line, take off caps, take out screws in mounting flange.

IGNITION TIMING

IGNITION TIMING:—For each engine as follows (see Vacuum Brake Setting below for adjustment depending on type of service and fuel used).

	Flywheel Degrees	Piston Position
All Engines	4° BTDC	.0058" BTDC.



1939 MODELS
See "60" Diagram for Third-Brush Generator

Ignition Timing Note—Manufacturer recommends use of Laboratory Test Set with Stroboscope attachment or V-126 Timing Fixture for all ignition settings.

Timing (On Engine)—No flywheel marks provided and timing should be set with piston on top dead center. With #1 piston on top dead center entering power stroke, loosen timing adjusting screw on left hand side of ignition unit housing, place screw in retard position at lower end of slot, move screw slowly up until timing contacts begin to open, note graduation on plate under screw head which is in line with reference mark on housing, move screw up exactly one additional graduation, tighten screw. This provides correct 4° BTDC. ignition timing.

NOTE—Dead center position can be determined by inserting gauge rod in cylinder or by measuring to tops of #2 and #3 pistons (should be equal).

Vacuum Brake Setting:—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, turn screw in just enough to eliminate ping, tighten locknut. When adjusted on Stroboscope, vacuum brake should retard spark to peepsight (set at 2°) at 950 RPM. (78-12127 Distr.), 650 RPM. (11A-12127 Distr.).

CARBURETOR

Holley (Chandler-Groves) Model AA-1, Ford No. 91A-9510-A. Dual (double barrel) downdraft type.
NOTE—Model 91A-9510A replaced by 21A-9510-A.
For complete data, refer to Carburetor Index.
Idle Adjustment—See Note below. With engine warm, choke valve wide open and Fast Idle inoperative, set throttle lever stopscrew for 350 R.P.M. (5 M.P.H.) idle speed. Turn each idle adjusting screw (one for each barrel, adjust in order) in until engine begins to miss, then out until engine begins to roll, finally turn screw in slowly until engine fires smoothly. Final setting should be approximately ¾ turn of the screw out from the inner seated position. Readjust throttle stopscrew for correct idle speed.
NOTE—Vacuum Gauge recommended for idling adjustment. Set for highest steady gauge reading.
Accelerating Pump Setting—Three holes provided for pump link connection. Adjust as follows:
#1 (Inner)—Min. Stroke—Summer Temperatures.
#2 (Center)—Med. Stroke—Winter Temperatures.
#3 (Outer)—Max. Stroke—Extreme cold weather.
NOTE—Link locked in pump rod by snap-lock. Pull link shaft out of pump rod to disengage lock.
Fast Idle:—Integral with carburetor. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: AC No. 1528238 (1939), 1529224 (1940) oil-wetted type Std. Heavy duty oil-bath type Optl.
Gasoline Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—91A-9280A (1939 Std. Pass. Car, Comml., Trucks), 91A-9280B (1939 Deluxe Pass. Cars), 01A-9280A (1940 Std. Pass. Cars, Comml., Trucks), 01A-9280B (1940 Deluxe Pass. Cars).
Tank Unit—No. 01A-9275A (1939-40 Pass. Cars & Comml.), 01A-9275B (1940 Sedan Delivery), 01Y-9275 (122" Panel Delivery), 01T-9275 (Trucks exc. C-O-E),
For complete data, refer to Carburetion Equip. Index.
Fuel Pump:—AC Type R #1523307. Diaphragm type. Ford No. 68-9350.
For complete data, refer to Carburetion Equip. Index.

BATTERY

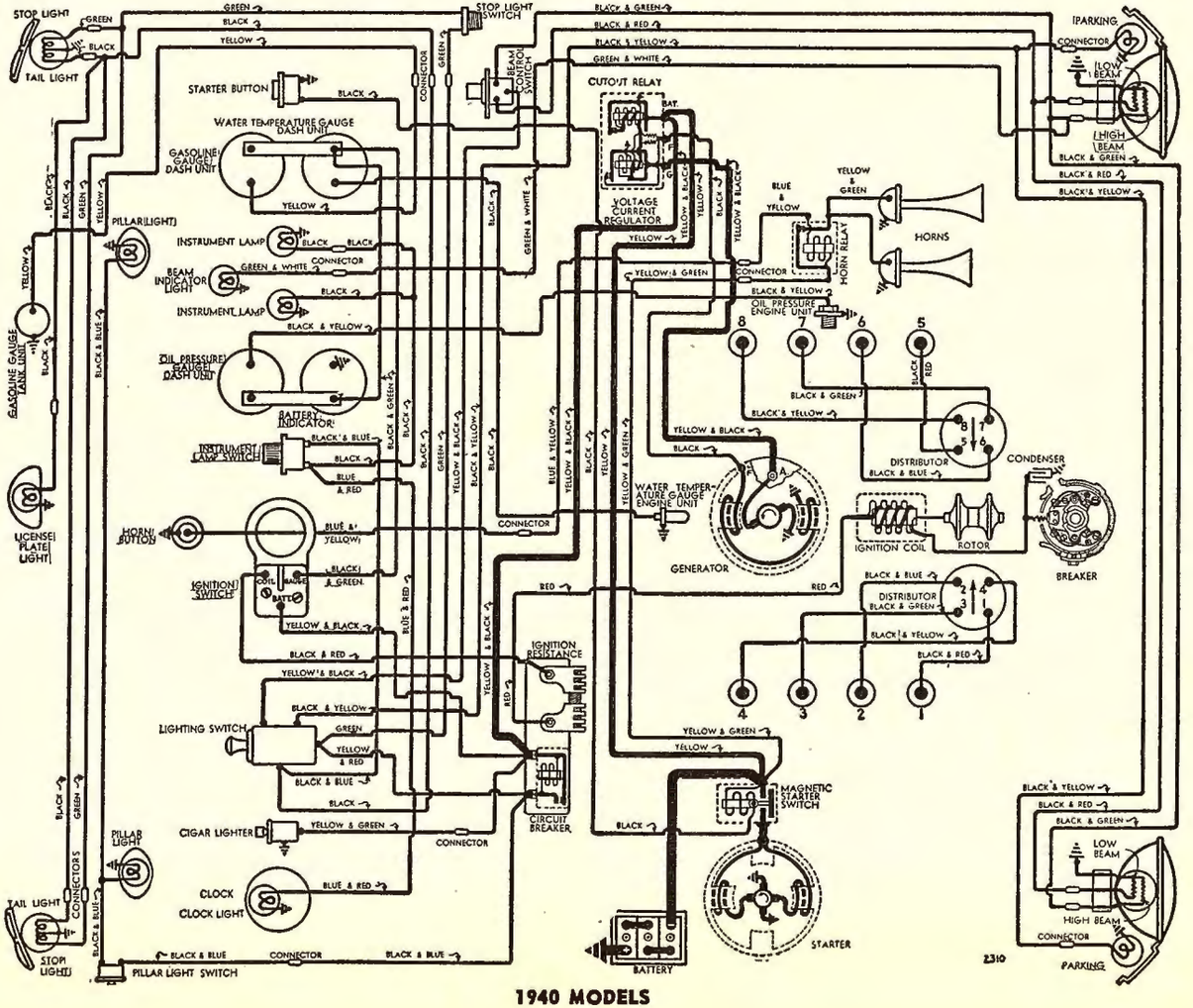
BATTERY (1939): Ford No. 81A-10655A. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Starting Capacity—126 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.3 minutes.
Grounded Terminal—Positive (+) grounded to dash. **Engine Ground**—Strap connector between right rear cylinder head stud and dash.
Dimensions—Length 10.5". Width 7.2". Height 7.1".
Location—On bracket ahead of cowl at right of engine under engine hood.
BATTERY (1940): Ford No. 01A-10655A. 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Dimensions—Length 10.6". Width 7.3". Height 9.2".
Other Specifications—Same as 1939 (above).
Battery Indicator: King-Seeley Electric. Voltmeter type. Ford No. 91A-10844B (1939 Deluxe Pass. Car), No. 01A-10844A (Std. 1940), 01A-10844B (Deluxe 1940 & replacement for 01A-10844A).
For complete data, refer to Electrical Equipment Index.

STARTER

STARTER:—No. 18-11002. Armature No. 18-11005.
Drive—Inboard Bendix Type L11FX-10, Ford No. B-11350 or Ford B&S Drive No. 91A-11350. Refer to Electrical Equipment Index for Ford B&S Drive servicing instructions.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 " "	660	4.3	340
12 " "	300	3.65	465
14 " "	Lock	3.5	500



1940 MODELS

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Starting Switch:—R.B.M. Model 2220, Ford No. 78-11450. Magnetic type mounted on right side of engine dash above starter. Controlled by pushbutton switch No. 91A-11500 (1939), 01A-11500A (1940 Std.), No. 01A-11500B (1940 Deluxe).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, take out through bolts on commutator end plate and free starter support brace, remove starter.

GENERATOR

THIRD-BRUSH TYPES

Third Brush Control Type (Std. 1939). Various types used as listed below. Generators are ventilated.

Generator	Armature	Pulley Diam"
81A-10000-A	79-10005	4.2"
81A-10000-B	79-10005-HA	4.2"

Charging Rate Adjustment—Remove commutator cover band, shift third brush by hand, counter-clockwise to increase output, or clockwise to decrease output. Brush is held in position by friction. Maximum rated output (shown in table below) secured with third brush set 1½ commutator bars from nearest (insulated) main brush. Set charging rate as low as possible to keep battery fully charged.

Maximum Charging Rate—As follows:

Performance Data

81A-10000-A		81A-10000-B	
Amperes	Eng. R.P.M.	Amperes	Eng. R.P.M.
Start	500	Start	525
17	1300	26	1250
11	2500	16	2500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—Approximately 28 ozs.
Field Current—4.5-6.0 amperes at 6.0 volts (81A-10000-A—field resistance 1.0-1.22 ohms), 3.43-4.17 amperes at 6.0 volts (81A-10000-B—field resistance 1.44-1.75 ohms).

Removal & Belt Adjustment: Same as for Two-Brush Generators (see below).

GENERATOR

TWO-BRUSH TYPES

Two-brush (shunt) type. Various types used as listed below. Generators are ventilated and have external voltage and current regulation.

Generator	Armature	Pulley Diam.
81A-10000-D	78-10005-A,C	4.38"
81A-10000-E	78-10005-B,D	4.38"
91A-10000	78-10005-A	3.68"
①01A-10000-A	01A-10005	3.68"
①01A-10000-B	01A-10005	3.18'

①—Replacement Generator 21A-10000.

Charging Rate Adjustment—No adjustment at generator. See Regulator data below.

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals, apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine at 1000 R.P.M., check output (see table below). After completing test, restore original connections.

Do not operate generator in service with terminals connected together. This eliminates all regulator action.

Performance Data

91A-10000, 81A-10000-D		81A-10000-E	
Amperes	Eng. R.P.M.	Amperes	Eng. R.P.M.
Start	500	Start	350
28	1250	20	1000
28	2500	20	2500
01A-10000-A		**01A-10000-B**	
Start	580	Start	520
32	1100	30	1060
32	2500	30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.2 amperes at 6.0 volts (91A-10000, 81A-10000-D,E—field resistance 2.7 ohms at 70°F), 2.86 amperes at 6.0 volts (01A-10000-A—field resistance 2.1 ohms at 70°F), 2.1 amperes at 6.0 volts (01A-10000-B—field resistance 2.88 ohms at 70°F).

Removal:—Generator mounted on bracket between cylinder banks at front of engine, driven in tandem with two water pumps by Vee belt. To remove, loosen nut on bracket stud.

Belt Adjustment:—Loosen nut on mounting bracket, raise generator up until side movement on belt midway between generator and water pump pulleys is 1", tighten mounting nut.

CUTOUT RELAY

Ford No. B-10505 (Used with Third Brush Generator). Mounted on generator. Generator field lead grounded to relay mounting screw.
Cuts In—5.8-6.3 volts, 600 R.P.M. (Pass. Cars).
Cuts Out—2 amperes maximum discharge.
Contact Gap—.015-.020" **Air Gap** .010-.015" (closed).

REGULATOR

REGULATOR:—No. 91-A-10505-A. Consists of Cutout Relay and vibrating Voltage-Current Regulator in case on dash.
NOTE—This 2-unit regulator superseded by new 3-unit type No. 01A-10505-C.
For complete data, refer to Electrical Equipment Index.
NOTE—Regulator mounted on rubber cushions and grounded to dash through separate ground lead. Case is sealed (no adjustments are possible).

Cutout Relay

Cuts In—6.5-7.0 volts, 510 Eng. R.P.M.
Cuts Out—2 ampere maximum discharge current.

Voltage-Current Regulator

Setting—7.6 volts Max. at 70° F.
Current Setting—30 amperes.
Regulator Checking & Adjustment—See article in Electrical Equipment Section for complete checking directions. No adjustment possible (case is sealed).

LIGHTING

SEE 1939-40 FORD V8 "60" CAR PAGES FOR DATA

MISC. ELECTRICAL

LIGHTING CIRCUIT PROTECTION:—Ford No. 91-A-12250 (Circuit Breaker) or No. 40-12250 (Fuse Block). Mounted on rear of dash under cowl with Ignition Resistor as an assembly. Vibrating type circuit breaker serviced by No. 01-A-12250 (1940 type).
Fuse Capacity—20 amps. (for 40-12250 Fuse Block).

HORNS:—Ford No. 91-A-13832 (High Note), 91-A-13833 (Low Note). Air electric type dual horns with relay
Horn Current—11-13 amperes (each).
Horn Relay:—R-B-M. Ford No. 91-A-13842.
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE SPECIFICATIONS (91A,C; 01A,C):—8 cyl., 90° Vee, L head. Both banks & crankcase cast Enbloc.
Bore—3.062". **Stroke**—3.75".
Rated Horsepower—30. **Displacement** 221 cu. ins.
Developed Horsepower—90 at 3800 RPM.
Compression Ratio—6.20-1 Cast-iron head.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE SPECIFICATIONS (99C, 09C):—Own 95. *See 1939-40 Mercury article for all "95" Engine data.*

OIL PAN REMOVAL: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening Torque and Cylinder Head Diagram—*See Ford Shop Notes.*
►**Re-working Head for Improved Cooling:** *See Ford Shop Notes for instructions (and new Head Gaskets).*

CYLINDER SLEEVES:—Hardened, dry type cylinder sleeves used on engines marked 'HS' on cylinder block beside inner front corner of left cylinder head.
Servicing:—*See Ford Shop Notes for complete data.*

PISTONS:—Steel alloy, light wgt., cam ground type. Recondition for finished replacement pistons.
Weight—333-337 grams (without rings or pin).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.
Replacement Pistons:—*See Ford Shop Notes for data.*
Fitting New Pistons: Use .50" wide feeler stock of correct thickness (see Table below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 6-10 lbs. (all types).

Engine With Sleeves	Feeler Thickness Steel Piston	Aluminum Piston
New Piston & Sleeve	.003"	.003"
New Piston—Worn Sleeve	.004"	.004"
Worn Piston & Sleeve	.005"	.005"
Engines Without Sleeves		
New Piston & Bore	.0025"	.002"
New Piston—Worn Bore	.004"	.004"
Worn Piston & Bore	.005"	.005"

PISTON RINGS:—Two compression, one slotted oil ring, all above pin (drain holes in oil ring groove).
NOTE—Expander used with #2 Compr. and oil ring.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0915-.0920"	.012-.017"	.0025-.003"
Compr. #2	.0915-.0920"	.012-.017"	.002-.0025"
Oil Contr.	.1535-.1540"	.012-.017"	.0015-.002"

Replacement Rings:—*See Ford Shop Notes for data.*

PISTON PIN:—**Diameter**—.7501-.7504". **Length**—2.850" (steel pistons), 2.780" (aluminum pistons). Floating type. Pin hole in rod bronze-bushed.
Pin Fit in Piston—.0001-.0002" clearance (aluminum pistons), .0003-.0009" clearance (steel pistons) or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" clearance (pin should pass through bushing slowly of own weight).
See Ford Shop Notes for Pin Fitting directions.
Replacement Pins: *See Ford Shop Notes.*

CONNECTING ROD:—**Length** 7.000". **Weight** 476 grams.
Crankpin Journal Diameter—1.999" (connecting rod diameter on crankpin—2.220").
Bearing Type—Steel-backed, special-alloy lined. Bearing floats in both rods (side-by-side mounting) with bearing surface on inner and outer faces.

ENGINE

CONTINUED FROM PRECEDING PAGE

Bearing Dimensions—Length 1.747". Thickness .1095". These bearings do not have end flanges.
Clearance—.0015-.0035" (see Bearing Adjustment).
Sideplay—.003-.007" (bearing endplay), .006-.014" (side clearance for both rods).

Bearing Adjustment: None (no shims). Do not file bearing caps. Replace bearings if less than .1085" thick, replace or hone rods for oversize bearings if worn more than .0015" over original size of 2.2195-2.2200". CAUTION—Both rods must be same size.

Replacement Bearings: *See Ford Shop Notes.*

Installing Rods:—Marks on rods and caps must be together and installed in same numbered cylinder with marks pointing down toward oil pan.

CRANKSHAFT:—3 bearing. Integral counterweights.
Journal Diameters—2.499" (all bearings).
Bearing Type—Steel-backed, special-alloy lined.
Clearance—.001-.003" (or slight drag with .002" feeler assembled in bearing for clearance check).
Bearing Adjustment:—None (no shims). Do not file.

End Thrust:—Taken by rear main bearing. Adjust by replacing bearing. **Endplay**—.002-.006".

Replacement Bearings:—*See Ford Shop Notes for Undersizes and special long rear main bearings.*

CAMSHAFT:—Three bearing. Helical gear drive.
Bearing Diameters—1.797" all bearings. Replace camshaft if worn to less than 1.7955" diameter.
Clearance—.002".

End Thrust:—Taken by gear hub and cover plate. Adjusted by replacing coverplate. **Endplay**—.005-.015".

Timing Gears:—Cast alloy iron (crankshaft), Bakelized Fabric—pressed on shaft, or Aluminum Alloy—bolted on shaft (camshaft). **Backlash**—.004" max.
See Ford Shop Notes for Timing Gear Replacement.

Camshaft Setting:—Mesh '0' marked tooth of crankshaft gear with '/' marked space on camshaft gear (this mark must be in line with mark on hub).

VALVES:—	Head Diameter	Stem Diameter	Length
All Valves	1.537"	3115"	4.750-4.751"
	Seat Angle	**Lift**	**Stem Clearance**
All Valves	45°	.292"	.0015-.0035"

NOTE—Service limit for valve stem diameter is .309" Intake, .3065" Exhaust. Valves interchangeable.
See Ford Shop Notes for Valve Servicing data.
NOTE—Seat inserts used for all valves.

Valve Guides:—Split type retained by 'C' washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).
For Valve Guide servicing data, see Ford Shop Notes.

Valve Lifters:—Barrel type in reamed holes in block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs:	Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.84"

NOTE—Replace spring if the pressure is less than 30 lbs. when compressed to 2.125".

VALVE TIMING

Tappet Clearance:—.010-.012" Intake, .014-.016" Exhaust. No adjustment.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
To Check Valve Timing—No flywheel marks provided. Intake valve opens with piston at TDC.

LUBRICATION

LUBRICATION:—Pressure. Gear type oil pump mounted in crankcase at rear of engine.

Normal Oil Pressure:—30 lbs. at 2000 R.P.M.

Oil Pump and Oil Pressure Regulator: *See "Oil Pump" in Ford Shop Notes for data.*

Oil Pressure Gauge:—King-Seeley Electric. Ford Nos: Dash Unit: 91A-9273B ('39 Del. Pass.Car), 91A-9273A ('39—all others), 01A-9273B ('40 Deluxe), 01A-9273A ('40—all others). Eng. 48-9278 (all).
See Miscellaneous Section for complete data.

Crankcase Capacity:—5 qts.

COOLING

COOLING:—**Capacity.** 22 qts. (Pass. Car; '39 Comm'l ¾ & 1 Ton; '40 Truck exc. C-O-E). 20 qts. ('40 Comm.). 24 qts. ('39 Truck exc. C-O-E). 23 qts. (C-O-E).

Water Pump: Packless. 2 used (1 for each bank).
See Water Pump Section for complete data.
Removal—Slack off drive belt, support engine at forward end, remove front engine mounting bolts, take out mounting screws in pump body.

Thermostat:—In each cylinder head outlet (2 used).
Setting—Start to open at 145°F. Fully open 180°.

Temperature Gauge:—1939—King-Seeley Liquid type, Ford Part No. 91A-10883B (Del. Pass. car), 91A-10883A (all others). 1940—King-Seeley Electric Ford Nos. Dash Unit: 01A-10883A (Std.), 01A-10883B (Deluxe). Engine Unit: 99A-10884.
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—**Long Model 9CF-CS.** Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.
Facings—Molded type, 2 required. Inside Diam. 5.76". Outside Diam. 9". Thickness .137".

Adjustment:—Pedal free movement should be 1.0-1.25". To adjust, remove clevis pin at end of connector rod, adjust clevis on rod.
NOTE—Pedal free movement 1.5-1.75" for '39 cars.

Removal:—Slide rear axle and transmission to rear as a unit to expose clutch (see Transmission Removal below), take out mounting screws in cover.

TRANSMISSION

TRANSMISSION:—**Own Make.** Constant-mesh, synchro-mesh (Second & High), sliding gear (low & reverse), all helical gear type. NOTE—Four speed spur gear type optional on Commercial.
See Transmission Section for complete data.

Transmission Control (01A):—Steering col. shift Std.
See Transmission Section for complete data.

Removal:—Disconnect rear shock absorbers, hand brake cables, hydraulic brake line at torque tube connection (bleed lines when re-connected), speedometer cable. Disconnect rear spring at center frame connection, take out universal joint ball housing screws, slide rear axle assembly back to disengage drive shaft at splined joint. Support engine at rear, take out rear engine mounting bolts and clutch housing screws, pull trans'm straight back.
NOTE—Disconnect gear shifter rods from levers at transmission on 1940 passenger car models.

UNIVERSALS

UNIVERSAL JOINT:—**Spicer 6454-FS ('39), 202-6 (std. '40), 202-8 (01C, 09C with 4 spd. trans.).** Steel bushed type at rear of transmission.
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—**Own Make.** ¾ floating, Spiral Bevel gear type with Torque Tube drive.
See Rear Axle Section for complete data.
Ratio—3.78-1 Std.; 3.54-1, 4.11-1 Optl.
Backlash—.012" max.

Removal:—Disconnect rear shock absorbers, hand brake cables, hydraulic brake line at torque tube connection (bleed lines when re-connected), speedometer cable. Disconnect rear spring at center frame connection, take out universal joint ball housing screws, pull axle assembly to rear to disengage splined joint, remove axle assembly.
Axle Shaft Removal—*Refer to Ford Passenger Car Rear Axle article in Rear Axle Section.*

REAR AXLE

OPTIONAL EQUIPMENT

TWO-SPEED REAR AXLE: Columbia—Two-Speed type.
See Rear Axle Section for complete data.

Removal:—Same as for standard axle (above) except that control linkage must also be disconnected.

SHOCK ABSORBERS

SHOCK ABSORBERS:—**Houde (Houdaille).** Front—BBDK (1939), BBDM (1940). Rear—BBDW (1939), BBDX (1940). Double acting, hydraulic, adjustable

FRONT SUSPENSION

Front Suspension:—Conventional 'I' beam section front axle with Reverse Elliott ends and transverse front spring. Axle positioned by radius rods.
Kingpin Inclination—8° crosswise.
Caster—9° Max., 4½° Min. Equal within ½°.
Camber—1° Max., ¼° Min. Must be equal within ¼° and the right wheel must not exceed the left.
Toe In—1/16". Set at 1-10 ratio to Camber. Adjust by loosening tie rod clamp bolts and turning tie rod.
Steering Geometry—Inner wheel 23⅓°. Outer 20°.

STEERING GEAR

Steering Gear: Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—**Service.** Lockheed hydraulic, double anchor type. Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Cast iron. Diameter 12".
Wheel Cylinders—Stepped or two-stage bore type: Front Wheel—Front cylinder 1.25". Rear 1.00".
Rear Wheel—Front cylinder 1.125". Rear 1.00".
Lining—Woven (forward shoes), Molded (rear shoes). Width 1.75". Thickness .20". Length per shoe 13.18" (forward shoes), 10.1" (rear shoes).
Clearance—Least possible amount without drag.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

1940 Power Operated Conv. Top: Vacuum Power type.
See Miscellaneous Section for complete data.

OIL PAN REMOVAL: *Refer to Ford Shop Notes.*

MODEL IDENTIFICATION

3/4 Ton Trucks

1939	1940	Engine	Wheelbase
91D	01D	V8 "85"	122"
92D	02D	V8 "60"	122"
99D	09D	V8 "95"	122"

1 Ton Trucks

91Y	01Y	V8 "85"	122"
92Y	02Y	V8 "60"	122"
99Y	09Y	V8 "95"	122"

C-O-E (Cab-over-Engine) Trucks

911W	011W	V8 "85"	101"
991W	091W	V8 "95"	101"
91W	01W	V8 "85"	134"
99W	09W	V8 "95"	134"
917W	018W	V8 "85"	157"①
997W	098W	V8 "95"	157"①
911Z		V8 "85"... (Dump Trk)	...101"
991Z		V8 "95"... (Dump Trk)	...101"

Other Trucks

91T	01T	V8 "85"	134"
99T	09T	V8 "95"	134"
917T		V8 "85"	157"
997T	098T	V8 "95"	157"①
	014T	V8 "85"... (Schl. Bus)	...194"
	018T	V8 "85"... (Schl. Bus)	...158"
	094T	V8 "95"... (Schl. Bus)	...194"
91U	01U	V8 "85"... (Dump Trk)	...134"
99U	09U	V8 "95"... (Dump Trk)	...134"

①—Wheelbase for 1940 models 158"

SERIAL & ENGINE NUMBER:—Stamped on top of clutch housing and on left frame side member near generator.

TUNE-UP

COMPRESSION: Ratio and pressure as follows:

Engine	Ratio	Pressure at 100 RPM
60	6.6-1	116 lbs.
85①	6.2-1	113 lbs.
85 Truck	5.9-1	108 lbs.
95①	6.3-1	112 lbs.
95 Truck	5.9-1	106 lbs.

①—Commercial, ¾ and 1 Ton Truck.

VACUUM READING:—Steady 18-20" at 5-7 MPH.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram for cylinder numbering and spark plug cable connections.

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. Gaps—.025"

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.014-.016" **Cam Angle**—36° (closed—both sets operating together).

Automatic Advance—8° max. at 950 RPM (distr.).

IGNITION TIMING: See Ignition Timing.

Std. Setting—4° BTDC. No flywheel marks provided. See Ignition Timing for timing procedure and Vacuum Brake adjustment.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Both idle screws ⅝-¾ turns open (Stromberg Carb.), ⅝-⅞ turn open (Chandler-Groves Carb.). Idle speed 5-7 MPH.

Float Level—Fuel level 15/32" (Stromberg Carb.), 21/32-23/32" (Chandler-Groves Carb.) below top edge of bowl.

Accelerating Pump (Stromberg Carb.)—Inner hole—Summer, Outer hole—Winter.

Accelerating Pump (Chandler-Groves Carb.)—Inner hole Summer, Center hole ordinary Winter temperatures, Outer hole extreme winter temperatures.

Fuel Pump Pressure: 3½ lbs. maximum.

VALVES: See Valve Timing.

Tappet Clearance—.011-.012" All Valves ("60" V8), .010-.012" Intake ("90" & "100"), .014-.016" Exhaust ("90" & "100").

STARTING: See Battery, Starter, Generator, and Regulator (when used).

IGNITION

Ignition Switch:—Oakes Steering Column & Ignition Lock Assembly. Part Nos. as follows:

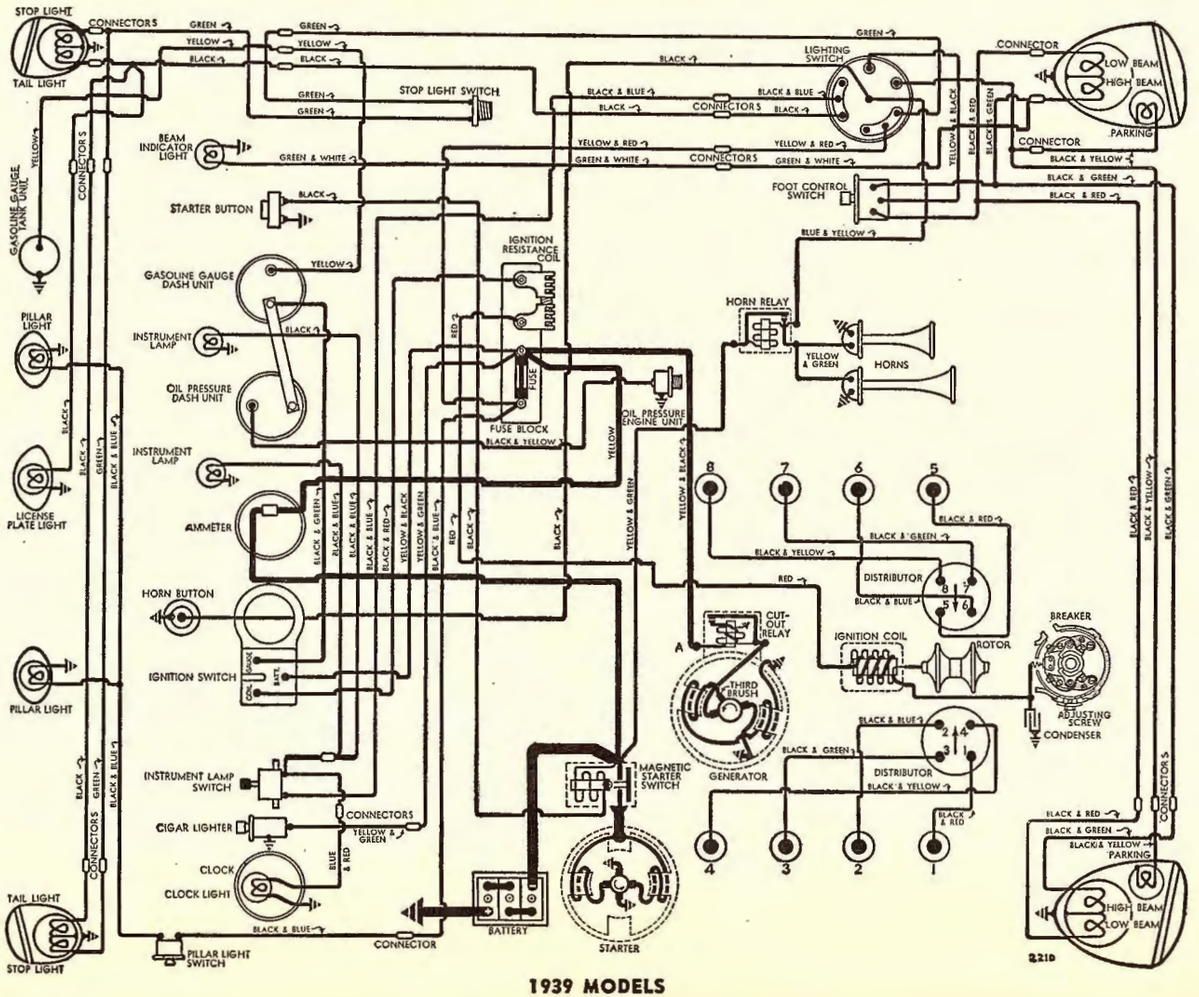
1939 Types—Assembly No. 301685, Ford No. 81C-3676 (Comml., ¾, 1 Ton); 301675, Ford No. 81T-3676 (Trucks). Ignition Switch No. 301683 (All Models).

1940 Types—Assembly No. 302120, Ford No. 01C-3676 (Comml., ¾, 1 Ton); Ford No. 81W-3676 (C-O-E Trucks); 302122, Ford No. 01T-3676 (Other Trucks). Ignition Switch No. 301683 (All Models).

Lock Cylinder—Hurd or Briggs & Stratton No. 80935, Ford No. 91A-3686A (with keys).
Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 78-12036 or 81A-12036 (Coil less Condenser). Mounted on ignition unit (part of ignition assembly).

Resistor Unit—Connected in coil primary circuit. Mounted on Circuit Breaker Assembly No. 01A-12250.



1939 MODELS

Ignition Current—4½-6 amperes (engine stopped). Ignition primary circuit resistance 1-1⅓ ohms.

CONDENSER: Ford Part No. 78-12300 (78-12036 Coil), 81A-12300 (81A-12036 Coil).

Capacity—.33-.36 microfarad.

DISTRIBUTOR: Ford Model 78-12127 (Less Coil, caps, and distributor plates). Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake Control (See Ignition Timing for adjustment).

REPLACEMENT DISTRIBUTOR—Model No. 11A-12127 with different advance. See 1941 Ford V8 article for all data on this model.

Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016 step 'no go'.

Cam Angle—36° closed, 9° open. For both sets operating together with correct coil-loading lead.

Breaker Arm Spring Tension—20-24 ozs.

Rotation—Clockwise viewed from drive end.

Automatic Advance
(High Vacuum or Vacuum Brake Inoperative)

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	200	0	400
2	300	4	600
3	375	6	750
5	600	10	1200
8	950	16	1900

Removal:—Ignition unit mounted on front of engine. To remove, disconnect vacuum line, take off caps, take out screws in mounting flange.

IGNITION TIMING

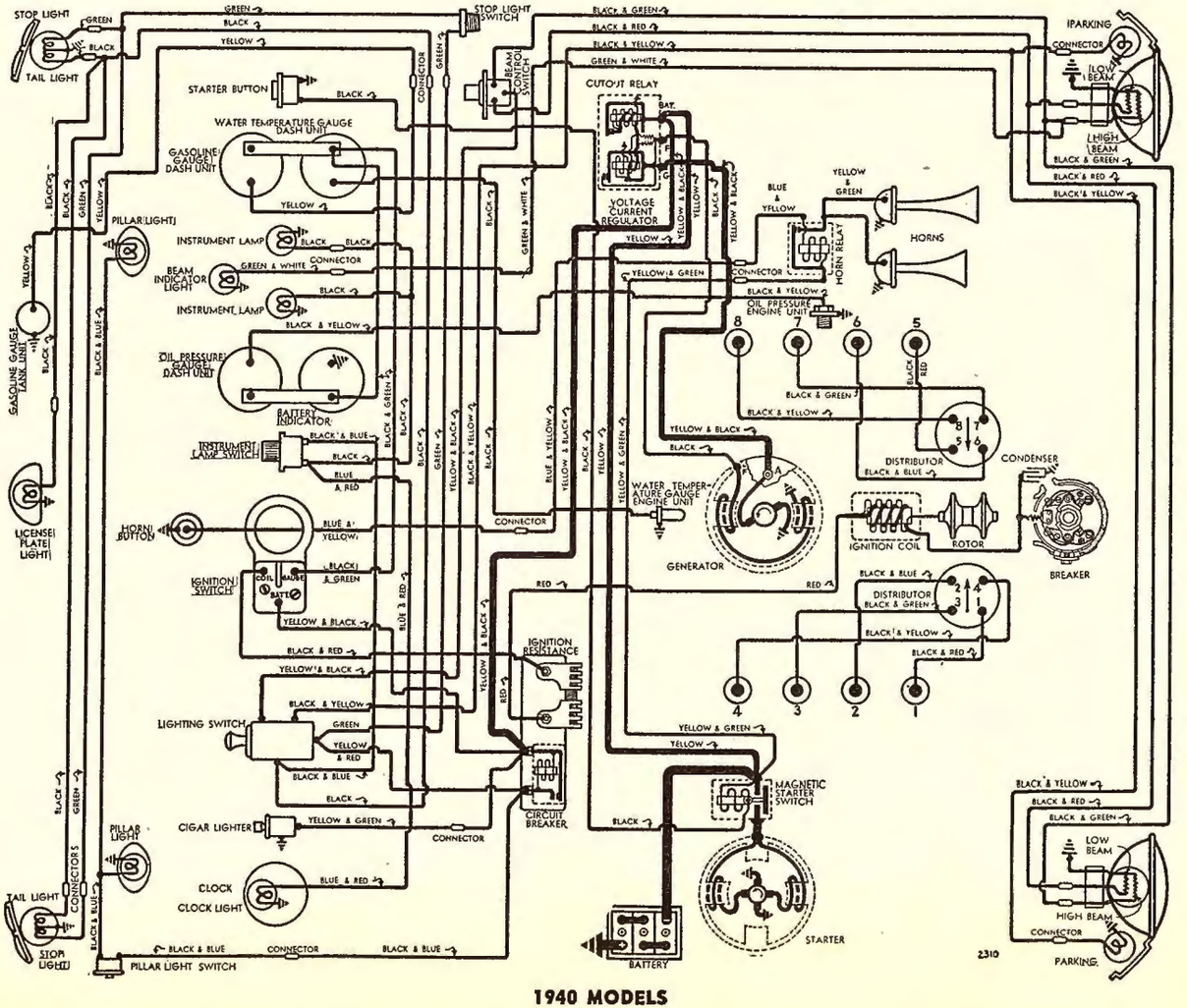
IGNITION TIMING:—For each engine as follows (see Vacuum Brake Setting below for adjustment depending on type of service and fuel used).

	Flywheel Degrees	Piston Position
'60' Engines	4° BTDC	.0048" BTDC.
'85' & '95' Engines	4° BTDC	.0058" BTDC.

Timing Note—Manufacturer recommends use of Laboratory Test Set with Stroboscope attachment

Timing (On Engine)—No flywheel marks provided and timing should be set with piston on top dead center. With #1 piston on top dead center entering power stroke, loosen timing adjusting screw on left hand side of ignition unit housing, place screw in retard position at lower end of slot, move screw slowly up until timing contacts begin to open, note graduation on plate under screw head which is in line with reference mark on housing, move screw up exactly one additional graduation, tighten screw.

Vacuum Brake Setting:—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, turn screw in just enough to eliminate ping, tighten locknut. When adjusted on Stroboscope, vacuum brake should retard spark to peepsight (set at 2°) at 950 RPM. (78-12127 Distr.), 650 RPM. (11A-12127 Distr.).



1940 MODELS

Carburetor—Holley (Chandler-Groves) Model No. AA-⅞ Ford No. 922A-9510A (60 Engine); AA-1, Ford No. 91A-9510-A (85 & 95 Engine). Dual, downdraft types. NOTE—Stromberg Model EE-⅞, Ford No. 52-9510B also used on 1939 models with "60" Engine. NOTE—Model 91A-9510A replaced by 21A-9510-A.

For complete data, refer to Carburetor Index.

Idle Adjustment—With engine warm, choke valve wide open, and Fast Idle inoperative, set throttle lever stopscrew for 5-7 MPH. idling speed, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then out until engine begins to roll, finally turn screw in until engine fires smoothly. Final setting should be approximately ⅝-¾ turn open (Stromberg), ⅝-⅞ turn open (Chandler-Groves). Readjust stopscrew for correct idling speed of 5-7 MPH.

NOTE—Vacuum gauge recommended for idling adjustment. Set for highest steady gauge reading.

Float Level (Stromberg)—Fuel level should be 15/32" below top edge of bowl with engine idling.

Float Level (Chandler-Groves)—1⅜-1 11/32" from bottom of float to face of cover with valve seated (invert to check). Fuel level 21/32-23/32" below top edge of bowl.

Accelerating Pump Setting (Stromberg)—Two ball studs provided for pump link connection as follows:
"S"—Minimum stroke—Summer operation.
"W"—Maximum stroke—Winter operation.

Accelerating Pump Setting (Chandler-Groves)—Three holes provided for pump link connection:
Inner (#1)—Min. stroke, Summer Temperatures.
Center (#2)—Med. stroke, Winter Temperatures.
Outer (#3)—Max. stroke, Extreme Cold Weather.

NOTE—Link locked in pump rod by snap-lock. Pull link shaft out of pump rod to disengage this lock.

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Fast Idle:—Integral with carburetor. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: AC No. 1528238 (1939 "60" Engine), 1528237 (1939 "85" & "95" Engine), 1529224 (1940 All) oil-wetted type Std. Heavy duty oil-bath type Optl.

Gasoline Gauge: King-Seeley Electric. Ford Nos. Dash Unit—91A-9280A (1939), 01A-9280A (1940). Tank Unit—81W-9275 (1939 C-O-E Trucks), 01W-9275 (1940 C-O-E Trucks), 01Y-9275 (1940 122" Panel Delivery), 01T-9275 (1939-40 Other Trucks).
For complete data, refer to Carburetion Equip. Index.

Fuel Pump:—AC Type R. #1523257, Ford No. 52-9350B (60 Engine); #1523307, Ford No. 68-9350 (85 & 95 Engines). Diaphragm type.
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY (1939): Ford No. 81A-10655-A. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Starting Capacity—126 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.3 minutes.
Grounded Terminal—Positive (+) grounded to dash. Engine ground—Strap connector between right rear cylinder head stud and dash.
Dimensions—Length 10.5". Width 7.2". Height 7.1".
Location—On right hand side of cowl under hood.

BATTERY (1940): Ford No. 01A-10655-A. 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Grounded Terminal—Positive (+) to dash.
Engine Ground—Strap connector between right rear cylinder head and dash (connected to battery ground strap bolt on Deluxe cars).
Dimensions—Length 10.6". Width 7.3". Height 9.2".
Location—On right side in engine compartment.

Battery Indicator:—King-Seeley. Voltmeter type. Ford No. 01A-10844A (1940 Std.), 01A-10844B (1940 Deluxe & replacement for 01A-10844A).
For complete data, refer to Electrical Equipment Index.

STARTER

Ford No. 52-11002 (60 Eng.), 18-11002 (85, 95 Eng.).
Armature—52-11005 (52-11002), 18-11005 (18-11002).
Drive—Barrel Type Bendix No. A-1806. Ford No. 52-11350-C (52-11002), Inboard Bendix No. L11FX-10, Ford No. B-11350 or Ford B&S Drive 91A-11350 (18-11002). *Refer to Electrical Equipment Index for Barrel Type Bendix Drive & Ford B&S Drive servicing.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: R-B-M. Ford No. 78-11450 (1939), 01A-11450A (1940) magnetic type mounted on dash and controlled by pushbutton on instrument panel Ford No. 81A-11500 (1939), 01A-11500A (1940).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR
THIRD-BRUSH TYPES

Third Brush Control Type (Std. 1939). Various types used as listed below. Generators are ventilated by fan on drive pulley.

1939—"60" Engines

Generator	Armature	Pulley Diam.
82A-10000-A	79-10005	3.71"

1939—"85" & "95" Engines

81A-10000-A	79-10005	4.38"
81A-10000-B	79-10005-HA	4.38"
79-10000-B	79-10005	Double 4.68"

Charging Rate Adjustment—Remove commutator cover band, shift third brush by hand, counter-clockwise to increase output, or clockwise to decrease output. Brush is held in position by friction. Maximum rated output (shown in table below) secured with third brush set 1½ commutator bars from nearest (insulated) main brush. Set charging rate as low as possible to keep battery fully charged.
Maximum Charging Rate—As follows:

Performance Data

81A-10000-A		81A-10000-B	
Amperes	Eng. R.P.M.	Amperes	Eng. R.P.M.
Start	500	Start	525
17	1300	26	1250
11	2500	16	2500

82A-10000-A		79-10000-B	
Start	500	Start	500
17	1300	17	1350
11	2500	11	2500

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—Approximately 28 ozs.

Field Current—6 amperes at 6.0 volts (79-10000B, 81A-10000A, 82A-10000A—field resistance 1.0 ohm at 70° F.), 4.17 amperes at 6.0 volts (81A-10000B—field resistance 1.44 ohms at 70° F.).

Removal & Belt Adjustment: Same as for Two-Brush Generators (see below).

GENERATOR
TWO-BRUSH TYPES

Two Brush (Shunt) Type (Optl. 1939, Std. 1940). Various types used as listed below. Generators are ventilated and have external voltage and current regulation.

1939—"60" Engines

Generator	Armature	Pulley Diam.
82A-10000-D	78-10005-A, C	3.68"
82A-10000-E①	78-10005-B, D	3.68"

1939—"85" & "95" Engines

81A-10000-D	78-10005-A, C	4.38"
81A-10000-E①	78-10005-B, D	4.38"
81T-10000A	78-10005-A, C	Double 4.68"
81T-10000-B①	78-10005-B, D	Double 4.68"

1940—All Engines

01A-10000-A③	01A-10005	3.68"
01A-10000-B③	01A-10005	3.18"
81T-10000-A②	78-10005-A, C	Double 4.68"
81T-10000-B①②	78-10005-B, D	Double 4.68"

①—Low Speed (Taxi, Door-to-Door Delvry., etc.).
②—Std. on 1940 C-O-E Trucks.
③—Replacement Generator 21A-10000.

Charging Rate Adjustment—No adjustment. See Regulator data below.

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine at approximately 1000 RPM, check output at 3 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

81A-, 82A-10000-D		81A-, 82A-10000-E	
Amperes	Eng. RPM	Amperes	Eng. RPM
Start	500	Start	350
28	1250	20	1000
28	2500	20	2500

01A-10000-A		01A-10000-B	
Start	580	Start	520
32	1100	30	1060
32	2500	30	2500

81T-10000-A		81T-10000-B	
Start	550	Start	350
28	1300	20	1050
28	2500	20	2500

Rotation—Counter-clockwise at commutator end.

Field Current—2.86 amperes at 6 volts (01A-10000 A—field resistance 2.1 ohms at 70°), 2.1 amperes at 6.0 volts (01A-10000B—field resistance 2.88 ohms at 70°F), 2.22 amperes at 6.0 volts (81A-10000-D, E; 82A-10000-D, E; 81T-10000-A, B—field resistance 2.7 ohms at 70°F).

Brush Spring Tension—Approximately 28 ozs.

Removal:—Generator mounted on bracket between cylinder banks at front of engine, driven in tandem with water pumps by Vee belt (on Cab-over-Engine Trucks, fan on generator shaft with double drive belts). To remove, loosen bracket stud nut.

Belt Adjustment:—Loosen nut on bracket mounting stud, raise generator up until side movement on belt midway between generator and water pump pulley is 1" (thumb and finger pressure).

CUTOUT RELAY

Ford No. B-10505 (Used with Third Brush Generator). Mounted on generator. Generator field lead grounded to relay mounting screw.

Cuts In—5.8-6.3 volts, 400 Eng. RPM (60 Trucks), 660 RPM (85 & 95 Trucks).

Cuts Out—2 amperes maximum discharge.

Contact Gap .015-.020". Air Gap .010-.015" (closed).

NOTE—Relay case sealed. No adjustment possible.

REGULATOR

REGULATOR:—Ford No. 01A-10505-A. Vibrating type Voltage-Current regulator with Cutout Relay in case on dash. NOTE—Regulator mounted on rubber cushions and grounded through separate ground wire attached to case. Regulator case is sealed and no adjustments can be made.

REPLACEMENT REGULATOR NOTE—New type 3-unit Regulator (separate Voltage & Current Regulator units) furnished as service replacement for above 2-unit type. *See 'Ford Regulator—3-unit Type' article in Electrical Equipment Section for complete data on this new type.*

Cutout Relay

Cuts In—5.8-6.3 volts.

Cuts Out—5.5 amperes max. (Cold 60°), 1.7 amperes (Hot 180°)—*see Regulator article in Electrical Equipment Section for specifications at other temperatures.*

Voltage-Current Regulator

Voltage Setting—6.9-7.2 volts at 70°F.

Current Setting—30-33 amperes.

Regulator Checking & Adjustment—*See Ford Regulator article in Electrical Equipment Section for complete testing directions.* No adjustments can be made as regulator case is sealed.

LIGHTING

Headlamps—Ford (Corcoran-Brown) Two-Lite, Prefocused, type (1939), Ford Sealed Beam type (1940), Upper and Lower Beams controlled by Beam Selector Switch on toeboard.

For complete data, refer to Electrical Equipment Index.

Headlamp Adjustment—Aim Upper Beam of each headlamp straight ahead with upper edge of beam on horizontal line at lamp center height (1939), center of hot spot 3" below horizontal line at lamp center height (1940) at distance of 25 feet.

Beam Indicator—Red jewel on instrument panel directly above speedometer. Lighted when upper beams in use.

Switches—1939

Lighting—R-B-M. Ford No. 81W-11653 (C-O-E Trucks), 81T-11647 (Others). Switch Body & Contact Assembly 81A-11657 (All Models).

Beam Selector—Ford No. 81A-13532.

Instrument Light—Ford No. 50-13740.

Stop Light—Ford No. 81T-13480.

Switches—1940

Lighting—R-B-M No. 6425. Ford No. 01A-11652.

NOTE—Switch is mounted on instrument panel.

Beam Selector—R-B-M No. 2480. Ford No. 81A-13552. Switch & Wiring Assy. Ford No. 01W-11653 (C-O-E Trucks), 01C-11653 (Other Trucks).

Instrument Light—Ford No. 50-13740.

Stop Light—Ford No. 91A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps (1939)	32-32	2330
Headlamps (1940)		Sealed Beam
Parking (Comm'l., Trks.)	3	63
Instrmt. (Comm'l., Trks.)	3	63
Beam Indicator	1	51
Stop & Tail	21-3	1158

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER:—R-B-M Model 6700, Ford No. 01A-12250. Combined with Ignition Resistor on block on dash under cowl. Combination thermostatic and wound-coil type. Contacts open with current of 50 amperes. Current continues to flow through winding which is connected across the contacts resulting in rapid vibrating action.

FUSE BLOCK: Ford No. 40-12250. Used instead of Lighting Circuit Breaker on some models. Combined with Ignition Resistor on block on dash under cowl.

Fuse Capacity—20 amperes.

HORNS: Vibrator type single horn Std.

Horn Current—6-8 amperes.

ENGINE

V8 "60" TYPE

ENGINE SPECIFICATIONS:—Own Model. 8 Cylinder 90° V, L head. Both banks & crankcase cast enbloc.

Bore—2.6". Stroke—3.2". Displm't—136 cu. ins.

Rated Horsepower—21.6.

Developed Horsepower—60 at 3500 R.P.M.

Compression Ratio—6.6-1 Std. No Optl. ratios.

Compression Pressure—158 lbs. at 2800 R.P.M. or 116 lbs. at cranking speed of 100 RPM.

Vacuum Reading—18-20" steady at 5-7 M.P.H.

For all other "60" Engine data, refer to 1939-40 Ford V8 "60" Passenger Car & Comm'l article.

ENGINE

V8 "85" TYPE

ENGINE SPECIFICATIONS:—Own Model. 8 Cylinder, 90° V, L head. Both banks & crankcase cast enbloc.

Bore 3.062". Stroke 3.75". Displm't. 221 cu. ins.

Rated Horsepower—30.

Developed Horsepower—90 at 3800 RPM.

Compression Ratio—6.2-1 (Comm'l, ¾, 1 Ton), 5.9-1 (Other Trucks). Heads are Cast Iron.

Compression Pressure—145 lbs. at 2300 RPM. max. or 113 lbs. at cranking speed of 100 RPM. (6.2-1 Head), 135 lbs. at 2300 RPM. max. or 108 lbs. at cranking speed of 100 RPM (5.9-1 Head).

Vacuum Reading—18-20" steady at 5-7 M.P.H.

For all other "85" Engine data, refer to 1939-40 Ford V8 "85" Passenger Car & Comm'l article.

ENGINE

V8 "95" TYPE

ENGINE SPECIFICATIONS: Own 95. 8 cylinder, 90° Vee, "L" Head. Both banks and crankcase cast enbloc.

Bore—3.187". **Stroke**—3.75".

Rated Horsepower—32.5. **Displacement**—239 cu. ins.

Developed Horsepower—95 at 3600 RPM.

Compression Ratio—6.3-1 (Comm'l), 5.9-1 (Trucks). Heads are Cast Iron.

Compression Pressure—145 lbs. at 2400 RPM max. or 112 lbs. at cranking speed of 100 RPM. (6.3-1 Head), 135 lbs. at 2200 RPM. max. or 106 lbs. at cranking speed of 100 RPM. (5.9-1 Head).

Vacuum Reading—Steady 18-20" idling at 5 MPH.

For all other "95" Engine data, refer to 1939-40 Mercury V8 "95" Passenger Car article.

VALVE TIMING

Tappet Clearance:—.011-.012" All Valves ("60" V8), "90" & "100"—.010-.012" Int., .014-.016" Exhaust.

Valve Timing ("60" Engine): See Camshaft setting.

Intake Valves—Open 9½° BTDC. Close 54½° ALDC.

Exhaust Valves—Open 57½° BLDC. Close 6½° ATDC.

Valve Timing ("85" & "95"): See Camshaft Setting.

Intake Valves—Open at TDC. Close 44° ALDC.

Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

To Check Valve Timing—No marks on flywheel or other means provided to check timing. If dead center position for piston #1 is established on flywheel, intake opening for this cylinder should occur with piston .0270" BTDC. with flywheel mark 3.22 teeth before dead center point (60 Engine) or with piston on top dead center and flywheel mark at dead center point (85, 95 Engines).

LUBRICATION

LUBRICATION:—Crankcase Capacity—4 qts. (60 Engine), 5 qts. (85, 95 Engines).

Normal Oil Pressure:—30 lbs. at 2000 R.P.M. (all).

Oil Pressure Gauge:—King-Seeley Electric. Ford Nos.:

Dash Unit—91A-9273A (1939), 01A-9273A (1940)

Engine Unit—48-9278 (All Models).

See Miscellaneous Section for complete data.

COOLING

Capacity: 16 qts. ("60" ¾ & 1 Ton), 22 qts. ("85" ¾ & 1 Ton), 23 qts. (C-O-E Trucks), 24 qts. (Other Trucks 1939), 22 qts. (Other Trucks 1940).

Water Pump: Packless. 2 used (1 for each bank).

See Water Pump Section for complete data.

Removal "60"—Slack off belt adjustment, unscrew large mounting nut behind pulley, pull pump out.

Removal "85" & "95"—Slack off drive belt, support engine at front, remove front engine mounting bolts, take out mounting screws in pump body.

Thermostat: In each cylinder head outlet (2 used). Starts to open at 145°F., fully open at 180°F).

Temperature Gauge (1939): King-Seeley (not electrical). Ford No. 91W-10883 (C-O-E Trucks), No. 91A-10883-A (Other Trucks).

See Miscellaneous Section for complete data.

Temperature Gauge (1940): King-Seeley Electric. Dash Unit—Ford No. 01A-10883A (exc. C-O-E). Engine Unit—Ford No. 99A-10884 (exc. C-O-E). NOTE—Gauge on C-O-E Trucks is Ford No. 91W-10883 (not electric) type.

See Miscellaneous Section for complete data.

NOTE—Gauge reads 212 (Hot) with Ignition Off.

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CLUTCH

Long Model 9CF-CS (Trucks with "60" Engine), Model 11CF-CI (All Others). Semi-centrifugal, single plate, dry disc type.

See Clutch Section for complete data.

Facings—Molded type, 2 required. Inside Diam. 5.76" (9CF), 6.5" (11CF). Outside Diam. 9" (9CF), 11" (11CF). Thickness .137" (all).

Adjustment:—Pedal free movement should be 1.5-1.75". To adjust, remove clevis pin at end of connector rod, adjust clevis on rod.

Removal:—Remove transmission (see Transmission Removal below). Take out mounting screws in clutch cover flange.

TRANSMISSION

3-SPEED TYPE

TRANSMISSION (3 SPD.):—Own Make. Std. on ¾ & 1 Tonner. Constant-mesh, synchro-mesh (Second & High), helical gears (Second & High), sliding spur gears (Low & Reverse). 4 Spd. Trans. Optl.

See Transmission Section for complete data.

Removal (1939): Remove the front shaft (coupling shaft) as follows: Take out all except top bolt in intermediate universal joint ball housing (frame bolts), remove all screws in front universal joint cover, slide cover back 6" on housing, take out screws in universal joint flange directly in back of universal, disengage coupling by pushing it back on shaft against spring tension, take out remaining bolt at intermediate universal joint, pull shaft down at front end to clear cross-member, pull forward until free at splined joint at rear end, remove shaft assembly. Support engine at rear end, take out rear engine mounting bolts, take out clutch housing mounting screws, pull transmission straight back and remove.

NOTE—Models 911-W, Z have one universal joint only (no coupling shaft used).

Removal (1940): Remove four companion flange bolt nuts at front universal. Take out 2 bolt nuts at coupling shaft center support (all except 101" WB. Cab-Over-Engine). Lower propeller shaft assembly to floor. Support engine at rear end, take out rear engine mounting bolts and clutch housing mounting screws. Pull transmission straight back and remove.

TRANSMISSION

4-SPEED TYPE

TRANSMISSION (4 SPD.):—Own Make. Std. on all models except ¾ & 1 Tonner. Sliding spur gear type.

See Transmission Section for complete data.

Removal:—Same as for 3 Spd. transmission above.

UNIVERSALS

Spicer. Needle bearing types (except 1939 ¾ & 1 Ton—Steel Bushing type). Universal joint installations are as follows:

1939 Models (exc. 911W, 911Z)—Two universals used, one at rear of transmission case, additional universal at frame cross-member between front and rear driveshafts.

1939 Models 911W, 911Z—One universal only. Mounted in ball housing at rear of transmission case.

1940 Models—New type exposed driveshaft (Hotchkiss Drive) with Universal Joints mounted on driveshaft flanges (see Coupling Shaft Bearing below). Universal Joint types are as follows:

1940 Universal Joints

Wheelbase	Front	Center	Rear
101"	1351-17	None	1358-104
122"	1318-103	1311-102	1318-103
134 & 158"	1358-4	1351-107	1358-104
194"	1358-5	1351-107	1358-105

See Universals Section for complete data.

Coupling Shaft Bearing (1940): With change from Torque Tube Drive to Hotchkiss Drive a new type cushion mounted Coupling Shaft Ball Bearing bolted to underside of intermediate frame cross member is now used. Bearing is mounted on end of coupling shaft in a sleeve with a felt retainer sleeve on each end and a bearing baffle over the front end. Bearing is retained by center universal companion flange. Bearing and sleeve assembly mounted in center support which is bolted to underside of frame cross member.

REAR AXLE

STANDARD

REAR AXLE (STD.):—Own Make. Full-floating, Spiral Bevel gear type with straddle-mounted pinion and new Hotchkiss drive.

See Rear Axle Section for complete data.

Ratio—¾ & 1 Tonner: 4.857-1 (Std. 85), 6.67-1 (Std. 60), 4.11-1 (Optl.). Other Trucks: 6.67-1 (Std.), 5.14-1 stamped with SS or 5.83-1 (Optl.).

Backlash—.004-.016".

Removal (1939): Disconnect hand brake cables and brake line (at torque tube connection—bleed lines when re-connected), speedometer cable. Disconnect rear springs (semi-elliptic type), take out universal joint ball housing bolts (rear joint), pull axle assembly to rear to disconnect splined joint, remove assembly.

Axle Shaft Removal—Take out two screws and remove hub cap, remove nuts on 8 hub studs which hold axle shaft flange in place, turn the two special screws (in tapped holes in flange) up evenly to break flange loose from wheel hub, back these screws out, strike axle shaft flange at center to loosen centering cones on studs, remove cones, pull axle shaft out (wheel not disturbed).

Wheel Bearing Adjustment—Remove axle shaft (above), use special bearing adjusting wrench and remove bearing locknut (outer nut), nut retainer, and grease retainer. Adjust inner bearing adjusting nut by turning up until tight and then backing off ⅛ turn, install grease retainer, bearing nut retainer, outer bearing locknut, turn locknut up tight.

NOTE—When installing axle shaft, make certain that gasket in place under shaft flange, cones in place on studs and that two loosening screws backed off sufficiently so that stud nuts can be tightened securely. Turn the two loosening screws in just enough to prevent loosening in service.

Removal (1940): Split rear universal by taking out bolts and nuts. Lower propeller shaft. Disconnect hand brake cables at equalizer (¾ & 1 Tonner) and flexible hydraulic brake line at rear axle (bleed lines when re-connected). Disconnect rear springs (semi-elliptic type) and withdraw axle assembly from beneath truck.

Axle Shaft Removal—Take out two screws (except ¾ & 1 Tonner) and remove hub cap, remove nuts on 8 hub studs which hold axle shaft flange in place, turn the two special screws (in tapped holes in flange) up evenly to break flange loose from wheel hub, back these screws out, strike axle shaft flange at center to loosen centering cones on studs, remove cones, pull axle shaft out (wheel not disturbed).

Wheel Bearing Adjustment—Remove axle shaft (above), use special bearing adjusting wrench and remove bearing locknut (outer nut), nut retainer, and grease retainer (except ¾ & 1 Tonner). Adjust inner bearing adjusting nut by turning up until tight and then backing off ⅛ turn, install grease retainer, bearing nut retainer, outer bearing locknut, turn locknut up tight.

NOTE—When installing axle shaft, make certain that gasket in place under shaft flange, cones in place on studs and that two loosening screws backed off sufficiently so that stud nuts can be tightened securely. Turn the two loosening screws in just enough to prevent loosening in service.

REAR AXLE

SPECIAL EQUIPMENT

REAR AXLE (OPTL.):—Two-speed type.

See Rear Axle Section for complete data.

Ratio—5.83-1 (Direct), 8.11-1 (2nd speed).

Backlash—.006-.020".

Removal:—Same as for standard axle (above) except that control linkage must also be disconnected.

SHOCK ABSORBERS

SHOCK ABSORBERS:—Houde (Houdaille). Double acting, hydraulic, adjustable. Used on front end only.

FRONT SUSPENSION

1939 MODELS

Front Suspension (1939): Conventional "I" beam front axle with Reverse Elliott ends and transverse spring positioned by radius rods (except Cab over Engine models), semi-elliptic springs (Cab over Engine models).

Kingpin Inclination—8° crosswise (except Cab-Over-Engine Trucks—7°).

Caster—9° Max., 8¼° Min (¾, 1 Ton). 3½° Max., 1° Min. (Cab-Over-Engine), 5° Max., 3° Min. (others). Must be equal within ½°. NOTE—Axle may be bent cold to correct caster provided that proper tools (wedges and blocks to prevent crushing axle flange) used.

Camber—1° Max., ¼° Min. (all models). Must be equal within ¼° and right wheel must not exceed left wheel. Adjust as for Caster (see Caster Note).

Toe In—1/16" (Cab-Over-Engine), 0" (other trucks—empty). Set at 10-1 ratio to camber. Toe in increases with load on trucks and should be set with truck empty. Adjust by loosening clamp bolts and turning tie rod.

Steering Geometry (Toe out on turns)—Outer wheel turned 20°, Inner wheel 23° (¾ & 1 Ton), 23¾° (101" WB. models), 22⅔° (134" WB. models), 22¼° (157" WB. models). Allowable variation ½°.

FRONT SUSPENSION

1940 MODELS

Front Suspension (1940): Conventional "I" beam front axle with Reverse Elliott ends and new semi-elliptic springs.

Kingpin Inclination—7° crosswise.

Caster—3½° Max., 1° Min. Must be equal within ½°.

NOTE—Caster angle controlled by wedge shims inserted between axle pads and springs. To increase caster, insert taper wedge shims equally at both sides (make certain that spring tie bolts extend through wedge anchoring spring to axle).

Camber—1° Max., ¼° Min. Must be equal within ¼° and right wheel must not exceed left wheel. NOTE—Axle may be bent cold to correct Camber provided that proper tools (wedges and blocks to prevent crushing axle flange) used.

Toe In—1/16". Set at 1-10 ratio to Camber. Toe-in increases with load on trucks and should be set with truck empty. Adjust by loosening clamp bolts and turning tie rod.

Steering Geometry (Toe out on Turns)—Outer wheel turned 20°. Inner wheel 23° (¾ & 1 Tonner), 23¾° (101" WB.), 22⅔° (134" WB.), 22¼° (158" WB.). Allowable variation ½°.

STEERING GEAR

Steering Gear: Gemmer Model 305. Worm-and-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—**Service.** Lockheed, hydraulic, double anchor type. Hand lever applies rear wheel service brakes (¾ & 1 Ton), independent rear wheel or driveshaft brake (All Others).
See Brake Section for complete data.

Drums—Cast-iron. Diameter: ¾ Ton (12" front & rear). 1 Ton (12" front, 14" rear). Other Trucks (14" front, 15" rear).

Wheel Cylinders—Stepped type used on ¾ Ton (front & rear wheels), 1 Ton (front). Sizes as follows:

	Front Wheel Front	Front Wheel Rear	Rear Wheel Front	Rear Wheel Rear
¾ Ton	1.25"	1.00"	1.25"	1.00"
1 Ton	1.25"	1.00"	1.375"	1.375"
All Others	1.375"	1.375"	1.50"	1.50"

Lining—Forward shoes (Woven—all wheels ¾ Ton, front wheel 1 Ton. Molded—All Others). Rear shoes (Molded—All Models).

	Width	Thickness	Length per Shoe Forward	Length per Shoe Rear
¾ Ton (all)	1.75"	20"	13.18"	10.1"
1 Ton (front)	1.75"	20"	13.18"	10.1"
1 Ton (rear)	2.00"	268"	15.53"	10.75"
Others (front)	2.00"	268"	15.53"	10.75"
Others (rear)	3.50"	33"	16.64"	11.52"

Clearance—Least possible amount without drag.

Hand Brake (¾ & 1 Ton):—See Service Brakes above.

Hand Brake (1939 exc. ¾ & 1 Ton): Independent internal expanding brake band in each rear wheel.

Drum Diameter—14".

Lining—Woven type. Width 1.5". Thickness .185". Length per wheel 41.12".

Hand Brake (1940 exc. ¾ & 1 Ton): Independent external contracting brake band on drum at rear of transmission.

Adjustment—Fully release hand brake lever. Flat on cam should rest on ear of band (if not, remove pin in lower end of hand lever). Turn anchor screw (on left side) in to give .010" clearance between drum and band, replace locking wire. Loosen lock nut and turn bracket adjusting screw (on right side) to give .010" clearance for lower half of band, tighten lock nut. Tighten adjusting rod nut (on right side) to give .010" clearance for upper half of band (slotted side of nut up). Adjust brake rod clevis so that pin enters clevis and hand brake lever with flat of cam on ear of band and lever in fully released position.

Drum Diameter—7.81".

Lining—Woven. Width 2.5". Thickness 0.250".

COMMERCIAL & TRUCK NOTE:—All Engine data below applies also to Ford Commercial & Truck Models with V8 '90' engine. See Ford Commercial & Truck article for all other data.

ENGINE HOOD NOTE:—Hood is Alligator type with release knob under instrument panel to left of steering column. To raise hood, pull out on release knob (hood will raise slightly), press in on safety catch under front edge of hood.

OIL PAN REMOVAL:—*See Ford Shop Notes for data.*

MODEL IDENTIFICATION

Model	Year	Body Type
11A	1941	Passenger Cars
21A	1942	Passenger Cars

SERIAL & ENGINE NUMBER:—Stamped on top of clutch housing and on left frame rail (near gen.).

TUNE-UP

COMPRESSION:—**Ratio**—6.2-1 Std. Cast iron or aluminum heads.
Pressure—140 lbs. max. at 2300 RPM. or 113 lbs. at cranking speed of 100 RPM.

VACUUM READING:—Steady 18-20" idling at 5-7 MPH.

FIRING ORDER:—1-5-4-8-6-3-7-2. See diagram.

SPARK PLUGS:—Champion H-10 (Pass. Cars), H-9 Com. (Truck). 14 MM. Metric type.
Gaps—.025".

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.014-.016". **Cam Angle** 36° (closed—both sets operating together).
Automatic Advance—8° max. at 950 RPM (78-12127 Distr.), 11° max. at 600 RPM (11A-12127 & 21A-12127 Distr.). Distributor degrees and RPM.

IGNITION TIMING: See Ignition Timing.
Std. Setting—4° BTDC. No flywheel marks provided. See Ignition Timing for ignition timing procedure and Vacuum Brake adjustment.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Both idle screws ⅝-¾ turn open. Idle speed 5-7 MPH.
Float Level—Fuel level 11/16" (21/32-23/32") below top edge of float bowl.
Accelerating Pump—Inner (#1) hole—Summer, Center (#2) hole—Winter, Outer (#3) hole for extremely cold temperatures only.
Fuel Pump Pressure: 3½ lbs. maximum.

VALVES: See Valve Timing.
Tappet Clearance—.010-.012" Intake, .014-.016" Exhaust. No adjustment.

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Oakes Steering Column and Ignition Lock Assembly.

	Steering Post & Ign. Lock Assem. Oakes No.	Ignition Switch Ford No.	Ignition Switch Oakes No.
1941 Deluxe Cars	302448	11A-3676B	302494
1941 Super Deluxe	302550	11A-3676B	302494
1941 Sedan Delvry	302575	11C-3676B	302461
1942 All Cars	302756	21A-3676A	302494

Lock Cylinder—Hurd or Briggs & Stratton No. 80935, Ford No. 91A-3686A (With Keys).
Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 78-12036 or 81A-12036 (1941), 1GA-12024 (1942). 1941 type coils mounted on top of distributor as part of ignition unit. 1942 coil is new type mounted separately on bracket on left of engine.
Resistor Unit—Connected in coil primary circuit. Mounted on Circuit Breaker Assembly No. 11A-12250 (V8 models only).
Ignition Current—4½-6 amperes (V8) with engine stopped. Ignition primary resistance 1-1⅓ ohms.

CONDENSER: Ford Part No. 78-12300 (78-12036 Coil), 81A-12300 (81A-12036 Coil), IGA-12300B (IGA-12024 Coil).
Capacity—.33-.36 mfd. (78-12300 & 81A-12300), .29-.32 mfd. (1GA-12300B).

DISTRIBUTOR (1941): Ford 78-12127 or 11A-12127 (less coil, caps, and plates). Both types alike except for automatic advance.
Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016" step 'no go'.
Cam Angle—36° closed, 9° open. For both sets operating together with correct coil-loading lead.
Breaker Arm Spring Tension—20-24 ozs.
Rotation—Clockwise viewed from drive end.

No. 78-12127

Distributor Degrees	Automatic Advance R.P.M.	Degrees	Engine R..P.M
Start	200	0	400
8	950	16	1900

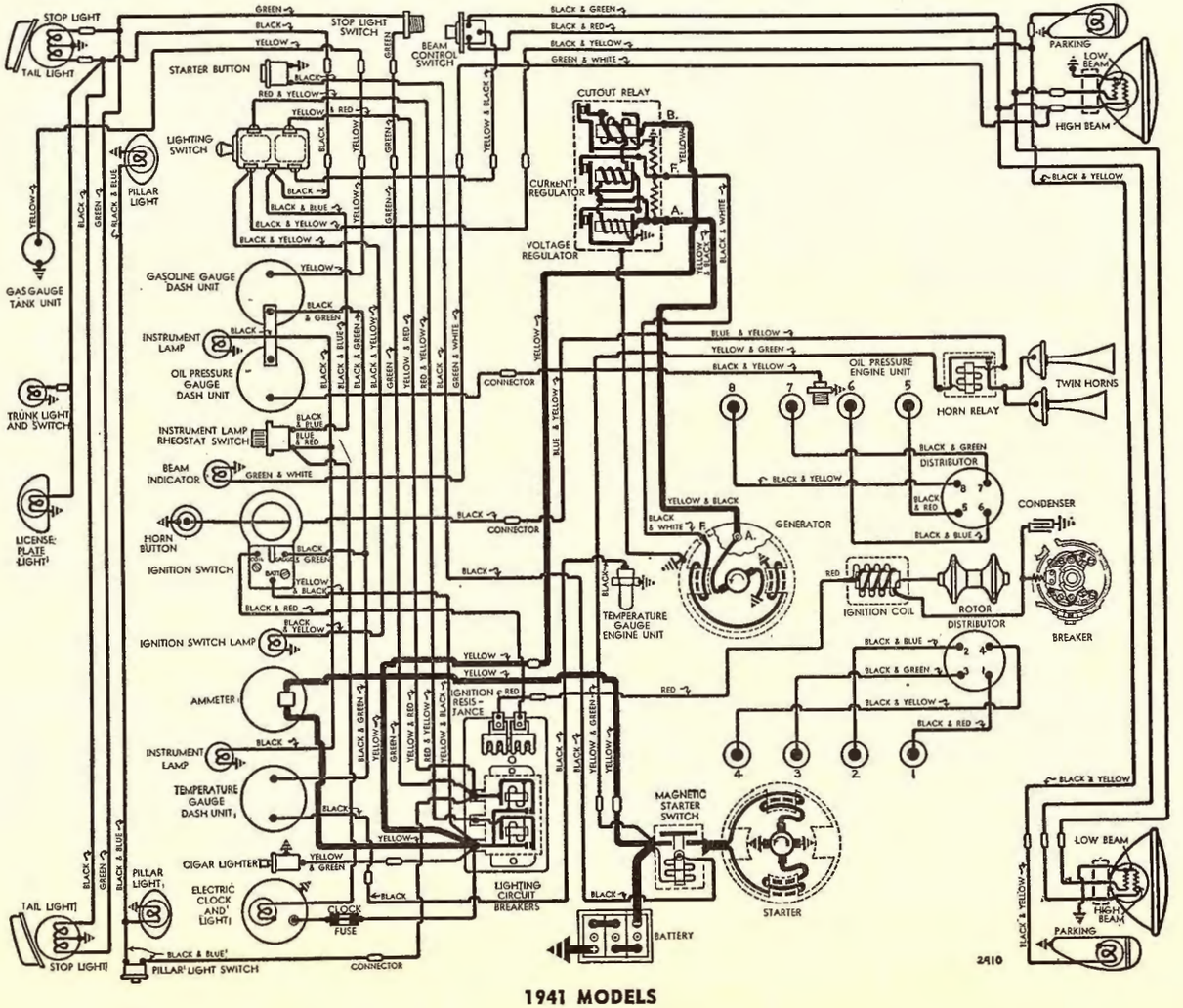
NOTE—Limits are 7½-8½° (distributor).

No. 11A-12127

Distributor Degrees	Automatic Advance R.P.M.	Degrees	Engine R..P.M
Start	200	0	400
11	600	22	1200

NOTE—Limits are 10½-11½° (distributor).

Removal:—Ignition unit mounted on front of engine. To remove, disconnect vacuum line, take off caps, take out screws in mounting flange.



1941 MODELS

DISTRIBUTOR (1942): Ford 21A-12127 (Less Terminal housing). New flat ignition unit (with separate coil) mounted on front of the engine and is driven directly off end of camshaft. Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake control (breaker design same as used earlier).

Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016" step 'no go'.

Cam Angle or Dwell—Approx. 36° closed, 9° open. Set dwell at 80% (limits 78-80% at 2000 RPM.) on Ford Test Set. For both sets operating together with correct coil-loading lead.

Breaker Arm Spring Tension—20-24 ounces.

Rotation—Clockwise viewed from drive end (counter-clockwise viewed from front of car).

Automatic Advance—No. 21A-12127
(Vacuum Brake Disconnected)

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	200	0	400
11	600	22	1200

NOTE—Limits are 10½-11½° (distributor degrees).

Removal:—Distributor mounted on front of engine. To remove, disconnect primary lead, remove distributor cap, take out mounting screws in distributor flange, lift unit out.

IGNITION TIMING

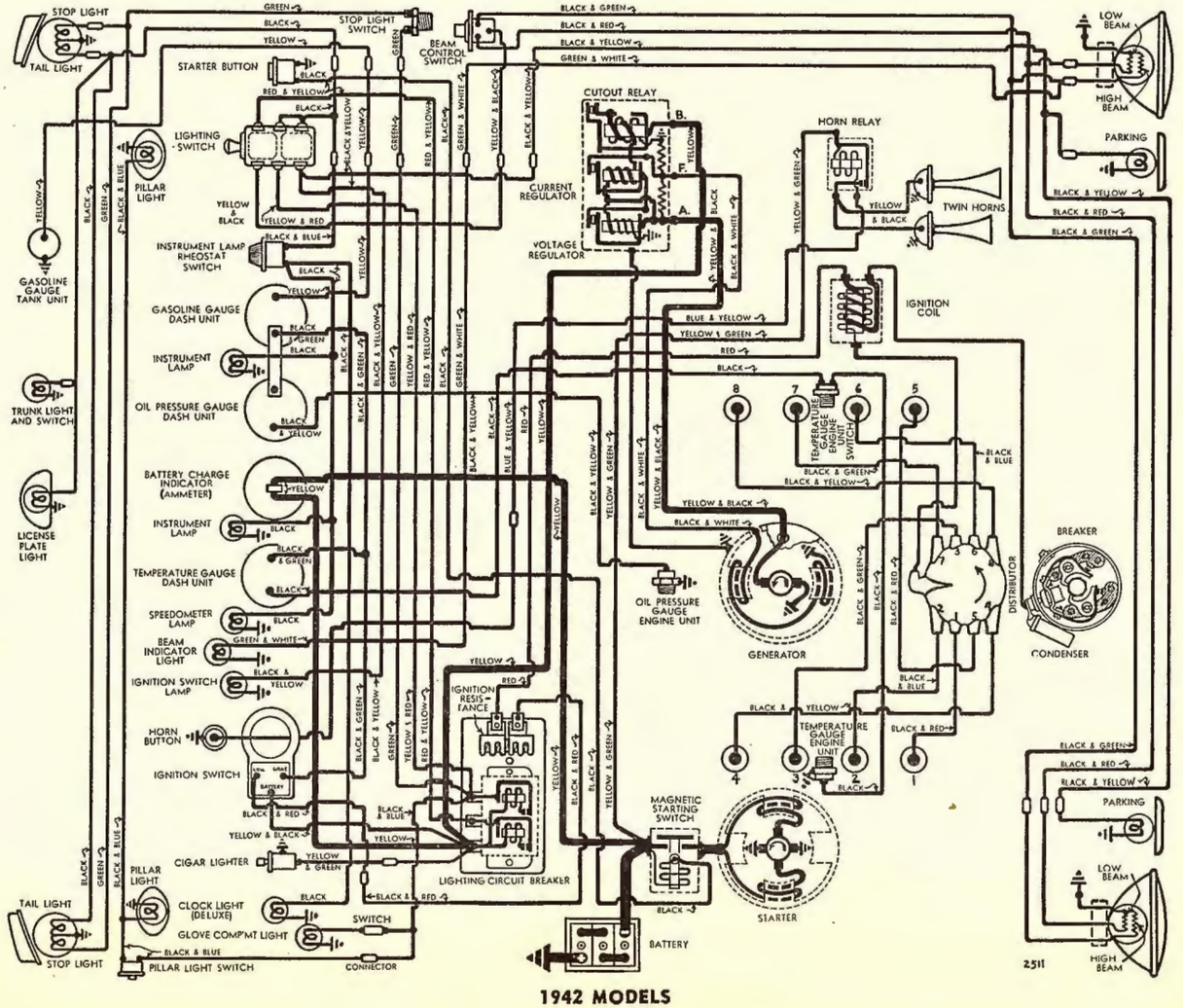
IGNITION TIMING:—For each engine as follows (see Vacuum Brake Setting below for adjustment depending on type of service and fuel (V8 only).

	Flywheel Degrees	Piston Position
All V8 Engines	4° BTDC	.0058" BTDC

Timing Note—Manufacturer recommends use of Laboratory Test Set with Stroboscope attachment or V-126 Timing Fixture for all ignition settings.

Timing (On Engine)—No flywheel marks provided and timing should be set with piston on top dead center. With #1 piston on top dead center entering power stroke, loosen timing adjusting screw on left hand side of ignition unit housing, place screw in retard position at lower end of slot, move screw slowly up until timing contacts begin to open, note graduation on plate under screw head which is in line with reference mark on housing, move screw up one additional graduation **on V8 Engines only.**

Vacuum Brake Setting (V8 Engines)—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, turn screw in just enough to eliminate ping, tighten locknut. When adjusted on Stroboscope, vacuum brake should retard spark to peepsight (set at 2°) **at 950 RPM. (78-12127 Distr.), 650 RPM. (11A-12127 & 21A-12127 Distr.)** with no vacuum to release brake.



1942 MODELS

CARBURETOR

Holley (Chandler-Groves) Ford No. 91A-9510-A ('41), No. 21A-9510-A (1942). Dual, downdraft types.

NOTE—Model 21A-9510-A used as replacement for 91A-9510-A. This new 21A-9510-A carburetor has bowl vent at rear and must be used on 1942 cars with new type higher fan (bowl vent location prevents fuel level fluctuations in bowl due to fan blast).

For complete data, refer to Carburetor Index.

Idle Adjustment—With engine warm, choke valve wide open, and Fast Idle inoperative, set throttle lever stopscrew for 5-7 MPH. idling speed, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then out until engine begins to roll, finally turn screw in until engine fires smoothly. Final setting should be approximately ⅝-¾ turn of screw from inner seated position. Recheck idle speed.

NOTE—Vacuum gauge recommended for idling adjustment. Set for highest steady gauge reading.

Float Level—Fuel level 11/16" plus or minus 1/32" (21/32-23/32" below top edge of float. ***See Carburetor article for float level checking data.***

Accelerating Pump Setting—Three holes provided for pump link connection as follows:
Inner (#1)—Min. stroke, Summer Temperatures.
Center (#2)—Med. stroke, Winter Temperatures.
Outer (#3)—Max. stroke, Extreme Cold Weather.

Fast Idle:—Integral type. No adjustment required.

CARB. EQUIPMENT

Air Cleaner:—Ford No. 91A-9600-A oil-wetted type Std., Heavy Duty oil-bath type Optl.

Gasoline Gauge:—King-Seeley Electric. Ford Nos.
Dash Unit—No. 11A-9280B (1941 Pass. Cars), 11C-9280B 1941 Sedan Delivery), 21A-9280 (1942 Cars).
NOTE—These units have Ivory Pointers. No. 11A-9280A (Red Pointer) also used on 1941 models.
Tank Unit—No. 99A-9275B (1941-42 Pass. Cars), 01A-9275B (1941 Sedan Delivery), 21A-9275A (1942 Sedan Delivery).
For complete data, refer to Carburetion Equip. Index.

Fuel Pump:—AC Type R, Ford No. 11A-9350. AC Replacement Pump No. 541. Diaphragm type.
For complete data, refer to Carburetion Equip. Index.

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BATTERY

BATTERY:—Ford No. 01A-10655-A. 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Grounded Terminal—Positive (+) grd. to dash.
Engine Ground—Strap connector between right rear cylinder head and dash.
Dimensions—Length 10.6". Width 7.3". Height 9.2".
Location—On right side in engine compartment.

STARTER

STARTER:—Ford No. 18-11002. Armature No. 18-11005.
Drive—Inboard Bendix Drive Type L11FX-10, Ford No. B-11350 or special Ford B&S Drive No. 91A-11350. *Refer to Electrical Equipment Index for servicing data on this Ford B&S Drive.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch:—R-B-M Model 5604, Ford No. 01A-11450-A Magnetic Switch mounted on dash, controlled by pushbutton on instrument panel R-B-M Model 3242, Ford No. 11A-11500 (Pass. Cars); R-B-M Model 3233, Ford No. 01A-11500A (Sedan Dlvry.), 21A-11500B (1942 Deluxe & Super Deluxe), 21A-11500C (1942 Special Pass. Cars).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR

Ford No. 01A-10000-B (1941), 21A-10000 (1942).
Armature—Ford No. 01A-10005 (all models). Two-brush shunt type with vibrating current and voltage regulation (new 3-Unit regulator).
NOTE—Model 01A-10000-B replaced by 21A-10000.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM.
Start	520
30	1060
30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F.).
Brush Spring Tension—Approximately 28 ozs.

Removal (V8 Eng.):—Generator mounted on bracket between cylinder banks at front of engine, driven in tandem with water pumps by Vee belt. NOTE—On 1942 models, generator mounting bracket modified to include fan mounting (fan driven by separate belt). To remove generator, loosen nut on mounting bracket stud.
Belt Adjustment:—Loosen nut on bracket mounting stud and raise generator until side movement of belt (with thumb and finger pressure) is 1" midway between generator and water pump pulley.

REGULATOR

REGULATOR:—Ford No. 01A-10505C. Three-Unit Type. Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash.
For complete data, refer to Electrical Equipment Index.
NOTE—Regulator case grounded through 'pigtail' to dash or ground wire to generator.

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—8 amperes discharge current (maximum).

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Elec. Equip. Section for other temps.
Checking & Adjusting—*Refer to Electrical Equipment Index for article on 'Ford Regulator—3 Unit Type' for complete instructions.*

Current Regulator

Setting—30-33 amperes hot (after 5 minutes run).
Checking & Adjusting—See Voltage Regulator

LIGHTING

LIGHTING:—Headlamps—Ford Sealed Beam type. Controlled by Lighting Switch on instrument panel and Beam Selector Switch on toeboard.
For complete data, refer to Electrical Equipment Index.
Headlamp Adjustment—Aim each headlamp straight ahead with upper beam hot spot centered on horizontal line 3" below lamp center height.
Beam Indicator—At left end of speedometer dial. (1941), lower edge of speedometer dial (1942). Lighted whenever Upper Beams in use.

Switches

Lighting—R-B-M Model 2445, Ford No. 11A-11652 (Pass. Cars), 01A-11652 (Sedan Delivery). Light Switch Knob & Insert (used with above switches) No. 11A-11661-A or C (Pass. Cars except Special 70C, 73C, 77C), 11A-11661-B or D (Spec. 70C, 73C, 77C), 11C-11661B (Sedan Delivery), 21A-11661A ('42 Del. & Super Del.), 21A-11661B (Special).
Beam Selector—R-B-M. Ford No. 11A-13532 (switch only). Switch & Wiring Ford No. 11A-11653 (1941 Pass. Cars), 21A-11653 (1942 Pass. Cars), 01A-11653A (1941 Sedan Delivery).
Instrument—Ford No. 11A-13740-A or C (1941 Deluxe & Super Deluxe), 11A-13740-B or D (1941 Special Pass. Cars), 21A-13740 (1942 Pass. Cars), 01A-13740B (1941 Sedan Delivery).
Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Parking, Instr. ('41), Clock	1½	55
Instr. ('42), Ign. Lock	1	51
Beam Indicator	1	51
Dome (Pillar), Luggage Compt.	3	63
Stop & Tail	21-3	1154
Rear License	3	63

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER:—No. 11A-12250-A. (V8). Combined with Ignition Resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlamp circuits, second unit protects other lighting circuits). Breakers are thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

FUSE BLOCK:—Ford No. 11A-12250-B. Special fuse block and ignition resistor used on Special Models 70C (Tudor), 73C (Fordor), 77C (Coupe).)
Fuse—25 ampere capacity. On fuse block.

HORNS:—Air Electric dual horns (Pass. Cars & Sedan Delivery). Horn relay used with dual horns.
Horn Current—24-28 amperes (total—dual horns),

Horn Relay:—R-B-M No. 50357. Ford No. 11A-13842D (except 70C,73C,77C), No. 11A-13842C (70C,73C,77C).
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE SPECIFICATIONS:—Own 90. 8 cylinder, 90° Vee, L head. Both banks & crankcase cast Enbloc.
Bore—3.062". **Stroke**—3.75".
Rated Horsepower—30. **Displacement** 221 cu. ins.
Developed Horsepower—90 at 3800 RPM.
Compression Ratio—6.20-1 Cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

CYLINDER HEAD: Tightening Torque and Cylinder Head Diagram—*See Ford Shop Notes.*
►**Re-working Head for Improved Cooling:** *See Ford Shop Notes for instructions (and new Head Gaskets).*

CYLINDER SLEEVES:—Hardened, dry type cylinder sleeves used on some engines. May carry mark 'HS' on block beside inner front corner of left cyl. head.
Servicing:—*See Ford Shop Notes for data.*

PISTONS:—Steel alloy, light weight, cam ground type or Aluminum alloy, T slot type. Recondition engine to take finished replacement pistons (replace sleeves, install Std. pistons. See Sleeve Note).
Weight—333-337 grams (without rings or pin).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.
Replacement Pistons:—*See Ford Shop Notes for data.*
Fitting New Pistons:—Use .50" wide feeler stock of correct thickness inserted between piston and cylinder wall at right angles to pin to check clearance. Pull to withdraw feeler should be 6-10 lbs.

Engine With Sleeves	Feeler Thickness Steel Piston	Aluminum Piston
New Piston & Sleeve	.003"	.003"
New Piston—Worn Sleeve	.004"	.004"
Worn Piston & Sleeve	.005"	.005"
Engines Without Sleeves		
New Piston & Bore	.0025"	.002"
New Piston—Worn Bore	.004"	.004"
Worn Piston & Bore	.005"	.005"

ENGINE

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PISTON RINGS:—Two compression, one slotted oil ring, all above pin (drain holes in oil ring groove).
NOTE—Expander used with #2 Compr. and oil ring.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0915-.0920"	.012-.017"	.0025-.003"
Compr. #2	.0915-.0920"	.012-.017"	.002-.0025"
Oil Contr.	.1535-.1540"	.012-.017"	.0015-.002"

Replacement Rings:—*See Ford Shop Notes for data.*

PISTON PIN:—**Diameter**—.7501-.7504". **Length**—2.850" (steel pistons), 2.780" (aluminum pistons). Floating type. Pin hole in rod bronze-bushed.
Pin Fit in Piston—.0001-.0002" clearance (aluminum pistons), .0003-.0009" clearance (steel pistons) or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" clearance (pin should pass through bushing slowly of own weight).
See Ford Shop Notes for Pin Fitting directions.
Replacement Pins: *See Ford Shop Notes.*

CONNECTING ROD:—**Length** 7.000". **Weight** 476 grams.
Crankpin Journal Diameter—1.999" (connecting rod diameter on crankpin—2.220").
Bearing Type—Steel-backed, special-alloy lined. Bearing floats in both rods (side-by-side mounting) with bearing surface on inner and outer faces.
Bearing Dimensions—Length 1.747". Thick. .1095".
Clearance—.0015-.0035" (see Bearing Adjustment).
Sideplay—.003-.007" (bearing endplay), .006-.014" (side clearance for both rods).
Bearing Adjustment: None (no shims). Do not file bearing caps. Replace bearings if less than .1085" thick, replace or hone rods for oversize bearings if worn more than .0015" over original size of 2.2195-2.2200". CAUTION—Both rods must be same size.
Replacement Bearings: *See Ford Shop Notes.*
Installing Rods:—Marks on rods and caps must be together and installed in same numbered cylinder with marks pointing down toward oil pan.

CRANKSHAFT:—3 bearing. Integral counterweights.
Journal Diameters—2.499" (all bearings).
Bearing Type—Steel-backed, special-alloy lined.
Clearance—.001-.003".
Bearing Adjustment:—None (no shims). Do not file.
End Thrust:—Taken by rear main bearing. Adjust by replacing bearing. **Endplay**—.002-.006".
Replacement Bearings: *See Ford Shop Notes.*

CAMSHAFT:—Three bearing. Helical gear drive.
Bearing Diameters—1.797" all bearings. Replace camshaft if worn to less than 1.7955" diameter.
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.002".
End Thrust:—Taken by gear hub and cover plate. Adjusted by replacing coverplate. **Endplay**—.005-.015".
Timing Gears:—Cast alloy iron (crankshaft), Bakelized Fabric or Aluminum bolted-on (Camshaft).
Backlash—.004" maximum. *Refer to Ford Shop Notes for Timing Gear Replacement data.*
Camshaft Setting:—Mesh '0' marked tooth of crankshaft gear with '/' marked space on camshaft gear (this mark must be in line with mark on hub).

VALVES:—

	Head Diameter	Stem Diameter	Length
All Valves	1.537"	.3115"	4.750-4.751"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	.292"	.0015-.0035"

NOTE—Service limit for valve stem diameter is .309" Intake, .3065" Exhaust. Valves interchangeable.
See Ford Shop Notes for Valve Servicing data.
NOTE—Seat inserts used for all valves.
Valve Guides:—Split type retained by 'C' washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).
For Valve Guide servicing data, see Ford Shop Notes.
Valve Lifters:—Barrel type in reamed holes in block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel on bottom only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs:	Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.84"

NOTE—Minimum spring tension 30 lbs. at 2.125".

VALVE TIMING

Tappet Clearance: .010-.012" Intake, .014-.016" Exh.
Valve Timing:—See Camshaft Setting above.
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
To Check Valve Timing—No flywheel marks provided. Intake valve opens with piston at TDC.

LUBRICATION

LUBRICATION:—Pressure. Gear type oil pump mounted in crankcase at rear of engine.
Normal Oil Pressure:—30 lbs. at 2000 R.P.M.
Oil Pump and Oil Pressure Regulator: *See "Oil Pump" in Ford Shop Notes for data.*
Oil Pressure Gauge:—King-Seeley Electric. Ford No.
Dash Unit: '41 Pass. Car 11A-9273B (Ivory Pointer), 11A-9273A (Red Pointer); '41 Sedan Delivery 11C-9273B; 1942 Passenger Cars 21A-9273.
Engine Unit: 48-9278.
See Miscellaneous Section for complete data.
Crankcase Capacity:—5 quarts.

COOLING

Water Capacity—26¼ qts. (11A), 22 qts. (21A).
Water Pump:—Packless type, 2 used (1 for each bank).
See Water Pump Section for complete data.
Thermostat:—In each cylinder head outlet (2 used). Setting—Start to open at 145°F. Fully open 180°.
Temperature Gauge:—King-Seeley Electric. Ford No.
Dash Unit: '41 Pass. Car 11A-10883B (Ivory Pointer), 11A-10883A (Red Pointer); '41 Sedan Del. 11C-10883B; '42 Passenger Cars 21A-10883.
Engine Unit: 99A-10884.
NOTE—Accessory Temperature Gauge Switch (for Other Bank) No. 01A-10990. Kit No. 11A-18381.
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—**Long Model 9CF-CS.** Semi-centrifugal, single plate, dry disc type. *See Clutch Section for data.*
Facings—Molded type, 2 required. Inside Diam. 5.76". Outside Diam. 9". Thickness .137".
Adjustment:—Pedal free movement should be 1.0-1.25". To adjust, remove clevis pin at end of connector rod, adjust clevis on rod.
Removal:—Slide rear axle and transmission to rear as a unit to expose clutch (see Transmission Removal below), take out mounting screws in cover.

TRANSMISSION

TRANSMISSION:—**Own Make.** Constant-mesh, synchro-mesh (Second & High), sliding gear (low & reverse), all helical gear type.
See Transmission Section for complete data.
Transmission Control:—Mechanical steering col. shift.
See Transmission Section for complete data.
Removal:—Disconnect gear shifter rods at levers on transmission (Pass. Cars), disconnect rear shock absorbers, hand brake cables, hydraulic brake line at torque tube connection (bleed lines when reconnected), and speedometer cable. Disconnect rear spring at center frame connection, take out universal joint ball housing screws, slide rear axle assembly back to disengage drive shaft at splined joint. Support rear of engine, take out rear engine mounting bolts, clutch housing screws & transmission.

UNIVERSALS

UNIVERSAL JOINT:—**Spicer 202-6** Steel bushing type.
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—**Own Make.** ¾ floating, Spiral Bevel gear type with Torque Tube drive.
See Rear Axle Section for complete data.
Ratio—3.78-1 Std. 3.54-1 or 4.11-1 Optl.
Backlash—.012" maximum.
Removal:—Disconnect rear shock absorbers, hand brake cables, hydraulic brake line at torque tube connection (bleed lines when re-connected), speedometer cable. Disconnect rear spring at center frame connection, take out universal joint ball housing screws, pull axle assembly to rear.
Axle Shaft Removal—*Refer to Ford Passenger Car Rear Axle article in Rear Axle Section.*

SHOCK ABSORBERS

SHOCK ABSORBERS:—**Houde (Houdaille).** Double acting, adjustable, hydraulic type.

	Houde Model	Right—Ford No.	Left
Front '41	BBCN	11A-18045A	11A-18046A
Front '42	BBCN	21A-18045	21A-18046
Rear	BBCZ	11A-18080A	11A-18081A

FRONT SUSPENSION

Front Suspension:—Conventional 'I' beam section front axle with Reverse Elliott ends and transverse front spring. Axle positioned by radius rods.
Kingpin Inclination—8° crosswise.
Caster—9° Max., 4½° Min. Equal within ½°.
Camber—1° Max., ¼° Min. Must be equal within ¼° and the right wheel must not exceed the left.
Toe In—1/16". Set at 1-10 ratio to Camber. Adjust by loosening tie rod clamp bolts and turning tie rod.
Steering Geometry—Inner wheel 23⅓°. Outer 20°.

STEERING GEAR

Steering Gear: Ford Make (Gemmer Model 305). Worm-and-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—**Service.** Lockheed hydraulic, double anchor type. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Cast iron. Diameter 12".
Wheel Cylinders—Stepped or two- stage bore type:
Front Wheel—Front cylinder 1.25". Rear 1.00".
Rear Wheel—Front cylinder 1.125". Rear 1.00".
Lining—Woven (forward shoes), Molded (rear shoes). Width 1.75". Thickness .20". Length per shoe 13.18" (forward shoes), 10.1" (rear shoes).
Clearance—Least possible amount without drag.
Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top: Auto-Lite Electric type. *See Miscellaneous Section for complete data.*

COMMERCIAL & TRUCK NOTE:—All Engine data below applies also to Ford Commercial & Truck Models with 6 Cylinder engine. See Ford Commercial & Truck article for all other data.

ENGINE HOOD NOTE:—**Passenger Cars**—Hood is Alligator type with release knob under instrument panel to left of steering column. To raise hood, pull out on release knob (hood will raise slightly), press in on safety catch under front edge of hood.

MODEL IDENTIFICATION

MODEL NOTE:—This new 6 Cylinder Engine offered in following models: Ford Special, Deluxe, Super Deluxe Passenger Car Models; All Commercial & Truck Models except Cab-over-Engine models.

Model	Year	Body Type
1GA	1941	Passenger Cars
2GA	1942	Passenger Cars

SERIAL & ENGINE NUMBER:—Stamped on top of clutch housing and on left frame rail (near gen.).

TUNE-UP

COMPRESSION:—**Ratio**—6.7-1 Std. Cast Iron Head. Head has large water passages and water distribution nozzle so that premium fuel not required.

Pressure—165 lbs. at 2000 RPM. max. or 105-125 lbs. at cranking speed (100 RPM.).

VACUUM READING:—Approx. 18-20" at idling speed.

FIRING ORDER:—1-5-3-6-2-4. See diagram for spark plug cable connections.

SPARK PLUGS:—Champion H-10. 14 MM. Metric.

Gaps—.025".

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.014-.016". **Cam Angle** 40° (closed).

Automatic Advance—11-12° max. at 600 RPM. distr.

IGNITION TIMING: See Ignition Timing.

Std. Setting—2° BTDC. No flywheel marks provided. See Ignition Timing for timing procedure and Vacuum Brake adjustment.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Idle screw open to point where highest steady vacuum reading secured. Idle speed 350 RPM or 8 MPH.

Float Level—Fuel level 11/16" (21/32-23/32") below top edge of bowl.

Accelerating Pump—Center (#2) hole Normal. Inner (#1) hole (Summer), Outer (#3) hole (Winter) for temperature extremes.

Fuel Pump Pressure: 3½ lbs. maximum.

MANIFOLD HEAT CONTROL: — Automatic thermostatic type. Valve has counterweight and thermostatic coil attached to shaft and should be closed (counterweight arm against stop pin on manifold) with engine cold. See that valve operates freely.

VALVES: See Valve Timing.

Tappet Clearance—.013-.015". All Valves Cold. No adjustment.

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Oakes Steering Column and Ignition Lock Assembly.

	Steering Post & Ign. Lock Assem. Oakes No.	Ford No.	Ignition Switch Oakes No.
Pass. Cars '41	302448	11A-3676-B	302494
Pass. Cars '42	302756	21A-3676-A	302494
Sedan Del.	302478	11C-3676-B	302494

Lock Cylinder—Hurd or Briggs & Stratton No. 80935, Ford No. 91A-3686A (With Keys).

Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 1GA-12024. Mounted separately on top left corner of engine block.

Resistor Unit—Connected in coil primary circuit. Mounted on Circuit Breaker Assembly 11A-12250-A (exc. Special), on Fuse Block 11A-12250-B (on all Special Models 70C, 73C, 77C Passenger Cars).

Ignition Current—4½-6 amperes with the engine stopped. Ignition primary resistance 1-1⅓ ohms.

CONDENSER: Ford Part No. 1GA-12300B.

Capacity—.29-.32 microfarad.

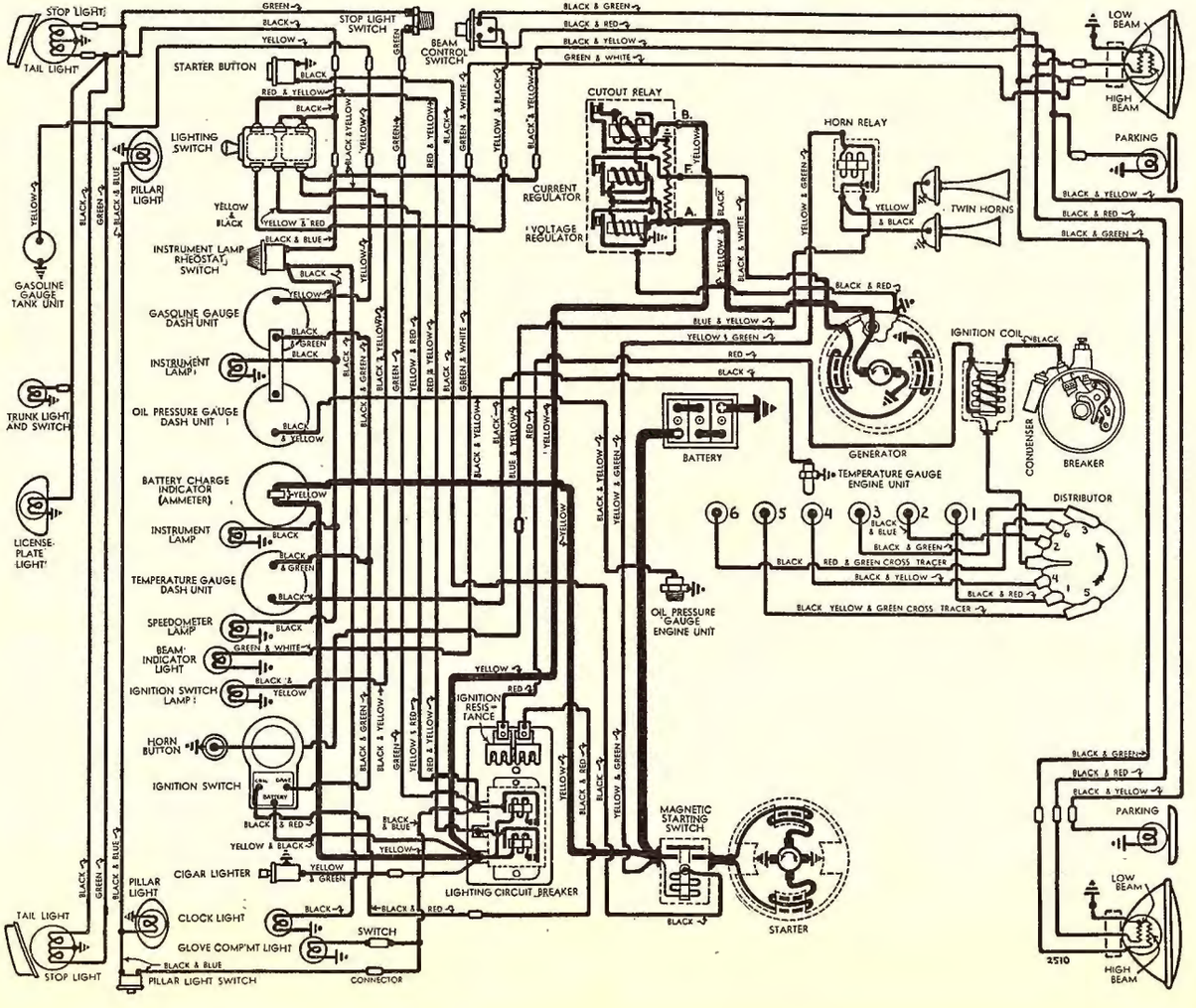
DISTRIBUTOR: Ford 1GA-12127 (less Terminal Housing). Single breaker, 6 lobe cam, full automatic advance type with Vacuum Brake Control. Ignition unit mounted on front end of engine and driven directly off end of camshaft. Ignition coil mounted separately.

Breaker Gap—.014-.016".

Cam Angle or Dwell—Approx. 40° closed, 20° open. Set dwell at 67% (limits 62-67% at 2000 RPM.) on Ford Test Set.

Breaker Arm Spring Tension—20-24 ounces.

Rotation—Counter-clockwise viewed from the front of the engine or clockwise viewing drive end of ignition unit.



Automatic Advance
(Vacuum Brake Disconnected)

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	200	0	400
11-12	600	22-24	1200

Removal:—Distributor mounted on front of engine. To remove, disconnect primary lead, remove distributor cap, take out mounting screws in distributor flange, lift unit out.

IGNITION TIMING

IGNITION TIMING:—See Vacuum Brake Setting for final adjustment dependent on fuel and operating conditions.

	Flywheel Degrees	Piston Position
All Engines	2° BTDC	.0018" BTDC.

Timing—Manufacturer recommends use of Ford Laboratory Test Set (Heyer H1) with Distributor Stroboscope (Heyer HI-DFZ) and Special Adapter (Heyer EGDAF). On Stroboscope set timing index at 1° before top dead center, set peepsight at Zero. Adjust the distributor by loosening screw in slot on left side of distributor and moving screw up (to retard spark), down (to advance spark), so that stroboscopic disc light is in line with peepsight, tighten adjusting screw.

Timing (On the Car)—No flywheel marks provided. With distributor adjusted as described above, this will give correct 2° BTDC. timing when installed on the engine.

Vacuum Brake Setting—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, then turn screw in just enough to eliminate ping, tighten locknut. When adjusted on stroboscope, vacuum brake should retard spark to peep sight with peep sight set at 2° when distributor is driven at 650 RPM. with no vacuum to release brake.

CARBURETOR

Holley (Chandler-Groves) Ford No. 1GA-9510-A. Single barrel, downdraft type with manual choke. ***For complete data, refer to Carburetor Index.***

Idle Adjustment—Use tachometer or vacuum gauge to adjust carburetor (adjust for highest steady reading of vacuum gauge). With engine warm and choke valve wide open, set throttle lever stop-screw so that engine idles at 350 RPM. Adjust idle adjusting screw so that engine fires smoothly and vacuum gauge indicates highest steady obtainable reading (turn screw in for leaner mixture, out for richer mixture). Recheck idle speed.

Accelerating Pump Setting—Three holes provided in throttle lever for pump rod link connection. Adjust for seasonal requirements as follows:
#1 (Inner) Hole—Summer or Hot weather.
#2 (Center) Hole—Average fuel and weather.
#3 (Outer) Hole—Extremely Cold Weather.

Metering Jets—***See Holley Chandler-Groves (Ford) Jet Specification Table in Carburetor Section.***

Power Valve—Vacuum controlled by-pass valve. Opens when vacuum decreases to 8½-9" of HG. **Not adjustable.**

Float Level—Use 9550-A Float Position Gauge to set float (same gauge used on other Ford models). 1.353" end 'Go', 1.322" end 'No Go' measuring from underside of bowl cover to bottom of float (cover and float assembly inverted). Fuel level in bowl should be 11/16" plus or minus 1/32".

Choke—Offset butterfly type with poppet type relief valve. Choke is spring-loaded for automatic control in part-choke position (locked when valve fully closed). Choke and throttle are interconnected for 'throttle-cracking' action when choke closed for cold starting. No adjustment required.

CARB. EQUIPMENT

Air Cleaner:—Ford No. 1GA-9600-C oil wetted type Std. Heavy duty oil-bath type optional.

Fuel Pump:—AC 'R' No. 1537744—Exchange No. 543, Ford No. 1GA-9350 diaphragm type fuel pump.
For complete data, refer to Carburetion Equip. Index.
Pressure—1½-2¾ lbs.

Gasoline Gauge:—King-Seeley Electric. Ford Nos.
Dash Unit—No. 11A-9280B (1GA), 21A-9280 (2GA).
Tank Unit—No. 99A-9275B (Pass. Cars), 01A-9275B (1GA Sedan Delivery), 2GA-9275B (2GA Sedan Delivery).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—**Ford No. 01A-10655-A.** 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Dimensions—Length 10.6". Width 7.3". Height 9.2".
Location—Left side of engine in engine compt.
Grounded Terminal — Positive (+) terminal grounded to dash. **Engine Ground**—Strap connector between rear of cylinder head and dash.

STARTER

Ford No. 18-11002. Armature Number 18-11005.
Drive—Inboard Bendix No. L11FX-10, Ford No. B-11350, or Ford B & S Drive (operates through rubber—no springs used) No. 91A-11350. ***Refer to Electrical Equipment Index for Ford B&S Starter Drive article for complete data.***
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch:—R.B.M. Ford No. 01A-11450-A. Magnetic switch mounted on dash and controlled by pushbutton on instrument panel Ford No. 11A-11500-B (1GA), 29A-11500-B (2GA Pass. Cars), 21A-11500 (2GA Station Wagon).

Removal:—Starter mounted on right front face of flywheel housing. To remove, disconnect cable, take off starter-to-oil pan support bracket, remove the through-bolts on commutator end plate.

NOTE—Take off crankcase ventilator extension tube.

GENERATOR

GENERATOR:—**Ford No. 1GA-10000-B. Arm. 01A-10005. (1GA), No. 2GA-10000-A, Armature 2GA-10005 (2GA).** Two brush (shunt) type with vibrating type voltage and current regulation. Ventilated by fan on drive pulley. Similar to V8 Models except for pivot mounting at left front of engine. Generator is driven by belt from crankshaft and drives water pump (with fan on 2GA) through a separate belt.

Charging Rate Adjustment—None (see Regulator).

Maximum Charging Rate—Controlled by regulator and dependant on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminate all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM.
Start	565
30	1160
30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F).
Brush Spring Tension—Approximately 28 ozs.

Removal:—Generator mounted on adjustable bracket at left front of engine. To remove, take out bolt in mounting bracket, slip off drive belt and water pump belt, lift generator out.

Belt Adjustment:—½" deflection midway between generator and crankshaft pulley (generator belt), generator and pump pulley (pump belt). Adjust both belts by loosening two capscrews in mounting bracket beneath generator, move generator up and out (bolt holes slotted at this angle).

REGULATOR

REGULATOR:—**Ford No. 01A-10505C. Three-Unit Type.** Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash.
For complete data, refer to Electrical Equipment Index.
NOTE—Regulator case grounded through 'pigtail' to dash or separate ground wire to generator. This ground lead must be re-connected if cover removed.

Cutout Relay
Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—8 amperes discharge current (maximum).

Voltage Regulator
Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Elec. Equip. Section for other temps.
Checking & Adjusting—***Refer to Electrical Equipment Index for article on 'Ford Regulator—3 Unit Type' for complete instructions.***

Current Regulator
Setting—30-33 amperes Hot (after engine run for 5 minutes).
Checking & Adjusting—See Voltage Regulator.

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LIGHTING

LIGHTING:—Headlamps—Ford Sealed Beam type. Controlled by Lighting Switch on instrument panel and Beam Selector Switch on toeboard.
For complete data, refer to Electrical Equipment Index.

Headlamp Adjustment—Aim each headlamp straight ahead with upper beam hot spot centered on horizontal line 3" below lamp center height.

Beam Indicator—In speedometer dial (at left end on 1GA, at lower edge on 2GA). Lighted whenever Country (high) beam in use.

Switches

Lighting—R-B-M Model 2445, Ford No. 11A-11652. Light Switch Knob and Insert Ford No. 11A-11661-A or C (1GA Deluxe & Super Del.), 11A-11661-B or D (1GA Special), 21A-11661-A (Deluxe & Super Del.), 21A-11661-B (2GA Special).

Beam Selector—R-B-M. Ford No. 11A-13532 (switch only), No. 11A-11653 for 1GA (switch and wiring), No. 21A-11653 for 2GA (switch and wiring).

Instrument—Ford No. 11A-13740-A or C (1GA Deluxe & Spec. Deluxe), 11A-13740-B or D (1GA Special), No. 21A-13740 (2GA).

Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Parking, Instrument, Clock	1½	55
Beam Indicator, Ign. Lock	1	51
Stop & Tail	21-3	1154
Stop (Station Wagon)	21	1129
Tail (Station Wagon)	3	63
Dome (Pillar), Luggage Compt.	3	63
Rear License	3	63

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER (All Models Except 'SPECIAL'):—Ford No. 11A-12250A. Combined with ignition resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlamp circuits), second unit protects other lighting circuits). Breakers are thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

LIGHTING FUSE BLOCK (USED ON 'SPECIAL' 70C, 73C, 77C):—Ford No. 11A-12250B. Combined with ignition resistor on block on dash under cowl. Fuse protects lighting circuits.
Lighting Fuse—25 amperes.

FUSES:—Lighting—25 amperes (on 'Special' only).
Electric Clock—2 amperes.

HORNS:—Air Electric dual horns (Pass. Cars except 'Special' Models), single horn ('Special'). Horn relay used on all models.
Horn Current—24-28 amperes (total—dual horns).

Horn Relay:—R-B-M. Ford Nos. 11A-13842C (used with single horn on 'Special' models & Sedan delivery). No. 11A-13842D (on cars with dual horns).
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE REMOVAL (For Oil Pan Removal & General Engine Service): *See Ford Shop Notes.*

ENGINE SPECIFICATIONS: 1GA (1941), 2GA (1942) 90 HP. 6 cylinder, "L" head type.
Bore—3.3". **Stroke**—4.4".
Rated Horsepower—26.1. **Displacement**—226 cu. ins.
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.7-1. Head is cast iron with large water passages. Premium fuel not required.
Compression Pressure—165 lbs. max. at 2000 RPM. or 105-125 lbs. at cranking speed (100 RPM.).
Vacuum Reading—Approx. 18-20" at idling speed.

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening (Torque Wrench) Specifications—*See Ford Shop Notes.*

CYLINDER SLEEVES:—Hardened, dry type cylinder sleeves used on some engines.
Servicing: *Refer to Ford Shop Notes for complete data.*

PISTONS:—Steel alloy, light weight, cam ground type or Aluminum alloy, T slot type (both types are spherical or 'dome' head). Recondition engines to take finished replacement pistons.
NOTE—Original pistons are 3-ring type. Replacement pistons are 4-ring Aluminum type.
Weight—365 grams (Al.), 460 grams (Steel).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.
Replacement Pistons:—*See Ford Shop Notes for data.*

Fitting New Pistons: Use .50" wide feeler stock of correct thickness (as listed below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 5-8 lbs. (all types).
Feeler Thickness—.002" New Piston in New Plain Bore, .004" New Piston in Worn Plain Bore, .005" Worn Piston in Worn Plain Bore.

PISTON RINGS:—Two compression, one slotted type oil control ring, all above pin (drain holes in oil ring groove). NOTE—Expander used with #2 Compression ring and oil control ring.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0915-.0920"	.012-.017"	.0025-.003"
Compr. #2	.0915-.0920"	.012-.017"	.002-.0025"
Oil #3	.1860-.1865"	.012-.017"	.0015-.002"

Replacement Rings:—*See Ford Shop Notes for data.*

PISTON PIN:—Diameter .8501-.8504". **Length** 2.91". Floating type with retainer at each end. Pin hole in rod is bronze-bushed.
Pin Fit in Piston—.0005" max. or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" (pin should pass through bushing slowly of own weight).
See Ford Shop Notes for Pin Fitting directions.
Replacement Pins: *See Ford Shop Notes.*

CONNECTING ROD:—Length 7.800". **Weight** 727 grams.
Crankpin Journal Diameter—2.235".
Bearing Type—Steel-backed, special alloy lined type removable shells clamped in rod and cap.
Clearance—.0013-.0035". **Sideplay**—.003-.007".

Bearing Adjustment:—None (no shims). Replace bearings worn .005" or more (.005" or more thinner than original insert).
Replacement Bearings:—*Refer to Ford Shop Notes.*

CRANKSHAFT:—Four bearing, cast alloy steel, counter-weighted type (vibration dampener at front).
Journal Diameters—2.499" (all bearings).
Bearing Type—Steel-backed, special alloy lined removable bearing shells.
Clearance—.001-.003" (or slight drag with .002" feeler assembled in bearing for clearance check).
Bearing Adjustment:—None (no shims). Do not file.
End Thrust:—Taken by rear main bearing. Adjust by replacing bearing. **Endplay**—.002-.006".
Replacement Bearings:—*Refer to Ford Shop Notes.*

CAMSHAFT:—Four bearing. Helical gear drive.
Bearing Diameters—1.797" all bearings. Replace the camshaft if worn to less than 1.7955" diameter. Replace bearings if inside diameter more than 1.802".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Timing Gears:—Cast alloy steel (crankshaft), fibre or aluminum, bolted-on type (camshaft).
See Ford Shop Notes for Timing Gear Replacement data.

Camshaft Setting: Mesh marked tooth of crankshaft gear in marked space between teeth on camshaft gear.

VALVES:—	Head Diameter	Stem Diameter
Intake	1.647"	.3115"
Exhaust	1.510"	.3115"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0015-.0045"

NOTE—Service limit for valve stem diameter .3065".
Refer to Ford Shop Notes for Valve Assembly Removal directions and valve servicing data.
NOTE—Seat inserts used on exhaust valves.

Valve Guides:—Split type retained by 'C' washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).
For Valve Guide servicing data, see Ford Shop Notes.

Valve Lifters:—Barrel type in reamed holes in block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs:—	Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.84"

NOTE—Replace spring if the pressure is less than 30 lbs. when compressed to 2.125".

VALVE TIMING

Tappet Clearance: .013-.015" All Valves Cold No adjustment.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 3° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
To Check Valve Timing—No marks provided. If top dead center point established on flywheel, intake valve should open approx. 1 tooth before this top dead center position.

LUBRICATION

LUBRICATION:—Pressure type. Oil pump in crankcase.
Normal Oil Pressure:—30 lbs. at 2000 RPM.

Oil Pump:—Helical gear type. Pump mounted on front main bearing cap in crankcase and driven by gear from crankshaft timing gear.
Oil Pump Service—*See Ford Shop Notes.*

Oil Pressure Regulator:—Under plug on right side of crankcase in front of fuel pump. Not adjustable.
NOTE—Replace oil relief valve spring if not within limits of 44-46 ozs. with spring compressed to 1.40".

Oil Screen & Drain Plug:—New type single unit on bottom of oil pan (plug is large type with screen

mounted on inner end so that screen removed and accessible for cleaning whenever plug taken out).

Oil Pressure Gauge:—King-Seeley Electric. Ford No.
Dash Unit—11A-9273B (1GA Pass. Car), 21A-9273 (2GA Pass. Car), 11C-9273B (Sedan Delivery).
Engine Unit—48-9278 (All Models).
See Miscellaneous Section for complete data.

Crankcase Capacity:—5 quarts.

COOLING

COOLING SYSTEM:—**Capacity** 17 qts. (1GA), 15 (2GA).
NOTE—Engine has distributing tube in cylinder block with nozzle for each cylinder which directs cooling water flow in engine.

Water Pump:—Self-sealing (packless), balanced, centrifugal type. Mounted on front of cylinder block and driven by belt from generator pulley. Delivery Capacity 50 gals. per minute against 15 lbs. pressure.
NOTE—1GA pump shaft mounted on bushing, 2GA type on sealed ball-bearing.
See Water Pump Section for complete data.

Thermostat:—New dual-valve type. Located in water outlet elbow on cylinder head. With main valve closed (cold engine), water is by-passed through passage in head directly to water pump to maintain circulation through engine. By-pass passage is shut off when main valve opens to permit circulation through radiator.

Temperature Gauge:—King-Seeley Electric. Ford Nos.
Dash Unit—11A-10883B (1GA Pass. Car), 21A-10883 (2GA Pass. Car), 11C-10883B (Sedan Delivery).
Engine Unit—99A-10884 (All Models).
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—**Long Model 10CF-TI.** Single plate, dry disc, semi-centrifugal type.
Facings—Woven type, 2 required. Inside Diam. 6¾". Outside Diam. 10". Thickness .125".
See Clutch Section for complete data.

Adjustment:—Pedal free movement should be 1.0-1.25". To adjust, remove clevis pin at end of connector rod, adjust clevis on rod.

Removal:—Slide rear axle and transmission to rear as a unit to expose clutch (see Transmission Removal below), take out mounting screws in cover.

TRANSMISSION

TRANSMISSION:—**Own Make.** Constant-mesh, synchro-mesh (Second & High), sliding gear (low & reverse), all helical gear type.
See Transmission Section for complete data.

Transmission Control:—Mechanical steering col. shift.
See Transmission Section for complete data.

Removal:—Disconnect gear shifter rods at levers on transmission (Pass. Cars), disconnect rear shock absorbers, hand brake cables, hydraulic brake line at torque tube connection (bleed lines when re-connected), and speedometer cable. Disconnect rear spring at center frame connection, take out universal joint ball housing screws, slide rear axle assembly back to disengage drive shaft at splined joint. Support rear of engine, take out rear engine mounting bolts, transmission mounting screws & transmission.

UNIVERSALS

UNIVERSAL JOINT:—**Spicer Model 202-6.** Steel bushing type. Single joint at rear of transmission case.
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—**Own Make.** ¾ floating, Spiral Bevel gear type with Torque Tube drive.
See Rear Axle Section for complete data.
Ratio—3.78-1 Std.; 3.54-1, 4.11-1 Optl.
Backlash—.012" max.

Removal:—Disconnect rear shock absorbers, hand brake cables, hydraulic brake line at torque tube connection (bleed lines when re-connected), speedometer cable. Disconnect rear spring at center frame connection, take out universal joint ball housing screws, pull axle assembly to rear.
Axle Shaft Removal—*Refer to Ford Passenger Car Rear Axle article in Rear Axle Section.*

SHOCK ABSORBERS

SHOCK ABSORBERS:—**Houde (Houdaille).** Double acting, adjustable, hydraulic type.

	Houde Model	Right—Ford No.	Left
Front '41	BBCN	11A-18045A	11A-18046A
Front '42	BBCN	21A-18045	21A-18046
Rear	BBCZ	11A-18080A	11A-18081A

FRONT SUSPENSION

Front Suspension:—Conventional 'I' beam section front axle with Reverse Elliott ends and transverse front spring. Axle positioned by radius rods.
Kingpin Inclination—8° crosswise.
Caster—9° Max., 4½° Min. Equal within ½°.
Camber—1° Max., ¼° Min. Must be equal within ¼° and the right wheel must not exceed the left. Axle may be bent cold to adjust caster & camber if proper tools (to prevent axle flange damage) used.
Toe In—1/16". Set at 1-10 ratio to Camber. Adjust by loosening tie rod clamp bolts and turning tie rod.
Steering Geometry—Inner wheel 23⅓°. Outer 20°.

STEERING GEAR

Steering Gear: Ford Make (Gemmer Model 305). Worm-and-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—**Service.** Lockheed hydraulic, double anchor type. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Cast iron. Diameter 12".
Wheel Cylinders—Stepped or two-stage bore type: Front Wheel—Front cylinder 1.25". Rear 1.00". Rear Wheel—Front cylinder 1.125". Rear 1.00".
Lining—Woven (forward shoes), Molded (rear shoes). Width 1.75". Thickness .20". Length per shoe 13.18" (forward shoes), 10.1" (rear shoes).
Clearance—Least possible amount without drag.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top: Auto-Lite Electric type. *See Miscellaneous Section for complete data.*

ENGINE HOOD NOTE:—Hood is alligator type with release catch on nose of hood. To raise hood, pull out on release catch, lift auxiliary catch (exposed when release catch raised), raise hood.

V8 OIL PAN REMOVAL: ***Refer to Ford Shop Notes.***

MODEL IDENTIFICATION

Commercial Models

Model 1941	Model 1942	Engine	Wheelbase
1NC	2NC	4 Cyl.	①
1GC	2GC	6 Cyl. (90 HP.)	①
11C	21C	V8 (90 HP.)	①
19C	29C	V8 (100 HP.)	②
3/4 Tonner			
1ND	2ND	4 Cyl.	122"
1GD	2GD	6 Cyl. (90 HP.)	122"
11D	21D	V8 (90 HP.)	122"
19D	29D	V8 (100 HP.)	122"
1 Tonner			
1NY	2NY	4 Cyl.	122"
1GY	2GY	6 Cyl. (90 HP.)	122"
11Y	21Y	V8 (90 HP.)	122"
19Y	29Y	V8 (100 HP.)	122"
Cab-Over-Engine Models			
111W	211W	V8 (90 HP.)	101"
11W	21W	V8 (90 HP.)	134"
118W	218W	V8 (90 HP.)	158"
191W	291W	V8 (100 HP.)	101"
19W	29W	V8 (100 HP.)	134"
198W	298W	V8 (100 HP.)	158"
Other Models			
1GT,1GU	2GT,2GU	6 Cyl. (90 HP.)	134"
1G8T	2G8T	6 Cyl. (90 HP.)	158"
1G4T	2G4T	6 Cyl. (90 HP.)	194"③
11T,11U	21T,21U	V8 (90 HP.)	134"
118T	218T	V8 (90 HP.)	158"
114T	214T	V8 (90 HP.)	194"③
19T,19U	29T, 29U	V8 (100 HP.)	134"
198T	298T	V8 (100 HP.)	158"
194T	294T	V8 (100 HP.)	194"③

①—1941—112" WB. 1942—114" WB. ③—School Bus
②—1941—118" WB. 1942—114" WB.

SERIAL & ENGINE NUMBER:—Stamped on top of the clutch housing (opening in toeboard with cover plate provided, number visible when floor mat and plate removed and light directed through opening).

TUNE-UP

COMPRESSION:

Engine	Ratio	Head Material	Pressure at 100 RPM
4 Cylinder	6.0-1	Cast-iron	103 lbs.
6 Cylinder	6.7-1	Cast-iron	117 lbs.
V8 "90"①	6.2-1	Cast-iron	113 lbs.
V8 "90"②	5.9-1	cast-iron	108 lbs.
V8 "100" '41①	6.6 -1	Aluminum	116 lbs.
V8 "100" '42①	6.6-1	Cast-iron	116 lbs.
V8 "100" '41②	5.9-1	Cast-iron	106 lbs.
V8 "100" '42②	6.4-1	Cast-iron	120 lbs.

①—Comm'l, ¾ & 1 Ton. ②—Other Trucks.

VACUUM READING:—Steady 18-20" idling at 5-7 MPH.

FIRING ORDER:—1-2-4-3 (4 Cyl.), 1-5-3-6-2-4 (6 Cyl.), 1-5-4-8-6-3-7-2 (V8). See diagram for cylinder Nos.

SPARK PLUGS:—Champion H9 Comm. 14 MM. Metric. Gaps—.025".

IGNITION: See Coil, Condenser, and Distributor. Breaker Gap—.014-.016". Cam Angle 40° (4 Cyl. & 6 Cyl.—Closed), 36° (V8—Closed both sets together)

Automatic Advance (4 Cyl.)—8½-9½° max. at 800 RPM. (distributor).

Automatic Advance (6 Cyl.)—11-12° max. at 600 RPM. (distributor).

Automatic Advance (V8)—8° max. at 950 RPM. (78-12127 Distr.), 11° max. at 600 RPM. (11A-12127 & 21A-12127 Distr.), distributor degrees and RPM.

IGNITION TIMING: See Ignition Timing.

Std. Setting—At TDC. (4 Cyl.), 2° BTDC. (6 Cyl.), 4° BTDC. (V8). No flywheel marks provided. See Ignition Timing for timing procedure and Vacuum Brake adjustment.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting (4 Cyl.)—Idle screw opened to point where engine fires smoothly (turning screw in will cause engine to "roll"). Idle speed 5-7 MPH. NOTE—Main metering jet adjustment screw should be set for maximum speed and power with engine operating on 1/3 throttle.

Idle Setting (6 Cyl.)—Idle screw open to point where highest steady vacuum reading secured. Idle speed 350 RPM. or 8 MPH.

Idle Setting (V8)—Both idle screws ⅝-¾ turn open. Idle speed 5-7 MPH.

Float Level (4 Cyl.)—9/32" from gasket seat on cover to nearest point on float (invert to check). NOTE—Set both floats alike.

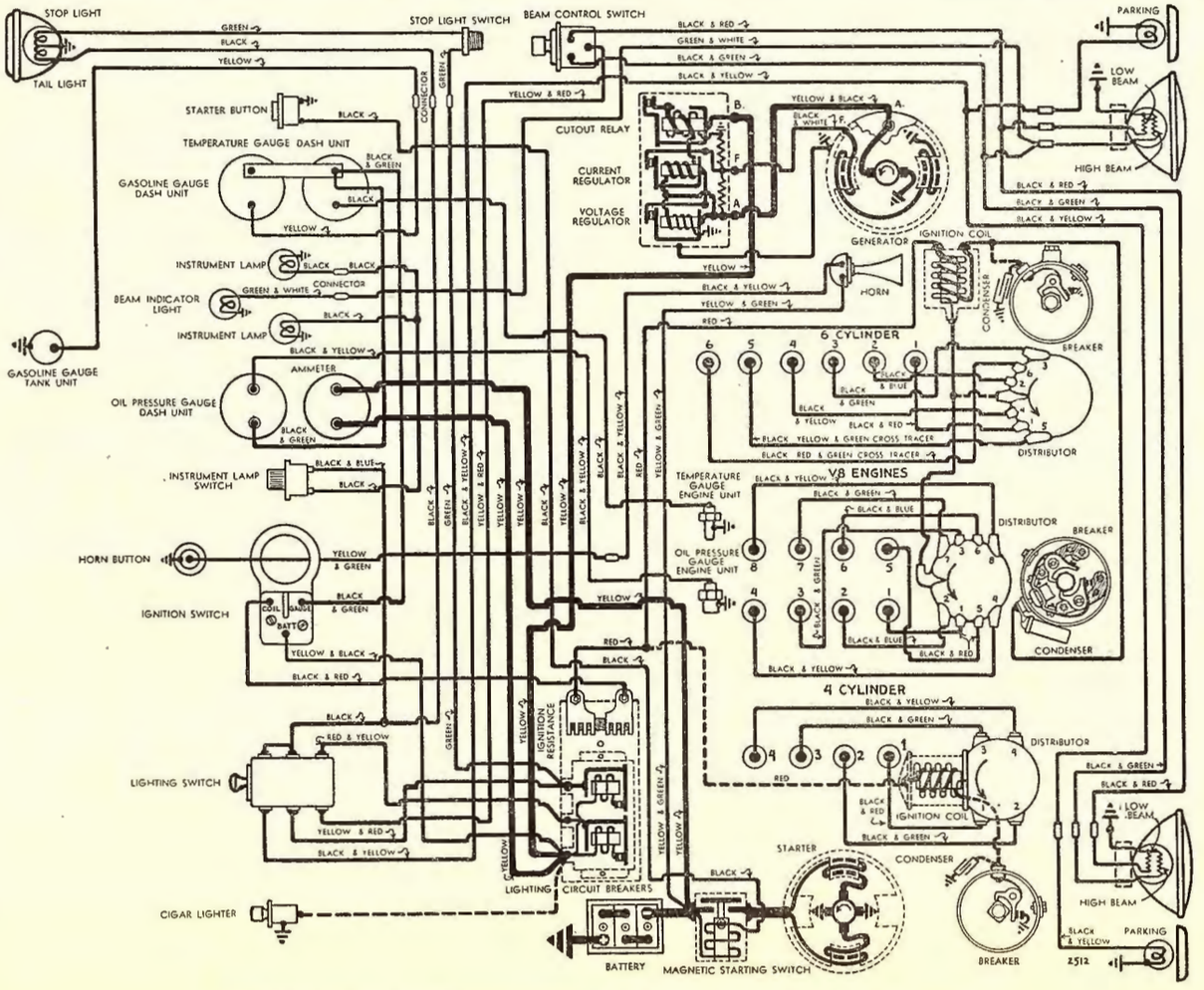
Float Level (6 Cyl. & V8)—Fuel level 11/16" (21/32-23/32" below top edge of bowl.

Accelerating Pump (6 Cyl.)—Center (#2) hole—Normal. Inner (#1) hole (Summer), Outer (#3) hole (Winter) for temperature extremes.

Accelerating Pump (V8)—Inner (#1) hole—Summer, Center (#2) hole—Winter. Outer (#3) hole for extremely cold temperatures only.

Fuel Pump Pressure: 3½ lbs. maximum.

MANIFOLD HEAT CONTROL (6 CYL.): Automatic type. Valve has counterweight and thermostatic coil attached to shaft and should be closed (counterweight arm against stop pin on manifold) with engine cold.



Refer to 1941 V8 Pass. Car diagram for Ignition Wiring of 1941 V8 Trucks

VALVES: See Valve Timing.

Tappet Clearance:—.010-.012" Intake, .014-.016" Exh. (4 Cyl. & V8), .013-.015" Intake and Exhaust (6 Cyl.). No adjustment provided.

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Oakes Steering Column and Ignition Lock Assembly.

Steering Post & Ign. Lock Assem.	Oakes No.	Ford No.	Ignition Switch Oakes No.
Comm'l. ①	302120	21C-3676-A	302461
Comm'l. ②	302478	21C-3676-B	302494
¾ & 1 Tonner	302120	21C-3676-A	302461
Cab-over-Eng.	301790	21W-3676	302461
Other Trucks	302122	21T-3676	302461

①—Floor mtd. Gearshift. ②—Strg. Col. Gearshift.

Lock Cylinder—Hurd or Briggs & Stratton. B&S No. 80935, Ford No. 91A-3686-A (with Keys).

Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 9N-12024 (4 Cyl.), 1GA-12024 (6 Cyl.), 78-12036 or 81A-12036 (1941 V8). 1GA-12024 (1942 V8). Coil mounted as part of ignition unit assembly (4 Cyl. & 1941 V8), separately on engine block (6 Cyl. & 1942 V8).

Resistor Unit—Connected in coil primary circuit. Mounted on Circuit Breaker Assembly 11A-12250-A

Ignition Current—4½-6 amperes (All) with engine stopped. Ignition primary resistance 1-1⅓ ohms.

CONDENSER: Ford Part No. 91A-12300 (4 Cyl.), 78-12300 or 81A-12300 (1941 V8), 1GA-12300B (6 Cyl. & 1942 V8).

Capacity—.33-.36 mfd. (78-12300 & 81A-12300), .29-.32 mfd. (91A-12300 & 1GA-12300B).

DISTRIBUTOR (4 CYL.): Ford 9N-12000 (With Coil), 9N-12100 (less Coil). Single breaker, 4 lobe cam, full automatic advance type (no Vacuum Brake Control). Ignition unit (coil mounted on distributor) mounted on front end of engine and driven directly off end of camshaft.

Breaker Gap—.014-.016". Use special two step feeler —.014" step 'go', .016" step 'no go'.

Cam Angle or Dwell—Approx. 40° closed, 50° open. Set dwell at 41% (limits 36-41% at 2000 RPM.) on Ford Test Set.

Breaker Arm Spring Tension—20-24 ounces.

Rotation—Clockwise viewed from drive end (counter-clockwise viewed from front of engine).

Automatic Advance (4 Cylinder)

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
3-4	400	6-8	800
8½-9½	800	17-19	1600

Removal:—Ignition unit mounted on front of engine. To remove, take off cap, take out mounting screws

DISTRIBUTOR (6 CYL. & V8): ***All data same as for Passenger Car equipment. See 1941-42 Ford 6 Cylinder and V8 articles for complete data.***

IGNITION TIMING

IGNITION TIMING:—For each engine as follows. See Vacuum Brake Setting following for adjustment depending on type of service and fuel (6 Cyl. & V8).

	Flywheel Degrees	Piston Position
4 Cyl. Engine	At TDC.	.0000" TDC.
6 Cyl. Engine	2° BTDC.	.0018" BTDC.
All V8 Engines	4° BTDC.	.0058" BTDC

Timing—Manufacturer recommends use of Ford Laboratory Test Set (Heyer H1) with Distributor Stroboscope (Heyer H1-DFZ) and Special Adapter (Heyer EGDAE for 4 Cyl., EGDAF for 6 Cyl.). On Stroboscope set timing index at top dead center (4 Cyl.), at 1° before top dead center (6 Cyl.), at 2° before top dead center (V8), set peepsight at Zero. Adjust distributor by loosening adjusting screw in slot on left side of housing and moving screw up (to retard spark), down (to advance speark) in slot until Stroboscopic disc light is in line with peepsight, tighten adjusting screw.

Timing (On the Engine)—No flywheel marks provided. With distributor adjusted as described above, this will give correct TDC (4 Cyl.), 2° BTDC. (6 Cyl.), 4° BTDC. (V8) timing on the engine.

Vacuum Brake Setting (6 Cyl. & V8 only)—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load; then turn screw in just enough to eliminate ping, tighten locknut. When adjusted on the stroboscope, vacuum brake should retard spark to peepsight with peepsight set at 2° when distributor is driven at 650 RPM. with no vacuum to release brake.

CARBURETOR

Carburetor (4 Cyl.):—Marvel-Schebler Model TSX, Ford No. ONY-9510. Single barrel, updraft type.
For complete data, refer to Carburetor Index.

Idle Adjustment—With engine warm, set throttle stopscrew for 5-7 MPH. idle speed. Turn idle adjusting screw in until engine rolls, then turn screw out until engine fires smoothly. Recheck idle speed.

Power (Main Metering Jet) Adjustment—Open throttle approximately 1/3, turn power adjusting screw in until engine begins to lose power and speed drops off, then turn screw out until speed picks up and power is at maximum. Road test car and turn screw out slightly if engine falters when picking up.

Float Level—9/32" from gasket surface on bowl cover to nearest point on float with valve seated (invert cover to check). Set both floats alike.

Metering Jets—***Refer to Carburetor Index for Marvel-Schebler Carburetor article for complete data.***

Carburetor (6 Cyl. & V8): ***All data same as for Passenger Car equipment. See 1941-42 Ford 6 Cylinder and V8 articles for complete data.***

CARB. EQUIPMENT

Air Cleaner:—Ford No. 91A-9600A (4 Cyl. & V8 except C-O-E), 1GA-9600C (6 Cyl.), 81W-9600A (Cab-Over-Engine). Oil-wetted type std. Oil bath type Optl.

Fuel Pump:—	Type	AC No.	AC Exch. No.	Ford No.
4 Cyl.	R	1537465		1NC-9350
6 Cyl.	R	1537744	543	1GA-9350
V8	R	1537384	541	11A-9350

For complete data, refer to Carburetion Equip. Index.

Pressure—1½-2¾ lbs.

Gasoline Gauge:—King-Seeley Electric type. Ford No. **Dash Unit**—91A-9280A (Cab-Over-Engine), 11C-9280A (Comm'l & Other Trucks). **Tank Unit**—No. 01W-9275 (Cab-over-Engine), 01Y-9275 (1941 Panels), 21C-9275B (1942 Panels), 01T-9275 (1941 Others), 21C-9275A (1942 Closed Cabs).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—**Ford No. 01A-10655-A.** 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).

Starting Capacity—150 amperes for 20 minutes.

Zero Capacity—300 amperes for 4.0 minutes.

Grounded Terminal—Positive (+) grd. to dash.

Engine Ground—Strap connector between rear of cylinder head (right head on V8) and dash.

Dimensions—Length 10.6". Width 7.3". Height 9.2".

Location—In engine compartment on left side (6 Cyl.), on right side (4 Cyl. & V8 exc. C-O-E). Under seat on right side on Cab-Over-Engine models.

STARTER

STARTER:—**Ford No. 52-11002 (4 Cyl.), 18-11002 (6 Cyl. V8). Armature 52-11005 (4 Cyl.), 18-11005 (Others).**

Drive—Barrel type Bendix No. A-1806, Ford No. 52-11350C (52-11002). Inboard Bendix No. L11FX-10, Ford No. B-11350 or Ford B&S Drive (rubber type, no spring) No. 91A-11350. ***Refer to Electrical Equip. Index for Ford B&S Starter Drive data.***

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—2 lbs. each.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch:—R-B-M. Ford No. 01A-11450-A. Magnetic switch mounted on dash and controlled by instrument panel pushbutton, Ford No. 11C-11500 (1941), 21C-11500 (1942).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR

GENERATOR:

Truck	Ford Numbers Generator	Armature
All 4 Cyl. ('41-42)	1NC-10000	01A-10005
All 6 Cyl. (1941)	1GA-10000	01A-10005
All 6 Cyl. (1942)	2GA-10000	2GA-10005
All V8 exc. C-O-E ('41)	01A-10000B	01A-10005
C-O-E Trk. (1941)	81T-10000A	78-10005C
C-O-E Trk. (1941)	81T-10000B	78-10005D
All V8 incl. C-O-E ('42)	21A-10000	01A-10005

Two brush type with vibrating type voltage and current regulation. Ventilated by drive pulley fan.

Charging Rate Adjustment—None (see Regulator).

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, refer to Ford 6 Cyl. or V8 Passenger Car article for complete directions.

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Performance Data

01A-10000-B		INC-10000	
Amperes	Eng. RPM.	Amperes	Eng. RPM.
Start	520	Start	610
30	1060	30	1240
30	2500	30	2500
		1GA-10000-B	
81T-10000-A		2GA-10000-A	
Start	550	Start	565
28	1300	30	1160
28	2500	30	2500
81T-10000-B		21A-10000	
Start	350	Start	520
20	1050	30	1060
20	2500	30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.1 amperes at 6.0 volts (1NC-, 1GA-, 2GA-, 21A-10000, 01A-10000B—field resistance 2.88 ohms at 70°F), 2.22 amperes at 6.0 volts (81T-10000-A,B—field resistance 2.7 ohms at 70°F).
Brush Spring Tension—Approximately 28 ozs.

Removal (4 Cyl.):—Generator pivot mounted at right of engine. To remove, take out mounting bolts.

Removal (6 Cyl.):—Generator mounted on adjustable bracket at left front of engine. To remove, take out 2 capscrews in mounting bracket.

Removal (V8 Eng.):—Generator mounted on bracket between cylinder banks at front of engine. To remove, loosen nut on bracket stud.

Belt Adjustment (4 Cyl.):—Loosen pivot and clamp bolts, swing generator away from engine until side movement of belt (finger pressure) is 1" midway between generator and fan pulleys.

Belt Adjustment (6 Cyl.):—½" deflection midway between generator and crankshaft pulley (generator belt), generator and pump pulley (pump belt). Adjust both belts by loosening 2 capscrews in mounting bracket beneath generator, move generator up and out (bolt holes slotted at this angle).

Belt Adjustment (V8 Eng.):—1" deflection midway between generator and water pump pulleys. NOTE—Generator mounting bracket modified to include fan mounting (fan driven by separate belt). Both belts adjusted in same manner by loosening mounting bolts and raising mounting brackets.

REGULATOR

REGULATOR:—Ford No. 01A-10505C. Three-Unit Type. Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash.
For complete data, refer to Electrical Equipment Index.
NOTE—Regulator case grounded through 'pigtail' to dash or separate ground wire to generator. This ground connection must be in place when regulator operated or tested (disturbed by cover removal).

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—3 amperes discharge current (maximum).

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Electrical Equipment Section for other temperatures.
Checking & Adjusting—*Refer to Electrical Equipment Index for article on 'Ford Regulator—3 Unit Type'*

Current Regulator

Setting—30-33 amperes (after 5 min. run).
Checking & Adjusting—See Voltage Regulator above.

LIGHTING

LIGHTING:—Headlamps—Ford Sealed Beam Type. Controlled by Lighting Switch on instrument panel and Beam Selector Switch on toeboard.
For complete data, refer to Electrical Equipment Index.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—On panel centered above speedometer. Lighted whenever upper beams in use.

Switches

Lighting—R-B-M. Ford No. 11A-11652 or 01C-11653 (Commercial), No. 01C-11653 (Trucks exc. C-O-E), No. 01W-11653 (Cab-Over-Engine Trucks). Light Switch Knob & Insert No. 11C-11661-C. NOTE—Light Switch Nos. 11653 includes switch and wiring.
Beam Selector—R-B-M. Ford No. 11A-13532.
Instrument—No. 50-13740 (Closed Cabs, Panels).
Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Parking (Trucks exc. C-O-E)	3	63
Parking (Cab-Over-Engine)	1½	55
Instrument, Beam Indicator	1	51
Stop	21	1129
Tail	3	63
Dome (Panels)	15	87

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER:—Ford No. 11A-12250A. Combined with Ignition Resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlight circuits, second unit protects other lighting circuits) of the thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

HORNS:—Ford No. 78-13833-A. Vibrator type, electric single horn. **Horn Current**—6-8 amperes.

ENGINE

4 CYLINDER TYPE

ENGINE SPECIFICATIONS (4 CYL. ENGINE):—4 Cylinder, 'L' head, Enbloc type.
Bore—3.187". **Stroke**—3.75".
Displacement—119.5 cubic inches.
Rated Horsepower—16.2.
Developed Horsepower—30 at 2800 RPM (for 1941), 40 at 3200 RPM (for 1942).
Compression Ratio—6.0-1 Cast-iron head.
Compression Pressure—129 lbs. at 1200 RPM. or 103 lbs. at cranking speed of 100 RPM.
Vacuum Reading—18-20" steady idling at 5-7 MPH.

CYLINDER SLEEVES:—Hardened, dry type, cylinder sleeves used on some engines.
Servicing:—*See Ford Shop Notes for data.*

PISTONS (4 CYL.):—Steel alloy, light weight, cam ground type. When reconditioning engine, replace cylinder sleeves and install new Std. pistons.
Weight—358-362 grams (without rings or pin).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.
Fitting New Pistons:—Use .003" feeler, .50" wide, inserted between piston and cylinder wall at right angles to pin. Pull required to withdraw feeler must be 7-12 lbs. NOTE—On engines with plain cylinders (no sleeves), use .0025" feeler with 7-12 lbs. pull.
Replacement Pistons:—*See Ford Shop Notes for data.*

PISTON RINGS (4 CYL.):—Two compression, one slotted oil control ring, all above pin. Oil ring groove drilled for oil drainage. NOTE—Expanders are used with #2 Compression Ring & Oil Control Ring.

Ring	Width	End Gap	Side Clearance
Compr. #1	.130-.140"	.012-.017"	.0025-.003"
Compr. #2	.130-.140"	.012-.017"	.002-.0025"
Oil Cont.	.1535-.1540"	.012-.017"	.0015-.002"

Replacement Rings:—*See Ford Shop Notes for data.*

PISTON PIN (4 CYL.):—Diameter—.7501-.7504". **Length** 2.97". Pin floating type with locking ring in piston at each end. Pin hole in rod bronze-bushed.
Pin Fit in Piston—.0005" clearance.
Pin Fit in Rod Bushing—.0001" clearance. *Refer to Ford Shop Notes for Piston Pin Fitting directions.*

CONNECTING ROD (4 CYL.):—Length 7.000".
Weight—580 grams.
Crankpin Journal Diameter—2.094".
Bearing Type—Removable steel-backed, special alloy lined type, clamped in rod and bearing cap.
Clearance—.0005-.002". **Sideplay**—.002-.006".

Adjustment:—None (no shims). Replace bearings. Do not file rods or bearing caps.

Replacement Bearings:—*Refer to Ford Shop Notes.*

CRANKSHAFT (4 CYL.):—Three bearing type with integral counterweights.
Journal Diameters—2.2485" (all bearings).
Bearing Type—Removable, steel-backed, special alloy lined. Front & Rear bearings interchangeable.
Clearance—.001-.003" (or slight drag with .002" feeler assembled in bearing for clearance check).

Bearing Adjustment:—None (no shims). Replace bearings. Do not file bearing caps.

End Thrust:—Taken by center bearing. Adjust by replacing bearing. **Endplay**—.002-.006".

Replacement Bearings:—*Refer to Ford Shop Notes.*

CAMSHAFT (4 CYL.):—Three bearing with Helical Gear drive (gear furnished as unit with shaft).
Journal Diameters—1.797" (all bearings).
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.002".

Timing Gears:—Cast alloy iron (crankshaft), Bakelized Fabric or Aluminum bolted on (camshaft).
Backlash—.004" maximum. *Refer to Ford Shop Notes for Timing Gear Replacement data.*

Camshaft Setting:—Mesh '0' marked tooth of crankshaft gear with '/' marked space on camshaft gear (this mark must be in line with mark on hub).

VALVES (4 CYL.):

	Head Diam.	Stem Diam.	Length
Intake	1.537"	.3115"	4.750-4.751"
Exhaust	1.280"	.3115"	4.750-4.751"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	.307"	.0015-.0035"

See Ford Shop Notes for Valve Servicing data.
NOTE—Seat inserts used for all valves.

Valve Guides:—Split type retained by 'C' washer and valve spring. *See Ford Shop Notes for servicing data.*

Valve Lifters:—Barrel type in reamed holes in block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs:—	Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.82"

ENGINE

6 CYLINDER TYPE

ENGINE SPECIFICATIONS: 1GA (1941), 2GA (1942) 90 HP. 6 cylinder, "L" head type.
Bore—3.3". **Stroke**—4.4".
Rated Horsepower—26.1. **Displacement** 226 cu. ins.
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.7-1 Cast Iron Head.
Compression Pressure—165 lbs. max. at 2000 RPM. or 117 lbs. at cranking speed.
Vacuum Reading—Approx. 18-20" at idling speed.

►*For all other 6 Cyl. Engine data, refer to 1941-42 Ford 6 Cylinder Passenger Car article.*

ENGINE

V8 "90" TYPE

ENGINE SPECIFICATIONS: Own 90. 8 Cylinder, 90° Vee, "L" Head type. Both cylinder banks and crankcase cast Enbloc.
Bore—3.062". **Stroke**—3.75".
Rated Horsepower—30. **Displacement** 221 cu. ins.
Developed Horsepower—90 at 3800 RPM.
Compression Ratio—6.2-1 (Comm'l, ¾, 1 Ton), 5.9-1 (Other Trucks). Cast Iron Heads.
Compression Pressure—140 lbs. (6.2-1 Head), 135 lbs. (5.9-1 Head) max. at 2300 RPM. or 113 lbs. (6.2-1), 108 lbs. (5.9-1) at cranking speed of 100 RPM.
Vacuum Reading—Steady 18-20" at 5-7 MPH.

►*For all other V8 "90" Engine data, refer to 1941-42 Ford V8 "90" Passenger Car article.*

ENGINE

V8 "100" TYPE

ENGINE SPECIFICATIONS: Own 100. 8 Cylinder, 90° Vee, "L" Head type. Both cylinder banks and crankcase cast Enbloc.
Bore—3.187". **Stroke**—3.75".
Rated Horsepower—32.5. **Displacement** 239 cu. ins.
Developed Horsepower—100 at 3800 RPM.
Compression Ratio & Pressure—As follows:

Engine	Ratio	Material	Pressure at 100 RPM
V8 "100" '41①	6.6 -1	Aluminum	116 lbs.
V8 "100" '42①	6.6-1	Cast-iron	116 lbs.
V8 "100" '41②	5.9-1	Cast-iron	106 lbs.
V8 "100" '42②	6.4-1	Cast-iron	120 lbs.

①—Commercial, ¾ & 1 Ton. ②—Other Trucks.
Vacuum Reading—Steady 18-20" idling at 5 MPH.

►*For all other V8 "100" Engine data, refer to 1941-42 Mercury V8 "100" Passenger Car article.*

VALVE TIMING

Tappet Clearance: .010-.012" Intake (4 Cyl. & V8), .014-.016" Exhaust (4 Cyl. & V8), .013-.015" All Valves (6 Cyl.). No adjustment provided.

Valve Timing (4 Cyl.): See Camshaft Setting above.
Intake Valves—Opens 6° BTDC. Close 22° ALDC.
Exhaust Valves—Opens 38° BLDC. Closes 6° ATDC.
Checking Timing—No flywheel marks or other means provided to check timing. If top dead center point established on flywheel, intake valve should open slightly less than 2 teeth before this point.

Valve Timing (6 Cyl.): See Camshaft Setting.
Intake Valves—Open 3° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
To Check Valve Timing—No flywheel marks provided. If top dead center point established on flywheel, intake valve should open approximately 1 tooth before this top dead center position.

Valve Timing (V8 "90" & "100"): See Camshaft Setting.
Intake Valves—Open At TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
To Check Valve Timing—No flywheel marks provided. Intake valve opens with piston at TDC.

LUBRICATION

LUBRICATION:—Pressure system. Gear type oil pump in crankcase. Pump mounted on right side of front main bearing cap with pump housing integral with bearing cap (4 and 6 Cyl.), mounted separately at rear of crankcase (V8 engines).

Normal Oil Pressure:—25 lbs. at 1400 RPM. (4 Cyl.), 30 lbs. at 2000 RPM. (6 Cyl. & V8 Engines).

Oil Pressure Regulator:—Opens at 25 lbs. (4 Cyl. Eng.), 30 lbs. (others). Not adjustable. Located under plug between cylinder banks at front of engine on 'V8' engine. Located under plug on right side of crankcase in front of fuel pump on Six Cylinder engines. Located under plug at top of timing gear cover (engine front cover) on left side on 4 Cyl. Engines.

Oil Screen & Drain Plug (4 & 6 Cyl.):—Single unit on bottom of oil pan (plug is large type with screen mounted on inner end so that screen removed and accessible for cleaning whenever plug taken out).

Oil Pressure Gauge:—King-Seeley Electric. Ford No. 11C-9273A (Dash Unit), 48-9278 (Eng. Unit).
See Miscellaneous Section for complete data.

Crankcase Capacity:—4 qts. (4 Cyl.), 5 qts. (others).

COOLING

COOLING SYSTEM:—**Capacity.** 14 qts. (All 4 Cylinder), 16¾ qts. ('42 6 Cyl. Comm'l., ¾ & 1 Ton), 17¼ qts. ('42 6 Cyl. Regular Truck), 23 qts. (All V8's exc. '41 C-O-E), 24 qts. ('41 Cab-Over-Engine).

Six Cylinder Note—A water distributing tube installed in cylinder block with a nozzle for each cylinder which directs flow of cooling water in engine.

Water Pump (4 Cyl. Eng.):—Packless type, 1 used. Mounted on front end of cylinder block and driven by fan belt (fan mounted on front end of water pump shaft).
See Water Pump Section for complete data.

Removal—Remove drive belt, take out mounting bolts and remove fan. Take out pump mounting screws and remove pump assembly.

Water Pump (6 Cyl. Eng.):—Packless (self-sealing), balanced, centrifugal type. Mounted on front of cylinder block and driven by a separate belt from the generator pulley.
See Water Pump Section for complete data.

Removal—Remove drive belt, take out mounting bolts and remove fan. Take out pump mounting screws and remove pump assembly.

Water Pump (V8 Engines):—Packless type, 2 used (1 for each bank). Mounted on front of engine block.
See Water Pump Section for complete data.
Removal—Slack off drive belt, support engine at forward end, remove front engine mounting bolts (engine mounting integral with pump housing), take out mounting screws in pump body.

Thermostat (4 Cyl. & V8):—In top radiator hose (4 Cyl. Engine—1 used), in each cylinder head outlet elbow (V8 Engine—2 used).
Setting—Starts to open at 145° F. Fully open 180°F.

Thermostat (6 Cylinder):—New dual-valve type. Located in outlet elbow on cylinder head. With main valve closed (cold engine), water is by-passed through passage in head directly to water pump to maintain circulation through engine. By-pass passage is shut off when main valve opens.

Temperature Gauge:—King-Seeley Electric. Ford No. 11C-10883A (Dash Unit), 99A-10884 (Eng. Unit). V8 NOTE—Accessory Temperature Gauge Switch (for Other Bank) No. 01A-10990. Kit No. 11A-18381.
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—Long Model 9CF-CS (4 Cyl., All Models, V8 '90' Commercial), 10CF-TI (6 Cyl. Comm'l & V8 '100' Comm'l., ¾ & 1 Ton), 11CF-CS (All Others). Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.

Facings—Molded type, 2 required.

Clutch Model	Inside Diameter	Outside Diameter	Thickness
9CF-CS	5.76"	9"	.137"
10CF-TI	6.75"	10"	.137"
11CF-CS	6.50"	11"	.137"

Adjustment:—Pedal free movement should be 1.5-1.75". To adjust, remove clevis pin at end of connector rod, adjust clevis on rod.

Removal:—Remove transmission (see Transmission Removal below). Take out mounting screws in clutch cover flange

TRANSMISSION

3-SPEED TYPE

TRANSMISSION (3 SPD.):—Own Make. Standard on all Commercial, 3/4 & 1 Ton with 6 Cyl. & V8 Engines (4 Spd. type Std. on 1 Ton with 4 Cyl. Engine). Constant-mesh, synchro-mesh, helical gears (second and high), sliding spur gears (low and reverse).
6 Cylinder Note—Transmission housed in separate case bolted to flywheel housing.
See Transmission Section for complete data.

NOTE—4 Spd. Transmission Optl. on these models.

Removal:—Remove 4 front companion flange bolt nuts at front universal. On truck models with two propeller shafts, take out 2 bolt nuts at coupling shaft center support. Lower propeller shaft assembly to floor. Support engine at rear end, take out rear engine mounting bolts. Remove clutch housing mounting screws (transmission mounting screws on 6 Cyl.). Pull transmission straight back and remove.

NOTE—1941 Commercial models equipped with Torque Tube Drive. *See 1941-42 Ford V8 "90" Passenger Car article for Transmission Removal instructions on these models.*

TRANSMISSION

4-SPEED TYPE

TRANSMISSION (4 SPD.):—Own Make. Std. on all Truck models except 3/4 & 1 Ton (with 6 Cylinder and V8 Engines). Sliding spur gear type.
See Transmission Section for complete data.

NOTE—This Transmission Optl. on other models.

Removal:—Same as for 3 Spd. Transmission above.

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UNIVERSALS

UNIVERSAL JOINTS:—Spicer—Needle bearing types. Two used (101" and 114" WB. models), 3 used with slip-joint in center behind coupling shaft bearing (122", 134", 158", 194" wheelbase models).
See Universals Section for complete data.

NOTE—1941 Commercial models equipped with one universal joint (Spicer Steel Bushing Type) in ball housing at rear of transmission.

Spicer Model Nos.

Wheelbase	Front	Center	Rear
101"	1351-22,23	None	1358-104, 115
114"①	1278-102	None	1278-102
114"②	1311-102	None	1318-104
122"	1318-103	1311-102	1318-103
134&158"	1358-4, 31	1351-110, 111	1358-104, 115
194"	1358-5, 32	1351-110, 111	1358-105, 116

①—3 Spd. transmission. ②—4 Spd. transmission.

Coupling Shaft (Center) Bearing (Trucks):—A cushion mounted Coupling Shaft Ball Bearing bolted to underside of intermediate frame cross member is now used. Bearing is mounted on end of coupling shaft in a sleeve with a felt retainer sleeve on each end and a bearing baffle over the front end. Bearing is retained by center universal companion flange. Bearing and sleeve assembly mounted in center support which is bolted to underside of frame cross member.

REAR AXLE
COMMERCIAL TYPES

REAR AXLE (COMMERCIAL):—Own Make. 3/4 floating, Spiral Bevel gear type with straddle-mounted pinion with Torque Tube drive (1941), Hotchkiss drive (1942 models).
See Rear Axle Section for complete data.
Ratio—6 & 8: 3.78-1 Std., 3.54-1 Optl. **4:** 4.55-1.
Backlash—.012" maximum.

Removal:—Split rear universal joint by taking out two 'U' bolts and nuts. Lower propeller shaft. Disconnect hand brake cables and flexible hydraulic brake line at rear axle (bleed brake lines when reconnected). Disconnect rear shock absorbers from axle. Disconnect rear springs (semi-elliptic type) and withdraw axle assembly to the rear.

NOTE—1941 Commercial models equipped with Torque Tube Drive. ***See 1941-42 Ford V8 "90" Passenger Car article for Rear Axle Removal instructions on these models.***

Axle Shaft Removal—Axle must be dismantled and shaft removed through differential housing at inner end (side gear integral). ***See Rear Axle Section for Ford Rear Axle article for complete data.***

REAR AXLE
TRUCKS

REAR AXLE (TRUCKS):—Own Make. Full-floating, Spiral Bevel gear type with straddle-mounted pinion and Hotchkiss drive.
See Rear Axle Section for complete data.

Ratio	Standard	Optional
3/4 & 1 Ton (4 Cyl.)	6.67-1	
3/4 & 1 Ton (Others)	4.857-1	4.11-1
All Others	6.67-1	5.14-1, 5.83-1

Backlash—.004-.016".

Removal:—Split rear universal joint by taking out two 'U' bolts and nuts. Lower propeller shaft. Disconnect hand brake cables at equalizer (3/4 & 1 Tonner) and flexible hydraulic brake line at rear axle (bleed lines when re-connected). Disconnect rear springs (semi-elliptic type) and withdraw axle assembly from beneath truck.

Axle Shaft Removal—Take out two screws (except 3/4 & 1 Tonner) and remove hub cap, remove nuts on 8 hub studs which hold axle shaft flange in place, turn the two special screws (in tapped holes in flange) up evenly to break flange loose from wheel hub, **back these screws out,** strike axle shaft flange at center to loosen centering cones on studs, remove cones, pull axle shaft out (wheel not disturbed).

Wheel Bearing Adjustment—Remove axle shaft (above), use special bearing adjusting wrench and remove bearing locknut (outer nut), nut retainer, and grease retainer (except 3/4 & 1 Tonner). Adjust inner bearing adjusting nut by turning up until tight and then backing off 1/8 turn, install grease retainer, bearing nut retainer, outer bearing locknut, turn locknut up tight.

NOTE—When installing axle shaft, make certain that gasket in place under shaft flange, cones in place on studs and that two loosening screws backed off sufficiently so that stud nuts can be tightened securely. Turn the two loosening screws in just enough to prevent loosening in service.

REAR AXLE
SPECIAL EQUIPMENT

REAR AXLE (OPTL.):—Own Make. Two-speed type.
See Rear Axle Section for complete data.
Ratio—5.83-1 (Direct), 8.11-1 (2nd speed).
Backlash—.006-.020".

Removal:—Same as for standard axle (above) except that control linkage must also be disconnected.

SHOCK ABSORBERS

SHOCK ABSORBERS:—Houde (Houdaille). Double acting, adjustable, hydraulic type. Model numbers: FRONT—BBCN (Comm'l), BBCME or BBCHMS (Trucks). REAR—BBCZ (Comm'l), BBG, BBCLL, or BBCLT (Trucks).

FRONT SUSPENSION

Front Suspension:—Conventional 'I' beam section front axle with Reverse Elliott ends and new semi-elliptic springs.

Kingpin Inclination—7° crosswise.

Caster—3½° Max., 1° Min. Must be equal within ½°.

NOTE—Caster angle controlled by wedge shims inserted between axle pads and springs. To increase caster, insert taper wedge shims equally at both sides (make certain that spring tie bolt passes through hole in wedge so that wedge held securely in place with spring leaves).

Camber—1° Max., ¼° Min. Must be equal within ¼° and right wheel must not exceed left wheel. NOTE—Axle may be bent cold to correct Camber provided that proper tools (wedges and blocks to prevent crushing axle flange) used.

Toe In—1/16". Set at 1-10 ratio to Camber. **Toe-in** increases with load on trucks and should be set with truck empty. Adjust by loosening clamp bolts and turning tie rod.

Steering Geometry (toe out on turns)—Outer wheel turned 20°. Inner wheel 23° (Comm'l, 3/4 & 1 Tonner), 23¾° (101" WB.), 23⅔° (134" WB.), 22¼° (158" WB.). Allowable variation ½°.

STEERING GEAR

Steering Gear (Comm'l Models): Ford Make (Gemmer Model 305 design). Worm-and-Roller type with push-pull adjustments.

Steering Gear (Truck Models): Gemmer Model 335. Worm-and-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—Service. Lockheed hydraulic, double anchor type. Hand lever applies rear wheel service brakes (Comm'l, 3/4 & 1 Tonner), independent shaft brake behind transmission (all others).
See Brake Section for complete data.

Drums—Cast-iron. Diameter: Comm'l & 3/4 Ton (12" front & rear). 1 Ton (12" front, 14" rear). Other Trucks (14" front, 15" rear).

Wheel Cylinders—Stepped type used on Commercial & 3/4 Ton (front & rear wheels), 1 Ton (front). Sizes as follows:

	Front Wheel Front	Front Wheel Rear	Rear Wheel Front	Rear Wheel Rear
Commercial	1.25"	-1.00"	1.125"	-1.00"
3/4 Ton	1.25"	-1.00"	1.25"	-1.00"
1 Ton	1.25"	-1.00"	1.375"	-1.375"
All Others	1.375"	-1.375"	1.50"	-1.50"

Lining—Forward shoes (Woven—all wheels Comm'l & 3/4 Ton, front wheel 1 Ton; Molded—All Others). Rear shoes (Molded—All Models).

	Width	Thickness	Length per Shoe Forward	Rear
Comm'l, 3/4 Ton	1.75"	.20"	13.18"	10.1"
1 Ton (front)	1.75"	.20"	13.18"	10.1"
1 Ton (rear)	2.00"	.268"	15.53"	10.75"
Others (front)	2.00"	.268"	15.53"	10.75"
Others (rear)	3.50"	.33"	16.64"	11.52"

Clearance—Least possible amount without drag.

Hand Brake (Comm'l, 3/4 & 1 Ton):—See Service Brakes above.

Hand Brake (Others):—On drum at rear of transmission.

Adjustment—Fully release hand brake lever. Flat on cam should rest on ear of band (if not, remove pin in lower end of hand lever). Turn anchor screw (on left side) in to give .010" clearance between drum and band, replace locking wire. Loosen lock nut and turn bracket adjusting screw (on right side) to give .010" clearance for lower half of band, tighten lock nut. Tighten adjusting rod nut (on right side), to give .010" clearance for upper half of band (slotted side of nut up). Adjust brake rod clevis so that pin enters clevis and hand brake lever with flat of cam on ear of band and lever in fully released position.

Drum Diameter—7.81".

Lining—Woven. Width 2.5". Thickness 0.250".

ENGINE HOOD NOTE: Hood is Alligator type hinged at cowl. To raise hood, pull out on release catch on nose of hood, lift auxiliary catch (exposed when release catch raised), lift hood up at forward end.

OIL PAN REMOVAL & INSTALLATION: ***See Ford Shop Notes.***

MODEL IDENTIFICATION

NOTE—All trucks built in 1944-45 were fitted with the V8 "100" Engine (3.187" Bore).

Model	1944 Models	Wheelbase
498T		158"
494T School Bus		194"
Model	**1945 Models**	**Wheelbase**
59C Commercial		114"
59T		134"
598T		158"
594T School Bus		194"

1946-47 Models

Model	Engine	Wheelbase
69C Light Duty	V8 "100"	114"
6GC Light Duty	6 Cyl. "90"	114"
69Y One Ton	V8 "100"	122"
6GY One Ton	6 Cyl. "90"	122"
69T Heavy Duty	V8 "100"	134"
6GT Heavy Duty	6 Cyl. "90"	134"
69U Dump Truck	V8 "100"	134"
6GU Dump Truck	6 Cyl. "90"	134"
69W Cab-over-Engine	V8 "100"	134"
691W Cab-over-Engine	V8 "100"	101"
694T School Bus	V8 "100"	194"
6G4T School Bus	6 Cyl. "90"	194"
698T Heavy Duty	V8 "100"	158"
6G8T Heavy Duty	6 Cyl. "90"	158"
698W Cab-over-Engine	V8 "100"	158"

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing and visible when floor mat and transmission cover plate removed.

TUNE-UP

COMPRESSION: Ratio—6.7-1 (6 Cyl. Engine), 6.4-1 (V8 1944-45), 6.75-1 (V8 1946-47). All heads Cast Iron.

Pressure—120 lbs. (105-125) at cranking speed of 100 RPM.

VACUUM READING: Steady 18-20" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2 (for 8 cyl. engine), 1-5-3-6-2-4 (for 6 cyl.). See diagram.

SPARK PLUGS: Champion H9 Comm. 14 mm. Metric. **Gaps**—.025".

IGNITION (6 CYL.): See Coil, Condenser, & Distrib'tr.
Breaker Gap—.014-.016" **Cam Angle** 40° (closed).
Breaker Arm Spring Tension—20-24 ounces.
Automatic Advance—Starts at 200 RPM. Maximum 9° at 600 RPM. (distr. degrees & RPM).

IGNITION (V8): See Coil, Condenser, & Distributor.
Breaker Gap—.014-.016". **Cam Angle** 36° closed for both sets operating together.
Breaker Arm Spring Tension—20-24 ounces.
Automatic Advance—Starts at 200 RPM. Maximum 11° at 600 RPM (distr. degrees & RPM).

IGNITION TIMING: See Ignition Timing.
Std. Setting—1° BTDC (Six Cylinder Engines), 4° BTDC (V8 Engines). No flywheel marks provided. See Ignition Timing for timing procedure and Vacuum Brake adjustment.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Both idle screws ⅝-¾ turn open and set for smooth idle. Idle speed 500 Eng. RPM or 5-7 MPH. NOTE—Six Cylinder Engine carburetor has only one idle adjusting screw (single barrel type).
Float Level—Fuel level 11/16" (21/32-23/32") below top edge of bowl.

Accelerating Pump—Center (#2) hole Normal. Inner (#1) Hole—Summer, Outer (#3) Hole—Winter for temperature extremes.

Fuel Pump Pressure: 3½ lbs. maximum.

MANIFOLD HEAT CONTROL (6 CYL.): Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely.

MANIFOLD HEAT CONTROL (V8—'46-47): Automatic thermostatic type located in exhaust manifold connection of left hand cylinder block (diverts exhaust gases through by-pass channel in intake manifold from left bank to right bank when valve is closed). See that valve operates freely.

VALVE TAPPET CLEARANCE: 6 Cylinder. .013-.015" Cold, for All Valves. No adjustment.

V8 Engine—.010-.012" Intake, .014-.016" Exhaust, Cold. No adjustment.

Valve Timing Check—***See Valve Timing.***

STARTING: ***See Battery, Starter, Generator, Regulator.***

IGNITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock Assembly. Part Nos. as follows:

	Steering Col. & Ign. Lock		Ignition Switch	
	Oakes No.	Ford No.	Oakes No.	Ford No.
Lgt. Trk.①	302120	01C-3676A	302461	81A-3700
Lgt. Trk.②	302478	01C-3676B	302494	81A-3700
H.D. Trk.	302122	21T-3676	302461	81A-3700
C-O-E (LHD)	301790	21W-3676	302461	81A-3700
C-O-E (RHD)	301882	21WF-3676	302461	81A-3700

①—Floor Mtd. Gearshift. ②Strg. Col. Mtd. Gearshift.

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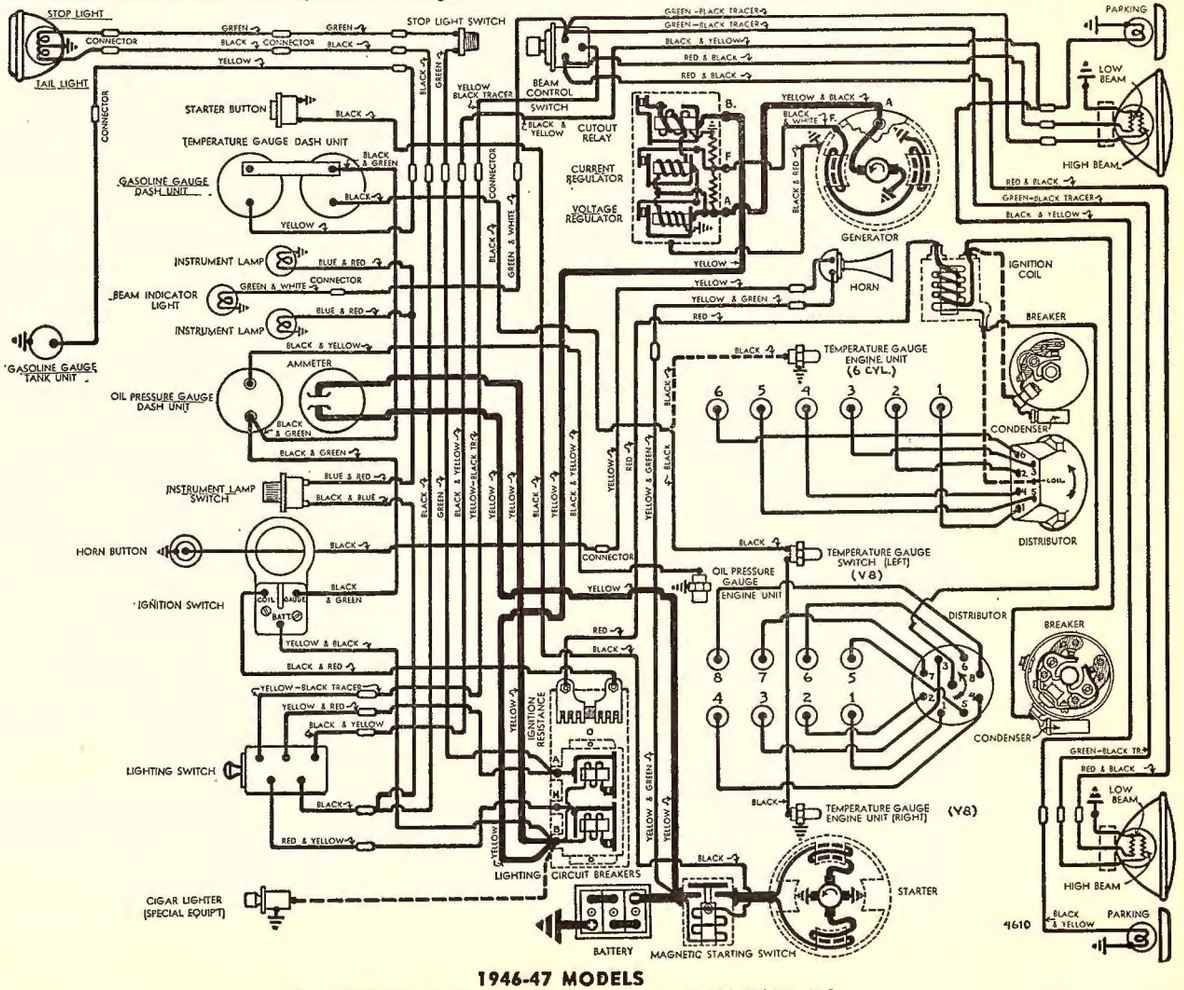

1946-47 MODELS

See 1942 Truck Diagram for wiring on 1944-45 Models

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Lock Cylinder—Hurd or Briggs & Stratton No. 80935. Ford No. 91A-3686A (with key).

Key Series—FK000 to FK999. **Groove**—No. 17

COIL: Ford No. 1GA-12024. Coil mounted separately on left front corner of cylinder block.

Resistor Unit—Connected in coil primary circuit. Mounted on Circuit Breaker Assy. No. 11A-12250-A.

Ignition Current—4½-6 amperes with engine stopped. Ignition primary resistance 1-1⅓ ohms.

CONDENSER: Ford Part No. 1GA-12300-B.

Capacity—.29-.32 microfarad.

DISTRIBUTOR (6 CYL. ENGINE): Ford No. 5GA-12127 (Less Terminal Housing & Rotor). New "Sealed Dry" type. Single breaker, 6 lobe cam, full automatic advance type with Vacuum Brake adjustmt.

Breaker Gap—.014-.016".

Cam Angle or Dwell—40° closed, 20° open (distr.).

Breaker Arm Spring Tension—20-24 ozs.

Rotation—Clockwise viewing drive end of unit.

Distributor	Automatic Advance	Engine
Degrees	R.P.M.	Degrees R.P.M.
Start	200	0 400
9	600	18 1200

DISTRIBUTOR (V8 ENGINE): Ford No. 21A-12127 (1944-45), No. 59A-12127 (1946-47)—Less Terminal Housing, Cap & Rotor. New flat type, Single Cap, "Sealed Dry" (1946-47) distributor similar to type used on 1942 models. Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake adjustment.

Breaker Gap—.014-.016" (each set). Use special two-step feeler—.014" step "go," .016" step "no go."

Cam Angle or Dwell—Approx. 36° closed, 9° open for both sets operating together with correct coil loading lead. Set dwell at 80% (limits 78-80% at 2000 RPM) on Ford Test Set.

NOTE—Cam Angle for each set operating singly approximately 22½° closed, 22½° open (50%).

Breaker Arm Spring Tension—20-24 ounces.

Rotation—Clockwise viewed from drive end (counter-clockwise viewed from front of car).

Automatic Advance
(With Vacuum Brake disconnected)

Distributor		Engine	
Degrees	RPM	Degrees	RPM.
Start	200	0	400
11	600	22	1200

NOTE—Limits 10½-11½ distributor degrees.

Vacuum Brake: Consists of a spring-loaded, vacuum controlled, brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.

Removal: Distributor mounted on front of engine. To remove, disconnect primary lead, remove distributor cap, take out mounting screws in distributor flange, lift unit out.

IGNITION TIMING

Std. Setting—As listed below. See Vacuum Brake Setting for final adjustment dependent on fuel and operating conditions.

Model	Flywheel Degrees
6 Cyl. "90" Engines	1° BTDC
V8 "100" Engines	4° BTDC

Ignition Timing (6 Cyl. Basic Setting)—Distributor can be timed for correct ignition timing when off engine as follows: Place small straight edge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate distributor in direction of rotation (clockwise) until leading edge of scale is exactly ⅝" before the nearest edge of the distributor mounting hole on the vacuum piston side of the mounting flange. If contacts do not begin to open at this point, loosen adjusting screw on side of distributor housing, move screw down (to advance spark) or up (to retard spark) in slot until contacts begin to open, tighten adjusting screw. This setting will provide correct 1° BTDC ignition timing when distributor installed on eng.

Ignition Timing (V8 Basic Setting)—Distributor can be set for correct ignition timing when off engine as follows: Place a small straight edge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate distributor in direction of rotation (clockwise) until trailing edge of scale is exactly ⅜" past the nearest edge of the small mounting hole (left hand hole—nearest vacuum brake) on the mounting flange. If left-hand (timing) contacts do not begin to open at this point, loosen adjusting screw on side of distributor housing, move screw down (to advance spark), up (to retard spark) in slot until contacts begin to open, tighten adjusting screw. This setting will provide correct 4° BTDC ignition timing when distributor installed on engine. NOTE—Timing is controlled by opening of **left hand breaker contacts** only (right hand contacts "load" coil and open and close earlier than the left hand contacts).

Ignition Timing (On Engine)—No flywheel marks or other means provided to check timing on engine. If basic setting of distributor is correct (above), all necessary adjustments for operating conditions and octane rating of fuel being used can be made by means of the Vacuum Brake adjustment as follows:

Vacuum Brake Setting—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, then turn screw in just enough to eliminate ping, tighten locknut. When adjusted on the stroboscope, vacuum brake should retard spark to peep sight with peep sight set at 2° when distributor is driven at 650 RPM with no vacuum to release brake.

CARBURETOR

Holley (Chandler-Groves) Ford No. 5GA-9510-A (Six Cyl. Engine), No. 59A-9510-A (V8 Engine). Single Barrel (6 Cyl.), Dual or double barrel (V8), downdraft types with manual choke control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm and idling at hot idling speed (choke valve open, fast idle inoperative), set throttle stopscrew for idle speed of 500 Engine RPM, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then turn screw out until engine begins to roll, finally turn screw in just enough so that engine fires smoothly. Recheck idle speed.

NOTE—There is only one idle adjusting screw on the Six Cylinder Engine (single barrel) carburetor.

Accelerating Pump Setting—Three holes in throttle lever for pump link connection. Adjust as follows:
Inner (#1)—Extremely hot weather.
Center (#2)—Normal setting—moderate weather.
Outer (#3)—Extremely cold weather.

Float Level—Use 9550-A gauge to set the float level (1.353" end "Go," 1.332" end "No Go") measuring from underside of bowl cover to bottom of float with cover and float assembly inverted. Fuel level in bowl should be 11/16" plus or minus 1/32".

Metering Jets—***See Chandler-Groves (Ford) Jet Specification Table in Carburetor Section.***

Fast Idle: Integral with carburetor. Operated by choke valve lever. No adjustment.

CARB. EQUIPMENT

Air Cleaner: Ford No. 1GA-9600-C (Six Cyl.), **91A-9600-A** (V8 exc. C-O-E), **81W-9600-A** (C-O-E). Heavy duty oil-bath type.
Servicing—Clean and refill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when crankcase drained) or more often if required. Wash filter element in cleaning fluid.
NOTE—Clean and re-oil filter element in oil filler cap (crankcase breather) every 1000 miles.

Fuel Pump: AC. Type R, Ford No. 1GA-9350 (Six Cyl.), 11A-9350 (V8). Diaphragm type fuel pump.
See Carburetion Equipment Section for data.
Pressure—3½ lbs. maximum (2-3¼ lbs.).

Gasoline Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—11C-9280A (All Models).
Tank Unit—No. 21C-9275-A (Clsd. Cabs), 21C-9275-B (Panels), 01W-9275 (C-O-E), 594T-9275 (School Bus), 21C-9275-B (C-O-E with side tank).
See Carburetion Equipment Section for data.

BATTERY

Ford No. 01A-10655-C. 6 volt, 15 plate, 100 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) grounded to engine dash. **Engine Ground**—Strap connector between rear of cylinder head and dash.
Location—In engine compartment on left side (6 Cyl.), right side (V8 exc. C-O-E), under right seat (C-O-E).
Dimensions—Length 10.56". Width 7.28". Hgt. 8.25".

STARTER

Ford Model No. 18-11002. Armature No. 18-11005.
Drive—Inboard Bendix No. A1472, Ford No. B-11350.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM, 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450. Magnetic switch mounted on the dash and controlled by instrument panel pushbutton, Ford No. 21C-11500.

Removal: Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR

Ford Model No. 2GA-10000A (Six Cyl. Engine), 21A-10000 (V8 Engine). Two brush (shunt) type with vibrating type voltage and current regulation. Ventilated by fan on drive pulley.

Armature—No. 2GA-10005 (2GA-10000A Gen.), 01A-10005A (21A-10000 Gen.).

Charging Rate Adjustment—No adjustment. See Regulator data below.

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire), Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine, check output at 2 speeds given in performance table below. Restore original connections after completing test.

Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.

Performance Data

2GA-10000A		21A-10000	
Ampere	Eng. RPM.	Ampere	Eng. RPM.
Start	565	Start	520
30	1160	30	1060
30	2500	30	2500

Rotation—Counter-clockwise at commutator end.

Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70° F.).

Brush Spring Tension—Approximately 28 ozs.

Removal (6 Cyl.): Generator mounted on adjustable bracket at left front of engine. To remove, take out bolt in mounting bracket, slip off drive belt and water pump belt, lift generator out.

Removal (V8): Generator mounted on bracket in cylinder banks at front of engine, driven in tandem with water pumps by Vee belt. To remove, loosen nut on bracket stud.

Belt Adjustment (6 Cyl.): ½" deflection midway between generator and crankshaft pulley (generator belt), generator and pump pulley (water pump belt). Adjust both belts by loosening two capscrews in mounting bracket beneath generator, move generator up and out (mounting bolt holes slotted at this angle).

Belt Adjustment (V8): ½" deflection midway between generator and pump pulleys. NOTE—Generator mounting bracket modified to include fan mounting (fan driven by a separate belt). Both belts adjusted in same manner by loosening mounting bolt and raising mounting brackets.

REGULATOR

Ford No. 01A-10505-C. Three-Unit Type. Consists of a Cutout Relay, vibrating Voltage Regulator, and vibrating Current Regulator (separate units) in single case on engine side of dash.

See Electrical Equipment Section for complete data.

NOTE—Regulator case is grounded through separate ground wire extending from regulator to generator frame. This ground connection must be in place when regulator being operated or tested.

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—8 ampere discharge current maximum.

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F.
Checking & Adjusting—*See "Ford Regulator—3-unit Type" in Electrical Equipment Section for data.*

Current Regulator

Setting—30-33 amperes (after 5 minutes run).
Checking & Adjusting See Voltage Regulator above.

LIGHTING

Headlamps—Ford Sealed Beam type. Controlled by Lighting Switch on instrument panel and Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.

Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—On panel directly above speedometer. Lighted whenever upper beams in use.

Switches

Lighting—Ford No. 11A-11652 (Switch & Wiring). Switch Knob & Insert No. 11C-11661A.

Beam Selector—Ford No. 11A-13532 (Switch only), No. 01C-11653 (Switch & Wiring—except C-O-E).

Instrument—Ford No. 50-13740 (1944), 21C-13740 (1945-47).

Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	
Parking	3	63
Instrument, Beam Ind.	1	51
Stop & Tail	21-3	1154

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Ford No. 11A-12250A. Combined with Ignition Resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects Headlamp circuits, second unit protects other circuits) of the thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate to control current.

HORNS: Ford No. 78-13833A. Vibrator type, single horn. **Horn Current**—6-8 amperes.

ENGINE

6 CYLINDER "90" TYPE

ENGINE SPECIFICATIONS: 6GA 90 HP. Six cylinder, "L" head type.
Bore—3.30" **Stroke**—4.40".
Displacement—226 cu.ins. **Rated H.P.**—26.13
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.7-1. Cast Iron Head.
Compression Pressure & Vacuum Reading—*See Tune-up data.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening Torque—*See Ford Shop Notes.*

OTHER ENGINE DATA: *Pistons, Piston Rings, Piston Pins, Connecting Rod, Crankshaft & Main Bearings, Camshaft, and Valves), see Ford 6 Cylinder (1946-47) Passenger Car article.*

ENGINE

V8 "100" TYPE

ENGINE SPECIFICATIONS: Eight Cylinder, 90° Vee, "L" Head type. Both cylinder banks and crankcase cast Enbloc.

Bore—3.187". **Stroke**—3.75".

Displacement—239 cu.ins. **Rated H.P.**—32.5.

Developed Horsepower—100 at 3800 RPM.

Compression Ratio—6.4-1 (1944-45), 6.75-1 (1946-47). Cast Iron Heads. *See Cylinder Head notes below.*

Compression Pressure & Vacuum Reading—*See Tune-up data.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD (1944): Tightening Torque—*See Ford Shop Notes.*

►**Re-working Head for Improved Cooling:** *See Ford Shop Notes for instructions and new Head Gaskets.*

NOTE—If Service Replacement Block No. 59A-6010C used with these heads, heads must be machined out to provide clearance for valves. *See Ford Shop Notes.*

CYLINDER HEAD (1945-47): Tightening Torque—*See Ford Shop Notes.*

►**New Type Cylinder Head & Block on 1945-46-47**—New type units used as follows:

Cylinder Head No. 59A-6050-B—Heads interchangeable Right & Left and can be identified by part number prefix "59A" cast on top. Heads have larger ¾" hole at top center and larger ⅝" hole at center between #2 and #3 bore.

Head Gasket No. 59A-6051—Gasket has 5/16" round hole instead of blunt cone shaped opening at center lower edge between #2 and #3 bore. This gasket must be used with new type head (above) and with old heads which have been reworked for improved cooling.

Cylinder Block No. 59A-6010-C—Has valve ports located .09" farther from center line of block and may be identified by oblong water passages on gasket surface just above valve (were round on earlier type blocks). CAUTION—If previous type heads (81A-, 81T-, 99T-, 29A-) used with this block, head must be machined out for valve clearance.
For Head re-working instructions, See Ford Shop Notes.

OTHER ENGINE DATA: *Pistons, Piston Rings, Piston Pins, Connecting Rod, Crankshaft & Main Bearings, Camshaft, and Valves), see Ford V-8 "100" (1946-47) Passenger Car article.*

VALVE TIMING

Tappet Clearance (6 Cyl.): .013-.015" All Valves Cold. No adjustment.

(V8 "100" Engine)—.010-.012" Intake, .014-.016" Exhaust, Cold. No adjustment.

Valve Timing: See Camshaft Setting above. Timing figures correct with .015" tappet clearance.

Six Cyl. "90" Engine

Intake Valves—Open 3° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

V8 "100" Engine

Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

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Valve Timing Check—No flywheel marks or other means provided to check timing. No. 1 intake valve should open approximately 1 tooth on flywheel before top dead center position (6 Cyl. Engine), with piston on top dead center (V8 Engine).

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears, and valve lifters (6 cyl. only). Oil pump mounted in crankcase at rear of engine (V8), or on #1 main bearing cap with oil intake pipe extending to oil screen in sump at rear end of oil pan (6 Cyl. Engines).

Crankcase Capacity—5 quarts.

Normal Oil Pressure—35 lbs. at 2000 RPM. (6 Cyl. Engine), 30 lbs. at 2000 RPM. (1944-45 V8 Engine), 50 lbs. at 2000 RPM. (1946-47 V8 Engine).

NOTE—1946-47 V8 engine has new type greater-capacity oil pump with pressure regulator built-in pump housing.

Oil Pressure Regulator (6 Cyl. Engine)—Located under plug on right side of crankcase at front of engine. Not adjustable.

NOTE—Replace oil relief valve spring if not within limits of 44-46 ounces with spring compressed to 1.40".

Oil Pressure Regulator (V8 Engine)—Located under plug above front camshaft bearing (under manifold) and on oil pump housing (some models). Not adjustable.

NOTE—Check relief valve spring tension whenever engine overhauled. Replace the cylinder block relief valve if tension not within limits of 43-50 ozs. at 1.380" (engines without oil pump relief valve), or 78-87 ozs. at 1.380" (engines with oil pump relief valve). Replace oil pump relief valve spring if tension not within limits of 78-87 ozs. at 1.380".

Oil Drain Plug & Screen (6 Cyl. Engine): Drain plug is large type with screen mounted on inner end so that it is removed with the plug. Clean screen whenever plug taken out.

Oil Drain Plug & Screen (V8 Engine): Drain plug located on bottom of oil pan directly under screen. On 1946-47 engines (except Light Duty), removable plate on bottom of pan provides access to screen.

Oil Pump (6 Cyl. Engine): Gear type. Mounted on front main bearing cap and driven from crankshaft timing gear (pump housing integral with bearing cap).

Oil Pump Servicing—*See Ford Shop Notes.*

Oil Pump (V8 Engine): Gear type. In crankcase at rear of engine. NOTE—New type pump 41A-6600-A (engines without oil pan baffles), 41A-6600-B (engines with oil pan baffles) has oil pressure relief valve in pump body.

Oil Pump Servicing—*See Ford Shop Notes.*

Oil Filter: Replace filter cartridge at 5000 mile intervals (Ford No. 01A-18662-A Unit).

Oil Pressure Gauge: King-Seeley Electric. Fords Nos.

Dash Unit—Ford No. 41C-9273.

Engine Unit—Ford No. 41A-9278 (V8), 48-9278 (six).

See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with water pump at front of engine (2 pumps on V8). Six Cyl. engine has water distributing tube in block to direct cooling water on exhaust valve seats and ports and has by-pass channel in head and block to permit recirculation of water in block with thermostat closed (thermostat is dual-valve type).

Capacity—17 qts. (6 Cyl.), 23 qts. (V8).

Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs.

Radiator Core Removal—*See Ford Shop Notes.*

Water Pump (6 Cyl.): Packless, centrifugal type with sealed ball bearing shaft.

See Water Pump Section for complete data.

Removal—Drain cooling system, remove fan blade assembly by taking out four capscrews in shaft hub, disconnect hose connection at pump. Take out three pump mounting capscrews, lift pump out.

Belt Adjustment—*See Generator Belt Adjustment.*

Water Pump (V8): Packless, centrifugal type (two). Mounted on front of engine (pump housing integral with front engine mounting).

See Water Pump Section for complete data.

Removal—Drain cooling system, place support jack under engine (use wood block on jack to avoid damaging pan), remove bolt from engine front support, raise engine so that no weight rests on front support. Loosen generator mounting bolt, remove drive belt. Disconnect and remove water pump hose. Remove four capscrews mounting water pump on engine, lift pump out. CAUTION—One mounting screw located within water pump inlet connection (accessible with hose removed).

Belt Adjustment—See Generator Belt Adjustment.

Thermostat (6 Cyl.): In cylinder head water outlet elbow. By-pass (dual valve) type.

Setting—Starts to open at 150-155°F. Fully open at 175-180°F.

Thermostat (V8): In each cylinder head outlet (one thermostat used for each cylinder bank).

Setting—Starts to open 150-155°F. Fully open at 170°F.

Temperature Gauge: King-Seeley Electric. Ford Nos.

Dash Unit—Ford No. 11C-10883A.

Engine Unit (6 Cyl. Engine)—No. 99A-10884.

Engine Unit (V8 Engine)—No. 01A-10990 (Temperature Gauge Switch—in left hand cylinder head), No. 99A-10884 (Regular Engine Unit—in right hand cylinder head).

See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-T1 (Comm'l), 11CF-CS (Others). Semi-centrifugal, single plate, dry disc type.

See Clutch Section for complete data.

Facings	Inside—Diameter	Outside	Thickness
10CF-TI	6.75"	10"	.125"①
11CF-CS	6.50"	11"	.137"

①—Thickness on 1944 and previous models—.137".

Adjustment: Pedal free travel must be 1.5-1.75". To adjust, disconnect clevis at clutch equalizer lever on left side of clutch housing, adjust clevis on rod for 1.5" free travel when re-connected.

Removal: Remove transmission (see Transmission Removal below), hold clutch in released position by installing wedges between each release lever and cover, remove flywheel housing by taking out seven bolts and one capscrew, take out capscrews in clutch cover mounting flange, remove cover assembly and driven member.

TRANSMISSION

3-SPEED TRUCK TYPE

Own Make. Constant-mesh, synchro-mesh, helical gears (Second & High), sliding spur gears (Low & Reverse). Used with conventional floor-mounted gearshift.

See Transmission Section for complete data.

NOTE—Four Speed Transmission is Optional on these models.

Removal: Disconnect propeller shaft at rear universal joint (remove nuts on "U" bolts), remove shaft by sliding it to the rear until it clears splined shaft in transmission. Remove clutch equalizer shaft by taking out clevis pin at clutch shaft and clutch pedal connector rod (CAUTION—do not lose spring and bushing halves in equalizer shaft bracket). Remove front floor plate by taking out retaining screws. Disconnect speedometer cable at engine rear support, remove nuts and washers from two engine rear support bolts. Raise rear end of engine (use block of wood on jack under engine) until rear support clears mounting bolts. Remove capscrews mounting transmission on flywheel housing, pull transmission straight back until main drive gear shaft clears clutch, lift transmission out through floor opening.

TRANSMISSION

4-SPEED TRUCK TYPE

Own Make. Four-speed, sliding spur gear type with conventional floor-mounted gearshift.

See Transmission Section for complete data.

NOTE—This transmission Optl. on Comm'l models.

Removal: Remove seat cushion, floor mat, and transmission cover on floor. Support engine with jack under flywheel housing (use wood block on jack), raise jack until engine weight is off rear mounting. Free coupling shaft support bearing from crossmember by removing nuts on two bolts, disconnect front universal joint by taking out four bolts mounting universal joint flange on hand brake drum and disconnect intermediate universal joint at support bearing by removing nuts on 'U' bolts (tape bearing caps in place to prevent losing needle bearings), remove front shaft. Remove clutch equalizer shaft by taking out pin in clutch shaft and clevis pin at lever and pulling equalizer shaft off the bracket (CAUTION—Do not lose spring and bushing halves). Remove two bolts in engine rear support. Disconnect speedometer shaft at transmission. Remove transmission capscrews from flywheel housing, pull transmission straight back until clutch (main drive gear) shaft clears, then lift transmission out through floor opening.

NOTE—To remove brake assembly, take out 2 capscrews in hand brake lever sector on transmission case and two capscrews in brake adjusting screw bracket, disconnect hand brake link from transmission and anchor adjusting screw from brake band, remove brake band assembly and hand brake lever. Remove nut holding universal joint flange on transmission mainshaft, remove universal joint flange and brake drum.

UNIVERSALS

Spicer. Needle bearing type, two used (114" WB. Light Duty & 101" C-O-E Trucks), three used with slip joint at forward end of rear shaft behind coupling shaft support bearing (Other Trucks).

NOTE—On Light Duty (114" WB) Trucks, propeller shaft is one-piece type and slip joint is provided by the front universal yoke sliding on the splined drive shaft in the transmission.

See Universals Section for complete data.

Spicer Model Nos.

Wheelbase	Front	Center	Rear
114" ①	1278-102X	None	1278-102X
114" ②	1311-102X	None	1318-104X
122"	1318-103X	1311-102X	1318-103X
134" & 158"	1358-54X	1351-5107X	1358-5104X
194"	1358-55X	1351-5107X	1358-5105X
101"	1351-517X	None	1358-5104X

①—3-Speed Transmission. ②—4-Speed Transmis'n.

Coupling Shaft Center Bearing: Consists of cushion mounted ball bearing bolted to underside of frame intermediate cross-member. Bearing is mounted on end of coupling shaft in a sleeve with felt retainer sleeve on each end and bearing baffle on front end. Bearing is retained by center universal companion flange nut.

REAR AXLE

3/4 FLOATING TYPE

Own Make. ¾ Floating, Spiral Bevel Gear type with straddle-mounted pinion and Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio (6 Cyl.)—3.78-1 Std., 3.54-1, 4.11-1 Optl.

Ratio (V8)—3.54-1 Std., 3.78-1, 4.11-1 Optl.

Backlash—.012" maximum.

Removal: Raise rear end of frame, disconnect propeller shaft by removing two "U" bolts and nuts in rear universal joint, lower propeller shaft. Disconnect hand brake cables and brake lines at rear axle (bleed brakes when line re-connected). Disconnect rear shock absorber links, disconnect rear springs, withdraw axle assembly from underneath.

Axle Shaft Removal—Axle assembly must be dismantled and axle shaft removed at inner end through differential housing. *See Ford Rear Axle article (in Rear Axle Section) for complete data.*

REAR AXLE

FULL-FLOATING TRUCK TYPE

Own Make. Full-floating, Spiral Bevel Gear type with straddle-mounted pinion and Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio (One Ton)—4.86-1 Std., 4.11-1 Optl.

Ratio (Other Trucks)—6.67-1 Std., 5.14-1, 5.83-1 Optl.

Backlash—.004-.016".

Removal: Raise rear end of frame, remove axle shafts (see below), wheel and drum assemblies. Disconnect hydraulic brake line at each wheel and hose at bracket (bleed brake lines when re-connected). Remove backing plate assemblies by taking out six bolts in axle housing flange, disconnect rear universal joint by taking off nuts on two "U" bolts and lower propeller shaft. Disconnect rear shock absorber links (School Bus). Remove nuts on rear spring "U" bolts, drive bolts up free of axle housing, lower axle assembly and remove from underneath.

Axle Shaft Removal—Remove hub cap, remove nuts on 8 hub studs which hold axle shaft flange in place, turn the two special screws (in tapped holes in flange) up evenly to break flange loose from wheel hub, **back these screws out**, strike axle shaft flange at center to loosen centering cones on studs, remove cones, pull axle shaft out (wheel not disturbed).

Wheel Bearing Adjustment—Remove axle shaft (above), use special bearing adjusting wrench and remove bearing locknut (outer nut), and lockwasher. Adjust bearings by turning bearing adjusting nut (inner nut) up until tight and then backing nut off ⅛ turn. Install bearing lockwasher making certain that it fits over dowel pin on adjusting nut, install bearing locknut and turn this nut up tight. NOTE—When installing axle shaft, make certain that gasket in place under shaft flange, cones in place on studs and that two loosening screws backed off sufficiently so that stud nuts can be tightened securely. Turn the two loosening screws in just enough to prevent loosening in service.

REAR AXLE

TWO-SPEED TRUCK TYPE

Own Make. Two-speed, Full-floating, Spiral Bevel Gear (final drive), spur gear planetary unit (reduction gearing), with straddle-mounted pinion and Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—5.83-1 (Direct Drive), 8.11-1 (2nd speed).

Backlash—.006-.020".

Removal: Same as for standard axle (above) after control linkage has been disconnected.

SHOCK ABSORBERS

Houde (Houdaille). Double acting, hydraulic, adjustable type. Used at Front and Rear end (114" Light Duty Truck and 194" School Bus), Front end only (122" One Ton Truck).

	Houde Model	Right—Ford No.—Left
114",122" Front	BBCN-3	51A-18045 — 51A-18046
114" Rear	BBCZ-3	51C-18080 — 51C-18081
194" Front	BBCHMS	
194" Rear	BBCLT	

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than **1 or 2 serrations at a time.** NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check at 5000 mile intervals and fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) required for these new shock absorbers which may be identified by round top filler plug.

FRONT SUSPENSION

Front Axle—Conventional "I" beam section with Reverse Elliott ends and semi-elliptic springs.

Kingpin Inclination—8° (Light Duty & 1 Ton), 8½° (Other Trucks) crosswise.

Caster—3° (exc. C-O-E), 4°20' (C-O-E) with load. Both wheels should be equal within ½°.

NOTE—Caster angle controlled by wedge shims inserted between axle pads and springs. To increase caster, insert taper wedge shims equally at both sides (make certain spring tie bolt passes through hole in wedge so wedge held securely in place).

Camber—¾° (both wheels equal within ¼°, right wheel must not exceed left wheel). Axle may be bent cold to correct Camber providing that proper tools (wedges and blocks to prevent crushing axle flange) are used.

Toe In—1/16". Set at 1-10 ratio to Camber. Toe-in increases with load and should be set with truck empty. Adjust by loosening clamp bolts and turning tie rod.

STEERING GEAR

Light Duty & 1 Ton Truck—Ford No. 21C-3503A (Gemmer Model 305 design). Worm-and-Roller type with push-pull adjustments.

See Steering Gear Section for complete data.

Other Trucks—Gemmer 335 (Ford No. 01T-3503 except C-O-E, No. 01W-3503 for C-O-E). Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service—Lockheed Hydraulic, double anchor type. Hand lever applies rear wheel service brakes (Light Duty & 1 Ton Truck), independent shaft brake at rear of transmission case (Other Trucks).

See Brake Section for complete data.

Drums—Composite (Cast iron and steel).

	Front — Drum Diameter — Rear
Light Duty (114")	12" — 12"
1 Ton (122")	12" — 14"
Other Trucks	14" — 15"

Lining—Molded type (all shoes).

	Width	Thickness	Length per Shoe①
Light Duty (114")	1.75"	.20"	13.5"—10.28"
1 Ton (Front)	1.75"	.20"	13.5"—10.28"
1 Ton (Rear)	2.00"	.27"	15.53"—10.78"
Others (Front)	2.00"	.27"	15.53"—10.78"
Others (Rear)	3.50"	.335"	16.67"—11.57"

①—Forward Shoe—Rear (reverse) Shoe.

Clearance—Least possible amount without drag.

Hand Brake (Light Duty & 1 Ton Truck): Hand lever applies rear wheel service brakes. See Service Brakes (above).

Hand Brake (Other Trucks): Independent external contracting band on drum at rear of transmission. **Adjustment**—Set hand brake in fully released position and make certain that flat portion of cam is resting on rear of brake band upper end (if cam not flat, remove clevis pin in upper end of cam, adjust clevis rod until cam is flat when rod re-connected). Remove locking wire from brake band anchor adjusting screw (left side), turn screw clockwise until clearance between band and drum is .010" at the anchor screw, install lock wire. Loosen locknut on adjusting screw for upper portion of brake band (round screw on brake mounting bracket), turn screw until clearance between upper portion of brake band and drum is .010", tighten the locknut Tighten adjusting nut at lower end of main adjusting bolt (on which band positioning springs are located) until clearance between lower portion of band and drum is .010". This completes the brake adjustment.

Drum Diameter—7.81".

Lining—Woven type. Width 2.5". Thickness .25". Length 24.6".

►**ENGINE PRODUCTION CHANGE: New "H" Series Engine starting September 1947.** New ignition system, valve system, oil pump, and cooling system.

►***"H" SERIES ENGINE INFORMATION—For Tune-Up, Ignition, Ignition Timing, and Engine data, see 1949 FORD SIX car pages.***

OIL PAN REMOVAL: ***See Ford Shop Notes for Engine Removal instructions (recommended for oil pan removal).***

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing (visible through opening in floor) and on left frame side member near front engine support.

TUNE-UP

COMPRESSION: Pressure—105-125 lbs. at cranking speed of 100 RPM. (Std. 6.7-1 Cast Iron Head).

VACUUM READING: Approx. 18-20" at idling speed.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Champion H-10 (Pass. Cars), H-9 Comm'l (Trucks). 14 mm. Metric type. **Gaps**—.025"

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.014-.016". **Cam Angle** 40° closed.

Breaker Arm Spring Tension—20-24 ozs.

Automatic Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.

Std. Setting—1° BTDC.

Timing Marks—None. See Ignition Timing for directions on setting of distributor for correct timing when installed on engine.

Vacuum Brake Setting—Set to just eliminate pinging when engine operated under load (back off adjusting screw until engine pings, then turn screw in just enough to eliminate ping).

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Adjust idle screw for smooth idling and highest steady reading of vacuum gauge (when used). Idle speed 500 Engine RPM. (can be judged by marking fan belt and setting engine for 25 revolutions of the belt in 10 seconds).

Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (Gauge 9550-A). Fuel level 11/16" plus or minus 1/32" below top edge of bowl.

Accelerating Pump—Center (#2) hole Normal. Inner (#1) hole—Summer, Outer (#3) hole—Winter for temperature extremes.

Fuel Pump Pressure: 3½ lbs. (2-3¼ lbs.).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely.

VALVES: See Valve Timing.

Tappet Clearance—.013-.015" Intake & Exhaust, Cold. No adjustment provided.

STARTING: See Battery, Starter, Generator, and Regulator.

IGNITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock Assembly No. 302848, Ford No. 51A-3676-A (Deluxe Models), Oakes No. 302850, Ford No. 51A-3676-B (Super Deluxe Models). Ignition Switch Assembly Oakes No. 302494, Ford No. 11A-3680 (All).
Ignition Lock—Hurd or Briggs & Stratton No. 80935, Ford No. 91A-3686A (with key).
Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 1GA-12024. Mounted on engine.
Resistor Unit—Connected in coil primary circuit (part of Lighting Circuit Breaker Assembly).
Ignition Current—4½-6 amperes with engine stopped (primary resistance 1-1⅓ ohms).

CONDENSER: Ford Part No. 1GA-12300-B.
Capacity—.29-.32 microfarad.

DISTRIBUTOR: Ford No. 5GA-12127 (less Terminal Housing & Rotor). New "Sealed-dry" type. Single breaker, 6 lobe cam, full automatic advance type with Vacuum Brake adjustment.
Breaker Gap—.014-.016"
Cam Angle or Dwell—40° closed, 20° open (distr.).
Breaker Arm Spring Tension—20-24 ozs.
Rotation—Clockwise viewing driving end of unit.

Distributor Degrees	Automatic Advance R.P.M.	Degrees	Engine R.P.M.
Start	200	0	400
9	600	18	1200

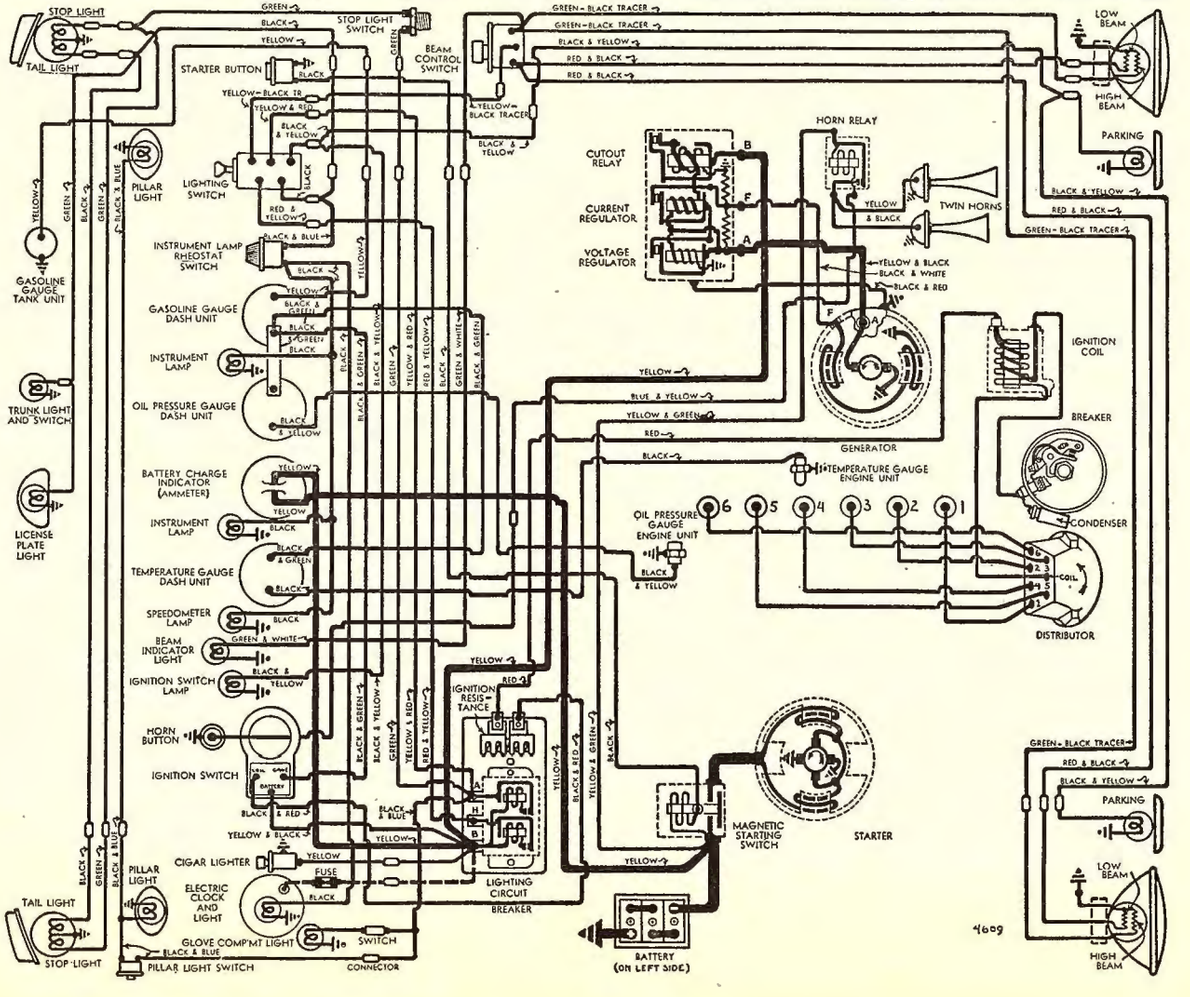
Vacuum Brake: Consists of a spring-loaded vacuum controlled brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.

Distributor Removal: Disconnect coil lead, unsnap two clips holding distributor cap in place, take out mounting capscrews. NOTE—Vacuum connection (for Vacuum Brake operation) is through hole in face of mounting flange.

IGNITION TIMING

Std. Setting	Flywheel Degrees
All Engines	1° BTDC

See Vacuum Brake Setting for service corrections.



Ignition Timing (Basic Setting)—Distributor can be timed for correct ignition timing when off engine as follows: Place small straightedge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate shaft in direction of rotation (clockwise) until leading edge of scale is exactly ⅝" before nearest edge of distributor mounting hole on vacuum piston side of mounting flange. If contacts do not begin to open at this point, loosen adjusting screw on side of distributor, move screw down (to advance spark), or up (to retard spark) in the slot until contacts begin to open, tighten adjusting screw. This will provide correct 1° BTDC ignition timing when distributor installed on engine.

Ignition Timing (On Engine)—No flywheel marks or other means provided to check timing on engine. If basic setting of distributor correct (above), all necessary adjustments for operating conditions and octane rating of fuel being used can be made through the Vacuum Brake adjustment.

Vacuum Brake Adjustment—Road test car. Back off vacuum brake adjusting screw until engine pings when operating under load, then turn adjusting screw in just enough to eliminate ping, tighten locknut.

CARBURETOR

Holley (Chandler-Groves) Ford No. 5GA-9510-A. Single barrel, downdraft type with manual choke control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm and choke valve wide open, set throttle stopscrew for idle speed of 500 engine RPM. Turn idle adjusting screw in until engine begins to miss, then turn screw out until engine begins to roll, finally turn screw in just enough so that engine idles smoothly. Recheck idle speed. NOTE—Idle speed can be noted by marking spot on fan belt and setting speed for 25 revolutions of the belt in 10 seconds.

Accelerating Pump Setting—Three holes in throttle lever for pump connection. Set as follows:

#1 (Inner)—Extremely Hot Weather.
#2 (Center)—Normal weather and fuel.
#3 (Outer)—Extremely Cold Weather.

Float Level—Use Ford No. 9550-A Gauge to check float. Invert air horn and float assembly, place gauge on face of bowl cover. Bottom of float should be 1.322-1.353" from face of cover (1.353" portion of gauge "GO", 1.322" portion "NO GO"). Adjust by bending lip on float lever. Fuel level in bowl 11/16" plus or minus 1/32" below top edge.

Metering Jets—*See Chandler-Groves (Ford) Jet Specification Table in Carburetor Section.*

Fast Idle: Consists of a "kicker" lever which opens throttle valve to fast idle position when choke valve closed for cold starting. Should not require adjustment.

CARB. EQUIPMENT

Air Cleaner: Ford No. 1GA-9600-C. Oil-bath type.

Servicing—Clean and refill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when draining crankcase), or more often if required.

NOTE—Clean and re-oil filter element in oil filler cap every 1000 miles.

Gasoline Gauge: King-Seeley Electric. Ford Nos.

Dash Unit—No. 51A-9280-A (1946 Deluxe & Sedan Del.), 51A-9280-B ('46 Sup. Del.), 6A-9280 (1947).

Tank Unit—No. 99A-9275-B (Deluxe & Super Deluxe Models), 21A-9275-A (Sedan Delivery).

See Carburetion Equipment Section for data.

Fuel Pump: AC. Type R, Ford No. 1GA-9350. Diaphragm type. **Pressure**—3½ lbs. max. (2-3¼ lbs.).

See Carburetion Equipment Section for data.

BATTERY

Ford Type No. 01A-10655-A. 6 volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).

Starting Capacity—150 amperes for 20 minutes.

Zero Capacity—300 amperes for 4.0 minutes.

Grounded Terminal—Positive (+) terminal grounded to dash. **Engine Ground**—Separate ground strap from rear of cylinder head to dash.

Location—On left side in engine compartment.

Dimensions—Length 10.56". Width 7.28". Height 8.25".

STARTER

Ford Model No. 18-11002. Armature No. 18-11005.

Drive—Inboard Bendix No. A1472. Ford No. B-11350.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—2 lbs. each.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on dash and controlled by pushbutton switch on instrument panel, Ford No. 19A-11500 (Pass. Cars).

Removal: Starter mounted on right front face of flywheel housing. To remove, disconnect cable, take out capscrews in right hand engine side pan and move pan to one side, loosen two through-bolts on commutator end plate and disconnect brace on commutator end of starter.

GENERATOR

Ford Model No. 2GA-10000A. Armature No. 2GA-10005. Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.

Charging Rate Adjustment—None (see Regulator).

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM
Start	565
32	1160
30	2500

Rotation—Counter-clockwise at commutator end.

Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F).

Brush Spring Tension—Approximately 28 ozs.

Removal: Generator mounted on adjustable bracket at left front of engine. To remove, take out bolt in mounting bracket, slip off drive belt and water pump belt, lift generator out.

Belt Adjustment: ½" deflection midway between generator and crankshaft pulley (generator belt), generator and pump pulley (pump belt). Adjust both belts by loosening two capscrews in mounting bracket beneath generator, move generator up and out (bolt holes slotted at this angle).

REGULATOR

Ford Model No. 01A-10505-C. Three-unit type Voltage & Current Regulator. In case with Cutout Relay on dash.

See Electrical Equipment Section for complete data.

NOTE—Regulator case grounded through 'pigtail' to dash or separate ground wire to generator. This ground connection must be in place when regulator being operated or tested (disturbed by cover removal).

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.

Cuts Out—8 amperes discharge current (maximum).

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Elec. Equip. Section for other temps.

Checking & Adjusting—*See Electrical Equipment Index for article on 'Ford Regulator—3 Unit Type' for complete instructions.*

Current Regulator

Setting—30-33 amperes Hot (after engine run for 5 minutes).

Checking & Adjusting—See Voltage Regulator.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot centers 3" below lamp center height at 25 ft.).

Beam Indicator—Red jewel on lower edge of speedometer dial. Lighted when upper beams in use.

Switches

Lighting—Ford No. 11A-11652 (Switch & Wiring—All Models), 51A-11661A (Knob & Insert—Deluxe Models), 51A-11661B (Knob & Insert—Super Deluxe with Blue-Gray Trim), 51A-11661C (Knob & Insert—Super Deluxe with Brown Trim).

Beam Selector—Ford No. 11A-13532 (Switch only), 5GA-11653 (Switch & Wiring).

Instrument—Ford No. 19A-13740.

Stop Light—Ford No. 11A-13480.

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Bulb Specifications

SEE 1946-47-48 FORD V8 PASS. CAR PAGES FOR DATA

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Ford No. 11A-12250A Combined with the Ignition Resister on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlamp circuits, second unit protects other lighting circuits). Breakers are thermostatic and wound-coil type. Contacts open with current of 50 ampere and vibrate rapidly to control current.

HORNS: Ford No. 91A-13832 (High Note), 91A-13833 (Low Note). Air electric type dual horns operated by horn relay.
Horn Current—24-28 amperes (total).

Horn Relay: Ford No. 11A-13842D (Horns on Left Side), 5GA-13842 (Horns on Right Side).
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

►**ENGINE PRODUCTION CHANGE: New "H" Series Engine starting September 1947.** New ignition system, valve system, oil pump, and cooling system.

►*"H" SERIES ENGINE INFORMATION—For Tune-Up, Ignition, Ignition Timing, and Engine data, see 1949 FORD SIX car pages.*

ENGINE SPECIFICATIONS: 6GA 90 HP. Six cylinder, "L" head type.
Bore—3.30" **Stroke**—4.40"
Displacement—226 cu. ins. **Rated H.P.** 26.13
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.7-1. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL (For Oil Pan Removal & General Engine Service): *See Ford Shop Notes.*

OIL PAN REMOVAL: *See Ford Shop Notes.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening Torque—*See Ford Shop Notes.*

CYLINDER SLEEVES: Hardened, dry type cylinder sleeves used on some engines.
Sleeve Installation—*See Ford Shop Notes.*

PISTONS: New aluminum alloy, four-ring, Cam-ground, Dome Head type. Pistons have additional oil ring below piston pin.
Weight—414 grams (stripped), 576 grams (complete).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.

Fitting New Pistons: Use .50" wide feeler stock of correct thickness (as listed below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 5-8 lbs. (all types).
Feeler Thickness—.002" New Piston in New Plain Bore, .004" New Piston in Worn Plain Bore, .005" Worn Piston in Worn Plain Bore.

Replacement Pistons: *See Ford Shop Notes.*

PISTON RINGS: Two compression, one oil ring above pin, additional oil ring on piston skirt below pin. Upper oil ring groove slotted, lower oil ring groove drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.092-.0925"	.012-.017"	.0015-.003"
Compr. (#2)	.092-.0925"	.012-.017"	.001-.0025"
Oil (#3, 4)	.186-.1865"	.012-.017"	.001-.0025"

Replacement Rings: *See Ford Shop Notes.*

PISTON PIN: Diameter .8501-.8504". **Length** 2.91"
Pin floats in piston and rod with locking ring at each end.
Pin Fit in Piston—.000-.0005" clearance or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" clearance (pin should fall through bushing slowly of own weight).
See Ford Shop Notes for Pin Fitting directions.

Replacement Pins: *See Ford Shop Notes.*

CONNECTING ROD: Length 7.800" **Weight** 732 grams.
Crankpin Journal Diameter—2.235".
Lower Bearing—Removable, steel-backed, special alloy lined type. No shims.
Clearance—.0013-.0035". **Sideplay**—.003-.007".
NOTE—Replace bearing inserts worn .005" or more (.005" or more thinner than original insert).

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps. NOTE—Make certain that small tangs on bearing halves engage grooves in rod and cap.

Replacement Bearings: *See Ford Shop Notes.*

CRANKSHAFT: Four Bearings, Cast alloy steel with integral counterweights and Vibration Dampener on front end.
Journal Diameters—2.499" (all main bearings).
Bearing Type—Removable precision type, steel-backed, special alloy lined type. No shims.
Clearance—.001-.003".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

Replacement Bearings: *See Ford Shop Notes.*

End Thrust: Taken by rear main bearings. Adjust by replacing bearing (use bearing with thicker flange to reduce endplay).
Endplay—.002-.006"

CAMSHAFT: Four bearing with helical gear drive.
Bearing Diameters—1.797" all bearings. Replace the camshaft if worn to less than 1.7955" diameter. Replace bearings if inside diameter more than 1.802".
Bearing Type—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Timing Gears: Crankshaft Gear—cast alloy steel, Camshaft Gear—aluminum alloy, bolted-on type.
Timing Gear Replacement—*See Ford Shop Notes.*

Camshaft Setting: Mesh marked tooth of crankshaft gear in marked space between teeth of camshaft gear.

VALVES:	Head Diameter	Stem Diameter
Intake	1.620"	.3095-.3105"
Exhaust	1.484"	.3095-.3105"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0015-.0045"

NOTE—Service limit for valve stem diameter .3065".
Valve Assembly Removal & Servicing—*See Ford Shop Notes.*
NOTE—Inserted valve seats of molybdenum-chrome steel are used for exhaust valves.

Valve Guides: Split type retained by 'C' washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).
For Valve Guide servicing data, see Ford Shop Notes.

Valve Springs:	Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.85"

NOTE—Replace spring if the pressure is less than 30 lbs. when compressed to 2.125".

Valve Lifters: Barrel type in reamed holes in block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

VALVE TIMING

Tappet Clearance: .013-.015" All Valves Cold. No adjustment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 3° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
Valve Timing Check—No flywheel marks or other means provided to check timing. If top dead center position located on flywheel, intake valve for this cylinder should open approx. 1 tooth on flywheel before this top dead center point.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, and to valve lifters and timing gears. Oil pump mounted on #1 main bearing cap in crankcase (oil intake pipe extends to oil screen in sump at rear end of oil pan).

Oil Pan Removal: *See Ford Shop Notes.*
Crankcase Capacity—5 quarts.
Normal Oil Pressure—35 lbs. at 2000 RPM of engine.
Oil Pressure Regulator—Located under plug on right side of crankcase at front end. Not adjustable. NOTE—Replace oil relief valve spring if not within limits of 44-46 ounces with spring compressed to 1.40".

Oil Pump: Gear type. Mounted on front main bearing and driven from crankshaft timing gear (pump housing integral with main bearing cap).
Oil Pump Servicing—*See Ford Shop Notes.*

Oil Screen & Drain Plug: Screen mounted on inner end of drain plug and removed with plug when crankcase drained. Clean oil screen each time removed.

Oil Filter: Replace filter cartridge at 5000 mile intervals (Ford No. 01A-18662-A Unit).

Oil Pressure Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—No. 51A-9273-A (1946 Deluxe), No. 51A-9273-B (1946 Super Deluxe), No. 6A-9273 (All 1947).
Engine Unit—No. 41A-9278 (80 lb.) All Models.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with water distributing tube in block to direct cooling water on exhaust valve seats and ports. Re-circulation of water in engine with thermostat closed provided by by-pass channel in front end of head and block leading to pump inlet.
Capacity—14.5 quarts (Pass. Cars).
Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs.

Water Pump: Packless, centrifugal type with sealed ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet below. By-pass (dual valve) type. Starts to open at 150-155°F. Fully open at 175-180°F.

Temperature Gauge: King-Seeley Electric. Ford Nos. **Dash Unit**—No. 51A-10883-A (1946 Deluxe), No. 51A-10883-B (1946 Super Deluxe), No. 6A-10883 (All '47). **Engine Unit**—No. 99A-10884 (All models).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI, Ford No. 19A-7563. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.
Facings—Woven asbestos composition. I.D. 6¾". O.D. 10". Thickness ⅛".

Pedal Adjustment: Pedal free travel 1-1¼". To adjust, disconnect clevis at equalizer (throw-out) shaft end of pedal connector rod, turn clevis on rod.

Removal: Remove Transmission (see Transmission Removal below), install wooden wedges between each release lever and cover to hold the clutch in released position, take out six capscrews mounting cover assembly on flywheel, lift out cover assembly and driven member.

TRANSMISSION

Own Make. Three-speed, all-helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever on steering column.
See Transmission Section for complete data.

Removal: Remove Rear Axle (see Rear Axle Removal below), remove capscrews mounting front seat track on floor, move front seat back for necessary room. Take out mounting screws in front floor pan spacer, remove spacer. Disconnect gearshift connecting rods at transmission case, disconnect and remove equalizer (clutch release) shaft. Remove capscrew and washer on end of transmission shaft (in universal joint), remove universal joint. Remove nuts and washers on engine rear support bolts. Support engine by placing jack (use wood block on jack) under rear end and raise engine sufficiently so that rear support clears mounting bolts (NOTE—remove nuts holding lower half of engine rear support assembly and remove the assembly). Take out eight capscrews mounting transmission case on flywheel housing, pull transmission straight back and lift out.

UNIVERSALS

Spicer Model 202-6X, Ford No. B-7090. Steel bushing type. Single joint in torque ball at rear of transmission case.
See Universals Section for complete data.

REAR AXLE

Own Make. ¾ Floating, Spiral Bevel Gear type with Torque Tube Drive.
See Rear Axle Section for complete data.
Ratio—3.78-1 Std., 4.11-1 Optl.
Backlash—.012" maximum.

Removal: Raise rear end of car. Disconnect track bar. Disconnect rear spring (use spring spreader if available) by placing block under each rear spring eye and lowering car so that weight keeps spring extended and then removing spring shackle bolts and bars. Take out pin in hand brake equalizer and disconnect hand brake cable. Disconnect hydraulic brake line at torque tube and rear shock absorber links at each wheel. Disconnect accelerator pedal, remove pedal pads, floor mat, beam control switch (take out two mounting screws), and floor pan. Disconnect speedometer cable at torque tube. Remove nuts on four universal joint ball housing bolts and two bolts holding ball cap halves together, remove ball cap. Pull rear axle back to disconnect torque tube from transmission and remove from beneath car.

NOTE—Bleed brake line after rear axle re-installed and line connected.

SHOCK ABSORBERS

Houde (Houdaille). Double Acting, adjustable, hydraulic types (Front & Rear).
See Shock Absorber Section for complete data.

	Houde Model	Right — Ford No.	Left
Front	BBCN-3	51A-18045	51A-18046
Rear①	BBCZ-3	51A-18080A	51A-18081A
Rear②	BBCZ-3	51A-18080B	51A-18081B

①—Except Sedan Delivery and Station Wagon.
②—Sedan Delivery & Station Wagon only.

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than **1 or 2 serrations at a time.** NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check every 5000 miles, fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) required for these new shock absorbers which may be identified by round top filler plug.

FRONT SUSPENSION

Front Axle: Conventional "I" beam section type with Reverse-Elliott ends and transverse spring. Axle positioned by radius rods.

Kingpin Inclination—8° crosswise.

Caster—3°. Axle may be bent cold for minor corrections providing correct tools used to prevent crushing of axle flange.

Camber—¾°. Adjust as for Caster (above).

Toe In—1/16". Adjust in usual manner by changing length of tie rod.

STEERING GEAR

Gemmer design (Model 305), Ford Make. Worm-&-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed Hydraulic, self-centering, double anchor type. Hand lever applies rear wheel brakes.

►**These brakes do not have anchor pin adjustment.**
See Brake Section for complete data.

Drums—Composite cast iron and steel type. Diameter 12".

Clearance—Least possible amount without drag.

Lining—Width 1.75". Thickness .187". Length per shoe 13.12" (forward shoes), 10.08" (rear shoes).

Hand Brakes: See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Top: Two types as follows:
1—Convertible—Auto-lite electric type.
2—Sportsman Convertible—Hydro-Lectric type.
See Miscellaneous Section for complete data.

Power Window Regulators (Sportsman Convertible): Hydro-Lectric type.
See Miscellaneous Section for complete data.

HOOD LOCK: Hood is Alligator type hinged at cowl. To raise hood (Pass. Cars), pull out release knob under instrument panel, release safety catch under front edge of hood.

OIL PAN REMOVAL: *See Ford Shop Notes.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing (visible through hole in floor) and on left frame side member near front eng. support.

TUNE-UP

COMPRESSION: Pressure—105-125 lbs. at cranking speed of 100 RPM. (Std. 6.75-1 Cast iron Head).

VACUUM READING: Steady 18-20" idling at 5-7 MPH.

FIRING ORDER: 1-5-4-8-6-3-7-2 (Cyl. Nos. 1-2-3-4 Right Bank, 5-6-7-8 Left Bank, front-to-rear).

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. Gaps—.025".

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.014-.016" (both sets).

Cam Angle—36° (both sets operating together).

Breaker Arm Spring Tension—20-24 ozs.

Automatic Advance—Starts at 200 RPM. Maximum 11° at 600 RPM (Distr. degrees & RPM).

IGNITION TIMING: See Ignition Timing.

Std. Setting—4° BTDC.

Timing Marks—None. See Ignition Timing for directions on setting of distributor for correct timing when installed on engine.

Vacuum Brake Setting—Set to just eliminate pinging when engine operated under load (back off screw until engine pings, then turn screw in until ping is eliminated).

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Both idle screws ⅝-¾ turn open and set for smooth idle and highest steady reading of vacuum gauge (when used). Idle speed 500 RPM or 5-7 MPH.

Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (Gauge 9550-A). Fuel level 11/16" plus or minus 1/32" below top edge of bowl.

Accelerating Pump—Center (#2) hole Normal. Inner (#1) hole—Summer, Outer (#3) hole—Winter for temperature extremes.

Fuel Pump Pressure: 3½ lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic control type (located in exhaust manifold outlet of left cylinder bank). See that valve operates freely.

VALVES: See Valve Timing.

Tappet Clearance—.010-.012" Intake, .014-.016" Exhaust. No adjustment provided.

STARTING: See Battery, Starter, Generator and Regulator.

IGNITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock Assembly No. 302848, **Ford No. 51A-3676-A** (Deluxe Models), Oakes No. 302850, **Ford No. 51A-3676-B** (Super Deluxe Models). **Ignition Switch Assembly** Oakes No. 302494, **Ford No. 11A-3680 (All Models).**

Lock Cylinder—Hurd or Briggs & Stratton #80935 **Ford No. 91A-3686-A** (with Keys).

Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 1GA-12024. Mounted separately on left front corner of cylinder block.

Ignition Current—4½-6 amperes with engine stopped (primary resistance 1-1⅓ ohm).

Resistor Unit—Connected in coil primary circuit (part of Circuit Breaker Assembly 11A-12250A).

CONDENSER: Ford Part No. 1GA-12300-B.

Capacity—.29-.32 microfarad.

DISTRIBUTOR: Ford No. 59A-12127 (less Terminal Housing, Cap & Rotor). New "Single Cap" sealed-dry "V" outlet type. Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake adjustment. Breaker "loading" and "timing" contacts operate in same manner as on previous V8 models.

Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016" 'no go'.

Cam Angle or Dwell—Approx. 36° closed, 9° open. **Set dwell at 80% (78-80% at 2000 RPM) on Ford Test Set for both sets operating together with correct coil loading lead.**

NOTE—Cam Angle for each set operating singly approximately 22½° closed, 22½° open (50%).

Breaker Arm Spring Tension—20-24 ounces.

Rotation—Clockwise viewed from drive end (counter-clockwise viewed from front of car).

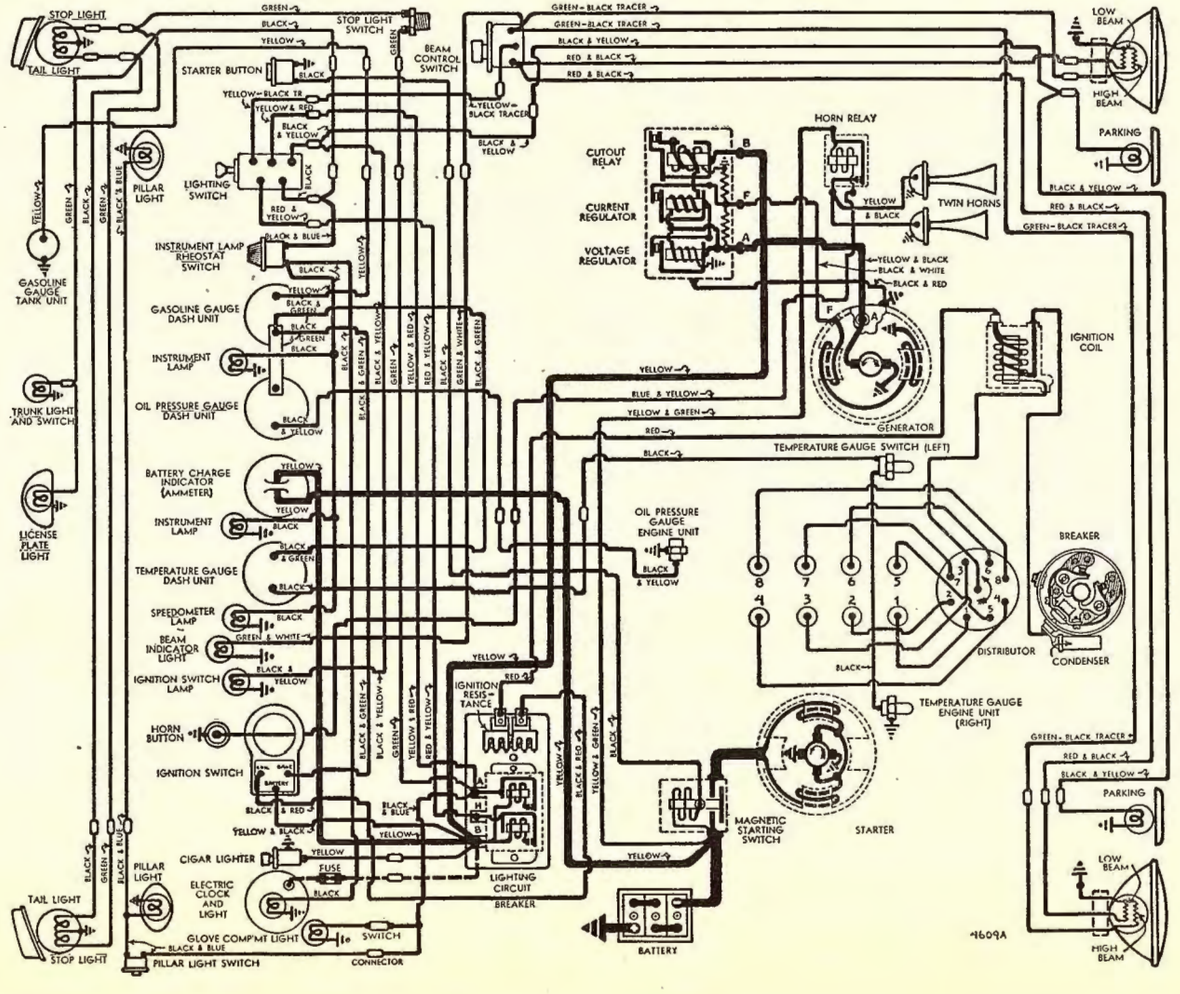
Automatic Advance

(Vacuum Brake Disconnected)

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	200	0	400
11	600	22	1200

NOTE—Limits are 10½-11½° (distributor degrees).

Vacuum Brake: Consists of a spring-loaded vacuum controlled brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.



Removal:—Distributor mounted on front of engine. To remove, disconnect primary lead, remove distributor cap, take out mounting screws in distributor flange, lift unit out.

IGNITION TIMING

Std. Setting—See Vacuum Brake Setting for service correction for operating conditions.

	Flywheel Degrees	Piston Position
All V8 Engines	4° BTDC	.0058" BTDC.

Ignition Timing (Basic Setting)—Distributor can be timed for correct ignition timing when off engine as follows: Place a small straight edge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate distributor in direction of rotation (clockwise) until trailing edge of scale is exactly 3/8" past the nearest edge of the small mounting hole (left hand hole—nearest vacuum brake) on the mounting flange. If left hand (timing) contacts do not begin to open at this point, loosen adjusting screw on side of distributor housing, move screw down (to advance spark), up (to retard spark), in slot until contacts begin to open, tighten adjusting screw. This setting will provide correct 4° BTDC. ignition timing when distributor installed on engine.

NOTE—Timing is controlled by opening of **left hand breaker contacts** only (right hand contacts "load" coil and open and close earlier than the left hand contacts).

Timing (On the Car)—No flywheel marks provided. With distributor adjusted as described above, this will give correct 4° BTDC. timing when installed on the engine and all necessary adjustments for operating conditions and octane rating of fuel being used can be made by means of the Vacuum Brake adjustment as follows:

Vacuum Brake Setting—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, then turn screw in just enough to eliminate ping, tighten locknut.

CARBURETOR

Holley (Chandler-Groves) Ford No. 59A-9510-A. Dual (double barrel), downdraft type with manual choke control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm, choke valve wide open, and Fast Idle inoperative, set throttle lever stopscrew for 500 RPM. idling speed, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then out until engine begins to roll, finally turn screw in until engine fires smoothly. Final setting should be approximately 5/8-3/4 turn of screw from inner seated position. Readjust stopscrew for correct idling speed. NOTE—Idling speed can be estimated by marking spot on fan belt and setting speed for 25 revolutions of the belt in 10 seconds.

Accelerating Pump Setting—Three holes provided in the throttle lever for pump rod link connection. Adjust for seasonal requirements as follows:
#1 (Inner) Hole—Summer or Hot weather.
#2 (Center) Hole—Average fuel and weather.
#3 (Outer) Hole—Extremely Cold weather.

Float Level—Use 9550-A gauge to set the float level (1.353" end 'Go', 1.332" end 'No Go') measuring from underside of bowl cover to bottom of float (with cover and float assembly inverted). Fuel level in bowl should be 11/16" plus or minus 1/32".

Metering Jets—*See Chandler-Groves (Ford) Jet Table in Carburetor Section for complete data.*

Fast Idle:—Integral with carburetor. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: Ford No. 91A-9600-A. Oil-bath type.
Servicing—Clean and refill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when crankcase drained) or more often if required. Clean filter element by washing in cleaning fluid.
NOTE—Clean and re-oil filter element in oil filler cap (crankcase breather) every 1000 miles.

Fuel Pump: AC. Type R. Ford No. 11A-9350. Diaphragm type. Exchange Pump AC No. 541 ('46), 571 ('47).
See Carburetion Equipment Section for data.
Pressure—3 1/2 lbs. max. (2-3 1/4 lbs.).

Gasoline Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—No. 51A-9280-A (1946 Deluxe & Sedan Del.), 51A-9280-B ('46 Sup. Del.), 6A-9280 (1947).
Tank Unit—No. 99A-9275B (Deluxe & Super Deluxe Models), 21A-9275A (Sedan Delivery).
See Carburetion Equipment Section for data.

BATTERY

Ford Type No. 01A-10655-A. 6 volt, 17 plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Grounded Terminal—Positive (+) grounded to dash.
Engine Ground—Strap connector between right rear cylinder head and dash.
Dimensions—Length 10.56". Width 7.28". Hgt. 8.25".
Location—On right side in engine compartment.

STARTER

Ford Model No. 18-11002. Armature No. 18-11005.
Drive—Inboard Bendix Drive No. A1472, Ford No. B-11350.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on dash and controlled by pushbutton switch on instrument panel, Ford No. 19A-11500 (Pass. Cars).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR

Ford Model No. 21A-10000. Armature No. 01A-10005A. Two brush (shunt) type with vibrating voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM.
Start	520
30	1060
30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F).
Brush Spring Tension—Approximately 28 ozs.

Removal:—Generator mounted on bracket between cylinder banks at front of engine, driven in tandem with water pumps by Vee belt. To remove, loosen nut on bracket stud.

Belt Adjustment: 1/2" deflection midway between generator and water pump pulleys. NOTE—Generator mounting bracket also includes the fan mounting (fan driven by a separate belt). Both belts adjusted in same manner by loosening mounting bolt and raising mounting brackets.

REGULATOR

Ford Model No. 01A-10505-C. Three Unit Type. Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash.
See Electrical Equipment Section for complete data.
NOTE—Regulator case is grounded through separate ground wire extending from regulator to generator frame. This ground connection must be in place when regulator being operated or tested.

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—8 ampere discharge current maximum.

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F.
Checking & Adjusting—*Refer to Electrical Equipment Index for article on 'Ford Regulator—3-unit Type' for complete instructions.*

Current Regulator

Setting—30-33 amperes (after 5 minutes run).
Checking & Adjusting See Voltage Regulator above.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—On lower edge of speedometer dial. Lighted whenever upper beams in use.

Switches

Lighting—Ford No. 11A-11652 (Switch & Wiring—All Models), 51A-11661A (Knob & Insert—Deluxe Models), 51A-11661B (Knob & Insert—Super Deluxe Models with Blue-Grey Trim), 51A-11661C (Knob & Insert—Super Deluxe Models with Brown Trim).

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Beam Selector—Ford No. 11A-13532 (Switch only), 21A-11653 (Switch & Wiring).
Instrument—Ford No. 19A-13740.
Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed	Beam
Parking	3	63
Beam Indicator, Ign. Lock	1	51
Instrument, Clock	1½	55
Stop & Tail	21-3	1154
Dome (Pillar), Luggage Compt.	3	63
Rear License	3	63

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Ford 11A-12250A Combined with Ignition Resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlight circuits, second unit protects other lighting circuits) of the thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

HORNS: Ford No. 91A-13832 (High Note), 91A-13833 (Low Note). Air electric type dual horns operated by horn relay.

Horn Current—24-28 amperes total.

Horn Relay: Ford No. 11A-13842D.
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE SPECIFICATIONS: Own "100". Eight Cylinder, 90° Vee, "L" Head type. Cylinder banks and crankcase cast Enbloc.

Bore—3.187". **Stroke**—3.75".
Displacement—239 cu. ins. **Rated H.P.**—32.5.
Developed Horsepower—100 at 3800 RPM.
Compression Ratio—6.75-1 Cast Iron Heads.
Compression & Vacuum Readings—*See Tune-up data*

►**1946-47 ENGINE SERVICE NOTES: Cylinder Head.** New type, Part No. 59A-6050-A or -B, is interchangeable right-and-left. May be identified by figures "59A" or "59A-B" on top. Heads have greater valve clearance for new cylinder block (below) and larger water holes for improved cooling (¾" hole at top center and ⅝" hole at center between #2 and #3 cylinders).

►**Cylinder Head Gasket**—New type, Part No. 59A-6051, may be identified by 5/16" round hole instead of blunt coneshaped opening at lower edge between #2 and #3 cylinder bores. ***This gasket must be used with new 1946 type Cylinder Head (above).***

►**Cylinder Block**—New type, Part No. 59A-6010-C with valve ports located .09" farther from center line of block. May be identified by number or by oblong water passages just above valves (round on previous types).

►***CAUTION—If the earlier type Cylinder Heads (81A-81T-, 99T-, 29A-) used with this block, heads must be machined out for valve clearance, and water passages in head should be enlarged for improved cooling. Refer to Ford Shop Notes for complete data.***

OIL PAN REMOVAL: *See Ford Shop Notes.*

ENGINE REMOVAL: *See Ford Shop Notes.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening—*See Ford Shop Notes.*

CYLINDER SLEEVE: Cast iron, dry type cylinder sleeves may be used (engine may have mark "HS" on block beside inner front corner of left cyl. head). **Servicing**—*See Ford Shop Notes.*

PISTONS: Steel Alloy, light weight, cam ground type or Aluminum Alloy, T slot type. Recondition engine to take finished replacement pistons (if sleeves used, replace sleeves, use new Std. size pistons). NOTE—All pistons are four ring type with slotted oil control ring on skirt below pin hole.

Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.

Replacement Pistons: *See Ford Shop Notes.*

Fitting New Pistons: Use .50" wide feeler stock of correct thickness (see table below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 6-10 lbs. (all types).

Engines with Steel Sleeves	Steel Piston	Aluminum Piston
	Feeler Thickness	
New Piston & Sleeve	.003"	.003"
New Piston—Worn Sleeve	.004"	.004"
Worn Piston & Sleeve	.005"	.005"
Engines without Sleeves		
New Piston & Bore	.0025"	.002"
New Piston—Worn Bore	.004"	.004"
Worn Piston & Bore	.005"	.005"

PISTON RINGS: Two compression, two slotted oil rings per piston (lower oil ring below pin). Oil ring grooves have oil drain holes.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0915-.0920"	.012-.017"	.0015-.003"
Compr. #2	.0915-.0920"	.012-.017"	.001-.0025"
Oil Contr.	.1545-.1550"	.012-.017"	.001-.0025"

Replacement Rings: *See Ford Shop Notes.*

PISTON PIN: Diameter .7501-.7504". **Length** 2.975" (with steel pistons), 2.850" (with aluminum pistons). Floating type with locking ring in piston at each end. Pin hole in connecting rod bronze bushed.
Pin Fit in Piston—.0001-.0002" (aluminum pistons), .0003-.0009" (steel pistons) or light hand push fit with piston at 70°F.

Pin Fit in Rod Bushing—.0002-.0005" (pin should pass through bushing slowly of own weight).
See Ford Shop Notes for Pin Fitting directions.

Replacement Pins: *See Ford Shop Notes.*

CONNECTING ROD: Length 7.000". **Weight** 492 grams. **Crankpin Journal Diameter**—2.1390" Connecting rod diameter on crankpin 2.360" (2.3597-2.3603").

Bearing Type—Steel-backed, special alloy lined with bearing surface on both inner and outer face. Bearing floats in both rods (side-by-side mounting)
Bearing Dimensions—Length 1.747". Thick .1095".
Clearance—.0015-.0035" (see Bearing Adjustment).

Sideplay—.003-.007" (bearing endplay), .006-.014" (side clearance for both rods).

Bearing Adjustment: None (no shims). Do not file bearing caps. Replace bearings if less than .1085" in thickness, replace or hone rod for oversize bearing if worn more than .0015" over original size (2.3597-2.3603"). CAUTION—Both rods must be same size.

Replacement Bearings: *See Ford Shop Notes.*

Installing Rods: Marks on rods and bearing caps (R1, L1 etc.) must be together and installed in same numbered cylinder with marks pointing down toward pan.

CRANKSHAFT: Three bearing type with integral counterweights. NOTE—New type crankshaft used with new wide land (four ring) pistons.
Journal Diameters—2.4990" (all bearings).

Bearing Type—Steel-backed, special alloy-lined.
Clearance—.001-.003".

Bearing Adjustment: None (no shims). Do not file bearing caps.

Replacement Bearings: *See Ford Shop Notes.*

End Thrust: Taken by rear main bearing. Adjust by replacing bearing. **Endplay**—.002-.006".

CAMSHAFT: Three bearing type. Helical gear drive.
Bearing Diameters—1.797" all bearings. Replace camshaft if worn to less than 1.7955" diameter.

Bearing Type—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

End Thrust: Taken by gear hub and thrust surface on inner face of cover plate. Adjusted by replacing coverplate. **Endplay**—.005-.015".

Timing Gears: Cast alloy iron (crankshaft), Aluminum or malleable iron bolted-on type (camshaft). **Backlash**—.004" maximum.

Replacement Gears—*See Ford Shop Notes for Gear Oversizes and installation instructions.*

Camshaft Setting: Mesh marked tooth of crankshaft gear in similarly marked space between teeth on camshaft gear.

VALVES:

	Head Diameter	Stem Diameter	Length
All Valves	1.510"	.3105"	4.577"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0025-.0045"

NOTE—Service limit for valve stem diameter is .309" Intake, .3065" Exhaust. Valves interchangeable.
Valve Seat Inserts—Used on all valves.
For Valve Servicing data, see Ford Shop Notes.

Valve Guides: Split type retained by "C" washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).
For servicing data, see Ford Shop Notes.

Valve Lifters: Barrel type in reamed holes in block.

Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).

Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs: Replace if pressure less than 30 lbs. when compressed to 2.125".

	Spring Pressure	Length.
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.84"

VALVE TIMING

Tappet Clearance: .010-.012" Intake, .014-.016" Exhaust, Cold. No adjustment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

Valve Timing Check—No flywheel marks or other means provided to check timing. No. 1 intake valve should open with No. 1 piston on top dead center entering intake stroke.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and timing gears. Oil pump mounted in crankcase at rear of engine.

Oil Pan Removal: *See Ford Shop Notes.*
Crankcase Capacity—5 quarts.
Normal Oil Pressure—50 lbs. at 2000 RPM.

Oil Pressure Regulator—Located under plug above front camshaft bearing (under manifold) and on oil pump housing (some models). Not adjustable.

NOTE—Check relief valve tension spring whenever engine overhauled. Replace the cylinder block relief valve spring if tension not within limits of 43-50 ozs. at 1.380" (engines without oil pump relief valve), or 78-80 ozs. at 1.380" (engines with oil pump relief valve). Replace oil pump relief valve spring if tension not within limits of 78-87 ozs. at 1.380".

Oil Pump: Gear type. In crankcase at rear of engine. NOTE—This new type pump, No. 41A-6600-A (for engines without oil pan baffles), has oil pressure regulator (relief valve) in pump body.

Oil Pump Servicing—*See Ford Shop Notes.*

Oil Pressure Gauge: King-Seeley Electric. Ford Nos. **Dash Unit**—No. 51A-9273-A (1946 Deluxe), No. 51A-9273-B (1946 Super Deluxe), No. 6A-9273 (All 1947).
Engine Unit—No. 41A-9278 (80 lb.) All Models.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with two water pumps at front of engine (pump for each bank). **Capacity**—22 quarts.

Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs.

Water Pump: Packless, centrifugal type (2 used). Mounted on front of engine (pump housing integral with front engine mounting).
See Water Pump Section for complete data.

Removal—Drain cooling system, place support jack under engine (use wood block on jack to avoid damaging pan), remove bolt from front engine support, raise engine until no weight rests on front support. Loosen generator mounting bolt, remove drive belt. Disconnect and remove hose at pump. Remove four capscrews mounting pump on engine, lift pump out. CAUTION—One mounting screw located within water pump inlet connection (accessible with hose removed).
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In each cylinder head water outlet (two used). Start to open at 150-155°F. Fully open at 175-180°F.

Temperature Gauge: King-Seeley Electric. Ford Nos. **Dash Unit**—No. 51A-10883-A (1946 Deluxe), No. 51A-10883-B (1946 Super Deluxe), No. 6A-10883 (All '47). **Engine Unit**—No. 01A-10990 (Temperature Gauge Switch—in left hand cylinder head), No. 99A-10884 (regular Engine Unit—in right cylinder head).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI, Ford No. 19A-7563. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.

Facings—Woven asbestos composition. I.D. 6¾". O.D. 10". Thickness ⅛".

Pedal Adjustment: Pedal free travel 1-1¼". To adjust, disconnect clevis at equalizer (throw-out) shaft end of pedal connector rod, turn clevis on rod.

Removal: Remove Transmission (see Transmission Removal below), install wooden wedges between each release lever and cover to hold the clutch in released position, take out six capscrews mounting cover assembly on flywheel, lift out cover assembly and driven member.

TRANSMISSION

Own Make. Three-speed, all-helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever on steering column.
See Transmission Section for complete data.

Removal: Remove Rear Axle (see Rear Axle Removal below), remove capscrews mounting front seat track on floor, move front seat back for necessary room. Take out mounting screws in front floor pan spacer, remove spacer. Disconnect gearshift connecting rods at transmission case, disconnect and remove equalizer (clutch release) shaft. Remove capscrew and washer on end of transmission shaft (in universal joint), remove universal joint. Remove nuts and washers on engine rear support bolts. Support engine by placing jack (use wood block on jack) under rear end and raise engine sufficiently so that rear support clears mounting bolts (NOTE—remove nuts holding lower half of engine rear support assembly and remove the assembly). Take out eight capscrews mounting transmission case on flywheel housing, pull transmission straight back and lift out.

UNIVERSALS

Spicer Model 202-6X, Ford No. B-7090. Steel bushing type. Single joint in torque ball at transmission.
See Universals Section for complete data.

REAR AXLE

Own Make. ¾ Floating, Spiral Bevel Gear type with Torque Tube Drive.
See Rear Axle Section for complete data.
Ratio—3.54-1 Std., 3.78-1 & 4.11-1 Optl.
Backlash—.012" maximum.

Removal: Raise rear end of car. Disconnect track bar. Disconnect rear spring (use spring spreader if available) by placing block under each rear spring eye and lowering car so that weight keeps spring extended and then removing spring shackle bolts and bars. Take out pin in hand brake equalizer and disconnect hand brake cable. Disconnect hydraulic brake line at torque tube and rear shock absorber links at each wheel. Disconnect accelerator pedal, remove pedal pads, floor mat, beam control switch (take out two mounting screws), and floor pan. Disconnect speedometer cable at torque tube. Remove nuts on four universal joint ball housing bolts and two bolts holding ball cap halves together, remove ball cap. Pull rear axle back to disconnect torque tube from transmission.

SHOCK ABSORBERS

Houde (Houdaille). Double Acting, adjustable, hydraulic types (Front & Rear).

	Houde Model	Right — Ford No.	Left
Front	BBCN-3	51A-18045	51A-18046
Rear①	BBCZ-3	51A-18080A	51A-18081A
Rear②	BBCZ-3	51A-18080B	51A-18081B

①—Except Sedan Delivery and Station Wagon.
②—Sedan Delivery & Station Wagon only.

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than **1 or 2 serrations at a time.** NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check every 5000 miles, fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) required for these new shock absorbers (identified by round top filler plug).

FRONT SUSPENSION

Front Axle: Conventional "I" beam section type with Reverse-Elliott ends and transverse spring. Axle positioned by radius rods.

Kingpin Inclination—8° crosswise.

Caster—3°. Axle may be bent cold for minor corrections providing correct tools used to prevent crushing of axle flange.

Camber—¾°. Adjust as for Caster (above).

Toe In—1/16". Adjust in usual manner by changing length of tie rod.

STEERING GEAR

Gemmer design (Model 305), Ford Make. Worm-&-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed Hydraulic, self-centering, double anchor type. Hand lever applies rear wheel service brakes. NOTE—These brakes do not have anchor pin adjustment.
See Brake Section for complete data.

Drums—Composite iron and steel. Diameter 12".

Clearance—Least possible amount without drag.

Lining—Width 1.75". Thickness .187". Length per shoe 13.12" (forward shoes), 10.08" (rear shoes).

Hand Brakes: See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Top: Two types as follows:
1—Convertible—Auto-lite electric type.
2—Sportsman Convertible—Hydro-Lectric type.
See Miscellaneous Section for complete data.

Power Window Regulators (Sportsman Convertible): Hydro-Lectric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

Series	MODEL "V8"①	"6 Cyl"②	WHB
F-1 ½ Ton	9RC	9HC	114"
F-2 ¾ Ton	9RD	9HD	122"
F-3 ¾ Heavy Duty	9RY	9HY	122"
F-3 Parcel Delivery	——	9HJ	104"
F-3 Parcel Delivery	——	9H2J	122"
F-4 1 Ton	9RTL	9HTL	134"
F-5 1½ Ton	9RT	9HT	134"
F-5 1½ Ton	9R8T	9H8T	158"
F-5 1½ Ton	9R6T	9H6T	176"
F-5 School Bus	9R8T	9H8T	158"
F-5 School Bus	9R4T	9H4T	194"
F-5 1½ C-O-E	9ROW	9HOW	110"
F-5 1½ C-O-E	9RW	9HW	134"
F-5 1½ C-O-E	9R8W	9H8W	158"
F-6 2 Ton	9RTH	9HTH	134"
F-6 2 Ton	9R8TH	9MTH③	158"
F-6 2 Ton	9R6TH	9H8TH	176"
F-6 2 C-O-E	9ROWH	9HOWH	110"
F-6 2 C-O-E	9RWH	9MOWH③	134"
F-6 2 C-O-E	9R8WH	9HWH	158"

①—Rouge 239 Truck V8 100 H.P. "R" Engine.
②—Rouge 226 Truck 6 Cyl. 95 H.P. "H" Engine.
③—Rouge 254 Truck 6 Cyl. 110 H.P. "M" Engine.

ENGINE NUMBER: On Rating Plate on dispatch compartment (glove box) door and on left side of frame near steering gear mounting bracket. NOTE—Engine Number is also Serial Number.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. at cranking spd.
VACUUM READING: Steady 18-21" idling at 500 RPM.
FIRING ORDER (V8): 1-5-4-8-6-3-7-2. See diagram.
FIRING ORDER (6 CYL.): 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: .025-.028".
Plug Type—Champion H-9 Comm. 14 mm.
DISTRIBUTOR:
Breaker Gap—(6 Cyl.) .024-.026" (V8) .014-.016"
Cam Angle—(6 Cyl.) 36° closed, (V8) 27° closed.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Condenser Capacity—.21-.25 microfarad.

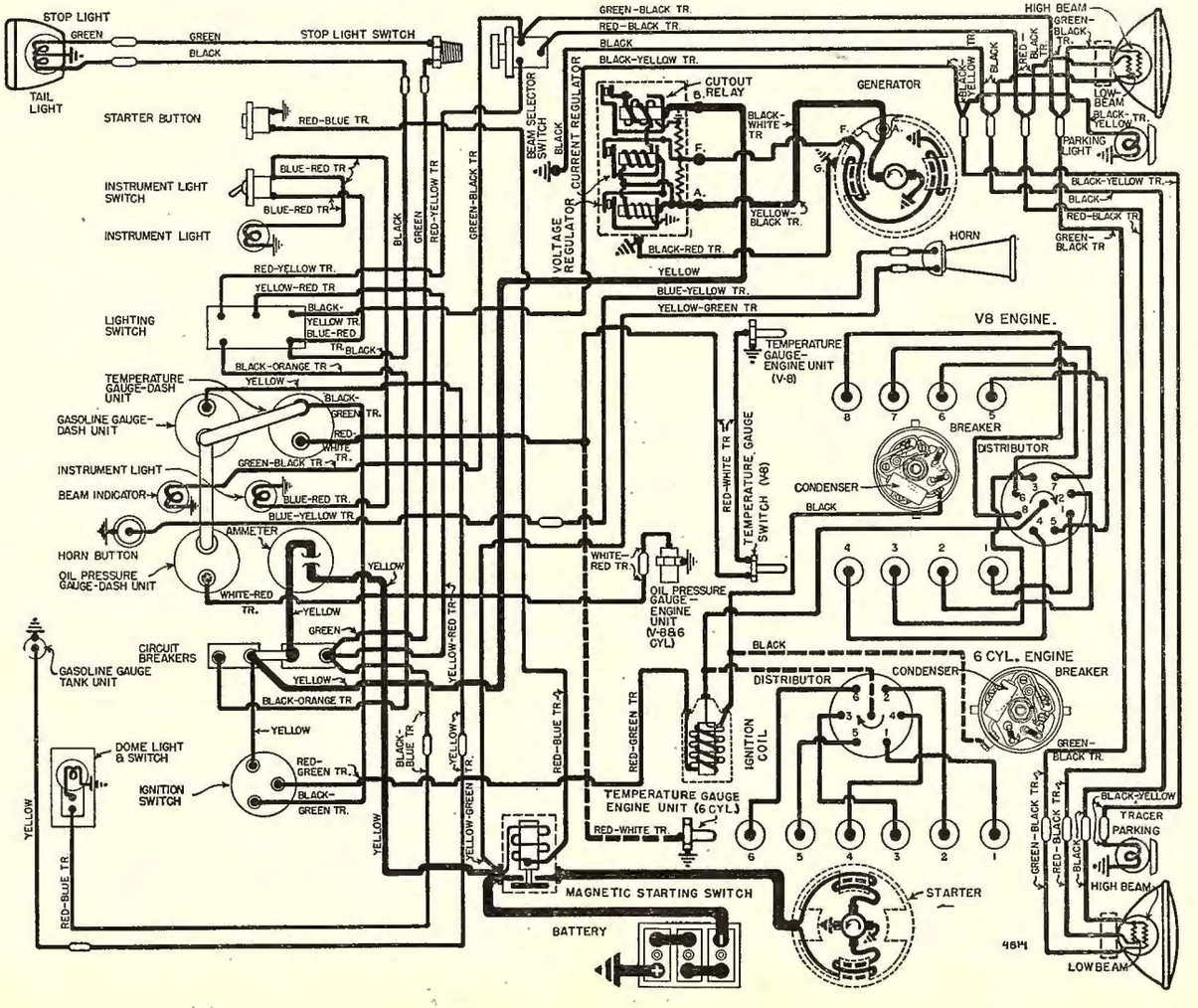
Distributor Line (Carburetor Connection) Vacuum Engine R.P.M.—	800	1000	2000
6 "H" & "M"	1.2-1.4"	2.1-2.9"	4.7-6.3"
V8 "R"	2.0-2.9"	3.5-4.8"	4.7-6.3"

IGNITION TIMING: 2° BTDC (V8), TDC (6 Cyl.).
Timing Procedure—*See Ignition Timing.*
V8—Crankshaft Pulley Mark—Circular boss aligned with pointer on right side of engine front cover.
6 Cyl.—Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper 6 Cyl. Timing.***
CARBURETION:
Idle Setting—Approx. 1 turn open. 2 screws used on V8—turning screws out gives richer mixture.
Idle Speed—Approximately 500 RPM.
Float Level (V8 & 6 cyl. "H" engine)—1.322-1.353" bottom of float to bowl cover with needle valve seated (use gauge No. 9550-A).
Float Level (6 Cyl. "M" Engine)—1.283" to 1.315" from bottom of float to machined surface of air horn with assembly held in inverted position.
Float Level (C-O-E 6 Cyl. "M" & "H" Engine)—1.180" to 1.200" from top of float to surface of bowl casting.
Fuel Level (6 cyl. "M" engine)—17/32"±1/32" top of bowl to fuel level.
Fuel Level (C-O-E 6 cyl. "M" & "H" engines)—½"±1/32" top of bowl to fuel level.
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.
Fuel Pump Pressure: (V8) 3½-4½ lbs., (6) 4-5 lbs.
MANIFOLD HEAT CONTROL: Automatic.
V8 Engine—Valve located between right end of exhaust pipe cross over and right exhaust manifold.
6 Cylinder—At center of exhaust manifold just under intake manifold.
VALVE TAPPET CLEARANCE (6 Cyl. "H" Engine)
CAUTION: Two camshafts used. Different tappet clearances for each type.

1948-49 & Early 1950
►First type Camshaft No. 7HA-6250-C
(No markings on engine or camshaft)
Tappet Clearance—Intake .009-.011". Exhaust .013-.015".

Late 1950 & 1951
►Later Type Camshaft No. OHA-6250
(Engine Marked "OH" above #3 Intake port)
(Camshaft marked "O" on front end)
Tappet Clearance—Intake .013-.015". Exhaust .017-.019".

VALVE TAPPET CLEARANCE (6 Cyl. "M" Engine): Intake .009-.011". Exhaust .014-.016".
►6 Cyl. High Speed Setting—.002" additional exhaust valve clearance recommended by manufacturer.
"V8" VALVE TAPPET CLEARANCE: ***CAUTION—Different settings required for each type camshaft:***



1948-49 TRUCKS

►**FIRST TYPE V8 CAMSHAFT NO. 8BA-6250-A**
(no markings on Engine or Camshaft)
Intake—.010-.012" COLD. **Exhaust**—.014-.016" COLD
►**SECOND TYPE V8 CAMSHAFT NO. 8BA-6250-B**
(Engine Marked—*"GAP, in- .014", ex- .018"*)①
(Camshaft Marked—*"B" on front end*)
Intake Valves .....014" (.013-.015") COLD
Exhaust Valves .....018" (.017-.019") COLD
①—On top of block at center under valve cover.

VALVE TIMING CHECK: ***See Valve Timing.***

STARTING: ***See Battery, Starter, Generator, Regulator.***

IGNITION

IGNITION SWITCH: Ford No. (1948-50) 6A-11572-A, (1951) OL-11572-A.
Ignition Lock—Ford No. (1948-49) 6A-11582-A, (1950) 8A-11582-A, (1951) 1A-11582-A.

COIL: Ford No. 7RA-12029-A. Metal can type.
Location—Next to distributor.
Ignition Current—Idling 2.75-3 amperes at 6 volts. 5-5.5 amperes stopped. Coil primary resistance 1.05-1.15 ohms (75°F). Secondary resistance 4100 ohms (75°F).

CONDENSER: Ford No. 7RA-12300-B.
Capacity— 21-.25 microfarad.

DISTRIBUTOR: Less Distributor Cap and Rotor.
7RA-12127-C (1948-49, early '50 V8 "R" engine).
8BA-12127, (Late 1950 & 1951 V8 "R" engine with cast iron front cover).
OBA-12127, (Late 1950 & 1951 V8 "R" engine with Aluminum front cover).
7HA-12127 (All 6 Cyl. "H" engines).
8MTH-12127 (6 Cyl. "M" engine).
Type—New "Pressure" distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs. Operating vacuum taken from 1 carburetor connection (2 passages inside carburetor, 1 at venturi, 1 at throttle valve). Full spark advance obtained at 18-35 MPH. with normal road load or for part throttle operation at any speed.
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.
Breaker Gap—(6 Cyl.) .024-.026" (V8) .014-.016".
Cam Angle—(6 Cyl.) 36° closed, (V8) 27° closed.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Unit

8BA-12127			OBA-12127		
Degrees	Vacuum	RPM	Degrees	Vacuum	RPM
0-0°	0"	200	0-0°	0"	200
0-1°	0.30"	500	0-1°	0.30"	500
5.2-6.2°	1.32"	1000	5.2-6.2°	1.32"	1000
8¾-10°	2.85"	1500	8¾-10°	2.85"	1500
10-11¼°	3.7"	2000	10-11¼°	3.7"	2000

7HA-12127			8MTH-12127		
Degrees	Vacuum	RPM	Degrees	Vacuum	R.P.M.
0-0°	0"	200	0-0°	0"	200
1¾-3°	0.4"	500	1¼-2¼°	0.4"	500
5½-6¾°	1.4"	1000	4¼-5¼°	1.7"	1000
11½-13°	5.5"	1000	6¼-7¼°	2.85"	1500
8½-9¾°	2.9"	1500	7½-8½°	3.7"	2000
10½-11½°	4.1"	2000			

Distributor Line (Carburetor Connection) Vacuum —***See Tune-Up.***

Distributor Removal: Disconnect vacuum line, take out hold-down screw, lift off. V8 distributor mounted at front of engine on right side. 6 Cylinder distributor mounted on left side of engine at center.

IGNITION TIMING

V8 Engine .....**2° BTDC.**
6 Cylinder .....**TDC.**
Timing Marks—***See Tune-Up data.***
Timing—With #1 piston at firing position and timing mark aligned with pointer on front of engine, loosen distributor clamp screw, rotate distributor until contacts begin to open, tighten clamp screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.
Timing (with Neon Timing Light)—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark timing mark and pointer with white chalk (6 cylinder equipped with two pointers use pointer nearest to outer circumference of dampener). Connect timing light to #1 spark plug, idle engine, adjust distributor by loosening clamp screw and rotating distributor until mark and pointer are aligned, tighten clamp screw, connect vacuum line.

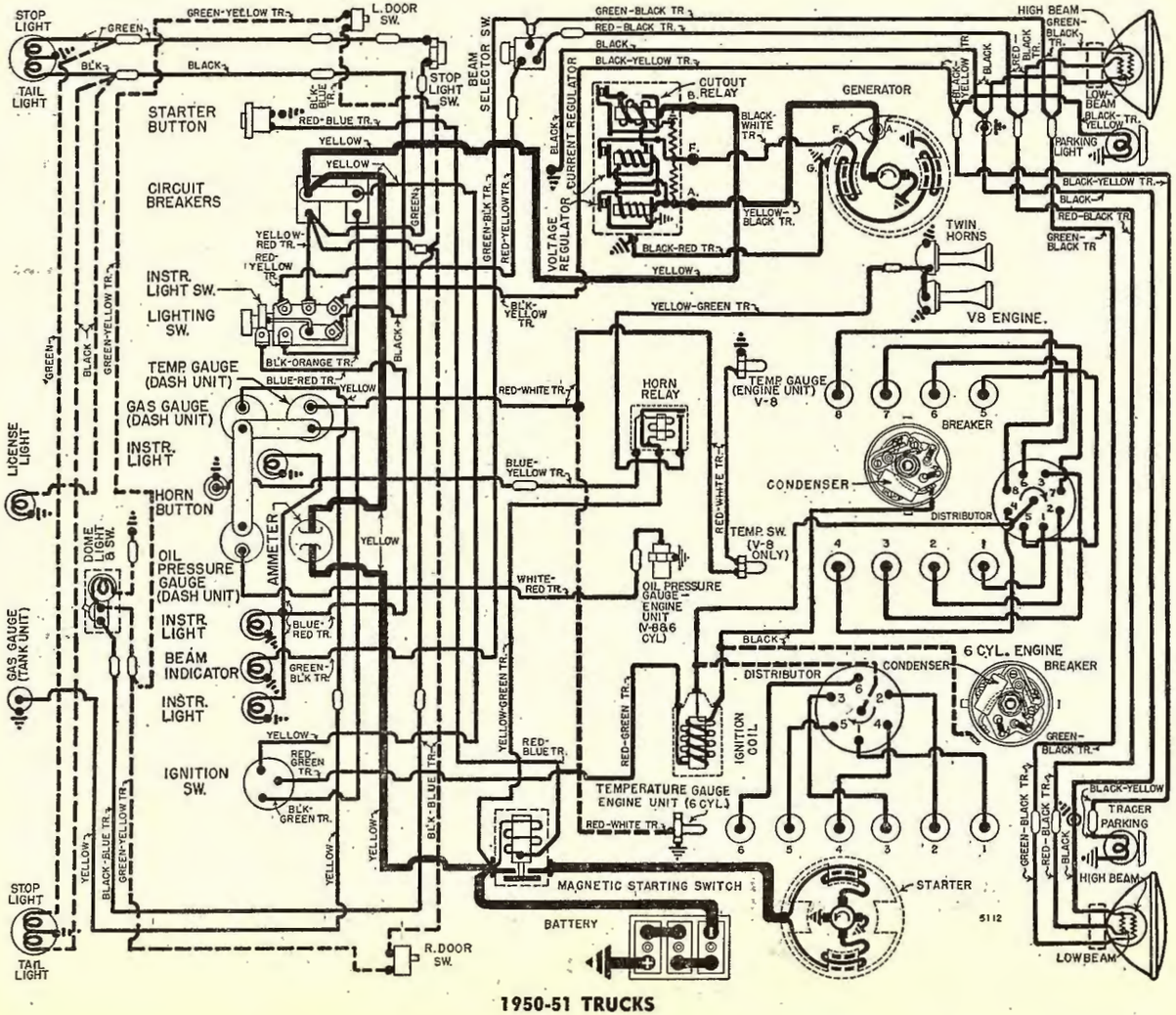
CARBURETOR

Holley-Ford Downdraft Types	Ford Model Nos.
V8 "R" Engine	7RT-9510-A
6 Cyl. "H" Engine	7HT-9510-A
6 Cyl. "M" Engine	8MTH-9510

Updraft Types

6 Cyl. "H" Engine COE & Parcel Del.	7HW-9510
6 Cyl. "M" Engine COE	8MWH-9510

Dual or double barrel (V8), single barrel (6 Cyl.)



1950-51 TRUCKS

CONTINUED ON NEXT PAGE

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downdraft type with new vacuum passages for distributor operation.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump (V8 Engines):
1948-50—(Std.) Ford No. 7RA-9350-C.
1948-50—(Optional) Ford No. 7RA-9350-A.
1948-50—(Calif. only) Ford No. 8CM-9350-E.
1951—(Std.) Ford No. 1BA-9350-A.
1951—(Std. California, optional otherwise) Ford No. 8CM-9350-E.

Fuel Pump (6 Cyl. Engines):
1948-50—(Std.) Ford No. 7HA-9350-B.
1951—(Std.) Ford No. 1HA-9350-A.
Pressure—3½-4½ lbs. (V8), 4-5 lbs. (6 Cyl.).
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—Ford No. 7RC-9280 (all models).
Tank Unit (All Closed Cabs)—Ford No. 7RC-9275.
Tank Unit (F-1, 2, 3 Panels)—Ford No. 21C-9275B.
Tank Unit (F-4, 5, 6 Panels & Bus)—No. 7RT-9275.
See Carburetion Equipment Section for complete data.

Air Cleaner V8, & 6Cyl. C-O-E (oil bath): Ford No. 7RT-9600-C (1 quart capacity).
6 Cyl. exc. C-O-E (oil bath)—Ford No. 7HT-9600-A

BATTERY

Std.—Ford 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Grounded Terminal—Positive (+) terminal.
Dimensions—L. 10½". W. 7⅛". H. 7¼".
Location—At rear of engine on right side (V8), left side (6 Cyl.). On right running board under separate cover on Cab-Over-Engine trucks.

School Bus (Spec. Equip. Other Models): Ford No. 01A-10655-A. 6 Volt, 17 Plate, 120 Ampere Hour
Grounded Terminal & Location—As given above.

STARTER

Model	Ford Part No.
V8 Engine (1948-50)	①7RA-11002
V8 Engine (1951)	①1A-11002-A
6 Cyl. "H" Engine (1948-50)	②7HA-11002
6 Cyl. "H" & "M" Engine (1948-50)	③7HA-11002
6 Cyl. "H" & "M" Engine (1951)	④1A-11002-A

①—Use with B-11350 Drive Assembly.
②—Use with B-11350 Drive Assembly & 2GA-6384-A Ring Gear.
③—Use with 8HA-11350 Drive Assembly & 8HA-6384 Ring Gear.
④—Use with 8HA-11350 Drive Assembly.

Armature No.—Ford No. 18-11005.
►**Starter Motor Rusting Correction**—*See "Electrical System Notes" in Ford Shop Notes.*
Drive—10 Tooth Pinion Type (All V8, Early 6 Cyl.) Ford No. B-11350 (Bendix No. A1472) for use with 112 tooth flywheel ring gear.
Drive—9 Tooth Pinion Type (Late 6 Cyl.) Ford Part No. 7HA-11350 (with 114 tooth flywheel ring gear).
►*6 CYL. STARTER DRIVE CAUTION—Use proper type drive. Both 9 and 10 tooth pinions used as listed above.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ounces.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on front of dash next to battery (left side on 6 Cyl. Conventional Truck, right side all others) controlled by pushbutton, Ford No. 11C-11500.

Removal: On right front face of flywheel housing cover. To remove, take off right engine splash pan (if used), free starter-to-oil pan bracket, take out 2 starter through bolts.

GENERATOR

Ford 2 brush type with voltage & current regulation.

Generator No.	Capacity
8BA-10002-A or D (Std. Equip.)	35 amps.
8BA-10002-B①	40 amps.
8HJ-10002-A (Parcel Delivery)①	30 amps.
OHA-10002-A (Std. Equip. 1951 "H" Eng.)	35 amps.
OHA-10002-B (Sch. Bus "H" Eng.)①	45 amps.

①—Special Equipment.

Armature No.	Generator No.
8BA-10005-A	8BA-10002-A or D
8EH-10005	8BA, OHA-10002-B
8HJ-10005-A	8HJ-10002-A
OHA-10005-A	OHA-10002-A, 8BA-10002-A or D

Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—Controlled by regulator dependent on load and battery condition.

Performance Data

	Maximum Rate Amperes	Eng. RPM
8BA-10002-A	35	935
8BA-10002-B	40	1060
8BA-10002-D	35	900
8HJ-10002-A	30	——
OHA-10002-A	35	890
OHA-10002-B	40	1060

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.

Removal (V8): On support secured to valve chamber cover by stud and nut, driven by belt in tandem with water pumps. To remove, loosen stud nut and disengage generator belt, take out capscrew in mounting strap, lift generator off support.

Removal (6 Cyl.): Separate generator mounting bracket mounted on engine bracket on left side of engine at front. To remove, slack off belt by loosening mounting bracket bolts, take out mounting strap bolt, lift generator off mounting bracket.

Belt Adjustment (V8): Loosen 2 bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulleys is ½" (thumb and finger pressure), tighten stud nut. Adjust fan belt in similar manner, tighten 2 fan bracket bolts.

Belt Adjustment (6 Cyl.): ½" deflection midway between generator and pump pulleys. To adjust, loosen 2 mounting bracket bolts under generator and capscrew in bracket slot behind generator.

REGULATOR

Ford Numbers

Regulator	Ampere Rating	Generator
51A-10505-A	30-34	8BA-10002-A
51A-10505-H	34-38	8BA-10002-A
8M-10505-A	34-38	8BA, 8HJ, OHA-10002-A
5EH-10505-C	38-42	8BA-10002-B
8L-10505	38-42	OHA, 8BA-10002-B

Voltage-current 3-Unit types.
See Electrical Equipment Section for complete data.
NOTE—Ground wire between generator and regulator must be in place.

Cutout Relay

Regulator	Cuts In
51A-10505-A,H, 5EH-10505-C	6.6-7.0 Volts
8M-10505-A, 8L-10505	6.0-6.6 Volts

Cuts Out (Discharge—0-8 Amperes.
Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting COLD①
All	7.2-7.6 Volts

①—Voltage settings will increase approx. .2 volts after 20 minutes running.

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.
►*CAUTION—Make certain gauge contacts armature and not brass rivet on underside of voltage armature.*
Contact Spring Tension—5 ounces minimum with contacts just opening.

Current Regulator

Regulator	Current Setting COLD Amperes
51A-10505-A	30-34
51A-10505-H, 8M-10505-A	34-38
5EH-10505-C, 8L-10505	38-42

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Bulb between Fuel and Oil Gauges on panel. Lighted when Upper Beam in use.

Switches

Lighting—Ford No. (1948-50) 7RA-11654, (1951) OL-11654.
Beam Selector—Ford No. 7RA-13532.
Instrument—Ford No. (1948-50) 21C-13740, (1951) OL-13740.
Stop Light—Ford No. 11A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Ford No. 51A-12258-A. Consists of two circuit breakers behind instrument panel: **Top Unit** Headlights. **Lower Unit** Auxiliary Lights.

HORNS: (1948-50) Single Horn (Std.), Dual Horns with relay (Optl.). (1951) Dual Horns with relay (Std.).

ENGINE

ENGINE SPECIFICATIONS: Own Make "L" Head
6 Cylinder Rouge 226 "H" Engine.
6 Cylinder Rouge 254 "M" Engine.
8 Cylinder Rouge 239 "R" Engine, Vee type.

	Bore	Stroke	Displacement
"H" Engine	3.30"	4.40"	226 cu. in.
"M" Engine	3.5"	4.40"	254 cu. in.
"R" Engine	3.187"	3.75"	239 cu. in.

	Comp. Ratio	Rated HP	Developed HP
"H" Engine	6.8-1	26.1	95 at 3300 RPM
"M" Engine	6.8-1	29.4	110 at 3400 RPM
"R" Engine	6.8-1	32.5	100 at 3800 RPM

Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Ford Special Data.*

►**OTHER ENGINE DATA:** *See 1950-51 Ford Six & V8 Passenger Car pages.* 6 Cyl. "H" engines and V8 "R" engines are similar to those used in 1950-51 passenger cars, and the data on pistons, rings, bearings, valves, etc. shown on passenger car pages applies to truck engines.

►**6 CYL. "M" ENGINE DATA:** *Same as for 6 Cyl. "H" engines except as follows:*

Fitting Pistons—Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows: New piston in new bore .0015". New piston in used bore .002". Used piston in used bore .003". Pounds pull to withdraw: 5-10 lbs.

►*PISTON PRODUCTION CHANGE—Split skirt pistons used in early production 1950. Solid skirt pistons used late 1950 & 1951.*
Piston Rings—3 used per piston, 2 Comp. and 1 Oil ring.
End Gap (Compr. Rings) .008-.016", (Oil) .007-.015".
Side Clearance—Oil ring .003".
Connecting Rod Side Clearance—.003-.007".
Crankshaft Main Bearing Clearance—.0005-.0032".

CAMSHAFT: *CAUTION*—Two different camshafts used in production. Valve tappet clearance remains as before. SEE TIMING GEARS (below).

►*CAMSHAFT IDENTIFICATION*—New camshaft can be identified by letter "N" stamped on end of shaft.

Timing Gears: *CAUTION*—7HA-6256-A Camshaft gear used with early unmarked camshaft. 7HT-6256-A Camshaft gear used with marked camshaft in either "H" or "M" engines.

►*NOTE*—7HA-6256-A Camshaft gear can be used with the unmarked camshaft by increasing the chamfer from 15° to 45°. 7HT-6256-A Camshaft gear can be used with either the marked or unmarked camshaft without interference.

VALVE TIMING

VALVE TAPPET CLEARANCE: Engine COLD.

	Intake	Exhaust
"H" Engine①②	.009-.011"	.013-.015"
"H" Engine①③	.013-.015"	.017-.019"
"M" Engine	.009-.011"	.014-.016"
"R" Engine②	.010-.012"	.014-.016"
"R" Engine③	.013-.015"	.017-.019"

①—Set .002" additional for high speed operation.
②—With Early type camshaft.
③—With Late type camshaft.

►*CAUTION—"R" V8 Engines—Loss of Power will result if correct tappet clearance is not used with "B" (late type) camshaft. See Tune-Up for Camshaft Identification data.*

VALVE TIMING: *See Camshaft setting 1949-50 Ford 6 Cyl. & V8 Pass. Cars.*

"H" & "M" 6 Cyl. Engine
Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.

"R" V8 Engine ("A" Camshaft)
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

"R" V8 Engines ("B" Camshaft)
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 3° ATDC.
Valve Timing Check—Intake valve opens at TDC (V8), 11° BTDC (6 Cyl.). Valve timing mark location on crankshaft pulley (V8), dampener (6 Cyl.).

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings. Timing gears and distributor drive gear lubricated through drilled hole in front end of camshaft on V8. Timing gears lubricated by spray past camshaft thrust plate on 6 cylinder engine.

►*OIL PAN CLEAN-OUT PLATE—On underside of oil pan, attached by 7 nuts. Remove to clean oil pump intake and screen, and oil pan.*
Crankcase Capacity—"H" & "R" engines 5 qts. "M" engine 6 qts.
Normal Oil Pressure—50 lbs. at 2000 RPM.

Oil Pressure Relief Valve (6 Cyl.): In cylinder block just to rear of oil filter mounting. Not adjustable.
Spring Tension—12.62-12.88 ozs. at 1.14".

Oil Pressure Relief Valve (V8): In oil pump body.
Spring Tension—242-246 ozs. at 1.14".
V8 NOTE—Cylinder block oil relief valve not used.

Oil Pump (6 Cylinder): Rotor type. Mounted externally on right side of engine with drive gear at center of camshaft.

►**Oil Pump Driven Gear Replacement before 6 Cylinder Engine No. 7H-219349**—*See Ford Shop Notes.*

Oil Pump (V8 Engine): Gear type (two types: one equipped with spur gears, second helical gears). In crankcase at rear of engine.

Oil Filter: On 6 cylinder, mounted directly on block (no external oil lines) on left side at rear. On V8, mounted on left cylinder head. Replace cartridge every 5000 miles or more often if required.
Oil Filter Cartridge—Ford No. 7HA-6731-A.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (1948-50) 7RC-9273, (1951) 1C-9273-A.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet) with outlet pipe in rear valve chamber extending down on right side of 6 cylinder engine, or from top of engine down behind fan and out along left side of V8 engine.

V8 NOTE—Outlet pipe may be equipped with filter element just below upper elbow.

Servicing—Wash screen in cleaning fluid and wet with engine oil when dry every 2500 miles.

COOLING

Cooling System: Pressure type with relief valve in filler cap, by-pass in block, and belt-driven water pump (2 used on V8).
Capacity—18 quarts (6 Cyl.), 23 quarts (V8).
Pressure Valve—In radiator filler cap. Ford Nos. 41A-8100-B (with knurled edge) or 41A-8100-A (flange type grip—use with 51A-8138 radiator cap gasket). Opens at 3½-4½ lbs.

Water Pump (6 Cylinder): Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing. No lubrication required.
See Water Pump Section for complete data.
Belt Adjustment—*See GENERATOR.*

Water Pumps (V8 Engine): Two used. Centrifugal, belt-driven, packless type. Shaft mounted on prepacked ball-bearing at front, and a bushing next to seal. Oil cup provided for bushing lubrication.
See Water Pump Section for complete data.

►*CAUTION—V8 WATER PUMP LUBRICATION: Fill oil cup in pump with SAE #20 engine oil every 1000 miles. When oiling new pump insert piece of wire down alongside wick in oiler to permit air to escape from cavity.*
Belt Adjustment—*See GENERATOR.*

Thermostat: In cylinder head water outlet (2 on V8). Ford No. 7HA-8575-A (6 Cyl.), 8RT-8575-A (V8). Two makes: Standard-Thompson or Fulton-Sylphon.
Setting (6 Cyl.)—Starts to open 157-162°F.
Setting (V8 Eng.)—Starts to open 148-153°F.

Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. (1948-50) 7RC-10883, (1951) 1C-10883-A.
Engine Unit—Ford No. (1948-49) 99A-10884, (1950-51) 8A-10884.
Temp. Switch (V8 Only)—Ford No. 01A-10990, (1950-51) 8A-10990, in left cylinder head.
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI (F-1 with 3 spd. Transmission).
Long Model 11CF-CI (All Other Models).
Semi-centrifugal, single plate, dry disc types.
See Clutch Section for complete data.
Facings (10CF)—Moulded. 10" O.D. .125" thick.
Facings (11CF)—Woven (School Bus), Moulded (Others). Outside Diameter 11". Thickness .137".

Pedal Adjustment: 1-1¼" (F-1 with 3 spd. Trans.), 1½-1¾" (All Others) pedal free travel. Adjusting clevis provided at forward end of connector rod between pedal shaft and equalizer shaft.

Removal: Remove transmission (see TRANSMISSION Removal below). Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out. NOTE—Flywheel housing may have to be removed on some models.

TRANSMISSION

3-SPEED TYPE

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

NOTE—This transmission standard on F-1 Series. Heavy Duty 3-speed or 4-speed transmissions Optl.

CONTINUED ON NEXT PAGE

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Removal: Remove propeller shaft by disconnecting rear universal and sliding shaft out of transmission. Disconnect clutch linkage and speedometer cable. Remove front floor plate. Remove nuts and washers from two engine rear support bolts. Raise rear end of engine (use block of wood on jack under engine) until rear support clears mounting bolts. Remove transmission mounting capscrews, pull transmission straight back until main drive gear shaft clears clutch, lift transmission out through floor opening.

HEAVY DUTY 3-SPEED TYPE

Own Make. Heavy duty, 3-speed. Helical gear, constant-mesh, synchro-mesh (Second & High). Sliding spur gear (Low & Reverse).
See Transmission Section for complete data.
NOTE—This transmission standard on **F-2, F-3** Series, optional on F-1, F-4, F-5.

Removal: Same as for 4-Speed type following.

4-SPEED

Own Make. 4-speed, sliding spur gear type.
See Transmission Section for complete data.
NOTE—This tranmission standard on **F-4, F-5, F-6** Series, optional on F-1, F-2, F-3.

Removal: Remove seat cushion, floor mat, and transmission cover on floor. Support engine with jack under flywheel housing (use wood block on jack), raise jack until engine weight is off rear mounting. Free coupling shaft support bearing from crossmember by removing nuts on two bolts, disconnect front universal joint by taking out four bolts mounting universal joint flange at hand brake drum and disconnect intermediate universal joint at support bearing by removing nuts on "U" bolts (tape bearing caps in place to prevent losing needle bearings), remove front shaft. Remove clutch equalizer shaft by taking out pin in clutch shaft and clevis pin at lever and pulling equalizer shaft off the bracket (CAUTION—Do not lose spring and bushing halves). Remove two bolts in engine rear support. Disconnect speedometer shaft at transmission. Remove transmission capscrews from flywheel housing, pull transmission straight back until clutch (main drive gear) shaft clears, then lift transmission out through floor opening.
NOTE—To remove brake assembly, take out 2 capscrews in hand brake lever sector on transmission case and two capscrews in brake adjusting screw bracket, disconnect hand brake link from transmission and anchor adjusting screw from brake band, remove brake band assembly and hand brake lever.

4-SPEED SYNCHRO-MESH

Own Make. 4-speed constant-mesh type. Synchro-mesh (Second, Third & High). Helical gears used for second, third and fourth speed. Spur gears used low and reverse.
See Transmission Section for complete data.
NOTE—This transmission standard equipment on F-6 with 6 cylinder "M" engine and as optional equipment on F-4, F-5, F-6 with either 8 cyl. ("R" Series) or 6 cyl. ("H" Series) engines.

Removal: Same as 4-Speed Transmission (see below).

UNIVERSALS

Spicer. Needle bearing type, two used (Series F-1, and F-5, F-6 C-O-E 110"), three used with slip joint at forward end of rear shaft behind coupling shaft support bearing (All Others).
SERIES F-1 NOTE—Propeller shaft is one-piece type with slip joint provided by front universal yoke sliding on splined drive shaft in transmission.
See Universals Section for complete data.

Spicer Model Nos.

Series	Front	Center	Rear
F-1①	1278-102X	None	1278-102X
F-1②	1311-102X	None	1318-105X
F-2, F-3	1318-103X	1311-102X	1318-103X
F-4, F-5, F-6	1358-54X	1351-5107X	1358-5104X
F-5, F-6 110"	1351-517X	None	1358-5104X
F-5 194"	1358-514X	1351-5107X	1358-5107X

①—3-Speed Transmission. ②—4-Speed Trans.

Coupling Shaft Center Bearing: Consists of cushion mounted ball bearing bolted to underside of frame intermediate cross-member. Bearing is mounted on end of coupling shaft in a sleeve with felt retainer sleeve on each end and bearing baffle on front end.

REAR AXLE

F-1 SERIES—SEMI-FLOATING HYPOID TYPE

Own Make. Semi-floating, Hypoid Gear type with Hotchkiss drive (**separate carrier not used**). Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).
►*NOTE—AXLE NOT SAME AS USED ON FORD CAR.*
See Rear Axle Section for complete data.
Ratio (Standard)—3.73-1 (41-11).
Ratio (Optional)—4.27-1 (47-11).
Backlash—.003-.006". Shim adjustment.

Removal: Raise rear of truck. Disconnect rear universal. Remove axle shafts (see instructions below). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Remove nuts on rear spring "U" bolts, drive bolts up free of housing, lower axle assembly and remove from underneath

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer nuts (work through opening in axle shaft flange). Use Puller No. 4235 and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).

Wheel Bearing Adjustment: None. Pre-lubricated sealed ball-bearings.

F-2, 3, 4, 5 SERIES—FULL-FLOATING TYPE

Own Make. Full-floating, Spiral Bevel Gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Ratios:	Standard	Optional
F2, F3	4.86-1 (34-7)	4.11-1 (37-9)
F4	5.14-1 (36-7)	5.83-1 (35-6)
F5	6.66-1 (33-5) 5.83-1 (35-6)	5.14-1 (36-7)

Backlash—.004-.018".

Removal: Raise rear end of frame, remove axle shafts (see below), wheel and drum assemblies. Disconnect hydraulic brake line at each wheel and hose at bracket (bleed brake lines when re-connected). Remove backing plate assemblies. Disconnect rear universal. Remove nuts on rear spring "U" bolts, drive bolts up free of housing, lower axle assembly and remove from underneath truck.

Axle Shaft Removal: Remove hub cap, remove nuts on 8 hub studs holding axle shaft flange in place, turn 2 special screws (in tapped holes in flange) up evenly to break flange loose from hub, back these screws out, strike axle shaft flange at center to loosen centering cones on studs, remove cones, pull axle shaft out (wheel not disturbed).

Wheel Bearing Adjustment: Remove axle shaft (see above), use special bearing adjustment wrench and remove bearing locknut (outer nut), and lockwasher. Adjust bearings by turning bearing adjusting nut (inner nut) up until tight and then backing nut off ⅛ turn. Install bearing lockwasher making certain that it fits over dowel pin on adjusting nut, install bearing locknut and turn this nut up tight. NOTE—When installing axle shaft make certain that gasket in place under shaft flange, cones in place on studs and that two loosening screws backed off sufficiently so that stud nuts can be tightened securely. Turn two loosening screws in just enough to prevent loosening in service.

TWO-SPEED TYPE
STD. F-6 SERIES, OPTL. F-5 SERIES

Own Make. Vacuum Operated Shift, Two-speed, Full-floating, Spiral Bevel Gear (final drive), spur gear planetary unit (reduction gearing) with Hotchkiss drive.
See Rear Axle Section for complete data.
Ratio (Standard)—5.83-1 (Direct Speed), 8.11-1 (Second Speed).
Ratio (Optional)—6.33-1 (Direct Speed), 8.81-1 (Second Speed).
Backlash—.004-.018".

Removal: Same as for standard axle (above) after disconnecting vacuum line at hose connection.

SHOCK ABSORBERS

Houde (Houdaille). Direct acting, hydraulic type.
►*Shocks are sealed (cannot be refilled or repaired).*
F-1, F-2, F-3—Ford No. 7RC-18045-B, Houde No. H-160 (Front). 7RC-18080-B, Houde H-170 (Rear). F-4, F-5, F-6 NOTE—Houde rotary type shocks optional equipment for front end only (Ford No. 8T-18045 Right, No. 8T-18046 Left). These shocks are adjustable and can be refilled.

FRONT SUSPENSION

Front Axle—Conventional "I" beam section with Reverse Elliott ends and semi-elliptic springs.
Kingpin Inclination—8° ± ¼° (Sch. Bus., Parcel Del., F-1, F-2 & F-3), 8¼° ± ¼° (F- 4,F-5, & F-6).
Caster—2½° to 4½° (F-1, F-2 & F-3)①, 1° to 3½° (F-4, F-5 & F-6), 1° to 3° (Parcel Del. & Sch. Bus). Maximum variation between wheels ½°.
①F-2, F-3 without caster wedges, caster angle should be Neg. ½° to Pos. 1½°.
NOTE—Caster angle controlled by wedge shims inserted between axle pads and springs. To increase caster, insert taper shims equally at both sides.
Camber—¼° to 1° (All Models). Maximum variation between wheels ¼°. Right wheel must not exceed left wheel.
Toe-In—0-1/16" (All Models) with truck empty.

STEERING GEAR

F-1, F-2, F-3—Ford No. 7RC-3504.
F-4, F-5, F-6—Ford No. 7RT-3504.
Cab-Over-Eng. & Parcel Del.—Ford #7RW-3504-B. Worm-and-Roller types with "push-pull" adjustment. Gemmer 305 & 335 design. See Gemmer.
See Steering Gear Section for complete data.

BRAKES

F-1 SERIES

Service—F-1: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameter: Front wheel 1.0655" (hone limit 1.0675"). Rear 1.003" (hone limit 1.005").

Drums—11" composite (cast iron and steel).

Lining—Molded or Woven. **Width** 2" (Front), 1¾" (Rear). **Length per shoe** 11 29/32".

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

F-2, 3, 4, 5, 6 SERIES

Service—F-2 (All Wheels), F-3 (Front): Ford-Lockheed Hydraulic, self-centering, double anchor type. Hand lever applies rear wheel service brakes.

F-3 (Rear Wheels), F-4, 5, 6 (All Wheels)—Ford-Lockheed Hydraulic, double anchor type. Hand lever applies rear wheel service brakes (F-3), independent shaft brake at transmission (F-4, F-5, F-6).

►**Parcel Delivery Note**—Ford-Lockheed Hydraulic, double anchor, with 13⅛" I.D. drums and independent shaft brake at transmission.

See Brake Section for complete data.

Wheel Cylinders—Diameters: **F-2 All Wheels, F-3 Front** 1.378" (hone limit 1.382") forward shoe, 1.003" (hone limit 1.005") reverse shoe. **F-3 Rear Wheels; F-4, F-5, F-6 Front Wheels** 1.378" (hone limit 1.382"). **F-4, F-5, F-6 Rear Wheels** 1.503" (hone limit 1.507").

Drum Diameter—

Model	Front	Rear
F-2	12"	12"
F-3 (1948-Early 1951)	12"	14"
F-3 (Late 1951)	12"	12"
F-3 P. Del. (1950-Early 1951)	13⅛"	13⅛"
F-3 P. Del. (Late 1951)	13⅛"	12"
F-4, F-5, F-6	14"	15"

Brake Drum Resurfacing Limits—.020" (Except following models having limits of .060") **F-1** (Front & Rear), **F-2, F-3** (Rear, Late 1951), **F-4, F-5, F-6** (Rear).

Lining—Molded type (all shoes).

Lining Width & Thickness—

Model	Front	Rear
F-2 (1948-Early 1951)	1¾"①	1¾"①
F-2 (Late 1951)	2"①	2"①
F-3 (1948-Early 1951)	1¾"①	2"②
F-3 (Late 1951)	2"①	2"①
Par. Del. (1950-Early 1951)	2"②	2"②
Par. Del. (Late 1951)	2"②	2"①
F-4, F-5, F-6	2"②	3½"③

Lining Thickness—①3/16"—②1/4"—③5/16".

Lining Length—

Model	Front Pri.	Front Sec.	Rear Pri.	Rear Sec.
F-2 (1948-Early 1951)	13½"	10⅜"	13½"	10⅜"
F-2 (Late 1951)	11½/	12 31/32"	11½"	12 31/32"
F-3 (1948-Early 1951)	13½"	10⅜"	15 33/64"	10¾"
F-3 (Late 1951)	11½"	12 31/32"	11½"	12 31/32"
F-3① (1948-Early 1951)	14 1/16"	12 17/64"	14 1/16"	12¼"
F-3① (Late 1951)	14 9/16"	12 17/64"	11 9/16"	12 31/32"
F-4, F-5, F-6	15 33/64"	10¾"	16⅝"	11 33/64"

①—Parcel Delivery.

Clearance—Least possible amount without drag.

Hand Brake (F-2, F-3): Hand lever applies rear wheel service brakes. See Service Brakes above.

Hand Brake (F-3 Parcel Delivery, F-4, F-5, F-6): Independent external contracting band on drum at rear of transmission.

Hand Brake (F-4, F-5, F-6): Independent external contracting band on drum at rear of transmission.

HAND BRAKE ADJUSTMENT: For independent shaft brake at transmission. Set hand lever in fully released position and make certain that flat portion of cam is resting on rear of brake band upper end (if cam not flat, remove clevis pin in upper end of cam, adjust clevis rod until cam is flat when rod re-connected). Remove locking wire from brake band anchor adjusting screw (left side), turn screw clockwise until clearance between band and drum is .010" at the anchor screw, install lock wire. Loosen locknut on adjusting screw for lower position of brake band (round screw on brake mounting bracket), turn screw until clearance between lower portion of brake band and drum is .010", tighten locknut. Tighten adjusting nut at lower end of main adjusting bolt (on which band positioning springs are located) until clearance between upper portion of band and drum is .010". This completes the brake adjustment.

Drum Diameter—7.81".

Lining Woven. Lgth. 24.6". Width 2½". Thick. ¼".

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper control arm.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. at cranking spd.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.024-.026".
Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Condenser Capacity—.21-.25 microfarad.
Distributor Line (Carburetor Connection) Vacuum—1.2-1.4" at 800 RPM., 2.1-2.9" at 1000 RPM., 4.7-6.3" at 2000 RPM.

IGNITION TIMING: TDC.
Timing Procedure—*See Ignition Timing.*
Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper timing.***

CARBURETION:
Idle Setting—Approx. 1 turn open. One screw—turning screw out gives richer mixture.
Idle Speed—Approximately 500 RPM.
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely).

VALVE TAPPET CLEARANCE: .013-.015" Cold, All Valves.

►**High Speed Setting**—.002" additional exhaust valve clearance recommended by car manufacturer.

►***ADJUSTABLE SELF-LOCKING TAPPET SCREWS***
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-A (Mitchell type), No. 6A-11572-B (Briggs & Stratton type).
Ignition Lock—Ford No. 8A-11582-A.

COIL: Ford No. 7RA-12029-A or 8BA-12029.
Location—On left side of engine above distributor.
Ignition Current—Idling 2.75-3.0 amperes at 6 volts, 5.0-5.5 stopped. Coil primary resistance 1.05-1.15 ohms, (75°F). Secondary resistance 4100 ohms, (75°F).

CONDENSER: Ford No. 7RA-12300-B.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Ford No. 7HA-12127 (Less Cap and Rotor). New "Pressure" distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs. Operating vacuum taken from 1 carburetor connection (2 passages inside carburetor, 1 at venturi, 1 at throttle valve). Full spark advance obtained at 18-35 MPH. with normal road load or for part throttle operation at any speed.
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.

►**Excessive Pinging Correction**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*
Breaker Gap—.024-.026".
Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Advance Performance
►(at Wide Open Throttle)

Distributor			Engine		
Degrees	Vacuum	R.P.M.	Degrees	Vacuum	R.P.M
0°	0"	200	0°	0"	400
1¾-3°	0.4"	500	3½-6°	0.4"	1000
5½-6¾°	1.4"	1000	11-13½°	1.4"	2000
11½-13°	5.5"	1000	23-26°	5.5"	2000
8½-9¾°	2.9"	1500	17-19½°	2.9"	3000
10½-11½°	4.1"	2000	21-23°	4.1"	4000

Distributor Line Vacuum Test—*See Tune-Up.*

IGNITION TIMING

Std. Setting ..... **at TDC.**

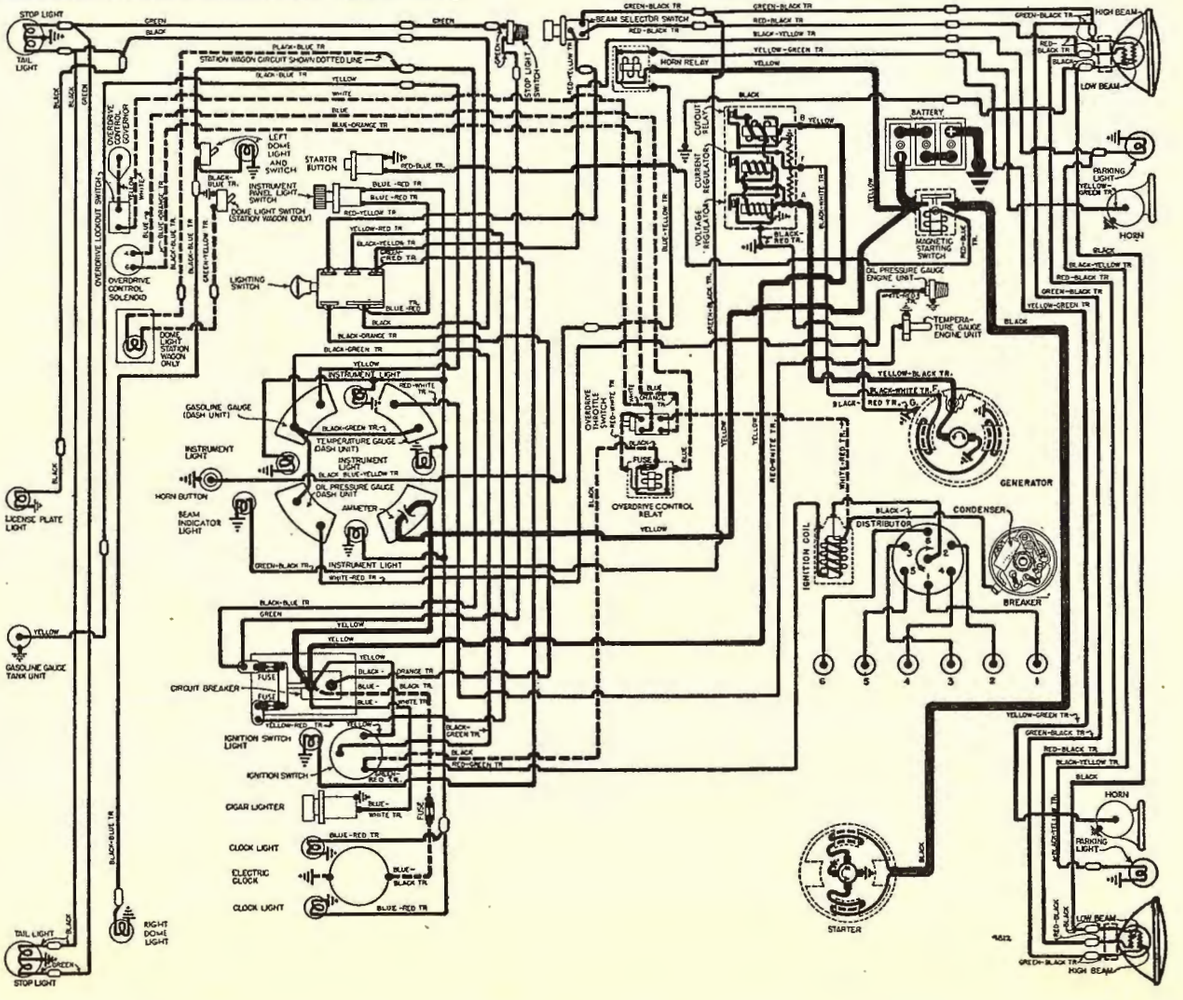
Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper timing.***

►**Timing (with Neon Timing Light)**—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark proper timing pointer (see Dampener Mark above) and dampener mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and pointer aligned when light flashes.

CARBURETOR

Holley-Ford No. 8HA-9510-A. Single barrel downdraft type with new vacuum passages for distributor operation.

See Carburetor Section for complete data.



►**Throttle Body Gasket Change & Installation Caution.** *See "Ford (Holley) Carburetor" in Carburetor Section.*

►**Accelerator Assy. Interference Correction:** *See "Ford (Holley) Carburetor" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump (std.): Ford No. 7HA-9350-B.
Optl. (Fuel-&-Vacuum)—Ford No. 8HA-9350.
Pressure—4-5 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-9280-A, (Red Ptr.) 8A-9280-B.
Tank Unit—No. 8A-9275 (Sta. Wg. 01A-9275A).
See Carburetion Equipment Section for complete data.

Air Cleaner (Std.—oil wetted): Ford No. OHA-9600-A.
Optl. (oil bath)—Ford No. OHA-9600-B1 (1 pint cap.), OHA-9600-B4 (1 quart cap.).

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr. **Zero Capacity**—300 amperes for 3.3 minutes. **Five** Second Voltage—4.2 volts.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.
Dimensions—L. 10½". W. 7⅛". H. 7¼".

STARTER

Ford Model No. 7HA-11002. Armature No. 18-11005.

►**Starter Motor Rusting Correction**—*See "Electrical System Notes" in Ford Shop Notes.*

Drive—Ford No. 7HA-11350. New 9 tooth pinion type for use with 114 tooth flywheel ring gear.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—20-22 ounces.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on left front fender apron and controlled by panel pushbutton switch Ford No. 6H-11500.

GENERATOR

Ford No. 8BA-10002-A (less pulley and bracket).

Armature No.—Ford No. 8BA-10005-A.
2 brush type with current and voltage regulation.

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—36 amperes, 7 volts, reached at approximately 20 MPH. Controlled by regulator and dependent on load and battery condition.

Performance Data

Amperes	Engine R.P.M.
35	1500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.

Belt Adjustment: ¼" deflection midway between generator and pump pulleys. To adjust, loosen 2 mounting bracket bolts under generator and capscrew in bracket slot behind generator.

REGULATOR

Ford Numbers

Regulator	Generator	Amperes
51A-10505-A or C	8BA-10002-A (Std. '49)	30-33

Voltage-current 3-Unit types.
See Electrical Equipment Section for complete data.
NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Regulator	Cuts In	Cuts Out (Discharge)
51A-10505-A	6.6-7.0 Volts	0-8 Amperes
51A-10505-C	6.4-6.9 Volts	0-8 Amperes

Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting COLD①
51A-10505-A	7.2-7.6 volts
51A-10505-C	7.0-7.5 volts

①—Voltage settings will increase approx. .2 volt after 20 minutes running.
Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.

►*CAUTION—Make certain gauge contacts armature and not brass rivet on underside of armature.*

Contact Spring Tension—5 ounces minimum with contacts just opening.

Current Regulator

Regulator	Current Setting COLD	Amperes
51A-10505-A		30-34
51A-10505-C		30-33

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Indicators—Right and Left indicators on lower edge of speedometer.
Direction Signal Flasher—Ford No. 8L-13350-B.

Switches

Lighting—Ford No. 7RA-11654.
Instrument—Ford No. 21C-13740.
Beam Selector—Ford No. 7RA-13532 or 8A-13532.
Dome Light—Ford No. 8A-13752.
Dome Light (Sta. Wagon)—Ford 8M-13752-A.
Door Switch—Ford No. 8M-13713.
Stop Light—Ford No. 11A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting (Headlights)—Ford No. 8A-12258-A. Behind instrument panel together with two lighting fuses (see wiring diagram).
Convertible Top—Ford No. 51A-12250-A. 30 ampere. On hydraulic pump motor or on front of dash near convertible top control switch.

FUSES: Auxiliary Lights (Parking, Tail & Instrument)—14 ampere. On circuit breaker bracket behind instrument panel (see wiring diagram).
Dome & Stop Lights—14 ampere. Next to fuse listed above.
Clock—2 ampere. In clock feed wire.
Overdrive—30 ampere. On relay on dash under hood.
Direction Signal—15 ampere. In feed from ignition switch to flasher.

HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), No. 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay. NOTE—"A" horns are 4.28" high, "B" horns are 4.14". Horns marked "HI" or "LO" on air columns.
Air Gap—.027-.029" for high pitch (right horn), .032-.034" for low pitch (left) for Sparks-Withington. NOTE—Air Gap for Auto-Lite type horns .040" HI, .050" LO.
Horn Current—13 amperes (high pitch), 14 (low).

Horn Relay: Ford No. 7RA-13853-B. On dash.

►*CAUTION—Use only Ford type relay No. 7RA-13853-B with TAN plastic cover. If Mercury relay No. 7RA-13853-A with Black plastic cover installed, shock at button may result when blowing horn.*
Contact Gap—.015-.025".
Contact Closing Voltage—4 volts max.

ENGINE

ENGINE SPECIFICATIONS: Own 8HA. Six cylinder, "L" head type.
Bore—3.30". **Stroke**—4.40".
Displacement—226 cu. ins. **Rated HP**—26.13.
Developed Horsepower—95 at 3300 RPM.
Compression Ratio—6.8-1 cast iron head.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

OIL PAN REMOVAL: *See Ford Special Data.*

ENGINE REMOVAL: *See Ford Special Data.*

CYLINDER HEAD AND GASKET INSTALLATION: *See "Cylinder Head" in Ford Shop Notes.*

►**CYLINDER HEAD STUD CHANGE:** *See "Cylinder Head" in Ford Shop Notes.*

CYLINDER SLEEVE: Cast iron dry type cylinder sleeves furnished for replacement service.

PISTONS: 4-ring (all above pin), flat head, aluminum alloy, steel strut, U-slot, cam ground type.
Weight—17.35 ozs.
Removal—Pistons and rods removed from above.
Clearance—See Fitting Pistons.

Replacement Pistons: Standard size and .0025", .005", .020", .030", .040", and .060" Oversize.

Fitting Pistons: Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin. Feeler thickness .002" for New Piston in New Bore, .004" for New Piston in Worn Bore or Worn Piston in New or Worn Bore. Pull to withdraw feeler **6-10 lbs.**

PISTON RINGS: 2 compression, 2 slotted oil rings, all above pin. Upper oil ring groove drilled with oil drain holes, lower ring groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"①	.0015-.0035"②
Compr. #2	3/32"	.007-.017"①	.001-.004"③
Oil (#3, 4)	3/16"	.007-.017"①	.001-.004"③

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Worn Limits—① .035", ② .0045", ③ .005".

Replacement Rings: Snap type ring sets furnished std. size and .020", .030", .040", .060" Oversize.

PISTON PIN: Diameter .8504" (maximum). Floating type (lock ring in piston at each end). Pin hole in connecting rod bronze-bushed.
Pin Fit in Piston—.0003" (new), .0015" (worn limit).
Pin Fit in Rod Bushing—.0002-.0005" (new), .0015" (worn limit).

Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" Oversize (yellow).

CONNECTING ROD: Length 8¼". **Weight** 29.0 ozs.
Crankpin Journal Diameter—2.2988". Maximum wear limits—Out-of-round .0015", Taper .001".
Lower Bearing—Removable, steel-backed, copper-lead alloy lined, locked in type. No shims. Upper and lower halves interchangeable.
Clearance—.000-.0025" (new), .005" (worn limit).
►*NOTE—Replace bearing shells less than .0593" thick.*
Sideplay—.006-.014" (new), .017" (worn limit).
►*BEARING ADJUSTMENT "M" ENGINES—CAUTION*—Connecting rods having shims must be serviced with the SHIMS IN PLACE. When assembling new rods and new crankshafts, if the bearing clearance is in excess of .0007" to .0013", the removal of one shim will reduce the clearance .00075". If both shims are removed, the bearing clearance will be reduced .0015".

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

CRANKSHAFT: 4 bearing, integral counterweights.
Vibration Dampener—Viscous or rubber type.
Journal Diameters—2.3740" (all bearings). Max. wear limits—Out-of-round .0015", Taper .001".
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.0009-.0032" (new), .0052" (worn limit).
►*NOTE—Replace main bearing shells less than .0938" thick.*

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in block and cap.

Replacement Bearings: Std., .002", .020", .030" U. S.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.003-.006" (new), .008" (worn limit).

CAMSHAFT: Four bearing with helical gear drive. Gear at center of shaft for oil pump & distributor drive.
►*NOTE*—Camshaft has phosphate coating (shows black oxide) beginning Eng. No. 8HA-2401 (Passenger Cars), 7HT-98891 (Trucks).
Bearing Diameter—1.9285" (replace bearing if diameter greater than worn limit 1.9315").
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.002".

Replacement Bearings: Three sizes as follows:
1—Std. size on both inside and outside diameter.
2—Std. on I.D., .080" Oversize on O.D.
3—.015" Undersize on I.D., std. size on O.D.

End Thrust: Thrust plate bolted to front of block behind camshaft hub (hub keyed on front end of shaft).

Timing Gears: *CAUTION—Two types camshaft gears used:* Aluminum type used before July '49. New Composition type released for "H" Series engines after July '49.
Crankshaft Gear—Cast Alloy Iron.
►**Installation of Integral Hub Type Camshaft Gear for Quieter Operation**—*See Ford Shop Notes.*
Replacement Camshaft Gears—Std., .006", .012" OS.

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Stem Clearance
Intake	1.65"	.3410"①	.0014-.0034"②
Exhaust	1.51"	.3405"③	.0019-.0039"④

	Seat Angle	Lift
All Valves	45°	.350"

Worn Limits (Stem Diam.)—① .3385", ③ .3375"
Worn Limits (Clearance)—② .0046", ④ .006"
►*NOTE—Valves are straight-stemmed type operating in one-piece valve guides.*
Sticking Valve Correction—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake valve guides.
Valve Seat Inserts—Used for exhaust valves.

Valve Guides: One-piece type pressed in block.
Removal: Use special tool 6510-0 to remove guides.
Installation—Upper end of guide 1.18" Intake, 1.08" Exhaust below top face of block. Install with stepped end down. Use tool 6510-N to drive guides in place.

Valve Lifters: Mushroom type with self-locking adjusting screws. Removable from below with camshaft out.
Diameter—.6240" (replace if worn to less than wear limit of .6225").
Clearance—.0005-.0015" (new) .003" (worn limit).

Valve Springs: Coated springs used. Install springs with closely spaced coils toward top (against block).
Spring Test—47-53 lbs. at 2.109". **Free** length 2.50".

VALVE TIMING

Tappet Clearance: .013-.015" Cold, All Valves.
►**High Speed Setting**—.002" additional exhaust valve clearance recommended by car manufacturer.
►*ADJUSTABLE SELF-LOCKING TAPPET SCREWS USED.*
►**VALVE TAPPET NOISE**—Silencing springs available. *See "Valve System" in Ford Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.
Valve Timing Check—Intake valve opens 11° BTDC. Valve timing mark location on vibration dampener.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings. Timing gears lubricated by spray past camshaft thrust plate. Rotor type oil pump mounted externally on right side of engine.
Crankcase Capacity—4 quarts (5 quarts when changing filter).
Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: In cylinder block just to rear of oil filter mounting. Not adjustable.
Spring Tension—12.64-12.88 lbs. at 1.14"

Oil Pump: Rotor type. Mounted externally on right side of engine with drive gear at center of camshaft.
►**Oil Pump Driven Gear Replacement before Eng. No. 8HA-107555**—*See Ford Shop Notes.*
Oil Pump Removal and Installation—*See Ford Shop Notes.*

Oil Filter: Mounted directly on block (no external oil lines) on left side. Replace cartridge each 5000 miles or more often if required.
Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr) 8A-9273-A, (Red Ptr.) 8A-9273-B.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet) with outlet pipe in rear valve chamber extending down on right side of engine.
Servicing—Wash screen in cleaning fluid and wet with engine oil when dry at oil change period (2500 miles).

COOLING

Cooling System: Pressure type with relief valve in filler cap, one belt-driven pump, and by-pass.
NOTE—Water distributing tube not used.
Capacity—16 quarts.
Pressure Valve—In radiator filler cap. Ford No. 26H-8100-B (AC #846740). Opens at 3½-4½ lbs.

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In head water outlet. Ford No. 7HA-8575-A or B. Two makes used Standard-Thompson or Fulton-Sylphon.
Setting (7HA-8575-A)—Starts to open 157-162°F.
Setting (7HA-8575-B)—Starts to open 148-153°F.

Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-10883-A, (Red Ptr.) 8A-10883-B.
Engine Unit—Ford No. 8A-10884.
See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½ CF-TS, Ford No. 8A-7563A. Single plate, semi-centrifugal, dry disc type.
►DISC NOTE—Softer damper springs used on cars with Overdrive (black colored springs). Cars without Overdrive have aluminum colored damper springs.
See Clutch Section for complete data.
Facings—Thickness .125". Outside diameter 9½".

Pedal Adjustment: 1" free travel. Lock nut and adjusting nut at release lever end of release rod.

Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

►**Transmission Locking in Reverse Correction**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

►**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

►*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

Transmission Control: Steering column mounted shift *See Transmission Section for complete data.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS1-R10E (exc. Conv. & Sta. Wagon). Optl. equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated "kick-down."

Warner Model AS3-R10E (Conv. & Sta. Wagon). Similar to AS1-R10E (above) except a special solenoid adapter plate used (re-locates solenoid under overdrive), "X" type frame used on these cars has insufficient clearance for solenoid in regular mounting position on side of overdrive.

See Transmission Section for complete data.

►**Overdrive not engaging, and Prolonged shorting out of Ignition on Kick-down Corrections**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

►**Overdrive Governor Production Change**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

►**Overdrive Noise Correction on Early Cars**—*See "Overdrive Notes" in Ford Special Data.*

Solenoid—Ford No. 8M-6916A (8A-6916A or C, C is rubber coated, for Sta. Wag. & Convertible).

Control Relay—Ford No. 8M-6915. On dash.

Overdrive Fuse—30 ampere. On Control Relay.

Lock-out Switch—Ford No. 8M-6917A.

Throttle Kick-down Switch—Ford No. 8A-6918B.

Governor—Ford No. 8M-6943 (Assembly with gear).

Removal: Same as for Std. transmission (above) after disconnecting overdrive control cable and wiring.

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used. *See Universals Section for complete data.*

NOTE—Slip joint formed by splined yoke of front universal engaging transmission mainshaft (or overdrive shaft). One-piece propeller shaft used.

►*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive **with separate carrier.** Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required). *See Rear Axle Section for complete data.*

►**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►**Ring & Pinion Gear Production Change**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Ratio—Standard: 3.73-1 (41-11). With overdrive: 4.10-1 (41-10). Optional: 3.54-1 (41-11).

Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

►**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.

Wheel Bearing Adjustment: None (sealed ball-bearing).

STATION WAGON

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive (**separate carrier not used**). Axle ends flanged —(no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).

►*NOTE—AXLE NOT SAME AS FORD PASSENGER CAR, similar to Mercury.*

See Rear Axle Section for complete data.

Ratio (Standard)—3.91-1 (43-11).

Ratio (with Overdrive)—4.27-1 (47-11).

Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as for Ford Pass. Car Rear Axle (above).

SHOCK ABSORBERS

Front—Delco Model 1037-F or Houdaille No. H-180, Ford No. 8A-18045-A (Pass. Cars), Houdaille H-210, Ford No. 8A-18045-B (Station Wagon).

Rear—Delco Model 1031-R or Houdaille No. H-190, Ford No. 8A-18080-A (Pass. Cars), Houdaille H-200, Ford No. 8A-18080-B (Station Wagon).

Direct acting, hydraulic types. Two makes are used and are interchangeable.

►*NOTE—Shock absorbers are permanently sealed and cannot be refilled or repaired.*

Rear Shock Absorber Installation—Lower tube has welded stone shield on lower end which must be installed toward front of car.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.

See Front Suspension Section for complete data.

►**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Spring Production Change & Installation Caution**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Pitman Arm and Idler Arm Bracket Change**—Requires 2 different Toe In Settings listed below. *For identification of parts, see "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►*CAUTION—Specifications listed below supersede earlier 1949 Ford Front End Specifications.*

Kingpin Inclination—5¼° crosswise.

Caster (Pass. Cars)—Pos. ½° to Neg. 1°.

(Station Wagon)—Neg. ¼° preferred, Limits Neg. ¼° to Neg. 1¾°.

NOTE—½° max. variation between wheels.

Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°.

NOTE—¼° max. variation between wheels.

►**Toe In**—*CAUTION: Two settings as follows:*

1)—**1/8" toe out to 3/16" toe out for cars built before March 1, 1949.**

2)—**1/16" toe in to 1/8" toe in for cars built after March 1, 1949.**

Adjustment—Adjusting sleeve on outer end of each tie rod. Adjust equally.

STEERING GEAR

Gemmer design (Model 305), Ford Make—Worm-&-Roller type.

See Steering Gear Section for complete data.

►**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameter: Front wheel 1.128" (hone limit 1.132"). Rear Wheel: .878" (hone limit .880").

Drums—Diameter 10" (11" Sta. Wagon rear drums).

Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe: **Front**—11". (Stn. Wgn. 11 15/16").

Rear—11" Pri., 11 3/4" Sec. (Stn. Wgn. 11 15/16" Pri. & Sec.).

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

►**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper arm.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. at cranking spd.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.014-.016".
Cam Angle—27° closed, 18° open.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Condenser Capacity—.21-.25 microfarad.
Distributor Line (Carburetor Connection) Vacuum—2.0-2.9" at 800 RPM., 3.5-4.8" at 1000 RPM., 4.7-6.3" at 2000 RPM.

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Crankshaft Pulley Mark—Circular boss aligned with timing pointer on right side of engine front cover.

CARBURETION:
Idle Setting—Approx. 1 turn open. Two screws—turning screws out gives richer mixture.
Idle Speed—Approximately 500 RPM.
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fuel Pump Pressure: 3½-4½ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross over and right exhaust manifold.

VALVE TAPPET CLEARANCE: ***CAUTION—Different settings required for each type camshaft.***
►**First type Camshaft No. 8BA-6250①**
(no markings on Engine or Camshaft)
Intake—.010-.012", **Exhaust**—.014-.016", Cold.
①—Before Eng. No. 8BA-622468—Partial production after this number.
►**Later type Camshaft No. 8BA-6250-B②**
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)
Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.
②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.
③—On top of block at center under valve cover.
►***CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.***
Adjustment—*See "Valve System" in Ford Shop Notes for complete data.*
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-A (Mitchell type), No. 6A-11572-B (Briggs & Stratton type).
Ignition Lock—Ford No. 8A-11582-A.

COIL: Ford No. 7RA-12029-A or 8BA-12029.
Location—On front lower corner of right cyl. head.
Ignition Current—Idling 2.75-3 amperes at 6 volts. 5-5.5 amperes stopped. Coil primary resistance 1.05-1.15 ohms (75°F). Secondary resistance 4100 ohms (75°F).

CONDENSER: Ford No. 7RA-12300-B.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Ford No. 7RA-12127-C or OBA-12127. New "Pressure" type distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs. Operating vacuum taken from 1 carburetor connection (2 passages inside carburetor, 1 at venturi, 1 at throttle valve). Full spark advance obtained at 18-35 MPH. with normal road load or for part throttle operation at any speed.
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.
►**Excessive Pinging Correction**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*
Breaker Gap—.014-.016".
Cam Angle—27° closed, 18° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

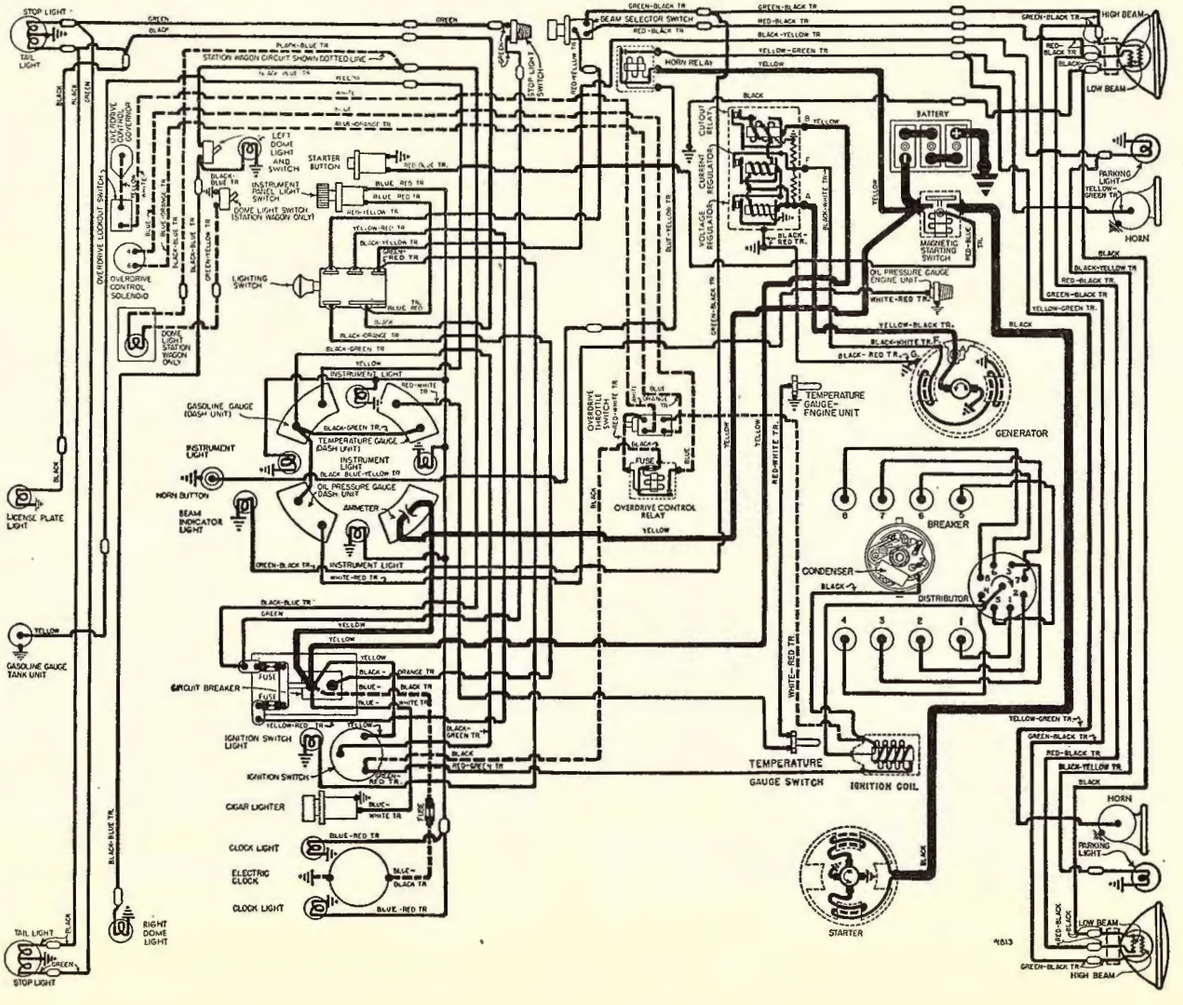
7RA-12127-C Advance Performance
(Wide Open Throttle)

Distributor			Engine		
Degrees	Vacuum	R.P.M.	Degrees	Vacuum	R.P.M.
0°	0"	200	0°	0"	400
1¼-2¼°	0.4"	500	2½-4½°	0.4"	1000
4¼-5¼°	1.7"	1000	8½-10½°	1.7"	2000
6¼-7¼°	2.85"	1500	12½-14½°	2.85"	3000
7½-8½°	3.7"	2000	15-17°	3.7"	4000

OBA-12127 Advance Performance
(Wide Open Throttle)

Distributor			Engine		
Degrees	Vacuum	R.P.M.	Degrees	Vacuum	R.P.M.
0	0"	200	0	0"	400
½-1½	.30"	500	1-3	.30"	1000
5-6	1.32"	1000	10-12	1.32"	2000
8¾-9¾	2.85"	1500	17½-19½	2.85"	3000
10¼-11¼	3.7"	2000	20½-22½	3.7"	4000

Distributor Line Vacuum Test—*See Tune-Up.*



Distributor Removal: Mounted at front of engine on right side. To remove, disconnect vacuum line, take out hold down screw, lift off.

IGNITION TIMING

Std. Setting ..... **2° BTDC.**
Crankshaft Pulley Mark—Circular boss on rear edge of pulley (timing pin on right front side of engine).
Timing—With #1 piston at firing position and timing mark on pulley aligned with timing pin on front of engine, loosen hold-down screw on distributor, rotate distributor until contacts begin to open, tighten hold-down screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.
►**Timing (with Neon Timing Light)**—*CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.* Mark timing pin and pulley mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and timing pin aligned.

CARBURETOR

Holley-Ford No. 8BA-9510-A. Dual (double barrel) downdraft type with new vacuum passages for distributor operation.
►**Throttle Body Gasket Change & Installation Caution.** *See "Ford (Holley) Carburetor" in Carburetor Section.*
►**Accelerator Assy. Interference Correction:** *See "Ford (Holley) Carburetor" in Carburetor Section.*
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump (std.): Ford No. 7RA-9350-C.
Optl. (Fuel-&-Vacuum)—Ford No. 7RA-9350-E.
Pressure—3½-4½ lbs. (both types).
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-9280-A, (Red Ptr.) 8A-9280-B.
Tank Unit—No. 8A-9275 (Sta. Wg. 01A-9275A).
See Carburetion Equipment Section for complete data.
Air Cleaner (Std.—Oil wetted): Ford No. OBA-9600-A.
Optl. (oil bath)—OBA-9600-B. Use OBA-9600-D with governor.

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Zero Capacity—300 amperes for 3.3 minutes. Five Second Voltage—4.2 volts.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.
Dimensions—L. 10½". W. 7⅛". H. 7¼".

STARTER

Ford Model No. 7RA-11002. Armature No. 18-11005.
►**Starter Motor Rusting Correction**—*See "Electrical System Notes" in Ford Shop Notes.*
Drive—Bendix No. A1472 (Ford No. B-11350).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ounces.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on left front fender apron and controlled by panel pushbutton switch Ford No. 6H-11500.
Removal: On right front face of flywheel housing cover. To remove, take off right engine splash pan (if used), free starter-to-oil pan bracket, take out 2 starter through bolts.

GENERATOR

Ford No. 8BA-10002-A (less pulley and bracket).
Armature No.—Ford No. 8BA-10005-A.
2 brush type with current and voltage regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—36 amperes, 7 volts, reached at approximately 20 MPH. Controlled by regulator (dependent on load & battery condition).
To Check Generator Output—Connect ammeter in series with charging line at regulator "ARM" terminal, connect short insulated jumper between generator "A" and "F" terminals (to short out regulator). Run engine at approximately 1500 RPM. and note ammeter reading. If generator output equals or exceeds rate output (below) generator performance is satisfactory. Remove jumper.
►*CAUTION—Do not operate generator at higher speeds or in service with jumper connected between generator armature and field terminals. This jumper eliminates all regulator action.*

Amperes	Performance Data	Engine R.P.M.
35		1500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.
Removal: On support secured to valve chamber cover by stud and nut, driven by belt in tandem with water pumps. To remove, loosen stud nut and disengage generator belt, take out capscrew in mounting strap, lift generator off support.
Generator Belt Adjustment: Loosen 2 bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulleys is ½" (thumb and finger pressure), **Fan Belt Adjustment**—*See COOLING.*

REGULATOR

Ford Numbers

Regulator	Generator	Amperes
51A-10505-A or C	8BA-10002-A (Std. '49)	30-33

Voltage-current 3-Unit types.
See Electrical Equipment Section for complete data.
NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Regulator	Cuts In	Cuts Out (Discharge)
51A-10505-A	6.6-7.0 Volts	0-8 Amperes
51A-10505-C	6.4-6.9 Volts	0-8 Amperes

Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting COLD①
51A-10505-A	7.2-7.6 Volts
51A-10505-C	7.0-7.5 Volts

①—Voltage settings will increase approx. .2 volts after 20 minutes running.

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.
►*CAUTION—Make certain gauge contacts armature and not brass rivet on underside of armature.*
Contact Spring Tension—5 ounces minimum with contacts just opening.

Current Regulator

Regulator	Current Setting COLD	Amperes
51A-10505-A		30-34
51A-10505-C		30-33

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".
Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Indicators—Right and Left indicators on lower edge of speedometer.
Direction Signal Flasher—Ford No. 8L-13350-B.

Switches

Lighting—Ford No. 7RA-11654.
Instrument—Ford No. 21C-13740.
Beam Selector—Ford No. 7RA-13532 or 8A-13532.
Dome Light—Ford No. 8A-13752.
Dome Light (Sta. Wagon)—Ford 8M-13752-A.
Door Switch—Ford No. 8M-13713.
Stop Light—Ford No. 11A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting (Headlights)—Ford No. 8A-12258-A. Behind instrument panel together with two lighting fuses (see wiring diagram).

ENGINE

ENGINE SPECIFICATIONS: Own 8BA. Eight cylinder, "L" head, 90° Vee type with both cylinder banks and crankcase cast Enbloc.
Bore—3.187". **Stroke**—3.75".
Displacement—239 cu. ins. **Rated HP**—32.5.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.8-1 cast-iron heads.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Ford Special Data.*

OIL PAN REMOVAL: *See Ford Special Data.*

ENGINE REMOVAL: *See Ford Special Data.*

CYLINDER HEAD AND GASKET INSTALLATION: *See Ford Special Data.*

CYLINDER SLEEVE: Cast iron dry type cylinder sleeves furnished for replacement service.

PISTONS: *CAUTION—Two types used:*
"49T" U-Slot Pistons (Before Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, steel strut, cam ground, dome head type.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CAUTION—49T pistons must be used in ALL steel sleeve engines. Use "29A-" piston rings with this piston. Do not use 49T pistons to replace Autothermic pistons.

"8BA" Solid Skirt Pistons, AUTOTHERMIC type (After Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, "Autothermic" closed type, and 1/16" offset pin.

CAUTION—8BA Autothermic pistons must not be used on steel sleeve engines. Can be used to replace 49T pistons in sets on other engines. Use "8BA-" piston rings with this piston (29T rings must not be used).

►*CAUTION—Ford and Mercury Pistons and Rings are not interchangeable.*

Weight—13.12 ozs.

Removal—Pistons and rods removed from above.

Clearance—See Fitting Pistons.

Replacement Pistons ("49T-"): Std., .005", .020", .030", .040", .060" Oversize.

Replacement Pistons ("8BA-" Autothermic): Std. (4 grades with limits 3.1879-3.1891 in .0003" steps for selective fitting), .0025", .020", .030", .040", .060" OS.

Fitting Pistons ("49T-"): Use .50" wide feeler stock of correct thickness (as listed below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull to withdraw feeler 6-10 lbs.

Feeler Thickness—.002" New Piston in New Plain Bore, .003" New Piston in New Sleeve, .004" New Piston in Worn Bore, .005" Worn Piston in Worn Bore.

Fitting Pistons ("8BA-" Autothermic): Use feeler gauge .0015" x ½" on thrust side of piston with 6-12 lb. pull.

Installing Pistons ("8BA-" Autothermic): Locating mark (small indention) on head of piston above one piston pin hole, to front on all pistons.

►*CAUTION*—Necessary since pin offset 1/16" and must be located on thrust side of bore.

PISTON RINGS: 2 compression, 2 slotted oil rings (lower oil ring below pin). Upper oil ring groove drilled with oil drain holes, lower groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0915-.0920"	.007-.017"①	.0015-.0035"②
Compr. (#2)	.0915-.0920"	.007-.017"①	.001-.003"③
Oil (#3,4)	.1545-.1550"	.007-.017"①	.001-.003"③

Worn Limits—① .035" ② .0045" ③ .005"

Replacement Rings: Snap type, Expander type, or Steel Section type ring sets furnished in the following sizes: Std., .020", .030", .040", .060" Oversize.

►*CAUTION—Use "29A-" rings on first type 49T Pistons, "8BA-" rings on 8BA Autothermic Pistons.*

PISTON PIN: Diameter .7504" (maximum). Floating type (lock ring in piston at each end). Pin hole in connecting rod bronze-bushed.

Pin Fit in Piston—.0005" (new), .0015" (worn limit).

Pin Fit in Rod Bushing—.0002-.0005" (new), .0015" (worn limit).

Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" OS (yellow).

CONNECTING ROD: Length 7". **Weight** 18.7 ozs.

►**Connecting Rod CAUTION**—Beginning Engine No. 8BA-628866 through 8BA-629940 and all Engines after 8BA-641087, new type connecting rod used with 5/64" squirt hole drilled on an angle into the side of the bearing flange web meeting a 3/16" hole in connecting rod bearing flange.

►*CAUTION—These new connecting rods should be used only on engines with neoprene seals on intake valve guides and increased capacity oil pump.*

►**CONNECTING ROD INSTALLATION**—*See "Connecting Rod & Bearings" in Ford Special Data.*

Crankpin Journal Diamter—2.1390". Maximum wear limits—Out-of-round .0015", Taper .001".

►**Lower Bearing**—*Locked in (not floating type as used on earlier engines).* Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves interchangeable.

Clearance—.0005-.003" (new), .005" (worn limit).

►*NOTE—Replace bearing shells less than .0745" thick.*

Side Play—(Early type rod) .006-.014". Late type rod .006-.020".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in rod and cap.

►*NOTE—Self-locking connecting rod nuts used. Tighten to 40-45 ft. lbs. Palnuts not required.*

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

Installing Rods—Rods with squirt hole installed with squirt hole toward valve push rod assembly.

CRANKSHAFT: 3 bearing with integral counterweights.

►*SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning. Always use new plugs if old plugs disturbed and peen or stake crankshaft to hold plugs in place securely.*

Journal Diameters—2.4990" (all bearings). Max. wear limits—Out-of-round .0015", Taper .001".

Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.

Clearance—.000-.003" (selective fit, crankshaft to turn free). Worn limit .005" maximum.

►*NOTE—Replace main bearing shells less than .0835" thick.*

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in block and cap.

Replacement Bearings: Standard size and .002", .010", .020", .030" Undersize. Rear mains also furnished .015" Oversize in Overall Length for taking up endplay wear.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.

Endplay—.002-.006" (new), .008" (worn limit).

CAMSHAFT: *CAUTION*—**Two different types used, each type requires different tappet clearance.**

8BA-6250—All engines before No. 8BA-622468 and partial production after this number.

8BA-6250-B—Partial production beginning Eng. No. 8BA-622468 and service replacement of first type Camshaft. Has new cam contours for quieter valve operation.

►*CAMSHAFT IDENTIFICATION*—New 8BA-6250-B Camshaft stamped "B" on forward end (first type not marked), and engine marked **"GAP, in- .014", ex- .018"** on top of block under valve cover at center.

►*ENGINE MARKING CAUTION*—Gap mark (see above) must be added when "B" shaft installed on unmarked block, or removed if first type shaft installed on marked block.

Bearing Diameter—1.7985" (replace bearing if diameter greater than worn limit 1.8015").

Bearings—Steel-backed, babbitt lined bushings.

Clearance—.001-.002".

Replacement Bearings: Standard size and .010", .015" Undersize (US. bearings require finish reaming).

End Thrust: Taken by front end of camshaft and thrust surface on inner face of cylinder front cover. Adjust by replacing cover. **Endplay**—.007-.016".

Timing Gears: *CAUTION—Two types camshaft gears used:* Aluminum (first), Fibre (later).

Crankshaft Gear—Cast Alloy Iron.

►*CAUTION—Camshaft gear teeth REVERSE (L.H.) providing one-way thrust to camshaft for silencing backlash.*

Replacement Camshaft Gears—Std. .006", .012" OS.

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
All Valves	1.51"	.3410"①	4.750"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	.292"	.0015-.0035"③

Wear Limit—①—.3375". ②—.005" Int., .006" Exh.

►*NOTE—Valves are straight-stemmed type operating in one-piece valve guides.*

►*NOTE*—Late type valve assemblies can be used in earlier 100 H.P. engines. *See "Valve System" in Ford Special Data and Shop Notes.*

►**Sticking Valve Correction**—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake guides.

Valve Seat Inserts—Used on all valves.

Valve Guides: One-piece type positioned and retained by "C" washer. Inside diameter .344", Outside diameter 1.031". Length 2.20". NOTE—Rubber seal used on intake guide.

Valve Lifters: Barrel type in guide holes in block.

Diameter—.9992" (replace if worn to less than .9977"). Length limit after resurfacing 1.700".

Clearance—.0007-.0016" (new), .003" (worn limit).

Valve Springs: Coated springs used.

Spring Pressure—37-40 lbs. (closed), 78-80 (open).

Spring Test—40-43 lbs. at 2.13". Free Length 2.41".

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—Different settings required for each type camshaft.*

►**First type Camshaft No. 8BA-6250①**
(no markings on Engine or Camshaft)

Intake—.010-.012", **Exhaust**—.014-.016", Cold.

①—Before Eng. No. 8BA-622468—Partial production after this number.

►**Later type Camshaft No. 8BA-6250-B②**
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)

Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.

②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.

③—On top of block at center under valve cover.

►*CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.*

Adjustment—*See "Valve System" in Ford Shop Notes for complete data.*

Valve Timing: See Camshaft Setting above.

Early Camshaft No. 8BA-6250

Intake Valves—Open at TDC. Close 44° ALDC.

Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

Late Camshaft No. 8RA-6250-B
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 3° ATDC.
Valve Timing Check—Intake valve opens at TDC. Valve timing mark location on crankshaft pulley.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear. Piston pins and valve lifters lubricated by splash. Oil pump mounted in crankcase at rear of engine.
Crankcase Capacity—4 quarts (5 quarts when changing oil filter).
Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: In oil pump body. Not adjustable.
Spring Tension—12 lbs. compressed to 1.14".
NOTE—Cylinder block oil relief valve not used.

Oil Pump: Gear type (two types: one equipped with spur gears, second helical gears). In crankcase at rear of engine.

Oil Filter: On left cylinder head. Replace cartridge each 5000 miles or more often if required.
Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr) 8A-9273-A, (Red Ptr.) 8A-9273-B.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet) with outlet pipe extending from top of engine down behind fan and out along left side.
Servicing—Wash screen in cleaning fluid and wet with engine oil when dry at oil change period (2500 miles).

COOLING

Cooling System: Pressure type with relief valve in filler cap and two belt-driven pumps (one for each bank) with re-circulating by-pass.
Capacity—21 quarts.
Pressure Valve—In radiator filler cap. Ford No. 26H-8100-B (AC #846740). Opens at 3½-4½ lbs.

Water Pumps: Two used. Centrifugal, belt driven, packless type.

►*CAUTION—WATER PUMP LUBRICATION: Oil cup provided on each pump which should be filled with SAE #20 engine oil when new and every 1000 miles. Use length of wire inserted in oil cup if necessary when oiling.*

►**Water Pump Change**—Late 1949 models use later type water pump with longer ball bearings and no oil cup. Requires no service lubrication. Later type pumps can be used on earlier 1949 engines, providing later type pulleys are also used.
See Water Pump Section for complete data.

Fan Belt Adjustment—Loosen 2 fan mounting bracket bolts, raise fan up until side movement of belt midway between fan and crankshaft pulleys is ½".
Generator (& Water Pump) Belt Adjustment—*See GENERATOR.*

Thermostats: Two used (one in each head water outlet). Ford No. 8BA-8575-B or 8RT-8575-A. Two makes used Standard-Thompson or Fulton-Sylphon.
Setting (8BA-8575-B)—Starts to open 157-162°F.
Setting (8RT-8575-A)—Starts to open 148-153°F.

Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-10883-A, (Red Ptr.) 8A-10883-B.
Engine Unit—Ford 8A-10990 (stamped 217 in right bank), 8A-10884 (stamped 224 in left bank).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½ CF-TS, Ford No. 8A-7563A. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.

►**Flywheel Rubbing on Housing Cover when Clutch Disengaged Correction**—*See "Clutch Notes" in Ford Shop Notes.*

Facings—Thickness .125". Outside diameter 9½".

Pedal Adjustment: 1" free travel. Lock nut and adjusting nut at release lever end of release rod.

Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

►**Transmission Locking in Reverse Correction**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

►**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

►*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

Transmission Control: Steering column mounted shift
See Transmission Section for complete data.

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS1-R10E (exc. Conv. & Sta. Wagon). Optl. equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated "kick-down."
Warner Model AS3-R10E (Conv. & Sta. Wagon). Similar to AS1-R10E (above) except a special solenoid adapter plate used (re-locates solenoid under overdrive), "X" type frame used on these cars has insufficient clearance for solenoid in regular mounting position on side of overdrive.
See Transmission Section for complete data.

►**Overdrive not engaging, and Prolonged shorting out of Ignition on Kick-down Corrections**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

►**Overdrive Governor Production Change**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

►**Overdrive Noise Correction on Early Cars**—*See "Overdrive Notes" in Ford Special Data.*

Solenoid—Ford No. 8M-6916A (8A-6916A or C, C is rubber coated, for Sta. Wag. & Convertible).
Control Relay—Ford No. 8M-6915. On dash.
Overdrive Fuse—30 ampere. On Control Relay.
Lock-out Switch—Ford No. 8M-6917A.
Throttle Kick-down Switch—Ford No. 8A-6918B.
Governor—Ford No. 8M-6943 (Assembly with gear).

Removal: Same as for Std. transmission (above) after disconnecting overdrive control cable and wiring.

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.
See Universals Section for complete data.
NOTE—Slipjoint formed by splined yoke of front universal engaging transmission mainshaft (or overdrive shaft). One-piece propeller shaft used.

►*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE
PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive with separate carrier. Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).
See Rear Axle Section for complete data.

►**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►**Ring & Pinion Gear Production Change**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Ratio—Standard: 3.73-1 (41-11). With overdrive: 4.10-1 (41-10). Optional: 3.54-1 (41-11).
Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

►**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.

Wheel Bearing Adjustment: None (sealed ball-bearing).

REAR AXLE
STATION WAGON

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive (separate carrier not used). Axle ends flanged —(no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).

►*NOTE—AXLE NOT SAME AS FORD PASSENGER CAR, similar to Mercury.*
See Rear Axle Section for complete data.
Ratio (Standard)—3.91-1 (43-11).
Ratio (with Overdrive)—4.27-1 (47-11).
Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Dis-

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connect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as for Ford Pass. Car Rear Axle (above).

SHOCK ABSORBERS

Front—Delco Model 1037-F or Houdaille No. H-180, Ford No. 8A-18045-A (Pass. Cars), Houdaille H-210, Ford No. 8A-18045-B (Station Wagon).
Rear—Delco Model 1031-R or Houdaille No. H-190, Ford No. 8A-18080-A (Pass. Cars), Houdaille H-200, Ford No. 8A-18080-B (Station Wagon).
Direct acting, hydraulic types. Two makes are used and are interchangeable.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.
See Front Suspension Section for complete data.

►**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Spring Production Change & Installation Caution**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Pitman Arm and Idler Arm Bracket Change**—Requires 2 different Toe In Settings listed below. *For identification of parts, see "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►*CAUTION—Specifications listed below supersede earlier 1949 Ford Front End Specifications.*
Kingpin Inclination—5¼° crosswise.
Caster (Pass. Cars)—Pos. ½° to Neg. 1°.
(Station Wagon)—Neg. ¼° preferred, Limits Neg. ¼° to Neg. 1¾°.
NOTE—½° max. variation between wheels.
Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°.
NOTE—¼° max. variation between wheels.

►**Toe In**—*CAUTION: Two settings as follows:*
1)—**1/8" toe out to 3/16" toe out for cars built before March 1, 1949.**
2)—**1/16" toe in to 1/8" toe in for cars built after March 1, 1949.**

STEERING GEAR

Gemmer design (Model 305), Ford Make—Worm-&-Roller type.
See Steering Gear Section for complete data.

►**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Diameter: Front wheel 1.128" (hone limit 1.132"). Rear Wheel: .878" (hone limit .880").
Drums—Diameter 10" (11" Sta. Wagon rear drums).
Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:
Front—11". (Stn. Wgn. 11 15/16").
Rear—11" Pri., 11 3/4" Sec. (Stn. Wgn. 11 15/16" Pri. & Sec.).
Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

►**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper control arm.

SERIAL NUMBERS: As follows:

Year	Engine Type	Model	Assembly Plant	Serial Number
1950	H	0	See below	100001 Up
1951	H	1	See below	100001 Up

Assembly Plant Designations

AT—Atlanta	**DA**—Dearborn	**MP**—Memphis
BF—Buffalo	**LU**—Louisville	**NR**—Norfolk
CS—Chester	**EG**—Edgewater	**RH**—Richmond
CH—Chicago	**KC**—Kansas City	**SR**—Somerville
DL—Dallas	**LB**—Long Beach	**SP**—Twin City (St. Paul)
HM—Highland Park		

TUNE-UP

COMPRESSION PRESSURE: (1950) 110 lbs. at cranking speed. (1951) 120 lbs. at cranking speed.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.024-.026".
Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Condenser Capacity—.21-.25 microfarad.
Distributor Line (Carburetor Connection) Vacuum—1.2-1.4" at 800 RPM., 2.1-2.9" at 1000 RPM., 4.7-6.3" at 2000 RPM.

IGNITION TIMING: TDC.
Timing Procedure—*See Ignition Timing.*
Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper timing.***

CARBURETION:
Idle Setting—Approx. 1 turn open. One screw—turning screw out gives richer mixture.
Idle Speed—(Std. Trans.) Approx. 500 RPM.
Idle Speed—(Fordomatic Trans.) 425 RPM.
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.
Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely).

►**VALVE TAPPET NOISE**—Silencing springs available. *See "Valve System" in Ford Special Data.*

VALVE TAPPET CLEARANCE: ***CAUTION—Different settings required for each type camshaft.***

►**First type Camshaft No. 7HA-6250-C**
(no markings on engine or camshaft)
Tappet Clearance (all valves) .013"-.015" Cold.
High Speed Setting—.002" additional exhaust valve clearance recommended by car manufacturer.

►**Later type Camshaft No. OHA-6250**
(Eng. Marked "OH" above #3 Intake port)
(Camshaft marked "O" on front end)
Tappet Clearance—Intake .014". Exhaust .018", Cold.

►***CAUTION***—Loss of power will result if correct tappet clearance not used on engines with "O" camshaft.

►***ADJUSTABLE SELF-LOCKING TAPPET SCREWS***

IGNITION

IGNITION SWITCH: Ford No. ('50) 6A-11572-B, ('51) No. 1A-11572-B.
Ignition Lock—Ford No. ('50) 8A-11582-A, ('51) 8A-11582-B.

COIL: Ford No. 8BA-12029.
Location—On left side of engine above distributor.
Ignition Current—Idling 2.75-3.0 amperes at 6 volts, 5.0-5.5 stopped. Coil primary resistance 1.05-1.15 ohms, (75°F). Secondary resistance 4100 ohms, (75°F).

CONDENSER: Ford No. 7RA-12300-B.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Ford No. 7HA-12127 (Less Cap and Rotor). "Pressure" distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs.
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.

►**Excessive Pinging Correction**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*
Breaker Gap—.024-.026".
Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

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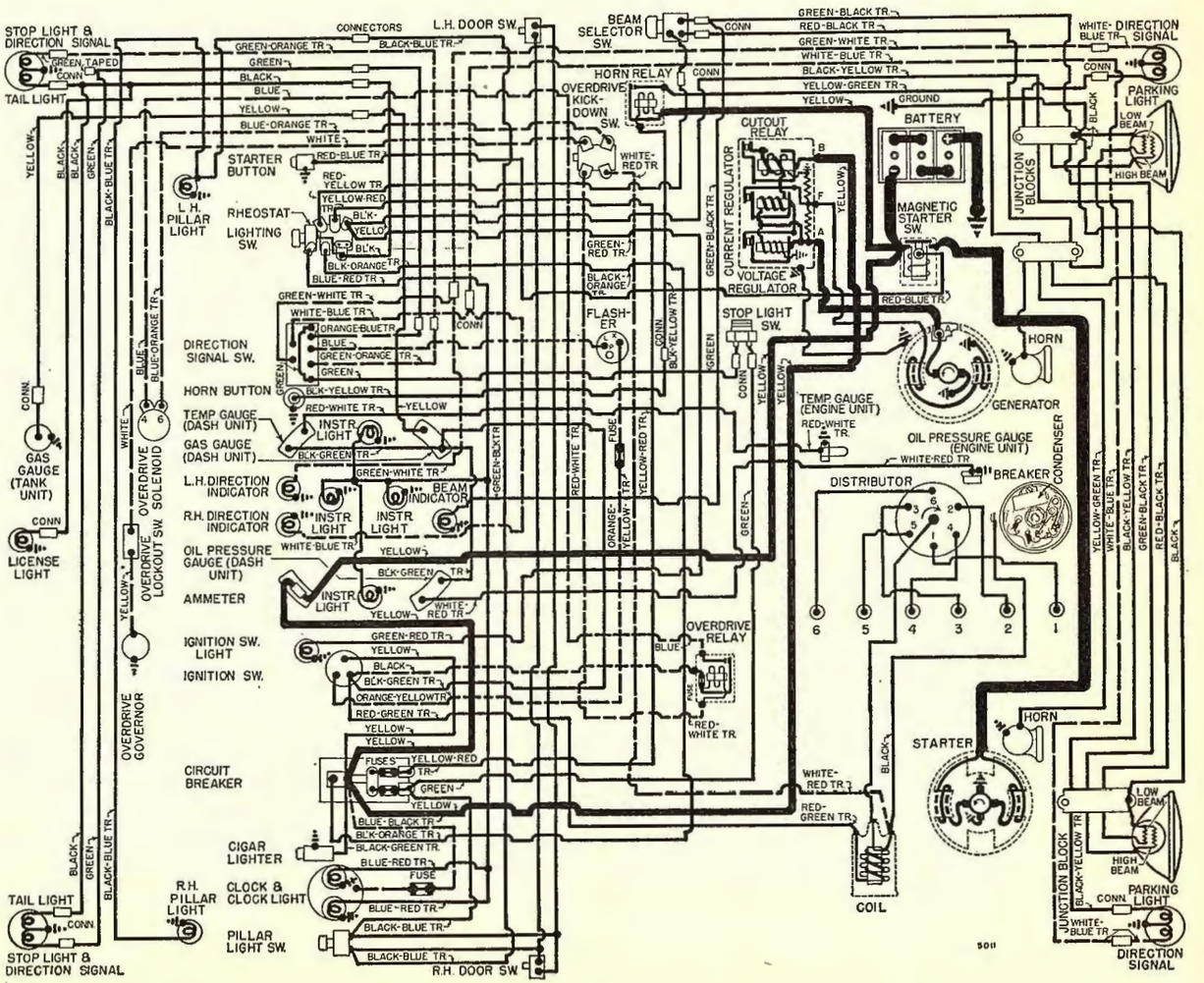

1950 MODELS

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Advance Performance

►With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0″	200
1¾-3°	0.4″	500
5½-6¾°	1.4″	1000
11½-13°	5.5″	1000
8½-9¾°	2.9″	1500
10½-11½°	4.1″	2000

Distributor Line Vacuum Test—*See Tune-Up.*

Distributor Removal: Mounted on left side of engine at center. To remove, disconnect vacuum line, take out hold-down screw in timing arm, lift off.

►***NOTE—Distributor angle-mounted on left side of engine and shaft splined to oil pump drive gear.***

IGNITION TIMING

Std. Setting.....**at TDC.**

Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper timing.***

Timing—With #1 piston at firing position and timing mark aligned with pointer on front of engine, loosen clamp screw on timing arm, rotate distributor until contacts begin to open, tighten clamp screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap).

►**Timing (with Neon Timing Light)**—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark proper timing pointer (see Dampener Mark above) and dampener mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and pointer aligned when light flashes.

CARBURETOR

1950-51 (Std. Trans.) Holley-Ford No. 8HA-9510-A. 1951 (with Fordomatic Trans.) Holley-Ford No. 1HA-9510-A.

Single barrel downdraft type with vacuum passages for distributor operation.

See Carburetor Section for complete data.

Setting (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Jets—***See Holley-Ford Jet Specification Table in Carburetor Section.***

►***CARBURETOR JET CHANGE—See Carburetor Section for complete data.***

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump (std.): Ford No. 7HA-9350-B.
Optl. (Fuel-&-Vacuum)—Ford No. 8HA-9350.
Pressure—4-5 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Red Pntr. 1950) 8A-9280-B, (White Pntr. 1951) No. 1A-9280-B.
Tank Unit—Ford No. 8A-9275.
See Carburetion Equipment Section for complete data.

Air Cleaner (Std.—oil wetted): Ford No. OHA-9600-A.
Optl. (oil bath)—Ford No. OHA-9600-B1 (1 pint cap.), OHA-9600-B4 (1 quart cap.).

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Zero Capacity—300 amperes for 3.3 minutes. Five Second Voltage—4.2 volts.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.
Dimensions—L. 10½". W. 7⅛". H. 7¼".

STARTER

1950 (All Models) Ford No. 7HA-11002.
1951 (Except Fordomatic) Ford No. 1A-11002-A.
1951 (With Fordomatic) Ford No. 1CM-11002-A.
Armature—(Except Fordomatic) No. 18-11005. (With Fordomatic) No. 1CM-11005-A.

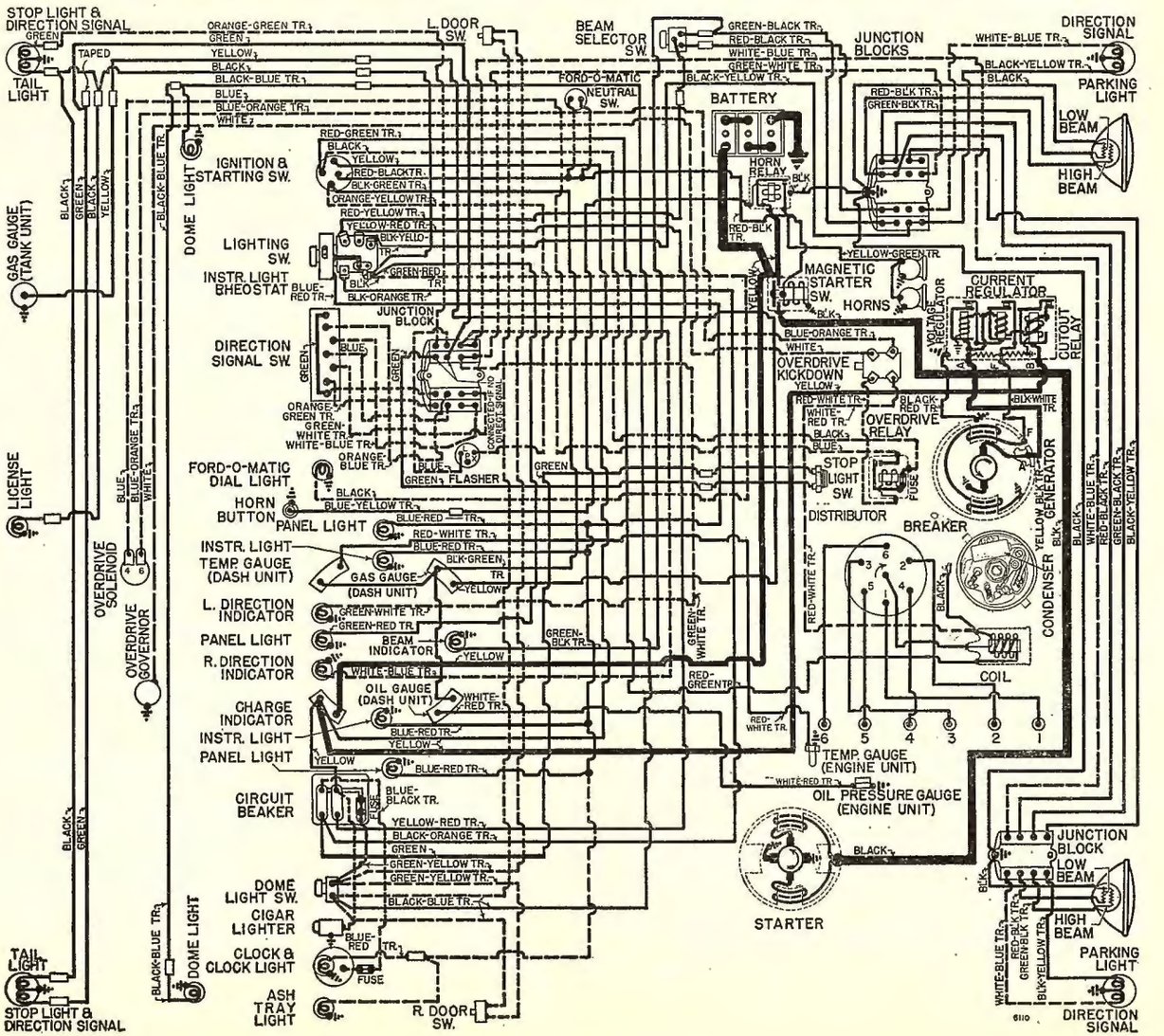
►**Starter, Motor Rusting Correction**—***See "Electrical System Notes" in Ford Special Data.***

►***STARTER DRIVE PRODUCTION CHANGE (LATE 1951)—Bendix "Folo-Thru" Starter Drive used on cars with FORDOMATIC TRANSMISSION. See Electrical Equipment Section for complete data.***

Drive—Ford No. 7HA-11350. New 9 tooth pinion type for use with 114 tooth flywheel ring gear.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ounces.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600



1951 MODELS

Starting Switch: (1950 All Models & 1951 Sta. Wgn.) Ford No. 21A-11450. (1951 Except Sta. Wgn.) Ford No. 1A-11450-A. Mounted on left front fender apron and controlled as follows:

►***1951 STARTER SWITCH CAUTION***—(Except Station Wagon). Starter switch grounded at switch bracket. Make sure mounting surfaces clean.

1950—Pushbutton Switch No. 6H-11500 mounted on instrument panel.

1951—Key operated ignition & starter switch, Ford No. 1A-11572-B. Turn switch full right to start.

►***FORDOMATIC DRIVE NOTE***—Neutral Safety Switch, Ford No. 1M-15812-B in circuit between ignition switch and starter relay. Selector lever must be in neutral to operate starter.

GENERATOR

1950—Ford No. (Std.) 8BA-10002-A, (Heavy Duty) 8BA-10002-B. Use with bracket No. 7HA-6129.

1951—Ford No. (Std.) OHA-10000-A, (Spec. Equip.) OHA-10000-B. Use with bracket OHA-6129-A.

Two brush type with current and voltage regulation.

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—36 amperes, 7 volts, at approximately 20 MPH. Controlled by regulator and dependent on load and battery condition.

Performance Data

Generator	Amperes	RPM.
OHM-10000-A	35	1500
OHM-10000-B	40	1500
8BA-10002-A	35	1500
8BA-10002-B	40	1500

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—20-24 ozs.

Belt Adjustment: ¼" deflection midway between generator and pump pulleys. To adjust, loosen 2 mounting bracket bolts under generator and capscrew in bracket slot behind generator.

REGULATOR

Ford Numbers

Regulator	Generator
51A-10505-A	8BA-10002-A
51A-10505-H	8BA-10002-A
5EH-10505-C	8BA-10002-B
8M-10505-A	OHA-10000-A
8L-10505	OHA-10000-B
8L-10505	8BA-10002-B

Voltage-current 3-Unit types.

See Electrical Equipment Section for complete data.

NOTE—Spearate ground wire extending to cowl must be in place when gereator operated.

Cutout Relay

Regulator	Cuts In	Cuts Out (Disch.)
51A-10505-A	6.6-7.0 Volts	0-8 Amperes
51A-10505-H	6.6-7.0 Volts	0-8 Amperes
5EH-10505-C	6.6-7.0 Volts	0-8 Amperes
8M-10505A	6.0-6.6 Volts	0-8 Amperes
8L-10505	6.0-6.6 Volts	0-8 Amperes

Contact Gap—.010" (armature against upper stop).

Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting COLD①
51A-10505-A	7.2-7.6 Volts
51A-10505-H	6.6-7.0 Volts
5EH-10505-C	6.6-7.0 Volts
8M-10505-A	7.2-7.6 Volts
8L-10505	7.2-7.6 Volts

①—Voltage settings will increase approx. .2 volt after 20 minutes running.

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

►***CAUTION—Make certain gauge contacts armature and not brass rivet on underside of armature.***

Contact Spring Tension—5 ounces minimum with contacts just opening.

Current Regulator

Regulator	Current Setting COLD	Amperes
51A-10505-A		30-34
51A-10505-B		34-38
5EH-10505-C		38-42
8M-10505-A		38-42
8L-10505		38-42

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

Contact Spring Tension—5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*

Direction Indicators—Right and Left indicators on lower edge of speedometer.

Directional Signal Flasher—Ford No. ('50).. 8L-13350-B, ('51) 8L-13350-C.

Switches

Lighting—Ford No. ('50) 0A-11654, ('51) 0L-11654.

Instrument—Part of Lighting Switch (operated by turning knob).

Beam Selector—Ford No. 8A-13532.

Dome Light—Ford No. ('50) 0A-13752, ('51) 1A-13752.

Dome Light (Sta. Wgn.) Ford No. 0M-13752.

Door Switch—Ford No. 0A-13713.

Stop Light—Ford No. ('50) 1 1A-13480, ('51) 0A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKER: Ford No. ('50) 0A-12258, ('51) 1A-12258-A. Behind instrument panel.

Convertible Top—Ford No. 51A-12250-A. 30 ampere. On hydraulic pump motor or on front of dash near convertible top control switch.

FUSES: Auxiliary Lights (Parking, Tail & Instrument) (1950 only)—14 ampere. On circuit breaker bracket behind instrument panel (see wiring diagram).

Dome & Stop (1950 only)—14 ampere. Next to fuse listed above.

Dome (1951)—14 ampere. On circuit breaker bracket behind instrument panel.

Clock—2 ampere. In clock feed wire.

Overdrive—30 ampere. On relay on dash under hood.

Direction Signal—15 ampere. In feed from ignition switch to flasher.

HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), No. 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay. NOTE—"A" horns are 4.28" high, "B" horns are 4.14". Horns marked "HI" or "LO" on air columns.

Air Gap—.027-.029" for high pitch (right horn), .032-.034" for low pitch (left) for Sparks-Withington.

Horn Current—13 amperes (high pitch), 14 (low).

Horn Relay: Ford No. ('50) 7RA-13853-B, ('51) 7RA-13853-A.

►***CAUTION—Use only Ford type relay No. 7RA-13852-B with TAN plastic cover on 1950 cars. If 1951 relay No. 7RA-13853-A with BLACK plastic cover is used, shock at button may result when blowing horn.***

Contact Gap—.015-.025".

Contact Closing Voltage—4 volts max.

ENGINE

ENGINE SPECIFICATIONS. Own 8HA. Six cylinder, "L" head type.

Bore—3.30". **Stroke**—4.40".

Displacement—226 cu. ins. **Rated HP**—26.13.

Developed Horsepower—95 at 3300 RPM.

Compression Ratio—6.8-1 cast iron head.

Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD AND TIGHTENING TORQUE: *See Ford Special Data.*

►***CYLINDER HEAD PRODUCTION CHANGE NOTE—New type cylinder head used in production beginning early 1950. Interchangeable with previous head.***

CYLINDER SLEEVE: Cast iron dry type cylinder sleeves furnished for replacement service.

OIL PAN REMOVAL: *See Ford Special Data.*

NOTE—Engine must be removed to remove oil pan.

PISTONS: *CAUTION—Two types used.*

1950 (Early Production)—7HA piston, 4 ring (all above pin), flat head, aluminum alloy, steel strut, U-slot cam ground type.

1950-51 (Except early 1950 production) *New OHA AUTOTHERMIC TYPE used.* Solid skirt, 4 ring (all above pin), aluminum alloy.

►***CAUTION—When installing the OHA piston, make sure the small indentation at the top outer edge is towards the front of the engine. This is necessary since pin is offset 1/16".***

►***PISTON INTERCHANGE CAUTION***—The OHA piston should not be replaced with the earlier 7HA piston. However, the OHA piston can be used to replace the 7HA piston individually or in sets.

Replacement Pistons: Standard size and .0025", .005", .020", .030", .040", and .060" Oversize.

Fitting Pistons: Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:

OHA Piston—New piston in new bore .002". New piston in used bore .002". Used piston in used bore .003". Pounds pull to withdraw gauge: 3 to 12.

7HA Piston—New piston in new bore .003". New piston in used bore .003". Used piston in used bore .003". Pounds pull to withdraw gauge: 6 to 12.

Skirt Clearance—(OHA Piston) .0006" to .0012".

►***PISTON RING PRODUCTION CHANGE 1950—New OHA piston rings of the steel segment type used beginning early 1950.***

►***CAUTION—When using the earlier type piston ring (7HA) on the OHA piston, install the oil ring expander in the 3rd groove rather than the 4th groove. OHA piston rings may be used on the 7HA piston.***

PISTON RINGS: 2 compression, 2 slotted oil rings, all above pin. Upper oil ring groove drilled with oil drain holes, lower ring groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"①	.0015-.0035"②
Compr. #2	3/32"	.007-.017"①	.001-.004"③
Oil (#3, 4)	3/16"	.007-.017"①	.001-.004"③

Worn Limits—① .035", ② .0045", ③ .005".

Replacement Rings. Snap type ring sets furnished std. size and .020", .030", .040", .060" Oversize.

See Ford Special Data.

PISTON PIN: Diameter .8504" (maximum).

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ENGINE

CONTINUED FROM PRECEDING PAGE

Floating type (lock ring in piston at each end). Pin hole in connecting rod bronze-bushed.
Pin Fit in Piston—.0003" (new), .0015" (worn limit).
Pin Fit in Rod Bushing—.0002-.0005" (new), .0015" (worn limit).
Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" Oversize (yellow).
CONNECTING ROD: Length 8¼". Weight 29.0 ozs.
Crankpin Journal Diameter—2.2988". Maximum wear limits—Out-of-round .0015", Taper .001".
Lower Bearing—Removable, steel-backed, copper-lead alloy lined, locked in type.
Clearance—.000-.0025" (new), .005" (worn limit).
►*NOTE—Replace bearing shells less than .0593" thick.*
Sideplay—.006-.014" (new), .017" (worn limit).
Bearing Adjustment: None (except early 1950 "M" engine). Do not file caps. Replace bearings. Tang on bearing must engage groove in rod and cap.
►*BEARING ADJUSTMENT FIRST "M" ENGINES*—Engines built prior to January 25, 1950 were equipped with connecting rods having shims. Engines built after this date did not have shims.
CAUTION—Connecting rods having shims must be serviced WITH THE SHIMS IN PLACE. When assembling new rods and new crankshafts if the bearing clearance is in exces of .0007" to .0013", the removal of one shim will reduce the clearance .00075". If both shims are removed the bearing clearance will be reduced .0015".
Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.
CRANKSHAFT: 4 bearing, integral counterweights.
Vibration Dampener—Viscous or rubber type.
Journal Diameters—2.8740" (all bearings). Max. wear limits—Out-of-round .0015". Taper .001".
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.0009-.0032" (new), .0052" (worn limit).
►*NOTE—Replace main bearing shells less than .0938" thick.*
Bearing Adjustment: None. Replace bearings. Tang on bearing must engage groove in block and cap.
Replacement Bearings: Std., .002", .020", .030" U. S.
End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.003-.006" (new), .008" (worn limit).
CAMSHAFT: *CAUTION—Two different types used, each type requires different tappet clearance.*
7HA-6250-C—All engines built before June 20, 1950.
OHA-6250—Beginning production June 20, 1950 and used for service replacement of first type camshaft. Has changed cam contours for quieter operation.
7HT-6256-A—Replaces earlier camshaft gear in truck engines.
►*CAMSHAFT IDENTIFICATION*—New OHA-6250 camshaft stamped "O" on the forward end. (First type not marked), and engine marked "OH" on right hand side of block directly above #3 intake port.
►*ENGINE MARKING CAUTION*—Engine marking (see above) must be added when "OH" camshaft installed in unmarked block, or removed if first type camshaft installed in marked block.
Bearing Diameter—1.9285" (replace bearing if diameter greater than worn limit 1.9315").
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.002".
Replacement Bearings: Three sizes as follows:
1—Std. size on both inside and outside diameter.
2—Std. on I.D., .080" Oversize on O.D.
3—.015" Undersize on I.D., std. size on O.D.
End Thrust: Thrust plate bolted to front of block behind camshaft hub.
Timing Gears: *CAUTION—Two types used.* **8HA-6256-D (Early type)** used with 7HA Camshaft. **OHA-6256-A (Late type)** used with new OHA-6250 Camshaft.
►*NOTE*—The early type camshaft gear can be used with the "OHA" camshaft by increasing the chamfer from 15° to 45°. The new type gear can be used with early type camshaft without interference.
Crankshaft Gear—Cast Alloy Iron.
Replacement Camshaft Gears—Std., .006", .012" OS.
Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVE TIMING

►**VALVE TAPPET NOISE**—Silencing springs available. *See "Valve System" in Ford Special Data.*
VALVE TAPPET CLEARANCE: *CAUTION—Different settings required for each type camshaft.*
►**First type Camshaft No. 7HA-6250-C (no markings on engine or camshaft)**
Tappet Clearance (all valves) .013"-.015" Cold.
High Speed Setting—.002" additional exhaust valve clearance recommended by car manufacturer.
►**Later type Camshaft No. OHA-6250 (Eng. Marked "OH" above #3 Intake port) (Camshaft marked "O" on front end)**
Tappet Clearance—Intake .014". Exhaust .018", Cold.
►*CAUTION*—Loss of power will result if correct tappet clearance not used on engines with "O" camshaft.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.
Valve Timing Check—Intake valve opens 11° BTDC. Valve timing mark location on vibration dampener.

VALVES:	Head Diam.	Stem Diam.	Stem Clearance
Intake	1.65"	.3410"①	.0014-.0034"②
Exhaust	1.51"	.3405"③	.0019-.0039"④

	Seat Angle	Lift
All Valves	45°	.350"

Worn Limits (Stem Diam.)—① .3385", ③ .3375".
Worn Limits (Clearance)—② .0046", ④ .006".
►*NOTE—Valves are straight-stemmed type operating in one-piece valve guides.*
Sticking Valve Correction—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake valve guides.
Valve Seat Inserts—Used for exhaust valves.
Valve Guides: One-piece type pressed in block.
Removal: Use special tool 6510-O to remove guides.
Installation—Upper end of guide 1.18" Intake, 1.08" Exhaust below top face of block. Install with stepped end down. Use tool 6510-N to drive guides in place.
Valve Lifters: Mushroom type with self-locking adjusting screws. Removable from below with camshaft out.
Diameter—.6240" (replace if worn to less than wear limit of .6225").
Clearance—.0005-.0015" (new), .003" (worn limit).
Valve Springs: Coated springs used. Install springs with closely spaced coils toward top (against block).
Spring Test—47-53 lbs. at 2.109". Free length 2.50".

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings. Timing gears lubricated by spray past camshaft thrust plate. Rotor type oil pump mounted externally on right side of engine.
Crankcase Capacity—4 quarts (5 quarts when changing filter).
Normal Oil Pressure—45 lbs. at 30 MPH.
Oil Pressure Relief Valve: Not adjustable.
Spring Tension—12.64-12.88 lbs. at 1.14".
Oil Pump: Rotor type. Mounted externally on right side of engine with drive gear at center of camshaft.
Removal and Installation—*See Ford Special Data.*
Oil Filter: Mounted directly on block.
Oil Filter Cartridge—Ford No. 7HA-6731A.
Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (1950 Red Pntr.) 8A-9273-B, (1951 White Pntr.) 1A-9273-B.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.
Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear valve chamber.

COOLING

Cooling System: Pressure type with relief valve in filler cap, one belt-driven pump, and by-pass.
Capacity—16 quarts.
Pressure Valve—In radiator filler cap. Ford No. (Except with Fordomatic) 26H-8100-B. Opens at 3½-4½ lbs. (With Fordomatic) 1M-8100-B. Opens at 6½-7½ lbs.
Water Pump: Centrifugal, belt driven, packless type.
See Water Pump Section for complete data.
Thermostat: In head water outlet. Ford No. 7HA-8575-A or B. Two makes used.

1950 Thermostats

Part No.	Starts to Open
8BA-8575-B	157°-162°
8BA-8575-C	167°-172°
8BA-8575-D	152°-157°
8BA-8575-A	148°-153°

1951 Thermostats

1BA-8575-A	157°-162°
1BA-8575-B①	177°-182°

①—For use with permanent anti-freeze.
Temperature Gauge: King-Seeley Electric type.
Dash Unit—Ford No. (1950 Red Pntr.) 8A-10883-B, (1951 White Pntr.) 1A-10883-B.
Engine Unit—Ford No. 8A-10884.
See Miscellaneous Section for complete data.

CLUTCH

Long Models—(Pass. Cars) 9½ CF-TS, Ford No. 8A-7563-A. (Police & Taxi) 10 CF-TI, Ford No. 19A-7563-A.
►DISC NOTE—Softer damper springs used on cars with Overdrive (black colored springs). Cars without Overdrive have aluminum colored springs.
See Clutch Section for complete data.
Facings—Thickness .125". Outside diameter 9½".
Pedal Adjustment: 1" free travel. Lock nut and adjusting nut at release lever end of release rod.
Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

SYNCHRO-MESH

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

►*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

►**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

Transmission Control: Steering column mounted shift *See Transmission Section for complete data.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Models—Optional Equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated kickdown.
AS1-R10E—1950 (Except Convertible & Sta. Wgn.).
AS4-R10E—1951 (Except Convertible & Sta. Wgn.). Same as AS1-R10E except does not have lockout switch.
AS3-R10E—1950-51 Convertible & Sta. Wgn. Same as AS1-R10E except solenoid is mounted under overdrive housing and connected to "pawl" by linkage. Frame construction does not allow standard mounting.
Solenoid—Ford No. 8M-6916-A (8A-6916-C is rubber coated for Convertible & Sta. Wgn.).
Control Relay—Ford No. 8M-6915.
Overdrive Fuse—30 amperes. On relay.
Lockout Switch—Ford No. 6917-A, (1950).
Throttle Kickdown Switch—Ford No. 8A-6818-B.

Removal: Same as for Std. Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission with hydraulic control and mechanical parking lock.

►*LINKAGE PRODUCTION CHANGE*—Throttle Linkage changed on later cars for quieter and more efficient operation. Can be installed on earlier cars. *See Fordomatic Transmission in Transmission Section. See Transmission Section for complete data.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15000 miles. **Use only Automatic Transmission Fluid, Type A.**

Capacity—Approx. 9 qts.

Checking Oil Level—With transmission selector lever in "Neutral," run engine approx. four minutes at idle speed. Clean floor mat and lift right side to expose plate in floor boards, remove plate. When engine and transmission are at normal operating temperature, move the selector lever through all ranges to assure distribution of oil throughuot the transmission. Clean all dirt away from fluid level indicator cap and remove indicator. Wipe indicator and insert in transmission making sure that it is seated and locked. Remove indicator and check level. Add fluid to bring level to the "full" mark on the indicator. Replace indicator and tighten it properly. Replace plate and floor mat.

►*CAUTION—Do not fill above FULL mark.*

Draining & Refilling—*See "Ford Fordomatic" in Transmission Section.*

Linkage Adjustment—*See "Ford Fordomatic" in Transmission Section.*

Removal: *See "Ford Fordomatic" in Transmission Section.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used. *See Universals Section for complete data.*

►*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive **with separate carrier.** Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required). *See Rear Axle Section for complete data.*

►**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►**Ring & Pinion Gear Production Change**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Ratios

Standard Transmission—3.73-1 (41-11).
Overdrive Transmission—4.10-1 (41-10).
Fordomatic Transmission—3.31-1 (43-13). (Optional) 3.54-1 (39-11).
Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

►**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.

Wheel Bearing Adjustment: None.

STATION WAGONS

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive **(separate carrier not used).** Axle ends flanged—(no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).

►*NOTE—AXLE NOT SAME AS FORD PASSENCER CAR, similar to Mercury.*
See Rear Axle Section for complete data.
Ratio (Standard)—3.91-1 (43-11).
Ratio (with Overdrive)—4.27-1 (47-11).
Ratio (with Fordomatic)—3.54-1 (39-11).
Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as Ford Pass. Cars.

SHOCK ABSORBERS

Front—Ford No. ('50 Pass. Cars) 8A-18045-A. ('51 Pass Cars) 1A-18045-A2. Ford No. ('50 Sta. Wagon) 8A-18045-B. ('51 Sta. Wagon) 1A-18045-D.
Rear—Ford No. ('50 Pass. Cars) 8A-18080-A. ('51 Pass. Cars) 1A-18080-A. Ford No. ('50 Sta. Wagon) 8A-18080-B. ('51 Sta. Wagon) 1A-18080-B.
Direct acting, hydraulic types. Two makes are used and are interchangeable.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.
See Front Suspension Section for complete data.

►**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section).*

►**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Spring Production Change & Installation Caution**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

Kingpin Inclination—5¼° crosswise.
Caster (Pass Cars)—Pos. ½° to Neg. 1°.
(Station Wagon)—Neg. ¼° preferred, Limits Neg. ¼° to Neg. 1¾°.
NOTE—½° max. variation between wheels.
Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°.
NOTE—¼° max. variation between wheels.
Toe In—1/16" to 1/8".

STEERING GEAR

Gemmer design (Model 305), Ford Make—Worm-&-Roller type.
See Steering Gear Section for complete data.

►**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Diameter: Front wheel 1.128" (hone limit 1.132"). Rear Wheel: .878" (hone limit .880").
Drums—Diameter 10" (11" Sta. Wagon rear drums).
Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:
Front—11". (Stn. Wgn. 11 15/16").
Rear—11". Pri., 11 3/4" Sec. (Stn. Wgn. 11 15/16" Pri. & Sec.).
Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

►**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper arm.

Year	Engine Type	Model	Assembly Plant	Serial Number
1950	B	0	See below	100001 Up
1951	B	1	See below	100001 Up

Assembly Plant Designations

AT—Atlanta	**DA**—Dearborn	**MP**—Memphis
BF—Buffalo	**LU**—Louisville	**NR**—Norfolk
CS—Chester	**EG**—Edgewater	**RH**—Richmond
CH—Chicago	**KC**—Kansas City	**SR**—Somerville
DL—Dallas	**LB**—Long Beach	**SP**—Twin City (St. Paul)
HM—Highland Park		

TUNE-UP

COMPRESSION PRESSURE: (1950) 110 lbs. at cranking speed. (1951) 120 lbs. at cranking speed.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.014-.016".
Cam Angle—27° closed, 18° open.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Condenser Capacity—.21-.25 microfarad.
Distributor Line (Carburetor Connection) Vacuum—Readings in inches Hg.
Distributor Line (Carburetor Connection) Vacuum—2.0-2.9" at 800 RPM., 3.5-4.8" at 1000 RPM., 4.7-6.4" at 2200 RPM., 4.6-6.2" at 2400 RPM.

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Crankshaft Pulley Mark—Circular boss aligned with timing pointer on right side of engine front cover.

CARBURETION:
Idle Setting—Approx. 1 turn open. Two screws—turning screws out gives richer mixture.
Idle Speed—(Std. Trans.) 475-500 RPM, (Automatic Trans.) 425 RPM.
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fuel Pump Pressure: 3½-4½ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross over and right exhaust manifold.

VALVE TAPPET CLEARANCE: ***CAUTION—Different settings required for each type camshaft.***

►First type Camshaft No. 8BA-6250①
(no markings on Engine or Camshaft)
Intake—.010-.012", **Exhaust**—.014-.016", Cold.
①—Before Eng. No. 8BA-622468—Partial production after this number.

►Later type Camshaft No. 8BA-6250-B②
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)
Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.
②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.
③—On top of block at center under valve cover.

►***CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.***

Adjustment—*See "Valve System" in Ford Special Data.*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-B ('50), No. 1A-11572-B ('51).
Ignition Lock—Ford No. 8A-11582-A ('50), No. 8A-11582-B ('51).

COIL: Ford No. 8BA-12029.
Location—On front lower corner of right cylinder head.
Ignition Current—Idling 2.75-3.0 Amperes at 6 volts. 5.0-5.5 amperes stopped. Coil primary resistance 1.05-1.15 ohms (75°F). Secondary resistance 4100 ohms (75°F).

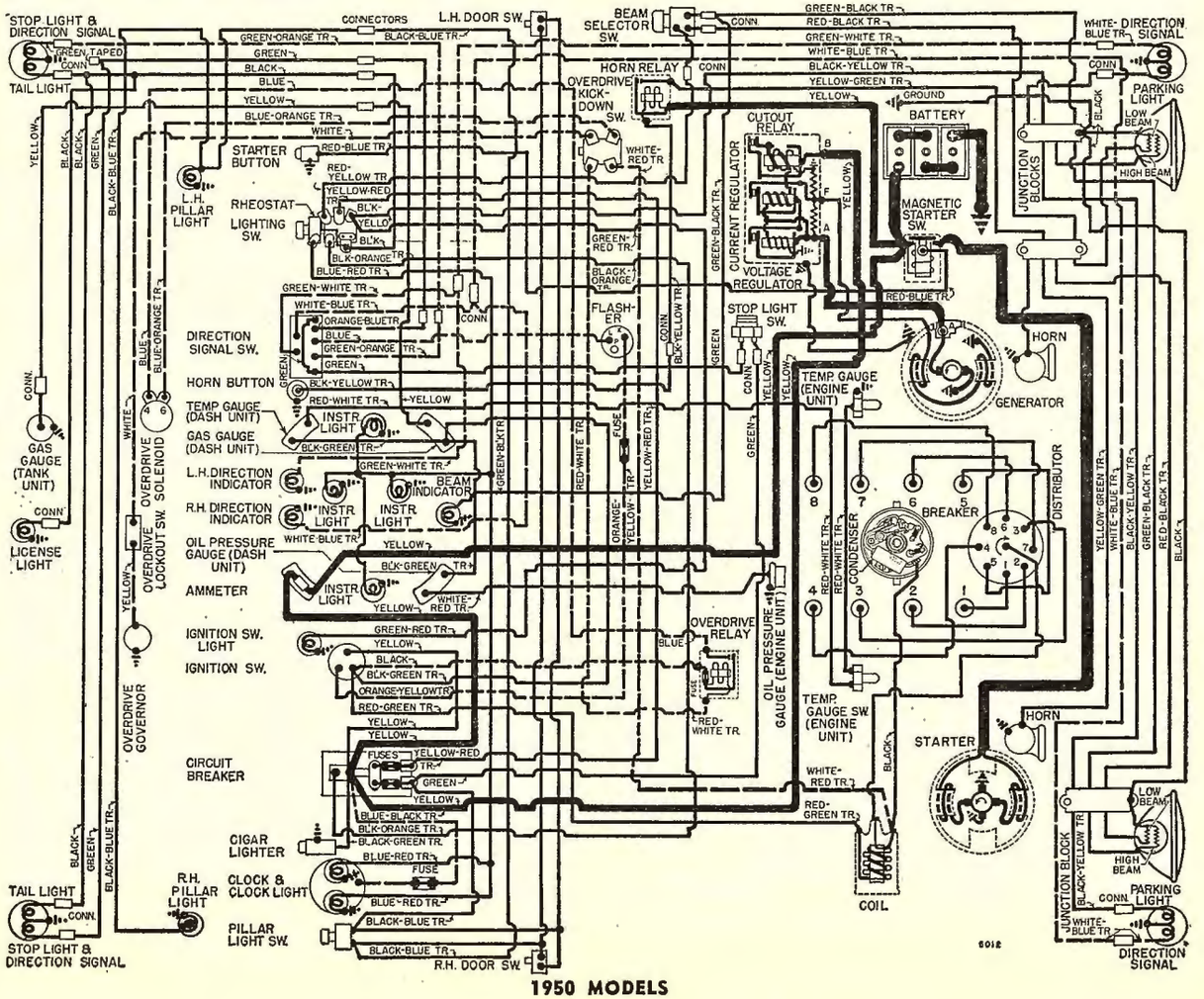
CONDENSER: Ford No. 7RA-12300-B.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: (Early 1950) Ford No. 7RA-12127-C. Use with 8BA-6250-A Camshaft. (Late 1950-51) Ford No. 8BA-12127 (used with cast iron front cover), 0BA-12127 (used with aluminum front cover). Pressure type distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs.

►**Excessive Pinging Correction**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*
Breaker Gap—.014-.016".
Cam Angle—27° closed, 18° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

8BA, OBA-12127 Advance Performance
►With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
0-1°	0.30"	500
5.2-6.2°	1.32"	1000
8¾-10°	2.85"	1500
10-11¼°	3.7"	2000



1950 MODELS

7RA-12127-C Advance Performance
►With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
1¼-2¼°	0.4"	500
4¼-5¼°	1.7"	1000
6¼-7¼°	2.8"	1500
7½-8½°	3.7"	2000

Distributor Line Vacuum Test—*See Tune-Up.*

Distributor Removal: Mounted at front of engine at right side. To remove, disconnect vacuum line, take out hold down screws, lift off.

IGNITION TIMING

Std. Setting ..... **2° BTDC.**

Crankshaft Pulley Mark—Circular boss on rear edge of pulley (timing pin on right front side of engine).

Timing—With #1 piston at firing position and timing mark on pulley aligned with timing pin on front of engine, loosen hold-down screw on distributor, rotate distributor until contacts begin to open, tighten hold-down screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.

►**Timing (with Neon Timing Light)**—*CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.* Mark timing pin and pulley mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and timing pin aligned.

CARBURETOR

1950-51 (Std. Trans.) Holley-Ford No. 8BA-9510-A.
1951 (With Fordomatic) Holley-Ford No. 1BA-9510-A.

Dual (double-barrel) downdraft type with new vacuum passages for distributor operation.
See Carburetor Section for complete data.

Setting (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump (std.): Ford No. (1950) 7RA-9350-C, (1951) 1BA-9350.
Optl. (Fuel & Vacuum)—(1950-51) Ford No. 7RA-9350-E.
Pressure—3½-4½ lbs. (both types).

Gasoline Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Red Pntr.) 8A-9280-B (All '50 & Sta. Wgn. '51). (White Pntr.) No. 1A-9280-B ('51 except Sta. Wgn.).
Tank Unit—No. 8A-9275 (Sta. Wgn. 01A-9275-A). *See Carburetion Equipment Section for complete data.*

Air Cleaner: (Std.—Oil Wetted): Ford No. 0BA-9600-A
Optl. (oil bath)—0BA-9600-B. Use 0BA-9600-D with governor.

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.

STARTER

1950 (All Models) Ford No. 7RA-11002.
1951 (Except Fordomatic) Ford No. 1A-11002-A.
1951 (With Fordomatic) Ford No. 1CM-11002-A.
Armature—(Exc. Fordomatic) No. 18-11005. (With Fordomatic) No. 1CM-11005-A.
Drive—Bendix No. A1472 (Ford No. B-11350).

►*STARTER DRIVE PRODUCTION CHANGE (LATE 1951)—Bendix "Folo-Thru" Starter Drive used on cars with FORDOMATIC TRANSMISSION. See Electrical Equipment Section for complete data.*

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ounces.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: (1950 All Models & 1951 Sta. Wgn.) Ford No. 21A-11450. (1951 Except Sta. Wgn.) Ford No. 1A-11450-A. Mounted on left front fender apron and controlled as follows:

►*1951 STARTER SWITCH CAUTION*—(Except Station Wagon). Starter switch grounded at switch bracket. Make sure mounting surfaces clean.
1950—Pushbutton Switch No. 6H-11500 mounted on instrument panel.
1951—Key operated ignition & starter switch, Ford No. 1A-11572-B. Turn switch full right to start.

►*FORDOMATIC DRIVE NOTE*—Neutral Safety Switch, Ford No. 1M-15812-B in circuit between ignition switch and starter relay. Selector lever must be in neutral to operate starter.

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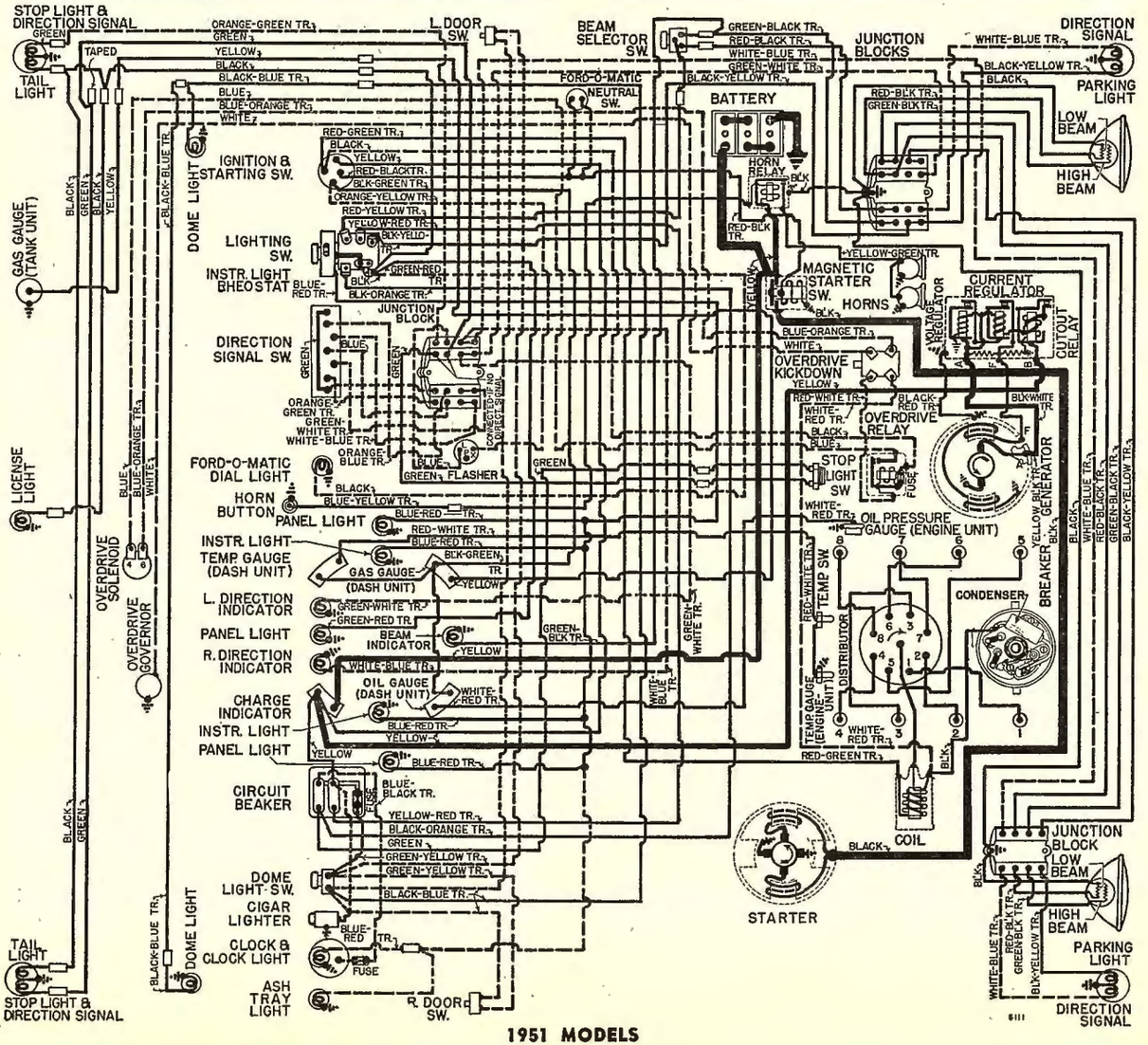

1951 MODELS

CONTINUED FROM PRECEDING PAGE

GENERATOR

Ford No. 8BA-10002-A or D (Std.), 8BA-10002-B (Heavy Duty).
Armature No.—Ford No. 8BA-10005-A (Std.), 8EH-10005 (Heavy Duty).
2 brush type with current and voltage regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—36 amperes, 7 volts, reached at approximately 20 MPH. Controlled by regulator (dependent on load & battery condition).

Performance Data

Generator	Amperes	RPM
8BA-10002-A	35	1500
8BA-10002-D	30	1500
8BA-10002-B	40	1500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.
Generator Belt Adjustment: Loosen 2 bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulleys is ½" (thumb and finger pressure).
Fan Belt Adjustment—*See COOLING.*

REGULATOR

Ford Numbers

Regulator	Generator
51A-10505-A	8BA-10002-A or D
51A-10505-H	8BA-10002-A or D
5EH-10505-C	8BA-10002-B
8L-10505	8BA-10002-B
8M-10505-A①	8BA-10002-A or D

①Service replacement regulator.
See Electrical Equipment Section for complete data.
NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Regulator	Cuts In	Cuts Out (Discharge)
51A-10505-A	6.6-7.0 Volts	0-8 Amperes
51A-10505-H	6.6-7.0 Volts	0-8 Amperes
5EH-10505-C	6.6-7.0 Volts	0-8 Amperes
8M-10505A	6.0-6.6 Volts	0-8 Amperes
8L-10505	6.0-6.6 Volts	0-8 Amperes

Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage & Current Regulator Cold Settings①

Regulator	Voltage Reg.	Current Reg.
51A-10505-A	7.2-7.6 Volts	30-34 Amperes
51A-10505-H	6.6-7.0 Volts	34-38 Amperes
5EH-10505-C	6.6-7.0 Volts	38-42 Amperes
8L-10505	7.2-7.6 Volts	38-42 Amperes
8M-10505-A	7.2-7.6 Volts	38-42 Amperes

①—Voltage settings will increase approx. .2 volts after 20 minutes running.
Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.
►*CAUTION—Make certain gauge contacts armature and not brass rivet on underside of armature.*
Contact Spring Tension—5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".
Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Indicators—Right and Left indicators on lower edge of speedometer.
Directional Signal Flasher—Ford No. ('50).. 8L-13350-B, ('51) 8L-13350-C.

Switches

Lighting—Ford No. ('50) 0A-11654, ('51) 0L-11654.
Instrument—Part of Lighting Switch (operated by turning knob).
Beam Selector—Ford No. 8A-13532.
Dome Light—Ford No. ('50) 0A-13752, ('51) 1A-13752.
Dome Light (Sta. Wgn.) Ford No. 0M-13752.
Door Switch—Ford No. 0A-13713.
Stop Light—Ford No. ('50) 11A-13480, ('51) 0A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKER: Ford No. ('50) 0A-12258, ('51) 1A-12258-A. Behind instrument panel.
Convertible Top—Ford No. 51A-12250-A. 30 ampere.
FUSES: Auxiliary Lights (Parking, Tail & Instrument) (1950 only)—14 ampere. On circuit breaker.
Dome & Stop (1950 only)—14 ampere. Next to fuse listed above.
Dome (1951)—14 ampere. On circuit breaker bracket.
Clock—2 ampere. In clock feed wire.
Overdrive—30 ampere. On relay on dash under hood.
Direction Signal—15 ampere. In feed from ignition switch to flasher.
HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), No. 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay.
Horn Current—13 amperes (high pitch), 14 (low).
Horn Relay: Ford No. ('50) 7RA-13853-B, ('51) 7RA-13853-A.
►*CAUTION—Use only Ford type relay No. 7RA-13852-B with TAN plastic cover on 1950 cars. If 1951 relay No. 7RA-13853-A with BLACK plastic cover is used, shock at button may result when blowing horn.*
Contact Gap—.015-.025".

ENGINE

ENGINE SPECIFICATIONS: Own 8BA. Eight cylinder "L" head, 90° Vee type with both cylinder banks and crankcase cast Enbloc.
Bore—3.187". **Stroke**—3.75".
Displacement—239 cu. ins. **Rated HP**—32.5.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.8-1 cast-iron heads.
Compression & Vacuum Reading—*See Tune-Up.*
CYLINDER HEAD & TIGHTENING TORQUE: *See Ford Special Data.*
CYLINDER SLEEVE: Cast iron dry type cylinder sleeves furnished for replacement service.
OIL PAN REMOVAL: *See Ford Special Data.*
►*NOTE—1951 Oil Pan cannot be interchanged with earlier models.*
PISTON: *CAUTION*—**Two types used:**
"49T" U-Slot Pistons (Before Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, steel strut, cam ground, dome head type.
CAUTION—49T pistons must be used in ALL steel sleeve engines. Use "29A-" piston rings with this piston. Do not use 49T pistons to replace Autothermic pistons.
"8BA" Solid Skirt Pistons, AUTOTHERMIC type (After Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, "Autothermic" type, 1/16" offset pin.
CAUTION—8BA Autothermic pistons must not be used on steel sleeve engines. Can be used to replace 49T pistons in sets on other engines. Use "8BA-" piston rings with this piston (29T rings must not be used).
►*CAUTION—Ford and Mercury Pistons and Rings are not interchangeable.*
Weight—13.12 ozs.
Removal—Pistons and rods removed from above.
Clearance—See Fitting Pistons.
Replacement Pistons ("49T-"): Std., .005, .020", .030", .040", .060" Oversize.
Replacement Pistons ("8BA-" Autothermic): Std. (4 grades with limits 3.1879-3.1891 in .0003" steps for selective fitting), .0025", .020", .030", .040", .060" OS.
Fitting Pistons ("49T-"): Use .50" wide feeler stock of correct thickness (as listed below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull to withdraw feeler 6-10 lbs.
Feeler Thickness—.002" New Piston in New Plain Bore, **.003"** New Piston in New Sleeve, **.004"** New Piston in Worn Bore, **.005"** Worn Piston in Worn Bore.
Fitting Pistons ("8BA-" Autothermic): Use feeler gauge .0015" x ½" on thrust side of piston with 6-12 lb. pull.
Installing Pistons ("8BA-" Autothermic): Locating mark (small indention) on head of piston above one piston pin hole, to front on all pistons.
►*CAUTION*—Necessary since pin offset 1/16" and must be located on thrust side of bore.
PISTON RINGS: 2 compression, 2 slotted oil rings (lower oil ring below pin). Upper oil ring groove drilled with oil drain holes, lower groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0915-.0920"	.007-.017"①	.0015-.0035"②
Compr. (#2)	.0915-.0920"	.007-.017"①	.001-.003"③
Oil (#3, 4)	.1545-.1550"	.007-.017"①	.001-.003"③

Worn Limits—① .035" ② .0045" ③ .005".
Replacement Rings: Snap type, Expander type, or Steel Section type ring sets furnished in the following sizes: Std., .020", .030", .040", .060" Oversize.
See Ford Special Data.
►*CAUTION—Use "29A-" rings on first type 49T Pistons, "8BA-" rings on 8BA Autothermic Pistons.*
PISTON PIN: Diameter .7504" (maximum). Floating type (lock ring in piston at each end). Pin hole in connecting rod bronze-bushed.
Pin Fit in Piston—.0005" (new), .0015" (worn limit).
Pin Fit in Rod Bushing—.0002-.0005" (new), .0015" (worn limit).
Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" OS (yellow).
CONNECTING ROD: Length 7". **Weight** 18.7 ozs.
►*CONNECTING ROD PRODUCTION CHANGE*—Beginning Engine No. 8BA-628866 through 8BA-629940 and all Engines after 8BA-641087, new type connecting rod used with 5/64" squirt hole drilled on an angle into the side of the bearing flange web meeting a 3/16" hole in connecting rod bearing flange.
►*CAUTION—These new connecting rods should be used only on engines with neoprene seals on intake valve guides and increased capacity oil pump.*
Crankpin Journal Diameter—2.1390". Maximum wear limits—out-of-round .0015", Taper .001".
Lower Bearing—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves interchangeable.

ENGINE

CONTINUED FROM PRECEDING PAGE

Clearance—.0005-.003" (new), .005" (worn limit).

►*NOTE—Replace bearing shells less than .0745" thick.*

Side Play—(Early type rod) .006-.014". Late type rod .006-.020".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in rod and cap.

►*NOTE—Self-locking connecting rod nuts used. Tighten to 40-45 ft. lbs. Palnuts not required.*

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

Installing Rods—Rods with squirt hole installed with squirt hole toward valve push rod assembly.

CRANKSHAFT: 3 bearing. Integral counterweights.

►*SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning. Always use new plugs if old plugs disturbed and peen or stake crankshaft to hold plugs in place securely.*

Journal Diameters—2.4990" (all bearings). Max. wear limits—Out-of-round .0015", Taper .001".

Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.

Clearance—.000-.003" (selective fit, crankshaft to turn free). Worn limit .005" maximum.

►*NOTE—Replace main bearing shells less than .0835" thick.*

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in block and cap.

Replacement Bearings: Standard size and .002", .010", .020", .030" Undersize. Rear mains also furnished .015" Oversize in Overall Length for taking up endplay wear.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.

Endplay—.002-.006" (new), .008" (worn limit).

CAMSHAFT: *CAUTION—Two different types used, each type requires different tappet clearance.*

8BA-6250—All engines before No. 8BA-622468 and partial production after this number.

8BA-6250-B—Partial production beginning Eng. No. 8BA-622468 and service replacement of first type. Has new cam contours for quieter valve operation.

►*CAMSHAFT IDENTIFICATION*—New 8BA-6250-B Camshaft stamped "B" on forward end (first type not marked), and engine marked **"GAP, in- .014", ex- .018"** on top of block under valve cover at center.

►*ENGINE MARKING CAUTION*—Gap mark (see above) must be added when "B" shaft installed on unmarked block, or removed if first type shaft installed on marked block.

Bearing Diameter—1.7985" (replace bearing if diameter greater than worn limit 1.8015").

Bearings—Steel-backed, babbitt lined bushings.

Clearance—.001-.002".

Replacement Bearings: Standard size and .010", .015" Undersize (US. bearings require finish reaming).

End Thrust: Taken by front end of camshaft. Adjust by replacing cover. **Endplay**—.007-.016".

Timing Gears: *CAUTION—Two types camshaft gears used:* Aluminum (first), Fibre (later).

Crankshaft Gear—Cast Alloy Iron.

►*CAUTION—Camshaft gear teeth REVERSE (L.H.) providing one-way thrust to camshaft for silencing backlash.*

►*INTEGRAL HUB CAMSHAFT GEAR—See "Camshaft" in Ford Special Data.*

Replacement Camshaft Gears—Std. .006", .012" OS.

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
All Valves	1.51"	.3410"①	4.750"
	Seat Angle	**Lift**	**Stem Clearance**
All Valves	45°	.292"	.0015-.0035"②

Wear Limit—①—.3375". ②—.005" Int., .006" Exh.

►*1951 VALVE ASSEMBLY CHANGE NOTE: New rotatable valve assembly used on all 1951 engines. See "Valve System" in Ford Special Data.*

►*NOTE—Valves are straight-stemmed type operating in one-piece valve guides.*

►*NOTE*—Late type valve assemblies can be used in earlier 100 H.P. engines.

►**Sticking Valve Correction**—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake guides.

►*INTAKE VALVE SEAT CHANGE NOTE*—(Except early 1950 engines). Intake valve seats discontinued in all 8BA engines.

Valve Guides: One-piece type positioned and retained by "C" washer. Inside diameter .344", Outside diameter 1.031". Length 2.20". NOTE—Rubber seal used on intake guide.

Valve Lifters: Barrel type in guide holes in block.

Diameter—.9992" (replace if worn to less than .9977"). Length limit after resurfacing 1.700".

Clearance—.0007-.0016" (new), .003" (worn limit).

Valve Springs: Coated springs used.

Spring Pressure—37-40 lbs. (closed), 78-80 (open).

Spring Test—40-43 lbs. at 2.13". Free length 2.41".

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—Different settings required for each type camshaft.*

►**First type Camshaft No. 8BA-6250①**
(no markings on Engine or Camshaft)

Intake—.010-.012", **Exhaust**—.014-.016", Cold.

①—Before Eng. No. 8BA-622468—Partial production after this number.

►**Later type Camshaft No. 8BA-6250-B②**
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)

Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.

②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.

③—On top of block at center under valve cover.

►*CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.*

Adjustment—*See "Valve System" in Ford Special Data*

Valve Timing: See Camshaft Setting above.

Early Camshaft No. 8BA-6250

Intake Valves—Open at TDC. Close 44° ALDC.

Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

Late Camshaft No. 8BA-6250-B

Intake Valves—Open 5° BTDC. Close 44° ALDC.

Exhaust Valves—Open 48° BLDC. Close 3° ATDC.

Valve Timing Check—**(8BA-6250 Camshaft)** Intake valve opens TDC.

(8BA-6250-B Camshaft) Intake valve opens 5° BTDC. No timing marks provided other than Ignition mark (2° BTDC) on vibration dampener.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear. Piston pins and valve lifters lubricated by splash. Oil pump mounted in crankcase at rear of engine.

Crankcase Capacity—4 quarts (5 quarts when changing oil filter).

Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: In pump body. Not adj.

Spring Tension—12 lbs. compressed to 1.14".

Oil Pump: Gear type (two types: one equipped with spur gears, second with helical gears).

Oil Filter: On left cylinder head.

Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pan Removal: *See Ford Special Data.*

Oil Pressure Gauge: King-Seeley Electric.

Dash Unit—Ford No. (1950 Red Pntr.) 8A-9273-B, (1951 White Pntr.) 1A-9273-B.

Engine Unit—Ford No. 41A-9278.

See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter in oil filler cap (inlet).

COOLING

Cooling System: Pressure type with relief valve in filler cap and two belt-driven pumps (one for each bank) with re-circulating by-pass.

Capacity—21 quarts.

Pressure Valve—In radiator filler cap. Ford No. (Except with Fordomatic) 26H-8100-B. Opens at 3½-4½ lbs. (With Fordomatic) 1M-8100-B. Opens at 6½-7½ lbs.

Water Pumps: Two used. Packless type.

Fan Belt Adjustment—Loosen 2 fan mounting bracket bolts, raise fan up until side movement of belt midway between fan and crankshaft pulleys is ½".

Generator (& Water Pump) Belt Adjustment—*See GENERATOR.*

Thermostats: Two Used (one in each head water outlet). Two makes used.

1950 Thermostats

Part No.	Starts to open
8BA-8575-B	157°-162°
8BA-8575-C①	167°-172°
8BA-8575-D	152°-157°
8RT-8575-A	148°-153°

1951 Thermostats

1BA-8575-A	157°-162°
1BA-8575-B①	177°-182°

①For use with permanent anti-freeze.

Temperature Gauge: King-Seeley Electric type.

Dash Unit—Ford No. (1950 Red Pntr.) 8A-10883-B, (1951 White Pntr.) 1A-10883-B.

Engine Unit—Consists of "Sender" (stamped 224), and "Switch" (stamped 217).

Sender—Ford No. 8A-10884, installed (1950) in left bank, (1951) right bank.

Switch—Ford No. 8A-10990, installed (1950) in right bank, (1951) left bank.

See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½ CF-TS, Ford No. 8A-7563A. Single plate, semi-centrifugal, dry disc type.

See Clutch Section for complete data.

Facings—Thickness .125". Outside diameter 9½".

Pedal Adjustment: 1" free travel. Lock nut and adjusting nut at release lever end of release rod.

Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

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TRANSMISSION

SYNCHRO-MESH

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.
►*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*
►**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*
Transmission Control: Steering column mounted shift
See Transmission Section for complete data.
Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Models—Optional Equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated kickdown.
AS1-R10E—1950 (Except Convertible & Sta. Wgn.).
AS4-R10E—1951 (Except Convertible & Sta. Wgn.). Same as AS1-R10E except no lockout switch.
AS3-R10E—1950-51 Convertible & Sta. Wgn. Same as AS1-R10E except solenoid is mounted under overdrive housing and connected to pawl by linkage.
Solenoid—Ford No. 8M-6916-A (8A-6916-C is rubber coated for Convertible & Sta. Wgn.).
Control Relay—Ford No. 8M-6915.
Overdrive Fuse—30 amperes. On relay.
Lockout Switch—Ford No. 6917-A, (1950).
Throttle Kickdown Switch—Ford No. 8A-6818-B.
Removal: Same as for Std. Transmission (above).
►**Overdrive not engaging, and Prolonged shorting out of Ignition on Kick-down Corrections**—*See "Ford, Lincoln, Mercury Overdrive in Transmission Section.*

FORDOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission, hydraulic control, mechanical parking lock.
►*LINKAGE PRODUCTION CHANGE*—Throttle Linkage changed on later cars for quieter and more efficient operation. Can be installed on earlier cars.
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15000 miles. **Use only Automatic Transmission Fluid, Type A.**
Capacity—Approx. 9 qts.
Checking Oil Level—With transmission selector lever in "Neutral," run engine approx. four minutes at idle speed. Clean floor mat and lift right side to expose plate in floor boards, remove plate. When engine and transmission are at normal operating temperature, move the selector lever through all ranges to assure distribution of oil throughuot the transmission. Clean all dirt away from fluid level indicator cap and remove indicator. Wipe indicator and insert in transmission making sure that it is seated and locked. Remove indicator and check level. Add fluid to bring level to the "full" mark on the indicator. Replace indicator and tighten it properly. Replace plate and floor mat.
►*CAUTION—Do not fill above FULL mark.*
Draining & Refilling—*See "Ford Fordomatic" in Transmission Section.*
Linkage Adjustment—*See "Ford Fordomatic" in Transmission Section.*
Removal: *See "Ford Fordomatic" in Transmission Section.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.
See Universals Section for complete data.
►*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive **with separate carrier.** Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).
See Rear Axle Section for complete data.
►**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*
►**Ring & Pinion Gear Production Change**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*
Ratios
Standard Transmission—3.73-1 (41-11).
Overdrive Transmission—4.10-1 (41-10).
Fordomatic Transmission—3.31-1 (43-13). (Optional) 3.54-1 (39-11).
Backlash—.005-.008". *Screw adjustment.*
Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.
►**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*
►*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*
Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).
Wheel Bearing Adjustment: None.

STATION WAGONS

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive **(separate carrier not used).** Axle ends flanged—(no separate hub). Wheel bearings are sealed-ball pre-lubricated type.
►*NOTE—AXLE NOT SAME AS FORD PASSENCER CAR, similar to Mercury.*
See Rear Axle Section for complete data.
Ratio (Standard)—3.91-1 (43-11).
Ratio (with Overdrive)—4.27-1 (47-11).
Ratio (with Fordomatic)—3.54-1 (39-11).
Backlash—.003-.008". *Shim adjustment.*
Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.
Axle Shaft Removal: Same as Ford Pass. Car.

SHOCK ABSORBERS

Front—Ford No. ('50 Pass. Cars) 8A-18045-A. ('51 Pass Cars) 1A-18045-A2. Ford No. ('50 Sta. Wagon) 8A-18045-B. ('51 Sta. Wagon) 1A-18045-D.
Rear—Ford No. ('50 Pass. Cars) 8A-18080-A. ('51 Pass. Cars) 1A-18080-A. Ford No. ('50 Sta. Wagon) 8A-18080-B. ('51 Sta. Wagon) 1A-18080-B.
Direct acting, hydraulic types. Two makes are used and are interchangeable.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.
See Front Suspension Section for complete data.
►**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*
►**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*
►**Front Spring Production Change & Installation Caution**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*
Kingpin Inclination—5¼° crosswise.
Caster (Pass Cars)—Pos. ½° to Neg. 1°.
(Station Wagon)—Neg. ¼° preferred, Limits Neg. ¼° to Neg. 1¾°.
NOTE—½° max. variation between wheels.
Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°. NOTE—¼° max. variation between wheels.
Toe In—1/16" to 1/8".

STEERING GEAR

Gemmer Design (305), Ford Make—Worm & Roller.
See Steering Gear Section for complete data.
►**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Diameter: Front wheel 1.128" (hone limit 1.132"). Rear Wheel: .878" (hone limit .880").
Drums—Diameter 10" (11" Sta. Wagon rear drums).
Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:
Front—11". (Stn. Wgn. 11 15/16").
Rear—11". Pri., 11 3/4" Sec. (Stn. Wgn. 11 15/16" Pri. & Sec.).
Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).
Hand Brake: See Service Brakes (above).
►**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top: Hydro-Lectric type
See Miscellaneous Section for complete data.
Windshield Wipers: Vacuum Link & Crank Arm Type.
See Miscellaneous Section for complete data.

HOOD ASSEMBLY

1947-51 MODELS

HOOD REMOVAL: Lift hood. At each hood hinge, remove two capscrews from inside hood and two additional capscrews from outside (on lower edge of hood), remove hood props if used, lift hood off.

HOOD REPLACEMENT: Place hood in position on hinges, install one inside and one outside capscrew in each hinge (use punch to align screw holes), then install remaining capscrews in each hinge, install hood props (first type hinge only), check hood alignment and adjust for proper fit by loosening hood hinge capscrews and shifting hood on hinges (screw holes are slotted to permit this adjustment).

Hood Hinge Replacement Note—Whenever hood hinges require replacement, install new type hinges with heavier coil springs and larger (⅜") mounting studs. Hood props not required with this hinge.

NOTE—1949-50 Hoods not interchangeable with earlier type hoods.

TIGHTENING SPECIFICATIONS

1947-48 MODELS

NOTE—Torque figures given below are for threads which are clean and dry. CAUTION—If threads are oiled, reduce torque approximately 10%.

	Ft.Lbs.	In.Lbs.
Cylinder Head Bolts①	40-50	480-600
Spark Plugs	5-10	60-120
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mtg. Bolts	36-40	432-480
Camshaft Sprocket Bolts	35-40	420-480
Camshaft Retaining Nut	30-35	360-420
Timing Gear Cover Bolts	14-20	168-240
Filler Block Screws	14-16	168-192
Int. & Exh. Manifolds	31-35	372-420
Oil Pan Screws	10-14	120-168
Water Pump Mtg. Bolts	12-15	144-180
Water Outlet on Cyl. Head	20-25	240-300
Starter Mtg. Bolts	20-25	240-300
Generator Bracket Mtg. Bolts	31-35	372-420
Vibration Dampener Bolt	100-130	1200-1560
Engine Mountings		See Note
Steering Wheel Nut	10-15	120-180
Steering Gear Mtg. Bolts	25-30	300-360
Front Shock Mtg. Nuts	10-15	120-180
Rear Shock Mtg. Nuts	25-30	300-360
Rear Spring "U" Bolts	45-55	540-660
Wheel Mtg. Nuts or Bolts	85-90	1020-1080
Radiator Mtg. Nuts	4-7	48-84
Rear Axle Diff. Carrier	38-42	456-504
Rear Axle Shaft Nut②	160 Min.	1920

①—Tighten cold and recheck with engine at 150°.
②—Minimum Torque. Turn nut further to line up cotter pin holes in nut and shaft.

Engine Mounting Torque Note—Tighten front and rear Support Insulator nuts (1/2-20-NF-3) to 38-43 ft.lbs. Tighten support insulator-to-frame nuts (front) and support insulator-to-crossmember nuts (rear) to 15-20 ft.lbs. Tighten rear support-to-transmission bolt to 18-23 ft.lbs.

Palnut Tightening Note—Spin nuts down finger-tight, then tighten additional ¼-⅓ turn to lock.

1949-51 MODELS

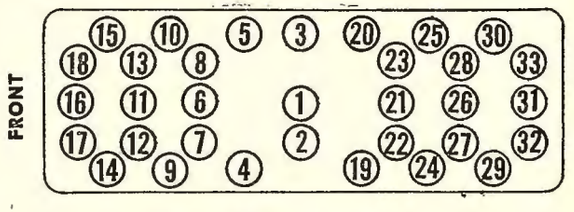
	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	30-35	360-420
Spark Plugs	30	360
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mounting Bolts	35-40	420-480
Camshaft Sprocket Nut	35-40	420-480
Camshaft Thrust Plate	12-15	144-180
Timing Gear Cover	12-15	144-180
Eng. Front End Plate 5/16"	12-15	144-180
Eng. Front End Plate 7/16"	40-50	480-600
Int. & Exh. Manifolds	30-35	360-420
Oil Pan Screws	12-15	144-180
Water Pump Mtg. Bolts	12-15	144-180
Vibration Dampener Bolt	100-130	1200-1560
Steering Wheel Nut	10-15	120-180
Steering Gear Mtg. Bolts	25-30	300-360
Pitman Arm Nut	110 min.	1320
Rear Spring "U" Bolt Nuts	45-55	540-660
Wheel Mtg. Nuts or Bolts	85-90	1020-1080
Differential Bearing Caps	38-42	456-504
Rear Axle Shaft Nut	160 min.	1920

CAUTION—Torque figures given are for clean and dry threads. If threads oiled, reduce torque approx. 10%.

CYLINDER HEAD

CYLINDER HEAD INSTALLATION: Use a Torque Indicating Wrench to tighten cylinder head bolts, tighten in correct sequence as shown in diagram. Heads should be tightened cold and rechecked after engine temperature reaches 150°F.

Tightening Torque: See Tightening Specifications.



ENGINE REMOVAL

1947-51 MODELS

ENGINE REMOVAL: Proceed as follows:

1. Remove Hood (see Hood Assembly above).
2. Drain cooling system.
3. Disconnect windshield wiper hose at manifold (or at vacuum pump), disconnect fuel line at point where fuel pump flexible line connected to tubing at frame, disconnect exhaust pipe at manifold.
4. Remove Radiator (see Radiator removal below).
5. Remove Battery. Disconnect cables, lift out.
6. Disconnect Wiring. Disconnect ground cable near left front engine mounting, disconnect wiring at starter, generator, and distributor.
7. Remove Air Cleaner.
8. Disconnect Temperature Gauge by removing bulb from cylinder head (Frazer), disconnecting lead (Kaiser). Disconnect oil gauge by disconnecting line at flexible hose connection on left side of engine (Frazer), disconnecting lead at engine unit (Kaiser).
9. Disconnect throttle linkage at carburetor.
10. Disconnect heater inlet and outlet hoses.
11. Remove transmission (and overdrive if used). See Transmission and Overdrive Removal on car pages.
12. Disconnect clutch throw-out linkage.
13. Install lifting bracket at #7 and #28 cylinder head bolts—see cylinder head diagram (remove distributor if required). Raise engine slightly with hoist.
14. Disconnect front engine mountings.
15. Hoist engine from car with engine turned at slight angle to frame with front end of engine raised to clear shroud. *CAUTION*—Do not damage engine accessories when lifting engine from car.

ORIGINAL BORE & PISTONS

1947-51 MODELS

BORE & PISTON SIZES: Engines originally equipped at factory with special oversize pistons may be identified by code letter following engine number: "N"—Pistons are .020" Oversize. "AN"—Pistons .020" Oversize. Main and connecting rod bearings Undersize (See Original Bearing Sizes). "NX"—Pistons .020" Oversize. Main bearings are Undersize (see Original Bearing Sizes following).

PISTONS

1947-51 MODELS

PISTON IDENTIFICATION: Two types of aluminum alloy pistons used which can be identified as follows:

►*CAUTION—Piston weight different on each type.*

Strut Type Piston—Has wide strut embedded within skirt at each piston pin boss and drilled oil drain holes in both #3 and #4 ring grooves.

T-Slot Type Piston—Has horizontal slot in lower (#4) ring groove and short vertical slot on one side of piston skirt. #3 oil ring groove has drilled oil drain holes.

1947-51 MODELS

REPLACEMENT PISTONS: See "Piston Identification" for types used. Each type piston furnished in following sizes:

	Kaiser-Frazer Part No.	
Piston Size	Strut Type	T-Slot Type
Standard	200108	201947
.005" Oversize	200357	201949
.010" Oversize	200358	201950
.020" Oversize	200359	201951
.025" Oversize	202484	202487
.030" Oversize	200360	201952
.040" Oversize		203751
.050" Oversize		203752
.060" Oversize		203753

►*CAUTION—Piston weight different on each type.*

PISTON RINGS

1947-51 MODELS

REPLACEMENT RINGS: Rings furnished as single rings (12 Compression, 12 Oil Rings required), or in complete sets (1 Set per car) as follows:

	Single Rings	
Ring Size	Compression—Part No.	—Oil
Standard	200111	200112
.010" Oversize	200361	200364
.020" Oversize	200362	200365
.030" Oversize	200363	200366

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PISTON RINGS

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Ring Sets

Ring Size	Cyl. Size ①	Part No.
Standard	Std. to .009" OS	203145
.020" Oversize	.010" to .029" OS	203146
.040" Oversize	.030" to .049" OS	203147
.060" Oversize	.050" to .069" OS	203148

①—Use ring indicated for oversize cylinders within this range (check End Gap).

ORIGINAL BEARING SIZES

1947-51 MODELS

MAIN & CONNECTING ROD BEARING SIZES: Engines originally equipped with special undersize main and connecting rod bearings may be identified by code letter following engine number:
"A"—Main & Connecting Rod Bearings .010" Undersize.
"X"—Main Bearings .002" Undersize.
"AN"—Main & Connecting Rod Bearings .010" Undersize and Pistons Oversize (see Original Bore and Pistons).
"NX"—Main Bearings .002" Undersize and Pistons Oversize (see Original Bore and Pistons).

CRANKSHAFT & MAIN BEARINGS

1947-48 MODELS

FRONT MAIN BEARING CHANGE: Two types of front main bearing used (flanged & unflanged). This bearing takes end thrust (see Endplay Adjustment).
1)—Front Main Bearing (Flanged Type). End thrust taken by flange on bearing.
2)—Front Main Bearing (Not Flanged). End thrust taken by thrust washer installed in front of bearing.

FRONT MAIN BEARING ASSEMBLY
Flanged Type Bearing①

K-F Part No.		K-F Part No.	
200070	Bearing Std.	200065	Thrustwasher
201928	" .002" US.	200067	.002" Shim
202062	" .004" US.	200068	.008" Shim
200337	" .010" US.	200066	Thrust Plate

①—Original type Bearing Cap used with flanged bearings not furnished for service (use No. 202689).

Bearing without Flange

202686	Bearing Std.	202685	Thrustwasher
202687	" .002"US.	202684	" pins (3)
202691	" .010" US.	200065	Thrustwasher
202689	Bearing Cap	200067	.002" Shim
202690	" Cap Dowel	200068	.008" Shim
		200066	Thrust Plate

Replacement Note—Both types of front main bearings are interchangeable. Flanged type can be used to replace unflanged type by removing thrustwasher and dowel pins.

1947-51 MODELS

CRANKSHAFT ENDPLAY ADJUSTMENT: Requires removal of radiator, vibration dampener, timing gear cover, timing gears and chain (remove as an assembly), thrustplate, and shims.

NOTE—Endplay can be checked at flywheel (with clutch pan off) without further disassembly.

Endplay Adjustment: *CAUTION*—Two thrust washers (1 at each side of front bearing) must be in place when checking endplay. With front end of crankshaft disassembled as described above, re-install thrust plate **(do not install shims at this time)**, install checking sleeve No. KF-28 on end of shaft, secure sleeve on shaft with vibration dampener bolt and lockwasher. Mount dial indicator at front of engine with button against front end of shaft. Pry shaft to rear, set indicator at zero and then pry shaft forward, reading will be endplay. Select shim pack (shims furnished .002" and .008" thick) so that when installed, endplay will be .004-.006".

►*CAUTION—Make certain that clearance exists between slinger on rear end of crankshaft and upper and lower filler blocks in rear end of crankcase.*

1947-51 MODELS

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket). Rear filler blocks (additional **upper filler block guard** in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger. Filler blocks can be removed and replaced without disturbing crankshaft as follows:

Front Filler Block (Lower) Servicing: Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block. When installing filler block, first install oil pan side gaskets (No. 200266), install filler block (use Perma-tex), install new end gasket (No. 200267) on block.

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal). Remove and discard old gasket or seal. Install new seal (no. 204654) in same manner as described below for Rear Filler Block (Upper) Guard. Install lower filler block **after** upper filler block guard has been installed.

Rear Filler Block (Upper) Guard Servicing: Guard is seated in groove in crankcase and can be "rotated" out without disturbing crankshaft after lower filler block removed. Remove and discard old gasket or seal, clean out seal groove. Install new graphite impregnated seal (no. 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard). **Do not use shellac or sealing compound in groove.**

►*CAUTION*—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft. If necessary, seal can be built up using 1/32" thick gasket material, 3/16" wide, as shims shellacked to groove in block or guard behind seal.

CAMSHAFT & BEARINGS

1947-51 MODELS

CAMSHAFT CHANGE: Two different camshafts are used (camshaft changed when fuel pump mounting location changed) and can be identified as follows:

Early Cars—Fuel pump mounted at rear of engine.
Later Cars—Fuel pump mounted at front of engine.

Replacement Camshafts for All Engines

K-F Part No. 200113.....Fuel Pump at Rear
K-F Part No. 203017.....Fuel Pump at Front

1947-48 MODELS

CAMSHAFT REMOVAL: Camshaft can be removed with radiator off and engine in car as follows:

1. Remove timing gears (remove both gears and chain as an assembly). This requires removal of vibration dampener and pulley, timing gear cover.
2. Remove cylinder head. 3. Remove fuel pump.
4. Remove oil pan, oil pan return tube & oil pump.
5. Lift valves, using valve spring lifter tool C-482 (see Note below), block valves up by inserting a clothespin or block of wood under each valve head.

NOTE—Remove right front tire and wheel and take off splash shield under fender for access to valves.

6. Block up Valve Lifters (lift each lifter up by hand and fasten in upper position with a wire).
7. Remove Camshaft Thrustplate by taking out two screws retaining thrustplate on crankcase.
8. Pull camshaft out through front of engine.

Camshaft Bearing Replacement Note—Requires removal of engine from car for access to plug at rear of block which must be removed.

TAPPET CLEARANCE ADJUSTMENT

1947-51 MODELS

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below). Remove right front wheel and access cover in fender splash shield for access to valve compartment. Remove spark plugs so that engine can be turned over by moving fan or fan belt. By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment.**

Valve Tappet Adjustment Order
(numbered from FRONT of engine)

Fully Raise Valve	Then ADJUST Valve:
Nos. 1 and 3	Nos. 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos. 2 and 6	Nos. 7 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 5	Nos. 8 and 9
Nos. 7 and 11	Nos. 2 and 6

Tappet Clearance—Prior to Engine No. 10769, tappet clearance should be .010" Intake, .014" Exhaust. Beginning Engine No. 10769 tappet clearance is .014" for both Intake and Exhaust valves.

VALVE SYSTEM

1947-48 MODELS

VALVE LIFTER REMOVAL: Lifters can be removed **on some cars,** without disturbing head, as follows: Remove splash shield under right front fender for access to valve compartment. Remove valve spring seat lock (retaining pin on early cars, split type locks on later cars). Turn tappet clearance adjusting screw down as far as possible, remove valve spring. Working through spark plug hole, lift valve up with a wire to provide clearance. Turn tappet clearance adjusting screw up free of the lifter barrel, tilt adjusting screw and locknut to clear valve stem and lift these parts out of the lifter barrel. Raise lifter barrel up until lower end clears hole in block, then tilt barrel and remove.

►*NOTE—If lifter barrel cannot be removed in this manner, remove cylinder head and remove valve.*

OIL PAN REMOVAL

1947-51 MODELS

OIL PAN REMOVAL: Raise front end of car and support it securely on stands. Disconnect steering drag link at idler arm on frame, turn wheels to right and work drag link clear of oil pan. Drain oil, remove oil pan capscrews and lockwashers, slide pan to rear.

►INSTALLATION NOTE—Lower Filler Blocks (front and rear) must be removed to install new oil pan side gaskets. See "Front & Rear Filler Blocks" under Crankshaft & Main Bearings (above) for data.

OIL PUMP

1947-51 MODELS

OIL PUMP SERVICING: Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling. Service pump as follows:

Disassembly—Take out cotter pin and remove screen float assembly. Remove cover and gasket. Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear. Remove idler gear (remove idler shaft if required). Take off lower drive gear (press fit and keyed to shaft).

Oil Pump Clearances—Check as follows:

1)—Pump Body Bushing: if over .005" clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to .500-.501".

2)—Pump Shaft: shaft diameter .4990-.4985".

3)—Lower Drive Gear: end of gear should be .001-.006" beyond gasket seat on pump body.

4)—Upper Drive Gear: .002-.004" clearance between underside of gear and upper end of pump body. Controlled by pressing lower drive gear on shaft until this clearance obtained.

NOTE—Cover plate should be replaced if worn from contact with gears, or if cracked.

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose). Replace by using drift inserted in distributor drive shaft bore from top of block. Install new bushing from below (must be flush with bottom of block).

Reassembly—Press upper drive gear on shaft with pin hole at right angles to tongue on shaft. Insert new pin and peen ends flush with gear. Install shaft and gear in pump body. Press lower drive gear on shaft (with key in place) until .002-.004" clearance obtained between upper drive gear and upper end of pump body. Press idler gear shaft in body, install idler gear. Install cover using new gasket and pin oil screen float assembly on cover. Check shaft and gears—must rotate freely when turned by hand.

Oil Pump Installation—Set #1 piston at top dead center. Insert distributor main drive shaft from top of block. Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx. parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut. Remove distributor shaft for cyl. head installation.

►***CAUTION—Check Ign. Timing after pump installed.***

RADIATOR

1947-48 MODELS

RADIATOR REMOVAL: Drain water, disconnect hose connections. Disconnect two tie rods at top of radiator. Remove nuts on mounting studs underneath radiator, lift radiator up and out.

1949-51 MODELS

RADIATOR REMOVAL: Drain water, disconnect hose connections. Take out radiator-to-shroud screws, 6 total (3 each side). Lift core out, tilting upper end to rear as core being raised.

PROPELLER SHAFT

1947-51 MODELS

CENTER SUPPORT BEARING: Consists of a ball bearing on rear end of front propeller shaft mounted in rubber in steel plate mounted on frame.

Removal & Disassembly—Disconnect front and intermediate universal joints, take off nuts on center support frame mounting bolts, remove front shaft and support bearing assembly. Clamp front shaft in a vise, remove bolt, lockwasher, and plain washer on rear end of shaft (in universal joint companion flange), pull companion flange using Puller C-452. Remove rear dust shield. Pull support plate off bearing insulator, remove bearing insulator. Use jaw type puller (KF-56) and pull bearing off shaft, remove front dust shield.

►***CAUTION—Do not wash bearing in gasoline or solvent.***

Reassembly—Install front dust shield and bearing (use driver KF-11) on splined end of front propeller shaft (bearing must support shield firmly). Place rubber insulator over bearing (small diameter to rear). Coat outer surface of insulator with liquid soap and slip support plate in place over insulator (flanged end of sleeve to front, insulator bottomed against bead on inside of sleeve). Install rear dust shield, companion flange, flat washer, lock washer, and bolt. Tighten bolt until flange and dust shield bottom against shaft shoulder (25-30 ft.lbs. torque).

Bearing Support Installation: When installing front propeller shaft and support bearing assembly in car, install washers and insulators on each support stud on frame cross-member in the following order: Spacer, Bushing, Front Support Insulator (fluted end to rear), Front Support Washer (has large hole), Support Bearing Plate, Rear Support Insulator (fluted end forward), Rear Support Washer (has small hole), and nut (tighten to 15-20 ft. lbs.).

►***CAUTION—Install center bearing support on frame studs so that sleeve in which bearing seated slopes downward toward the rear to provide correct propeller shaft angularity.***

HOOD REMOVAL & REPLACEMENT: *See "Hood Assembly" in Frazer Shop Notes.*

MODEL IDENTIFICATION

STARTING SERIAL NUMBERS

	Model	Serial Numbers
1947 Frazer	F-47	F-47-001001 Up
1947 Frazer Manhattan	F-47C	F-47C-1000001 Up
1948 Frazer	F-485	F-485-001001 Up
1948 Frazer Manhattan	F-486	F-486-001001 Up

SERIAL NUMBER: On left front door hinge post.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Nameplate on left side of crankcase. NOTE—Numeral following Engine Model Designation (first part of Engine Number) indicates Engine Plant as follows: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes)** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Frazer Shop Notes.* NOTE—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 115-125 lbs. **(6.86-1 Heads).** 120-130 lbs. **(7.3-1 Heads)** at cranking speed of 140 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.

►*NOTE—7.3-1 Heads marked by "73" stamped on Head directly above engine number pad on block.*

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .032"
Plug Type—Auto-Lite A-5 (normal driving), A-7 (for short runs or to correct hard-starting in cold climates). 14 mm. metric type.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle or Dwell—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: TDC. (at Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—Mark "DC" on flywheel (first cars), on vibration dampener (beginning Eng. No. 17160).
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—¾-1¼ turn open—one screw (WA1 Carb.), 1¼-2¼ turns open—one screw (W1 Carb.), 1-1¾ turns open—2 screws (WCD Carb.). Turn screws out for richer mixture.
Idle Speed—550 RPM.
Float Level (WA1 Carb.)—5/16" (610S), ⅜" (622S with first Float and Inlet Valve), ½" (622SA, SB & 622S with late type Float and Inlet Valve). Measure from top of projection on bowl cover to top of soldered seam on free end of float with bowl cover assembly inverted.
Float Level (W1)—½" from top of float at free end to gasket seat on cover.
Float Level (WCD Carb.)—9/64" (685S with first type Inlet Valve), 1/16" (685S & 685SA with later type Inlet Valve) from top of each float to gasket seat on cover with valve closed (assembly inverted).
Accelerating Pump—Lower hole (medium) Normal. NOTE—Pump on 574S has no seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. (for pump mounted at rear of engine), 3-4¼ lbs. (pump mounted at
►*CAUTION—Pump pressure must not exceed 4½ lbs.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

►**VALVE TAPPET CLEARANCE:** *CAUTION—Two settings used.*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.

►**Adjustment Procedure**—*See Frazer Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Douglas or Mitchellock. Frazer No. 201354 (Before Frazer No. F47-36877, Manhattan No. F47C-1033604), No. 203186 (After Above Nos.).
Lock Cylinder—Kaiser-Frazer No. 201898 (with key).

COIL: Auto-Lite Model IG-4093. On left side of engine opposite distributor.
Ignition Current—3 amperes idling, 5 amperes at 6.4 volts (stopped).

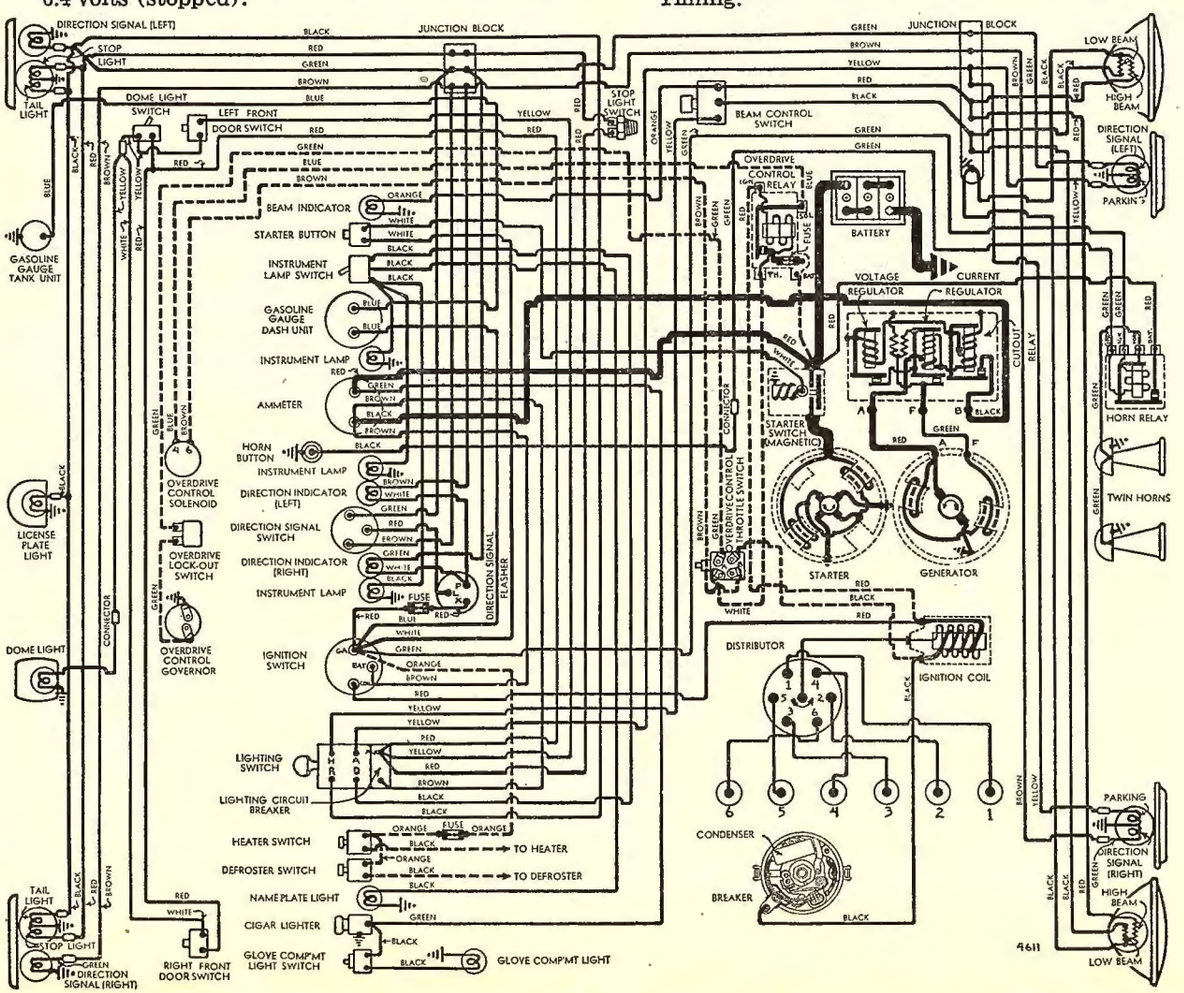
CONDENSER: Auto-Lite No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4211. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
IGS-4214 (Used on late '48 Cars)—*See "1949-50 Frazer" for data on this Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IGS-4211

Distributor Degrees	Distributor RPM.	Engine Degrees	Engine R.P.M.
Start	350	0	700
1	365	2	730
3	400	6	800
7	1150	14	2300
10	1700	20	3400

Octane Selector—Manual adjustment at distributor providing 10° advance and retard. See Ignition Timing.



Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGS-4211

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	8"
4°	8°	11¼"
7.5°	15°	14"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting ..... **At TDC.**

TIMING MARK NOTE—Timing mark located on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 up). Consists of "DC" mark or "0" mark at top dead center with 1° graduations

Timing (with Timing Light C-693)—Mark "DC" or "0" top dead center mark on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 Up) with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at **400 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen clampscrew in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten clampscrew. Check octane selector setting.

►*CAUTION—Reset engine idling speed at 550 RPM.*

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

CARTER WA-1

Carter WA1 Type 622SB superseding 622S & 622SA (All Models). 1¼" Single Barrel, Downdraft type

►NOTE—622S carburetor can be converted to 622SA by installing new Float and Inlet Valve assembly and changing float level.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle (WA1 Carburetors): Carter Single Barrel type.

See Carburetion Equipment Section for data.

Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

Automatic Choke (WA1 Carburetors): Carter Climatic Control (Single Carburetor Type).

See Carburetion Equipment Section for complete data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER WCD

Carter WCD Type 685S superseded by 685SA (Optl. on Manhattan F-486). 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.

►NOTE—685S carburetor can be converted to 685SA by installing new intake Needle & Valve Assembly and resetting float level to 685SA specifications.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle (WCD Carburetors): Carter Dual (WCD) type.

See Carburetion Equipment Section for complete data.

Setting—.016" throttle opening with choke valve held closed and throttle lever stopscrew backed off

Automatic Choke (WCD Carburetors): Carter Climatic Control (Dual Carburetor Type).

See Carburetion Equipment Section for data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER W1

Carter W1 Type 574S. 1¼" Single Barrel, downdraft type with manual choke.

NOTE—This carburetor used for part production starting with following numbers: **F-47** 30,770; **F-47C** 1021118.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

CARB. EQUIPMENT

Air Cleaner: AC. Oil-bath type. Kaiser-Frazer No. 200618 (All models with WA1 or W1 Carbs.), No. 203372 (F-486 Manhattan with WCD Carb.).

Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with approx. 1 pint SAE No. 50 engine oil (No. 20 for below freezing tem.) at 1000 mile intervals or when engine tuned

Fuel Pump (Early type—mounted at rear of engine): AC No. 1539057, K-F No. 200281. Diaphragm type.

►*CAUTION—Install this pump with rocker arm OVER camshaft eccentric.*

See Carburetion Equipment Section for data.

Pressure—3½-4½ lbs. maximum.

Fuel Pump (Later type—mounted at front of engine): AC No. 1539073 (K-F No. 201509) Diaphragm type fuel pump or AC No. 1539074 (K-F No. 202319) combination Fuel-and-Vacuum Pump.

Replacement Pump—AC No. 574 (for 1539073), No. 582 (for 1539074 fuel-and-vacuum pump).

►*CAUTION—Install these pumps with rocker arms UNDER camshaft eccentric.*

See Carburetion Equipment Section for data.

Pressure—3-4¼ lbs.

Gasoline Gauge: Auto-Lite electric type.

Dash Unit—A-L No. NG-11104D, Frazer No. 200471.

Tank Unit—A-L No. NG-10987T, Frazer No. 200468.

See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).

Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.

Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4043. Armature MAW-2128.

Drive—Barrel type Bendix Drive No. A1792.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
5.75 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
18.0 "	Lock	4.0	670

Starting Switch: Auto-Lite Model SS-4001 magnetic switch. Mounted on starter and controlled by push-button on instrument panel.

See Electrical Equipment Section for complete data.

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cables, take out flange mounting screws.

GENERATOR

Auto-Lite Model GDZ-4818A. Armature GDZ-2006F. Two brush type with voltage and current regulation.

Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM. or approximately 20 MPH.

Charging Rate Adjustment—None (see Regulator).

Performance Data

Cold Amperes	Cold Volts	Cold R.P.M.	Hot Amperes	Hot Volts	Hot R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.

Belt Adjustment: ⅛" belt deflection midway between generator and fan pulleys (adjust by pulling generator out with 15 lb. force with all mounting bolts loose).

REGULATOR

Auto-Lite Model VRP-4004F-2. Vibrating type Voltage and current regulators with Cutout Relay.

See Electrical Equipment Section for complete data.

NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).

Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.

Checking (without breaking seal) & Adjustment—***See Electrical Equipment Section.***

Contact Gap—.012" min. (armature against stop pin).

Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).

Checking (without breaking seal) & Adjustment—***See Electrical Equipment Section.***

Contact Gap & Air Gap—Same as Voltage Regulator.

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LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch. *See Electrical Equipment Section for complete data.*
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel on left side of instrument panel (above starter button). Lighted when upper (country beams) in use.

Direction Signal: Mitchell (United Specialties) type. *See Electrical Equipment Section for complete data.*
Direction Indicators—Right and Left indicator lights above instrument dials. Lighted when direction signal on same side of car in operation.

Switches

Lighting—Kaiser-Frazer No. 200819.
Beam Selector—Kaiser-Frazer No. 200863 (Frazer before No. F485-1838), No. 201605 (Frazer after above Nos. & All Manhattans).
Direction Signal—Kaiser-Frazer No. 201467 (Frazer before No. F485-1838), No. 202692 (Frazer after above Nos. & All Manhattans).
Instrument (Rheostat Type)—K-F No. 200821.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Park & Direc. Signal	21-3	1154
Beam Ind., Ign. Switch	1	51
Dir. Sig. Ind. & Clock	1	51
Instrument & Nameplate	1½	55
Rear Direc. Signal	21	1129
Stop & Tail	21-3	1154
License Plate, Rear Compt.	3	63
Dome, Glove Compt.	21	1129
Courtesy	6	81

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type. On back of lighting switch.

FUSES: **Clock**—2 ampere. In clock lead.
Overdrive—20 amperes. On relay on dash.
Direction Signal—9 ampere. In flasher lead under instrument panel to left of steering column.

HORNS: **Auto-Lite.** Model HT-4021 or HT-4023 (Low Note), HT-4022 or HT-4024 (High Note). Twin horns.

Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16". **Stroke**—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.86-1 (First Cars), 7.3-1 (All Cars after Eng. No. 304305—Detroit, 66125—Muskegon).
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune Up data.*

ORIGINAL BORE & BEARING SIZES: *See Frazer Shop Notes.*

TIGHTENING TORQUES: *See Frazer Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Frazer Shop Notes.*

ENGINE REMOVAL: *See Frazer Shop Notes.*

PISTONS: Two types used. Aluminum alloy, Cam-ground, Tin-plated, strut type with split skirt, or T-slot type. Length 3 9/16" (both types).
NOTE—Pistons can be identified by drilled oil drain holes in fourth ring groove and strut within skirt at each pin boss (Strut Type), or by horizontal slot in fourth ring groove and short vertical slot on one side of skirt (T-slot Type).
►*CAUTION—Piston weight different on each type.*
Weight—15.58 ozs. (strut type), 14.28 ozs. (T-slot).
Clearance—.0255-.0315" (Top Land). See Fitting new pistons.
Removal—Pistons and rods removed from above.

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.

Replacement Pistons: *See Frazer Shop Notes.*

Installing Pistons: Slot in skirt toward left or away from camshaft (all types). NOTE—On pistons marked by arrow on head, arrow toward front of car.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled for oil drainage (all types), fourth groove drilled (strut type pistons), slotted (T-slot pistons).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Compr. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3, 4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.

Replacement Rings: *See Frazer Shop Notes.*

PISTON PIN: **Diameter**—55/64". **Length**—2 13/16". Floating type, with lock ring at each end.
Pin Fit in Piston—Tight fit (—.0003" clearance), or push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing: +.0003" clearance. When installing oversize pins or new bushings, ream bushings for this clearance with DD-82-2 Reamer (used also to ream piston pin bore in piston).

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: **Length**—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Shop Notes.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0023". **Sideplay**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.

Installing Rods: Rods and bearing caps marked. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". All bearings.
►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Shop Notes.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0015-.002".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation *See "Crankshaft & Main Bearings" in Frazer Shop Notes.*

Replacement Bearings: Furnished Std. size and .002", .004", .010" Undersize. NOTE—Two types of #1 bearings (flanged & unflanged). See Endplay data.

End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between bearing journal and thrustwasher. **Endplay**—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Frazer Shop Notes.*

CAMSHAFT: Four bearing. Two-sprocket chain drive.
NOTE—Two different camshafts used due to relocation of fuel pump. Camshaft No. 200113 (first cars—pump at rear), No. 203017 (later cars—pump at front).
Journal Diameters—#1, 1 7/8"; #2, 1 13/16"; #3, 1 3/4"; #4, 1 1/4".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".

Bearing Adjustment: None. Replace bushings with camshaft removed.

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket). **Endplay**—.003-.007".

Camshaft Removal: *See "Camshaft & Bearings" in Frazer Shop Notes.*

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3395-.3387"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

NOTE—Valves with drilled stem (for lock pin) used on first cars, valves with grooved stem (for split type locks) used on later cars.

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Use Driver DD-849. Drive old guide down and out, drive new guide down into place (same height as old guide with mark on driver stem in line with top face of block). NOTE—Tapered end of guide must be upward.

Valve Springs: Check spring with tester C-647. Pressure should be 101±3 lbs. at 1⅜". Spring free length 1 15/16".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. NOTE—Lifters can be removed (some engines only) without disturbing cylinder head. *See "Valve System" in Frazer Shop Notes.*
Clearance—.0005-.0018". With correct clearance, lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and .0005" .001", .0015", .002" Oversize.

VALVE TIMING

►**Tappet Clearance:** *CAUTION—Two settings used:*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.

►**Adjustment Procedure**—*See Frazer Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With tappet clearance set at .014" (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with the ten-degree mark after the dead center mark "DC" at indicator in flywheel housing inspection hole (before Eng. No. 17160). Beginning with Eng. No. 17160, marks located on dampener.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Under plug on right side of crankcase between #4 & #5 cylinders. Opens at 35 lbs. Adjustable by adding or removing washer, No. 200272, between end of spring and plug.

Oil Pan Removal: *See Frazer Shop Notes.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine.

Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Frazer Shop Notes.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostat.
Capacity (First 22" Radiator)—15 qts. (14 qts. at driving level). **(Later 17" Radiator)** 13½ qts. (13 qts. at driving level).
Pressure Valve—AC. No. 846740 (Radiator Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).

Radiator: Two types used as follows:
First Cars—No. 200445 (22" wide). Service by installing later type (No. 202906) and installing Radiator Shroud Side Panel Extension No. 203100 (two required), using No. 576 screws (10 required).
Later Cars—Radiator No. 202906 (17" wide).
Radiator Removal—*See Frazer Shop Notes.*

Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only).
Setting (Std. type)—Begins to open at 148-155°F. Fully open at 173°F.

Temperature Gauge: Auto-Lite No. H-11103, Frazer No. 200453. Not electric.

CLUTCH

Borg & Beck.....**Model 9A7**
Auburn (Some Cars).....**Model 9251-15**
Clutch Identification—Types can be identified by number of pressure plate springs—3 (Auburn), 9 (Borg & Beck—cover also marked "951").
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven asbestos, 2 required. I.D. 6". O.D. 9¼". Thickness ⅛".
Facings (Auburn)—Moulded metallic or Raybestos, 2 required. I.D. 6". O.D. 9¼. Thickness .135".

Pedal Adjustment: Pedal free travel ¾-1". To adjust, position nut on pedal assist spring link (at rear end of spring) so that it is lined up with spring adjusting gauge, KF-10, installed on spring.

Removal: Remove transmission (see Transmission Removal below), remove clutch housing underpan, disconnect clutch pedal cross-shaft from pedal linkage. Install Clutch Plate Aligning Arbor, C-360, to hold clutch parts in alignment, take out mounting screws in clutch cover flange (rotate flywheel so that all screws accessible through pan opening). Remove aligning arbor, remove clutch cover assembly and driven member through underpan opening.

TRANSMISSION

Warner Model AS11-T86E (Std.), Model AS12-T86E with new Type R10B Overdrive (Optl.). Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Disconnect front propeller shaft at front universal joint (take out bolts in transmission companion flange), move shaft out of the way. Disconnect speedometer drive cable and transmission control levers at transmission case, free parking brake cable support bracket from frame cross-member. Remove four bolts mounting engine support on frame cross-member (support comes out with transmission). Loosen all four bolts mounting transmission on clutch housing, remove two lower bolts only (CAUTION—two upper bolts must support transmission until ready for removal). Remove flywheel housing underpan, raise rear end of engine (place jack under flywheel, use wood block between jack and flywheel) for sufficient clearance for transmission removal. Remove the two upper transmission mounting bolts, move transmission back until clear of clutch, slide tranmission clear of cross-member and remove from beneath car.

OVERDRIVE

Warner Type R10B (with special AS12-T86E Transmission). Optl Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down".
See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy 1118132, Warner No. 3AR10B-62 Kaiser-Frazer No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001, Kaiser-Frazer No. 201636. On left side of dash.
Kick-down Switch—Kaiser-Frazer No. 201638. Adjust switch by means of nuts on threaded sleeve so switch actuating cam on accelerator lever just contacts plunger on switch at wide open throttle
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Disconnect all wiring at control units on overdrive case, disconnect control cable and speedometer cable. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

UNIVERSALS

Detroit Series 4200. Ball-and-trunnion type or **Mechanics.** Roller bearing type. Three used with intermediate universal at propeller shaft support
See Universals Section for complete data.

Propeller Shaft & Support Bearing: Two shafts used:
Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Frazer Shop Notes.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (Without Overdrive)—4.09-1 Std., 3.73-1 Optl.
Ratio (With Overdrive)—4.27-1.
Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABSORBERS

Monroe. Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

	Front	Rear
Kaiser-Frazer No. (Std.)	201490	201493
Kaiser-Frazer No. (Exp.)	202864	202866

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾—5¾° crosswise.
Caster—0° preferred (—1° to +1°).
Camber—¼° preferred (0° to ¾°).
Toe-In—1/16". Adjust by turning both tie rods
Steering Geometry (Toe-out): Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 11"
Clearance—.008" at heel and toe of each shoe.
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).

Hand Brake: See Service brake data (above).

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1949 Numbers—Frazer F-495—F-495-001000 and up, Frazer Manhattan F-496—F-496-001000 and up.
1950 Numbers—Prefixed by F-505 (Frazer), F-506 (Manhattan).
Body Number Note—Stamped on plate on right front face of dash in engine compartment.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.
NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes)** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Frazer Special Data.* NOTE—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. (7.3-1 Heads) at cranking speed of 70 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.
NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plug Type—Auto-Lite A-5 or AR5.

DISTRIBUTOR: Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.
►*CAUTION—Engine must be idling below 450 RPM when setting timing.*
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:
Idle Setting—1-1½ turns open—2 screws. Turn screws out for richer mixture.
Idle Speed—550 RPM.
Float Level—Flush to 1/32" from top of each float to gasket seat on cover with valve closed (bowl cover assembly inverted).
Accelerating Pump—Lower Hole (min.) Normal.

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4¼ lbs.
►*CAUTION—Pump pressure must not exceed 4½ lbs.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.
►**Adjustment Procedure**—*See Frazer Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Kaiser&Frazer No. 204485.
Lock Cylinder—Kaiser-Frazer No. 203885 (with key).

COIL: Auto-Lite IG-4093, IG-6001 or 9A. On left side of engine opposite distributor.
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distr. Degrees	R.P.M.	Eng. Degrees	R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

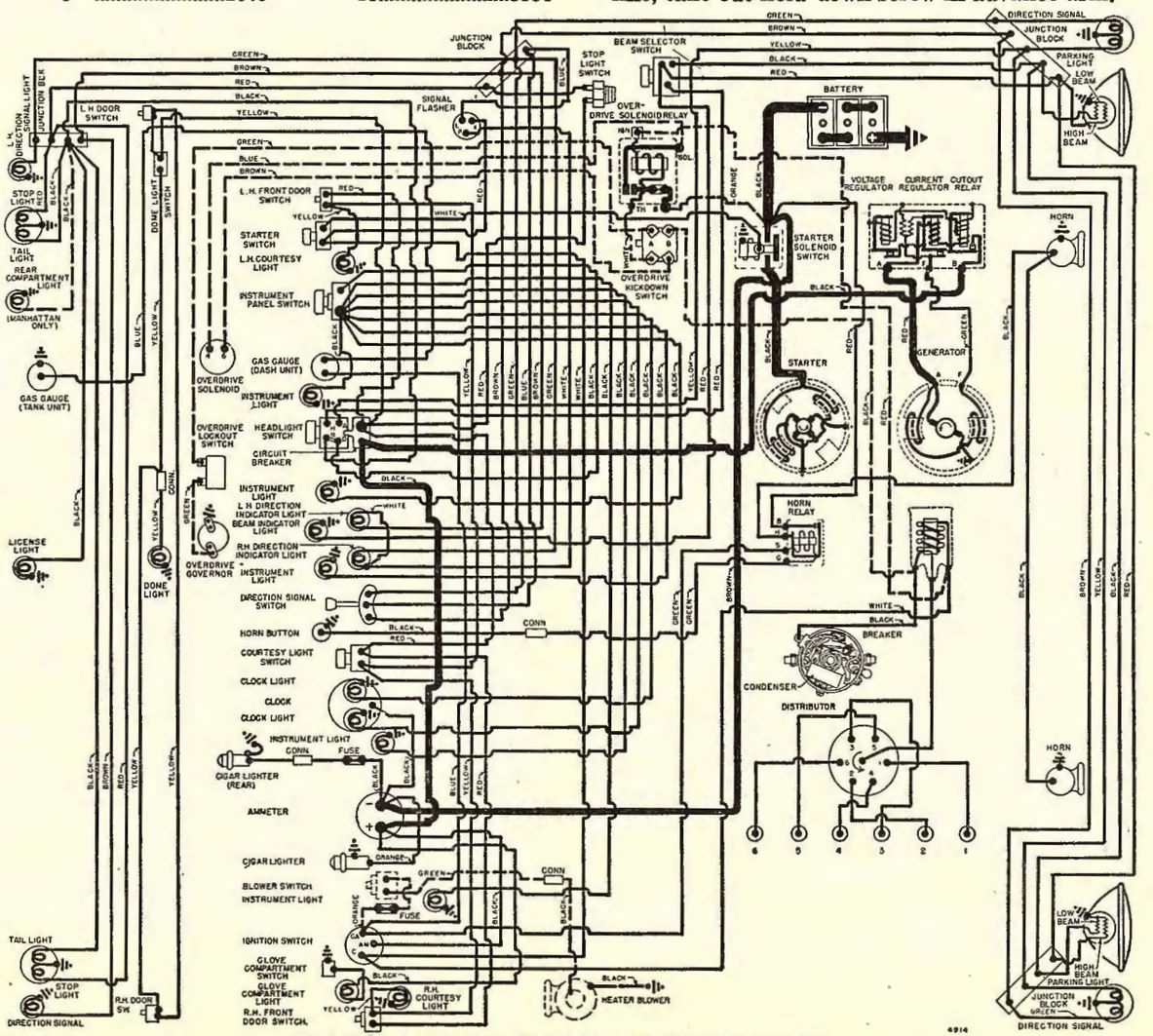
Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.



FRAZER MANHATTAN BODY WIRING SHOWN ABOVE

IGNITION TIMING

Std .Setting .....4° BTDC.

Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.

Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine **below 450 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten cap screw. Check octane selector setting.

►***CAUTION—Reset engine idling speed at 550 RPM.***

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

Carter WCD Type 723S. 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.
Casting No. on Flange—550.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

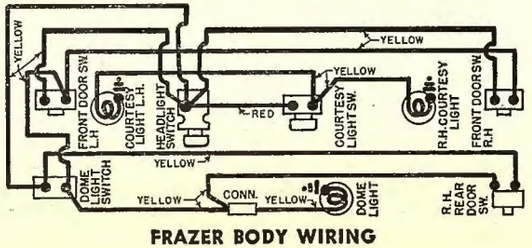
Fast Idle: Carter Dual (WCD) type.
See Carburetion Equipment Section for complete data.
Setting—.018" throttle opening with choke valve held closed and throttle lever stopscrew backed off.

Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
See Carburetion Equipment Section for data.
Setting—Centered (coil housing at index mark).

CARB. EQUIPMENT

Air Cleaner: AC No. 1544539 Oil-bath type.
Element—AC No. 22.
Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with SAE No. 50 engine oil (No. 20 for below freezing temp.) at 2000 mile intervals or when engine tuned.

Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.



FRAZER BODY WIRING

►***CAUTION—Install pump with rocker arms UNDER camshaft eccentric.***
See Carburetion Equipment Section for data.
Pressure—3-4¼ lbs.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—A-L No. 11586A.
Tank Unit—A-L No. 11571A.
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4054. Armature MAW-2128.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
8.50 "	400	4.0	400
6.0 "	Lock	2.0	335

Starting Switch: Magnetic switch K-F Part No. 204752 on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws.

GENERATOR

35 Amp.....Auto-Lite GDZ-4818A. Arm. GDZ-2006F.
45 Amp.....Auto-Lite GGU-6001B. Arm. GGU-2006F.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance Data (GDZ-4818A)

Amperes	Volts	Cold—R.P.M.	Hot
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GGU-6001B)

45	8.0	1550 Max.	———

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.60-1.78 amperes at 6.0 volts, (GGU) 1.6-1.8 —amperes at 6.0 volts.
Motoring Current—(GDZ) 4.16-4.60 amps. at 6.0 volts, (GGU) 5.5-6.5 amperes at 6.0 volts.

Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.

Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

REGULATOR

35 Amp.—Auto-Lite VRP-4004F-2.....for GDZ Gen.
45 Amp.—Auto-Lite VAV-4002C.....for GGU Gen.
Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—***See Electrical Equipment Section.***
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—As follows:
VAV-4002C 44-46 amperes (marked '45' on cover).
VRP-4004F-2 34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—***See Electrical Equipment Section.***
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at bottom of speedometer dial. Lighted when upper (country beams) in use.

Direction Signal: Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on face of speedometer. Lighted when direction signal on same side of car in operation.

Switches
Lighting—Kaiser-Frazer No. 203830.
Beam Selector—Kaiser-Frazer No. 204545.
Instrument Panel—Kaiser-Frazer No. 203833.
Courtesy (on Instrument Panel)—K-F No. 200821.
Door—Kaiser-Frazer No. 204229.
Dome Lamp—Kaiser-Frazer No. 204779.
Stop Lamp—Kaiser-Frazer No. 201466.
Direction Signal—Kaiser-Frazer No. 204552.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.

FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Cigar Lighter—30 amperes. In lead back of instrument panel.

HORNS: Auto-Lite or Sparton. A-L HW-4017 (Low Note), HW-4018 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.

Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core.

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ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145"). *See "Original Bore & Pistons" in Frazer Special Data.*
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—112 at 3600 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

ORIGINAL BORE & BEARING SIZES: *See Frazer Special Data.*

TIGHTENING TORQUES: *See Frazer Special Data.*

CYLINDER HEAD INSTALLATION: *See Frazer Special Data.*

ENGINE REMOVAL: *See Frazer Special Data.*

PISTONS: Aluminum alloy, Cam-ground. Tin-plated, T-slot type. Length 3 9/16".
Clearance—See Fitting new pistons.
Removal—Pistons and rods removed from above.

►*CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.*

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.

Replacement Pistons: *See Frazer Special Data.*

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.

Replacement Rings: *See Frazer Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-.8595" for new std. pins.

►**CAUTION**—Pin bushing must protrude .1/64" on each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".

►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.

CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".

►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation—*See "Crankshaft & Main Bearings" in Frazer Special Data.*

Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.

End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between front crankshaft thrust washer (ahead of #1 bearing) and crankshaft thrust plate (behind crankshaft sprocket).
Endplay—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Frazer Special Data.*

CAMSHAFT: Four bearing. Two-sprocket chain drive.
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I. D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set (furnished finished line-bored and do not require reaming after installation). Use KF-4 Camshaft Bearing Remover & Replacer.

►*CAUTION—Align oil hole in bushings and block.*

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket **Endplay**—.003-.007".

Camshaft Removal: *See "Camshaft & Bearings" in Frazer Special Data.*

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.

►*Timing Chain Caution—Morse and Link Belt chains used. Interchangeable only as complete sets with both sprockets.*

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:

	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.

Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. Two types used and are interchangeable. One type using tappet adjusting screw with locknut, other type is self-locking.
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize. Oversize identified as follows: "A", .0005", "B", .001", "C", .0015", "D", .002", "K", .005", "S", .008".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.

►**Adjustment Procedure**—*See Frazer Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .014" tappet clearance (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark **after** dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Located in right side of cylinder block below the valve chamber and toward the rear of engine. Adjustable by replacing spring or install washers No. 200272 between end of spring and plug.

Oil Pan Removal: *See Frazer Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine. NOTE—Two types of valve cover and outlet pipe assemblies used—can be identified by angle of cut-off at lower end of tube: (Early 1949 Cars) angular cut-off faces **forward,** (Later 1949 Cars) angular cut-off faces **toward rear.**

►*CAUTION—Do not install later valve cover & outlet pipe assembly on early cars (may cause loss of oil through tube).*

Oil Pump: Gear Type. In crankcase.

Oil Pump Servicing—*See Frazer Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

Oil Gauge—Auto-Lite No. 11585A.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostatic control.

Capacity—13½ qts. (13 qts. at driving level).

Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Radiator: No. 202906 (17" wide). Side mounted to shroud with six bolts.

Radiator Removal—*See Frazer Special Data.*

Water Pump: Centrifugal type with ball bearing shaft. *See Water Pump Section for complete data.*

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.

Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: Auto-Lite No. 11587A or 11775A. Not electric.

CLUTCH

Auburn Model 9251-15 or Borg & Beck Model 9A7.

►**Clutch Identification**—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (for Borg & Beck—cover marked "951").

See Clutch Section for complete data.

Facings (Borg & Beck)—Woven asbestos, 2 required. Inside Diam. 6". Outside Diam. 9¼". Thickness ⅛".

Facings (Auburn)—Moulded metallic or Raybestos. 2 required. I. D. 6". O. D. 9¼". Thickness .135".

Pedal Adjustment: Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bellcrank. Turn clevis end in or out to obtain correct pedal free movement. Install adjusting link clevis on bellcrank, insert clevis pin, cotter pin, and return spring.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, using Flywheel Turning Tool C-771 and loosen six bolts equally before removing. Remove clutch pressure plate and cover assembly and clutch disc.

TRANSMISSION

Warner Model AS23-T86E (Std.), Model AS24-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low and Reverse).

See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.

See Transmission Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, disconnect propeller shaft at front companion flange. Free engine rear support from cross-member by taking out two insulator bolts at transmission. Disconnect and remove master cylinder operating rod. Disconnect hand brake cable at equalizer and engine rear crossmember. Remove eight bolts at frame side rails and remove crossmember. Remove four bolts holding transmission to clutch housing and pull out the transmission. (If overdrive is installed it will be removed with transmission).

OVERDRIVE

Warner Type R10B (with special AS24-T86E Transmission). Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."

See Transmission Section for complete data.

Overdrive Solenoid—D-R 1118132, K-F No. 200911.

Governor—Kaiser-Frazer No. 200908.

Control Relay—Auto-Lite HRT-4001 or 1A. Has 20-ampere fuse on BAT terminal.

Kick-down Switch—Kaiser-Frazer No. 203451.

Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Disconnect front propeller shaft at front companion flange and move shaft away from housing. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

UNIVERSALS

Detroit Series 4200. Ball-and-Trunnion. 3 used with intermediate universal at propeller shaft support.

See Universals Section for complete data.

Propeller Shaft & Support Bearing: Two shafts used with support bearing on frame crossmember at intermediate universal.

Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Frazer Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio (Without Overdrive)—3.91-1 Std., 3.73-1 or 4.09-1 Optl.

Ratio (With Overdrive)—4.27-1 or 4.55-1.

Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.

Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.

Endplay—.001-.006".

SHOCK ABSORBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—5½° preferred (4¾-5¾° crosswise).

Caster—0° preferred (—1° to +1°).

Camber—¼° preferred (0° to ¾°).

Toe In—1/16". Adjust by turning both tie rods.

Steering Geometry (Toe-out)—Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.

See Brake Section for complete data.

►*SELF ADJUSTING BRAKE NOTE*—Used on a limited number of cars during 1949-50 production. *See "Wagner Lockheed" Brakes in Brake Section for complete data.*

Drums—Composite (cast-iron & steel). Diameter 11"

Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).

Clearance—.008" at heel and toe of each shoe.

Braking Power—56% Front wheels, 44% Rear.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate located on left front pillar post.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.

NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes)** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Frazer Special Data.* NOTE—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. (7.3-1 Heads) at cranking speed of 70 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.

NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032" (A-5 plug), .040" (AR-5 plug).

Plug Type—Auto-Lite A-5 or Resistor type AR-5. 14 mm.

DISTRIBUTOR: Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.

►***CAUTION—Engine must be idling below 450 RPM when setting timing.***

Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:

►***CARBURETOR CHANGE (to Correct Hard Starting & Flooding)—See Carburetor Section for complete data.***
Idle Setting—½ to 1 turn open—2 screws. Turn screws out for richer mixture.
Idle Speed—550-600 RPM (Std.), 425-450 RPM (Hydra-Matic).
Float Level—(Early Production, Spring Loaded Needle & Seat assembly)—7/64". (Later Production, Solid Needle & Seat assembly)—¼", measured from machined surface of bowl cover to top of float with bowl cover inverted.

►***CAUTION—When measuring float level do not depress float lip against spring in needle, but let float rest of its own weight. Adjust by bending lip of float, not float arm.***
Accelerating Pump—No seasonal adjustment. *See Carburetor Section for complete data.*

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4½ lbs.

►***CAUTION—Pump pressure must not exceed 4½ lbs.***

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.

►**Adjustment Procedure**—*See Frazer Special Data.*

NOTE—Remove splash shield under right front fender for convenience in adjusting valves.

Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Kaiser & Frazer No. 204485.
Lock Cylinder—Kaiser-Frazer No. 203885 (with key).

COIL: Auto-Lite IG-6009A (Early), CR-6009 (Late). On left side of engine opposite distributor.
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

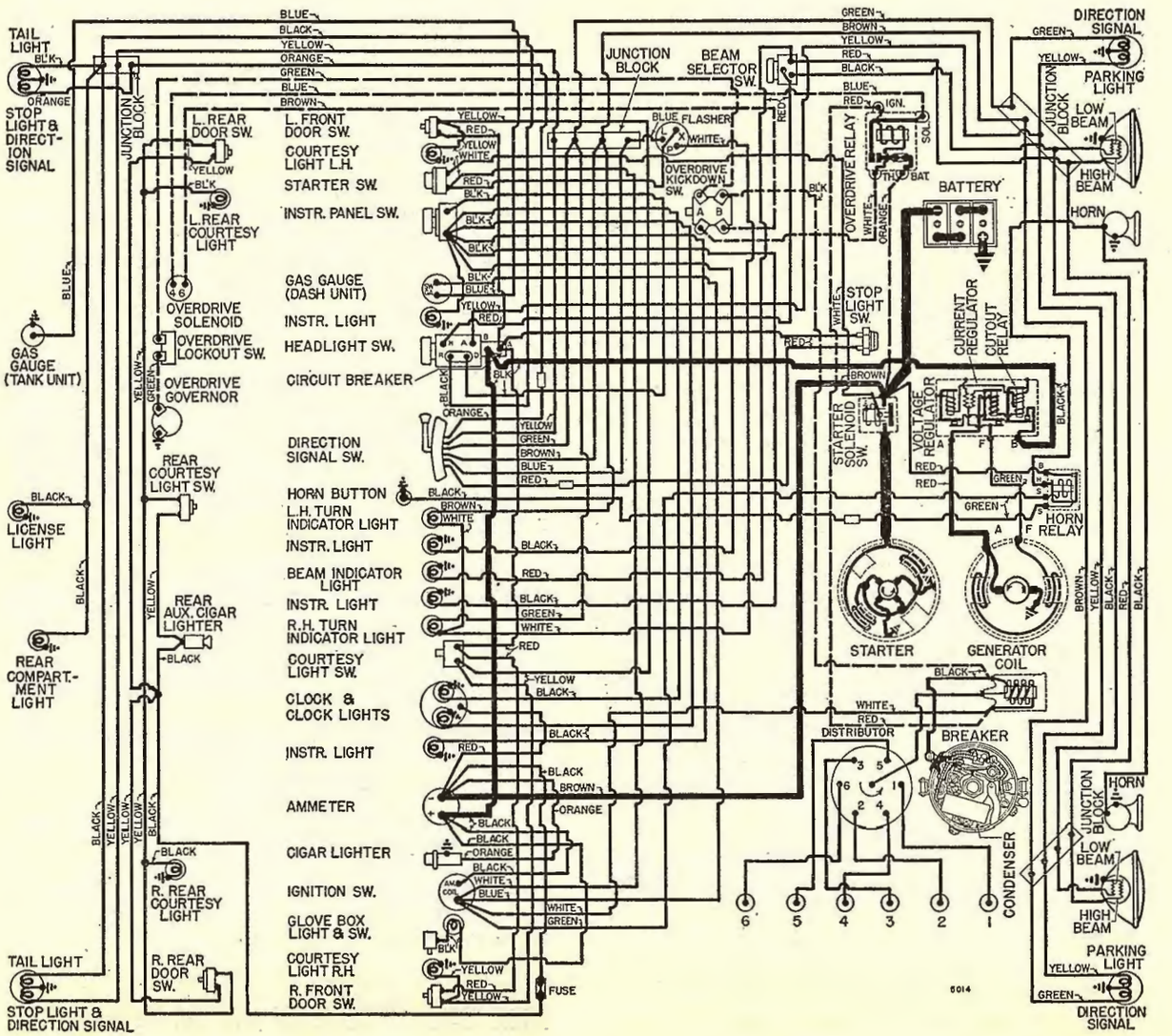
DISTRIBUTOR: Auto-Lite Model IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.

Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type).



Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting ..... **4° BTDC.**
Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.
Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine **below 450 RPM,** (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten capscrew. Check octane selector setting.
►*CAUTION*—Reset engine idling speed to 550 RPM on cars with synchro-mesh transmission.
Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

Carter WGD Type 813S. 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.
►*CARBURETOR CHANGE (to Correct Hard Starting & Flooding)—See Carburetor Section for complete data.*
Casting No. on Flange—774.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Dual (WGD) type.
Setting—With thermostatic coil housing gasket and baffle plate removed, crack throttle valve and hold choke valve closed. There should now be .018" to .023" clearance (gauge T109-29) between throttle valve and bore of carburetor (side opposite idle port). Adjust by bending the choke connector rod at lower angle bend.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
Setting—Centered (coil housing at index mark).
See Carburetion Equipment Section for data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544539 Oil-bath type.
Element—AC No. 22.
Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with SAE No. 50 engine oil (No. 20 for below freezing temp.) at 2000 mile intervals or when engine tuned.
Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.
►*CAUTION—Install pump with rocker arm UNDER camshaft eccentric.*
Pressure—3-4¼ lbs.
See Carburetion Equipment Section for data.
Gasoline Gauge: Auto-Lite electric type.
Dash Unit—A-L No. 11586A.
Tank Unit—A-L No. 11571A.
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4054 (Std.), MAW-4057 (Hydra-Matic). Armature MAW-2138.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
12.0 "	Lock	3.0	505
6.0 "	Lock	2.0	335

Starting Switch: Magnetic switch K-F Part No. 204752 on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

35 Amp.....Auto-Lite GDZ-4818A. Arm. GDZ-2006F.
45 Amp.....Auto-Lite GGU-6001B. Arm. GGU-2006F.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance Data (GDZ-4818A)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
35	8.0	1800-2000 — 2150-2350

Performance Data (GGU-6001B)

Amperes	Volts	Cold—R.P.M.—Hot
45	8.0	1550 Max. —

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.60-1.78 amperes at 6.0 volts, (GGU) 1.7-1.8 amperes at 6.0 volts.
Motoring Current—(GDZ) 4.16-4.60 amperes at 6.0 volts, (GGU) 5.5-6.2 amperes at 6.0 volts.
Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

REGULATOR

Auto-Lite Regulator No.	For Generator No.
VRP-4004F-2 (Early)	GDZ-4818A
VRP-6001A (Late)	GDZ-4818A
VAV-4002C (Taxi)	GGU-6001B

Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—As follows:
VAV-4002C 44-46 amperes (marked '45' on cover).
VRP-4004F-2 34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at bottom of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on face of speedometer. Lighted when direction signal on same side of car in operation.

Switches
Lighting—Kaiser-Frazer No. 203830.
Beam Selector—Kaiser-Frazer No. 204545.
Instrument Panel—Kaiser-Frazer No. 203833.
Courtesy (on Instrument Panel)—K-F No. 200821.
Door—Kaiser-Frazer No. 204229.
Dome Lamp—Kaiser-Frazer No. 204779.
Stop Lamp—Kaiser-Frazer No. 201466.
Direction Signal—Kaiser-Frazer No. 204552.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.
FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Rear Seat Cigar Lighter & Body Lights—30 ampere in lead back of instrument panel.
HORNS: Auto-Lite or Sparton. A-L HW-4017 (Low Note), HW-4018 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.
Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core.

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ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145"). *See "Original Bore & Pistons" in Frazer Special Data.*
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3
Developed Horsepower—115 at 3650 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

CYLINDER HEAD AND TIGHTENING TORQUES: *See Frazer Special Data.*

PISTONS: Aluminum alloy, Cam-ground. Tin-plated, T-slot type. Length 3 17/32".
Clearance—See Fitting new pistons.
Removal—Pistons and rods removed from above.
►*CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.*

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.

Replacement Pistons: *See Frazer Special Data.*

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.

Replacement Rings: *See Frazer Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-8595" for new std. pins.
►*CAUTION*—Pin bushing must protrude 1/64" on each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0018". **Side Play**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.
CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".
►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0007-.002".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation—*See "Crankshaft & Main Bearings" in Frazer Special Data.*

Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.

End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between front crankshaft thrust washer (ahead of #1 bearing) and crankshaft thrust plate (behind crankshaft sprocket).
End Play—.002-.006".

CAMSHAFT: Four bearing. Two-sprocket chain drive.
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I.D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbited bushings.
Clearance—.002-.004".

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set (furnished finished line-bored and do not require reaming after installation). Use KF-4 Camshaft Bearing Remover & Replacer.
►*CAUTION—Align oil hole in bushings and block.*

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket. **Endplay**—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.
►*Timing Chain Caution—Morse and Link Belt chains used. Interchangeable only as complete sets with both sprockets.*

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3520"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width: 5/64" (max.).

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.

Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32". Free length 1 31/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. Two types used and are interchangeable. One type using tappet adjusting screw with locknut, other type is self-locking.
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize. Oversize identified as follows: "A", .0005", "B", .001", "C", .0015", "D", .002", "K", .005", "S", .008".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.
►**Adjustment Procedure**—*See Frazer Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .020" tappet clearance, #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Located in right side of cylinder block below the valve chamber and toward the rear of engine. Adjustable by replacing spring or install washers No. 200272 between end of spring and plug.

Oil Pressure Gauge: Auto-Lite No. 11585A (Not elec.).

Oil Pan Removal: *See Frazer Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine.

Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Frazer Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostatic control.
Capacity—13½ qts. (13 qts. at driving level).
Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Water Pump: Centrifugal type with ball bearing shaft. *See Water Pump Section for complete data.*
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.
Temperature Gauge: Auto-Lite No. 11775A (Not elec.).

CLUTCH

Auburn Model 9251-18 or Borg & Beck 9A7 No. 951. Single plate, dry disc type.
►**Clutch Identification**—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (for Borg & Beck). Borg & Beck cover marked 951.
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven asbestos, 2 required. Inside Diam. 6". Outside Diam. 9¼". Thickness ⅛".
Facings (Auburn)—Molded metallic or Raybestos. 2 required. I. D. 6". O. D. 9¼". Thickness .135".
Pedal Adjustment: Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bellcrank. Turn clevis end in or out to obtain correct pedal free movement. Install adjusting link clevis on bellcrank, insert clevis pin, cotter pin, and return spring.
Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, using Flywheel Turning Tool C-771 and loosen six bolts equally before removing. Remove clutch pressure plate and cover assembly and clutch disc.

TRANSMISSION

Warner Model AS49-T86E (Std.), Model AS50-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low and Reverse).
See Transmission Section for complete data.
Transmission Control: Remote control type with gear-shift lever mounted on steering column.
See Transmission Section for complete data.
Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit.) Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, disconnect propeller shaft at front companion flange. Free engine rear support from cross-member by taking out two insulator bolts at transmission. Disconnect and remove master cylinder operating rod. Disconnect hand brake cable at equalizer and engine rear crossmember. Remove eight bolts at frame side rails and remove crossmember. Remove four bolts holding transmission to clutch housing and pull out the transmission. (If overdrive is installed it will be removed with transmission).

OVERDRIVE

Warner Type R10B (with special AS50-T86E Transmission). Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."
See Transmission Section for complete data.
Overdrive Solenoid—D-R 1118132, K-F No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001A, K-F Part No. 201636. Has 20-ampere fuse on BAT terminal.
Kick-down Switch—Kaiser-Frazer No. 203451.
Lock-out Switch—Kaiser-Frazer No. 200915.
Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Disconnect front propeller shaft at front companion flange and move shaft away from housing. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

HYDRA-MATIC DRIVE TRANSMISSION

Four-speed planetary type automatic transmission and fluid coupling.
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check fluid level every 1000 miles. Add fluid as required, to maintain level at "F" mark on dip stick. Drain and refill every 15,000 miles. Use Hydra-Matic Fluid (Automatic Transmission Fluid Type "A").
Capacity—Approx. 11 qts. (refilling after draining). 12 qts. (when transmission disassembled).
Checking Fluid Level—Check only with transmission warm (set hand brake, run engine with selector in "N"). With transmission oil hot, idle engine for at least two minutes, then check with engine running and selector in "N". Dip stick located under inspection hole cover in floor pan under front floor mat. Add fluid as required to bring level up to "F" mark on stick.
CAUTION—Do not fill above "F" mark on dip stick.
Draining & Refilling—*See "Kaiser-Frazer Hydra-Matic Drive" in Transmission Section.*
Removal: *See "Kaiser-Frazer Hydra-Matic Drive" in Transmission Section.*
Neutral Safety Switch Adjustment—(Hydra-Matic) No adjustment required.

UNIVERSALS

Detroit Series 4200. Ball-and-Trunnion. 3 used with intermediate universal at propeller shaft support.
See Universals Section for complete data.
Propeller Shaft & Support Bearing: Two shafts used with support bearing on frame crossmember at intermediate universal.
Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Frazer Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (Without Overdrive)—3.91-1 Std., 3.73-1 or 4.09-1 Optl.
Ratio (With Overdrive)—4.27-1 or 4.55-1.
Backlash—.003-.006". Shim adjustment.
Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.
Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABSORBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5½° preferred (4¾-5¾° crosswise).
Caster—0° preferred (—1° to +1°).
Camber—½° preferred (0° to ¾°).
Toe-In—1/8" preferred (1/16-1/8"). Adjust by turning both tie rods.
Steering Geometry (Toe-out)—Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 11"
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Clearance—.010" at heel and toe of each shoe.
Braking Power—55.5% Front wheels, 44.5% Rear.
Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

HOOD ASSEMBLY

HOOD ALIGNMENT: Hinge screw holes in hood are slotted to permit fore-and-aft movement of the hood for adjustment (no adjustment at hood hinge-to-cowl mounting). To align hood, loosen three attaching screws at each hood hinge just enough to permit hood to be shifted on the hinges, shift hood as necessary to obtain 5/32" clearance between rear edge of hood and cowl, and uniform clearance between edge of hood and fender at each side, tighten hinge screws being careful not to change position of hood.

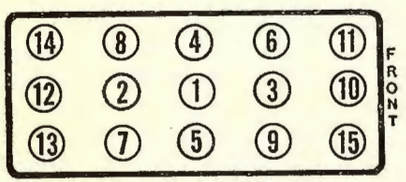
FRONT END SHEET METAL

FRONT END SHEET METAL ASSEMBLY REMOVAL: Entire front assembly with exception of hood (front fenders, splash shields, radiator shroud, grille, radiator, and radiator support) can be removed as an assembly for work on front of engine. To remove assembly, take out six bolts at body front cowl and one bolt and insulator at radiator support, disconnect fender-to-cowl brace on each side.

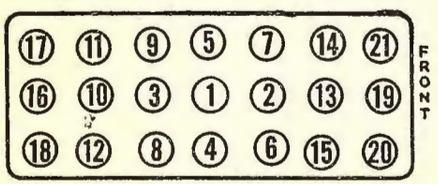
CYLINDER HEAD

CYLINDER HEAD INSTALLATION: Use a Torque Indicating Wrench to tighten cylinder head nuts. Heads should be tightened cold and rechecked after engine reaches temperature of 150°F.

Tightening Torque—See Tightening Specifications.



4 CYLINDER



6 CYLINDER

TIGHTENING SPECIFICATIONS

	Ft.Lbs.	In.Lbs.
Cylinder Head Stud Nuts	60-65	780-792
Main Bearing Capscrews	65-70	780-840
Con. Rod Bolts (4 Cyl.)	50-55	600-660
Con. Rod Bolts (6 Cyl.)	25-30	300-360
Spark Plugs	30	360
Manifold Nuts	20-25	240-300

CRANKSHAFT & MAIN BEARINGS

CRANKSHAFT SERVICING: Bearing Replacement— ►*CAUTION*—4 Cyl. engine must be removed from car for bearing replacement (bearings "doweled" in case and crankshaft must be taken out to remove and install bearings). 6 Cyl. bearings not doweled in this manner. Make certain that oil holes in bearings line up with oil holes in crankcase. On 4 cylinder, see that bearings fit snugly on dowel pins in crankcase and bearing caps.

Rear Bearing Oil Seal—Consists of a wick type packing installed in grooves in bearing cap and crankcase. To install new packing, insert packing in groove, use round piece of wood or steel to "roll" packing into groove, working from both ends toward center. With packing firmly seated in groove, cut off ends flush with surface. NOTE—Crankshaft must be removed to install packing in upper (crankcase) half of bearing.

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case. When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. CAUTION—Do not cut off this protruding portion of the packing.

Front (Timing Cover) Oil Seal—On all models, timing case cover (with double baffle and spring loaded leather seal) and crankshaft pulley (with polished surface for seal contact) used.

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Drain radiator and cylinder block, remove entire Front End Sheet Metal Assembly or remove grille and radiator. Remove cylinder head, manifold, valves, and valve springs. Remove oil pump, fuel pump, fan blade assembly, and oil pan. Remove drive belt. Use puller W-175 to remove crankshaft pulley. Remove timing gear cover. Remove camshaft gear using puller W-172. Tie up all valve lifters out of the way (can be held up by string to manifold studs). Take out attaching screws in camshaft thrust plate, remove thrust plate and spacer. Withdraw camshaft at front of engine.

Camshaft Front Bearing—Consists of a steel-backed, babbitt-lined bushing which takes thrust. When installing this bushing, make certain oil hole lines up with drilled oil hole in crankcase, stake bearing in place to prevent turning in service.

Camshaft Thrust Plate—Thrust plate is assembled on shaft behind camshaft gear with spacer between plate and camshaft front bearing journal. If required, thin shim can be installed behind spacer to increase clearance, or spacer can be dressed off to reduce clearance.

CAUTION—Install spacer with beveled inner edge toward rear.

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT PROCEDURE: The following is the recommended order for adjusting tappets at room temperature. (Valves are counted from front of engine).

Fully Raise Valve	Then ADJUST Valve
Nos. 1 and 3	Nos. 6 and 8
Nos. 2 and 5	Nos. 4 and 7
Nos. 6 and 8	Nos. 1 and 3
Nos. 4 and 7	Nos. 2 and 5
Nos. 1 and 3	Nos. 10 and 12
Nos. 7 and 9	Nos. 4 and 6
Nos. 2 and 5	Nos. 8 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 6	Nos. 7 and 9
Nos. 8 and 11	Nos. 2 and 5

OIL PUMP

ROTOR TYPE OIL PUMP: Pump mounted externally on left hand side of crankcase.

Pump Removal—Remove mounting screws in pump body flange, slide pump assembly out. To disassemble pump, remove cover screws and lockwashers, lift off cover, remove pump outer rotor. To remove shaft and rotor assembly, file off end of pin in drive gear hub, drive pin through shaft using a small drift, remove gear, withdraw shaft and rotor from housing. To remove oil regulator, remove hexagonal-headed plug on side of housing, withdraw regulator spring and plunger.

CAUTION—Do not lose adjusting shims located in plug above spring.

Pump Servicing & Assembly—Replace rotors if clearance between inner and outer rotor excessive, or if rotor clearance in housing excessive. Replace cover if rotor bearing surface is worn or scratched. Use new body and cover gaskets. Make certain that driving gear pin is securely installed.

OIL PUMP INSTALLATION: Turn flywheel to #1 piston firing position with flywheel mark "IGN" centered in inspection hole in right front face of flywheel housing below starter. Turn distributor shaft to #1 firing position with distributor rotor finger opposite #1 terminal in distributor cap. Hold oil pump in same relative position as when installed on engine, turn pump shaft until tongue offset is upward (widest part of shaft down) and line up gear retaining pin with right hand side of slot in pump body. Slide pump into place on mounting studs, recheck rotor position. NOTE—If distributor rotor not at #1 terminal with pump installed, remove pump, turn shaft as required, and re-install.

OIL PAN REMOVAL

6 CYL. MODELS

OIL PAN REMOVAL (6 Cyl. Models): Drain radiator and remove upper and lower hoses. Remove nuts and washers securing engine front end plate to right and left front engine support insulators. Raise front of car, drain engine oil and remove tie rod from pitman arm. Loosen rear engine support insulator-to-crossmember bolts enough to prevent distortion of rear insulators when engine is raised. Attach hoist and raise front of engine until sufficient clearance is obtained between bottom of pan and front crossmember to remove pan. Remove right front engine support bracket and then remove oil pan.

OIL PAN INSTALLATION: Reverse removal procedure.

RADIATOR

RADIATOR REPLACEMENT: Radiator mounted in U-shaped cradle by three bolts on each side with shroud on each side at front of radiator to direct air flow through core. On 4 Cyl. model, additional shroud or fan ring installed between radiator core and fan to increase air flow through radiator core.

Radiator Removal—Drain cooling system and disconnect hoses. Take out three bolts on each side attaching radiator to cradle. On 4 Cyl. model, move fan shroud back out of the way or remove this shroud. Lift radiator out.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1951 Nos. 1001 Up.
Body Number Note—Stamped on plate on right front upper firewall in engine compartment.

ENGINE NUMBER: Stamped on top of water pump boss at front of engine and on Engine Name Plate on right side of crankcase.
1951 Nos. 3,500,000 Up.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. at cranking speed (Std. 7.0-1 Hd.). 10 lbs. max. variation between cylinders.

VACUUM READING: Steady 17-21" idling at 550 RPM.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAP: .030".
Plug Type—Auto-Lite AN-7 (Std.). 14 mm. Tighten to 30 ft. lbs. torque.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".
Cam Angle—41°±1° closed.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 5° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—5° mark before top dead center "TC" mark on flywheel.
CAUTION—Engine must be idling below 550 RPM. when setting timing.

CARBURETION:
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" from top of float at free end to bowl cover when needle is seated (assembly inverted).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. fast idle.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control Valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type.
See that valve operates freely.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.
►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*
NOTE—Tappet adjusting screws self-locking. Remove left front wheel and access hole cover in splash shield for access when adjusting valves.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: K-F No. 212063

COIL: Auto-Lite Model CR-4009. On right side of engine to rear of distributor.
Ignition Current—2.5 amperes (idling). 4.8 amps. (stopped) at 6.3 volts.

CONDENSER: Auto-Lite Part No. IAT-3076L.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite No. IAT-4008 & 4008-A. New "Pivoted Breaker Plate" type. Full automatic advance with auxiliary vacuum spark control.
See Electrical Equipment Section for complete data.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—41°±1° closed.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IAT-4008

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0°	600
1°	400	2°	800
5°	650	10°	1300
10°	1800	20°	3600
11°	2000	22°	4000

Automatic Advance—IAT-4008-A

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
2°	560	4°	1120
5°	875	10°	1750
8°	1190	16°	2380
11°	1500	22°	3000

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IAT-4008

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4¾"
1°	2°	5⅜"
3°	6°	6¾"
4°	8°	7⅜"
5°	10°	8"

Vacuum Advance—IAT-4008-A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
2°	4°	5¾"
5°	10°	9¼"
8°	16°	12¾"
10°	20°	15"

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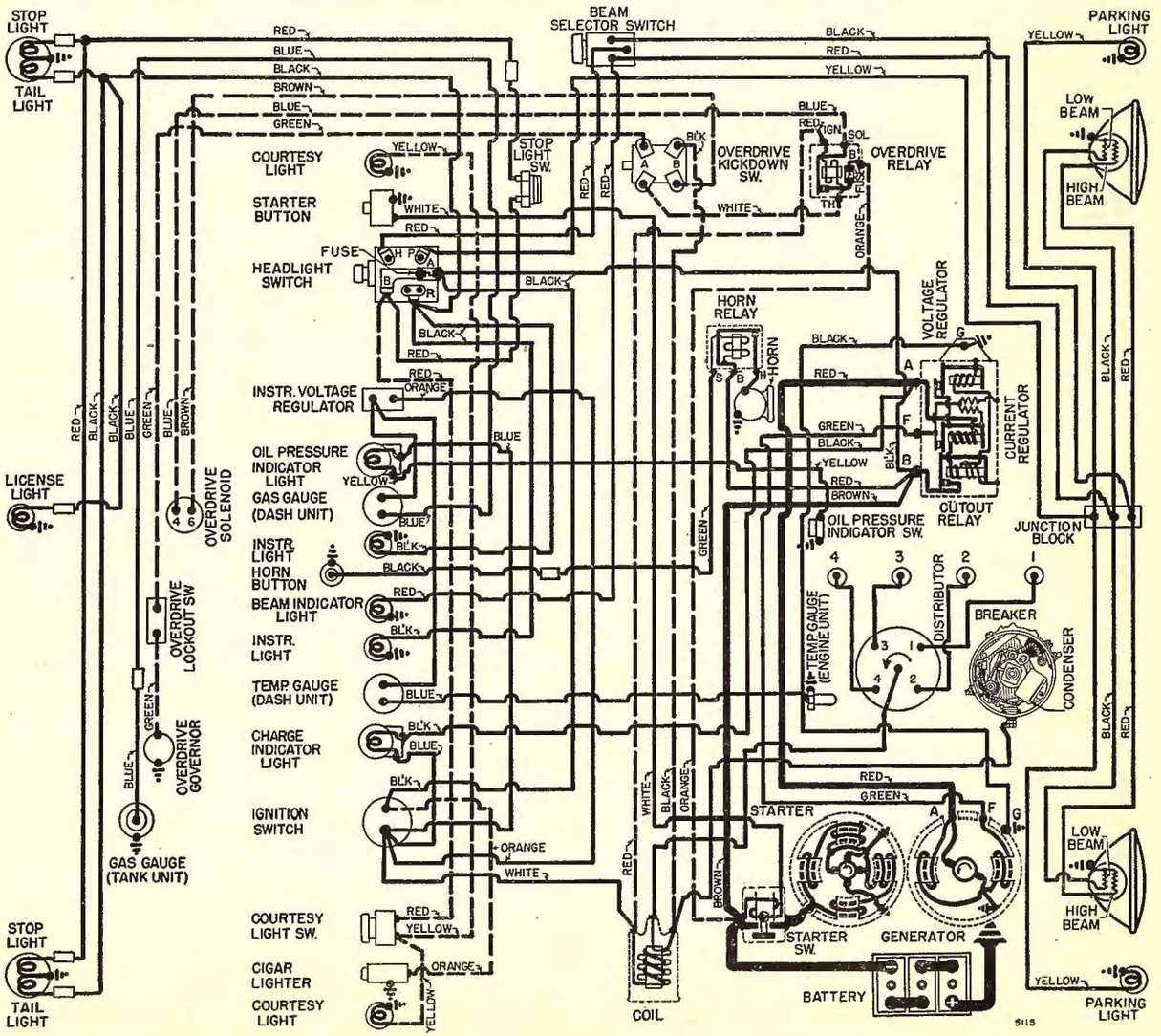

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Distributor Removal: Distributor located on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

►*CAUTION—If Oil Pump removed, refer to Oil Pump Installation directions in Henry J Special Data.*

IGNITION TIMING

Std. Setting .....5° BTDC.

Timing Mark—Timing mark located on flywheel. Consists of "TC" mark at top dead center with a 5° mark before this point.

Timing (with Timing Light C-693)—Mark 5° mark before "TC" top dead center mark on flywheel with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at lowest possible smooth idle speed (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw extending upward through 45° slot in arm under distributor. Advance or retard distributor until timing mark appears in line with index mark on edge of flash hole, tighten cap screw.

►*CAUTION—Reset engine idling speed at 550 RPM.*

CARBURETOR

Carter YF-820S, SA, SB—1¼" Single Barrel, Downdraft types. Identical in appearance with YF-814 & 833S (6 cyl.) but not interchangeable.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Single Barrel.

See Carburetion Equipment Section for complete data.

Setting—With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.

CARB. EQUIPMENT

Air Cleaner: United Specialties. K-F No. 212749 Oil-wetted type Std., Oil-bath type Optl.

Fuel Pump (Std.): Carter M807S. Diaphragm type.

Optl.—Carter No. M809S combination Fuel-and-Vacuum Pump.

See Carburetion Equipment Section for complete data.

Pressure—3½-4½ lbs. fast idle. At 1000 RPM should be 3-4¼ lbs. If more than 4½ lbs., adjust by adding gaskets between pump and cylinder block.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.

Dash Unit—K-S No. 45574.

Tank Unit—K-S No. 45567.

See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air Intake Pipe (from air cleaner to **oil filler pipe**) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve **must close at idling speed** for satisfactory engine idling performance.

Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. When vacuum control valve is clogged, pressure will build up in crankcase. When not seating, idle will be unsatisfactory. Remove and clean vacuum control valve and air outlet pipe when tuning engine or if system operating incorrectly.

Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type IM-100D or Willard HW-1-100—6 volt, 15 plate, 100 ampere hour capacity (20 Hour Rate).

Grounded Terminal—Positive (+) terminal grounded at right front engine support. Engine ground cable connected at same point.

Location—In engine compt. on right side.

STARTER

Auto-Lite Model MZ-4163. Armature No. MZ-2237. Four field, 4 brush type with magnetic switch on starter.

Drive—Barrel type Bendix Drive No. A2089.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4000	5.0	68
4.4	"	Lock	2.0	280

Starting Switch: Auto-Lite No. SS-4014 solenoid operated, mounted on motor near starter and controlled by push-button on instrument panel.

Removal: Flange mounted on right front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws and bracket screw.

GENERATOR

Auto-Lite No. GDZ-6001-E. Armature No. GGY-2006F. Two-brush type with voltage and current regulation.

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—35 amperes, cold, at 8.0 volts, 1800-2000 RPM.

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.3-1.5 amperes at 5.0 volts.

Motoring Current—3.9-4.4 amperes at 5.0 volts.

Removal: Pivot mounting at right front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts.

Belt Adjustment: Loosen clamp and pivot bolts, swing generator out away from engine to 15 lbs. pull on scale in line with adjusting bracket.

Generator Indicator: Warning light (under RED plastic) burns red when ignition switch turned on and goes out when cutout relay closes.

REGULATOR

Auto-Lite Model VRP-6001-A. Vibrating type voltage and current regulator.

See Electrical Equipment Section for complete data.

NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-6.9 volts (set to 6.4-6.6 volts).

Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).

Contact Gap—.015" minimum.

Air Gap—.031-.034" with arm against stop.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.

Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*

Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).

Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*

Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.

See Electrical Equipment Section for complete data.

Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.

Direction Signal: (Optl.)—Guide Light Division make.

See Electrical Equipment Section for complete data.

Direction Indicators—Right and left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Lighting—K-F No. 212091

Beam Selector—K-F No. 204545

Courtesy Light (Optl.)—K-F No. 200821

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. On back of switch.

Overdrive—20 amperes. On control relay.

Heater—14 amperes.

Radio—14 amperes.

HORNS: Delco-Remy No. 1999639 (Low Note), 1999640 (High Note). Matched tone twin horns with relay.

Horn Relay—K-F No. 212080.

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is connected in gauge feed circuit.

ENGINE

ENGINE SPECIFICATIONS: K-F Model 4L-134. Four cylinder Supersonic "L" head type.

Bore—3⅛" or 3.125".

Stroke—4⅜".

Displacement—134.2 cu. ins. **Rated HP**—15.63.

Developed Horsepower—68 at 4000 RPM.

Compression Ratio—7.0-1.

Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Henry J Special Data.*

CYLINDER HEAD INSTALLATION: *See Henry J Special Data.*

PISTONS: Aluminum alloy, "T" slot, Cam ground, tin- or brass-plated type with heat insulation groove above top ring groove.

Length—3¾".

Weight—12.7 ozs. without rings or pin.

Removal—Pistons and rods removed from above.

Clearance—Top land .017-.019". Skirt .003".

CAUTION—Pistons must not be "lapped" in (will destroy tin-plated surface).

Replacement Pistons: Std. & .010", .020", .030", .040" oversize.

Fitting New Pistons: Use .003" feeler stock, ¾" wide,

ENGINE

CONTINUED FROM PRECEDING PAGE

inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.008-.013"	.0005-.001"
Oil Contr.	3/16"	.008-.013"	.001-.0015"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: .010", .020", .030", .040" oversize.

PISTON PIN: Diameter—.8117-.8119". **Lgth**—2 25/32". Pin is locked in connecting rod by clampscrew.
Pin Fit in Piston—.0001-.0005" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: No oversizes are available.

CONNECTING ROD: Length—9.1845-9.1905". **Weight**—39.41 ozs. NOTE—Rods are offset and are **not** interchangeable.
Crankpin Journal Diameter—1.938-1.9375".
Lower Bearing—Steel-backed, babbitt-lined, replaceable precision type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.
Clearance—.0005-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: None. (No shims.) Replace bearings. Do not file connecting rods or bearing caps. NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: .001", .002", .010", .012" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in lower end of rod toward right of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type with removable counterweights.
Journal Diameters—2.3341" (all bearings).
Bearings—Steel-backed, babbitt-lined, replaceable precision type. Bearing shells are dowelled in bearing caps and crankcase.
Clearance—.0014-.0029".
NOTE—Replace bearings when clearance exceeds .006" or when endplay exceeds .018".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instructions in Henry J Special Data.*
NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing.

Replacement Bearings: .001", .002", .010" Undersize.

Oil Seals: Rear main bearing oil seal is wick type packing in groove in crankcase and rear main bearing cap.
Oil Seal Installation—*See Henry J Special Data.*

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft gear thrustwasher and shoulder on crankshaft at front of flanged front bearing. NOTE—Crankshaft gear must be removed with a gear puller in order to make endplay adjustments.
Endplay—.002-.008".

CAMSHAFT: Four bearing, helical gear drive. Pressed-on type fibre gear.
Journal Diameters—#1, 2.188"; #2, 2 1/4"; #3, 2 3/16"; #4, 1 3/4".
Bearings—Removable steel-backed, babbitt-lined bushing (front), machined in crankcase (all others).
Clearance—.002-.0035". Service limit .006" (front), .008" (all others).
Camshaft Removal—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.
Endplay—.003-.0055".

Timing Gears: Crankshaft gear cast iron. Camshaft gear fibre with steel hub.
Timing Gear Backlash—.000-.002".

Camshaft Setting: Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1 17/32"	.373"	5 57/64"
Exhaust	1 15/32"	.3725"	5 13/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.0015-.00325"
Exhaust	45°	23/64"	.0025-.0045"

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place to following dimensions:
Intake Guide—Top of guide 1 5/16" below top face of block. The shorter smaller-diameter section end of the guide should be up.
Exhaust Guide—Top of guide 1" below top face of block. Taper end (counter-bored end) of guide should be up.

Valve Springs: Two close-wound coils toward top of block. Install springs with closed-coil end up toward cylinder block. Spring free length 2½".

	Spring Pressure	Length
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

Valve Lifters: Mushroom type with self-locking screws, operating in reamed holes in block. Access hole in cover in left front splash shield. Serviced by installing oversize lifters.
Lifter Diameter—.6240-.6245".
Lifter Clearance—.0005-.002".
NOTE—Camshaft must be removed for lifter removal. *See Camshaft Removal instructions in Henry J Special Data.*

VALVE TIMING

Tappet Clearance: .016" All Valves, Cold.
►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—With .020" tappet clearance on #1 intake valve. This valve should open with #1 piston at 9° or .039" BTDC. with flywheel mark "I.O." centered in inspection hole in right front face of flywheel housing. Reset tappet clearance at .016"

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to timing gears.
Crankcase Capacity—4 qts. refill.
Normal Oil Pressure—35 lbs. at 30 MPH.
Oil Pressure Regulator—Opens at 28-40 lbs. Located on oil pump cover. Adjustable by removing or adding shims between valve retainer and spring.

Oil Pump: External Rotor type with floating oil intake. Mounted externally on left side of crankcase.
Oil Pump Servicing—*See Henry J Special Data.*

Oil Pressure Gauge: Indicator light on instrument panel. Controlled by King-Seeley Engine Unit. Light glows RED until oil pressure rises above 13 lbs.
Engine Unit—King-Seeley No. 47100. Pressure Switch. Contacts open at 13 lbs. (remain closed with lower oil pressure).

COOLING

Cooling System: Pressure type. Relief valve in cap optl. equipment.
Capacity—10¾ qts. (11¾ qts. with heater).
Pressure Cap (Optl.)—For high altitudes or extremely hot temperatures.

Water Pump: Centrifugal, belt-driven, packless type with sealed ball bearing shaft.
See Water Pump Section for complete data.
Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.

Thermostat: Harrison. In outlet elbow on cylinder head. No by-pass.
Std.—Stamped '151'. Starts to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) Electric type with voltage regulator.
Dash Unit—King-Seeley No. 45577.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-37 or Rockford Model 8½ RM with Borg & Beck Driven Member. Single plate dry disc type.
Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 6 (Rockford).
See Clutch Section for complete data.
Facings (Auburn)—Molded metallic or Raybestos. 2 required" I.D. 5⅜". O.D. 8½". Thickness .305".
Facings (B&B on Rockford Clutch)—Woven Asbestos. 2 required. I.D. 5⅜". O.D. 8½". Thickness .132-138".

Pedal Adjustment: Free travel 1" measured at pedal rod. Adjust as follows: (1) Clearance between rounded forward end of release fork adjusting rod and clutch housing when release bearing just contacting clutch levers should be ⅝". If less than ½", adjust to ⅝" by changing release fork adjusting rod length (more accessible by removing bellcrank from pivot with rod attached—grease bellcrank pivot before re-installing). (2) Connect and adjust length of pedal rod at trunnion end on bellcrank for required 1" free pedal travel.

Removal: Remove transmission (see Transmission Removal). Free clutch pedal adjusting rod at trunnion end of bellcrank. Remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws to clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

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TRANSMISSION

Warner Model AS40-T96. Model AS41-T96 with new Type R10B Overdrive (Optl.). Constant-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.

Removal: Support car on stands, drain transmission case (and overdrive case). Disconnect both shift rods at levers on transmission case (on overdrive cars, disconnect control cable from lever on overdrive case and electrical wiring at solenoid and lockout switch). Remove two capscrews and washers attaching clutch cross-shaft support bracket to transmission and remove bracket. Disconnect speedometer cable. Disconnect propeller shaft by taking off four nuts attaching front universal joint to yoke (CAUTION—tape needle bearing retainers in place to prevent entry of dirt or loss of bearings), tie propeller shaft up out of the way. Remove two capscrews attaching rear mounting insulator to cross-member, support rear end of engine (Support Tool KF-104) and raise engine just enough to remove weight from cross-member. Disconnect clutch realease bearing return spring from transmission (accessible through opening in right side of clutch housing). Remove four nuts attaching transmission to clutch housing, pull transmission straight back and remove from beneath car.

OVERDRIVE

Warner Type R10B (with special AS41-T96 Transmission)—Optl. equipment. New solenoid operated, governor controlled with throttle "kick-down."
NOTE—Overdrive is new "centered ring gear" type with one rear bearing only.
Control Relay—K-F No. 207923
Overdrive Governor—K-F No. 212385
Kick-down Switch—K-F No. 207924
Overdrive Solenoid—Warner 4AR10B-62.
See Transmission Section for complete data.

Removal: Overdrive and transmission are removed as a unit. See Transmission Removal above.

UNIVERSALS

Spicer Model with needle bearing.
Spicer No. 10275-1SF. Needle bearing type.
See Universals Section for complete data.

REAR AXLE

Spicer (Salisbury) Model 23-6, Part No. 2125-1; or Model 23-6, Part No. 2125-2 with O.D.—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.10-1 (Std.), 4.55-1 (with O.D.).
Backlash—.001-.005".

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers at spring seat, disconnect parking brake cables. Take out "U" spring bolts, disconnect both springs at rear shackle, remove axle from beneath car.

Axle Shaft Removal: Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out, using Axle Shaft Puller KF-15 (with Adapter SP-341 required).

SHOCK ABSORBERS

Monroe—Direct Acting, hydraulic two-way type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4½° preferred. Limits 4-4¾°.
Caster—0° preferred (±1°). Adjust by adding half shim under upper control arm at frame mounting bolt (rear bolt for Pos., front bolt for Neg. caster).
Camber—½° preferred (¼°-1° Pos. limits). Adjust by adding or removing whole shim under upper control arm at frame mounting bolts.
Toe-In—¼" (3/16-1/4" limits). Adjust by turning sleeve at outer end of each tie rod equally.
Steering Geometry (Toe-out)—Inner wheel 20°. Outer wheel 17°31'. No adjustment.

STEERING GEAR

Own Make (Gemmer 305 Type)—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 9".
Lining—Molded type. Width 2". Thickness 3/16". Length per shoe—9.75" (Forward Shoe—all wheels), 7.18" (Rear Shoe—all wheels).
Clearance—Shoe eccentric backed off to point where wheel turns freely.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1951 Nos. 1001 Up.
Body Number Note—Stamped on plate on right front firewall in engine compartment.

ENGINE NUMBER: Stamped on pad on right front upper corner of cylinder block and on Engine Name Plate on right side of crankcase.
1951 Nos. 3,000,000 Up.

TUNE-UP

COMPRESSION PRESSURE: 130-140 lbs. at cranking speed (Std. 7.0-1 Hd.). 10 lbs. max. variation between cylinders.

VACUUM READING: Steady 18-21" idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .030".
Plug Type—Auto-Lite AN-7 (Std.). 14 mm. Tighten to 30 ft. lbs. torque.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° ±1° closed.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: TDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Top dead center "0" mark on flywheel dampener.
CAUTION—Engine must be idling below 550 RPM. when setting timing.

CARBURETION:
Idle Setting—1-2 turns open. Turn screw out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" from top of float at free end to bowl cover when needle is seated (assembly inverted).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. fast idle.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.
►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*
NOTE—Tappet adjusting screws self-locking. Remove left front wheel and access hole cover in splash shield for access when adjusting valves.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: K-F No. 212063

COIL: Auto-Lite Model CR-4009. On right side of engine to rear of distributor.
Ignition Current—2.5 amperes (idling). 4.8 amps. (stopped) at 6.3 volts.

CONDENSER: Auto-Lite Part No. IAT-3076L.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite No. IAT-4007. New "Pivoted Breaker Plate" type. Full automatic advance with auxiliary vacuum spark control.
See Electrical Equipment Section for data.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° ±1° closed (at 300 RPM).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
1°	380	2°	760
7°	550	14°	1100
11°	1300	22°	2600
12°	1500	24°	3000

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
1°	2°	5½"
3°	6°	9¼"
5°	10°	13"
6°	12°	15"

Distributor Removal: Distributor located on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

►*CAUTION—If Oil Pump removed, refer to Oil Pump Installation directions in Henry J Special Data.*

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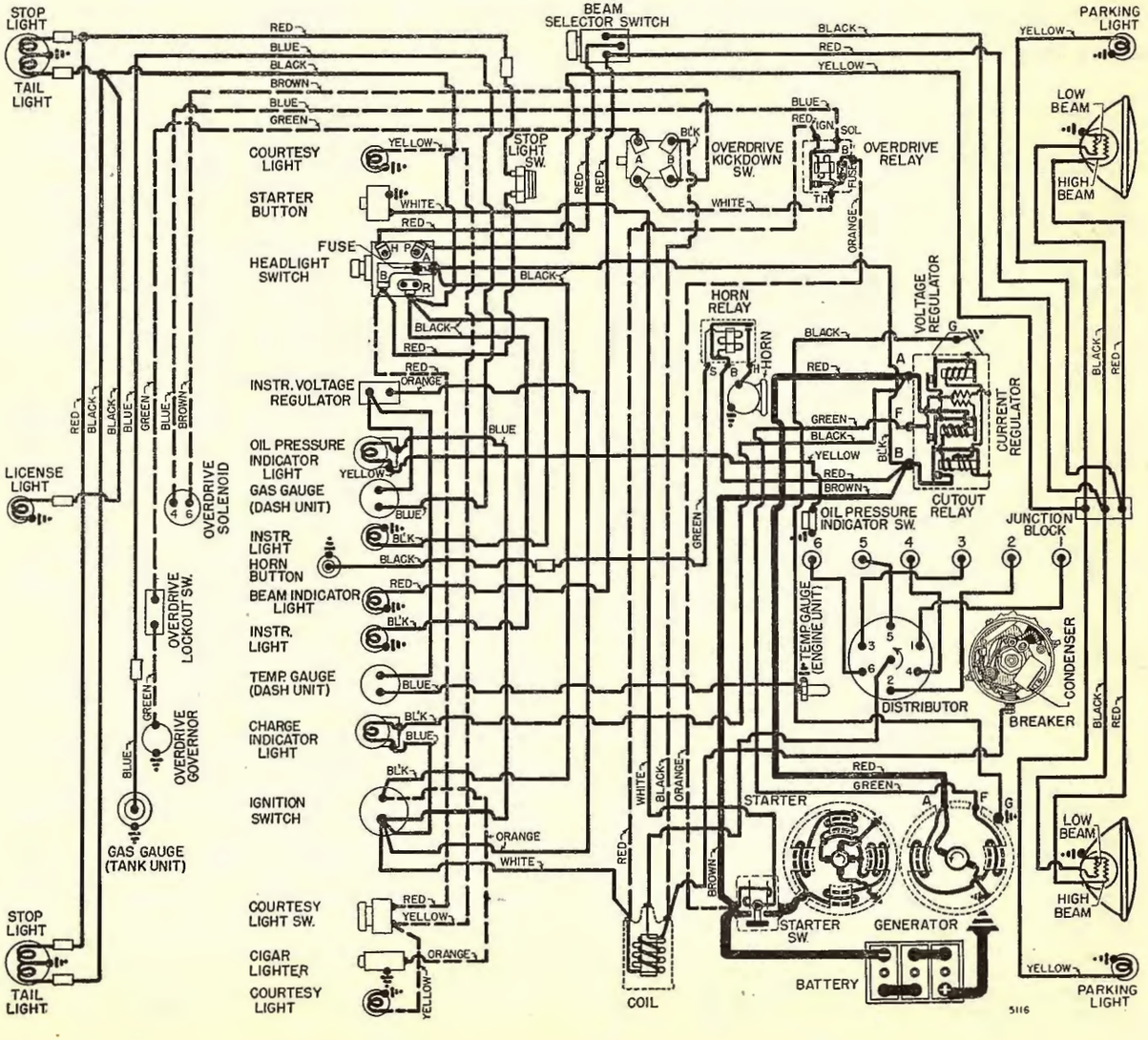

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IGNITION TIMING

Std. Setting ..... **TDC.**
Timing Mark—Timing mark located on flywheel dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.
Timing (with Timing Light C-693)—Mark "0" mark of top dead center on dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at lowest possible smooth idle speed (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw extending upward through 45° slot in arm under distributor. Advance or retard distributor until timing mark appears in line with pointer at front of engine. Tighten cap screw and recheck timing.
►*CAUTION—Reset engine idling speed at 550 RPM.*

CARBURETOR

Carter YF No. 814S (First Cars), No. 833S, SA, SB (Late Cars). 1¼" Single barrel. Downdraft types. Identical in appearance with YF-820S, SA, SB (4 Cyl.) but not interchangeable.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Single Barrel.
See Carburetion Equipment Section for complete data.
Setting—With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.

CARB. EQUIPMENT

Air Cleaner: United Specialties. K-F No. 212749 Oil-wetted type Std., Oil-bath type Optl.
Fuel Pump (Std.): Carter No. M807S Diaphragm type.
Optl.—Carter No. M809S combination Fuel-and-Vacuum Pump.
See Carburetion Equipment Section for complete data.
Pressure—3½-4½ lbs. fast idle. At 1000 RPM should be 3-4½ lbs. If more than 4½ lbs., adjust by adding gaskets between pump and cylinder block.
Vacuum—Not less than 6" at fuel pump inlet while cranking engine. 8" at 120 fuel pump RPM or 10½" at 1800 RPM.
Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 45574.
Tank Unit—K-S No. 45567.
See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air Intake Pipe (from air cleaner to **oil filler pipe**) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve **must close at idling speed** for satisfactory engine idling performance.
Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. When vacuum control valve is clogged, pressure will build up in crankcase. When not seating, idle will be unsatisfactory. Remove and clean vacuum control valve and air outlet pipe when tuning engine or if system operating incorrectly.
Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type IM-100D & Willard HW-1-100—6 volt, 15 plate, 100 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at right front engine support. Engine ground cable connected at same point.
Location—In engine compt. on right side.

STARTER

Auto-Lite Model MZ-4163. Armature No. MZ-2237. Four-field, 4-brush type with magnetic switch in starter.
Drive—Barrel type Bendix Drive No. A2089.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Starting Switch: Auto-Lite No. SS-4014 solenoid operated, mounted on motor near starter and controlled by push-button on instrument panel.
Removal: Flange mounted on right front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws and bracket screw.

GENERATOR

Auto-Lite No. GDZ-6001-E. Armature No. GGY-2006F. Two-brush type with voltage and current regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, cold, at 8.0 volts, 1800-2000 RPM.

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 amperes at 5.0 volts.
Motoring Current—3.9-4.4 amperes at 5.0 volts.
Removal: Pivot mounting at right front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts.
Belt Adjustment: Loosen clamp and pivot bolts, swing generator out away from engine to 15 lbs. pull on scale in line with adjusting bracket.
Generator Indicator: Warning light (under RED plastic) burns red when ignition switch turned on and goes out when cutout relay closes.

REGULATOR

Auto-Lite Model VRP-6001-A. Vibrating type voltage and current regulator.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cut In—6.4-6.9 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015"minimum.
Air Gap—.031-.034" with arm against stop.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
Adjustment—Aim upper beam straigh ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: (Optl.)—Guide Light Division make.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Lighting—K-F No. 212091
Beam Selector—K-F No. 204545
Courtesy Light (Optl.)—K-F No. 200821

MISC. ELECTRICAL

FUSES: Lighting—30 ampere on back of switch.
Overdrive—20 amperes. On control relay.
Heater—14 amperes.
Radio—14 amperes.
HORNS: Delco-Remy No. 1999639 (Low Note), 1999640 (High Note). Matched tone twin horns with relay.
Horn Relay—K-F No. 212080.
GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is connected in gauge feed circuit. See wiring diagram.

ENGINE

ENGINE SPECIFICATIONS: K-F Model 6L-161. Six cylinder Supersonic "L" head type.
Bore—3⅛" or 3.125".
Stroke—3½".
Displacement—161.0 cu. ins. **Rated HP.**—23.44.
Developed Horsepower—80 at 3800 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*
TIGHTENING TORQUES: *See Henry J Special Data.*
CYLINDER HEAD INSTALLATION: *See Henry J Special Data.*
OIL PAN REMOVAL: *See Henry J Special data.*
PISTONS: Aluminum alloy, "T" slot, cam ground, tin-plated type with heat insulation groove above top ring groove.
Length—3".
Weight—10.8 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top land .018-.021". Skirt .0021".
CAUTION—Pistons must not be "lapped" in (will destroy tin-plated surface).

ENGINE

CONTINUED FROM PRECEDING PAGE

Replacement Pistons: Std. & .010", .020", .030", .040" oversize.

Fitting New Pistons: Use .0015" feeler stock, ½" wide, inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.007-.017"	.0005-.001"
Oil Contr.	3/16"	.008-.013"	.001-.0015"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: .010", .020", .030", .040" oversize.

PISTON PIN: Diameter—.7496-.7495". **Length**—2 1/32". **Pin Fit in Piston**—.0001-.0005" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: No Oversizes are available.

CONNECTING ROD Length—6.345". **Weight** 22.5 ozs. NOTE—Rods are **not** offset and are interchangeable.

Crankpin Journal Diameter—1.875" (1 7/8").

Lower Bearing—Steel-backed, babbit-lined, replaceable precision type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.

Clearance—.0005-.0025". **Sideplay**—.002-.008".

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps. NOTE—Replace Bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: .001", .002", .010", .012" Undersize.

Installing Rods: Rods **not** offset. Install with oil spray hole in lower end toward right (away from camshaft) on all rods.

CRANKSHAFT: Four-bearing type with integral counter-weights. Vibration dampener on forward end.

Journal Diameters—2.250" (all bearings).

Bearings—Steel-backed, babbit-lined, replaceable precision type.

NOTE—Bearing shells are NOT dowelled on 6 cylinder engine. They can be removed and replaced without removing crankshaft.

Clearance—.0009-.003".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instruction in Henry J Special Data.*

Replacement Bearings: .001", .002", .010" Undersize.

Oil Seals: Rear main bearing oil seal is wick type packing in groove in crankcase and rear main bearing cap.

Oil Seal Installation—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.

End Play—.002-.008".

CAMSHAFT: Four-bearing, helical gear drive. Pressed-on type fibre gear.

Journal Diameters—#1, 1.8755-1.8760"; #2, 1.8425-1.8435", #3, 1.8110-1.8120"; #4, 1.6245-1.6250".

Bearings—Removable steel-backed, babbit-lined bushing (front), machined in crankcase (all others).

Clearance—.002-.0035". Service limit .006" (front), .008" (all others).

Camshaft Removal—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.

Endplay—.003-.0055".

Timing Gears: Crankshaft gear cast iron. Camshaft gear fibre with steel hub.

Timing Gear Backlash—.000-.002".

Camshaft Setting: Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1 3/8"	.3410"	4 9/16"
Exhaust	1 9/32"	.3400"	4 9/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.284"	.0015-.00325"
Exhaust	45°	.300"	.0025-.0045"

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place. Upper end 7/8" below upper edge of valve seat (taper end up).

Valve Springs: Springs can be installed with either end up. Free length 1 57/64".

	Spring Pressure	Length
Valve Closed	50 lbs.	1 5/8"
Valve Open	105 lbs.	1 21/64"

Valve Lifters: Mushroom type with self-locking screws, operating in reamed holes in block. Serviced by installing oversize lifters.

NOTE—Camshaft must be removed for lifter removal. *See Camshaft Removal instructions in Henry J Special Data.*

Lifter Diameter—.597-.605". **Length**—2".

Clearance in Block—.0005-.002".

VALVE TIMING

Tappet Clearance: .016" All Valves, Cold.

►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

Valve Timing: See Camshaft Setting above.

Intake Valves—Open 5° BTDC. Close 44° ATDC.

Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

Valve Timing Check—With .020" tappet clearance on #1 intake valve, this valve should open with piston 5° before top dead center with five-degree mark **before** dead center "0" mark on dampener aligned with pointer at front of engine. Reset tappet clearance at .016".

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to timing gears.

Crankcase Capacity—5 qts. refill.

Normal Oil Pressure—30-40 lbs. at 30 MPH.

Oil Pressure Regulator—Opens at 40 lbs. Located on oil pump cover. Adjustable by removing or adding shims between valve retainer and spring.

Oil Pump: External Rotor type with floating oil intake. Mounted externally on left side of crankcase.

Oil Pump Servicing—*See Henry J Special Data.*

Oil Pressure Gauge: Indicator light on instrument panel. Controlled by King-Seeley Engine Unit. Light glows RED until oil pressure rises above 13 lbs.

Engine Unit—King-Seeley No. 47100. Pressure Switch. Contacts open at 13 lbs. (remain closed with lower oil pressure).

COOLING

Cooling System: Pressure type. Relief valve in cap optl. equipment.

Capacity—9 qts. (10 qts. with heater).

Pressure Cap (Optl.)—For high altitudes or extremely hot temperatures.

Water Pump: Centrifugal, belt-drive, packless type with sealed ball bearing shaft. NOTE—Seal not same as that on 4 cylinder.

Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.

See Water Pump Section for complete data.

Thermostat: Harrison. In outlet elbow on cylinder head. No by-pass.

Std.—Stamped '151'. Starts to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) Electric type with voltage regulator.

Dash Unit—King-Seeley No. 45577.

Engine Unit—King-Seeley No. 44200.

See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-37 or Rockford Model 8½ RM with Borg & Beck Driven Member. Single plate dry disc type.

Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 6 (Rockford).

See Clutch Section for complete data.

Facings (Auburn)—Molded metallic or Raybestos. 2 required. I.D. 5⅜". O.D. 8½". Thickness .305".

Facings (B&B on Rockford Clutch)—Woven Asbestos, 2 required. I.D. 5⅜". O.D. 8½". Thickness .132-.138".

Pedal Adjustment: Free travel 1" measured at pedal rod. Adjust as follows: (1) Clearance between the rounded forward end of release fork adjusting rod and clutch housing when release bearing just contacting clutch levers should be ⅝". If less than ½", adjust to ⅝" by changing release fork adjusting rod length (more accessible by removing bellcrank from pivot with rod attached—grease bellcrank pivot before re-installing). (2) Connect and adjust length of pedal rod at trunnion end on bellcrank for required 1" free pedal travel.

Removal: Remove transmission (see Transmission Removal). Free clutch pedal adjusting rod at trunnion end of bellcrank. Remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws to clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS40-T96. Model AS41-T96 with Type R10B Overdrive (Optl.). Constant-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.

Removal: Support car on stands, drain transmission case (and overdrive case). Disconnect both shift rods at levers on transmission case (on overdrive cars, disconnect control cable from lever on overdrive case and electrical wiring at solenoid and lockout switch). Remove two capscrews and washers

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attaching clutch cross-shaft support bracket to transmission and remove bracket. Disconnect speedometer cable. Disconnect propeller shaft by taking off four nuts attaching front universal joint to yoke (CAUTION—tape needle bearing retainers in place to prevent entry of dirt or loss of bearings), tie propeller shaft up out of the way. Remove two capscrews attaching rear mounting insulator to cross-member, support rear end of engine (Support Tool KF-104) and raise engine just enough to remove weight from cross-member. Disconnect clutch realease bearing return spring from transmission (accessible through opening in right side of clutch housing). Remove four nuts attaching transmission to clutch housing, pull transmission straight back and remove from beneath car.

OVERDRIVE

Warner R10B (with special AS41-T96 Transmission)—Optl. equipment. New solenoid operated, governor controlled with throttle "kick-down."
NOTE—Overdrive is new "centered ring gear" type with one rear bearing only.
Control Relay—K-F No. 207923
Overdrive Governor—K-F No. 212385
Kick-down Switch—K-F No. 207924
Overdrive Solenoid—Warner 4AR10B-62.
See Transmission Section for complete data.
Removal: Overdrive and transmission are removed as a unit. See Transmission Removal above.

UNIVERSALS

Spicer No. 10275-1SF. Needle bearing type.
See Universals Section for complete data.

REAR AXLE

Spicer (Salisbury) Model 23-6, Part No. 2125-1; or Model 23-6, Part No. 2125-2 with O.D.—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.10-1 (Std.), 4.55-1 (with O.D.).
Backlash—.001-.005".
Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers at spring seat, disconnect parking brake cables. Take out "U" spring bolts, disconnect both springs at rear shackle, remove axle from beneath car.
Axle Shaft Removal—Remove rear wheel and drum using Puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out, using Axle Shaft Puller KF-15 (with Adapter SP-341 required).

SHOCK ABSORBERS

Monroe—Direct Acting, hydraulic two-way type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4½° preferred. Limits 4-4¾°
Caster—0° preferred (±1°). Adjust by adding half shim under upper control arm at frame mounting bolt (rear bolt for Pos., front bolt for Neg. caster).
Camber—½° preferred (¼-1° Pos. limits). Adjust by adding or removing whole shim under upper control arm at frame mounting bolts.
Toe-In—¼" (3/16-1/4" limits). Adjust by turning sleeve at outer end of each tie rod equally.
Steering Geometry (Toe-out)—Inner wheel 20°. Outer wheel 17°31'. No adjustment.

STEERING GEAR

Own Make (Gemmer 305 Type). Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Composite (cast iron & steel). Diameter 9".
Lining—Molded type. Width 2". Thickness 3/16". Length per shoe—9.75" (Forward Shoe—all wheels), 7.18" (Rear Shoe—all wheels).
Clearance—Shoe eccentric backed off to point where wheel just turns freely.
Hand Brake: See Service Brakes (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type.
See Miscellaneous Section for complete data.

HOOD ASSEMBLY

1940-47 MODELS

ENGINE HOOD (BONNET) LOCK: Alligator type hood (hinged at front) with integral side panels and instrument panel lock. To raise hood, push forward on lock handle located under edge of instrument panel to left of steering column, lift rear of hood.

Hood (Bonnet) Removal—Unlock and raise hood. Disconnect bonnet light wires from terminals on fender junction block. Remove bonnet-to-bonnet support bolts and bonnet-to-bonnet hinge bolts. Lift bonnet straight up and remove from car. Align Hood and Front Fenders as directed below

Radiator Louvre Panel Removal—Remove panel-to-fender bolts from under fender. Remove front bumper bolt and and loosen rear bolt permitting bumper assembly to be lowered. Remove center front screw from under panel and lift panel off.

1940-41 MODELS

HOOD (BONNET) & FRONT FENDER ALIGNMENT: —U-shaped bonnet hinge consisting of cross-bar in back of grille with an upright arm at each end which attach to each side of hood. Hinge cross-bar equipped with loose fitting bracket at each end which is attached to frame bracket by screws. Frame and hood hinge brackets have serrated faces. Thick and thin hinge positioning washers assembled on each end of hinge cross-bar and are retained by a large cotter pin. Each front fender positioned by brace rod anchored to frame at lower end and to fender bracket on upper end by means of positioning nuts.

Hood (Bonnet) Adjustments—Bonnet alignment can be adjusted at three points as follows: For full fore-and-aft bonnet movement, loosen bonnet-to-bonnet hinge bolts (three on each side along lower edge of hood). For slight sidewise or lengthwise movement, loosen bonnet hinge frame bracket-to-frame bolts. To position bonnet hinge assembly for sidewise movement, take out large cotter pin in each end of hinge cross-bar and add or remove washers for correct fit.

Fender Adjustment—Fender fit can be adjusted by means of positioning nut on each side of fender bracket at upper end of brace rod. Separate brace rod for each fender located under bonnet behind radiator louvre panel.

Radiator Louvre Panel Adjustment—Louvre panel fit can be adjusted by loosening louvre-to-fender bolts on outer ends of panel. Bolts on back side of panel and are accessible from behind panel with bonnet raised. Louvre panel should be pushed forward as far as possible for correct fit.

1942 MODELS

HOOD (BONNET) & FRONT FENDER ALIGNMENT: —Bonnet alignment can be obtained by loosening fender bracket bolt at bonnet hinge (lower end of each bonnet hinge arm behind radiator louvre panel). Bolt hole in each fender is enlarged which permits bonnet being shifted until fitted properly. Hinge to fender bracket bolt should be installed as follows: Place flat washer on bolt, then rubber shouldered washer and assemble in bonnet hinge hole (see that rubber washer seats properly). slide second rubber shouldered washer, plain washer and spring over bolt, screw bolt in fender bracket and install locknut.

Front Fender Alignment—Fenders can be fitted for sidewise movement at front end by means of adjusting nut and locknut on fender brace rods under bonnet behind radiator louvre assembly. Adjust fenders to obtain proper fit along bonnet.

FRONT FENDERS

1940-41 MODELS

FRONT FENDER REMOVAL: Unlock and raise hood. Disconnect headlamp wires at junction block, unclip wires from fender and dash and push headlamp cables through hole in fender (remove battery if left fender to be removed). Remove fender bolts at following points: running board, brace rod top nut, louvre panel, fender cross member (with spacers), brace to cross member screw, core baffle to fender screws (right fender only), radiator lower tank shield screws, hood support screws, apron support to inspection cover screw, and horn bracket to frame screws. Lift fender off.

Right Front Fender Inspection Hole Plate Removal —This plate replaces fender dust shield (now welded to fender) used on 1939 models for access to valve tappets, fuel pump, and oil pump. To remove, unlock and raise hood, remove horn mounting bolts and push horns forward (in engine compartment). Raise front end of car, remove right front wheel and 12 cap screws along the top, bottom and front edge of plate (under fender).

1942 MODELS

FRONT FENDER REMOVAL: Remove wheel, raise bonnet and support in open position. Remove battery (if left fender being removed). Disconnect light wires at junction block on left fender (if right fender being removed pull wires back through hole in fender and remove grommet). Take off dust shield hole cover (right fender only). Remove fender screws and bolts as follows: 2 bolts at bonnet support, 2 Phillips head screws at radiator tank lower shield, all screws in radiator baffle and remove baffle, 2 hex head bolts in louvre end bracket, 1 hex head bolt at frame bracket (under car), 2 hex head bolts at frame cross member, 4 hex head bolts at front bumper splash guard, 6 hex head bolts at cowl, 2 hex head bolts at bonnet hinge bracket, and fender brace rod nut. Lift fender off car. Mouldings, lamp and brace can be disassembled from fender after fender removed from car. NOTE—When installing fender, assemble headlamp after fender installed on car. Fender to cowl bolts should not be tightened until bonnet fitted to fender.

CYLINDER HEAD

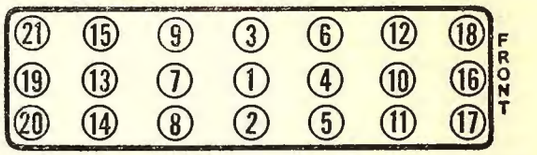
1939-51 MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head stud nuts, tighten in the sequence shown in the diagram.

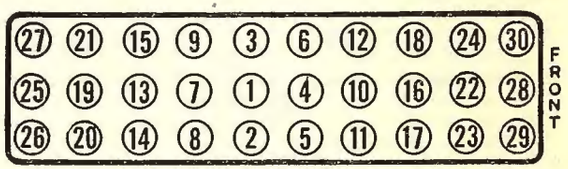
Cast Iron Heads—With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all nuts

Aluminum Heads—With the engine cold, tighten all nuts to correct tension. Run engine until thoroughly warm, allow engine to cool off, and then recheck all nuts. Do not tighten aluminum heads when warm.

Tightening Torque—See Tightening (Torque Wrench) Specifications below.



HUDSON 6



HUDSON 8

TIGHTENING SPECIFICATIONS

1948-51 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Capscrews (6)	70-75	840-900
Cylinder Head Stud Nuts (8)	45-50	540-600
Main Bearing Capscrews (6)	75-80	900-960
Main Bearing Capscrews (8)	70-80	840-960
Connecting Rod Bolts	40-45	480-540
Camshaft Gear Bolt	20-30	240-360
Intake Manifold Stud Nuts	12-15	144-180
Exhaust Manifold Stud Nuts	20-30	240-360
Engine Mounting Bolts	40-45	480-540
Vibration Dampener Screw	100-120	1200-1440
Clutch Cover Bolts	20-25	240-360
Differential Carrier Bolts	35-40	420-480
Rear Axle Shaft Nut	125-200	1500-2400

1941-47 MODELS

Cylinder Head Stud Nuts (6)	40	480
Cylinder Head Stud Nuts (8)	50	600
Spark Plugs (14 MM. Type)	28	336
Main Bearing Bolts	75	920
Connecting Rod Bolt Nuts	40	480
Flywheel to Crankshaft	45	540
Water Jacket Cover Bolt	15	180
Front Engine Support Bolt	45	540
Clutch Cover Mounting Bolts	22	264
Differential Carrier Nuts	37	444
Axle Shaft Nut	95	1140

1940 & PREVIOUS MODELS

Cylinder Head Stud Nuts (6)	45	540
Cylinder Head Stud Nuts (8)	55	660
Main Bearing Stud Nuts	91⅔	1100
Connecting Rod Bolt Nuts	52½	630

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ENGINE REMOVAL

1939 MODELS

ENGINE ASSEMBLY REMOVAL: All engines can be removed as follows: Remove bonnet (see Hood and Support Removal) and radiator (see Radiator Core Removal). Disconnect generator, starter, temperature gauge and oil check valve wires. Remove wire harness along left side of engine, spark plug cables (with brackets) and distributor cap. Disconnect flexible fuel pump feed line and remove fuel line to carburetor. Disconnect throttle linkage and choke wire (if used). Remove accelerator cross shaft, carburetor and air cleaner. Disconnect exhaust pipe. Remove front motor support bolts, flywheel guard, accelerator pedal, floor mat, transmission hole cover, clutch housing-to-engine support bolts, engine ground strap and exhaust pipe bracket at rear engine support. Hoist engine out of car (move engine forward carefully to disconnect from transmission mainshaft). Finally, remove distributor, generator, fuel pump and clutch.

Installation—Reverse procedure listed above and note following points. Wrap a piece of soft wire around clutch throwout bearing oil seal with ends of wire extending up through clutch housing, lower engine in place (use care not to damage clutch driving plate assembly when engaging transmission mainshaft), pull wire out (this will prevent edge of seal from being curled by clutch cover). Install starter after engine in place.

1940-47 MODELS

ENGINE ASSEMBLY REMOVAL: All engines can be removed as follows: Remove bonnet (see Hood Removal), front seat cushion, accelerator pedal, front floor mat, transmission hole cover, clutch housing to engine bolts, engine ground strap, radiator core (see Radiator Core Removal), radiator stay rods and horns. Disconnect generator, starter, temperature gauge, and oil check valve wires and remove wiring harness from clips on left side of engine. Disconnect flexible fuel pump feed line and remove fuel line to carburetor. Disconnect throttle linkage leading from accelerator cross shaft and remove cross shaft (pull shaft toward spring and slip shaft out of opposite bracket). Disconnect windshield wiper hose at manifold. Remove spark plug wires and bracket, distributor cap, carburetor and air cleaner. Disconnect exhaust pipe at manifold. Remove front engine support bolts and nuts. Hoist engine out of car (use Tool J-917 attached to engine) move engine forward carefully to disconnect from transmission mainshaft. Finally, remove distributor, generator, fuel pump and clutch.

Installation—Reverse procedure listed above and note following point. Wrap a piece of soft wire around clutch throwout bearing oil seal with ends of wire extending up through clutch housing, lower engine in place (use care not to damage clutch driving plate assembly when engaging transmission mainshaft), pull wire out (this will prevent edge of seal from curling over).

ENGINE MOUNTINGS

1940-51 MODELS

ENGINE FRONT SUPPORT REMOVAL: Drain cooling system. Remove generator, fan belt, radiator outlet hose and raise front end of car. Remove radiator lower tank shield, vibration dampener (see Vibration Dampener Removal) and timing gears (see Timing Gear Removal). Block up front end of engine and remove front engine mounting bolts and nuts. Take out engine support bolt and locks and remove plate.

Installation—Reverse procedure listed above, note the following points: Clean front face of cylinder block thoroughly and use new gaskets. When replacing engine mounting bolts, tighten nuts until upper and lower plates are against spacer.

ENGINE FRONT INSULATOR REMOVAL: Can be removed without removing support plate (above) by taking off self-locking nuts on insulator bolts and raising engine sufficiently to clear bolt threads from insulators. When installing insulators, tighten bolt nuts to 40-45 ft. lbs.

ENGINE REAR MOUNTING ADJUSTMENT & REMOVAL:

►*CAUTION—Mounting must be kept properly tightened or engine roughness and noise will result.*

Adjustment—Remove nuts, lockwashers, and bolts attaching rear mount to cross-member, jack up engine using block of wood between jack and oil pan (to avoid damage to pan) for one-inch clearance between base of mount and cross-member, insert box wrench or short socket through this clearance space and engage head of screw attaching mount to clutch housing (in hole in center of mount). Tighten screw, then lower engine re-install mount bolts in cross-member, tighten bolt nuts to 40-50 ft. lbs.

Removal—Proceed as for adjustment (above), use box wrench or short socket to remove attaching screw from center hole in mount, remove mount from clutch housing.

ORIGINAL BORE

1939-51 MODELS

ORIGINAL BORE SIZE: Original production (new engine) bore size indicated by code mark stamped on lower edge of valve chamber opposite cylinders. See table below for size and code marks.

1948-51 6 CYL. PISTON & BORE SIZES

	1951 4A, 5A, 6A Except Hornet		Hornet	
Code	Cyl.	Piston	Cyl.	Piston
A			3.812"	3.8095"
B	3.5625"	3.560"	3.8125"	3.810"
C	3.563"	3.5605"	3.813"	3.8105"
D	3.5635"	3.561"	3.8135"	3.811"
E	3.564"	3.5615"	3.814"	3.8115"
F	3.5645"	3.562"	①	3.812"
J	①	3.564"	①	3.814"
L	①	3.565"	①	3.815"
P	①	3.567"	①	3.817"
AO	3.572"	3.5695"	3.822"	3.8195"
BO	3.5725"	3.570"	3.8225"	3.820"
CO	3.573"	3.5705"	3.823"	3.8205"
DO	3.5735"	3.571"	3.8235"	3.821"
EO	3.574"	3.5715"	3.824"	3.8215"
FO	3.5745"	3.572"	①	3.822"
LO	①	3.575"	①	3.825"
BB	3.5825"	3.580"	3.8325"	3.830"
DD	3.5835"	3.581"	3.8335"	3.831"
FF	3.5845"	3.582"	3.8345"	3.832"

①—Cylinders not originally bored these sizes.

1947 & Earlier 6 Cyl. Piston & Bore Sizes
1951 & Earlier 8 Cyl. Piston & Bore Sizes

Code	Cyl.	Piston
A①	3.000"	2.998"
B①②	3.0005"	2.9985"
C①	3.001"	2.999"
D①②	3.0015"	2.9995"
E①	3.002"	3.000"
F	3.0025"	3.0005"
J	3.0045"	3.0025"
L	3.0055"	3.0035"
P	3.0075"	3.0055"
AO①	3.010"	3.008"
BO①②	3.0105"	3.0085"
CO①	3.011"	3.009"
DO①②	3.0115"	3.0095"
EO①	3.012"	3.010"
FO	3.0125"	3.0105"
JO	3.0145"	3.0125"
LO	3.0155"	3.0135"
PO	3.0175"	3.0155"
BB	3.0205"	3.0185"
DD	3.0215"	3.0195"
FF	3.0225"	3.0205"
BOOO	3.0305"	3.0285"
EOOO	3.032"	3.030"

①—1950 and earlier engines bored these sizes only in production.
②—1951 engines bored these sizes only in production.

PISTONS

1939-51 MODELS

►**1949 SIX CYL. REPLACEMENT PISTON CAUTION (Piston Production Change beginning Car No. 491-95958):** Different pistons (see identification Note below) must be used on engines after this number. These engines have new block with recess in top face between valve seat chamfer and cylinder bore. **Piston Identification**—Pistons used with new block (above) marked by number 302562 cast inside skirt near piston pin boss and have piston ring locating pin 20° from center-line of pin boss (44° on previous type pistons).

►**1950 PACEMAKER & OTHER SIX CYL. REPLACEMENT PISTON CAUTION**—*Pacemaker pistons are higher and must not be interchanged with pistons used on other engines.*

Six Cyl. Piston Identification

	Pin Center to Top—Height—Overall
Pacemaker	2.310-2.314" — 3¾"
Other 6 Cyl.	2.060-2.064" — 3¾"

REPLACEMENT PISTONS: Standard and oversize pistons marked by letter stamped on head and furnished for cylinder diameter sizes listed below. See Replacement Rings (following) for ring sizes.

Piston Markings—Code marks stamped on head of piston indicate the following: **Letter** indicates piston size and cylinder size for which piston to be fitted (see table below). **Number** indicates piston weight in ounces (if 2 numbers used, one over the other, top number indicates weight in ounces, lower number ¼ ounces). All pistons in one engine should be of same weight (carry same weight marks on head). NOTE—Original factory installed pistons carry two additional numbers, one number indicates cylinder in which piston installed, second number indicates cylinder block number.

PISTON RINGS

1939-51 MODELS

REPLACEMENT RINGS: Use Standard or Oversize rings for replacement pistons listed above. Ring size and pistons for each size as follows:

Six Cylinder		Eight Cylinder	
Ring Size	**Piston Mark**	**Ring Size**	**Piston Mark**
Standard	B,C,D	Standard	A,B,C,D,E,F
.003" OS	F	.003" OS	J
.005" OS	J,L	.005" OS	L,P
.010" OS	P,AO,BO	.010" OS	AO,BO,CO
.010" OS	CO,DO	.010" OS	DO,EO,FO
.015" OS	EO,FO,LO	.015" OS	JO,PO,LO
.020" OS	BB,DD,FF	.020" OS	BB,DD,FF
		.030" OS	BOOO,EOOO

Piston Ring Sets—Cast-iron or steel segment types furnished standard size, .010" and .020" oversize.
Note—If rings filed, keep clearance at pin uniform with end gap (.006-.014" desired on 6 cyl., .004-.009" on 8 cyl.).

PISTON PINS

1939-51 MODELS

PISTON PIN REPLACEMENT: When replacing pins, manufacturer recommends that oversize piston pins be fitted to the piston boss and new piston pin bushings be installed in rod. Piston pin bosses are diamond-bored and should not be reamed.

Replacement Piston Pins—Furnished in standard size and .002", .005", .010" oversize.

Fitting Pins (1947 & Earlier)—Hand press fit in piston with piston heated to 200°F. (heat in boiling water or electric furnace—do not use torch or direct heat). Replace pin bushing in rod and ream or burnish to .0003" greater diameter than pin (giving desired .0003" clearance on pin). To check pin fit in rod bushing, hold piston with rod in horizontal position, rod should just turn on pin of own weight.

Fitting Pins (1948-50)—Pins should be a hand press fit in piston with piston at 70°F. (1948), 200°F. (1949-50).

CAUTION—Do not ream piston pin bosses in piston.

CRANKSHAFT SIZE CODE

1939-51 MODELS

CRANKSHAFT SIZE CODE: Engines built with undersize parts are identified by following marks stamped on crankshaft or engine block (see Location data below).
PU—.010" undersize connecting rod crank pins.
MU—.010" undersize main bearing journals.
PMU—.010" undersize main and connecting rod pins.

Location of Marks

Crankshaft Mark (Six Cyl. Engines through 1947, All Eight Cyl. Engines)—On left front corner of cylinder block on bottom face beside oil pan gasket (visible from below without removing oil pan).

Crankshaft Mark (Six Cyl. Engine 1948 on)—Stamped on front face of crankshaft #1 counterweight.

Bearing Marks—Undersize Main Bearings marked by green paint and part number stamped on back for Eight Cylinder engines, stamped on back of bearing shells only on Six Cylinder engines.

CONNECTING ROD & BEARINGS

1948-51 MODELS

►**1948 SIX CYL. CONNECTING ROD PRODUCTION CHANGE:** Three different type connecting rods used in production as listed below.

CAUTION—See Rod interchangeability Caution below.

(1) No. 300044 (Drilled Type)—Used on all engines before Car No. 482-108180 (Oct. 1948) except for 563 engines on which type (2) rods used. These rods have drilled hole in rod web extending up to pin bushing for pressure lubrication of pin from crankshaft in addition to oil-spray hole in lower end for cylinder wall lubrication.

(2) No. 302293 (Non-drilled Type)—Used on all engines beginning Car No. 482-108180 and on 563 engines before this number. These rods are same forging as type (1) rods above but do not have drilled hole for pressure lubrication of pin. Pin lubrication is provided by a drilled hole in upper end of rod through pin bushing and rod has oil-spray hole in lower end for cylinder wall lubrication.

(3) No. 302601 (Non-drilled Type)—Used on later engines. These rods same as type (2) above except that forging changed (different design I-beam section).

►**CONNECTING ROD INTERCHANGEABILITY CAUTION:** All three types of six cyl. connecting rods (see Production Change Note above) are interchangeable **but must be matched for weight with rod being replaced.** All rods installed in engine must be uniform in weight.

NOTE—Where undrilled rod (type 2 or 3) used to replace drilled rod (type 1), the undrilled rod may be slightly heavier (fraction of an ounce) than the drilled rod it replaces. This difference will be compensated for by weight of oil in drilled rod.

Rod Installation—All types of rods should be installed with oil spray hole in lower end toward valve side of engine.

CRANKSHAFT & MAIN BEARINGS

1939 MODELS

CRANKSHAFT REMOVAL: 1937-38 Models. Crankshaft must be removed for main bearing replacement. To remove shaft, remove vibration dampener (following) and timing gear cover. Remove crankshaft gear with Gear Puller J-471, oil reservoir, transmission (see Car article for data) and clutch. Disconnect connecting rods. Remove main bearing caps (use Puller J-377 for removal of Front and Rear caps) and lower crankshaft out.
1939 Models—Remove engine (see Engine Assembly Removal), vibration dampener, timing gear cover and oil reservoir. Disconnect connecting rods and remove main bearing caps as directed above.

Installation:—Reverse procedure listed above for removal and note following points. Front and rear oil seal grooves in caps and case must be cleaned of all oil packing. After caps secured in place, drive new packing in grooves using Tool J-392 (install in horizontal groove first on front cap). See Connecting Rod Palnuts (above) for 1938-39 models. Use Tool J-843 to press crankshaft gear and dampener in place. Check oil seal on timing gear cover and do not fold or damage when installing. See Checking Oiling System for oil reservoir installation.

1940-47 MODELS

CRANKSHAFT REMOVAL: Crankshaft can be removed with engine in chassis as follows: Remove bonnet (see Hood (Bonnet) Removal above), radiator (see Radiator Core Removal following), vibration dampener (see Vibration Dampener Removal following), timing gears (see Removal instructions following), transmission and clutch (see Hudson 6 and 8 Car articles for data). Remove flywheel and engine oil pan and tray. Remove connecting rod bearing caps and push rods up clear of crankshaft. Remove front and rear main bearing caps with Puller Tool J-377. Remove center main bearing cap with care and take out crankshaft.

Installation—Reverse removal procedure listed above. Install new oil seals at front and rear main bearing cap (see Front and Rear Main Bearing Cap Installation following) and new palnuts on main and connecting rod bolts (see Connecting Rod and Main Bearing Palnut Installation above).

1948-51 MODELS

CRANKSHAFT REMOVAL: ***Can be removed with engine in car but manufacturer recommends that engine be removed first. Then proceed as follows:***
Remove transmission and clutch assembly, remove flywheel, crankshaft oil thrower, oil pan, and oil pan baffle. Remove vibration dampener (use puller J-676-C). Remove gear case cover, lift out camshaft thrust plunger (8 cyl. only). On six cyl. engines, remove camshaft gear and timing chain. On all engines, use puller J-471 to remove crankshaft gear. Remove all piston and connecting rod assemblies. Use puller J-2955 to remove front & rear main bearing caps, remove other bearing caps and remove crankshaft with a rope sling.
Installation Note (8 Cyl.)—Before installing flywheel, make certain that lower half of oil retainer fits squarely on upper half and that gaskets are in good condition. If contacting faces nicked, install new retainer. NOTE—Screw holes in oil retainer half mounted on bearing cap are slotted to permit adjustment for good contact with upper half.
►***CAUTION—Oil leaks may result if oil retainer joint not tight.***

1939-40 MODELS

MAIN BEARINGS: Adjustment. Laminated shims are provided on top of caps. Remove caps (use Puller J-377 for front and rear caps) and remove shims until clearance is .001". See Crankshaft Installation

Replacement Bearings:—Finished bearings (with attaching screws) furnished standard and .010" undersize (see Crankpin Size Code for original bearing sizes). Unfinished bearings furnished with 1/32" extra stock and must be line-reamed (see below).

Removal:—Bearing shells are removable type and are held in case and caps by screws. To replace bearings, crankshaft must be removed (see Crankshaft Removal above). With shaft out, take out screws securing shells in cap and case.

Installation:—With crankshaft removed, secure bearing shells in case and cap with machine screws. If unfinished bearings installed, line-ream as directed below. Install crankshaft (see Crankshaft Installation). Add or remove shims on bearing caps until .001" clearance obtained. Secure caps in place.

Line-Reaming Main Bearings:—Where unfinished bearings used for replacement, bearings must be

CONTINUED ON NEXT PAGE

CRANKSHAFT & MAIN BEARINGS

CONTINUED FROM PRECEDING PAGE

line-reamed to size as follows: install bearings in cap and case, place .021" shims between case and cap and tighten cap, then line ream bearings. Thrust flange on center (Six), #3 (Eight) bearing must be faced for .006" endplay.

ALL 1941-47 MODELS
1948-51 EIGHT CYLINDER

MAIN BEARINGS: Removal and Installation (with engine in car). Bearing halves are retained in crankcase and caps by a machine screw in each half, requiring removal of crankshaft for access to screw in upper half. Remove crankshaft (see Crankshaft Removal above), take out machine screw in each bearing half in crankcase and caps, remove bearings. Install by reversing this procedure.

NOTE—Shims not used on 1941 & later engines.

Replacement Bearings—Hudson replacement bearings furnished reamed (standard size or .010" undersize) and not reamed (see Line-Reaming data below). Reamed bearings carry punch marks on one side and when installed these marks should be together and on the same side for all bearings so that they will be in the same position as when reamed.

IMPORTANT—Lower half of bearing shell extends .002" above surface of cap (allows bearing to seat in cap and crankcase when stud nuts tightened).

Fitting Bearings—See Replacement Bearings above. Bearings can be fitted with shims (do not file caps) as follows: Install bearing shells in caps and case and oil bearing surface. Fit each bearing separately. Install crankshaft and bearing cap (on front and rear bearings, caps should be centralized on studs by inserting ¼" drill rod in vertical packing holes on each side of cap), tighten stud nuts to 75 ft. lbs. Test bearing fit by using two hand pull on crankshaft, shaft should start hard but be able to be turned over. If shaft cannot be moved, insert .005" shim between cap and case (trim shim flush with bearing shell). Repeat test until shaft turns easily. Shims are furnished .003" and .005" thick.

Line-Reaming Bearings—See Replacement Bearings above. Semi-finished bearings available for service which must be line-reamed on engine as follows: Place bearing shells in place in caps and crankcase, and secure with machine screws (see that screws are seated in countersink hole in shells), bearing shell in cap should project .002" above cap while shell in case should be flush, tighten caps to 75 ft. lbs. (front and rear caps should be centralized on studs by inserting ¼" drill rod in vertical packing holes on each side of cap). Line-ream bearings for .001" maximum clearance on crankshaft and face flange on center bearing for .006" shaft endplay.

Front and Rear Main Bearing Cap Removal and Installation—These caps fit in machined openings in crankcase. Front cap has vertical and horizontal grooves, rear cap vertical grooves only, with packing installed in these grooves to seal caps in place. When removing these caps a special removing Tool J-377 must be used to pull caps out of engine. After caps removed, grooves in caps and crankcase must be cleaned of all old packing. If old packing not removed from crankcase, oil passages may be clogged. When installing main bearing caps, insert new cotton wicking (use Crankshaft Bearing Packing Tool J-392) in vertical grooves on each side of front and rear caps, then install packing in horizontal grooves in upper end of front cap (horizontal grooves not used on rear cap). Lower half of oil retainer on rear cap should be a tight fit against upper half to prevent oil leaks at this point.

1948-51 SIX CYLINDER

FRONT AND REAR OIL SEALS: (Front)—Install oil seal using Tool J-2776. Press seal tightly in place. **(Rear)**—Crowd seal material into outer groove of bearing cap by hand and with Installer J-2779, drive seal tightly into groove by tapping handle of tool with bronze hammer. Large diameter of tool cylinder should be to front of cap. After seal has been seated in cap and in the block, and while tool is still compressing seal, cut the seal off flush with top face of cap. **Do not cut seal too short.** Seal must entirely fill the groove.

Front & Rear Bearing Cap Seals: Consist of vertical grooves on each side of cap, and additional horizontal grooves on each side of front bearing cap only, for installation of special wood seals. Install seals in following order:

Vertical Seals No. BM300093—Now furnished with 1/32" saw slot approximately 2/3 length of seal. Dip seal in engine oil, start sawed end in bearing cap groove, drive seal in until bottomed securely.

Horizontal Seals No. 300093 (Front Cap only)—Install only after vertical seals have been installed. Dip seals in engine oil, drive in grooves in bearing cap until bottomed against vertical seals.

1948-51 SIX CYLINDER

FRONT BEARING CAP LOCK PLATE INSTALLATION: New lock plates, BM303799, furnished for installation on front bearing cap screws to replace split lockwashers formerly used. NOTE—These lockplates will prevent oil leakage or seepage which might occur when regular lockwashers used.

Lockplate Installation—Install lockplate under screw head with lock tabs pointing straight forward. After screws properly tightened to 75-80 ft. lbs., use pointed punch to bend center tab up, then use V-shaped drift to secure tab firmly against cap screw head.

VIBRATION DAMPENER

1939 MODELS

VIBRATION DAMPENER REMOVAL: 1937-38. Remove fan belt, radiator shell, and radiator. Unscrew starting jaw. Pull dampener using Tool J-676. Install dampener using Tool J-483.

1939 Models—Dampener can be removed from beneath car without removing radiator core or shell as follows: Remove fan belt, raise front end of car, unscrew starting jaw, pull dampener using Tool J-676 (set puller tool screw in place through starting crank hole in frame cross member) and remove from below. Install dampener using Tool J-483.

Servicing—No adjustment other than replacing 2 rubber discs (drive flywheel from hub) if worn.

1940-47 MODELS

VIBRATION DAMPENER REMOVAL: Dampener can be removed from beneath car without removing radiator louvre panel or radiator (radiator must be removed on Eight only) as follows: Remove radiator louvre panel center moulding, front bumper bracket bolts permitting bumper to drop down, and fan belt. On Eight only, remove radiator (see Radiator Core removal data above). Unscrew crankshaft starting jaw from end of crankshaft. Install jaw of special vibration dampener removal tool over dampener and place screw of tool through starting crank hole. Withdraw dampener by turning screw of dampener tool and remove from beneath car (6), or above (8).

1948-51 MODELS

►**VIBRATION DAMPENER PRODUCTION CHANGE:** Dampener No. 300098 used on first cars, superseded by No. 301934 which has front face machined at angle for balance drilling in production. **These dampeners are interchangeable** (see replacement caution below).

Dampener Alignment Marks—Center-punch marks on front end of hub and adjacent mark on pulley indicate relative position of parts when dampener assembled and balanced. If dampener disassembled, **assemble dampener with these two marks together.**

►**Six Cylinder Balanced Crankshaft & Dampener Replacement Caution**—On special balanced engines, where crankshaft and dampener matched for proper balance, engine is marked by "B" stamped on front machined face of block beside water pump housing. When replacing crankshaft on these engines, install new No. 301934 Dampener.

►***CAUTION—Do not re-install dampener used with original specially balanced crankshaft.***

►**INOPERATIVE VIBRATION DAMPENER (Causing Engine Roughness & Vibration at 24-26 MPH.):** May be caused by inner and outer members being locked together by mounting capscrew in crankshaft. Inspect capscrew and locking washer for contact with outer member. If clearance not noted at this point, remove screw, chamfer outer corners of hexagonal head of screw at 45° angle, re-install screw and tighten to 100-120 ft. lbs. torque, bend **all lips** of locking washer over capscrew flats.

CAMSHAFT & BEARINGS

1940-47 SIX CYLINDER

REPLACEMENT CAMSHAFT (6 CYL. ENGINES): One type camshaft only furnished for service on all engines, Part No. 166195 (superseding first replacement camshaft 162962). This camshaft same as type used on small (3x4⅛") engine beginning with part production 1941 and has special cam contours which **require special tappet clearance** (see Tappet Clearance Note below) and results in **different valve timing** (see Valve Timing Note below). Camshafts used originally on each model are as follows:

Model	Engine	Original Camshaft
40 ('40)	Small (3"x4⅛")	159505
41, 42, 43, 48 ('40)	Large (3"x5")	159505
10 ('41) First	Small (3"x4⅛")	159505
10 ('41) Later	Small (3"x4⅛")	162962
10, 11, 12, 18 ('41)	Large (3"x5")	159505
20 ('42)	Small (3"x4⅛")	162962
20, 21, 22, 28 ('42)	Large (3"x5")	159505
All ('46 On)	Large (3"x5")	166195①

①—Supersedes first type No. 162962.

Camshaft Identification: New type No. 166195 (and first type replacement camshaft 162962) camshaft has new cam contours which are not apparent to the eye and shaft is marked for identification by "X" on face of camshaft gear mounting flange and has shoulder (increased diameter section) ¼" wide exactly midway between 2nd. and 3rd. cams from

front end (visible from below with oil pan and upper tray removed).

Installation Caution: A Warning decalcomania is furnished with each of these camshafts and this should be placed on valve cover when camshaft installed in engine. This warning tag specifies the special tappet clearance required when these No. 162962 or 166195 camshafts are used.

Tappet Clearance (With No. 162962 or 166195 Camshaft): Tappet clearance on all engines with either of these camshafts must be set as follows:

Intake Valves—.010"
Exhaust Valves—.012"

Tappet clearance should be set with engine at normal operating temperatures.

CAUTION—This tappet clearance is essential for proper Idling and Low Speed operation.

Valve Timing (With No. 162962 or 166195 Camshaft): When either of these camshafts installed on 6 cyl. engines, valve timing will be as follows:

Intake—Opens 27°30' BTDC. Closes 68°10' ALDC.
Exhaust—Opens 51°50' BLDC. Closes 32°10' ATDC.
These figures correct with .010" tappet clearance.

1941 MODELS

CAMSHAFT CHANGE ON 3" x 4⅛" SMALL 6 CYLINDER ENGINE:—New design camshaft used on Model 10 engine after car no. 6848. Cams machined to new contour, intake and exhaust cams alike, which requires new valve timing and tappet clearance. This camshaft is same type furnished for replacement on all 6 cylinder engines (see Replacement Camshaft data above).

Identification—New camshaft used after car no. 6848 and may be identified by letter 'X' stamped on front face of shaft behind camshaft gear. Engines with this camshaft carry a decalcomania on valve cover stating "Tappet Clearance Hot, Inlet .010", Exhaust .012"."

Interchangeability—This new type camshaft can be installed on early 1941 engines and all 1940 engines (3" x 4⅛"). See Replacement Camshaft data above. When installed on engine originally equipped with old style camshaft, a decalcomania with the new tappet clearance figures of .010" Inlet and .012"Exhaust Hot, should be installed on cover plate.

1939 MODELS

CAMSHAFT REMOVAL: Remove bonnet (see Hood and Support Removal) and radiator (see Radiator Core Removal). Raise front end of engine and remove front engine guard. Remove radiator center grille (all except 112) which is attached by 8 sheet metal screws. Remove radiator shell on 112 only. Unscrew starting crank jaw. Remove vibration dampener, timing gear case cover, and camshaft gear. Remove right front wheel and fender dust shield (see Right Front Fender Dust Shield Removal). Remove valve covers, cylinder head, valves, tappets, oil pump, fuel pump, distributor, camshaft, thrust button and spring. If camshaft will not clear radiator shell splash guard, guard can be pressed down until shaft clears.

1940 MODELS

CAMSHAFT REMOVAL: Remove bonnet (see Hood Removal), radiator (see Radiator Core Removal), radiator louvre panel assembly, vibration dampener (see Vibration Dampener Removal), fan blades, fan belt, timing gear cover, camshaft gear (3 bolts), valve chamber cover, cylinder head, valves, tappets, oil pump, fuel pump and distributor (on Six cylinder cars, remove distributor shaft and support assembly). Loosen front engine support and raise front end of engine until camshaft clears radiator tank lower shield. Withdraw camshaft with thrust button and spring. CAUTION—Two special washer head timing gear cover bolts used at lower left corner of cover and must be re-installed in same holes when cover replaced.

Camshaft Bearing Removal:—Remove camshaft as directed above. Remove oil pan and bearings. See Rear Camshaft Bearing Installation for Six Cylinder Engines following.

Replacement Camshaft Bearings:—Finished bearings available which are reamed sufficiently oversize to provide correct running fit when installed in engine without reaming or scraping. Standard bearings with added wall thickness provided for installations where reaming equipment to be used. These bearings must be line-reamed for .001" clearance.

Rear Camshaft Bearing Installation (Six Cylinder only):—Due to new location of distributor at top rear of cylinder block, distributor gear is now cut in rear bearing journal with a special cut-out machined in camshaft rear bushing for the distributor support shaft gear. **Whenever rear bearing replaced, this cut-out must be made in bearing after installing in engine as follows:** With distributor driveshaft and support assembly off engine, remove driveshaft from support, insert cutting tool in support (making up cutting tool by mounting 1 ⅛" hole saw on end of 12" length of ½" cold rolled stock, thread opposite end for hex nut), install support (with cutting tool) on engine and tighten support anchor bolt. Cut bearing (use nut on end of cutting tool and turn with rachet wrench) using light pressure to give a clean cut. IMPORTANT—Place oil soaked rag under bearing to catch chips (avoiding necessity of removing crankshaft). Remove support (together with cutting tool). Drill hole in side of bearing for anchor plug by using ⅜" drill inserted in camshaft anchor plug hole on right side of engine. Install new anchor plugs. Remove oil soaked rag and use extreme care to remove all bearing chips and cuttings.

1941-47 MODELS

CAMSHAFT SERVICING: Camshaft Remov'l. Remove bonnet (see Hood (Bonnet) Removal above), radiator (see Radiator Core Removal following), radiator louvre panel, vibration dampener (see Vibration Dampener Removal above), fan blades, fan belt, timing gear cover and gasket, vibration dampener spacer, camshaft gear (3 bolts and lockwire), valve chamber cover, valves, tappets, oil pump, fuel pump, and distributor. Camshaft with thrust button and spring can then be withdrawn from engine by pressing down on radiator lower tank shield.

Camshaft Installation—See Timing Gear data below (note CAUTION on cover bolt installation).

Camshaft Bearings—New thin type steel-backed, babbitt-lined bushings used (cannot be used for service on earlier cars). Factory reamed bearings available for replacement which require no reaming or scraping. Standard bearings with extra wall thickness permitting line-reaming on engine also available (line-ream for .001" bearing clearance).

Camshaft Bearing Removal & Installation—Bearings can be removed as follows: Remove camshaft (see Camshaft Removal above), remove oil pan and tray, press old bearings out. New bearings can be installed as follows: Press new bearings in place with locating notch on front edge at top (back of bearing has 1/16" chamfer so that bearings can be readily installed in crankcase, bearing material on front of bearing has light chamfer at front). Coat bearings with light engine oil, install camshaft.

1948-51 MODELS

CAMSHAFT REMOVAL: Remove radiator, cylinder head, right front wheel, fender side shield. Disconnect vacuum pump line, windshield wiper, hose and fuel pump. Remove distributor and oil pump. Remove grille center support cover, upper baffle and right hand moulding, remove grille intermediate baffle and moulding. Place block of wood between oil pan and head of jack, raise engine 1½". Remove vibration dampener, screw lock and dampener, dampener key and gear case cover. Remove coil and valve covers. Remove valve and valve springs (use Tool KMO-484). On Six Cyl. raise and secure tappets enough to permit camshaft removal. On Eight Cyl. remove tappet retainer screws, plates, washers, and lockwashers, tappets and guides. Align sprocket or gear markings and remove camshaft sprocket or gear. Remove camshaft and thrust washer.

TIMING GEARS

1939-47 MODELS

REPLACEMENT TIMING GEARS: Laminated Fibre. Starting with 1941 engines timing gears have new design 20° pressure angle teeth (formerly 14½°) providing increased gear life and quieter operation. All other specifications (material and size) same as for preceding gears **These new type gears can be used for replacement on 1940 & earlier cars in sets Identification Marking**—Figure '20' used to mark these gear types. Cast on front of crankshaft gear (also carries mark 'FRONT'), and moulded on front face of camshaft gear.

REPLACEMENT TIMING GEARS: Aluminum Type. A new aluminum Camshaft Gear has been used on all models beginning with 1946 engines (later cars only—first cars have laminated fibre type gear). This gear (and cast iron crankshaft gear used with it) have 20° pressure angle teeth and in addition, teeth have slight crown or curvature to improve quietness. These gears **furnished for service in Matched Sets only.** See Installation data below for changes necessary when aluminum camshaft gear used to replace the laminated fibre type.

Identification Marking—Both gears marked by figure "20" on front face of gear. Crankshaft gear has additional marking "FRONT" to insure correct installation.

Camshaft Gear Installation (Aluminum Type): When using aluminum gear to replace laminated fibre type, additional clearance must be provided for this gear as follows:

Support Plate Screws—With camshaft gear out, remove front support plate (see Engine Front Support Removal), countersink the two screw holes in the plate behind the camshaft gear, and the corresponding holes in the cylinder block, to take special countersunk head screws and lockwashers furnished for use at this point.

Support Plate Cutout—The cutout in the plate adjacent to the camshaft flange should be increased in size or chamfered to provide adequate clearance when aluminum gear installed.

CONTINUED ON NEXT PAGE

TIMING GEARS

CONTINUED FROM PRECEDING PAGE

ALL 1940-47 MODELS
1948-51 EIGHT CYLINDER

TIMING GEAR REMOVAL: Drain cooling system. Remove fan belt, radiator outlet hose, vibration dampener (see Vibration Dampener Removal), timing gear cover bolts, cover, cover gasket and vibration dampener spacer. Turn engine over until timing marks (2 teeth mark on camshaft gear, 1 tooth mark on crankshaft gear) coincide. Remove camshaft gear (retained by 3 capscrews and lock wire). Remove crankshaft gear using Puller Tool J-471. **Gear Installation**—Reverse removal procedure above (use Tool J-483 to replace camshaft gear). Use new timing cover gasket and check leather oil seal in timing gear cover. If new seal to be installed, coat seal seat in cover with red or white lead and press seal securely in place. Do not curl edge of seal over when cover installed. CAUTION—On 1940-41 engines, two special washer head timing gear cover bolts used at lower left corner of cover and must be re-installed in same holes when cover installed. All bolts are washer-head type beginning with 1942 engines.

Replacement Camshaft Gear:—A special .008" oversize camshaft gear (marked with daub of yellow paint on front face of gear) available for service.

VALVE SYSTEM

1939-47 MODELS

VALVE TOOLS: Valve stem diameter reduced to 11/32" starting 1938 (was 3/8"). Due to this decrease in stem diameter, new pilot size necessary for valve servicing tools. Tool numbers as follows:

Tool	Tool No.
Valve Stem Guide Replacer Pilot	J883-6
Valve Stem Guide Reamer Pilot	J129-2
Valve Stem Guide Remover Pilot	J267
Valve Seat Reamer Pilot	J491-12

ALL 1937-47 MODELS
1948-51 EIGHT CYLINDER

VALVE LIFTER REMOVAL: Valve lifters may be removed without removing cylinder head as follows: Remove Right Front Fender Dust Shield on '39 cars, Right Front Fender Inspection Hole Plate on '40-'42 cars (see first page). Remove valve cover, break loose tappet adjusting screws, remove spring seat retainer using Tool J-915, remove tappet adjusting screw, spring seats, spring dampeners, tappet guide clamp screws and clamps. Take out tappet and guide assemblies.

OILING SYSTEM

1949 SIX CYLINDER

TIMING CHAIN LUBRICATION CHANGE: On first cars, chain was lubricated through tube (with restricted end) mounted on front of cylinder block and connected at drilled hole in front end of cylinder block. On later cars, this tube was replaced with open oil trough which conveys oil overflowing from camshaft front bearing thrust plate to the chain and hole in cylinder block has been eliminated.
NOTE—Oil trough eliminates possibility of oil supply to chain being stopped by clogging of restricted opening in oil tube.

►**Installation of Oil Trough on First Cars with Oil Tube (to prevent possibility of oil stoppage to chain due to clogged tube)**—With front end of engine stripped for access to front of block, remove and discard oil tube. Enlarge tube hole in front face of block with 21/64" drill and tap with 1/8" pipe tap. Close hole by installing special headless pipe plug tightly (CAUTION—plug must be flush with front of block). Install new oil trough No. 302513 using same attaching screw as used for oil tube.

►*CAUTION—Use care not to allow metal particles to enter oil passages when drilling and tapping hole in block.*

1949 EIGHT CYLINDER

OIL PAN TRAY BAFFLE INSTALLATION: On first 1949 and earlier 8 cylinder engines without this baffle, small sheet metal baffle, No. 302539, can be installed to improve engine lubrication. Position baffle on top of oil pan tray, on right side next to large oil return opening at center of tray, and 2 7/8" to rear of next baffle. Attach baffle by soldering both sides of flange securely.

1948-51 MODELS

►**OIL LEAKAGE AT MACHINING LOCATING HOLE IN CRANKCASE FLANGE CORRECTION**—Locating hole in crankcase flange at left rear of engine behind starter opens into oil pan and is sealed by a special cup shaped plug. If this plug loose or dislodged, oil may be thrown out or dirt and water allowed to enter oil pan. Check this plug, and similar plugged opening at right front of engine and install new plugs as follows:

Plug Installation—Plug can be installed from above (after starter removed) or from below (if oil pan off). Use plug No. 171091 (cup shaped plug 9/16" in diameter), coat outer rim with white lead or sealer, drive plug into hole, entering closed end of plug first (handle of J-483 vibration dampener installer tool can be used as a driver).

ALL 1939-47 MODELS
1948-51 EIGHT CYLINDER

CHECKING OILING SYSTEM: See that oil lines securely in place and not bent or damaged. Drop oil reservoir and clean thoroughly every six months. When installing oil reservoir, check flapper valve on rear main bearing oil return tube (soldered in rear of reservoir). Valve must work freely and should be slightly open with reservoir level. Holes in gaskets between crankcase and oil dipper tray and between tray and reservoir must align with oil return tube and register with hole in bearing cap. NOTE—Beginning with 1942 engines, oil suction pipe was redesigned and lower end extended into center of oil reservoir to insure constant supply of oil to oil pump.

1939 MODELS

OILING SYSTEM CHANGES ON "112" & SIX CYLINDER ENGINES:—Oil passages from oil pump through cylinder block to front and rear of engine have been relocated. Front line now delivers oil directly to #1 trough in oil tray (formerly directed oil to timing gear compartment). Timing gears now lubricated by splash from connecting rods and higher oil level in gear compartment maintained by use of baffle on timing gear cover and elimination of oil drain hole in front main bearing cap (formerly used to supply oil to front of oil pan). Rear line from oil pump delivers oil to check valve (operates oil signal on instrument panel) which has been relocated farther forward in cylinder block allowing direct oil passage to #6 trough in oil tray.
Oil Pan Tray ('112' Engine)—New type conveyors used at front and rear ends of tray. Oil dams now used opposite #1 and #2 troughs and #5 and #6 troughs which direct oil draining from right side of cylinder block directly into #1 and #6 troughs. REPLACEMENT NOTE—1939 trays can be used on earlier cars. Old type cannot be used on 1939 cars.
Oil Pan Tray (Six Engine)—New baffles used between #1 and #2 troughs and between #5 and #6 troughs which maintain higher oil levels in #1 and #6 troughs and overflow from these troughs fed to remaining troughs. REPLACEMENT NOTE—Same as for '112' above.

ALL 1939-47 MODELS
1948-51 EIGHT CYLINDER

OIL SUCTION PIPE SEAL: Synthetic rubber suction pipe oil seal fitted in counter-bore in cylinder block flange at point where suction pipe passes through oil pan flange. Seal fitted around pipe and compressed by pan (pan gasket widened at this point).
NOTE—Use new seal whenever pan installed.

OIL PAN REMOVAL

1948-51 SIX CYLINDER

OIL PAN REMOVAL: Raise front end of car and place jack stands under #2 cross-member. Take out three bolts attaching center steering arm support bracket to #2 cross-member and drop center steering arm and tie rods. Take out two bolts attaching flywheel dust cover, remove cover. Drain oil pan. Take out oil pan attaching screws and lockwashers, lower pan and slide it out to rear.

►*CAUTION—Do not lose round rubber gasket at oil outlet tube.*

1948-51 EIGHT CYLINDER

OIL PAN REMOVAL: Raise front of car and place jacks under each side of #3 crossmember. Drain oil and re-install plug. Place jack under center of #2 crossmember and raise jack until pressure is exerted against #2 crossmember enough to hold member in place against coil spring expansion pressure when attaching studs are removed. Remove one bolt (and loosen the second bolt) in each shock absorber anchor plate, which will allow the shock absorbers to slide out of the anchor plates. Remove the outer bolt (each side) of #2 crossmember at front of coil springs and insert 1/2"-20x6" studs. Remove two bolts (each side) from #2 crossmember at rear of coil springs and insert 1/2"-20x6" studs. Remove four bolts holding crossmember at front of coil springs. Release pressure of jack slowly and allow crossmember to settle on the heads of the six special studs. Remove two bolts from flywheel dust cover and remove cover. Remove bolts from oil pan and remove pan.

OIL PUMP

1948-51 SIX CYLINDER

OIL PUMP REMOVAL: Lift off distributor cap and rotate crankshaft until distributor rotor is in firing position for #1 cylinder. Keep engine in this position while pump is removed. Remove three oil pump to block attaching studs and remove oil pump.

Pump Inspection—Disassemble pump by taking off cover and drive gear (drive out pin and press gear off shaft). Thoroughly clean parts and dry with compressed air. Check pump parts as follows:
1)—With rotors in pump body, turn shaft so that one lobe on inner rotor pushed into notch in outer rotor, check clearance between opposite lobe of inner rotor and inner face of outer rotor. If clearance greater than .010" replace both rotors.
2)—Height (or thickness) of both rotors should be at least .873". Diameter of outer rotor should be at least 2.746". Replace if measurements are less.
3)—With rotors in pump body, turn body up, place straightedge across face of body between screw holes. Clearance between straightedge and rotors should be .004" max. If greater, replace pump body.
4)—With outer rotor pressed to one side of body, clearance at opposite side should be .008" maximum. If greater, replace pump body.
5)—Check cover by placing straightedge across inner face and if .002" feeler can be inserted between cover and straightedge, or if face is scratched or marred, replace cover.

Pump Assembly—Install outer rotor in pump body, slide shaft and rotor assembly into pump body. Support pump body and shaft, and rotors assembly, and press drive gear on shaft. Endplay between hub of gear and pump body should be .004-.008". Install gear pin, peening over both ends securely. Make sure pump is clean, install cover gasket, cover and tighten screws evenly and securely.

Pump Installation—Oil pump must be installed on engine with #1 piston in firing position with rotor on distributor opposite #1 terminal in cap.

RADIATOR

1939 MODELS

RADIATOR CORE REMOVAL: Remove hood and support (see Hood and Support Removal). Drain cooling system. Remove shell extension-to-side panel bolts and spacers (except 90, 98) and radiator hoses. Take out shell-to-core bolts. Remove water pump, fan belt, front engine splash guard and 2 radiator anchor bolt nuts. Lift out radiator core. IMPORTANT—When reassembling, reverse procedure listed above. **Install water pump after core installed.**

1940-47 MODELS

RADIATOR CORE REMOVAL: Drain radiator and remove upper and lower hoses. Disconnect radiator stay rod bolts at radiator and remove 2 radiator mounting bolts. Lift core out of car.

1948-51 MODELS

RADIATOR CORE REMOVAL: Drain cooling system, remove upper and lower hoses. Disconnect hood lock conduit and pull wire at lower hood lock support. Remove nine capscrews from fender tie panel and hook lock support panel, remove panel. Remove four bolts attaching radiator core to channel (NOTE—remove nuts located inside radiator channel). Lift radiator core up and forward out of channel.

CLUTCH NOTES

1939-48 MODELS

CLUTCH OIL SERVICING: Hudsonite (oil) in clutch must be renewed every 5000 miles. Turn engine over until hexagonal drain plug on front face of flywheel is visible in timing inspection hole on left side of motor rear support above starting motor. Remove hex head drain plug with a socket wrench, turn engine over ⅓ revolution until star on flywheel is at inspection hole, allow engine to stand in this position one minute to drain old oil, turn engine over until filler plug is again at inspection hole, insert ⅓ pint Hudsonite (use J-485 gun) replace plug.

1949-51 MODELS

CLUTCH OIL SERVICING: Hudsonite (oil) in clutch must be renewed every 5000 miles. Remove plug using socket wrench J-472. Crank engine slowly until star on flywheel is aligned with timing pointer at timing inspection hole. This will bring drain hole to bottom of flywheel and allow drainage. Crank engine until drain hole again appears at inspection hole and insert 1/3 pint Hudsonite (use J-485 gun), replace plug.

Capacity & Oil—1/3 pt. Hudsonite Clutch Compound.

PROPELLER SHAFT

1948-51 MODELS

PROPELLER SHAFT CENTER BEARING REPLACEMENT: Remove nuts, lock plates, and "U" bolts from universal joint at front end of rear shaft and lower shaft support. Remove nut and washer attaching flange to rear of front propeller shaft. Use puller J-820 to pull companion flange from splined shaft. Remove bolt attaching center bearing and housing assembly to cushion frame support, remove center bearing and housing assembly from shaft. Remove lock rings from either side of bearing and press bearing from housing.

Installation—Reverse procedure above.

FRONT SUSPENSION NOTES

1939 MODELS

TORQUE ARMS: Assembled between bracket on each frame siderail and rear of front axle. When removing axle, disconnect each torque arm at frame bracket (use Bolt Press J-885 to remove bolts from rubber grommets) and remove axle with torque arms attached. When assembling axle to springs (with torque arms mounted on axle), adjust U-bolt nuts so torque arms will fall slowly of own weight when raised at rear end, install jam nuts on U-bolts. Finally connect torque arms to frame brackets by assembling rubber grommets in eye of each arm (immerse rubber in gasoline before installing to allow bolt to enter freely), insert bolt through bracket and arm, tighten nut.

1939 MODELS

KING PIN THRUST BEARING: King pin end thrust taken by 5 loose balls in upper bushing above king pin. Ball seat in bushing and on king pin end.

Installation—To install king pin, insert king pin from below until it enters top bushing (with keyways aligned and 'Corprene' seal in place under top bushing). Drop 5 loose balls through lubrication fitting hole on top of bushing, insert driver J-479-1 in hole to position balls, drive king pin into place (keyways aligned).

1939-47 MODELS

AUTOPOISE CONTROL: Used On All Passenger Cars—New type linkage (similar to stabilizer) connecting front wheels together and helps maintain front wheels in straight ahead position. Consists of transverse bar suspended in rubber bushings mounted in brackets bolted to frame (ahead of front axle). Ends of bar curve to rear and are attached to brackets bolted to spindles by rubber bushed link at each end. In operation, bar is twisted or sprung whenever wheels turned away from straight ahead position which results in wheels being returned to straight ahead position when turning force on steering wheel released. A slight increase in force required to turn wheel results.

NOTE—Autopoise Control may be installed on all 1937-38 Hudson and Terraplane models.

CAUTION—Autopoise control must be centralized (to avoid tendency to turn front wheels in one direction to the other). Check and adjust Autopoise as follows:

Checking Autopoise Centralization—Jack up front of car so that front wheels are free. Disconnect drag link at steering gear pitman arm. Note position of front wheels (wheels should point straight ahead). Any tendency of wheels to turn right or left indicates Autopoise bar not centralized and has greater projection on side toward which wheels tend to turn.

Adjusting Autopoise—Loosen frame bracket bolt nuts at each Autopoise bushing bracket to relieve tension on bushings, turn front wheels to extreme right and left positions (this will cause Autopoise bar to centralize itself in brackets). Wheels should return to straight ahead position of own accord when released. Tighten frame bracket mounting bolts. Recheck Autopoise action with bracket bolts tight.

NOTE—Autopoise should be adjusted whenever bar removed or brackets disturbed.

Autopoise Servicing: Removal—Disconnect Autopoise bar from links at each side (remove nut on upper end of links). Lift engine hood. Remove bolts from Autopoise frame brackets on each side. Cut one rubber bushing off Autopoise bar (slice bushing neatly from end-to-end so that it may be re-used). Work bar out of hole in fender on opposite side from which bushing was cut, remove bar from the opposite fender and lift bar out through engine hood opening. NOTE—Bushings cannot be pulled through holes in fenders.

Installation—With one bushing off Autopoise bar, insert bar through engine hood opening, installing the end without a bushing through hole in fender first, then maneuver opposite end into place. Install rubber bushing and both frame brackets, tighten bracket bolts loosely. Connect Autopoise links. Adjust Autopoise as directed above before tightening bracket bolts securely.

BRAKE NOTES

1939 MODELS

BRAKE LINING CHANGE: Later cars use new type primary shoe lining. This lining is harder than first type and provides less sensitive brake. New lining should be installed on first cars in complete sets only (Brake Shoe and Lining Sets).

ENGINE BONNET LOCK, HOOD, SIDE PANEL AND DUST SHIELD REMOVAL:—*See Hudson Shop Notes*

MODEL IDENTIFICATION

SERIAL NUMBER: First No. 90-101 (1939), 40-101 (1940). On plate on right front door hinge pillar post.

ENGINE NUMBER:—Same as Serial Number (above). Stamped on top of cylinder block between #1 & #2 exhaust manifold flanges.

TUNE-UP

COMPRESSION PRESSURE: 115 lbs. (1939), 125 lbs. (1940) at cranking speed of 125 R.P.M.

VACUUM READING: Steady 18-21" idling at 7 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUGS: Champion Type J-8. 14 mm. Metric. Gaps—.032"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020" Cam Angle 35° (closed).
Automatic & Vacuum Advance—See tables below.

IGNITION TIMING: See Ignition Timing.
Std. Setting—¼" flywheel travel BTDC. (1939), At TDC. (1940) with flywheel mark "UDC. 1-6/" ¼" ahead (1939), or at indicator (1940) in inspection hole in left front face of rear motor support.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Idle screw ¼-1 turn open (1939), ¾-1½ turn open (1940). Idle speed 7 MPH.
Float Level (1939)—⅜" from gasket seat on cover to top of float at free end (invert to check).
Float Level (1940)—⅜" from top of machined projection on bowl cover to top of soldered seam on free end of float (invert to check).
Accelerating Pump—Lower hole Normal. Inner hole (Summer), Outer hole (Winter) for temp. extremes.
Fuel Pump Pressure: 3 lbs. maximum.

MANIFOLD HEAT CONTROL:—Manual adjustment on center of manifold behind carburetor. Change setting for seasonal requirements as follows:
Setting—Arrow on valve should be lined up with 'W' on manifold for winter temperatures, 'S' for summer temperatures. For high speed driving in extremely hot weather, line arrow up with boss ahead of 'S' mark. To adjust, loosen two nuts on valve bar to release valve, turn valve by hand, tighten nuts

VALVES: See Valve Timing.
Tappet Clearance: *CAUTION—Two settings used:*
►ALL 1939 ENGINES
►1940 ENGINES (Original Camshaft)
.006" Intake, .008" Exhaust, Hot & Idling.
►1940 ENGINES (Replacement Camshaft)①
.010" Intake, .012" Exhaust, Hot & Idling.
①—*These engines should have decalcomania on valve cover specifying this .010" & .012" setting.*
See Hudson Shop Notes for Replacement Camshaft data.

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

IGNITION SWITCH: Mitchellock. Model 24-B. Type 8062 (1939), 8273 (1940). Coil connection armored.
Ignition Lock—Briggs & Stratton. Mitchell No. 6095. B & S #50184. Key Series H601-H1100. Groove #1.

COIL: Auto-Lite Model IG-4656 (1939), IG-4662 (1940). Service Coil (less Switch & Cable) IG-3224JS.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IGW-3075B (IGW-4125A & IGW-4202A), IGW-3075C (IGW-4203).
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGW-4125A (1939—First 6493 Cars), IGW-4202A (1939—6493 Up), IGW-4203 (1940). Single Breaker, 6 lobe cam, full automatic advance type with Fuel Compensator adjustment. Model IGW-4203 has auxiliary vacuum spark NOTE—Primary circuit resistor on '39 distributor (used only with low-rate generator without regulator). Resistor must be removed or IGW-4201A distributor installed when regulator installed.

Breaker Gap—.020".
Cam Angle or Dwell—35° closed, 25° open (distr.).
Breaker Arm Spring Tension—16-20 ounces.
Rotation—Clockwise (for 1939 cars), counter-clockwise (1940), viewed from above.

Distributor Degrees	R.P.M.	Automatic Advance Degrees	Engine R.P.M.
Start	300	0	600
3	400	6	800
6	720	12	1440
9	1040	18	2080
12	1360	24	2720
14	1580	28	3160

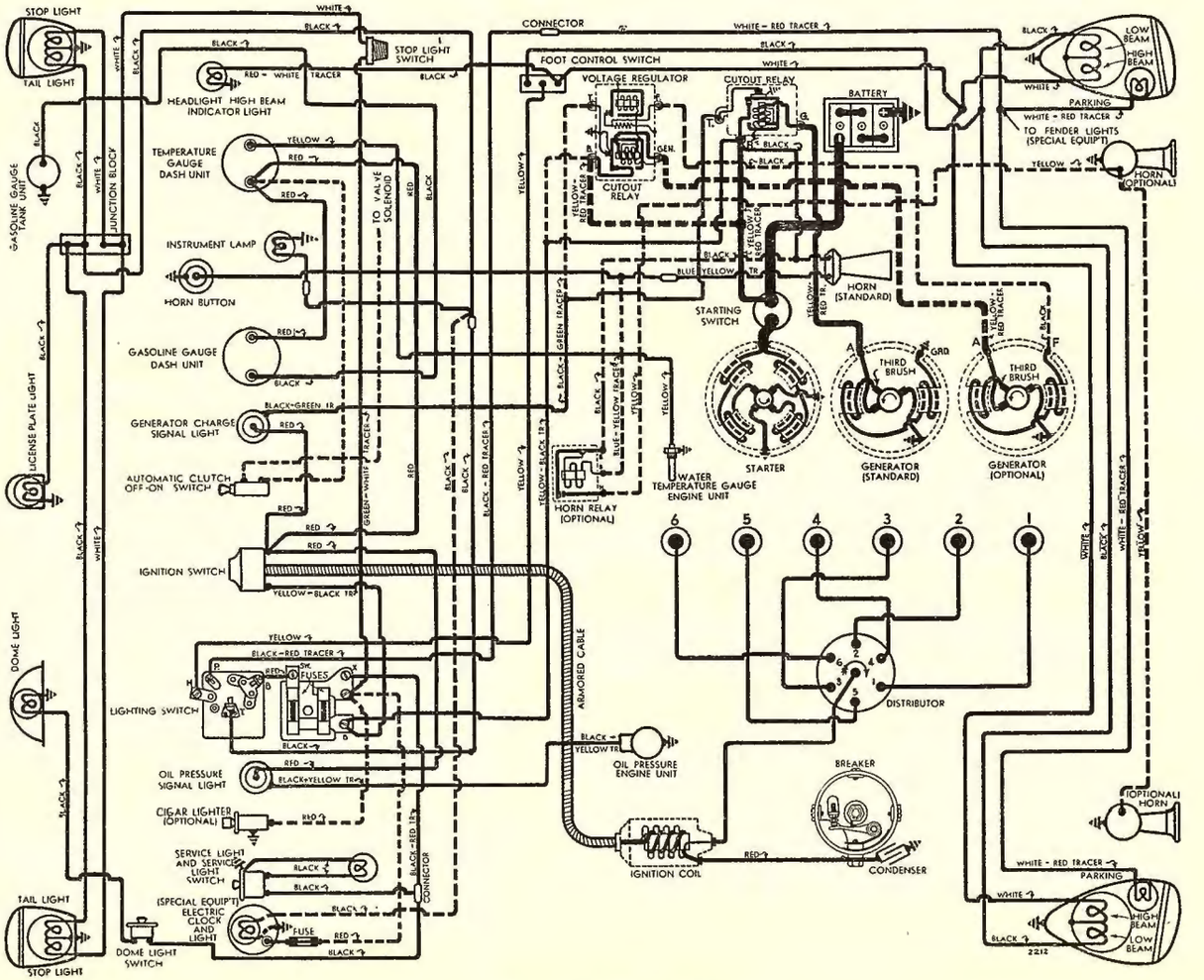
Vacuum Spark Control (IGW-4203 Distr.)—Mounted on distributor hold-down plate and linked to quadrant scale on side of distributor. Provides additional advance at speeds above idling except when engine is accelerated or operated at wide open throttle when spark is retarded by return spring within unit.

Vacuum Advance (IGW-4203 Distr. only)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅞"
4°	8°	9¼"
7.5°	15°	11¼"

Fuel Compensator Adjustment—Manual adjustment for octane rating of fuel. See Ignition Timing.

Removal (1939): Distributor mounted on right side of crankcase. To remove, take out hold-down screw in advance arm.



1939 "112" MODEL 90

FOR 1940 MODELS 40, 40P, 40T—SEE 1940 DIAGRAM FOLLOWING

Removal (1940): Distributor mounted at top rear of cylinder block. To remove, disconnect vacuum line, take out cylinder head stud nuts on hold-down plate.

IGNITION TIMING

IGNITION TIMING:—Initial setting as given. See Fuel Compensator setting (following) for correction.

Model	Flywheel Degrees
90 (1939)	¼" BTDC.
40 (1940)	0° At TDC.

Timing—With #1 piston on compression, turn engine over until piston reaches firing position with flywheel mark 'UDC.1-6' ¼" before indicator (90), at indicator (40) in inspection hole in front face of left rear motor support above starter. Loosen advance arm hold-down screw, rotate distributor clockwise to limit of slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw. Check Fuel Compensator **Timing (Using Synchroscope)**—Recommended by manufacturer. Mark flywheel with white chalk or paint, connect at #6 spark plug. Idle engine and adjust distributor as directed above.

Fuel Compensator Setting—Road test car and note performance when acelerating from 10-15 M.P.H. with wide open throttle on level road (warm engine). Slight ping should be evident. To adjust, loosen hold-down screw, rotate distributor one graduation on scale counter-clockwise (if no ping), clockwise (if ping too severe), repeat test. Final setting must not be more than ¾" before 'UDC.1-6/' mark on flywheel.

CARBURETOR

(1939)—Carter Model W1 Vacumeter Type 438-S (Std.), 437-S (With Automatic Clutch Control). 1¼" Single Barrel, Downdraft type.

(1940)—Carter Model WA-1 Type 454-S. 1¼" Single Barrel, Downdraft type with Fast Idle and Automatic Choke.

For complete data, refer to Carburetor Index.

Idle Adjustment—With engine warmed up, choke valve wide open and throttle-cracker inoperative, set throttle lever stopscrew to idle engine at 7 MPH., Turn idle adjusting screw in until engine begins to miss, then out until engine begins to roll, finally turn screw in slowly until engine fires smoothly. Final setting should be ¼-1 turn (1939), ¾-1½ turn (1940) out from inner seated position. Readjust throttle stopscrew for correct idle speed.

Accelerating Pump Setting—Pump lever (under dust cover on float bowl cover) has three holes for pump link engagement. Adjust as follows:
Lower Hole (Med. Stroke)—Normal setting.
Inner Hole (Min.)—Hot weather, high-test fuel.
Outer Hole (Max.)—Cold weather, low-test fuel.

Throttle Cracker (1939): Connecting linkage between choke valve and throttle lever, opens throttle valve .036-.040" with choke valve fully closed.

Fast Idle (1940): Integral type (part of carburetor).
For complete data, refer to Carburetion Equip. Index.
Setting—Adjust by bending connecting link offset for ⅝" choke valve opening with stopscrew against (not on) first step of fast idle cam.

Automatic Choke (1940): Carter Climatic Control.
For complete data, refer to Carburetion Equip. Index.
Setting—Centered (at index).

CARB. EQUIPMENT

Air Cleaner: AC No. 1528159 Std. Oil-wetted type. United heavy duty oil-bath type Optl.

Fuel Pump:—AC Type AF #1523753 Std., Type #1523937 combination fuel-and-vacuum pump Optl.
For complete data, refer to Carburetion Equip. Index.

Gasoline Gauge:—King-Seeley Electric. K-S Nos. Dash Unit—7175 (Pass. Cars), 7098 (Comm'l.), 6783 (Sta Wagon), 8118 (1940 Early—White lines), 7752 (1940 Later Cars—White Diamonds).
Tank Unit—5835 (1939 First Cars), 7500 (1939 Later Cars & Service Unit), 7550 (1940).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—National Type HT-17. 6 volt, 17 plate, 96 A.H. capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—500 amperes for 3.5 minutes. Five second voltage 4.24 volts.
Grounded Terminal—Positive (+) to frame.
Engine Ground—Strap connector from rear motor support plate to frame.
Dimensions—Length 10 9/16". Width 7¼". Height 7 11/16".
Location—In engine compartment on left side.

STARTER

Auto-Lite Model MAJ-4057 (1939 First Cars), MAJ-4061 (1939 Later Cars), MZ-4079 & 4079A (1940).
Armature MAJ-2062 (MAJ-4057 & 4061), MZ-2138 (MZ-4079 & 4079A).
Drive—Inboard Barrel type Bendix No. A-1673 (MAJ-4057), No. A-1684 (all others).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM., 125 amperes, 5 volts.

Performance Data.
MAJ-4057, 4061

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4100	5.5	67
.3 "	2500	5.5	100
2.25 "	1450	5.0	200
4.6 "	960	4.5	300
7.3 "	575	4.0	400
10.3 "	225	3.5	500
12.0 "	Lock	3.0	550
17.0 "	Lock	4.0	750

MZ-4079, 4079A

0	ft. lbs.	4300	5.5	70
2.55	" "	1325	5.0	200
4.95	" "	750	4.5	300
7.65	" "	220	4.0	400
7.8	" "	Lock	3.0	420
11.8	" "	Lock	4.0	560

Removal:—Starter flange mounted on left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch (1939): Auto-Lite Model SW-4010. Manual type. Operated by button directly below steering column.

Starting Switch (1940): R-B-M Model 5607. Magnetic type. On starter. Controlled by pushbutton on instrument panel, Douglas No. 5751.

GENERATOR

STANDARD (1939)

Auto-Lite Model GBM-4609A. Armature Number GBM-2065. Third brush control type. Ventilated by fan on drive pulley.
Charging Rate Adjustment—Remove commutator cover band, shift third brush by hand counter-clockwise to increase, or clockwise to decrease, charging rate. Brush held in position by friction.
Maximum Charging Rate—20 amperes (cold), 18 amperes (hot), 8.5 volts, 30-35 M.P.H. Use test ammeter connected in charging line to check output.

Performance Data—GBM-4609A

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	760	0	6.4	800
4	6.8	920	4	6.9	960
8	7.25	1050	8	7.35	1150
12	7.65	1240	12	7.8	1360
16	8.1	1450	16	8.3	1750
20	8.5	2150	18	8.5	2450

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—50-60 ozs. (new brushes).
Field Current—3.80-4.20 amperes at 6.0 volts.
Motoring Current—5.7-6.3 amperes at 6.0 volts.

Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Swing generator out until possible belt deflection midway between generator and fan pulleys is ¾" (use straightedge across pulleys).

GENERATOR

OPTL. (1939), STD. (1940)

Auto-Lite Models GDS-4801A. Armature Number GDF-2006. Third brush control type with external voltage regulator. Ventilated by fan on pulley.
Maximum Charging Rate—33 amperes cold, 27.5 amperes (hot), 8.0 volts, 30-35 MPH. Actual charging rate controlled by Voltage Regulator and dependent on battery condition.
Charging Rate Adjustment—Maximum output controlled by third brush and secured with standard setting of 1 commutator bar from nearest (insulated) main brush. Do not exceed output shown in table below. See Regulator data below for adjustment. To check output, connect ammeter in charging line at regulator 'BAT' terminal, ground 'F' terminal to eliminate regulator action.

Performance Data—GDS-4801A

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	920	0	6.4	960
4	6.6	1050	4	6.6	1120
8	6.8	1175	8	6.85	1280
12	7.0	1300	12	7.1	1430
16	7.2	1450	16	7.3	1640
20	7.4	1600	20	7.55	1900
24	7.6	1820	24	7.75	2320
28	7.9	2075	27.5	8.0	3200
33	8.0	2900			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.65-1.82 amperes at 6.0 volts.
Motoring Current—5.10-5.45 amperes at 6.0 volts.

Removal & Belt Adjustment:—Same as std. generator.

CUTOUT RELAY

Auto-Lite Model CBA-4003 (Used with GBM-4609A Gen.). Mounted on engine side of the dash.
Relay has extra set of contacts for Generator Teleflash Charging Indicator Control.
For complete data, refer to Electrical Equipment Index.
Cuts In—6.75-7.5 volts.
Cuts Out 1.5-4.5 amp. discharge after 16 amp. charge.

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

Contact Gap—.015-.045" with upper ground contacts closed (Upper contacts must open when main contacts close).
Air Gap—.010-.030" with contacts closed.

REGULATOR

Auto-Lite Model VRD-4008A (1939), VRD-4008B (1940 First Cars), VRR-4001A (1940 Later Cars). Used with GDS-4801A Gen. Cutout Relay and vibrating Voltage Regulator in case on dash. Cutout Relay has special upper contacts for Generator Teleflash Signal control.
For complete data, refer to Electrical Equipment Index.

Cutout Relay

Cuts In—6.4-7.0 volts (VRD), 6.4-6.6 volts (VRR).
Cuts Out—.5-3.0 amperes (before Regulator Serial No. 2T-000001), 1.5-4.5 amperes (after No. 2T-000001). (VRD); 4.2-4.8 volts with approximately 4-6 ampere discharge current (VRR).
Contact Gap—.015" min. with ground contacts closed (ground contacts must open when main contacts close).
Air Gap—.034-.038" (VRD), .031-.034" (VRR) at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Setting—7.1-7.4 volts at 110°F (all models).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.010-.020" (VRD), .012" Min. (VRR)
Air Gap—.0595-.0625" (VRD), .048-.052" (VRR) with contacts just opening.

LIGHTING

Headlamps—Hall Pre-focused type (1939), Hall "Sealed Beam" type (1940). Upper and lower beams controlled by Beam Selector Switch on toeboard.
Headlamp Adjustment—Aim upper beam of each headlamp straight ahead with hot spot centered on horizontal line 3" below lamp center height.
Beam Indicator—On upper left hand corner of instrument panel. Lighted whenever upper beams on.

Switches

Lighting—R-B-M No. 1725 (1939), Cole-Hersee (1940).
Beam Selector—Douglas or R-B-M No. 1076 (1939), R-B-M No. 2467 (1940). **Instrument**—Douglas.

MISC. ELECTRICAL

SIGNAL LIGHTS:—Generator Charge, and Oil Pressure Indicators. Hudson Teleflash Electric type.
For complete data, refer to Electrical Equipment Index.
FUSES:—Lighting—20 ampere. On fuse block on lower flange of instrument panel at center.
Accessory—20 ampere. On fuse block.
Twin Horns—30 ampere on block on engine dash.
Transmission Overdrive Control—20 ampere.
Direction Indicator—10 ampere.
Electric Clock—2 ampere. On back of clock.
HORNS:—Std. Single Horn—Schwartze Model 42 (Before #7418), Model EX3099 (After #7418).
Optl. Dual Horns—Delco-Remy Air-trumpet type or Sparton Air-Electric, vibrator type with relay.
Horn Relay—R-B-M Model 4751 (1939), 4790 (1940). **Contacts Close**—3.5-4.5 volts. **Current Draw** ¾ amp.

ENGINE

ENGINE SPECIFICATIONS:—6 cylinder, 'L' head type.
Bore—3". **Stroke**—4⅛".
Displacement—175 cu. ins. **Rated HP**—21.6.
Developed Horsepower—86 (1939), 92 (1940) at 4000 RPM.
Compression Ratio—6.5-1 '39, 7.0-1 '40. Iron heads.
Compression & Vacuum Reading—*See Tune-up data.*
PISTONS:—Own Lo-Ex aluminum alloy, 'T' slot, cam ground type. Use finished replacement pistons.
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above.
Clearance—Top .016". Skirt .001-.002".
Original Bore Sizes & Replacement Pistons:—*See Hudson Shop Notes for complete data.*
Fitting New Pistons:—Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs.
Installing Pistons:—Slot away from camshaft.
PISTON RINGS:—2 compression, 2 oil rings (1 above pin, 1 below pin). Rings positioned by pin in groove.

Model 90 (1939)

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.005-.010"	.001"
Oil Control①	3/16"	.005-.010"	.001"
Oil Control②	5/32"	.005-.010"	.001"

①—Both rings on early cars, top ring on later cars.
②—Lower oil ring on later cars. *See Hudson Shop Notes for complete data on Oil Ring Width change.*

Model 40 (1940)

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil Cont. (#1)	3/16"	.009-.011"	.001"
Oil Cont. (#2)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*
PISTON PIN:—Diameter—¾". **Length**—2 7/16".
Floating Type. Retained by locking rings. *See Hudson Shop Notes for Pin Servicing data.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.
Replacement Pins:—Std., .002", .005", .010" oversize.
CONNECTING ROD:—Weight—30¾". **Length**—8⅝".
Crankpin Journal Diameter—1.936" (1.935-1.936"). *See Crankshaft Size Code Note in Hudson Special Data for original bearing size.*
Lower Bearing—'Bermax' alloy spun type. Exchange rods furnished Std. & .010" undersize. *See Crankshaft Size Code in Hudson Shop Notes for bearing sizes.*
Clearance—.001". **Sideplay**—.006-.010"
Bearing Adjustment:—None (no shims). Replace rods.
Installing Rods:—Offset. Install rods with widest half of bearing toward rear (#1, 2, 4), toward front (#3, 5, 6). Oil scoop on all rods toward camshaft.
CRANKSHAFT:—3 bearing, integral counterweights. *See Hudson Shop Notes for Crankshaft and Vibration Dampener Removal, Main Bearing Removal, Installation, Replacement Bearings and Line-reaming data.*
Journal Diameters—#1, 2.342" (2.341-2.342"), #2, 2.374" (2.373-2.374"), #3, 2.405" (2.404-2.405"). *See Crankshaft Size Code Note in Hudson Shop Notes for original bearing sizes.*
Bearings—Bronze backed, Bermax alloy. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".
Bearing Adjustment:—Shims. *See Hudson Shop Notes.*
►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*
Replacement Bearings: *See Hudson Shop Notes.*
End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. **Endplay**—.006-.012".
CAMSHAFT:—3 bearing, gear driven. *See Hudson Shop Notes for Camshaft Removal & Special Bearing Installation (Cutout must be made in rear bearing on 1940 cars).*
Journal Diameters #1, 2"; #2, 1 31/32"; #3 (1939) 1½"; #3 (1940), 1 9/16".
Bearings—Babbitt type. **Clearance**—.0025".
►**Replacement Camshaft for 1940 Engines:** Original 159505 camshaft superseded by new re-designed camshaft with new cam contours.
►*CAUTION*—When above shaft installed, **Tappet Clearance and Valve Timing changed.** See Valve Timing (following) or *see Replacement Camshaft in Hudson Shop Notes.*
End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.
Timing Gears:—Crankshaft gear cast-iron. Camshaft gear GE or Continental Diamond Fibre Bakelite.
1941 Type Timing Gear Set can be installed on these models. Refer to Hudson Shop Notes for data.
Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:—	Head Diameter	Stem Diameter	Length
All valves	1⅜"	11/32"	5 11/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides:—2 9/16" long. Install with top 1 1/16" below top of block and finish ream to size.
Valve Springs:—Dampeners (originally used on bottom of spgs.) should be omitted when valves serviced.
Free length 2 17/64".

	Spring Pressure	Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—Replace if pressure below 34 lbs. at 2".
Valve Lifters:—Roller shoe type, fitted in removable guides. *See Hudson Shop Notes for lifter removal.*

VALVE TIMING

Tappet Clearance: *CAUTION—Two settings used:*

►**ALL 1939 ENGINES**
►**1940 ENGINES (Original Camshaft)**
.006" Intake, .008" Exhaust, Hot & Idling.
►**1940 ENGINES (Replacement Camshaft)①**
.010" Intake, .012" Exhaust, Hot & Idling.
①—*These engines should have decalcomania on valve cover specifying this .010" & .012" setting.*

Valve Timing:—See Camshaft Setting above.
►***1940 Valve Timing Change:*** **On 1940 engines when new replacement camshaft installed, intake opening point advanced to 27°30' BTDC.** or 10 flywheel teeth ahead of 'UDC. 1-6/' flywheel mark.

ORIGINAL VALVE TIMING SPECIFICATIONS
►**for All 1939 Engines (& 1940 with Original Camshaft)**
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC.
These figures correct with .010" tappet clearance.

NEW VALVE TIMING SPECIFICATIONS
►**for 1940 Engines with new Replacement Camshaft**
Intake—Open 27°30' BTDC. Close 68°10' ALDC.
Exhaust—Open 51°50' BLDC. Close 32°10' ATDC.
These figures correct with .010" tappet clearance.

Valve Timing Check (All 1939 Engines; 1940 with original camshaft)—With .010" tappet clearance #1 intake valve should open with piston 10°40' or .0441" BTDC. when point on flywheel approx. 3.95 teeth before 'UDC.1-6/' lines up with indicator in hole above starter. Reset tappet clearance .006" Hot.

(1940 Engines with new replacement camshaft)—With .010" tappet clearance #1 intake valve should open with piston 27°30' BTDC. when point on flywheel 10 teeth before 'UDC. 1-6/' lines up with indicator in hole above starter.

LUBRICATION

LUBRICATION:—Duo-flo (pressure & positive splash).
Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.
Normal Oil Pressure—3 lbs. (no gauge).
Oil Pressure Regulator:—Located on right side of crankcase at rear. Opens at 3 lbs. Not adjustable.
Oil Pressure Indicator:—Teleflash Oil Pressure indicator. ***For data, refer to Electrical Equipment Index.***
Checking Oiling System:—***See Hudson Shop Notes.***
Crankcase Capacity:—4½ qts. (refill), 5½ (dry). NOTE—Whenever pan installed, place 1½ qts. in upper tray, then 4 qts. through filler.

COOLING

Capacity: 12½ qts. (1939), 13 qts. (1940).
See Hudson Shop Notes for radiator core removal.
Water Pump:—Centrifugal, belt driven, packless type.
See Water Pump Section for complete data.
Removal—Drain water, remove fan belt, disconnect pump hoses, remove mounting bolts and lift off
Thermostat:—Fulton. In cylinder head water outlet.
Setting—Starts to open 150-155°F. Fully open 185°.
Temperature Gauge:—King-Seeley Electric K-S Nos.
Dash Unit—7170 (1939 Pass. Cars), 7096 (1939 Comml.), 7121 (1939 Sta. Wagon), 8120 (1940 Early—White Lines), 7755 (1940 Later—White Diamonds).
Engine Unit—No. 7000 (All Models).
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—**Own make.** Single plate, cork insert type operating in oil. **Overdrive Cars**—equipped with heavier clutch housing and larger (10") clutch.
See Clutch Section for complete data.
Driven Member—Cork Insert type (operates in oil).

	Inside—Diameter	Outside	No. Corks
1939	5⅜"	8 23/32"	90
1940 Std.	5⅜"	9"	90
1940 With OD	6½"	10"	108

Corks are .244-.255" thick (1939), .077" thick (1940).
Pedal Adjustment:—1½" free travel. Adjust yoke on lower end of pedal connector link. Check Automatic Clutch Control & Hill-holder (if used).
Clutch Oil Servicing:—***See Hudson Shop Notes.***
Removal:—Remove transmission (see below), drain clutch oil, take out mounting screws in clutch cover rim, remove clutch assembly from below.
Automatic Clutch Control:—Electric type. Optl.
See Clutch Section for complete data.

TRANSMISSION

TRANSMISSION:—**Own Make.** Constant-mesh, helical gear (second & high), sliding spur (low & reverse).
See Transmission Section for complete data.
Transmission Control:—Hudson 'Handy-Shift' type.
See Transmission Section for complete data.
Removal (1939): Disconnect the "Handy-Shift" at transmission and remove Automatic Clutch Control unit (if used)—see articles in Clutch and Transmission Sections for adjustment of these units when re-installed. On cars with standard shift, remove transmission cover (install temporary cover to keep transmission clean until removed from car). Disconnect speedometer cable and front universal. Remove transmission side bumpers. Raise front end of car, support engine at rear. Remove flywheel guard, rear engine mounting bolts, clutch cross shaft (2 screws in bracket), shift engine to right. Take out clutch housing-to-engine support bolts.
Removal (1940): Remove front cushion and push seat back, remove accelerator pedal. Remove floor mat and transmission hole cover. Disconnect front universal joint. Remove clutch pedal return spring, assist spring, and cross-shaft. Release transmission side bumpers and rods, disconnect handy-shift controls at transmission, remove speedometer cable. Raise front end of car, remove lower flywheel guard and engine rear mounting bolts, raise rear end of engine off frame. Remove clutch housing-to-engine mounting bolts, pull transmission back and lift out. NOTE—Transmission can be taken out without disturbing clutch housing by taking out transmission-to-clutch housing bolts.
Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed. Remove wire after transmission installed.

OVERDRIVE

Overdrive:—Warner Model AS13-R6 with electrical 'Kick-down' control optional.
See Transmission Section for complete data.
Overdrive Transmission Removal—Same as Std. Transmission (above) except overdrive solenoid wires and control cable must also be disconnected.
Overdrive Solenoid—Delco-Remy No. 1569.
Throttle Control Switch—R-B-M Model 6013. Adjust so contact washer on accelerator linkage just contacts switch plunger with throttle wide open.
Control Relay—Auto-Lite Model HR-4201.

UNIVERSALS

Spicer. Needle Bearing type. Model Nos. as follows:
Front—1271-01X (1939 Early Cars), 1261-01X (1939 Later Cars), 1261-101 (1940 Std.), 1271-101 (1940 with Overdrive).
Rear—1278-01X (1939 Early Cars), 1268-01X (1939 Later Cars), 1268-101 (1940 Std.), 1278-101 (1940 with overdrive).
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—**Own Make.** Semi-floating spiral bevel gear & Hotchkiss drive. ***See Rear Axle Section.***
Ratio (1939)—4 1/9-1 (Std. Pass Cars, Optl. Business Cars), 4 5/9-1 (Std. Business, Optl. Pass. Cars)
Ratio (1940)—4 5/9-1 (Std.—Optl. with Overdrive), 4⅞-1 (Std. with Overdrive, Optl. without Overdrive), 4 1/9-1 (Optl. all models).
Backlash—.0005-.003". Screw adjustment.
Removal:—Disconnect drive shaft at rear universal. Remove axle shafts (see below) and capscrews on carrier flange. Pull carrier assembly out.
Axle Shaft Removal:—Remove wheel and hub (use screw type puller only), remove 4 nuts on bearing cap bolts, push bolts out of backing plate, remove cap (without disturbing brake link), remove shims, pull shaft & wheel bearing (do not drag on seal).
Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see Removal directions above), add or remove shims equally at both wheels. **Endplay**—.002-.004".

SHOCK ABSORBERS

Monroe. Direct Acting, Hydraulic type. Rear Shock Absorbers Optl. on 1939 Business Cars (not Std.).
Front—Monroe No. 156778 (1939), 160101 (1940—Std. Springs), 160102 (1940—Heavy Duty Springs).
Rear—Monroe No. 157800 (1939), 160107 (1940—Std. Springs), 160108 (1940—Heavy Duty Springs).

FRONT SUSPENSION

1939 MODELS

Front Axle: Conventional "I" beam section axle with Elliott type ends, semi-elliptic springs.
Autopoise Control—***See Hudson Shop Notes.***
Kingpin Inclination—7° crosswise. ***See Hudson Shop Notes for Kingpin Thrust Bearing servicing data.***
Caster—1-2° (equal for both wheels within ½°). Adjust with wedge shims between axle and spring.
Camber—1-1½°. Bend axle cold for minor changes.
Toe-In—0-⅛". Measure on inside of rims 10" above ground. Adjust by turning tie rod.
Steering Geometry—Inner Wheel 20°. Outer 17¼°.

FRONT SUSPENSION

1940 MODELS

Front Suspension (1940): Independent, linked parallelogram type with coil springs & Autopoise control.
See Front Suspension Section for complete data.
Kingpin Inclination—4°36' crosswise.
Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.
Camber—Positive ¼° to Pos. ¾°. Adjustable.
Toe In—0-1/16". Adjust each tube equally.
Steering Geometry—Inner wheel 24°. Outer 20°50'.

STEERING GEAR

Steering Gear: Gemmer Model 305 Worm-and-Roller with "push-pull" adjustments. NOTE—1940 Cars have new Center Point Steering Linkage (for Suspension) ***See Steering Gear Section for complete data.***

BRAKES

1939 MODELS

BRAKES:—**Service**—Bendix Hydraulic, duo-servo, Double Anchor (90 pass. cars, Utility Coach and Coupe), Single Anchor (90 others, 98) with mechanical follow-up (pedal linked to hand brake cables). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drum—Alloy steel. Diameter 9 1/16"(90 pass. cars, Utility Coach & Coupe), 10 1/16" (90 others, 98).
Lining—Moulded (primary), woven (secondary). Thickness 7/32". Width 1¾". Length per wheel 19" (90 pass., Util. Coach & Coupe), 22⅛" (Others).
See Hudson Shop Notes for Brake Lining change.
Clearance—.010" at heel and toe of each shoe.

Hand Brake:—See Service Brakes above.

Hill-Holder: Optional. ***See article in Brake Section..***

BRAKES

1940 MODELS

BRAKES (40T,40P):—**Service**—Bendix hydraulic, Double Anchor, duo-servo type with Mechanical Follow-up. Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Alloy steel. Diameter—9 1/16".
Lining—Moulded (primary), woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 19".
Clearance—.010" at heel and toe of each shoe.

Hand Brake:—See Service Brakes above.

Hill-Holder: Optional. ***See article in Brake Section..***

BRAKES (40 BUSINESS CARS): Service—Same as Model 40 (above) except for: **Drums**—Diam. 10 1/16". **Lining**—Length per wheel 22⅛".

ENGINE HOOD (BONNET) LOCK & FENDER PLATE REMOVAL:—*See Hudson Shop Notes.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on right front door hinge pillar post. First Nos. as follows:

	1939	1940
Pacemaker Six	9132576	
Six	92101	41101
Country Club Six	93101	43101
Business Cars	98101	48101

ENGINE NUMBER:—Same as Serial No. On top of cylinder block between #1 and 2 exhaust flanges.

TUNE-UP

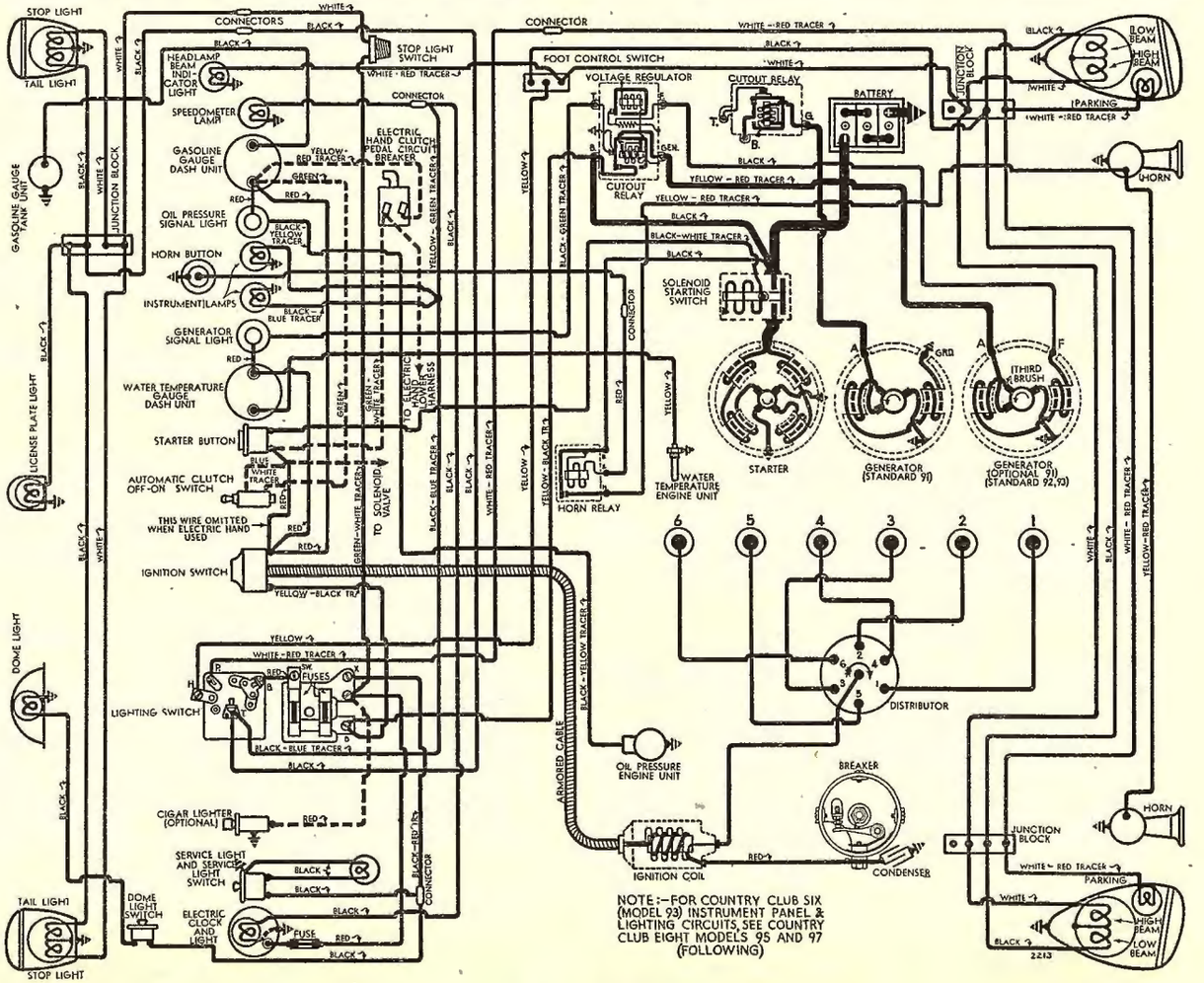
COMPRESSION PRESSURE: 120 lbs. at 125 RPM.
VACUUM READING: Steady 18-21" idling at 7 MPH.
FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUGS: Champion Type J-8. 14 mm. Metric.
Gaps—.032"
IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020" **Cam Angle** 35° (closed).
Automatic & Vacuum Advance—*See Distributor.*
IGNITION TIMING: See Ignition Timing.
Std. Setting—At TDC. with flywheel mark "UDC. 1-6/" at indicator in inspection hole in left front face of rear motor support.
CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting (Single Carb.)—Idle screw ¼-1 turn (437-S, 438-S), ¾-1½ turn (454-S) open. Idle speed 7 MPH.
Idle Setting (Dual Carb).—Both idle screws ¼-1 turn (430-S), ¼-1¼ turn (430-SV, 461-S) open. Idle speed 7 MPH.
Float Level (437-S, 438-S)—⅜" from gasket seat on cover to top of float at free end.
Float Level (454-S)—⅜" from top of machined projection on bowl cover to top of soldered seam on free end of float.
Float Level (430-S, 430-SV, 461-S)—3/32" from gasket seat on cover to top of float at each end.
Accelerating Pump (Single Carb.)—Lower hole Normal. Inner hole (Summer), Outer hole (Winter).
Accelerating Pump (Dual Carb.)—Outer hole Normal. Inner hole (min. stroke) when required.
Fuel Pump Pressure: 3 lbs. max. (98, 48), 4½ (Others).
MANIFOLD HEAT CONTROL: (91, 92, 98, 48)—Manual adjustment type on center of manifold behind carburetor. 1939 type should be adjusted for seasonal requirements as follows:
Setting (91, 92, 98)—Arrow on valve should be lined up with "W" on manifold for winter temperatures, "S" for summer temperatures. For high speed driving in extremely hot weather, line arrow up with boss ahead of "S" mark. To adjust, loosen two nuts on valve bar, turn valve by hand, tighten nuts.
Setting (48)—Valve set at factory with pointer toward rear in "W" position. Correct for all seasons.
(Models 93, 41, 43)—Automatic thermostatic coil type. No adjustment. See that valve operates freely.
VALVES: See Valve Timing.
Tappet Clearance: *CAUTION—Two settings used:*
►**ALL 1939 ENGINES**
►**1940 ENGINES (Original Camshaft)**
.006" Intake, .008" Exhaust, Hot & Idling.
►**1940 ENGINES (Replacement Camshaft)** ①
.010" Intake, .012" Exhaust, Hot & Idling.
①—*These engines should have decalcomania on valve cover specifying this .010" & .012" setting.*
STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

IGNITION SWITCH: Mitchellock. Model 24-B. Type 8062 (1939), 8273 (1940). Coil connection armored.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—H601 to H1100. **Groove**—No. 1.
COIL: Auto-Lite Model IG-4656 (1939), IG-4662 (1940). Service Coil (less Switch & Cable) IG-3224JS.
Ignition Current—2.5 amperes idling, 4.5 stopped.
CONDENSER: Auto-Lite Part No. IGW-3075A (IGW-4125A, 4126A, 4201A, 4202A), IGW-3075C (IGW-4203).
Capacity—.20-.25 microfarad.
DISTRIBUTOR: Auto-Lite Model IGW-4202A (91—see Note), IGW-4126A (92, 93 before No. 5146), IGW-4201A (91, 93 No. 5146 Up), IGW-4125A (98 before No. 6493—see Note), IGW-4202A (98 No. 6493 Up—see Note), IGW-4203 (41, 43, 48). Single breaker, 6 lobe cam, full automatic advance type. 1940 distributor (IGW-4203) has vacuum spark control.
Model 91, 98 Note—Has resistor for primary circuit (used only with low-rate generator without regulator). Resistor must be removed or IGW-4201A distributor installed when regulator used.
1940 Note—Distributor mounted at top of cylinder block at rear and driven through offset tongue-and-slot coupling by intermediate shaft. Rotation is now counter-clockwise (reversed from 1939 models).
Breaker Gap—.020".
Cam Angle or Dwell—35° closed, 25° open (dist.).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise (for 1939 cars), counter-clockwise (1940), viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	300	0	600
3	400	6	800
7	825	14	1650
11	1255	22	2510
14	1580	28	3160



NOTE:—FOR COUNTRY CLUB SIX (MODEL 93) INSTRUMENT PANEL & LIGHTING CIRCUITS, SEE COUNTRY CLUB EIGHT MODELS 95 AND 97 (FOLLOWING)

1939 MODELS

Vacuum Spark Control (IGW-4203)—On distributor hold-down plate and linked to quadrant scale on side of distributor. Provides additional advance at speeds above idling (vacuum port in carburetor above throttle) except when engine is accelerated or operated with wide open throttle when spark is retarded by return spring within unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅞"
4°	8°	9¼"
7.5°	15°	11¼"

Fuel Compensator—Manual adjustment for octane rating of fuel used. See Ignition Timing.

Removal (1939): Distributor mounted on right side of crankcase. To remove, take out hold-down screw in advance arm.

Removal (1940): Distributor mounted at top rear of cylinder block. To remove, disconnect vacuum line, take out cylinder head stud nuts on hold-down plate.

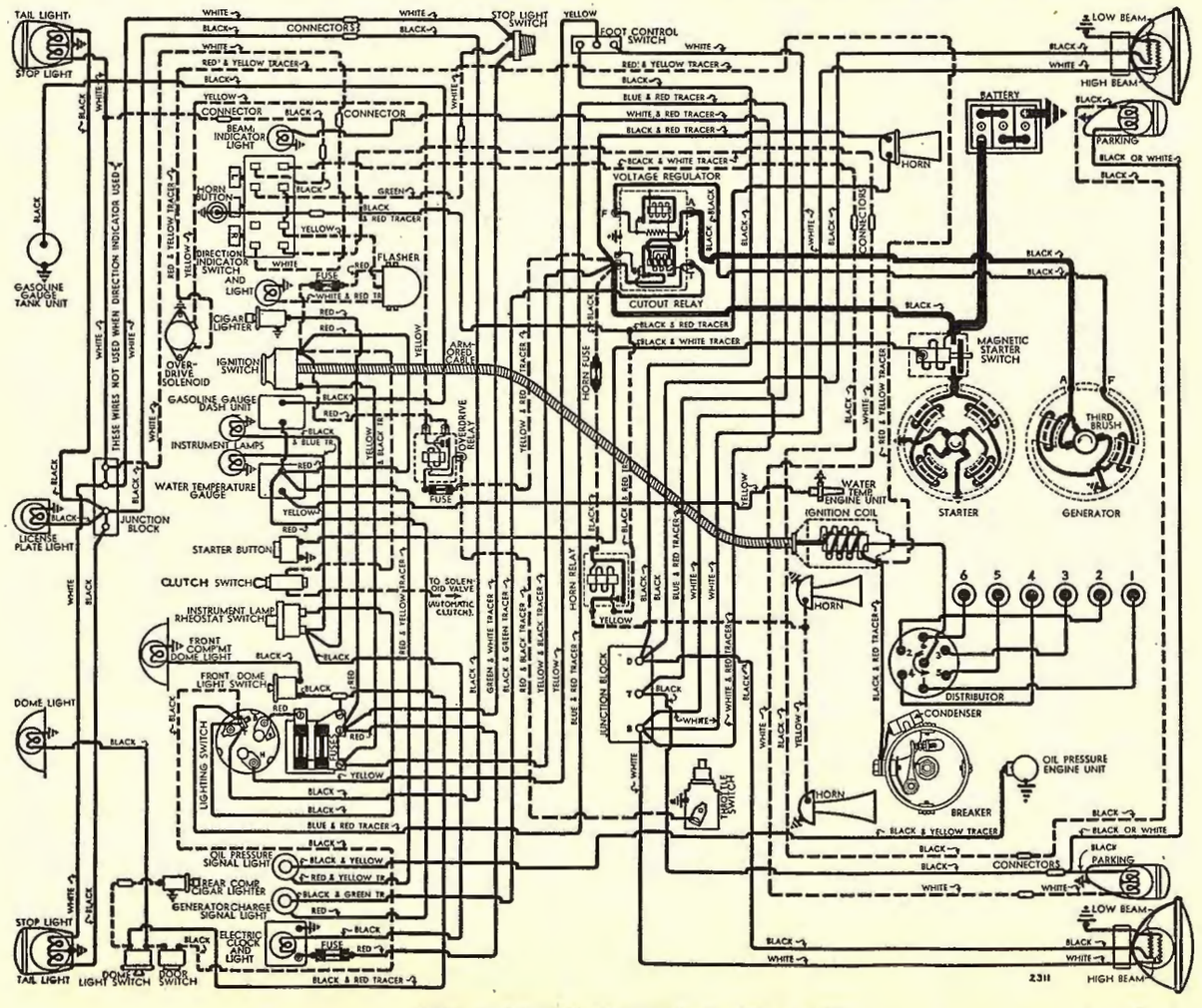
IGNITION TIMING

IGNITION TIMING:—Initial setting (for 70 octane fuel). See Fuel Compensator Setting following.

	Flywheel Degrees	Piston Position
All engines	0° at TDC	.0000" TDC

Timing—With #1 piston on compression, turn engine over until piston reaches top dead center, when flywheel mark 'UDC.1-6/' lines up with pointer in left front face of rear motor support above starter. Loosen advance diaphragm screw (at rear end of link), rotate distributor counter-clockwise to limit of slot, then slowly rotate clockwise until contacts begin to open, tighten diaphragm screw securely. Check Fuel Compensator Setting below.

Timing (Using Synchroscope)—Recommended by manufacturer. Mark flywheel with white chalk or paint, connect at #6 spark plug. Idle engine and adjust distributor as directed above.



1940 MODELS (INCLUDING 40, 40P, & 40T)

Fuel Compensator Setting—Road test car with engine at normal operating temperature. With car running at 7 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen advance diaphragm screw, rotate distributor one graduation on quadrant scale clockwise (if no ping), counter-clockwise (if ping too severe), repeat test. Final setting not more than ¾" before 'UDC.1-6/' mark.

CARBURETOR

SINGLE BARREL

(Model 91, 92—First Cars, 98): Carter Model W1 Vacumeter Type 438-S (Std.), 437-S (Cars with Automatic Clutch Control). 1¼" Single barrel downdraft types. NOTE—Model 92 (after No. 31834) fitted with Carter WDO dual carburetor.

(Model 48)—Carter Model WA-1 Type 454-S. 1¼" single barrel downdraft type with Fast Idle and Automatic Choke.

For complete data, refer to Carburetor Index.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for 7 MPH idle speed. Adjust idle adjusting screw until engine fires smoothly—idle screw approximately ¼-1 turn open (437-S, 438-S), ¾-1½ turn open (454-S)—turn screw in for leaner mixture. Readjust idle speed.

Accelerating Pump Setting—Pump arm has 3 holes for pump link. Set as follows:

Lower Hole (med. stroke)—Normal setting.

Inner Hole (min.)—Hot weather, high-test fuel.

Upper Hole (max.)—Cold weather, low-test fuel.

Float Level (437-S, 438-S)—⅜" from gasket seat on cover to top of float at free end (invert to check).

Float Level (454-S)—⅜" from top of machined projection on bowl cover to top of soldered seam on free end of float (invert to check).

Throttle Cracker (437-S, 438-S only):—Connecting linkage between choke valve and throttle lever. Opens throttle .036-.040" with choke valve closed.

Fast Idle (454-S): Integral with carburetor.

For complete data, refer to Carburetion Equip. Index.

Setting—Adjust by bending connecting link offset for ⅝" choke valve opening with stopscrew against (not on) first step of fast idle cam.

NOTE—With choke valve fully closed and pin on fast idle cam at bottom of slot in fast idle link, clearance between top of fast idle cam (behind link) and trip lever should be .010". To adjust, bend trip lever stop (on engine side of link).

Automatic Choke (454-S): Carter Climatic Control (Single Carburetors).

See Carburetion Equipment Section for complete data.

Setting—Centered (at index mark).

CARBURETOR

DUAL (DOUBLE BARREL)

(Model 92—After No. 31834, 93, 41, 43): Carter Model WDO Type 430-S (1939), 430-SV (1940 before Eng. No. 3116), 461-S (1940 after Eng. No. 3116). 1" Dual (double barrel) downdraft types with Fast Idle and Automatic Choke.

For complete data, refer to Carburetor Index.

Idle Adjustment—With engine warm and running at slow idle speed (Fast Idle and Automatic Choke inoperative), set throttle stopscrew to idle engine at

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7 MPH. Turn each idle adjusting screw (in succession) in until engine begins to miss, then turn screw out until engine begins to roll, finally turn screw in until engine fires smoothly. Final setting of both screws should be ¼-1 turn open (1939), ¼-1¼ turn open (1940). Readjust for 7 MPH idle speed.

Accelerating Pump Setting—Pump lever (under dust cover on top of bowl) has two holes for pump link engagement. Adjust as follows:
Outer Hole (max. stroke)—Normal setting.
Inner Hole (min. stroke)—If less charge required.

Float Level—3/32" from gasket seat on cover to top of float at each end (invert to check).

Fast Idle (430-S, 430-SV, 461-S): Integral with carburetor.
For complete data, refer to Carburetor Index.
Setting—Adjust fast idle screw so that throttle opening is .018" with choke valve tightly closed.

Automatic Choke: Carter Climatic Control (Dual Carburetors).
For complete data, refer to Carburetion Equip. Index.
Setting—Center thermostatic coil housing.

CARB. EQUIPMENT

Air Cleaner: AC No. 1528161 (Std. 91, 92, 93, 41, 43), 1528160 (91, 92, 93 with Electric Hand), 1528159 (Std. 98, 48), 1523937 (98 with Electric Hand), Oil-wetted type. United heavy duty Oil-bath type Optl.

Fuel Pump: AC Type AK, No. 1523289 (Std. 91, 92, 93, 41, 43); Type AF, No. 1523753 (Std. 98, 48). Diaphragm type fuel pump. Combination Fuel-and-Vacuum Pump No. 1523297 (91, 92, 93), 1523937 (98) Optl.
For complete data, refer to Carburetion Equip. Index.

Gasoline Gauge:—King-Seeley Electric. K-S Nos. **Dash Unit**—No. 6783 (91, 92), 7415 (93), 7175 (98 Pass. Cars), 7098 (98 Comml.), 8118 (1940 Early—White Lines), 7752 (1940 Later—White Diamonds). **Tank Unit**—No. 5835 (1939 First), 7500 (1939 Later & Service Unit), 7550 (1940 All Models).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—**National, Type HT-17.** 6 volt, 17 plate, 96 ampere hour capacity (20 hour rate).

Starting Capacity—120 amperes for 20 minutes.

Zero Capacity—300 amperes for 3.5 minutes. Five second voltage—4.24 volts.

Grounded Terminal—Positive (+) grounded to frame. **Engine Ground**—Strap connector from rear motor support to frame.

Location—Left side of engine comp't. (under hood).

STARTER

Auto-Lite Model MAB-4075 (92, 93 Early), MAB-4100 (91 All; 92, 93 Later), MAJ-4057 (98 Early), MAJ-4061 (98 Later Cars), MZ-4079 or 4079A (1940 All Models).

Armature—Auto-Lite MAB-2113 (All MAB- Starters), MAJ-2062 (All MAJ- Starters), MZ-2138 (All MZ- Starters).

Drive—Inboard Barrel Type Bendix Drives Nos. A-1673 (MAB-4075, MAJ-4057), No. A-1684 (All others).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM., 125 amperes, 5.4 volts.

Performance Data
MAJ-4057, 4061

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4100	5.5	67
.3 "	2500	5.5	100
2.25 "	1450	5.0	200
4.6 "	960	4.5	300
7.3 "	575	4.0	400
10.3 "	225	3.5	500
12.0 "	Lock	3.0	550
17.0 "	Lock	4.0	750

MAB-4075, 4100

0 ft. lbs.	3700	5.5	60
3.4 "	1100	5.0	200
6.6 "	695	4.5	300
10.15 "	420	4.0	400
15.8 "	Lock	3.0	582
22.5 "	Lock	4.0	775

MZ-4079, 4079A

0 ft. lbs.	4300	5.5	70
.65 " "	2500	5.5	100
2.55 " "	1325	5.0	200
4.95 " "	750	4.5	300
7.65 " "	220	4.0	400
7.8 " "	Lock	3.0	420
11.8 " "	Lock	4.0	560

Removal:—Flange (new heavier casting) mounted on left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch (MAB-4075, 4100): Auto-Lite Model SS-4001. Magnetic type. Mounted on starter and controlled by pushbutton on instrument panel. Operative only with ignition "on" and clutch disengaged on cars with Electric Hand.
(MAJ-4057, 4061)—Auto-Lite Model SW-4010. Manual type. Mounted on starter and operated by button directly below steering column.
(MZ-4079, 4079A)—R-B-M Model 5607. Magnetic type. On starter, controlled by pushbutton on instrument panel Douglas #5751. NOTE—Switch is new type.

GENERATOR

MODELS 91 & 98

Auto-Lite Model GDF-4803A-1 (91 First 15000 Cars), GDS-4803A-1 (91 After 15000 Cars, 98 Optl.), GBM-4609A (98 Std.). Third brush control type. Used with Cutout Relay. Ventilated by fan on drive pulley.
Armature—Auto-Lite No. GBM-2065 (GBM-4609A), GDF-2006 (GDF-4803A-1 & GDS-4803A-1).
Charging Rate Adjustment—Remove commutator cover band, shift third brush by hand counter-clockwise to increase, or clockwise to decrease charging rate. Brush held in position by friction.
Maximum Charging Rate—As given in table below.

Performance Data—GBM-4609A

Cold Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	760	0	6.4	800
4	6.8	920	4	6.9	960
8	7.25	1050	8	7.35	1150
12	7.65	1240	12	7.8	1360
16	8.1	1450	16	8.3	1750
20	8.5	2150	18	8.5	2450

Performance Data—GDF-4803A-1

0	6.4	860	0	6.4	1020
4	6.75	1200	4	6.8	1260
8	7.1	1450	8	7.15	1500
12	7.45	1680	12	7.55	1740
16	7.8	2020	16	7.9	2240
18	8.0	2800	17	8.0	2800

Performance Data—GDS-4803A-1

Cold Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	800	0	6.4	820
4	6.75	1160	4	6.8	1200
8	7.05	1325	8	7.1	1380
12	7.35	1520	12	7.45	1600
16	7.7	1775	16	7.8	1960
20	8.0	2550	18.5	8.0	2600

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—50-60 ozs. (GBM- Gen.), 53 ozs. (GDF-, GDS- Gen.) for new brushes.
Field Current—3.8-4.2 amperes (GBM- Gen.), 1.90-2.10 amperes (GDF- Gen.), 1.65-1.82 amperes (GDS-Gen.) at 6.0 volts.
Motoring Current—5.7-6.3 amperes (GBM- Gen.), 4.6-5.2 amperes (GDF- Gen.), 4.8-5.0 amperes (GDS- Gen.) at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment:—Swing generator out until possible belt deflection midway between generator and fan pulleys is ¾" (measure with straightedge).

GENERATOR

MODELS 92, 93, 41, 43, 48

Auto-Lite Model GDS-4801A (92,93,48 Std.; 98 Optl.), GEC-4801A (41, 43 Std.). Third brush control with external vibrating voltage regulation. Ventilated by fan on drive pulley.
Armature—GDF-2006F (GDS), GDZ-2006F (GEC).
Maximum Charging Rate—GDS—32-34 amperes (cold), 8.0 volts, 2900 RPM or approx. 35 MPH. GEC—39-44 amperes (cold), 8.0 volts, 3350 RPM or approx. 43 MPH. Actual charging rate controlled by Voltage Regulator and dependent on battery condition. See Regulator. To check output, ground generator 'F' terminal (to eliminate regulator).
Charging Rate Adjustment—See Regulator data. Third brush setting: GDS—1 commutator bar minus 1 mica strip minimum, 1 commutator bar maximum from insulated (nearest) main brush. GEC—1 commutator bar Min., 1 comm. bar plus 1 mica strip Max. Setting adjustable by shifting third brush.

Performance Data—GDS-4801A

Cold Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	920	0	6.4	960
4	6.6	1050	4	6.65	1120
8	6.8	1175	8	6.9	1280
12	7.0	1300	12	7.1	1430
16	7.2	1450	16	7.35	1640
20	7.4	1600	20	7.6	1900
24	7.6	1820	24	7.8	2320
28	7.8	2075	27.5	8.0	3400
33	8.0	2900			

Performance Data—GEC-4801A

0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.65-1.82 amperes (GDS), 1.60-1.78 amperes (GEC) at 6.0 volts.

Motoring Current—5.10-5.45 (GDS), 4.85-5.4 (GEC) amperes at 6.0 volts.
Removal & Belt Adjustment: Same as 91 & 98 above.

GENERATOR

SPECIAL EQUIPMENT

SPECIAL GENERATORS:—Auto-Lite GEG-4801A, GEA-4803B, GEB-4802B (Police etc.). Used with Regulator Models VRP-4008A (GEG Gen.), VRP-4008B GEA Gen.), VRP-4008C (GEB Gen.). *Refer to 1940 Hudson Eight article (following) for complete data.*

CUTOUT RELAY

Auto-Lite Model CBA-4003 (Used with GBM-4609A, GDF-4803A-1, GDS-4803A-1 Gen.). Mounted on engine side of dash. Relay has extra set of contacts for Generator "Teleflash" signal Charging Indicator *For complete data, refer to Electrical Equipment Index.*
Cuts In—6.75-7.5 volts.
Cuts Out—1.5-4.5 ampere discharge current (after charging at 16 amperes).
Contact Gap—.015-.045" with upper ground contacts closed (upper contacts must open when main contacts close).
Air Gap—.010-.030" with contacts closed.

REGULATOR

Auto-Lite Model VRD-4008A (1939), VRD-4008-B (1940 First Cars), VRR-4001A (1940 Later Cars). Used with GDS-4801A & GEC-4801A Gen. Cutout Relay and vibrating Voltage Regulator in case on dash. Cutout Relay has special upper contacts for Generator Teleflash Signal control.
For complete data, refer to Electrical Equipment Index.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In—6.4-7.0 volts (VRD), 6.4-6.6 volts (VRR) 825 RPM., 9.4 MPH.
Cuts Out—.5-3.0 amperes (before Regulator Serial No. 2T-000001), 1.5-4.5 amperes (after No. 2T-000001) (VRD); 4.2-4.8 volts with approximately 4-6 amperes discharge current (VRR).
Contact Gap—.015" minimum with ground contacts closed (must open when main contacts close).
Air Gap—.034-.038" (VRD), .031-.034" (VRR), at hinge end of core (contacts open, ground contacts closed).

Voltage Regulator

Setting—7.1-7.4 volts at 110° F. (all models).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.010-.020" (VRD), .012" Min. (VRR) (armature against stop pin).
Air Gap—.0595-.0625" (VRD), .048-.052" (VRR) with contacts just opening.

LIGHTING

Headlamps—Hall Pre-focused type (1939), Hall "Sealed Beam" type (1940).
For complete data, refer to Electrical Equipment Index.
Headlamp Adjustment—Aim upper beam of each headlamp straight ahead with hot spot centered on horizontal line 3" below lamp center height.
Beam Indicator—Red pilot bulb on speedometer dial. Lighted with Country (upper) beam in use.
Direction Indicator—Standard equipment on 43, Optl. on 40, 41, 48. *See Electrical Equipment Section.*

Switches

Lighting—R-B-M No. 1725 (1939), Cole-Hersee (1940).
Beam Selector—Douglas or R-B-M No. 1076 (1939), R-B-M No. 2467 (1940).
Instrument (43 only)—R-B-M Model 5203.

MISC. ELECTRICAL

SIGNAL LIGHTS:—Generator Charge and Oil Pressure Indicators. Hudson Teleflash Electric type.
For complete data, refer to Electrical Equipment Index.
FUSES:—Lighting—20 ampere. Lower fuse on fuse block on lower edge of instrument panel to right of steering column. **Accessory**—20 amperes. Top fuse on fuse block. NOTE—Silver-plated fuses used.
Twin Horns—30 ampere on block on engine dash.
Transmission Overdrive Control—20 amp. On Relay.
Direction Indicator—10 ampere. In case on back of instrument panel near speedometer.
Electric Clock—2 ampere on back of clock.
HORNS: Single—Schwarze Type 42 (98 before #7418), EX3099 (98 After #7418), Schwarze Electric type (48)
Dual Horns—Vibrator type twin horns operated by relay. Delco-Remy K-33 (92), Sparton (93, 41, 43).
Horn Relay: R-B-M Model 4751 (1939), 4790 (1940).
Contacts Close—3.5-4.5 volts. **Current Draw** ¾ amp.

ENGINE

ENGINE SPECIFICATIONS:—6 cylinder, 'L' head type.
Bore—3". **Stroke**—5".
Displacement—212 cubic inches. **Rated HP** 21.6.
Developed Horsepower—For each model as follows:
91, 92, 98 (Single Carb.) .....96 HP. at 3900 RPM.
92, 93 (Dual Carb.) .....101 HP. at 4000 RPM.
48 (Single Carb.) .....98 HP. at 4000 RPM.
41, 43 (Dual Carb).....102 HP. at 4000 RPM.
Compression Ratio—6.25-1 '39, 6.5-1 '40 Iron heads.
Compression & Vacuum Reading—*See Tune-up data.*

PISTONS:—Own Lo-Ex aluminum alloy, 'T' slot, cam ground type. Use finished replacement pistons.
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above.
Clearance—Top .016". Skirt .001-.002".
Original Bore Sizes & Replacement Pistons:—*See Hudson Shop Notes for complete data.*
Fitting New Pistons:—Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs.
Installing Pistons:—Slot away from camshaft.

PISTON RINGS:—2 compression, 2 oil rings (1 above pin, 1 below pin). Rings positioned by pin in groove.

Models 91, 92, 93, 98 (1939)

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.005-.010"	.001"
Oil Control①	3/16"	.005-.010"	.001"
Oil Control②	5/32"	.005-.010"	.001"

①—Both rings on early cars, top ring on later cars.
②—Lower oil ring on later cars.

Models 41, 43, 48 (1940)

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil Cont. (#1)	3/16"	.009-.011"	.001"
Oil Cont. (#2)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN:—**Diameter**—¾". **Length**—2 7/16".
Floating Type. Retained by locking rings. *See Hudson Shop Notes for Pin Servicing data.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.
Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD:—**Weight** 30 ozs. **Length** 8 3/16".
Upper Bearing (Piston Pin Bushing)—Bronze.
Crankpin Journal Diameter—1.936" (1.935-1.936"). *See Crankshaft Size Code Note in Hudson Special Data for original bearing size.*
Lower Bearing—'Bermax' alloy spun type. Exchange rods furnished Std. & .010" undersize. *See Crankshaft Size Code in Hudson Shop Notes for bearing sizes.*
Clearance—.001". **Sideplay**—.006-.010".
Bearing Adjustment:—None (no shims). Replace rods.
Installing Rods:—Offset. Install rods with widest half of bearing toward rear (#1, 2, 4), toward front (#3, 5, 6). Oil scoop on all rods toward camshaft.

CRANKSHAFT:—3 bearing, integral counterweights. *See Hudson Shop Notes for Crankshaft and Vibration Dampener Removal, Main Bearing Removal, Installation, Replacement Bearings and Line-reaming data.*
Journal Diameters—#1, 2.342" (2.341-2.342"), #2, 2.374" (2.373-2.374"), #3, 2.405" (2.404-2.405"). *See Crankshaft Size Code Note in Hudson Shop Notes for original bearing sizes.*
Bearings—Bronze backed, Bermax alloy. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".
Bearing Adjustment:—Shims. *See Hudson Shop Notes.*
►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*
Replacement Bearings: *See Hudson Shop Notes.*
End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. **Endplay**—.006-.012".

CAMSHAFT:—3 bearing, gear driven. *See Hudson Shop Notes for Camshaft Removal & Special Bearing Installation (Cutout must be made in rear bearing on 1940)*
Journal Diameters #1, 2"; #2, 1 31/32"; #3 (1939) 1½"; #3 (1940), 1 9/16".
Bearings—Babbitt type. **Clearance**—.0025".

►**Replacement Camshaft for 1940 Engines:** Original 159505 camshaft superseded by new re-designed camshaft with new cam contours.
►*CAUTION*—When above shaft installed, **Tappet Clearance and Valve Timing changed.** See Valve Timing (following) or *see Replacement Camshaft in Hudson Shop Notes.*
End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.
Timing Gears:—Crankshaft gear cast-iron. Camshaft gear GE or Continental Diamond Fibre Bakelite.
1941 Type Timing Gear Set can be installed on these models. Refer to Hudson Shop Notes for data.
Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:—

	Head Diameter	Stem Diameter	Length
All valves	1⅜"	11/32"	5 11/32"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides:—2 9/16" long. Install with top 1 1/16" below top of block and finish ream to size.
Valve Springs:—Dampeners (originally used on bottom of spgs.) should be omitted when valves serviced.

Free length 2 17/64".	Spring Pressure	Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—Replace if pressure below 34 lbs. at 2".
Valve Lifters:—Roller shoe type, fitted in removable guides. *See Hudson Shop Notes for lifter removal.*

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VALVE TIMING

Tappet Clearance: *CAUTION—Two settings used:*

►**ALL 1939 ENGINES**

►**1940 ENGINES (Original Camshaft)**

.006" Intake, .008" Exhaust, Hot & Idling.

►**1940 ENGINES (Replacement Camshaft)①**

.010" Intake, .012" Exhaust, Hot & Idling.

①—*These engines should have decalcomania on valve cover specifying this .010" & .012" setting.*

VALVE TIMING: See Camshaft Setting above.

►*1940 Valve Timing Change:* **On 1940 engines when new replacement camshaft installed, intake opening point advanced to 27°30' BTDC. or 10 flywheel teeth ahead of 'UDC. 1-6/' flywheel mark.**

ORIGINAL VALVE TIMING SPECIFICATIONS

►**for All 1939 Engines (& 1940 with Original Camshaft)**

Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44'ATDC.

NEW VALVE TIMING SPECIFICATIONS

►**for 1940 Engines with new Replacement Camshaft**

Intake—Open 27°30' BTDC. Close 68°10' ALDC.
Exhaust—Open 51°50' BLDC. Close 32°10' ATDC.
These figures correct with .010" tappet clearance.

Valve Timing Check (All 1939 Engines; 1940 with original camshaft)—With .010" tappet clearance #1 intake valve should open with piston 10°40' or .0562" BTDC when a point on the flywheel approx. 3.94 teeth before 'UDC.1-6/' lines up with indicator hole above starter. Reset tappet clearance .006" Hot.

(1940 Engines with new replacement camshaft)—With .010" tappet clearance #1 intake valve should open with piston 27°30' BTDC. when point on flywheel 10 teeth before 'UDC. 1-6/' lines up with indicator in hole above starter.

LUBRICATION

LUBRICATION:—Duo-flo (pressure & positive splash).

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Normal Oil Pressure—3 lbs. (no gauge).

Oil Pressure Regulator:—Located on right side of crankcase at rear. Opens at 3 lbs. Not adjustable.

Oil Pressure Indicator:—Teleflash Oil Pressure indicator. *For data, refer to Electrical Equipment Index.*

Checking Oiling System:—*See Hudson Shop Notes.*

Crankcase Capacity:—4½ qts. (refill), 5½ (dry). **NOTE—If pan off, install 1½ qts. in upper tray.**

COOLING

Capacity: 12½ qts. (1939), 13 qts. (1940).
See Hudson Shop Notes for radiator core removal.

Water Pump:—Centrifugal, belt driven, packless type.
See Water Pump Section for complete data.

Thermostat:—Fulton. In cylinder head water outlet. Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge:—King-Seeley Electric K-S Nos. **Dash Unit—No. 7121 (91, 92), 7420 (93), 7170 (98 Pass. Cars), 7096 (98 Comml.), 8120 (1940 Early—White Lines), 7755 (1940 Later—White Diamonds). Engine Unit—No. 7000 (1939-40 All Models).**
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—Own make. Single plate, cork insert type operating in oil. Overdrive Cars—equipped with heavier clutch housing and larger redesigned disc
See Clutch Section for complete data.

Driven Member—Cork Insert type (operates in oil).

	Inside—Diameter	Outside	No. Corks
91,92,98 (Sedan)	5⅜"	8 23/32"	90
93,98 (Comml.)	6½"	9 27/32"	108
41 (without OD)	5⅜"	9"	90
41 OvDr,43,48....	6½"	10"	108

Corks are .244-.255" thick (1939), .077" (1940).

Pedal Adjustment:—1½" free travel. Adjust yoke on lower end of pedal connector link. Check Automatic Clutch Control & Hill-holder (if used).

Clutch Oil Servicing:—*See Hudson Shop Notes.*

Removal:—Remove transmission (see below), drain clutch oil, take out mounting screws in clutch cover rim, remove clutch assembly from below.

Automatic Clutch Control:—Electric type. Optl.
See Clutch Section for complete data.

TRANSMISSION

TRANSMISSION:—Own Make. Constant-mesh, helical gear (second & high), sliding spur (low & reverse).
See Transmission Section for complete data.

Transmission Control:—Hudson 'Handy-Shift' type.
See Transmission Section for complete data.

Removal (1939): Disconnect "Handy-shift" controls at transmission, remove Automatic Clutch Control unit and Electric Hand power unit after disconnecting all wires and vacuum and air hoses if car is so equipped (NOTE—See Clutch and Trans. Sections for necessary adjustments on these units when reinstalled). Disconnect transmission side bumpers, interlock straps, and speedometer cable. Disconnect drive shaft at front universal, support engine at rear, free rear engine mounting. Take out bell housing-to-engine mounting bolts, pull transmission straight back and remove.

Removal (1940): Remove front cushion and push seat back, remove accelerator pedal. Remove floor mat and transmission hole cover. Disconnect front universal joint. Remove clutch pedal return spring, assist spring, and cross-shaft. Release transmission side bumpers and rods, disconnect handy-shift controls at transmission, remove speedometer cable. Raise front end of car, remove lower flywheel guard and engine rear mounting bolts, raise rear end of engine off frame. Remove clutch housing-to-engine mounting bolts, pull transmission back and lift out. NOTE—Transmission can be taken out without disturbing clutch housing by taking out transmission-to-clutch housing bolts.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed. Remove wire after transmission installed.

OVERDRIVE

Overdrive:—Warner Model AS13-R6 with electrical 'Kick-down' control optional.
See Transmission Section for complete data.

Overdrive Transmission Removal—Same as Std. Transmission (above) except overdrive solenoid wires and control cable must also be disconnected.

Overdrive Solenoid—Delco-Remy No. 1569.

Throttle Control Switch—R-B-M Model 6013. Adjust so contact washer on accelerator linkage just contacts switch plunger with throttle wide open.

Control Relay—Auto-Lite Model HR-4201.

UNIVERSALS

Spicer. Needle bearing type. Model Nos. as follows: Front—1271-01X (91,92,93), 1281-01X (98), 1271-101 (41,43,48). Rear—1278-01X ('39), 1278-101 ('40).
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—Own Make. Semi-floating spiral bevel gear & Hotchkiss drive. *See Rear Axle Section.*

Ratio—4 1/9-1 (Std., Optl. on Overdrive), 4 5/9-1 (Std. on Overdrive, Optl. reg. transmission).

Backlash—.0005-.003". Screw adjustment.

Removal:—Remove wheel and hub assembly (use screw type puller), remove nuts on 4 bearing cap bolts, push bolts back through backing plate, remove cap (without disturbing brake link), remove shims, pull axle shaft and wheel bearing. Disconnect drive shaft at rear universal, remove nuts on housing to carrier studs, withdraw carrier.

Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see Removal directions above), add or remove shims equally at both wheels. **Endplay**—.002-.004".

SHOCK ABSORBERS

SHOCK ABSORBERS:—Direct acting, hydraulic types.

Car Model	Make	Front	Rear
91, 92	Monroe	157400	157801
93 (Dom. & Exp.)	Delco	1113-R	1120-S
41, 48 (std. springs)	Monroe	160101	160107
41, 48 (hvy. springs)	Monroe	160102	160108
43 (Dom. & Exp.)	Delco	1007-C	1008-S

FRONT SUSPENSION

1939 MODELS

Front Suspension (1939): Conventionel "I" beam section front axle with Elliott type ends and semi-elliptic springs with Autopoise Control.

Autopoise Control—*See Hudson Shop Notes.*

Kingpin Inclination—7° crosswise. *See Hudson Shop Notes for Kingpin Thrust Bearing data.*

Caster—1-2° and equal within ½° for both wheels. To adjust, loosen capscrews at forward end of torque arm, insert shim between arm and axle at upper screw, or remove shim at lower screw to decrease caster, remove shim at upper screw or insert shim at lower screw to increase caster. Shims .020" thick, change caster ½°.

Camber—1-1½°. Bend axle cold for minor changes.

Toe In—0-1/8" measured 10" up from ground.

Steering Geometry—Inner wheel 20°. Outer 17¼°.

1940 MODELS

Front Suspension (1940): Independent, linked parallelogram type with coil springs & Autopoise control.
See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Pos. ¾°. Adjustable.

Toe In—0-1/16". Adjust each tube equally.

Steering Geometry—Inner wheel 24°. Outer 20°50'.

STEERING GEAR

Steering Gear: Gemmer Model 305 Worm-and-Roller
See Steering Gear Section for complete data.

BRAKES

BRAKES:—Service. Bendix hydraulic, duo-servo, single anchor type with eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.
See Brake Section for complete data.

Drums Steel. Diam 11 1/16" (43), 10 1/16" (others)

Lining—Moulded (primary), woven (secondary). Thickness 7/32". Width 1¾". Length per wheel 22⅛". **(except 43), 23 15/16" (43).**

Clearance—.010" at heel and toe of each shoe.

Hand Brake:—See Service Brakes above.

Hill-Holder: Optional. *See article in Brake Section..*

ENGINE HOOD (BONNET) LOCK & FENDER PLATE REMOVAL:—*See Hudson Shop Notes.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on right front door hinge pillar post. First Nos. as follows:

	1939	1940
Eight		44101
Deluxe Eight		45101
Country Club Eight	95101	47101
Country Club Cust. Sedan	97101	

ENGINE NUMBER:—Same as Serial No. On top of engine block between #1 & 2 exhaust flanges.

TUNE-UP

COMPRESSION: Ratio—6.25-1 (1939), 6.5-1 (1940). Pressure—118 lbs. (1939), 120 lbs. (1940) at cranking speed of 125 RPM.

VACUUM READING:—18-21" steady idling at 7 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUGS: Champion Type J-8. 14 mm. Metric. Gaps—.032"

IGNITION: See Coil, Condenser, and Distributor. Breaker Gap—.017" Cam Angle 31° (closed). Automatic Advance—17.5° max at 1700 RPM (distr.).

IGNITION TIMING: See Ignition Timing. Std. Setting—At TDC. with flywheel mark "UDC. 1-8/" at indicator in inspection hole in left front face of rear motor support.

CARBURETION: See Carburetor & Carb. Equipment. Idle Setting—Both idle screws ¼-1 turn open (430-S), ½-1½ turns open (455-S). Idle speed 7 MPH. Float Level—3/32" from gasket seat on cover to top of float at each end (invert to check). Accelerating Pump—Outer hole (max. stroke) Normal. Inner hole (min. stroke) when required. Fuel Pump Pressure: 4 lbs. max. (Comb. fuel & vacuum pump), 4½ lbs. max. (fuel pump only).

MANIFOLD HEAT CONTROL:—Automatic thermostatic coil type. No adjustment required.

VALVES: See Valve Timing. Tappet Clearance: .008" Intake, .010" Exhaust (with engine hot and idling). Remove right front fender plate for access to valves. *See Hudson Shop Notes for Fender Plate removal.* *NOTE—This supersedes earlier data.*

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

IGNITION SWITCH: Mitchellock. Model 24-B, Type 8062 (1939), 8273 (1940). Connected to coil by armored cable. Ignition Lock—Briggs & Stratton. B & S No. 50184. Key Series—H601 to H1100. Groove—No. 1.

COIL: Auto-Lite Model 4635 (1939), 4641 (1940). Service Coil (less Switch & Cable) CE-3224JS. Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671. Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4008A. Full automatic advance type with manual (octane selector) adjustment. No vacuum spark control. Breaker Gap—.017". Cam Angle or Dwell—31° closed, 14° open (dist.). Breaker Arm Spring Tension—17-20 ounces. Rotation—Clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

Fuel Compensator Adjustment—Manual adjustment for octane rating of fuel. See Ignition Timing.

Removal:—Mounted on right side of crankcase. To remove take out hold-down screw in advance arm.

IGNITION TIMING

IGNITION TIMING:—Initial Setting (for 70 octane rating fuel). See Fuel Compensator setting following.

	Flywheel Degrees	Piston Position
All Engines	0° at TDC	.0000" TDC

Timing—With #1 piston on compression, turn engine over until piston reaches top dead center when flywheel mark 'UDC.1-8/' lines up with pointer in left front face of rear motor support. Loosen hold-down screw in advance arm, rotate distributor clockwise to limit of advance arm slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw. Check Fuel Compensator setting.

Timing (Using Synchroscope)—Recommended by manufacturer. Mark flywheel with white chalk or

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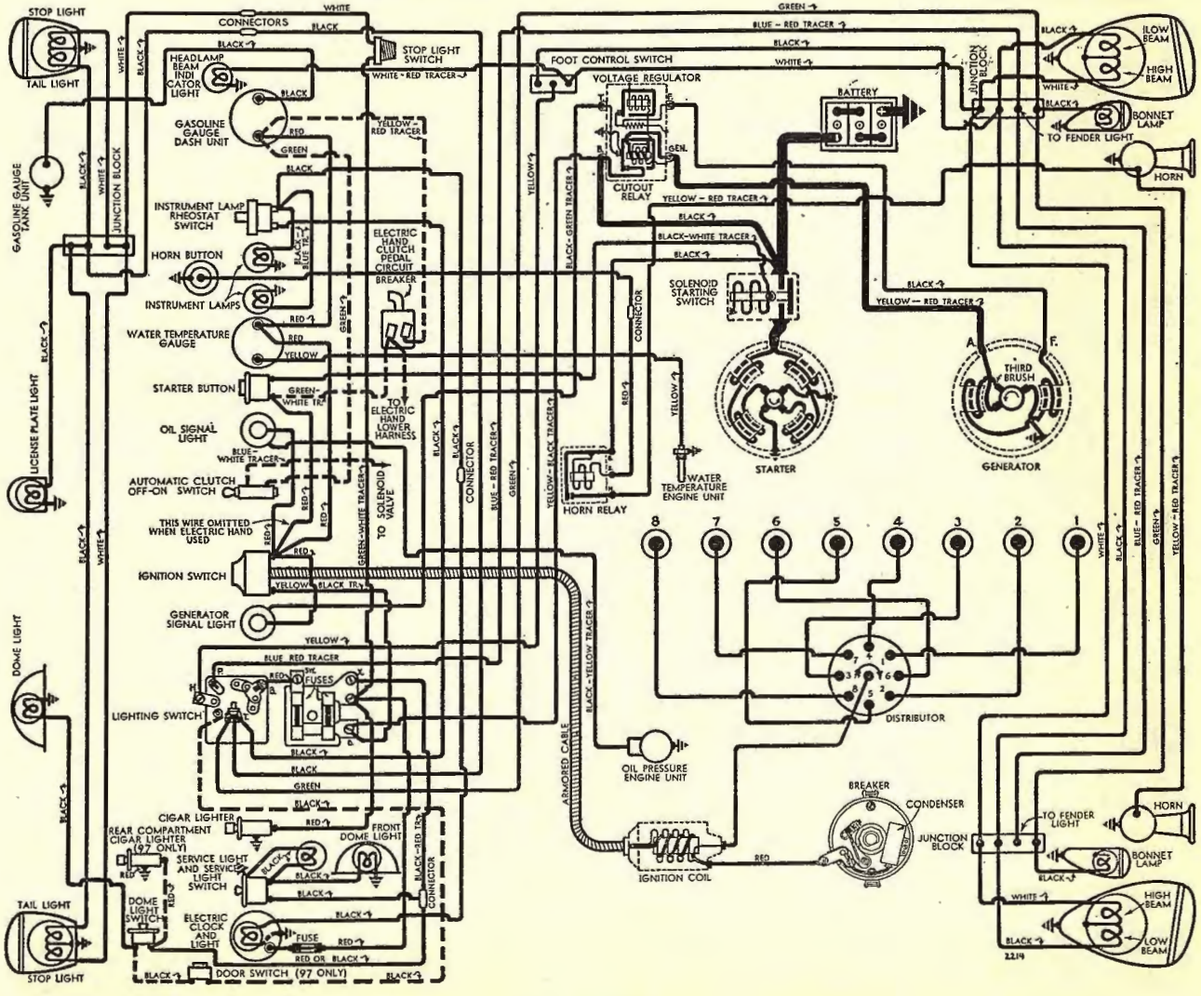

1939 MODELS

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paint, connect at #8 spark plug. Idle engine and adjust distributor as directed above.

Fuel Compensator Setting—Road test car and note performance when accelerating from 10-15 M.P.H. with wide open throttle on level road (warm engine). Slight ping should be evident. To adjust, loosen hold-down screw, rotate distributor one graduation on scale counter-clockwise (if no ping), clockwise (if ping too severe), repeat test. Final setting should not be more than ¾" before 'UDC. 1-8/' mark on flywheel.

CARBURETOR

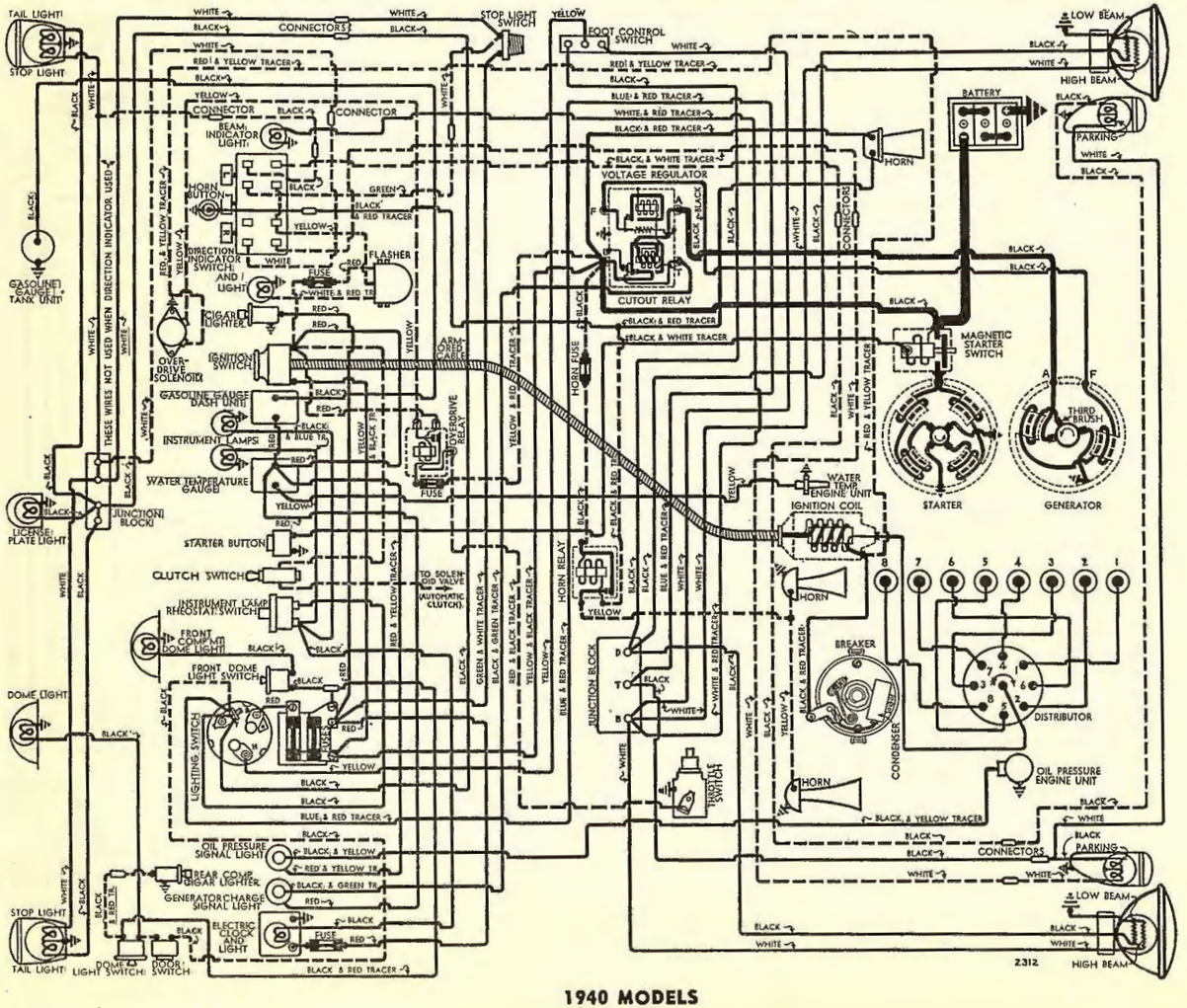
Carter Model WDO, Type 430-S (1939), 455-S (1940). 1" (430-S), 1¼" (455-S), Dual (double barrel), downdraft type with Fast Idle & Automatic Choke.
For complete data, refer to Carburetor Index.

Flange Gasket Note—Eight gaskets now used (was two in 1939) on all carburetors.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for 7 MPH idle speed. Adjust idle adjusting screws (2 used, 1 for each barrel) in succession until engine fires smoothly. Final setting should be ¼-1 turn (430-S), ½-1½ turns (455-S) open for each idling adjusting screw. Readjust idle speed. NOTE—Car manufacturer recommends use of vacuum gauge. Adjust one screw at a time for highest steady gauge reading.

Accelerating Pump Setting—Pump lever (under dust cover at top of carburetor) has 2 holes for pump link engagement. Adjust as follows:
Outer Hole (Max. stroke)—Normal setting.
Inner Hole (Min. stroke)—If less charge required.

Float Level—3/32" from top of float to gasket seat on cover (invert to check).



1940 MODELS

Fast Idle:—Integral type (built-in carburetor).
For complete data, refer to Carburetion Equip. Index.
Fast Idle Setting—Turn fast idle adjusting screw in to secure .018" throttle opening with choke valve tightly closed.

Automatic Choke:—Carter Climatic Control.
For complete data, refer to Carburetion Equip. Index.
Choke Setting—Thermostatic coil housing centered on piston plate housing reference mark.

CARB. EQUIPMENT

Air Cleaner:—AC #1528161 oil-wetted type Std. #1628160 (1939 Cars with Electric Hand). United heavy duty Oil-bath type Optl.

Fuel Pump:—AC Type AK #1523289 diaphragm type Std.—Type AJ #1523936 fuel & vacuum pump Optl. Type AK, #1533313 Pump used on 1939 RHD. cars.
For complete data, refer to Carburetion Equip. Index.

Gasoline Gauge:—King-Seeley Electric. K-S Nos. Dash Unit—No. 7415 (1939), 8118 (1940 Early—White Lines), 7752 (1940 Later—White Diamonds). Tank Unit—No. 5835 (1939 First Cars), 7550 (1939 Later Cars & 1940).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—National Type HT-19. 6 volt, 19 plate, 108 ampere hour capacity (20 hour rate).
Starting Capacity—135 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes. Five second voltage—4.43 volts.
Grounded Terminal—Positive (+) grounded to frame. **Engine Ground**—Strap connector from rear motor support to frame.
Dimensions—Length 11¾". Width 7¼". Height 7 11/16".
Location—In engine compartment on left side.

STARTER

Auto-Lite Model MAB-4075 (1939 First Cars), MAB-4100 (1939 Later Cars), MAB-4103 & 4103A (1940).
Armature—Auto-Lite MAB-2113 (All Models).
Drive—Inboard Barrel Type Bendix Drive, No. A-1673 (MAB-4075), A-1684 (Others).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 120-125 amperes, 5 v.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	3700	5.5	60
.6 "	1910	5.5	100
3.4 "	1100	5.0	200
6.6 "	695	4.5	300
10.15 "	420	4.0	400
15.8 "	Lock	3.0	582
22.5 "	Lock	4.0	775

NOTE—Lock torque figures correct without switch.

Removal:—Flange (new heavier casting) mounted on left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch (1939): Auto-Lite Model SS-4001. Magnetic type. Mounted on starter and controlled by pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Electric Hand).
For complete data, refer to Electrical Equipment Index.
1940—R-B-M Model 5607. Magnetic type switch. On starter, controlled by pushbutton on instrument panel Douglas #5751. NOTE—Switch is new type.

ENGINE HOOD (BONNET) LOCK & FENDER PLATE REMOVAL:—*See Hudson Shop Notes.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on right front door hinge pillar post. First Nos. as follows:

	1939	1940
Eight		44101
Deluxe Eight		45101
Country Club Eight	95101	47101
Country Club Cust. Sedan	97101	

ENGINE NUMBER:—Same as Serial No. On top of engine block between #1 & 2 exhaust flanges.

TUNE-UP

COMPRESSION: Ratio—6.25-1 (1939), 6.5-1 (1940). Pressure—118 lbs. (1939), 120 lbs. (1940) at cranking speed of 125 RPM.

VACUUM READING:—18-21" steady idling at 7 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUGS: Champion Type J-8. 14 mm. Metric. Gaps—.032"

IGNITION: See Coil, Condenser, and Distributor. Breaker Gap—.017" Cam Angle 31° (closed). Automatic Advance—17.5° max at 1700 RPM (distr.).

IGNITION TIMING: See Ignition Timing. Std. Setting—At TDC. with flywheel mark "UDC. 1-8/" at indicator in inspection hole in left front face of rear motor support.

CARBURETION: See Carburetor & Carb. Equipment. Idle Setting—Both idle screws ¼-1 turn open (430-S), ½-1½ turns open (455-S). Idle speed 7 MPH. Float Level—3/32" from gasket seat on cover to top of float at each end (invert to check). Accelerating Pump—Outer hole (max. stroke) Normal. Inner hole (min. stroke) when required. Fuel Pump Pressure: 4 lbs. max. (Comb. fuel & vacuum pump), 4½ lbs. max. (fuel pump only).

MANIFOLD HEAT CONTROL:—Automatic thermostatic coil type. No adjustment required.

VALVES: See Valve Timing. Tappet Clearance: .008" Intake, .010" Exhaust (with engine hot and idling). Remove right front fender plate for access to valves. *See Hudson Shop Notes for Fender Plate removal.* *NOTE—This supersedes earlier data.*

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

IGNITION SWITCH: Mitchellock. Model 24-B, Type 8062 (1939), 8273 (1940). Connected to coil by armored cable. Ignition Lock—Briggs & Stratton. B & S No. 50184. Key Series—H601 to H1100. Groove—No. 1.

COIL: Auto-Lite Model 4635 (1939), 4641 (1940). Service Coil (less Switch & Cable) CE-3224JS. Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671. Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4008A. Full automatic advance type with manual (octane selector) adjustment. No vacuum spark control. Breaker Gap—.017". Cam Angle or Dwell—31° closed, 14° open (dist.). Breaker Arm Spring Tension—17-20 ounces. Rotation—Clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

Fuel Compensator Adjustment—Manual adjustment for octane rating of fuel. See Ignition Timing.

Removal:—Mounted on right side of crankcase. To remove take out hold-down screw in advance arm.

IGNITION TIMING

IGNITION TIMING:—Initial Setting (for 70 octane rating fuel). See Fuel Compensator setting following.

	Flywheel Degrees	Piston Position
All Engines	0° at TDC	.0000" TDC

Timing—With #1 piston on compression, turn engine over until piston reaches top dead center when flywheel mark 'UDC.1-8/' lines up with pointer in left front face of rear motor support. Loosen hold-down screw in advance arm, rotate distributor clockwise to limit of advance arm slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw. Check Fuel Compensator setting.

Timing (Using Synchroscope)—Recommended by manufacturer. Mark flywheel with white chalk or

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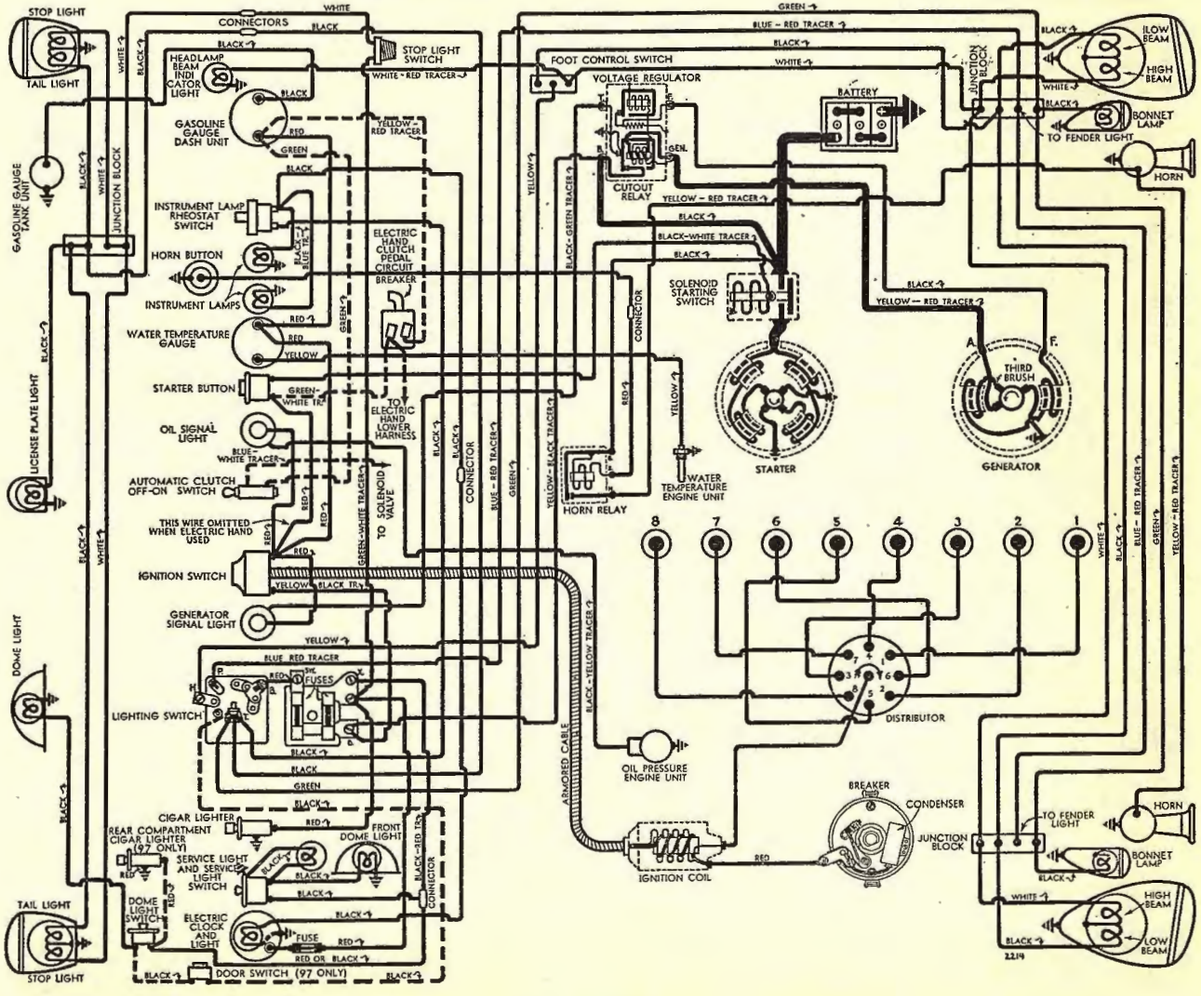

1939 MODELS

GENERATOR

STANDARD

Auto-Lite Model GDS-4801A (1939), GEC-4801A (1940). Third brush control with external vibrating voltage regulation. Ventilated by fan on drive pulley.

Armature—GDF-2006F (GDS), GDZ-2006F (GEC).

Maximum Charging Rate—(GDS Gen.) 33 amperes (cold), 27.5 amperes (hot), 8.0 volts, 30-35 MPH (GEC Gen.) 39-44 amperes (cold), 3350 RPM or approximately 43 MPH. Actual charging rate controlled by voltage regulator and dependent on battery condition. When checking generator output, ground generator "F" terminal to eliminate regulator action.

Charging Rate Adjustment—See Regulator data. Third Brush setting should be as follows: (GDS) 1 commutator bar minus 1 mica strip (Min.), 1 commutator bar (Max.) from nearest main brush; (GEC) 1 commutator bar (Min.), 1 commutator bar plus 1 mica strip (Max.) from nearest main brush.

Performance Data—GDS-4801A

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	920	0	6.4	960
4	6.6	1050	4	6.65	1120
8	6.8	1175	8	6.9	1280
12	7.0	1300	12	7.1	1430
16	7.2	1450	16	7.45	1640
20	7.4	1600	20	7.6	1900
24	7.6	1820	24	7.8	2320
28	7.8	2075	27.5	8.0	3200
33	8.0	2900			

Performance Data—GEC-4801A

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.65-1.82 amperes (GDS Gen.), 1.60-1.78 amperes (GEC Gen.) at 6.0 volts.
Motoring Current—5.10-5.45 amperes (GDS Gen.), 4.85-5.4 amperes (GEC Gen.) at 6.0 volts.

Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Swing generator out until possible belt deflection midway between generator and fan pulleys is ¾" (use straightedge across pulleys).

GENERATOR

SPECIAL EQUIPMENT

SPECIAL GENERATORS:—Auto-Lite GEG-4801A, GEA-4803B, GEB-4802A, B. Two brush types with voltage and current regulation.
Armatures—No. GEG-2006F (GEG Gen.), GDZ-2006F (GEA Gen.), GEB-2006F (GEB Gens.).
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—For each model as follows:

Model GEA-4803B

Cold Performance Data			Hot Performance Data		
0	6.4	780	0	6.4	840
4	6.6	870	4	6.6	935
8	6.8	960	8	6.8	1025
12	6.95	1050	12	6.95	1120
16	7.15	1140	16	7.15	1220
20	7.3	1230	20	7.3	1320
24	7.6	1320	24	7.6	1420
28	7.7	1410	28	7.7	1520
32	7.85	1500	32	7.85	1685
35	8.0	1570	35	8.0	1300

Models GEB-4802A, GEB-4802B①

0	6.4	560	0	6.4	600
4	6.6	630	4	6.6	675
8	6.8	700	8	6.8	750
12	7.0	775	12	7.0	840
16	7.2	845	16	7.2	930
20	7.4	920	20	7.4	1030
24	7.6	1000	24	7.6	1140
28	7.8	1075	28	7.8	1260
32	8.0	1150	32	8.0	1400

①—Before Serial No. 2V-000001.

Model GEG-4801A

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	780	0	6.4	820
5	6.6	870	5	6.6	900
10	6.8	960	10	6.8	990
15	7.0	1040	15	7.0	1080
20	7.2	1130	20	7.2	1170
25	7.4	1220	25	7.4	1270
30	7.6	1310	30	7.6	1380
35	7.8	1410	35	7.8	1510
40	8.0	1520	40	8.0	1680

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (GEA Gen.), 64-68 ozs. (GEB, GEG Gen.) with new brushes.
Field Current—1.57-1.75 amperes (GEA Gen.), 1.6-1.78 amperes (GEB, GEG Gen.) at 6.0 volts.
Motoring Current—4.45-4.9 amps. (GEA Gen.), 4-4.5 amps. (GEB), 4.7-5.2 amps. (GEG) at 6.0 volts.
Removal & Belt Adjustment:—Same as for Std. Gen.

REGULATOR

STANDARD

Auto-Lite Model VRD-4008A (1939), VRD-4008B (1940 First Cars), VRR-4001A (1940 Later Cars).
Used with GDS-4801A & GEC-4801A Gen. Cutout Relay and vibrating Voltage Regulator in case on dash. Cutout Relay has special upper contacts for Generator Teleflash Signal control.

For complete data, refer to Electrical Equipment Index.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In—6.4-7.0 volts (VRD), 6.4-6.6 volts (VRR) 825 RPM., 9.4 MPH.
Cuts Out—.5-3.0 amperes (before Regulator Serial No. 2T-000001), 1.5-4.5 amperes (after No. 2T-000001) (VRD); 4.2-4.8 volts with approximately 4-6 amperes discharge current (VRR).
Contact Gap—.015" minimum with ground contacts closed (must open when main contacts close).
Air Gap—.034-.038" (VRD), .031-.034" (VRR), at hinge end of core (ground contacts closed).

Voltage Regulator

Setting—7.1-7.4 volts at 110° F. (all models).
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal, voltmeter between this terminal and ground. Operate generator at speed of 30 MPH charging battery until voltage is constant. Voltmeter reading should be within limits of 7.1-7.4 volts at 110°. See Electrical Equipment Section for voltages at other temp.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.010-.020" (VRD), .012" Min. (VRR) (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

REGULATOR

SPECIAL EQUIPMENT

REGULATOR (SPEC. GEN.):—Auto-Lite VRP-4008A (GEG Gen.), VRP-4008B (GEA Gen.), VRP-4008C (GEB-4802A, B Gen.), VRP-4008D (GEB-4802B-2 Gen.). Cutout Relay and vibrating type Voltage & Current Regulator units in a single case on the dash. Same design as Std. VRR Regulator except for additional Current Regulator.

For complete data, refer to Electrical Equipment Index.

Cutout Relay & Voltage Regulator

All specifications same as for Std. VRR Type (above).

Current Regulator

Setting—39-41 amperes—marked '40' on cover (VRP-4008A), 34-36 amperes—marked '35' (VRP-4008B, 8D), 31-33 amps. marked '32' (VRP-4008C).
To Check—Connect test meters as for voltage check (above), operate generator at speed for maximum output, turn on lights so that generator charges at peak rate and current regulator operates, check ammeter reading which should agree with setting given above.
Adjustment, Contact Gap, Air Gap—Same as for VRR Voltage Regulator unit as given above.

LIGHTING

Headlamps—Hall Pre-focused type (1939), Hall "Sealed Beam" type (1940). Upper and lower beams controlled by Beam Selector Switch on toeboard.
Headlamp Adjustment—With car unloaded, 25' from screen and upper beams lighted, aim each headlamp so that center of hot spot is 3" below horizontal line at lamp center height, and hot spot centered on lamp vertical center-line.
Beam Indicator—On upper left hand corner of instrument panel. Lighted whenever upper beams in use.
Bonnet Side Panel Lamps—Used instead of parking bulb in headlamp. NOTE—To remove bulb, pull bulb socket out of lamp.

Switches

Lighting—R-B-M No. 1725 (1939), Cole-Hersee (1940).
Beam Selector—Douglas or R-B-M No. 1076 (1939), R-B-M No. 2467 (1940).
Instrument—Douglas.

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Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps (1939)	32-32	2331
Headlamps (Export)	21-50	2520
Headlamps (1940)	Sealed Beam	
Bonnet Side Panel, Radio	1½	55
Instr., Spdmtr., Service	1½	55
Beam Indicator & Signals	1	51
Stop & Tail	21-3	1158
License, Fender	3	63
Dome	15	87

Front Direction Signal bulb (1940) is 21-3 cp. Mazda No. 1154. The 3 cp. filament of this bulb is used in place of the regular parking (bonnet side panel) bulb (No. 55).

MISC. ELECTRICAL

SIGNAL LIGHTS:—Generator Charge and Oil Pressure Indicators. Hudson Teleflash Electric type. *For complete data, refer to Electrical Equipment Index.*

FUSES:—Lighting—20 ampere. Lower fuse on fuse block on lower edge of instrument panel to right of steering column. Accessory—20 amperes. Top fuse on fuse block. NOTE—Silver-plated fuses used.

Twin Horns—30 ampere on block on engine dash.

Transmission Overdrive Control—20 amp. On Relay.

Direction Indicator—10 ampere. In case on back of instrument panel near speedometer.

Electric Clock—2 ampere on back of clock.

HORNS:—Sparton—Twin, vibrator type, air trumpet horns standard. Operated by relay.

Horn Relay: R-B-M Model 4751 (1939), 4790 (1940). Mounted on horn bracket.

Contacts Close—3.5-4.5 volts. Current Draw ¾ amp.

ENGINE

ENGINE SPECIFICATIONS:—8 cylinder, 'L' head type.

Bore—3". Stroke—4½".

Displacement—254 cubic inches. Rated HP—28.8.

Developed Horsepower—128 at 4200 RPM.

Compression Ratio—6.25-1 (1939), 6.5-1 (1940). Heads are Cast Iron.

Compression Pressure—118 lbs. (1939), 120 lbs. (1940) at cranking speed of 125 RPM.

Vacuum Reading—Steady 18-21" idling at 7 MPH.

PISTONS:—Own Lo-Ex aluminum alloy, "T" slot, cam ground type. Use finished replacement pistons.

Weight—10.5 ozs. (stripped). Length—3 3/16".

Removal—Piston and rod assemblies may be removed from above or below.

Clearance—Top .016". Skirt .001-.002".

Original Bore Sizes & Replacement Pistons:—*See Hudson Shop Notes for complete data.*

Fitting New Pistons:—Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS:—2 compression, 2 oil rings (1 above pin, 1 below pin). Rings positioned by pin in groove.

Models 95, 97 (1939)

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.005-.010"	.001"
Oil Control①	3/16"	.005-.010"	.001"
Oil Control②	5/32"	.005-.010"	.001"

①—Both rings on early cars, top ring on later cars.
②—Lower oil ring on later cars.

Models 44, 45, 47 (1940)

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil Cont. (#1)	3/16"	.009-.011"	.001"
Oil Cont. (#2)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN:—Diameter—¾". Length—2 7/16". Floating Type. Retained by locking rings. *See Hudson Shop Notes for Pin Servicing data.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD:—Weight 30 ozs. Length 8 3/16". Upper Bearing (Piston Pin Bushing)—Bronze.
Crankpin Journal Diameter—1.935-1.936". *See Crankshaft Size Code Note in Hudson Special Data for original bearing size.*
Lower Bearing—'Bermax' alloy spun type. Exchange rods furnished Std. & .010" undersize. *See Crankshaft Size Code in Hudson Shop Notes for bearing sizes.*
Clearance—.001". Sideplay—.006-.010".

Bearing Adjustment:—None (no shims). Replace rods.

Installing Rods:—Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT:—5 bearing, integral counterweights. *See Hudson Shop Notes for Crankshaft and Vibration Dampener Removal, Main Bearing Removal, Installation, Replacement Bearings and Line-reaming data.*
Journal Diameters—#1, 2.279-2.280", #2, 2.311-2.312", #3, 2.341-2.342", #4, 2.373-2.374", #5, 2.404-2.405". *See Crankshaft Size Code Note in Hudson Shop Notes for original bearing sizes.*
Bearings—Bronze-backed, 'Bohnalloy' type. Bearings secured in cap and crankcase by brass screws. Clearance—.001".

Bearing Adjustment:—Shims. *See Hudson Shop Notes.*

►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. Endplay—.006-.012".

CAMSHAFT:—5 bearing, gear driven. *See Hudson Shop Notes for Camshaft Removal.*
Journal Diameters (1939)—#1, 2 1/32"; #2, 2"; #3, 1 31/32"; #4, 1 15/16"; #5, 1½".
Journal Diameters (1940)—#1, 2.029"; #2, 1.998"; #3, 1.966"; #4, 1.935"; #5, 1.498".
Bearings—Babbitt type. Clearance—.0025".

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.

Timing Gears:—Crankshaft gear cast-iron. Camshaft gear GE or Continental Diamond Fibre Bakelite. *1941 Type Timing Gear Set can be installed on these models (tooth angle redesigned to provide quieter operation). Refer to Hudson Shop Notes.*

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1½"	11/32"	5 3/32"
Exhaust	1⅜"	11/32"	5 3/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: 2 9/16" long. Install with top 1 1/16" (1939), 15/16" (1940) below top of block and finish ream to size.

Valve Springs:—Dampeners (originally used on bottom of spgs.) should be omitted when valves serviced.

Free length 2 17/64".	Spring Pressure	Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—Replace if pressure below 34 lbs. at 2".

Valve Lifters:—Roller shoe type, fitted in removable guides. *See Hudson Shop Notes for lifter removal.*

VALVE TIMING

Tappet Clearance—.008" Int., .010" Exh., Hot.
NOTE—This supersedes earlier data.
See Hudson Shop Notes for Fender Plate Removal.

Valve Timing:—See Camshaft Setting above.

Intake Valves—Open 10°40' BTDC. Close 60° ALDC.

Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC. These figures correct with .010" tappet clearance.

Valve Timing Check—With .010" tappet clearance #1 intake valve should open with piston 10°40' or .0494" BTDC when a point on the flywheel approx. 3.97 teeth before 'UDC.1-8/' mark lines up with indicator. Reset tappet clearance .008" hot and idling.

LUBRICATION

LUBRICATION:—Duo-flo (pressure & positive splash).

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Normal Oil Pressure—3 lbs. (no gauge).

Oil Pressure Regulator:—Located on right side of crankcase at rear. Opens at 3 lbs. Not adjustable.

Oil Pressure Indicator:—Teleflash Oil Pressure indicator. *For data, refer to Electrical Equipment Index.*

Checking Oiling System:—*See Hudson Shop Notes.*

Crankcase Capacity:—7 qts. (refill). NOTE—Install 2 qts. add'tl oil in upper tray when pan installed.

COOLING

Water Capacity: 17½ qts. (1939), 18 qts. (1940). *See Hudson Shop Notes for radiator core removal.*

Water Pump:—Centrifugal, belt driven, packless type. *See Water Pump Section for complete data.*
Removal—Drain water, remove fan belt, disconnect pump hoses, remove mounting bolts and lift off fan and pump assembly.

Thermostat:—Fulton. In cylinder head water outlet.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge:—King-Seeley Electric K-S Nos.
Dash Unit—No. 7420 (1939), 8120 (1940 Early—White Lines), 7755 (1940 Later—White Diamonds).
Engine Unit—No. 7000 (1939-40 models).
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—Own make. Single plate, cork insert type operating in oil. **Overdrive Cars**—equipped with heavier clutch housing and larger redesigned disc *See Clutch Section for complete data.*

Driven Member—Cork Insert type. Cork thickness .244-.255" (1939), .077" (1940). Inside Diameter 6½". Outside Diameter 9 27/32" (1939), 10" (1940). No. of corks 108.

Pedal Adjustment:—1½" free travel. Adjust yoke on lower end of pedal connector link. Check Automatic Clutch Control & Hill-holder (if used).

Clutch Oil Servicing:—*See Hudson Shop Notes.*

Removal:—Remove transmission (see below), drain clutch oil, take out mounting screws in clutch cover rim, remove clutch assembly from below.

Automatic Clutch Control:—Electric type. Optl. *See Clutch Section for complete data.*

TRANSMISSION

TRANSMISSION:—Own Make. Constant-mesh, helical gear (second & high), sliding spur (low & reverse). *See Transmission Section for complete data.*

Transmission Control:—Hudson 'Handy-Shift' type. *See Transmission Section for complete data.*

Removal (1939): Disconnect "Handy-shift" controls at transmission, remove Automatic Clutch Control unit and Electric Hand power unit after disconnecting all wires and vacuum and air hoses if car is so equipped (NOTE—See Clutch and Trans. Sections for necessary adjustments on these units when reinstalled). Disconnect transmission side bumpers, interlock straps, and speedometer cable. Disconnect drive shaft at front universal, support engine at rear, free rear engine mounting. Take out bell housing-to-engine mounting bolts, pull transmission straight back and remove.

Removal (1940): Remove front cushion and push seat back, remove accelerator pedal. Remove floor mat and transmission hole cover. Disconnect front universal joint. Remove clutch pedal return spring, assist spring, and cross-shaft. Release transmission side bumpers and rods, disconnect handy-shift controls at transmission, remove speedometer cable. Raise front end of car, remove lower flywheel guard and engine rear mounting bolts, raise rear end of engine off frame. Remove clutch housing-to-engine mounting bolts, pull transmission back and lift out. NOTE—Transmission can be taken out without disturbing clutch housing by taking out transmission-to-clutch housing bolts.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed. Remove wire after transmission installed.

OVERDRIVE

Overdrive:—Warner Model AS13-R6 with electrical 'kick-down' control. Optional equipment. *See Transmission Section for complete data.*

Overdrive Transmission Removal—Same as Std. Transmission (above) except overdrive solenoid wires and control cable must also be disconnected.

Overdrive Solenoid—Delco-Remy No. 1569.

Throttle Control Switch—R-B-M Model 6013. Adjust so contact washer on accelerator linkage just contacts switch plunger with throttle wide open.

Control Relay—Auto-Lite Model HR-4201.

UNIVERSALS

Spicer. Needle Bearing type. Model Nos. as follows: Front—1281-01X (1939), 1271-101 (1940 exc. 47 without Overdrive), 1281-101 (1940 47 Std.). Rear—1278-01X (1939), 1278-101 (1940). *See Universals Section for complete data.*

REAR AXLE

REAR AXLE:—Own Make. Semi-floating spiral bevel gear type with Hotchkiss drive. *See Rear Axle Section for complete data.*

Ratio—4 1/9-1 (Std., Optl. on Overdrive), 4 5/9-1 (Std. on Ovdr., Optl. on reg. transmission).

Backlash—.0005-.003". Screw adjustment.

Removal:—Disconnect drive shaft at rear universal. Remove axle shafts (see below) and capscrews on carrier flange. Pull carrier assembly out.

Axle Shaft Removal:—Remove wheel and hub (use screw type puller only), remove 4 nuts on bearing cap bolts, push bolts out of backing plate, remove cap (without disturbing brake link), remove shims, pull axle shaft and wheel bearing out.

Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see Removal directions above), add or remove shims equally at both wheels. **Endplay**—.002-.004".

SHOCK ABSORBERS

Delco. Direct Acting, Hydraulic type. Model Nos. as follows: Front—1113-R (1939 Std.), 1132-S (1939 Exp.), 1007-C (1940). Rear—1120-S (1939 Std.), 1131-T (1939 Exp.), 1008-S (1940).

FRONT SUSPENSION

1939 MODELS

Front Suspension (1939): "I" beam section type front axle with Elliott type ends and semi-elliptic springs. Axle alignment maintained by torque arm at side of each spring seat and held by rubber-bushed bolt at frame rail.

Autopoise Control—*See Hudson Shop Notes.*

Kingpin Inclination—7° crosswise. *See Hudson Shop Notes for Kingpin Thrust Bearing data.*

Caster—1-2° and equal within ½° for both wheels. To adjust, loosen capscrews at forward end of torque arm, insert shim between arm and axle at upper screw, or remove shim at lower screw to decrease caster, remove shim at upper screw or insert shim at lower screw to increase caster. Shims .020" thick, change caster ½°.

Camber—1-1½°. Bend axle cold for minor changes.

Toe In—0-⅛" measured 10" up from ground. Adjust by loosening clamp bolts and turning tie rod.

Steering Geometry—Inner wheel 20°. Outer 17¾°.

FRONT SUSPENSION

1940 MODELS

Front Suspension (1940): Independent, linked parallelogram type with coil springs and Autopoise Control. *See Front Suspension Section for complete data.*

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Pos. ¾°. Adjustable.

Toe In—0-1/16". Loosen clamp at outer end of each tube (adjust tubes equally).

Steering Geometry—Inner wheel 24°. Outer 20°50'.

STEERING GEAR

Steering Gear: Gemmer Model 335 Worm-and-Roller type with "push-pull" adjustments. *See Steering Gear Section for complete data.*

BRAKES

BRAKES:—Service. Bendix hydraulic, duo-servo, single anchor type with eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes. *See Brake Section for complete data.*

Drums—Alloy steel. Diameter—11 1/16".

Lining—Moulded (primary), woven (secondary). Thick. 7/32". Width 1¾". Length per whl. 23 15/16".

Clearance—.010" at heel and toe of each shoe.

Hand Brake:—See Service Brakes above.

Hill-Holder: Optional. *See article in Brake Section..*

ENGINE HOOD (BONNET) LOCK, HOOD REMOVAL AND ADJUSTMENT:—*See Hudson Shop Notes.*

MODEL IDENTIFICATION

	1941 Model	1941 Serial No.	1942 Model	1942 Serial No.
Six Traveler	10T①	10101	20T②	20101
Six Deluxe	10P①	10101	20P②	20101
Super Six	11	11101	21	21101
Commodore Six	12	12101	22	22101
Business Cars	10C①	10101	20C②	20101
Big Boy	18	18101	28	28101

①—See Model 10 Note (below).
②—See Model 20 Note (below).

MODEL 10 NOTE:—3"x 5" engine optional (when this engine used **all equipment listed below for Model 11 used on these cars**). Serial No. plate carries identification prefixes as follows: **3"x4⅛" Eng.** 'T' (Traveler), 'P' (Deluxe), 'C' (Commercial). **3"x5" Engine** additional letter 'L' thus: 'TL', 'PL', 'CL'.

MODEL 20 NOTE:—3" x 5" engine optional (when this engine used **all equipment listed below for Model 21 used on these cars**). Serial No. plate carries identification prefixes as follows: **3"x4⅛" Eng.** 'T' (Six), 'P' (Deluxe), 'C' (Commercial). **3"x5" Engine** an additional letter 'L' thus: 'TL', 'PL', 'CL'.

SERIAL NUMBER: First No. for each model as shown in table above. Stamped on plate on right front door hinge pillar post. NOTE—First two figures of number indicate model thus: 10-101.

ENGINE NUMBER:—Same as Serial No. On top of cylinder block between #1 and 2 exhaust flanges.

TUNE-UP

COMPRESSION: Ratio & Pressure—As follows:

Model	Ratio	Pressure (At 125 RPM)
10, 20	7.25-1	125 lbs.
10, 20 (3"x5" Eng.)	6.5-1	120 lbs.
11, 12, 18 ('41)	6.5-1	120 lbs.
21, 22, 28 ('42)	6.5-1	120 lbs.

VACUUM READING:—18-21" steady idling at 600 RPM.

FIRING ORDER:—1-5-3-6-2-4. See diagram.

SPARK PLUGS:—Champion Spec. J9 Hudson. 14 MM. **Gaps—.032"**
Optl. Plug Note—Champion J-5 (Hotter) for continuous slow speed service or J-10 Commercial (Cooler) for continuous high speed service.

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020" Cam Angle 35° (Closed).
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.
Std.Setting—½" flywheel travel BTDC. with 2nd graduation on flywheel ahead of mark "UDC.1-6/" at indicator on left front face of rear motor support above starter.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting (Single Carb.)—Idle screw ¾-1½ turn open. Idle speed 580-600 RPM.
Idle Setting (Dual Carb.)—Both idle screws ¼-1¼ turn open (461-S), ½-1½ turn open (501-S). Idle speed 580-600 RPM.
Float Level (Single Carb.)—⅜" from top of bowl cover projection to top of soldered seam on free end of float with valve seated (invert to check).
Float Level (Dual Carb.)—3/32" (461-S), ⅛" (501-S) from gasket seat on bowl cover to top of float at each end (invert to check).
Accelerating Pump (Single Carb.)—Lower hole (medium stroke) Normal. Inner hole (Summer), Upper hole (Winter) for temperature extremes.
Accelerating Pump (Dual Carb.)—Outer hole (max. stroke) Normal. Inner hole (min.) when required.
Fuel Pump Pressure: 3½ lbs. max. (AF), 4½ lbs. max. (AK).

MANIFOLD HEAT CONTROL: Models 10, 18 ('41), 20, 28 ('42). Manual type. Located on manifold behind carburetor.
Setting—Arrow on valve cover pointing to "W" cast on top of manifold. Correct for **Summer & Winter.**

Models 11, 12 ('41), 21, 22 ('42)—Automatic thermostatic type. No adjustment. See that valve operates freely. NOTE—This type used on Models 10 and 20 with 3"x5" Engine.

VALVES: See Valve Timing.

►**Tappet Clearance:** *CAUTION*—2 settings used:

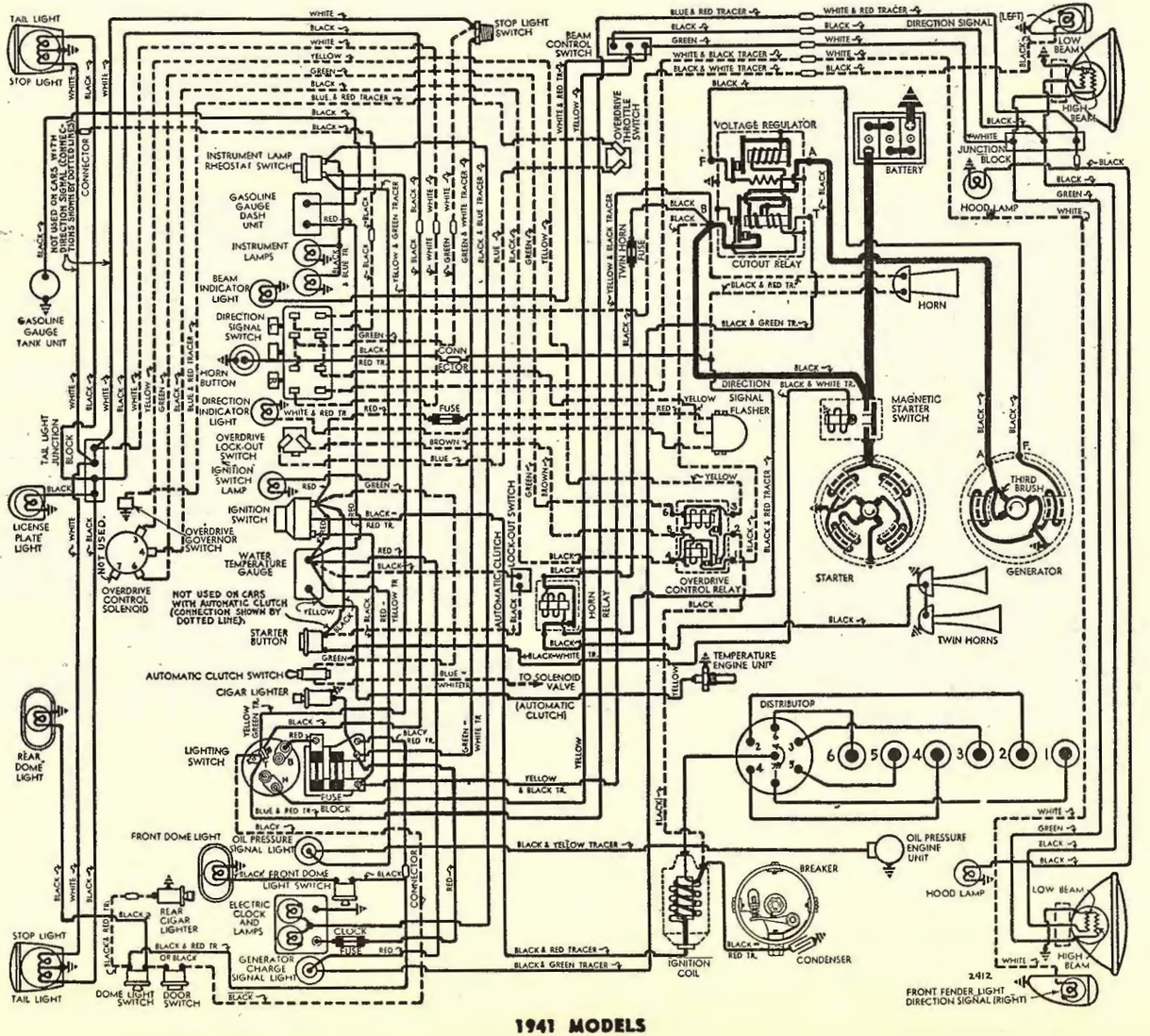
►**1941 3x4 ⅛" Eng. (Before No. 6848)**
►**1941-42 3x5" Eng. (Orig. Camshaft)**
.006" Intake, .008" Exhaust, hot and idling.

►**1941-42 3x4 ⅛" Eng. (After No. 6848)**
►**All Engines (Repl. Camshaft)①**
.010" Intake, .012" Exhaust, hot and idling.

①—Engines with replacement camshaft should have decalcomania on valve cover plate specifying this .010" Int., .012" Exh. setting.

See Hudson Shop Notes for data on this new Camshaft.

STARTING: See Battery, Starter, Generator, Regulator.



1941 MODELS

IGNITION

Ignition Switch:—Mitchellock Model 24-B, No. 8797.
Ignition Lock—Briggs & Stratton B & S No. 50184.
Key Series—H601 to H1100. **Groove**—No. 1.

COIL: Auto-Lite Model IG-4098. Mounted on the dash. **IMPORTANT**—Coil is hooked up reversed from conventional manner (as shown on 1940 diagram) with switch lead connected to terminal on high tension terminal end of coil, breaker lead to terminal on opposite end. Will not operate satisfactorily if connected otherwise.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IGW-3075C.
Capacity—.20-.25 microfarad.

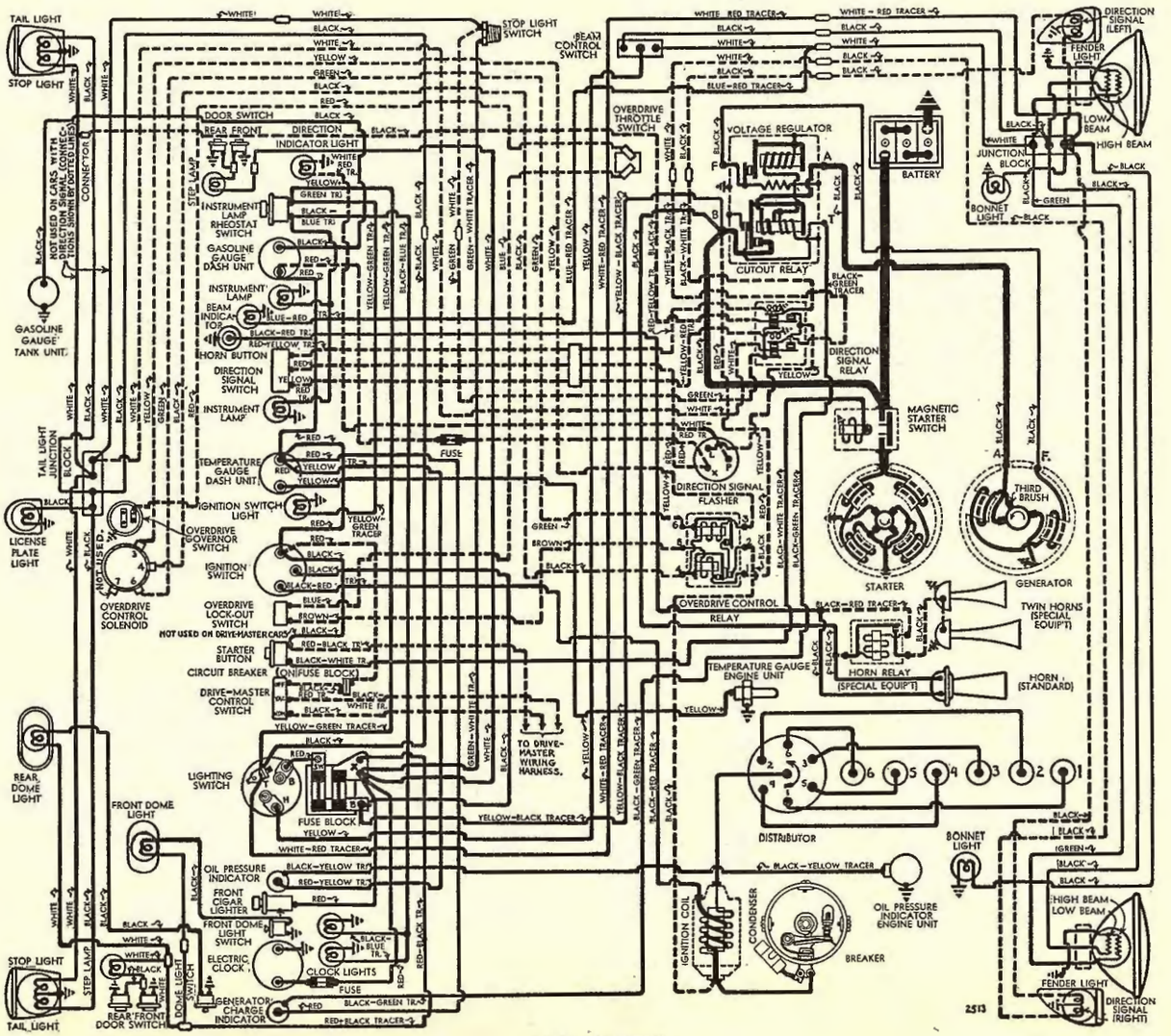
DISTRIBUTOR: Auto-Lite Model IGW-4203A. Single breaker, 6 lobe cam, full automatic advance type with auxiliary vacuum spark control.
Breaker Gap—.020".
Cam Angle or Dwell—35° closed, 25° open (distr. °).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Distributor Degrees	Automatic Advance R.P.M	Engine Degrees	R.P.M.
Start	400	0	800
3	700	6	1400
6	1000	12	2000
9	1300	18	2600
11.75	1570	23.5	3140

Vacuum Spark Control—On distributor hold-down plate, linked to quadrant scale on distributor. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring within unit).

Vacuum Advance		
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅞"
4°	8°	9¼"
7.5°	15°	11¼"

Fuel Compensator—Manual adjustment for octane rating of fuel used. See Ignition Timing for setting.
Distributor Removal:—Mounted at top rear of cylinder head. To remove, disconnect vacuum line, take out cyl. head stud nuts on hold-down plate.



1942 MODELS

IGNITION TIMING

IGNITION TIMING:—Initial Setting—½" (two spaces) BTDC. for fuel of approximately 72 Octane rating.
Flywheel Marks—'UDC.1-6/' at TDC with 4 graduations (¼" apart) ahead of this mark.
Timing—With #1 piston on compression, turn engine over until second graduation before flywheel mark 'UDC.1-6/' lines up with pointer on left front face of rear motor support above starter. Loosen vacuum advance diaphragm screw on quadrant scale, rotate distributor counter-clockwise to limit of slot, then slowly rotate clockwise until contacts begin to open, tighten diaphragm screw securely. Check Fuel Compensator Setting below.
Timing (Using Synchroscope)—Recommended by car manufacturer. Mark flywheel with white chalk or paint. Idle engine, adjust distributor (above).
Fuel Compensator Setting—Road test car (engine warm). When running at 8 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen vacuum unit link screw on distributor quadrant, rotate distributor one graduation on quadrant scale clockwise (if no ping), counter-clockwise (if ping too severe).
Final setting must not be more than 1" (4th graduation) before 'UDC.1-6/' flywheel mark.

CARBURETOR

SINGLE BARREL

(Models 10—see Note, 18, 20—see Note, 28)—Carter Model WA-1, Type 454-S. 1¼" Single Barrel, downdraft type with Fast Idle and Carter Climatic Control (automatic choke).
Model 10, 20 Note—Cars with 3"x 5" Engine have dual carburetor (same as Models 11, 21 below).
**For complete data, refer to Carburetor Index.*
Idle Adjustment—With engine warm, set throttle stopscrew for 600 RPM hot or slow idle speed (fast idle inoperative), adjust idle adjusting screw so engine fires smoothly and vacuum reading at maximum (screw ¾-1½ turns open—turn screw in for leaner setting), recheck idle speed.
Accelerating Pump Setting—Pump arm has three holes for pump link engagement. Set as follows:
Lower Hole (med. stroke)—Normal setting.
Inner Hole (min.)—Hot weather or hi-test fuel.
Upper Hole (max.)—Cold weather or low-test fuel.
Float Level—⅜" from top of bowl cover projection to top of soldered seam on float at free end.
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

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Fast Idle (454-S): Integral with carburetor.
For complete data, refer to Carburetion Equip. Index.
Setting—Adjust by bending connecting link offset for ⅝" choke valve opening with throttle stopscrew against (not on) first step of fast idle cam.
Automatic Choke (454-S): Carter Climatic Control (Single Carburetors).
See Carburetion Equipment Section for complete data.
Setting—Centered (at index mark).

CARBURETOR

DUAL (DOUBLE BARREL)

(Models 11, 12, 21, 22): Carter Model WDO, Type 461-S (1941 before No. 2150), Type 501-S (1941 After No. 2150 & 1942). 1" Dual (double barrel), downdraft types with Fast Idle and Carter Climatic Control (automatic choke). NOTE—Type 461-S, only, has "Slow-Closing Throttle" dashpot device.
Idle Adjustment—With engine warm, set throttle stopscrew for 580-600 RPM hot or slow idle speed (fast idle inoperative). Adjust both idle screws (two used, one for each barrel) in succession until engine fires smoothly. Final setting should be ¼-1¼ turn open (461-S), ½-1½ turn open (501-S) from inner seated position. Turn screws in for leaner mixture. If vacuum gauge used, adjust for highest steady reading of the gauge. Readjust stopscrew for correct idling speed.
Accelerating Pump Setting—Pump lever (under dust cover on bowl cover) has two holes for pump link engagement. Adjust as follows:
Outer Hole (max. stroke)—Normal Setting.
Inner Hole (min. stroke)—If less charge required.
Float Level—3/32" (461-S), ⅛" (501-S) from top of float to bowl cover with valve seated.

Fast Idle (461-S, 501-S): Integral with carburetor.
For complete data, refer to Carb. Equip. Index.
Setting (461-S)—With choke valve closed, adjust fast idle screw for .018" throttle opening.
Setting (501-S)—With choke valve closed and fast idle screw on high lobe of fast idle cam, turn fast idle screw in until throttle opening is .045".
Automatic Choke:—Carter Climatic Control.
For complete data, refer to Carburetion Equip. Index.
Setting (461-S)—Centered (at index mark).
Setting (501-S)—One Notch Lean (supersedes "Centered" setting originally specified for this model.

CARB. EQUIPMENT

Air Cleaner:—AC oil wetted types.

Car Model	Standard	Cars with Drive-Master	Replacement Filter Elem.
10,18,20,28	1528159	1542384	Type #1
11,12,21,22	1528161	1542385	Type #2

Fuel Pump: AC Type AF, No. 1523753 (10,18,20,28 Pass. Cars); Type AK, No. 1523289 (All others). Pump Exchange No. 509 (Type AF), 499 (Type AK).
For complete data, refer to Carburetion Equip. Index.
Gasoline Gauge:—King-Seeley Electric. K-S No. 8305 (Dash Unit—stamped 'G'), No. 7550 (Tank Unit).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—National, Type HT-17. 6 volt, 17 plate, 96 ampere hour capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage—4.24 volts.
Grounded Terminal—Positive (+) to frame. Engine Ground—Strap (rear motor support to frame).
Dimensions—Lgth. 10 9/16". W. 7¼". Hght. 7 13/16".
Location—On left side under engine hood.

STARTER

Auto-Lite Model MZ-4092. Armature No. MZ-2138.
Drive—Inboard Barrel type Bendix No. A-1684.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 125 amperes, 5.4 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4300	5.5	70
2.55 "	1325	5.0	200
4.95 "	750	4.5	300
7.65 "	220	4.0	400
7.8 "	Lock	3.0	420
11.8 "	Lock	4.0	560

Removal:—On left front face of rear motor support. To remove, take out flange mounting screws.
Starting Switch:—A-L Model SS-4001. Magnetic type.
For complete data, refer to Electrical Equipment Index.

GENERATOR

STANDARD

Auto-Lite Model GDS-4801A (Std. 10, 18, 20, 28); GEC-4801A (Std. 11, 12, 21, 22, 20P Conv. Sedan, 20 with 3" x 5" Eng., All Cars with DriveMaster). Third brush control type with vibrating voltage regulator. Ventilated by fan on drive pulley.
Armature—GDF-2006F (GDS), GDZ-2006F (GEC).
Maximum Charging Rate (GDS)—32-34 amperes (cold), 8.0 volts, 2900 RPM or approx. 35 MPH. (GEC) 39-43 amperes (cold), 8.0 volts, 3350 RPM or approx. 43 MPH. Actual charging rate controlled by Voltage Regulator (see Regulator). Ground generator 'F' terminal when checking generator output.
Charging Rate Adjustment—See Regulator. Third brush setting (GDS) 1 comm. bar minus 1 mica strip min., 1 comm. bar max. from insulated (nearest main brush). (GEC) 1 comm. bar min., 1 comm. bar plus 1 mica strip max. Adjust by shifting 3rd brush.

Performance Data—GDS-4801A

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M
0	6.4	920	0	6.4	960
4	6.6	1050	4	6.65	1120
8	6.8	1175	8	6.9	1280
12	7.0	1300	12	7.1	1430
16	7.2	1450	16	7.35	1640
20	7.4	1600	20	7.6	1900
24	7.6	1820	24	7.8	2320
28	7.8	2075	27.5	8.0	3400
33	8.0	2900			

Performance Data—GEC-4801A

0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.65-1.82 amperes (GDS), 1.60-1.78 amperes (GEC) at 6.0 volts.
Motoring Current—5.10-5.45 (GDS), 4.85-5.4 (GEC) amperes at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment:—¾" slack midway between pulleys.

GENERATOR

SPECIAL EQUIPMENT

SPECIAL GENERATORS:—Police & Spec. Service—*Refer to 1941-42 Hudson Eight article (following) for complete data on these Generators and Regulators.*

REGULATOR

REGULATOR:—**Auto-Lite VRR-4001A.** Cutout Relay and vibrating Voltage Regulator in case on dash. Cutout Relay has extra set of contacts for Generator Teleflash Indicator control. NOTE—Regulator enclosed in close-fitting metal cover on dash.
For complete data, refer to Electrical Equipment Index.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay
Cuts In—6.4-6.6 volts, 825 RPM. 9.4 MPH.
Cuts Out—4.2-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min. ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator
Setting—7.1-7.4 volts at 70°F.
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal, voltmeter between this terminal and ground. Operate generator at speed of 30 MPH charging battery until voltage is constant. Voltmeter reading should be within limits of 7.1-7.4 volts at 70°F. See Electrical Equipment Section for other temperatures.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

LIGHTING:—**Headlamps**—Hall 'Sealed Beam' type.
For complete data, refer to Electrical Equipment Index.
Headlamp Adjustment—Aim upper beam of each headlamp straight ahead with hot spot centered on horizontal line 3" below lamp center height.
Beam Indicator—Red pilot bulb on speedometer dial. Lighted with Country (upper) beam in use.
Direction Indicator—Optional equipment.
For complete data, refer to Electrical Equipment Index.

Switches—1941
Lighting—Douglas. Hudson No. 147835.
Beam Selector—R-B-M Model 2484.
Instrument—R-B-M. Hudson No. 160092.

Switches—1942
Lighting—Douglas. Hudson Part No. 200417.
Beam Selector—R-B-M. Hudson Part No. 164439.
Instrument—R-B-M. Hudson Part No. 160092.

Bulb Specifications—1941

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Side Panel (Parking)	1½	55
Fender Lamp (see Note)	3	63
Speedometer, Elec. Clock	1½	55
Generator & Oil Signals	1½	55
Ign. Lock, Mech. Clock	1	51
Beam & Direct. Indic.	1	51
Stop & Tail	21-3	1154
Rear License	3	63
Dome	15	87

NOTE—21 cp. No. 1129 for Direction Indicator.

Bulb Specifications—1942

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Bonnet Side Panel (Park)	1.5	55
Fender Lamp (see Note)	3	63
Ign. Lock, Clock	1.5	55
Indicators (Gen.,Oil,Beam,Dir.)	1	51
Speedometer	1	51
Stop & Tail	21-3	1154
Rear License	3	63
Dome & Courtesy	15	88

NOTE—No. 1158 21-3 cp. used with Direction Indic.

MISC. ELECTRICAL

SIGNAL LIGHTS:—Generator Charge and Oil Pressure Indicators used. Hudson Teleflash Electric type. *For complete data, refer to Electrical Equipment Index.*

FUSES:—**Lighting**—30 ampere. Lower fuse on fuse block on lower edge of instrument panel to right of steering column. **Accessory**—30 amp. Top fuse on block. NOTE—Silver-plated fuses used. 30 amp. fuse supersedes 20 ampere fuse used on early cars.
Twin Horns (1939)—30 ampere. On engine dash.
Direction Indicator—10 amp. near speedometer.
Electric Clock—2 amp. in case behind clock.
NOTE—Feed wire for electric clock on early cars connected to fuse block 'Bat' terminal. Should be changed to accessory 'X' terminal (as shown).

CIRCUIT BREAKER:—**Used on Drive-Master Cars only.** On fuse block. Protects Drive-Master circuit only.

HORNS: Single—Schwarze Electric type. Std. on Models 10T, 18 (1939), 20T, 28 (1940).
Twin—Sparton air electric type operated by relay. Fuse on dash. **(Air Gap)** .026-.030" high pitch (short), .032-.035" low pitch (long).

Horn Relay:—R-B-M Model 6004. On dash. **Contacts** Close 3-4 volts (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS (10T, 10P, 10C '41; 20T, 20P, 20C '42): 6 Cylinder, "L" Head type.
Bore—3". **Stroke**—4⅛".
Displacement—175 cubic inches.
Rated Horsepower—21.6.
Developed Horsepower—92 at 4000 RPM.
Compression Ratio—7.25-1 cast-iron head.
Compression Pressure—125 lbs. at 125 RPM (cranking speed). 90 lbs. minimum (10 lbs. max. variation).
Vacuum Reading—Steady 18-21" idling at 600 RPM.

ENGINE SPECIFICATIONS (10TL, 10PL, 10CL, 11, 12, 18 '41; 20TL, 20PL, 20CL, 21, 22, 28 '42): 6 Cylinder, "L" Head type.
Bore—3". **Stroke**—5".
Displacement—212 cubic inches. **Rated HP**—21.6.
Developed Horsepower—102 at 4000 RPM (all models except Models 18, 28), 98 at 4000 RPM (Models 18, 28 only). NOTE—Model 18 & 28 Engines equipped with single carburetor. Dual carburetor used on all other models.
Compression Ratio—6.50-1 cast-iron head.
Compression Pressure—120 lbs. at 125 RPM (cranking speed). 90 lbs. minimum (10 lbs. max. variation).
Vacuum Reading—Steady 18-21" idling at 600 RPM.
See Hudson Shop Notes for Engine Removal instructions and Engine Front Support Removal and Installation.

PISTONS: Lo-Ex aluminum alloy (1941), Cast Alloy (1942), cam ground type. Use finished replacement pistons.
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above.
Clearance—Top .016". Skirt .0005-.001". See Fitting New Pistons below.
Original Bore & Piston Sizes, Replacement Pistons:—*See Hudson Shop Notes for sizes and markings.*
Fitting New Pistons:—Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888-A Piston Feeler Scale to measure pull.
Installing Pistons: Slot away from camshaft.

PISTON RINGS:—Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap).

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil (upper)	3/16"	.009-.011"	.001"
Oil (lower)	5/32	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN:—**Diameter**—¾". **Length**—2 7/16".
Floating type. Retained by locking rings.
See Hudson Shop Notes for Pin Servicing data.
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Standard and .002", .005", .010" oversize.

CONNECTING ROD:—**Weight**—30¾ ozs. (3" x 4⅛" engines), 30 ozs. (3" x 5" engines).
Length—8⅝" (3" x 4⅛" engines), 8 3/16" (3" x 5" engines).
Crankpin Journal Diameter—1.936" (1.935-1.936").
See Crankshaft Size Code Note in Hudson Shop Notes for Original Connecting Rod Bearing sizes.
Lower Bearing—Lead alloy-lined (1941), babbitt-lined (1942), Spun type. Exchange Rods furnished Standard Size and .010" Undersize.
Clearance—.001". **Sideplay**—.006-.010".

Bearing Adjustment:—None (no shims). Do not file rods or caps.

Installing Rods:—Lower end of rods offset. Install rods with widest half of bearing toward the rear (#1, 2, 4); toward front (#3, 5, 6). Oil scoop on lower end of rod toward camshaft.

CRANKSHAFT:—3 bearing, integral counterweights.
See Hudson Shop Notes for Crankshaft and Vibration Dampener Removal, Main Bearing Removal and Installation, Replacement Bearings & Line-Reaming data.
Journal Diameters—#1, 2.342" (2.341-2.342"), #2, 2.374" (2.373-2.374"), #3, 2.405" (2.404-2.405").
See Crankshaft Size Code Note in Hudson Shop Notes for Original Main Bearing Sizes.
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
NOTE—No shim pack is used. Palnuts used in place of cotter pins to lock bearing cap nuts.
Clearance—.001".

Bearing Adjustment:—None (no shims). Do not file caps.

►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. NOTE—If new unfinished bearings installed, thrust face for center bearing must be faced for proper endplay.
Endplay—.006-.012".

►**CAMSHAFT:** *CAUTION*—**Two types of production camshafts used as follows:**
1)—**Part No. 159505.** For all 1941-42 3" x 5" engines, and up to car no. 6848 on 1941 3" x 4⅛" engines.
2)—**Part No. 162962.** For all 1942 3" x 4⅛" engines, and after car no. 6848 on 1941 3" x 4⅛" engines.

►*CAUTION*—**Different Tappet Clearance Settings and Valve Timing** used with each camshaft listed above. See Valve Timing (following).

1942 Note—Camshaft Bearing Clearance and Timing Gear Backlash reduced from that used on previous models for quieter operation of valve mechanism. No valve spring dampeners used.

Journal Diameters—#1, 2.000"; #2, 1.968"; #3, 1.5625".

Bearings—New type steel-backed, 'Bermax' (babbitt) lined bushings (formerly solid type babbitt).
Clearance—.002-.0025" (1941), .001-.0025" (1942).
See Hudson Shop Notes for Camshaft Removal and Camshaft Bearing installation instructions.

►**Replacement Camshaft for ALL ENGINES:** New replacement camshaft no. 166195 (similar to No. 2 Production Camshaft listed above). *See Replacement Camshaft in Hudson Shop Notes for changes and identification.*

►*CAUTION*—When replacement camshaft installed on engines with No. 1 (159505) production camshaft (listed above), **Tappet Clearance Settings and Valve Timing changed.** See Valve Timing (following) or *see Replacement Camshaft in Hudson Shop Notes.*

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.
NOTE—Service thrust washer available which can be split and installed without removing camshaft.

Timing Gears:—Crankshaft gear cast-iron, camshaft gear laminated fibre. Tooth shape changed to 20° pressure angle (was 14½°) to provide quieter operation and longer gear life. Gears can be identified by figure 20 stamped on front face (crankshaft gear carries additional FRONT mark to insure correct installation). Gears may be installed in sets only (not singly) on earlier car models (new type gears similar to previous type except for tooth pressure angle).

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

NOTE—Camshaft gear available in .008" Oversize (can be distinguished from Std. Size by spot of yellow paint on front face).

Backlash—.002-.004".

See Hudson Shop Notes for Timing Gear removal and installation instructions.

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:—	Head Diameter	Stem Diameter	Length
All valves	1⅜"	11/32"	5 11/32"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: Removable type. New longer exhaust guide used in 1942 (counterbore at top increased) and lengthened approx. ⅜", lower end of guide has been lengthened approx. ⅜" to compensate for increased length of counterbore at top). This new guide designed to reduce tendency of exhaust valves to stick due to fuel or oil gum formations at upper end of valve stem.

Servicing—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 1 1/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-2 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122

Valve Springs:—Cadmium plated springs used with dampener installed on bottom with open side toward cylinder (Dampener used on 1941 cars only). Use Tool J-587-A to install valve spring and seat

NOTE—Car manufacturer recommends that dampeners be omitted whenever valves are serviced.

Spring Free Length—2 17/64".

	Spring Pressure	Spring Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—When springs removed, test for pressure (Tool U-15). Replace if pressure below 34 lbs. at 2".

Valve Lifters:—Roller shoe type, fitted in removable guides. ***See Hudson Shop Notes for lifter removal.***

VALVE TIMING

Tappet Clearance: *CAUTION—Two camshafts used.* Different settings as follows:

►**1941 3x4 ⅛" Eng. (Before No. 6848)**

►**1941-42 3x5" Eng. (Orig. Camshaft)**

.006" Intake, .008" Exhaust, hot and idling.

►**1941-42 3x4 ⅛" Eng. (After No. 6848)**
►**All Engines (Repl. Camshaft)**①

.010" Intake, .012" Exhaust, hot and idling.

①—Engines with replacement camshaft should have decalcomania on valve cover plate specifying this .010" Int., .012" Exh. setting.

NOTE—See Replacement Camshaft data on preceding page for data.

See Hudson Shop Notes for Fender Plate Removal for access to valve compartment.

VALVE TIMING: See Camshaft Setting above.

ORIGINAL VALVE TIMING SPECIFICATIONS

►**for 1941-42 3" x 5" Engines**

►**for 1941 3" x 4⅛" Engines up to car no. 6848 (with production 159505 camshaft)**

Intake Valves—Open 10°40' BTDC. Close 60° ALDC.

Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC. These figures correct with .010" tappet clearance.

►**for 1941-42 3" x 4⅛" Engines after '41 car no. 6848 (with production 162962 camshaft)**

Intake Valves—Open 28°30' BTDC. Close 68°30' ALDC.

Exhaust Valves—Open 52°40' BLDC. Close 32°40' ATDC. These figures correct with .010" tappet clear.

NEW VALVE TIMING SPECIFICATIONS

►**for all 1941-42 Engines (with replacement 166195 camshaft)**

Intake—Open 27°30' BTDC. Close 68°10' ALDC.

Exhaust—Open 51°50' BLDC. Close 32°10' ATDC. These figures correct with .010" tappet clearance.

Valve Timing Check (for engines with production 159505 camshaft)—With .010" tappet clearance, #1 intake valve should open with piston 10°40' BTDC. when point on flywheel 4 teeth before "UDC. 1-6/" lines up with indicator in hole in support above starter. Reset tappet clearance to .006" Intake.

(for engines with production 162962 camshaft or replacement 166195 camshaft)—With .010" tappet clearance, #1 intake valve should open with piston 27°30' BTDC. when point on flywheel 10 teeth before "UDC. 1-6/" lines up with indicator in support above starter.

LUBRICATION

LUBRICATION:—Duo-flo (pressure and positive splash) lubricating system.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure Indicator below).

NOTE—On 1942 engines, lower end of oil reservoir suction pipe (from oil pan to crankcase wall) extends to center of oil reservoir to insure constant oil supply to pump.

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. Consists of signal light on instrument panel operated by switch mounted on oil check valve.

For complete data, refer to Electrical Equipment Index.

Checking Oiling System:—***See Hudson Shop Notes.***

Crankcase Capacity:—4½ quarts (refill), 5½ (dry).

Servicing Note—When changing oil without removing oil pan, refill with 4½ quarts. If oil pan removed, place 1½ quarts in upper tray before oil pan installed, then 4 quarts through filler with pan in place.

COOLING

COOLING SYSTEM:—Capacity—13 quarts.

See Hudson Shop Notes for radiator core removal.

Water Pump:—Centrifugal, belt-driven, packless type with single outlet (no by-pass). Grease fitting provided for front & rear bearing lubrication.

See Water Pump Section for complete data.

Thermostat:—Fulton. Choke type located in cylinder head water outlet.

Setting—Starts to open 150-155°F. Fully open 185°.

NOTE—Special high temperature thermostats available for use with ethylene glycol type anti-freeze. Starts to open 160-165°F. Fully open 190°F.

Temperature Gauge:—King-Seeley Electric. K-S Nos. 8310 (Dash Unit—stamped "T"), 7000 (Eng. Unit).

See Miscellaneous Section for complete data.

NOTE—Temperature gauge inoperative with ignition 'off'. Pointer returns to 'H' (hot) position.

CLUTCH

CLUTCH:—Own Make. Single plate, cork insert type operating in oil.

See Clutch Section for complete data.

Driven Member—Cork Insert type (90 cork inserts on 9" size, 108 cork inserts on 10" size). Corks are .203" thick.

	Inside—Diameter	Outside
10, 10L, 11 (no O.D.)	5¼"	9"
10, 10L, 11 (With O.D.)	6⅜"	10"
12, 18	6⅜"	10"
20, 21 (no O.D.)	5¼"	9"
20, 21 (with O.D.)	6⅜"	10"
22, 28	6⅜"	10"

Pedal Adjustment (1941): Setting used dependent on connector link position on cross shaft lever. Normal setting (with connector link in center hole on cross shaft lever) 1½" clearance between underside of toeboard and center of clutch pedal clamp bolt. Second setting (with connector link in lower hole—for lighter clutch pedal pressure) clearance increased to 2". To adjust, loosen lock nut on connector link above clevis, take out clevis pin and turn clevis in or out for correct clearance. Check Automatic Clutch Control adjustment if used.

Pedal Adjustment (1942): Clearance between underside of toeboard and top of pedal shaft should be 1½" with link engaged in pedal and cross-shaft levers as given in table below. To adjust, loosen locknut on adjusting link above clevis, take out clevis pin (at lower end of link), adjust length of rod for proper clearance by turning clevis in or out on adjusting link.

Model	Top	Bottom
20T, 20P, 20C	Inner Hole	Outer Hole
20TL, 20PL, 20CL; 21	Outer Hole	Outer Hole
22,24,25,27,28 & ①	Outer Hole	Center Hole

①—All Six & Eight cylinder cars with Vacumotive Drive, Drive-Master, or Overdrive.

Clutch Oil Servicing:—***See Hudson Shop Notes for data.***

Removal:—Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate above starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

NOTE—See Installation Note following Transmission Removal for Clutch Throwout Bearing Oil Seal

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.

NOTE—Governor switch changed during production.

See Clutch Section for complete data.

TRANSMISSION

TRANSMISSION:—Own Make. New all helical gear, constant-mesh type with synchro-mesh (Second and High), sliding gears (Low & Reverse) and steering column gear shift. NOTE—External shift rail locks not used but are available in Accessory Kits for installation on cars operated in mountainous regions where Second Gear operation required for long periods.

See Transmission Section for complete data.

Transmission Control:—Hudson 'Handy-Shift' type.

See Transmission Section for complete data.

Removal:—Transmission can be removed from inside car as follows: Take off accelerator pedal by removing cotter pins in anchor bracket and bell crank link clevis pins. Move steering column rubber hole cover up out of way. Remove floor mat by taking out screws at kick pads on dash and mat trim clips. Remove front seat cushion and transmission floor opening cover (CAUTION—Accelerator pedal operating rod should be secured so as not to drop on starter switch). Disconnect front universal by taking out four nuts and lock plates on U-bolts. Release clutch pedal return spring. Remove two cross shaft bracket bolts, clutch control link clevis pin and clutch pedal assisting spring. Remove Handy Shift control tube-to-transmission shift rod cotter pin, washer and grommet; transmission casing lower anchor bracket screws and anchor bracket; transmission case outer lever retainer nut and retainer nut washer; and lever. Remove two flywheel guard-to-clutch housing screws and two rear engine mounting bolts (CAUTION—Do not remove rear engine mounting-to-clutch housing bolt). Jack rear of engine up ½" off frame. Remove clutch housing to transmission bolts. Disconnect speedometer cable from transmission. Pull transmission back and lift out.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed (twist wire with ends extending up through clutch housing so that it will come off the seal after transmission installed).

DRIVE-MASTER TRANSMISSION

Drive-Master:—Conventional 3-speed transmission with automatic gearshifting between second and high gears in conjunction with Vacumotive Drive (automatic clutch control). Optl. equipment.

See Transmission Section for complete data.

OVERDRIVE

Overdrive:—Warner Model AS1-R9B with electrical 'kick-down' control (new type—no centrifugal clutch pawls used). Optional equipment.

1941 Governor Switch Change to Correct Late Cut-In—New Governor Switch Part No. 162867 with purple dots on terminal screw heads and purple band around switch has reversed oil threads in shaft bushings to keep transmission lubricant out of switch, overcoming improper operation of switch. Used on Late '41 cars.

See Transmission Section for complete data.

Overdrive Transmission Removal—Same as standard transmission removal (above) except that overdrive control and wiring connections must be disconnected. Special Tool J-1502-H (hoist and dolly) should be used to lift transmission and lower onto dolly. Transmission and overdrive assembly can then be rolled out from beneath car.

Overdrive Solenoid—Delco-Remy. Hudson #163305.

Throttle Switch—Cole-Hersee. Hudson No. 162594. Adjust position of contact washer on accelerator pedal rod so that it just contacts switch plunger with carburetor throttle in wide open position.

Governor Switch—Bendix No. 162867. NOTE—Changed to new type with purple dots on terminals.

UNIVERSALS

UNIVERSAL JOINTS:—Spicer. Needle bearing type.

Car Model	Spicer Model No. Front	Rear
10, 20 Std.	1261-101	1268-101
11, 12, 21, 22 Std.	1271-101	1278-101
18,28 Std.	1281-101	1278-101
All Models (with Overdrive)	1281-101	1278-101

See Universals Section for complete data.

REAR AXLE

REAR AXLE:—Own Make. Semi-floating, spiral bevel gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratios	4 1/9-1	4 5/9-1	4 7/8-1
10 Std.	Optl.	Std.	Optl.
10 With Overdrive	Optl.	Optl.	Std.
11, 12 Std.	Std.	Optl.	
11, 12 With Overdrive	Optl.	Std.	
18 Pass. Car Std.	Std.	Optl.	
18 Comml. Std.		Std.	
18 Pass. Car With O.D.	Optl.	Std.	
18 Comml. With Overdrive		Optl.	Std.
20 Std.	Optl.	Std.	Optl.
20 With Overdrive	Optl.	Optl.	Std.
21, 22, 28 Pass. Std.	Std.	Optl.	
21, 22, 28 Pass. O.D.	Optl.	Std.	
28 Comml. Std.		Std.	
28 Comml. With O.D.		Std.	

Backlash—.0005-.0035". Screw adjustment.

Removal:—Disconnect rear universal by taking out four nuts and lock plates on U-bolts, drop rear end of propeller shaft. Remove axle shafts (see instructions below). Remove bolts nuts on carrier flange, pull carrier assembly out of axle housing.

Axle Shaft Removal:—Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer (use Tool J-351). Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, push bolts out of backing plate, remove bearing cap and shims (without disturbing hand brake link). Take out rear wheel bearing and axle shaft using puller Tool J-352. Do not drag axle shaft on oil seal assembly in housing.

Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft—if adjustment made at one wheel only spacer will bind on shaft.

Endplay—.002-.004".

SHOCK ABSORBERS

SHOCK ABSORBERS:—Direct acting, hydraulic types.

Car Model	Make	Front	Rear
10, 11, 18① Std. Springs	Monroe	160101	160107
10, 11, 18① Hvy. Springs	Monroe	161636	160108
10, 11, 12, 18②	Monroe	161657	161658
12, 22①	Delco	1007-C	1008-S
20, 21, 22, 28③	Monroe	164545	164546
20, 21, 22, 28④	Monroe	164547	164548
20, 21, 28⑤	Monroe	164786	164787

①—All Sedans. ②—Coupes (3 & 4 Pass.).
③—Early Sedans (exc. 22), Late 3 Pass. & Club Coupe.
④—Early 3 Pass. & Club Coupe.
⑤—Late Sedans.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs and Autopoise Control.

See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Positive ¾°. Adjustable.

Toe In—0-1/16". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry (Toe-out on Turns)—With outer wheel turned 25°. Inner wheel turn should be 30°.

STEERING GEAR

Steering Gear: Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments. All models have Center Point steering linkage.

See Steering Gear Section for complete data.

BRAKES

BRAKES:—Service. Bendix hydraulic, duo-servo, single anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to rear wheel brakes through hand brake cables) provided. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Commercial Cars Model 10C Note—Early 1941 Model 10C cars (up to Car No. 1054730) equipped with 11" brakes (see 1941 Hudson 8 page following for 11" brake specifications). Data below applies to Model 10C starting with Car No. 1054731 & all other Sixes.

Drums—New centrifuse type. Diameter 10".

Lining—Multibestos molded (primary), Ferodo woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 22⅛".

Clearance—.015" at each end of secondary shoe with primary shoe forced out against drum.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydro-electric type (hydraulic actuation with motor-driven hydraulic pump). Used on Convertible models.

See Miscellaneous Section for complete data.

Top Control Motor—Auto-Lite Model MBM-4001.

ENGINE HOOD (BONNET) LOCK, HOOD REMOVAL AND ADJUSTMENT:—*See Hudson Shop Notes.*

MODEL IDENTIFICATION

	1941 Model	1941 Serial No.	1942 Model	1942 Serial No.
Commodore Eight	14	14101	24	24101
Commo. Cust. Coupe	15	15101	25	25101
Commo. Cust. Sedan	17	17101	27	27101

SERIAL & ENGINE NUMBER:—See Model Notation for first Nos. (first 2 figures indicate model thus: 14-101). Stamped on plate on right front door hinge pillar post and on top of engine block between #1 and #2 exhaust manifold flanges.

TUNE-UP

COMPRESSION:—Ratio—6.5-1 Std. No Optl. ratios.
Pressure—120 lbs. at 125 RPM cranking speed.

VACUUM READING:—18-21" steady idling at 600 RPM.

FIRING ORDER:—1-6-2-5-8-3-7-4. See diagram.

SPARK PLUGS:—Champion Spec. J9 Hudson, 14 MM.
Gaps—.032"
Optional Plugs—Champion J5 (hotter plug) for continuous low speed service or J10 Commercial (cooler plug) for continuous high speed service.

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.017" Cam Angle 31° (closed).
Automatic Advance—17.5° max. at 1700 RPM(distr.).

IGNITION TIMING: See Ignition Timing.
Std. Setting—At TDC. with flywheel mark "UDC. 1-8/" at indicator in inspection hole in left rear motor support.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Both idle screws ½-1½ turn open. Idle speed 580-600 RPM.
Float Level—3/32" (455-S), ⅛" (502-S) from gasket seat on cover to top of float (valve seated).
Accelerating Pump—Outer hole (max. stroke) Normal. Inner hole (min. stroke) when required.
Fuel Pump Pressure: 4½ lbs. max. (AK), 4 lbs. (AJ).

MANIFOLD HEAT CONTROL:—Automatic thermostatic type. No adjustment required.

VALVES: See Valve Timing.
Tappet Clearance: .008" Intake, .010" Exhaust (with engine hot and idling). Remove right front fender plate for access to valves. *See Hudson Shop Notes for Fender Plate Removal.*
NOTE—This supersedes earlier data.

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Mitchellock Model 24-B, No. 8797.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—H601 to H1100. Groove—No. 1.

COIL: Auto-Lite Model CE-4029. Mounted on dash. Service Coil (less switch & cable) CE-3224JS.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4008A. Single breaker, 8 lobe cam, full automatic advance type.
Breaker Gap—.017".
Cam Angle or Dwell—31° closed, 14° open (dist.).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

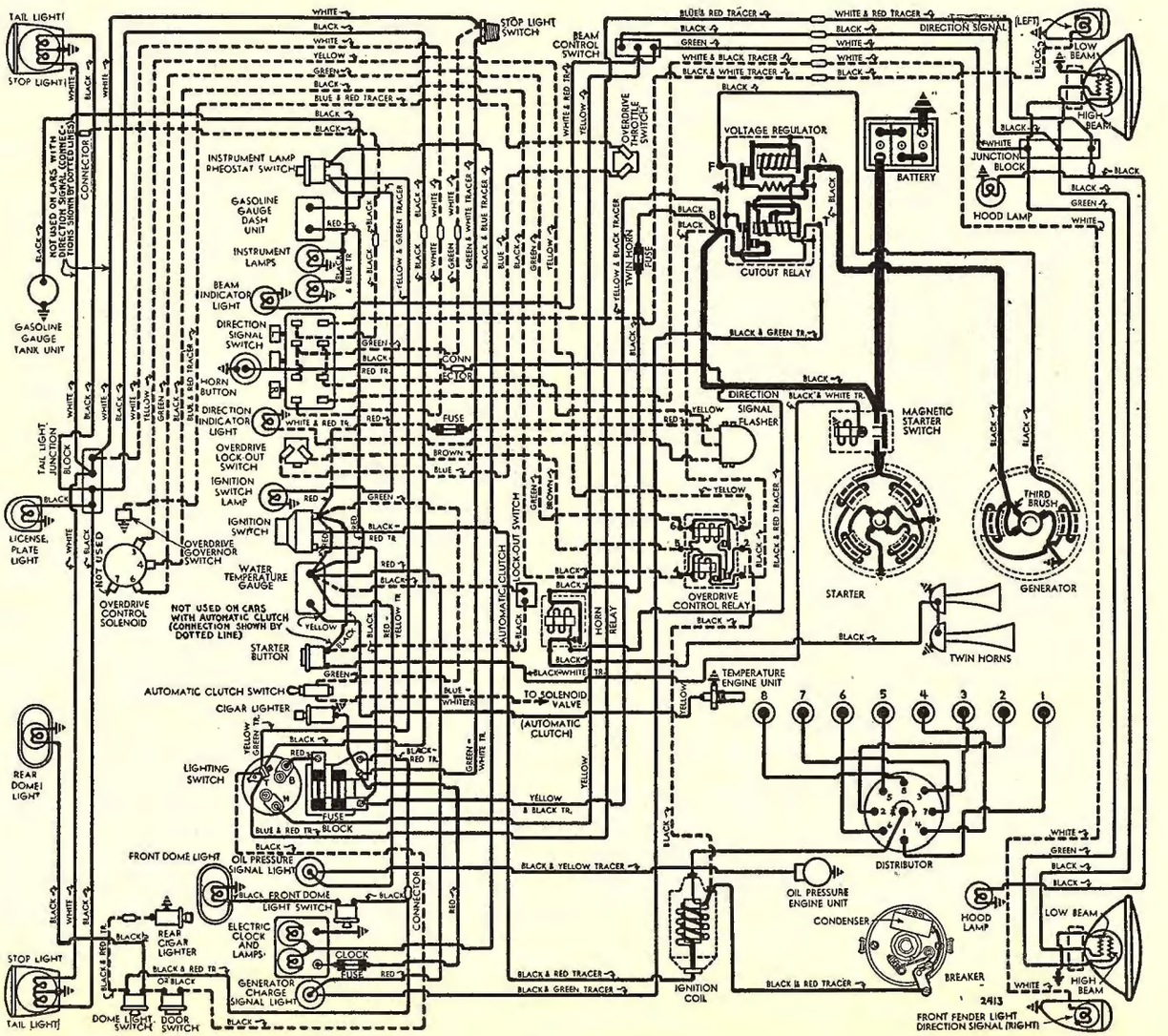
Fuel Compensator—Manual adjustment for octane rating of fuel used. See Ignition Timing for setting.
Removal:—Mounted on right side of crankcase. To remove take out hold-down screws in advance arm.

IGNITION TIMING

IGNITION TIMING:—Initial Setting (for 72 octane rating fuel). See Fuel Compensator setting following.

	Flywheel Degrees	Piston Position
All Engines	0° at TDC	.0000" TDC

Flywheel Marks—'UDC.1-8/' at TDC with 4 graduations (¼" apart) ahead of this mark.
Timing—With #1 piston on compression, turn engine over until piston reaches top dead center when



1941 MODELS

flywheel mark 'UDC.1-8/' lines up with pointer in left front face of rear motor support. Loosen hold-down screw in advance arm, rotate distributor clockwise to limit of advance arm slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw. Check Fuel Compensator setting.

Timing (Using Synchroscope)—Recommended by manufacturer. Mark flywheel with white chalk or paint, connect at #1 spark plug. Idle engine and adjust distributor as directed above.

Fuel Compensator Setting—Road test car (engine warm). When running at 8 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen hold-down screw, rotate distributor one graduation on scale counter-clockwise (if no ping), clockwise (if ping to severe). **Final setting must not be more than ¾" (3rd graduation) before 'UDC.1-8/' mark.**

CARBURETOR

CARBURETION (EIGHT):—Carburetor—Carter Type WDO Model 455-S (before Serial & Engine No. 7293), Model 502-S (1941 after No. 7293 and 1942 Models). 1¼" dual downdraft types. #279 cast on face of carburetor flange (both carburetors). Slow closing throttle 'dashpot' device used on Model 455-S only. ***For complete data, refer to Carburetor Index.***

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for 600 RPM idle speed. Adjust idle adjusting screws (2 used, 1 for each barrel) in succession until engine fires smoothly. Final setting should be ½-1½ turns open for each screw (turn screws in for leaner mixture). If vacuum gauge used, adjust for highest steady reading of gauge. Readjust throttle stopscrew for correct idling speed.

Accelerating Pump Setting—Pump lever (under dust cover at top of carburetor) has 2 holes for pump link engagement. Adjust as follows:
Outer Hole (Max. stroke)—Normal setting.
Inner Hole (Min. stroke)—If less charge required.

Float Level—3/32" (455-S), ⅛" (502-S) from top of float to bowl cover with valve seated.

Fast Idle:—Integral type (part of carburetor).
For complete data, refer to Carb. Equip. Index.

Setting (455-S)—With choke valve closed, adjust fast idle screw for .018" throttle opening.

Setting (502-S)—With choke valve closed and fast idle screw on high lobe of fast idle cam, turn fast idle screw in until throttle opening is .053".

Automatic Choke:—Carter Climatic Control.
For complete data, refer to Carb. Equip. Index.

Setting—Centered (at index mark) for 455-S, 1 Notch Lean for 502-S (supersedes "Centered" setting originally specified for 502-S).

CARB. EQUIPMENT

Air Cleaner:—AC #1528161 oil-wetted type Std. #1542385 (Cars with Drive Master) Oil-wetted type. Replacement Filter Element Assembly Type #1. United heavy duty oil-bath type cleaner Optl.

Fuel Pump: AC Type AK, No. 1523289 diaphragm type fuel pump Std. Type AJ combination fuel-and-vacuum pump Optl. Replacement Exchange Pump (AK) No. 499.
For complete data, refer to Carb. Equip. Index.

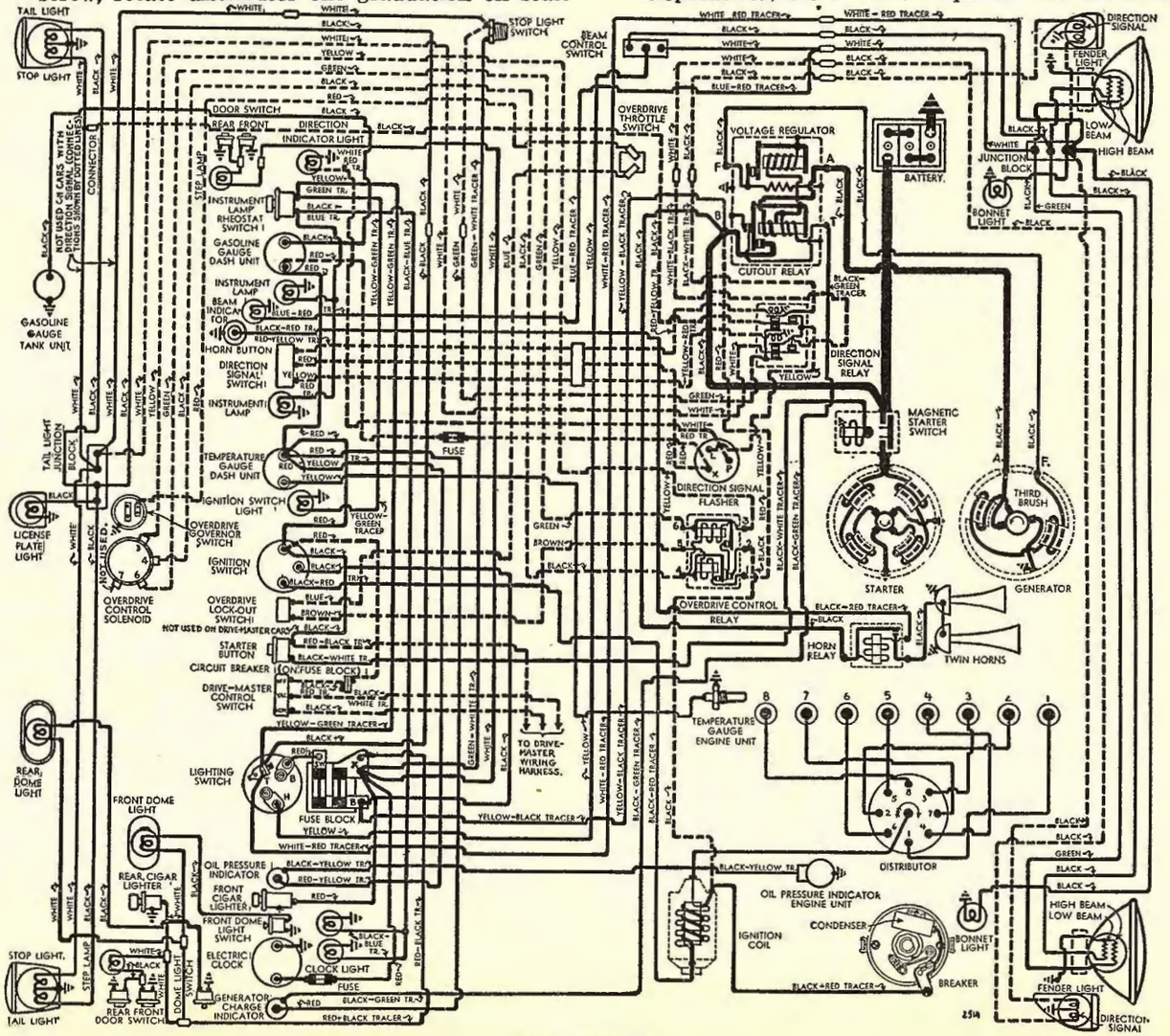
Gasoline Gauge:—King-Seeley Electric. K-S No. 8305 (Dash Unit—stamped 'G'), No. 7550 (Tank Unit).
For complete data, refer to Carb. Equip. Index.

BATTERY

BATTERY:—National, Type HT-19. 6 volt, 19 plate, 108 ampere hour capacity (20 hour rate).
Starting Capacity—135 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes. Five second voltage—4.43 volts.
Grounded Terminal—Positive (+) to frame. **Engine Ground**—Strap (rear motor support to frame).
Dimensions—Lgth. 11¾". Width 7¼". Hght. 7 13/16".
Location—On left side under engine hood.

STARTER

STARTER:—Auto-Lite MAB-4100. Armature MAB-2113.
Drive—Inboard Barrel type Bendix No. A-1684.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 120-125 amperes, 5 v.



1942 MODELS

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Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	3700	5.5	60
0.6 "	1910	5.5	100
3.4 "	1100	5.0	200
6.6 "	695	4.5	300
10.15 "	420	4.0	400
15.2 "	Lock	3.0	575
21.5 "	Lock	4.0	750

NOTE—Lock torque figures correct with switch.

Removal:—On left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch:—A-L Model SS-4001. Magnetic type. Mounted on starter, controlled by switch on instrument panel. Operative only with ignition on (and clutch disengaged on cars with Vacumotive Drive or Hudson Drive Master). Starter pushbutton Douglas, Hudson No. 147834 (1941).

For complete data, refer to Electrical Equipment Index.

GENERATOR

STANDARD

GENERATOR:—Auto-Lite GEC-4801A. Armature GDZ-2006F. Third brush control with voltage regulation. Ventilated by fan on drive pulley.

Maximum Charging Rate—39-43 amperes (cold), 3350 RPM, 39 MPH ('41), 43 MPH ('42). Charging rate controlled by Voltage Regulator and dependent on battery. See Regulator. Ground generator 'F' terminal when checking generator output.

Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Setting adjustable by shifting third brush.

Performance Data

Cold Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amperes at 6.0 volts.

Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Swing generator out until possible belt deflection midway between generator and fan pulley is ¾" (use straightedge across pulleys).

GENERATOR

SPECIAL EQUIPMENT

Auto-Lite Generator	Armature Number	Regulator Model
GEA-4803-B	GDZ-2006F	VRP-4008B
GEB-4802-A	GEB-2006F	VRP-4008C
GEB-4802B	GEB-2006F	①
GEB-4802-B2	GEB-2006F	VRP-4008D
GEG-4801-A	GEG-2006F	VRP-4008A

①—VRP-4008C before generator serial #2V-000001. VRP-4008D after generator serial #2V-000001.
Type—Two-brush with current-voltage regulators.
Charging Rate Adjustment—None. See Regulator.
Maximum Charge Rate—As listed below.

Model GEA-4803B

Cold Amperes	Volts	Performance Data R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	780	0	6.4	840
4	6.6	870	4	6.6	935
8	6.8	960	8	6.8	1025
12	6.95	1050	12	6.95	1120
16	7.15	1140	16	7.15	1220
20	7.3	1230	20	7.3	1320
24	7.6	1320	24	7.6	1420
28	7.7	1410	28	7.7	1520
32	7.85	1500	32	7.85	1685
35	8.0	1570	35	8.0	1800

Models GEB-4802B①, GEB-4802B-2

0	6.4	560	0	6.4	620
5	6.6	640	5	6.6	700
10	6.8	720	10	6.8	800
15	7.1	800	15	7.1	910
20	7.3	880	20	7.3	1040
25	7.5	980	25	7.5	1170
30	7.8	1080	30	7.8	1340
35	8.0	1200	35	8.0	1520

①—After Generator Serial Number 2V-000001. *For GEB-4802-B data before this number, refer to the 1940 Hudson Eight article (preceding).*

Model GEG-4801A

0	6.4	780	0	6.4	820
5	6.6	870	5	6.6	900
10	6.8	960	10	6.8	990
15	7.0	1040	15	7.0	1080
20	7.2	1130	20	7.2	1170
25	7.4	1220	25	7.4	1270
30	7.6	1310	30	7.6	1380
35	7.8	1410	35	7.8	1510
40	8.0	1520	40	8.0	1680

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (GEA Gen.), 64-68 ounces (GEB & GEG Gen.) with new brushes.
Field Current—1.57-1.75 amperes (for GEA Gen.), 1.60-1.78 amperes (for GEB, GEG Gen.) at 6.0 volts.
Motoring Current—4.45-4.9 amperes (GEA Gen.), 4-4.5 amps. (GEB), 4.7-5.2 amps. (GEG) at 6.0 volts.
Removal & Belt Adjustment: Same as for Std. Gen.

REGULATOR

STANDARD

REGULATOR:—Auto-Lite VRR-4001A. Cutout Relay and vibrating Voltage Regulator in case on dash. Cutout Relay has extra set of contacts for Generator Teleflash Indicator control. NOTE—Regulator enclosed in tight fitting metal cover on dash.

For complete data, refer to Electrical Equipment Index.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In—6.4-6.6 volts, 825 RPM. 9.4 MPH.
Cuts Out—4.2-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min. ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Setting—7.1-7.4 volts at 70°F.
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal, voltmeter between this terminal and ground. Operate generator at speed of 30 MPH charging battery until voltage is constant. Voltmeter reading should be within limits of 7.1-7.4 volts at 70°F. See Electrical Equipment Section for other temperatures.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.

REGULATOR

SPECIAL EQUIPMENT

Auto-Lite Regulator	Generator Used On
VRP-4008-A	GEG-4801-A
VRP-4008-B	GEA-4803-B
VRP-4008-C	GEB-4802-A
VRP-4008-C	①GEB-4802-B
VRP-4008-D	②GEB-4802-B
VRP-4008-D	GEB-4802-B2

①—Before Generator Serial Number 2V-000001.
②—After Generator Serial Number 2V-000001.

Type—Cutout Relay and vibrating type Voltage & Current Regulator units in a single case on dash. Same design as Std. VRR Regulator except for the additional Current Regulator.

For complete data, refer to Electrical Equipment Index.

Cutout Relay & Voltage Regulator

All specifications same as for Std. VRR type (above).

Current Regulator

Setting—39-41 amps.....marked '40'.....VRP-4008-A
34-36 amps.....marked '35'..VRP-4008-B&D
31-33 amps.....marked '32'.....VRP-4008-C
To Check—Connect test meters as for voltage check (above), operate generator at speed for maximum output, turn on lights so that generator charges at peak rate and current regulator operates, check ammeter reading, should agree with setting above.
Adjustment, Contact Gap, Air Gap—Same as for VRR Voltage Regulator unit data as given above.

LIGHTING

Headlamps—Hall "Sealed Beam" type.

For complete data, refer to Electrical Equipment Index.

Headlamp Adjustment—Aim upper beam of each headlamp straight ahead with hot spot centered on horizonal line 3" below lamp center height.

Beam Indicator—Red Pilot bulb on speedometer dial. Lighted when Country (upper) beams in use.

Direction Indicator—Optional Equipment.

For complete data, refer to Electrical Equipment Index.

Switches—1941

Lighting—Douglas. Hudson No. 147835.
Beam Selector—R-B-M Model 2484.
Instrument—R-B-M. Hudson No. 160092.

Switches—1942

Lighting—Douglas. Hudson No. 200417.
Beam Selector—R-B-M. Hudson No. 164439.
Instrument—R-B-M. Hudson No. 160092.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	
Bonnet Side Panel (Park)	1.5	55
Fender Lamp (See Note)	3	63
Ign. Lock ('42), Clock	1.5	55
Speedometer ('41)	1.5	55
Spdmtr. ('42), Ign. Lock ('41)	1	51
Gen. & Oil Signal ('41)	1.5	55
Gen. & Oil Signal ('42)	1	51
Beam & Direction Ind.	1	51
Stop & Tail	21-3	1154
Rear License	3	63
Dome & Courtesy	15	88

NOTE—Front Direction Indicator bulb is separate 21 cp. Mazda No. 1129 (1941), combined with Fender Lamp in 21-3 cp. Mazda No. 1158 bulb (1942).

MISC. ELECTRICAL

SIGNAL LIGHTS:—Generator Charge and Oil Pressure Indicators used. Hudson Teleflash Electric type.
For complete data, refer to Electrical Equipment Index.

FUSES:—**Lighting**—30 ampere. Lower fuse on fuse block on lower edge of instrument panel to right of steering column. **Accessory**—30 amp. Top fuse on block. NOTE—Silver-plated fuses used. 30 amp. fuse supersedes 20 ampere fuse used on early cars.

Twin Horns (1941)—30 ampere. On engine dash.

Direction Indicator—10 amp. near speedometer.

Electric Clock—2 amp. in case behind clock.

NOTE—Feed wire for electric clock on early cars connected to battery 'B' terminal on fuse block. Car manufacturer recommends that feed be connected to accessory 'X' terminal (see diagram).

HORNS:—**Sparton**—Twin air electric type operated by relay. 30 amp. fuse in case on dash.

Air Gap—.026-.030" high pitch (short horn), .032-.035" low pitch (long horn).

Horn Relay:—R-B-M Model 6004. On engine dash.

Contacts Close—3 volts min., 4 volts, max.

Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS:—8 cylinder, 'L' head type.
Bore—3". **Stroke**—4½".
Displacement—254 cubic inches. **Rated HP.**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio—6.50-1 cast-iron head.
Compression Pressure—120 lbs. at 125 RPM.
Vacuum Reading—Steady 18-21" idling at 600 RPM.
See Hudson Shop Notes for Engine Removal data.

PISTONS: Lo-Ex aluminum alloy (1941), Cast Alloy (1942), cam ground type. Use finished replacement pistons.

Weight—10.5 ozs. (stripped). **Length**—3 3/16".

Removal—Piston and rod assemblies may be removed from above or below.

Clearance—Top .016". Skirt .0005-.001".

Original Bore & Piston Sizes, Replacement Pistons:—*See Hudson Shop Notes for sizes and markings.*

Fitting New Pistons:—Use .0015" feeler ½" wide (Piston Feeler Scale Tool J-888-A) inserted between piston and cylinder wall on side opposite slot 90° from pin. Pull to withdraw feeler 3-4 lbs.

Installing Pistons: Slot away from camshaft.

PISTON RINGS:—2 compression, 2 oil rings (1 above pin, 1 below pin). Rings positioned by pin in groove.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil Cont. (#1)	3/16"	.009-.011"	.001"
Oil Cont. (#2)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN:—**Diameter**—¾". **Length**—2 7/16". Floating type. Retained by locking rings.
See Hudson Shop Notes for Pin Servicing data.

Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.

Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD:—**Weight** 30 ozs. **Length** 8 3/16".

Crankpin Journal Diameter—1.935-1.936".
See Crankshaft Size Code Note in Hudson Special Data for original bearing size.

Lower Bearing—Lead alloy-lined (1941), babbitt-lined (1942), Spun type. Exchange Rods furnished Standard Size and .010" Undersize.

Clearance—.001". **Sideplay**—.006-.010".

Bearing Adjustment:—None (no shims). Replace rods.

Installing Rods:—Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT:—5 bearing, integral counterweights.
See Hudson Shop Notes for Crankshaft and Vibration Dampener Removal, Main Bearing Removal and Installation, Replacement Bearings & Line-Reaming data.

Journal Diameters—#1, 2.279-2.280", #2, 2.311-2.312", #3, 2.341-2.342", #4, 2.373-2.374", #5, 2.404-2.405".

See Crankshaft Size Code Note in Hudson Special Data for original bearing size.

Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.

NOTE—No shim pack is used. Palnuts used in place of cotter pins to lock bearing cap nuts.
Clearance—.001".

Bearing Adjustment:—None (no shims). Do not file caps.

►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. **Endplay**—.006-.012".

CAMSHAFT:—Five bearing, gear driven type with new type bearings and timing gears. *See Hudson Shop Notes for Camshaft Removal and Bearing Installation.*

1942 Note—Camshaft Bearing Clearance and Timing Gear Backlash reduced from that used on previous models for quieter operation of valve mechanism. No valve spring dampeners used.

Journal Diameters—#1, 2.029"; #2, 1.998"; #3, 1.966"; #4, 1.935"; #5, 1.498".

Bearings—New type steel-backed, 'Bermax' (babbitt) lined bushings (formerly solid type babbitt).

Clearance—.002-.0025" (1941), .001-.0025" (1942).

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.

NOTE—Service thrust washer available which can be split and installed without removing camshaft.

Timing Gears: Crankshaft gear Cast Iron, camshaft gear Laminated Fibre. Tooth shape changed to 20° pressure angle (was 14½°) to provide quieter operation and longer gear life. Gears can be identified by figure 20 stamped on front face (crankshaft gear carries additional FRONT mark to insure correct installation). Gears may be installed in sets only (not singly) on earlier car models (new type gears similar to previous type except for pressure angle).

NOTE—Camshaft gear available in .008" Oversize (can be distinguished from Std. Size by spot of yellow paint on front face).

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1½"	11/32"	5 3/32"
Exhaust	1⅜"	11/32"	5 3/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: Removable type. New longer exhaust guide used in 1942 (counterbore at top increased and lengthened approx. ⅜", lower end of guide has been lengthened approx. ⅜" to compensate for increased length of counterbore at top.) This new guide designed to reduce tendency of exhaust valves to stick due to fuel or oil gum formations at upper end of valve stem.

Servicing—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-2 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122 to remove carbon and scale out of guides (pay particular attention to carbon in counterbore at top of exhaust guide).

Valve Springs:—Cadmium plated springs used with dampener installed on bottom with open side toward cylinder (Dampener used on 1941 cars only). Use Tool J-587-A to install valve spring and seat assembly.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

NOTE—Car manufacturer recommends that dampeners be omitted whenever valves are serviced.

	Spring Pressure	Spring Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—Replace if pressure below 34 lbs. at 2".

Valve Lifters:—Roller shoe type, fitted in removable guides. *See Hudson Shop Notes for lifter removal.*

VALVE TIMING

Tappet Clearance—.008" Int., .010" Exh., Hot.
NOTE—This supersedes earlier data.
See Hudson Shop Notes for Fender Plate Removal.

Valve Timing:—See Camshaft Setting above.

Intake Valves—Open 10°40' BTDC. Close 60° ALDC.

Exhaust Valves—Open 50° BLDC. Close 18°44'ATDC.

Above figures correct with .010" tappet clearance.

Valve Timing Check—With .010" tappet clearance #1 intake valve should open with piston 10°40' or .0494" BTDC when a point on the flywheel approximately 3.97 teeth before 'UDC.1-8/' mark lines up with indicator in inspection hole above starter. Reset tappet clearance at .008" hot and idling.

LUBRICATION

LUBRICATION:—Duo-flo (pressure & positive splash). NOTE—On 1942 engines, lower end of oil reservoir suction pipe (from oil pan to crankcase wall) extends to center of oil reservoir to insure constant oil supply to pump.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure Indicator below).

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. *For data, refer to Elec. Equip. Index.*

Checking Oiling System:—*See Hudson Shop Notes.*

Crankcase Capacity:—7 qts. (refill), 9 qts. (dry).

Servicing Note—Whenever pan removed, install 2 qts. in upper tray before pan installed, then add 7 qts. through oil filler after pan in place on engine.

COOLING

COOLING SYSTEM:—**Capacity**—18 quarts.
See Hudson Shop Notes for radiator core removal.

Water Pump:—Centrifugal, belt-driven, packless type with single outlet (no by-pass) on Models 14 & 24, double outlet (with by-pass) on Models 15, 17, 25, 27.
See Water Pump Section for complete data.

Thermostat: Fulton. Choke type (Models 14, 24), By-pass type (Models 15, 17, 25, 27). In cylinder head water outlet.

Setting—Starts to open 150-155°F. Fully open 185°F.

NOTE—Special high temperature thermostats available for use with ethylene glycol type anti-freeze. Starts to open 160-165°F (14, 24), 165-170°F (15, 17, 25, 27); Fully open 190°F (14, 24), 195°F (15, 17, 25, 27).

Temperature Gauge:—King-Seeley Electric. K-S Nos. 8310 (Dash Unit—stamped 'T'), 7000 (Eng. Unit).
See Miscellaneous Section for complete data.

NOTE—Gauge reads HOT with ignition 'off'.

CLUTCH

CLUTCH:—**Own Make.** Single plate, cork insert type operating in oil.
See Clutch Section for complete data.

Driven Member—Cork insert type. Inside Diam. 6⅜". Outside Diam. 10". Facing 108 corks .203" thick.

Pedal Adjustment (1941): Two settings used dependent on connector link position on cross-shaft lever. Normal setting (with connector link in center hole on cross-shaft lever) 1½" clearance between underside of toeboard and center of clutch pedal clamp bolt. Second setting (with connector link in lower hole for lighter clutch pedal pressure) clearance increased to 2". To adjust, loosen locknut on connector link above clevis, remove clevis pin, turn clevis in or out for correct clearance. Check Automatic Clutch Control adjustment (if used).

Pedal Adjustment (1942): Clearance between underside of toeboard and top face of pedal shaft should be 1½" with adjusting link engaged in pedal and cross-shaft levers as listed in table below. To adjust, loosen locknut on adjusting link above clevis, remove clevis pin at lower end of link, turn clevis in or out for correct clearance.

Model	Top	Bottom
24, 25, 27	Outer Hole	Center Hole

Clutch Oil Servicing:—*See Hudson Shop Notes for data.*

Removal:—Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate above starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

NOTE—See Installation Note following Transmission Removal for Clutch Throwout Bearing Oil Seal

VACUMOTIVE DRIVE

Vacumotive Drive:—Automatic clutch control. Optl.

NOTE—Governor switch changed during production.
See Clutch Section for complete data.

TRANSMISSION

TRANSMISSION:—**Own Make.** New all helical gear, constant-mesh type with synchro-mesh (Second & High), sliding gears (Low & Reverse) and steering column gear shift. NOTE—External shift rail locks are not used.
See Transmission Section for complete data.

Transmission Control:—Hudson 'Handy-Shift' type.
See Transmission Section for complete data.

Removal:—Transmission can be removed from inside car as follows: Take off accelerator pedal by removing cotter pins in anchor bracket and bell crank link clevis pins. Move steering column rubber hole cover up out of way. Remove floor mat by taking out screws at kick pads on dash and mat trim clips. Remove front seat cushion and transmission floor opening cover (CAUTION—Accelerator pedal operating rod should be secured so as not to drop on starter switch). Disconnect front universal by taking out four nuts and lock plates on U-bolts. Release clutch pedal return spring. Remove two cross shaft bracket bolts, clutch control link clevis pin and clutch pedal assisting spring. Remove Handy Shift control tube-to-transmission shift rod cotter pin, washer and grommet; transmission casing lower anchor bracket screws and bracket, shift shaft outer lever nut, washer and lever. Remove two flywheel guard-to-clutch housing screws and two rear engine mounting bolts (CAUTION—Do not remove rear engine mounting-to-clutch housing bolt). Jack rear of engine up ½" off frame. Remove clutch housing to transmission bolts. Disconnect speedometer cable from transmission. Pull transmission back and lift out.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed (twist wire with end extending up through clutch housing so that it will come off the seal after transmission installed).

DRIVE-MASTER TRANSMISSION

Drive-Master: Conventional 3-speed transmission with automatic gear shifting between second and high gears in conjunction with Vacumotive Drive (automatic clutch control). Optl. equipment.
See Transmission Section for complete data.

OVERDRIVE

Overdrive:—Warner Model AS1-R9B with electrical 'kick-down' control (new type—no centrifugal clutch pawls used). Optional equipment.

1941 Governor Switch Change to Correct Late Cut-In—New Governor Switch Part No. 162867 with purple dots on terminal screw heads and purple band around switch has reversed oil threads in shaft bushings to keep transmission lubricant out of switch, overcoming improper operation of switch. Used on Late '41 cars.
See Transmission Section for complete data.

Overdrive Transmission Removal—Same as standard transmission removal (above) except that overdrive control and wiring connections must be disconnected. Special Tool J-1502-H (hoist and dolly) should be used to lift transmission and lower onto dolly. Transmission and overdrive assembly can then be rolled out from beneath car.

Overdrive Solenoid—Delco-Remy. Hudson #163305.

Throttle Switch—Cole-Hersee. Hudson No. 162594. Adjust position of contact washer on accelerator pedal rod so that it just contacts switch plunger with carburetor throttle in wide open position.

Governor Switch—Bendix No. 162867.

NOTE—Switch changed to Part No. 162867 during production (identified by purple dots on terminal screw heads & purple band around switch body).

UNIVERSALS

Spicer. Needle bearing type. Spicer Model Nos.: **Front**—1271-101 (14, 15, 24, 25), 1281-101 (17, 27). **Rear**—1278-101 (All Models).
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—Own Make. Semi-floating, spiral bevel gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Ratio—4 1/9-1 (Standard, Optl. on Overdrive), 4 5/9-1 (Std. with Ovdr., Optl. on reg. transmission).

Backlash—.0005-.0035". Screw adjustment.

Removal:—Disconnect rear universal by taking out four nuts and lock plates on U-bolts, drop rear end of propeller shaft. Remove axle shafts (see instructions below). Remove bolt nuts on carrier flange, pull carrier assembly out of axle housing.

Axle Shaft Removal:—Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer (use Tool J-351). Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, push bolts out of backing plate, remove bearing cap and shims (without disturbing hand brake link). Take out rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly in housing.

Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft). **Endplay**—.002-.004".

SHOCK ABSORBERS

SHOCK ABSORBERS:—Delco—Sedans & Club Coupes: 1007-C (front), 1008-S (rear). **Monroe**—3 & 4 passenger Coupes: (Front) 161657 (1941), 164547 (1942 Early Cars), 164545 (1942 Later Cars). (Rear) 161658 (1941), 164548 (1942 Early Cars), 164546 (1942 Later Cars). All shock absorbers are Direct Acting, Hydraulic type.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs and Autopoise Control.
See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Positive ¾°. Adjustable

Toe In—0-1/16". Loosen clamps at ends of each tie rod (adjust rods equally with steering arm centered).

Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Steering Gear: Gemmer Model 335. Worm-and-Roller type with "push-pull" adjustments and Center Point steering linkage.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—Service. Bendix hydraulic, duo-servo, single anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.
See Brake Section for complete data.

Drums—Centrifuse. Diameter 11".

Lining—Multibestos molded (primary), Ferodo woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 23 15/16".

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydro-electric type (hydraulic actuation with motor-driven hydraulic pump). Used on Convertible models.
See Miscellaneous Section for complete data.

Top Control Motor—Auto-Lite Model MBM-4001.

HOOD LOCK: Hood is Reverse Alligator type hinged at radiator. To raise hood, press in on lock handle to left of steering column, raise rear end of hood.

MODEL IDENTIFICATION

	Super 6		Commodore 6		Bus. Cars	
	Model	Ser.No.	Model	Ser.No.	Model	Ser.No.
1946	51	31-101	52	32-101	58	38-101
1947	171	171-101	172	172-101	178	178-101

SERIAL & ENGINE NUMBER: See model notation above for First No. and prefix (first two figures indicate model thus: 31-101). Stamped on plate on right front door hinge pillar post and on top of engine block between #1 and #2 exhaust flanges.

TUNE-UP

COMPRESSION: Pressure—120 lbs. at 125 RPM.

VACUUM READING: Steady 18-21" idling 7½-8 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Champion Special J-9 Hudson. 14 mm. Gaps—.032"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap .020". Cam Angle 35° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance See tables following.

IGNITION TIMING: See Ignition Timing.
Std. Setting—½" on flywheel before TDC.
Timing Mark—Flywheel marked "UDC.1-6/" with four graduations ¼" apart ahead of this mark. Set timing with the 3rd white line aligned with pointer in inspection hole in motor support above starter, then adjust Fuel Compensator as follows:
Fuel Compensator Setting—Advance spark (loosen vacuum unit link screw on distributor quadrant) until slight ping noted accelerating with wide open throttle between 10-15 MPH. Final setting must not be more than 1" before "UDC.1-6/".

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set both idle adjusting screws for smooth running and highest steady vacuum gauge reading (each screw ½-1½ turns open—turn screws in for leaner mixture). Idle speed 7½-8 MPH.
Float Level—⅛" from top of float to gasket seat on cover with valve seated (invert to check).
Accelerating Pump—Outer hole (max.) Normal.

Fuel Pump Pressure: 3-4 lbs. (AC. mechanical type), 2½-3 lbs. (Autopulse electrical type).

MANIFOLD HEAT CONTROL: Automatic thermostatic type (no adj.). Valve must operate freely.

VALVES: See Valve Timing.
Tappet Clearance—.008" Int., .010" Exh, Hot.
NOTE—This supersedes earlier data.
gine idling at normal operating temperatures.

STARTING: See Battery, Starter, Generator and Regulator.

IGNITION

IGNITION SWITCH: Mitchellock 24-B, No. E8996.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—H601 to H1100. Groove—No. 1.

COIL: Auto-Lite Model IG-4098. Service Coil IG-4098S. Mounted on dash. NOTE—Coil connections are reversed (breaker connection at base of coil).
Ignition Current—2½ amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IGW-3075C.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGW-4203-A with separate VC-3060ES Vacuum unit. Full automatic advance type with auxiliary vacuum spark control and Fuel Compensator adjustment.

Breaker Gap—.020". Limits .020-.024".

Cam Angle or Dwell—35° closed, 25° open.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

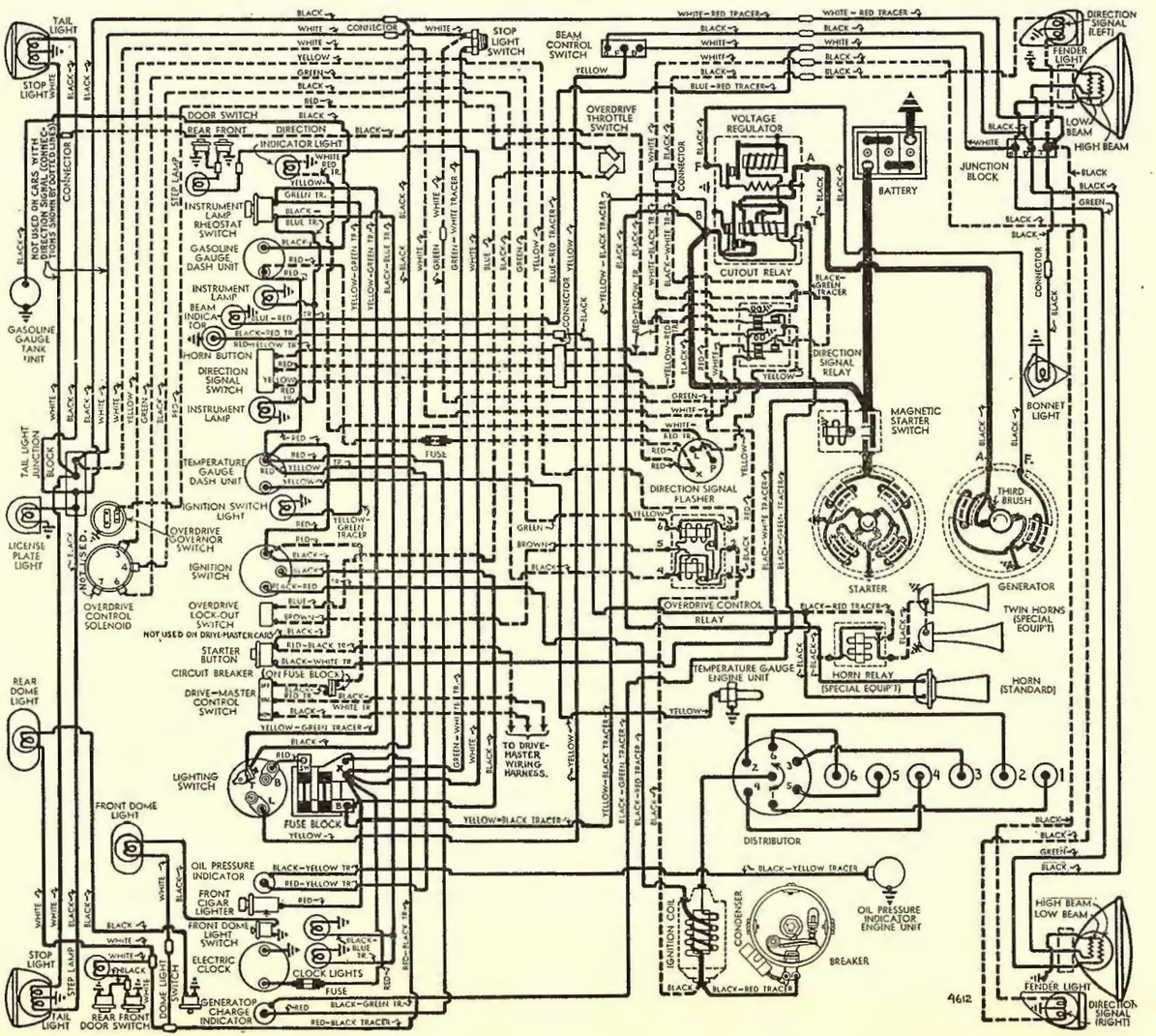
Distributor Degrees	Automatic Advance R.P.M.	Engine Degrees	R.P.M.
Start	400	0	800
3	700	6	1400
6	1000	12	2000
9	1300	18	2600
11.75	1570	23.5	3140

Fuel Compensator—Manual adjustment for octane rating of fuel used. See Ignition Timing for setting.

Vacuum Spark Control: Auto-Lite No. VC-3060ES Unit. Separate unit mounted on distrib. hold-down plate, linked to quadrant scale on distributor. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring within unit).

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅞"
4°	8°	9¼"
7.5°	15°	11¼"

Distributor Removal:—Mounted at top rear of cylinder head. To remove, disconnect vacuum line, take out cyl. head stud nuts on hold-down plate.



IGNITION TIMING

Std. Setting .....½" On Flywheel BTDC This setting correct for fuel of approximately 72 Octane Rating. See Fuel Compensator Setting for fuel and operating condition correction.

Flywheel Marks—'UDC.1-6/' at TDC with 4 white graduations (¼" apart) ahead of this mark.

Timing—With #1 piston on compression, turn engine over until second graduation before flywheel mark 'UDC.1-6/' lines up with pointer on left front face of rear motor support above starter. Loosen vacuum advance diaphragm screw on quadrant scale, rotate distributor counter-clockwise to limit of slot, then slowly rotate clockwise until contacts begin to open, tighten diaphragm screw securely. Check Fuel Compensator Setting below.

Timing (Using Synchroscope)—Recommended by car manufacturer. Mark flywheel with white chalk or paint. Idle engine, adjust distributor (above).

Fuel Compensator Setting—Road test car (engine warm). When running at 8 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen vacuum unit link screw on distributor quadrant, rotate distributor one graduation on quadrant scale clockwise (if no ping), counter-clockwise (if ping too severe).

Final setting must not be more than 1" (4th graduation) before 'UDC.1-6/' flywheel mark.

CARBURETOR

Carter Model WDO, Type 501S. 1" Dual (double barrel) downdraft type with Carter Climatic Control. *See Carburetor Section for complete data.*

Idle Adjustment—With engine warm (Fast Idle and Automatic Choke inoperative), set throttle stop-screw for idle speed of 7½-8 MPH. Adjust both idle adjusting screws (two used—one for each barrel), in succession until engine fires smoothly. Final setting of each screw should be ½-1½ turns open from inner seated position (turn screws in for leaner mixture). Recheck idle speed.

Accelerating Pump Setting—Pump lever (under dust cover at top of bowl cover) has two holes for pump link engagement. Set as follows:
Outer Hole (Max. stroke)—Normal setting.
Inner Hole (Min. stroke)—If less charge required.

Float Level—⅛" from top of float to bowl cover with valve seated (remove gasket, invert to check).

Metering Rods & Jets—*Refer to Carburetor Index for Carter Downdraft Carburetor Jet Specification Table.*

Fast Idle:—Integral type (part of carburetor). *See Carburetion Equipment Section for data.*
Setting—With choke valve closed and fast idle screw on high lobe of fast idle cam, turn fast idle screw in until throttle opening is .045".

Automatic Choke: Carter Climatic Control. *See Carburetion Equipment Section for data.*
Setting—1 Point Lean.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., United Oil-bath type Optl.
Servicing (Oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.
Servicing (Oil-bath type)—Remove filter element, clean sump with kerosene (clean filter element with kerosene also if necessary), refill with 1 Pint engine oil (service same as for Oil-wetted type).

Fuel Pump: AC. Type AK Diaphragm type mechanical pump or Autopulse electric pump Std., AC. Type AJ combination fuel and vacuum pump Optl. *See Carburetion Equipment Section for data.*
Pressure—3-4 lbs. (Type AK), 2½-3 (Autopulse).

Gasoline Gauge: King-Seeley Electric type. K-S Nos. 41050 (dash unit), 7550 (tank unit). *See Carburetion Equipment Section for data.*

BATTERY

National Type HT-17. 6 Volt, 17 Plate, 96 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage—4.24 volts.
Grounded Terminal—Positive (+) to frame. **Engine Ground**—Strap (rear motor support to frame).
Dimensions—Lgth. 10 9/16". W. 7¼". Hght. 7 13/16".
Location—On left side under engine hood.

STARTER

Auto-Lite Model MZ-4092. Armature MZ-2138.
Drive—Inboard Barrel type Bendix No. A-1684.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 125 amperes, 5.4 volts.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4300	5.5	70
2.55	"	1325	5.0	200
4.95	"	750	4.5	300
7.65	"	220	4.0	400
7.8	"	Lock	3.0	420
11.8	"	Lock	4.0	560

Removal:—On left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch:—A-L Model SS-4001. Magnetic type. Mounted on starter, controlled by switch on instrument panel. Operative only with ignition on (and clutch disengaged on cars with Vacumotive Drive or Drive-Master). *See Electrical Equipment Section for complete data.*

GENERATOR

Auto-Lite Model GEC-4801A. Armature GDZ-2006F.
SEE 1946-47 HUDSON 8 CAR PAGES FOR DATA

REGULATOR

Auto-Lite Model VRR-4001A. Voltage Regulator.
SEE 1946-47 HUDSON 8 CAR PAGES FOR DATA

LIGHTING

Headlamps: Hall "Sealed Beam" type with upper lower beams controlled by Beam Selector Switch on toeboard. *See Electrical Equipment Section for complete data.*
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb on speedometer dial. Lighted with Country (upper) beam in use.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—At extreme left hand side of instrument panel. Flashes whenever Right or Left Direction Signal is operating.

Switches
Lighting—Hudson No. 200417.
Beam Selector—Hudson No. 164439.
Instrument—Hudson No. 160092.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	35-45watts	Sealed Beam
Front Bonnet (Park)	1½	55
Fender (no Dir. Sig.)	3	63
Fender (with Dir. Sig.)	21-3	1158
Beam & Dir. Sig. Indicator	1	51
Gen. & Oil Indicators	1	51
Spdmtr. (51, 58)	1	51
Spdmtr. (54), Clock	1½	55
Courtesy, Dome	15	88
Ignition Lock	1½	55
Stop & Tail	21-3	1154
Rear License	3	63
Fog Lamp	50	1211S
Spot Lamp	32	1209S

MISC. ELECTRICAL

GENERATOR CHARGE SIGNAL: Red indicator on right hand side of instrument panel (to right of clock). Should light when ignition turned on and should go out when generator begins to charge. *See Electrical Equipment Section for complete data.*

OIL PRESSURE SIGNAL: Red indicator on right hand side of instrument panel (to left of clock). Should light when ignition turned on and go out as soon as engine is started. *See Electrical Equipment Section for complete data.*

FUSES: Lighting—30 ampere. Bottom fuse on fuse block to right of steering column behind instrument panel. **Accessory**—30 ampere. Top fuse on fuse block. NOTE—Silver-plated fuses used.
Direction Indicator—10 ampere. Near flasher.
Electric Clock—3 ampere. In lead behind clock.
Weathermaster—14 ampere.
Radio—20 ampere.

CIRCUIT BREAKER: Drive-Master Cars only. Thermostatic type. Mounted on fuse block. Protects Drive-Master circuits only.

HORNS: Sparton. Twin type air electric horns operated by horn relay.
Air Gap—.026-.030" high pitch (short horn), .032-.035" low pitch (long horn).

Horn Relay:—R-B-M Model 6004. On dash. **Contacts Close** 3-4 volts (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. Six Cylinder, "L" Head type.
Bore—3". **Stroke**—5".
Displacement—212 cubic inches.
Rated Horsepower—21.6.
Developed Horsepower—102 at 4000 RPM.
Compression Ratio—6.5-1 Std. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Hudson Shop Notes.*

ENGINE FRONT SUPPORT REMOVAL & INSTALLATION: *See Hudson Shop Notes.*

ORIGINAL BORE & PISTONS: *See Hudson Shop Notes.*

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Hudson Shop Notes.*

PISTONS: Aluminum alloy, Cam ground, T-slot type. Use finished replacement pistons.
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above.
Clearance—Top .016". Skirt .0005-.001". See Fitting New Pistons below.

Replacement Pistons: *See Hudson Shop Notes.*

Fitting New Pistons:—Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888-A Piston Feeler Scale to measure pull.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap).

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil (upper)	3/16"	.009-.011"	.001"
Oil (lower)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN: Diameter—¾". **Length**—2 7/16".
Floating type with diamond-drilled pin holes in piston and bronze bushing in connecting rod. Pin retained by lock ring at each end.
Piston Pin Servicing—*See Hudson Shop Notes.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD: Weight 29.75 ozs. **Length** 8 3/16"
Crankpin Journal Diameter—1.936" (1.935-1.936"). *See Crankshaft Size Code Note in the Hudson Shop Notes for Original Connecting Rod Bearing sizes.*
Lower Bearing—Babbitt lined, spun type.
Clearance—.001". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or bearing caps. Palnuts used on bolt nuts.

Replacement Rods: Exchange rods furnished Std. size and .010" Undersize.

Installing Rods:—Lower end of rods offset. Install rods with widest half of bearing toward the rear (#1,2,4), toward front (#3,5,6). Oil scoop on lower end of rod toward camshaft.

CRANKSHAFT: Three bearing type with integral counterweights and vibration dampener on forward end.
Vibration Dampener Removal—*See Hudson Shop Notes.*
Crankshaft & Main Bearing Removal & Installation—*See Hudson Shop Notes.*
Journal Diameters—#1, 2.342" (2.341-2.342"), #2, 2.374" (2.373-2.374"), #3, 2.405" (2.404-2.405").
See Crankshaft Size Code Note in the Hudson Shop Notes for original Main Bearing Sizes.
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".
Bearing Adjustment:—None (no shims). Do not file bearing caps. Palnuts used on bearing cap bolt nuts.

►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. NOTE—If new unfinished bearings installed, thrust face for center bearing must be faced for proper endplay.
Endplay—.006-.012".

CAMSHAFT: Three bearing type. Helical gear drive. New design camshaft used. *See Hudson Shop Notes for Replacement Camshaft data.*
CAUTION—Special tappet clearance required for this camshaft. *See Tappet Clearance in "Tune-up" and "Valve Timing".*
Camshaft Removal—*See Hudson Shop Notes.*
Bearing Diameters—#1, 2"; #2, 1 31/32";, #3 1 9/16".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Bearing Removal & Installation: *See Hudson Shop Notes.*

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover. NOTE—Service thrust washer available which can be split and installed without removing camshaft.

Timing Gears:—Crankshaft gear cast-iron, camshaft gear Laminated Fibre (first cars), Aluminum (Later Cars). All gears have 20° pressure angle teeth. Aluminum gears (and crankshaft gear used with them) have teeth slightly crowned to improve quietness.
NOTE—Gears have figure 20 on front face (crankshaft gear carries additional FRONT mark to insure correct installation). NOTE—Camshaft gear available in .008" oversize and can be distinguished from std. size by spot of yellow paint on front face.
Replacement Gear Caution—Aluminum Camshaft Gear furnished in Matched Sets only with crankshaft gear (aluminum gear has slight crown or curvature of teeth for quietness and must be used with similarly crowned teeth type crankshaft gear).
Backlash—.002-.004".
Timing Gear Removal & Installation—*See Hudson Shop Notes.*

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
All Valves	1⅜"	11/32"	5 11/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: Removable type pressed in block.
Servicing—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 1 1/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-2 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122

Valve Springs:—Cadmium plated springs are used. Use tool J-587-A to install valve spring and seat
Spring Free Length—2 17/64".

	Spring Pressure	Spring Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—When springs removed, test for pressure (Tool U-15). Replace if pressure below 34 lbs. at 2".

Valve Lifters:—Roller shoe type, fitted in removable guides in cylinder block.
Valve Lifter Removal—*See Hudson Shop Notes.*

VALVE TIMING

Tappet Clearance—.008" Int., .010" Exh. Hot.
NOTE—This supersedes earlier data.
CAUTION—This tappet clearance required by new camshaft. See Camshaft data above.

Valve Timing:—See Camshaft Setting above.
Intake Valves Open 27°30'BTDC. Close 68°10' ALDC.
Exhaust Valves—Open 51°50' BLDC. Close 32°10' ATDC. These figures correct with .010" tappet clear.
Valve Timing Check—With .010" tappet clearance No. 1 intake valve opens 27°30' BTDC. with point on flywheel approximately 10½ teeth before top dead center mark "UDC. 1-6/" in line with indicator in inspection hole in flywheel housing above starter.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.
NOTE—Lower end of oil reservoir suction pipe (from oil pan to crankcase wall) now extends to center of oil reservoir to insure constant oil supply to pump.
Crankcase Capacity—5½ qts. (dry), 4½ (refill).
Servicing Note—When changing oil without removing oil pan, refill with 4½ quarts. If oil pan removed, place 1½ quarts in upper tray before oil pan installed, then 4 quarts through filler with pan in place.
Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure Indicator below).

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Filter: Special Hudson type. Optl. equipment.
Servicing—Replace filter cartridge at 5000 mile intervals.

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. Consists of signal light on instrument panel operated by switch mounted on oil check valve.
See Electrical Equipment Section for complete data.

Checking Oiling System:—*Refer to Hudson Shop Notes.*

COOLING

Cooling System: Positive circulation type with the water pump at water inlet on front of engine.
Capacity—13 quarts.

Water Pump:—Centrifugal, belt-driven, packless type with single outlet (no by-pass). Grease fitting provided for front and rear bearing lubrication.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Fulton Choke type. In cyl. head outlet. **Setting**—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge:—King-Seeley Electric. K-S Nos. 41053 (dash unit), No. 41085 (engine unit).

See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in oil). 9" Type Std. on Passenger Cars, 10" Type Std. on Commercial (Business) Cars and all Passenger Cars with Vacumotive Drive, Overdrive, or Drive-Master.

See Clutch Section for complete data.

Facings—Cork Insert type as follows:

	No. Corks	Inside Diam.	Outside Diam.
9" Type	90	5¼"	9"
10" Type	108	6⅜"	10"

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin in throw-out lever at lower end of connector link, turn clevis in or out of link, tighten locknut after re-connecting clevis. CAUTION—Make certain that clevis pin inserted in same hole in lever.

Clutch Oil Servicing:—*See Hudson Shop Notes.*

Removal:—Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate above starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car. NOTE—See Installation Note following Transmission Removal for Clutch Throwout Bearing Oil Seal.

VACUMOTIVE DRIVE

Vacumotive Drive:—Automatic clutch control. Optl.

See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

See Transmission Section for complete data.

NOTE—External shift rail lock accessory kits available for installation on cars operated in mountainous regions where long 2nd gear operation required.

Transmission Control: Handy-Shift remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal:—Transmission can be removed from inside car as follows: Take off accelerator pedal by removing cotter pins in anchor bracket and bell crank link clevis pins. Move steering column rubber hole cover up out of way. Remove floor mat by taking out screws at kick pads on dash and mat trim clips. Remove front seat cushion and transmission floor opening cover (CAUTION—Accelerator pedal operating rod should be secured so as not to drop on starter switch). Disconnect front universal by taking out four nuts and lock plates on U-bolts. Release clutch pedal return spring. Remove two cross shaft bracket bolts, clutch control link clevis pin and clutch pedal assisting spring. Remove Handy Shift control tube-to-transmission shift rod cotter pin, washer and grommet; transmission casing lower anchor bracket screws and bracket, shift shaft outer lever nut, washer and lever. Remove two flywheel guard-to-clutch housing screws and two rear engine mounting bolts (CAUTION—Do not remove rear engine mounting-to-clutch housing bolt). Jack rear of engine up ½" off frame. Remove clutch housing to transmission bolts. Disconnect speedometer cable from transmission. Pull transmission back and lift out.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed (twist wire with end extending up through clutch housing so it will come off after transmission installed).

OVERDRIVE

Warner Model AS2-R9B. Optl. equipment, used with Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down".

See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy. Hudson #163305.

Throttle Switch—R-B-M. Hudson No. 164438. On toeboard under accelerator pedal. Not adjustable.

Governor Switch—Auto-Lite Model TGA-4002 (two terminal type), Model TGB-4002 (five terminal type used on cars with Hudson Drive-Master transmsn.).

Removal: Same as standard transmission removal (above) except that overdrive control and wiring connections must be disconnected. Special Tool J-1502-H (hoist and dolly) should be used to lift transmission and lower onto dolly for removal.

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

See Transmission Section for complete data.

UNIVERSALS

Spicer. Needle bearing type. Two used.

	Front — Spicer Model — Rear
Standard	1261-101X — 1268-101X
With Overdrive	1261-101X — 1278-101X
Commercial	1281-101X — 1278-101X
" with OD.	1261-101X — 1268-101X

See Universals Section for complete data.

REAR AXLE

Own Make. Semi-floating type with Spiral Bevel Gears and Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratios	Pass. Cars	Comm'l.
Standard	4 1/9-1	4 5/9-1
Optl.	4 5/9-1	
Std. with Overdrive	4 5/9-1	4 5/9-1
Optl. with Overdrive	4 1/9-1	
Std. with Drive-Master	4 5/9-1	4 5/9-1
Optl. with Drive-Master	4 1/9-1	

Backlash—.0005-.003". Screw adjustment.

Removal:—Disconnect rear universal by taking out four nuts and lock plates on U-bolts, drop rear end of propeller shaft. Remove axle shafts (see instructions below). Remove bolt nuts on carrier flange, pull carrier assembly out of axle housing.

Axle Shaft Removal:—Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer (use Tool J-351). Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, push bolts out of backing plate, remove bearing cap and shims (without disturbing hand brake link). Take out rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal aseembly in housing.

Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft). **Endplay**—.004-.010".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic type.
Delco Model 1037-C (front), 1041-S (rear).
Monroe Model 18076 (front), 18077 (rear).

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs and Autopoise Control.

See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Positive ¾°. Adjustable.

Toe In—0-1/16". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry (Toe-out on Turns)—With outer wheel turned 25°, inner wheel turn should be 30°.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, 4-wheel, Duo-servo, Single anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.

See Brake Section for complete data.

Drums—Centrifuse type. Diameter 10" (Std. on Pass. Cars), 11" (Comm'l Cars & Optl. for Police Car & Taxicab).

Lining—Multibestos molded (primary), Ferodo woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 22⅛" (10" type), 23 15/16" (11" type).

Clearance—.0075" at each end of each shoe. (.015" at each end of secondary or rear shoe with primary shoe forced out against drum).

Mechanical Follow-up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which causes rear wheel brakes to be applied mechanically by pedal if hydraulic system not operating.

See Brake Section for complete data.

Setting—1¼" clearance between face of pedal pushrod and end of actuating tube with brakes released.

Hand Brake: See Service Brakes above..

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydraulic (hydro-electric) type with hydraulic power cylinders actuated by motor driven hydraulic pump.

See Miscellaneous Section for complete data.

HOOD LOCK: Hood is Reverse Alligator type hinged at radiator. To raise hood, press in on lock handle to left of steering column, raise rear end of hood.

MODEL IDENTIFICATION

	Super Eight Model	Ser. No.	Commodore Eight Model	Ser. No.
1946	53	33-101	54	34-101
1947	173	173-101	174	174-101

SERIAL & ENGINE NUMBER: See model notation above for first No. and prefix (first two figures indicate model thus: 33-101). Stamped on plate on right front door hinge pillar post and on top of engine block between #1 and #2 exhaust flanges.

TUNE-UP

COMPRESSION: Pressure—120 lbs. at cranking speed of 125 RPM.

VACUUM READING: Steady 18-21" idling 7½-8 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUGS: Champion Special J-9 Hudson. 14 mm.. **Gaps**—.032"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.017" **Cam Angle** 31° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic Advance—Starts at 300 RPM., 3° at 400 RPM., Maximum 17.5° at 1700 RPM (Distr. ° & RPM)

IGNITION TIMING: See Ignition Timing.
Std. Setting—At Top Dead Center.
Timing Mark—Flywheel marked "UDC.1-8" with four graduations ¼" apart ahead of this mark. Set timing with first white line aligned with pointer in inspection hole in motor support above starter, then adjust Fuel Compensator as follows:
Fuel Compensator Setting—Advance spark (loosen hold-down screw and rotate distributor) until slight ping noted when accelerating with wide open throttle between 10-15 MPH. **Final setting must not be more than ¾" before "UDC.1-8/".**

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set both idle adjusting screws for smooth running and highest steady vacuum gauge reading (each screw ½-1½ turns open—turn screws in for leaner mixture). Idle speed 7½-8 MPH.
Float Level—⅛" from top of float to gasket seat on cover with valve seated (invert to check).
Accelerating Pump—Outer hole (max.) Normal.

Fuel Pump Pressure: 3-4 lbs. (AC. mechanical type), 2½-3 lbs. (Autopulse electrical type).

MANIFOLD HEAT CONTROL: Automatic thermostatic type (no adj.). Valve must operate freely.

VALVES: See Valve Timing.
Tappet Clearance—.008" Intake, .010" Exhaust, engine idling at normal operating temperatures.
NOTE—This supersedes earlier data.

STARTING: See Battery, Starter, Generator and Regulator.

IGNITION

IGNITION SWITCH: Mitchellock 24-B, No. E8996.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—H601 to H1100. **Groove**—No. 1.

COIL: Auto-Lite Model CE-4029. Service Coil CE-3224JS. Mounted on the dash.
Ignition Current—2½ amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4008-A or IGP-4008-B. Full automatic advance type (no vacuum control) with Fuel Compensator adjustment.
Breaker Gap—.017".
Cam Angle or Dwell—31° closed, 14° open.
Breaker Arm Spring Tension—18-20 ozs.
Rotation—Clockwise viewed from above.

Distributor Degrees	Automatic Advance R.P.M.	Engine Degrees	R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

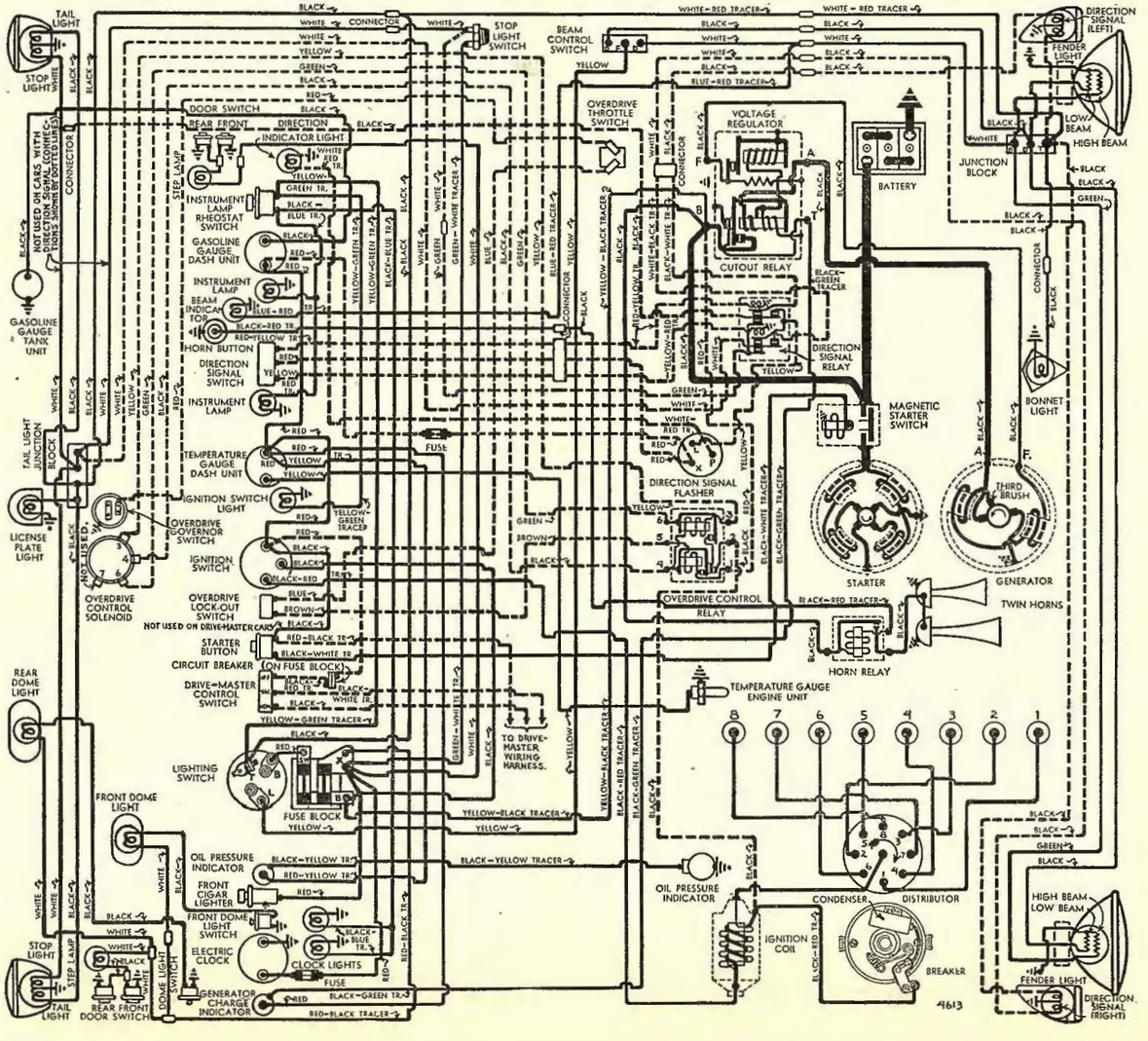
Fuel Compensator—Manual adjustment for octane rating of fuel used. See Ignition Timing for setting.
Removal:—Mounted on right side of crankcase. To remove take out hold-down screws in advance arm.

IGNITION TIMING

Std. Setting.....At Top Dead Center This setting correct for fuel of approximately 72 Octane Rating. See Fuel Compensator Setting for fuel and operating condition correction.

Flywheel Marks—'UDC.1-8/' at TDC with 4 graduations (¼" apart) ahead of this mark.

Timing—With #1 piston on compression, turn engine over until piston reaches top dead center when flywheel mark 'UDC.1-8/' lines up with pointer in left front face of rear motor support. Loosen hold-down screw in advance arm, rotate distributor clockwise to limit of advance arm slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw. Check Fuel Compensator setting.
Timing (Using Synchroscope)—Recommended by



manufacturer. Mark flywheel with white chalk or paint, connect at #1 spark plug. Idle engine and adjust distributor as directed above.

Fuel Compensator Setting—Road test car (engine warm). When running at 8 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen hold-down screw, rotate distributor one graduation on scale counter-clockwise (if no ping), clockwise (if ping too severe). **Final setting must not be more than ¾" (3rd graduation) before 'UDC.1-8/' mark.**

CARBURETOR

Carter Model WDO, Type 502S. 1¼" Dual (double barrel), downdraft type with Carter Climatic Control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for 7½-8 MPH. idling speed. Adjust both idle adjusting screws (2 used, one for each barrel) in succession until engine fires smoothly. Final setting should be ½-1½ turns open for each screw (turning screws in gives leaner mixture) to give highest reading on vacuum gauge. Recheck idle speed.

Accelerating Pump Setting—Pump lever (under dust cover at top of carburetor) has two holes for pump link engagement. Set as follows:
Outer Hole (Max. stroke)—Normal setting.
Inner Hole (Min. stroke)—If less charge required.

Float Level—⅛" from top of float to bowl cover with valve seated (remove gasket, invert to check).

Metering Rods & Jets—***Refer to Carburetor Index for Carter Downdraft Carburetor Jet Specification Table.***

Fast Idle:—Integral (built-in each carburetor).

See Carburetion Equipment Section for complete data.

Fast Idle Setting—With choke valve closed and fast idle screw on high lobe of fast idle cam, turn fast idle screw in until throttle valve opening is .053".

Automatic Choke:—Carter Climatic Control.

See Carburetion Equipment Section for complete data.

Setting—Set coil housing 1 Notch Lean.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., United Oil-bath type Optl.

Servicing (Oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.

Servicing (Oil-bath type)—Remove filter element, clean sump with kerosene (clean filter element with kerosene also if necessary), refill with 1 Pint engine oil of same grade used in crankcase at 2000 mile intervals or more often if required by operating conditions.

Fuel Pump: AC. Type AK Diaphragm type mechanical pump or Autopulse electric pump Std., AC. Type AJ combination fuel and vacuum pump Optl.

See Carburetion Equipment Section for data.

Pressure—3-4 lbs. (AC. Type AK), 2½-3 lbs. (Autopulse type).

Gasoline Gauge: King-Seeley Electric type. K-S Nos. 41050 (dash unit), 7550 (tank unit).

See Carburetion Equipment Section for complete data.

BATTERY

National Type HT-19. 6 Volt, 19 Plate, 108 Ampere Hour Capacity (20 hour rate).
Starting Capacity—135 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes. Five second voltage—4.43 volts.
Grounded Terminal—Positive (+) to frame. **Engine Ground**—Strap (rear motor support to frame).
Dimensions—Lgth. 11¾". Width 7¼". Hght. 7 13/16".
Location—On left side under engine hood.

STARTER

Auto-Lite Model MAB-4100. Armature MAB-2113.
Drive—Inboard Barrel type Bendix No. A-1684.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 120-125 amperes, 5 v.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	3700	5.5	60
0.6 "	1910	5.5	100
3.4 "	1100	5.0	200
6.6 "	695	4.5	300
10.15 "	420	4.0	400
15.2 "	Lock	3.0	575
21.5 "	Lock	4.0	750

NOTE—Lock torque figures correct with switch.

Removal:—On left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch:—A-L Model SS-4001. Magnetic type. Mounted on starter, controlled by switch on instrument panel. Operative only with ignition on (and clutch disengaged on cars with Vacumotive Drive or Hudson Drive-Master).

See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature No. GDZ-2006F. Third brush control with voltage regulation. Ventilated by fan on drive pulley.
Maximum Charging Rate—44 amperes (Cold), 38 amperes (hot), 35 MPH. Actual charging rate controlled by Voltage Regulator and dependent on battery condition. See Regulator data. When checking generator output, ground "F" terminal.
Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Setting adjustable

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amperes at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Swing generator out until possible belt deflection midway between generator and fan pulley is ¾" (use straightedge across pulleys).

REGULATOR

Auto-Lite Model VRR-4001A. Voltage Type. Cutout Relay and Voltage Regulator in case on dash.
NOTE—Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control.

See Electrical Equipment Section for complete data.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In—6.4-6.6 volts, 825 RPM. 9.4 MPH.
Cuts Out—4.2-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min. ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Setting—7.1-7.4 volts at 70°F.
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal, voltmeter between this terminal and ground. Warm up generator by running engine at speed of 20 MPH for 15 minutes. Then increase speed to 30 MPH charging battery until voltage is constant. Voltmeter reading should be within limits of 7.1-7.4 volts at 70°F. See Electrical Equipment Section for voltages at other temperatures.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type with upper lower beams controlled by Beam Selector Switch.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at upper center of speedometer dial. Lights with Upper Beam "on".

Direction Signal: ***See Electrical Equipment Section.***

Direction Signal Indicator—At extreme left hand side of instrument panel. Flashes whenever Right or Left Direction Signal is operating.

Switches

Lighting—Hudson No. 20041'/.
Beam Selector—Hudson No. 164439.
Instrument—Hudson No. 160092.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	35-45watts	Sealed Beam
Front Bonnet (Park)	1½	55
Fender (no Dir. Sig.)	3	63
Fender (with Dir. Sig.)	21-3	1158
Beam & Dir. Sig. Indicator	1	51
Gen. & Oil Indicators	1	51
Spdmtr. (53)	1	51
Spdmtr. (52), Clock	1½	55
Courtesy, Dome	15	88
Ignition Lock	1½	55
Stop & Tail	21-3	1154
Rear License	3	63
Fog Lamp	50	1211S
Spot Lamp	32	1209S

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MISC. ELECTRICAL

GENERATOR CHARGE SIGNAL: Red indicator on right hand side of instrument panel (to right of clock). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on right hand side of instrument panel (to left of clock). Should light when ignition turned on and go out as soon as engine is started.
See Electrical Equipment Section for complete data.

FUSES: Lighting—30 ampere. Bottom fuse on fuse block to right of steering column behind instrument panel. **Accessory**—30 ampere. Top fuse on fuse block. NOTE—Silver-plated fuses used.
Direction Indicator—10 ampere. Near flasher.
Electric Clock—3 ampere. In lead behind clock.

CIRCUIT BREAKER: Drive-Master Cars only. Thermostatic type. Mounted on fuse block. Protects Drive-Master circuits only.

HORNS: Sparton. Twin type air electric horns operated by horn relay.
Air Gap—.026-.030" high pitch (short horn), .032-.035" low pitch (long horn).

Horn Relay:—R-B-M Model 6004. On engine dash.
Contacts Close—3 volts min., 4 volts, max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. Eight Cylinder "L" Head type.
Bore—3". **Stroke**—4½".
Displacement—254 cubic inches. **Rated HP**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio—6.50-1 cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Hudson Shop Notes.*

ENGINE FRONT SUPPORT REMOVAL & INSTALLATION: *See Hudson Shop Notes.*

ORIGINAL BORE & PISTONS: *See Hudson Shop Notes.*

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Hudson Shop Notes.*

PISTONS: Aluminum alloy, Cam ground, T-slot type. Use finished replacement pistons.
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Piston & rod removed from above or below. **Clearance**—Top .016". Skirt .0005-.001".

Replacement Pistons: *See Hudson Shop Notes.*

Fitting New Pistons:—Use .0015" feeler ½" wide (Piston Feeler Scale Tool J-888-A) inserted between piston and cylinder wall on side opposite slot 90° from pin. Pull to withdraw feeler 3-4 lbs.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one oil ring above piston, second ring on skirt below pin). All rings are positioned by pin in ring groove.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil (upper)	3/16"	.009-.011"	.001"
Oil (lower)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN: Diameter—¾". **Length**—2 7/16". Floating type with diamond-drilled pin holes in piston and bronze bushing in connecting rod. Pin retained by lock ring at each end.
Piston Pin Servicing—*See Hudson Shop Notes.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD: Weight 29.75 oz. **Length** 8 3/16".
Crankpin Journal Diameter—1.935-1.936".
See Crankshaft Size Code Note in Hudson Shop Notes for Original Connecting Rod Bearing sizes.
Lower Bearing—Babbitt lined, spun type.
Clearance—.001". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or bearing caps. Palnuts used on bolt nuts.

Replacement Rods: Exchange rods furnished Std. size and .010" Undersize.

Installing Rods:—Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.
Vibration Dampener Removal—*See Hudson Shop Notes.*
Crankshaft & Main Bearing Removal & Installation—*See Hudson Shop Notes.*
Journal Diameters—#1, 2.279-2.280", #2, 2.311-2.312", #3, 2.341-2.342", #4, 2.373-2.374", #5, 2.404-2.405".
See Crankshaft Size Code Note in Hudson Special Data for original bearing size.
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Bearing Adjustment:—None (no shims). Do not file bearing caps. Palnuts used on bearing cap bolt nuts. *See Palnut Installation in Hudson Shop Notes.*

►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. **Endplay**—.006-.012".

CAMSHAFT: Five bearing type. Helical gear drive.
Camshaft Removal—*See Hudson Shop Notes.*
Bearing Diameters—#1, 2 1/32"; #2, 2"; #3 1 31/32"; #4, 1 15/16"; #5, 1½".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Bearing Removal & Installation—*See Hudson Shop Notes.*

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.

Timing Gears: Crankshaft gear Cast Iron, camshaft gear Laminated Fibre (first cars), Aluminum (later cars). All gears have 20° pressure angle teeth. Aluminum gears (and crankshaft gears used with them) have teeth slightly crowned to improve quietness. NOTE—Gears have figure "20" on front face for identification (crankshaft gear also marked "FRONT" to insure correct installation).
Replacement Gear Caution—Aluminum Camshaft Gear furnished in Matched Sets only with crankshaft gear (aluminum gear has slight crown or curvature of teeth for quietness and must be used with similarly crowned teeth type crankshaft gear).
Backlash—.002-.004".
Timing Gear Removal & Installation—*See Hudson Shop Notes.*

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1½"	11/32"	5 3/32"
Exhaust	1⅜"	11/32"	5 3/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: Removable type pressed in block.
Servicing—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-2 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122

Valve Springs: Cadmium plated springs are used. Use tool J-587-A to install valve spring and seat assembly. **Spring Free Length**—2 17/64".

	Spring Pressure	Spring Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—When springs removed, test for pressure (Tool U-15). Replace if pressure below 34 lbs. at 2".

Valve Lifters: Roller shoe type, fitted in removable guides in cylinder block.
Valve Lifter Removal—*See Hudson Shop Notes.*

VALVE TIMING

Tappet Clearance—.008" Int., .010" Exh., Hot.
NOTE—This supersedes earlier data.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44'ATDC.
Above figures correct with .010" tappet clearance.
Valve Timing Check—With .010" tappet clearance #1 intake valve should open with piston 10°40' or .0494" BTDC when a point on the flywheel approximately 3.97 teeth before 'UDC.1-8/' mark lines up with indicator in inspection hole above starter. Reset tappet clearance at .008" hot and idling.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.
NOTE—Lower end of oil reservoir suction pipe (from oil pan to crankcase wall) now extends to center of oil reservoir to insure constant oil supply
Crankcase Capacity—9 qts. (dry), 7 (refill).
Servicing Note—Whenever pan removed, install 2 qts. in upper tray before pan installed, then 7 qts. through oil filler after pan in place on engine.

Oil Filter: Special Hudson type. Optl. equipment.
Servicing—Replace filter cartridge at 5000 mile intervals.
Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure indicator below).

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. *For data, refer to Elec. Equip. Index.*

Checking Oiling System:—*See Hudson Shop Notes.*

COOLING

Cooling System: Positive circulation type with water pump at water inlet on front of engine. On Commodore Eight only, by-pass passage between outlet elbow on head and water pump inlet provides recirculation of water through block with thermostat closed.

Capacity—18 quarts.

Water Pump: Centrifugal, belt driven, packless type.

NOTE—Pump used on Commodore Eight has double inlet (for by-pass).

See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Fulton. Choke type (Super Eight), By-pass type (Commodore Eight). In cylinder head water outlet elbow.

Setting—Starts to open 150-155°F. Fully open 185°F.

Temperature Gauge:—King-Seeley Electric. K-S Nos. 41053 (dash unit), No. 41085 (engine unit).

See Miscellaneous Section for complete data.

NOTE—Gauge reads HOT with ignition 'Off'.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in oil). 10" type used on all models.

See Clutch Section for complete data.

Driven Member—Cork insert type. Inside Diam. 6⅜". Outside Diam. 10". Facing 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin in throw-out lever at lower end of connector link, turn clevis in or out of link, tighten locknut after re-connecting clevis. CAUTION—Make certain that clevis pin inserted in same hole in throw-out lever from which removed.

Clutch Oil Servicing:—*See Hudson Shop Notes.*

Removal:—Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate above starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

NOTE—See Installation Note following Transmission Removal for Clutch Throwout Bearing Oil Seal.

VACUMOTIVE DRIVE

Vacumotive Drive:—Automatic clutch control. Optl.

See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

See Transmission Section for complete data.

Transmission Control: Handy-Shift remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal:—Transmission can be removed from inside car as follows: Take off accelerator pedal by removing cotter pins in anchor bracket and bell crank link clevis pins. Move steering column rubber hole cover up out of way. Remove floor mat by taking out screws at kick pads on dash and mat trim clips. Remove front seat cushion and transmission floor opening cover (CAUTION—Accelerator pedal operating rod should be secured so as not to drop on starter switch). Disconnect front universal by taking out four nuts and lock plates on U-bolts. Release clutch pedal return spring. Remove two cross shaft bracket bolts, clutch control link clevis pin and clutch pedal assisting spring. Remove Handy Shift control tube-to-transmission shift rod cotter pin, washer and grommet; transmission casing lower anchor bracket screws and bracket, shift shaft outer lever nut, washer and lever. Remove two flywheel guard-to-clutch housing screws and two rear engine mounting bolts (CAUTION—Do not remove rear engine mounting-to-clutch housing bolt). Jack rear of engine up ½" off frame. Remove clutch housing to transmission bolts. Disconnect speedometer cable from transmission. Pull transmission back and lift out.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed (twist wire with end extending up through clutch housing so that it will come off the seal after transmission installed).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

See Transmission Section for complete data.

OVERDRIVE

Warner Model AS2-R9B. Optl. equipment, used with Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down".

See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy. Hudson #163305.

Throttle Switch—R-B-M. Hudson No. 164438. On toeboard under accelerator pedal. Not adjustable.

Governor Switch—Auto-Lite Model TGA-4002 (two terminal type), Model TGB-4002 (five terminal type used on cars with Hudson Drive-Master transmsn.).

Removal: Same as standard transmission removal (above) except that overdrive control and wiring connections must be disconnected. Special Tool J-1502-H (hoist and dolly) should be used to lift transmission and lower onto dolly. Transmission and overdrive assembly can then be rolled out from beneath car.

UNIVERSALS

Spicer. Needle bearing type. Two used.

	Front—Spicer Model	Rear
Std.	1261-101X	1268-101X
With Overdrive	1261-101X	1278-101X

See Universals Section for complete data.

REAR AXLE

Own Make. Semi-floating, Spiral Bevel gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—	Standard	Optional
Std. Transmission	4 1/9-1	4 5/9-1
With Overdrive	4 5/9-1	4 1/9-1
With Drive-Master	4 1/9-1	4 5/9-1

FOR OTHER REAR AXLE DATA SEE 1946-47 HUDSON SIX CAR PAGES

SHOCK ABSORBERS

Delco Model 1037-C (front), Model 1041-S (rear). Direct acting, hydraulic types.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs and Autopoise Control.

See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Positive ¾°. Adjustable.

Toe In—0-1/16". Loosen clamps at ends of each tie rod (adjust rods equally with steering arm centered).

Steering Geometry—Inner wheel 30°, Outer 25°.

STEERING GEAR

Gemmer Model 335. Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, 4-wheel, Duo-servo, Single anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.

See Brake Section for complete data.

Drums—Centrifuse. Diameter 11".

Lining—Multibestos molded (primary), Ferodo woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 23 15/16".

Clearance—.0075" at each end of each shoe. (.015" at each end of secondary or rear shoe with primary shoe forced out against drum).

Mechanical Follow-up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which causes rear wheel brakes to be applied mechanically by pedal if hydraulic system not operating.

See Brake Section for complete data.

Setting—1¼" clearance between face of pedal pushrod & end of actuating tube with brakes off.

Hand Brake: See Service Brakes above..

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydraulic (hydro-electric) type with hydraulic power cylinders actuated by motor driven hydraulic pump.

See Miscellaneous Section for complete data

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door hinge pillar post and stamped vertically on upper right front corner of block.

	Super 6 Serial No.	Commodore 6 Serial No.
1948	481101 Up	482101 Up
1949	491101 Up	492101 Up

Identification—First three figures of number indicate model.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs,. min. at 125 RPM. but not less than 100 lbs. min., and not over 10 lbs. max. variation between cylinders.

VACUUM READING: 17-18" idling at 540-560 RPM. (Std.), 580-600 RPM (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs for Cast-iron Head—Champion J-7. 14 mm.
Plugs for Aluminum Head—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° Closed. 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC-1-6/" (1948-49) aligned with pointer in rear engine support plate opening behind starter.
plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting (647S, SA)—1¼-1¾ turns open, **(776S)** ½-1 turn open. Turn screws out for richer mixture.
Idle Speed (Std.)—540-560 RPM. or 7½-8 MPH.
(Vacumotive or Drive-Master)—580-600 RPM.
Float Level—3/16". Measured from top of float to gasket seat (machined surface) on bowl cover with needle valve seated. **776S NOTE**—Measured from center highest point of float.
Accelerating Pump—Outer hole, max. (Normal).
776S Note—No seasonal pump adjustment.

Choke Setting: Coil housing one mark lean.

Fuel Pump Pressure: (Carter)—4-5 lbs. at carburetor, **(AC)**—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Int., .010" Exh. Hot.

►*CAUTION—This figure supersedes earlier data.*
NOTE—Self-locking tappet adjusting screws used. Remove apron in right front fender for access.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

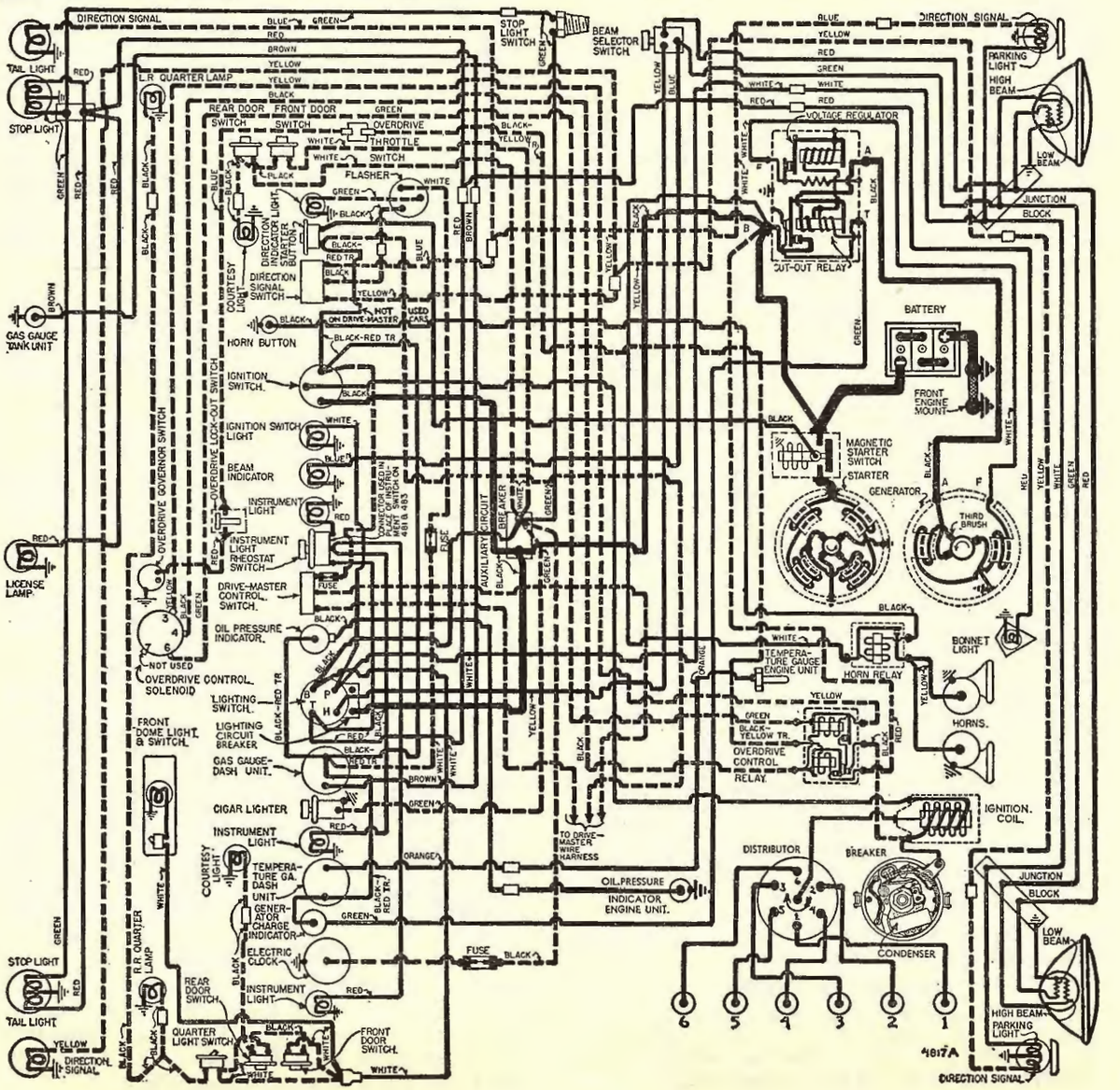
IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite No. CE-6006A (Early), CR-6012A (Late).
Location—Left side of engine above distributor.
Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Auto-Lite IG-3927G.
Capacity—.25-.28 microfarad.

►**1949 DISTRIBUTOR PRODUCTION CHANGES:** Vacuum advance changed on first (IGS-4213-1) distributor, and new (IGS-4213A-1) distributor with different advance used on later cars.
IGS-4213-1 (8.5° Vacuum Adv.)....Up to No. 49133913
IGS-4213-1 (3.5 or 4° Vac. Adv.) ①After No. 49133913
IGS-4213A-1 .....Beginning No. 49176984
①—May be found on cars before this no. (identify these distributors by number on breaker plate.

DISTRIBUTOR: *See Production Change Note above.*
Auto-Lite IGS-4213-1 (1948-49 to Car No. 49176984).
IGS-4213A-1 ('49) (beginning with Car #49176984).
Automatic advance type with Vacuum Spark Control and Fuel Compensator adjustment.
Breaker Plate Identification—No. stamped on plate (at breaker arm pivot pin) indicates max. vacuum advance:
8.5°.....①First IGS-4213-1 Distributors
3.5° or 4°.....①Later IGS-4213-1 Distributors
4°..... IGS-4213A-1 Distributors
①—See Distributor Production Change Note above.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° Closed, 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.



Automatic Advance—IGS-4213-1

Degrees	Distr.	R.P.M.	Degrees	Eng.	R.P.M.
Start		400	0		800
3		800	6		1600
6		1200	12		2400
9		1600	18		3200
12		2000	24		4000

Automatic Advance—IGS-4213A-1

Start	500	0	1000
1	670	2	1340
4	1150	8	2300
8	1825	16	3650
9	2000	18	4000

Fuel Compensator: 10° advance or retard adjustment at distrbutor. See Ignition Timing.

Vacuum Spark Control: Auto-Lite. Integral type.

►***PRODUCTION CHANGE CAUTION***—Vacuum advance changed on IGS-4213-1 distributor, and different advance also used on IGS-4213A-1 distributors:

IGS-4213-1 Vacuum Advance
►Marked "8.5"—Up to Car No. 49133913

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
2°	4°	10½"
4°	8°	11⅝"
6°	12°	12⅝"
8.5°	17°	14"

IGS-4213-1 Vacuum Advance
►Marked "3.5" or "4"—After Car No. 49133913

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	12½"
1°	2°	13¼"
2°	4°	14"
3°	6°	14¾"
4°	8°	15¾"

Vacuum Advance—IGS-4213A-1
►Beginning Car No. 49176984

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	13⅜"
1°	2°	14"
2°	4°	14¾"
3°	6°	15⅜"
3.75°	7.50°	16"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

►***INSTALLATION CAUTION—If oil pump removed, refer to Oil Pump Installation in Hudson Special Data.***

IGNITION TIMING

Std. Setting.....At Top Dead Center

NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

Flywheel Mark—"UDC-1/" (#1 and #6 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark (opening behind starter).

NOTE—Early flywheels marked "UDC-1-6/", later flywheels marked "UDC-1/".

Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.

Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 800 R.P.M., adjust distributor (as directed above) until mark lines up with lower edge of opening.

Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**

CARBURETOR

Carter WDO No. 647S, 647SA. 1¼" dual downdraft with Carter Climatic Control.

Casting No. on Flange (647S, SA)—542.

See Carburetor Section for complete data.

►**Difficult Starting & Carburetor loading and stalling Correction on 1948 & Early 1949 Cars**—***See Carter "WDO" Carburetor in Carburetor Section for installation of new Intake Manifold (with angle mounting flange) and other necessary carburetor parts.***

►**1949 Intake Manifold & Carburetor Production Changes**—***See Carter "WDO" Carburetor in Carburetor Section for new manifold and new 647SA carburetor used on later 1949 cars.***

►**Lean Condition at 20 MPH. correction on 647S carburetors**—***See Carter WDO carburetors in Carburetor Section.***

►**ACCELERATION "STUMBLE" CORRECTION**—***See "Carter WDO" in Carburetion Section.***

Settings (Idle Setting, Float Level, and Accelerating Pump: ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle: Carter Dual (WDO) Carburetor type.

See Carburetion Equipment Section for complete data.

Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.

Automatic Choke: Carter Climatic Control (Dual Carbs.).

See Carburetion Equipment Section for complete data.

Setting—Set coil housing 1 point lean.

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Optl. oil bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.

Fuel Pump (Std.): (1948-49) AC Type AH #1539109.
Optl. (Fuel-&-Vacuum)—AC Type AJ No. 1539108.
Replacement Pump—No. 584.
Pressure—4-5 lbs. at carburetor.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 42120 ('48-49 Super), 42135 ('48-49 Commander).
Tank Unit—K-S No. 41765.
See Carburetion Equipment Section for complete data.

BATTERY

National S17-2HF, 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

STARTER

Auto-Lite Model MCL-6006.
Armature—Auto-Lite MCH-2023.
Drive—Bendix No. A-1806. Inboard Barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data (MCL-6006)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Removal: On left front face of rear motor support. To remove, take off Drivemaster mounting bracket bolts (on cars equipped with Drivemaster), disconnect linkage, and pull bracket out and forward, disconnect cables from solenoid switch, remove two starter mounting stud nuts and remove starter

Starting Switch: Auto-Lite No. SS-4001. On starter with pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Vacumotive Drive, Drive-Master or Super-Matic).

See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature GDZ-2006F. Third brush control with voltage regulation.
Maximum Charging Rate—43 amperes (Cold), 37 amperes (Hot), at approx. 35 MPH. Ground "F" terminal when checking generator output.
Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Adjust 3rd brush.

Cold		**Performance Data**	Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
41	8.0	3350	34	8.0	3800

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amps. at 6.0 volts.

Belt Adjustment: ¾" belt deflection between generator and pump. Loosen clamp, swing generator out.

REGULATOR

Auto-Lite Model VRR-4001A. Voltage type.
NOTE—Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-6.6 volts.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

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Voltage Regulator

Voltage Setting—7.1-7.4 volts at 70°F.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Door Switch—Hudson No. 300796.
Front Dome Light—Hudson No. 211312.
Rear Quarter Pillar—Hudson No. 160091.
Direction Signal—Hudson No. 300875 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.

FUSES: Electric Clock—3 ampere. Behind clock.
Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.
Weather Control—14 ampere. On heater.
Drive-Master—15 ampere (supersedes 10 ampere type used on 1948 & early 1949 cars). On back of Drive-Master Control Switch.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on instrument panel (to left of gas gauge). Should light with ignition on, go out as soon as engine started.
Oil Pressure Warning Switch—Carter No. A658S. Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. Not adjustable. *See Electrical Equip. Section for data.*

HORNS: *See 1948-49 Hudson Eight car pages for data.*

ENGINE

ENGINE SPECIFICATIONS: Own Make. Six cylinder, "L" head type.
Bore—3 9/16". *See "Original Bore & Pistons" in Hudson Special Data.*
Stroke—4⅜".
Displacement—262 cu. ins. Rated HP—30.4.
Developed Horsepower—121 at 4000 RPM.
Compression Ratio (Std.)—6.50-1, cast iron head.
Compression Ratio (Optl.)—7.00-1, aluminum head.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*

►**1949 CYLINDER BLOCK & PISTON PRODUCTION CHANGE**—Beginning Car No. 491-95958 (April, 1949), blocks have tapered depresssion ⅛" deep extending from valve seat chamfers to cylinder bores. **Special pistons (with cast 302562 identification number must be used in these blocks.**
See "Pistons" in Hudson Special Data.

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CYLINDER HEAD DIAGRAM: *See Hudson Shop Notes.*

OIL PAN REMOVAL: *See Hudson Shop Notes.*

PISTONS: Aluminum alloy, Cam ground, T-slot type.
►*CAUTION*—DIFFERENT PISTONS used **starting car no. 491-95958.** Change required due to change in finishing cylinder top face.
Weight—18 ± ⅛ ozs. (stripped). **Length**—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0015 to .002" (skirt).
See "Original Bore & Pistons" in Hudson Special Data.
Piston Fitting—Insert piston in cylinder with .0015" feeler gauge. Pull to withdraw feeler 3 to 4 lbs.

Replacement Pistons: *CAUTION*—Two different types required. *See Hudson Special Data.*

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap.

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.007-.012"	.001"
Oil (upper)	3/16"	.007-.012"	.001"
Oil (lower)	5/32"	.007-.012"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.

Replacement Rings: *See Hudson Shop Notes.*

PISTON PIN: Dia.—.9684-.9687". **Length**—2.9375".
Floating type with diamond-drilled pin holes in piston and rolled steel babbitt faced bearing in connecting rod. Pin retained by lock ring at each end.
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.

Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8⅛".

►**1948 CONNECTING ROD PRODUCTION CHANGE:** New non-drilled rods used beginning Car No. 482-108180 (and some cars before this no.). *See "Connecting Rod & Bearings" in Hudson Special Data.*
Weight—34.23 ozs. (without bearings).
Crankpin Journal Diameter—2.1244-2.1254".
Lower Bearing—Steel-backed, babbitt-lined type with upper and lower halves alike. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Bearings: Furnished Std. ("Large" & "Small"), & .001", .002", .010", .012" Undersize.

Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.

►**INOPERATIVE VIBRATION DAMPENER (Causing Engine Roughness at 24-26 MPH.)**—*See "Vibration Dampener" in Hudson Special Data.*
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".
Bearings—Removable steel-backed, babbitt-lined Upper and lower halves of each bearing alike.
Clearance—.0005-.0015".
Front & Rear Oil Seals—*See "Crankshaft & Main Bearings" in Hudson Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft with Tool KMO-734.
Palnuts—Tighten finger tight, plus 1/3 turn.
►**Front Main Bearing Lock Plates**—Used on 1950 cars and can be installed on 1948-49 cars (instead of lockwashers) to eliminate oil leakage or seepage. *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Replacement Bearings: Furnished Std. & .001", .002", .010", .012" Undersize.

End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive. **Endplay**—.003-.009".

CAMSHAFT: 4 bearing type. Non-adjustable chain
►**Oil Pump & Camshaft Gear Change**—Camshaft driving gear & mating oil pump gear have "Granoseal" finish to reduce wear (may be identified by black velvety appearance).
Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-1.4975".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than individual camshaft journals.
►*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks.

Timing Chain: Morse. 60 links, ⅜" pitch. Width—1¼".
Chain Tension Shoe—Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC). NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

ENGINE

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VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 53/64"	.3402-.3412"	5.730"
Exhaust	1 9/16"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides as follows:
Intake Guide—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-3442".
Exhaust Guides—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442". Counterbored 9/16" deep to diameter of 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	77 lbs.	2 3/16"

NOTE—Reject springs if pressure less than 60 lbs. Free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out. Service by installing oversize lifter.
Clearance—.00075-.00175".
Replacement Lifters—.002", .004", .010" Oversize.

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot.
►*CAUTION—This figure supersedes earlier data.*
Self-locking tappet screws are used. Remove right front fender apron for access to valve compartment.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exhaust Valves—Open 53°18' BLDC. Close 7°42' ATDC. These figures correct with .010" tappet clear.
Valve Timing Check—Adjust #1 intake tappet to .010" hot. Insert .002" feeler gauge between valve and tappet and turn engine in direction of rotation until exhaust valve begins to close, then continue to turn engine until a slight drag is felt on feeler gauge. The first of the five timing marks on flywheel (the one furthest from UDC mark) will be 5/8" above lower edge of opening in engine plate. One tooth out of time is equivalent to approximately 1½" on flywheel. Reset valve tappet clearance to .008" hot.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, piston pins (Cars before No. 482-108180—see Connecting Rod production change note), valve lifters & timing chain.
►**Oil Leakage (through machining locating hole in crankcase flange) Correction**—*See "Oiling System" in Hudson Special Data.*
►**Timing Chain Oil Trough Installation (replacing Oil Tube)**—*See Oiling System in Hudson Special Data.*
Crankcase Capacity—7 qts. (refill), 7½ qts. (dry).
Normal Oil Pressure—40 lbs. at 30 MPH. No gauge used. See Oil Pressure Indicator below.
Oil Pressure Relief Valve—Non-adjustable release valve and spring under plug on left side of engine ahead of starter.
Oil Pan Removal: *See Hudson Shop Notes.*
Oil Pump: Rotor type consisting of inner and outer rotor, shaft, body, and cover. Angle mounted on right side of crankcase and driven from camshaft.
►*CAUTION*—New granoseal type oil pump gear must be installed on cars with previous type steel gear or when installing new camshaft.
Removal & Overhaul—*See "Oil Pump" in Hudson Special Data.*
Oil Pressure Indicator: Hudson Signal Light with new Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—Carter No. A658S. Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. No adjustment. *See Electrical Equip. Section for data.*
Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.
Servicing—Wash filter element in gasoline and re-oil when changing oil.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and brass water distribution tube in cylinder block.
Capacity—17 quarts.
Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.
Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S 42125 ('48-49 Super), 42140 ('48-49 Commander).
Engine Unit—K-S No. 41085.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil. 10" type used on all models.
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.
Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.
Clutch Oil Servicing: *See Hudson Shop Notes.*
Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
See Transmission Section for complete data.
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.65:1 (Std.) 1948-49, 1.82-1 (cars with Drive-Master). NOTE—1.65 ratio discontinued in production and only 1.82 ratio gears furnished.
►**Transmission Main Drive Gear Stop Ring Production Change**—New Main Drive Gear with Stop Ring used on 1.65-1 Ratio Transmissions beginning Dec. 29, 1948 (after first 22645 "490 Series" cars) and on other transmissions after Jan. 18, 1949, to correct overshift in high gear position resulting in premature wear of Shift Sleeve & Fork.
See "Hudson Transmission" in Transmission Section for Stop Ring installation.
►**High Gear Overshift Correction (1948 & Early 1949 Cars)**—See Main Drive Gear Stop Ring Production Change above for correction of overshift in high gear resulting in wear of Shift Sleeve & Fork.
Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.
Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross-member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening (NOTE—Hoist J-1502 can be used to lift transmission out).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).
See Transmission Section for complete data.
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.
►**Drive-Master Fuse Change**—15 ampere fuse, No. 71406, used on late 1949 & 1950 cars. **Replace previous type 10 ampere fuse with new 15 ampere fuse on earlier cars.**
Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

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SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.
See Transmission Section for complete data.

OVERDRIVE

Warner Model AS2-R9B (1948), AS1-R10D (1949)—Optl. equip. used with the Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down."
See Transmission Section for complete data.

►**OVERDRIVE FUSE INSTALLATION**—On 1948 & early 1949 cars without overdrive fuse, 30 ampere fuse (in Holder Assy. 302566) should be connected in overdrive circuit at regulator "B" terminal. **Install this fuse in all instances where short-circuits have caused damage to relay or solenoid.**
Overdrive Fuse—30 ampere. In lead from regulator "B" terminal on left front side of dash. NOTE—See fuse installation note above for first cars where fuse not used.
Overdrive Solenoid—Hudson No. 301757.
Lock-Out Switch—Hudson No. 301755.
Throttle Switch—Hudson No. 164438.
Governor—Hudson No. 165829 (standard), Hudson No. 165831 (cars with Drive-Master).
Relay—Hudson No. 165826. On left fender shield.

Removal: Same as standard transmission removal (above) except that overdrive control cable and wiring must also be disconnected.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.
See Universals Section for complete data.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint).
2) Rear shaft with slip joint at forward end.
Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.
Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Ratios	Std.	Optl.
1948-49 Std. & Drive-Master	4.1-1	4.59-1
1948-49 With Overdrive	4.95-1	4.1-1

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets, on cross-member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear spring at axle housing, and at rear shackle, lower rear end of springs, slide axle out toward rear.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).
Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	Front	Rear
Light Scale		
Monroe	300350	300351
Delco	301240	301241
Heavy Scale		
Monroe	301767	301768
Delco	301769	301770
Extra Heavy Scale		
Delco	301637	301638

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.
See Front Suspension Section for complete data.
Kingpin Inclination—3°36' crosswise.
Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.
Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.
Toe In—1/32" ± 1/32". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).
Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Diameters: Front wheel 1⅛", Rear wheel 15/16".
Drums—11" centrifuse type.
Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).
Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.
See Brake Section for complete data.
Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door hinge pillar post and stamped on top of cylinder block between No. 1 and No. 2 exhaust manifold flanges.

	Super 8 Serial No.	Commodore 8 Serial No.
1948	483101 Up	484101 Up
1949	493101 Up	494101 Up

Identification—First three figures of number indicate model.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs. min. at 125 RPM. Minimum 100 lbs. with not more than 10 lbs. variation between cylinders.

VACUUM READING: 18-21" idling at 540-560 RPM. (Std.), 580-600 RPM (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs for Cast-iron Head—Champion J-7. 14 mm.
Plugs for Aluminum Head—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° closed with .017" gap.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC-1-6/" (1948-49) aligned with pointer in rear engine support plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting—(648S) 1-1½ turns open. Turn screws out for richer mixture.
Idle Speed (Standard)—540-560 RPM., 7½-8 MPH.
(Vacumotive or Drive-Master)—580-600 RPM.
Float Level—(648S) 13/64" measured from top of float gasket seat (machined surface) on bowl cover with needle valve seated (invert to check).
Accelerating Pump—(648S) Outer hole—Normal, Inner hole if less charge required.

Choke Setting: Center at index.

Fuel Pump Pressure: (Carter)—4-5 lbs., (AC)—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust at normal operating temperature.

►*CAUTION—This setting supersedes earlier data.*

NOTE—Remove apron in right front fender for access to valve compartment.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite CE-6006A (Early), CR-6012A (late).
Location—Right side of engine above distributor.
Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Auto-Lite No. IG-2671G.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGT-4204A-1 (1948-49 to car No. 494114018), IGT-4204B-1 (1949 Beginning car No. 494114018), Automatic advance type with Vacuum Spark Control & Fuel Compensator adjustment.

Breaker Plate Identification—No. stamped on plate (opposite vacuum control unit) indicates maximum vacuum advance: 8.5 (IGT-4204A-1), 4 (IGT-4204B-1).

Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° closed with .017" gap.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance (IGT-4204A-1 & IGT-4204B-1)

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

Fuel Compensator: 10° adjustment at distributor. See Ignition Timing for adjustment and setting.

Vacuum Spark Control: Auto-Lite. Integral type. Linked directly to breaker plate. Provides additional

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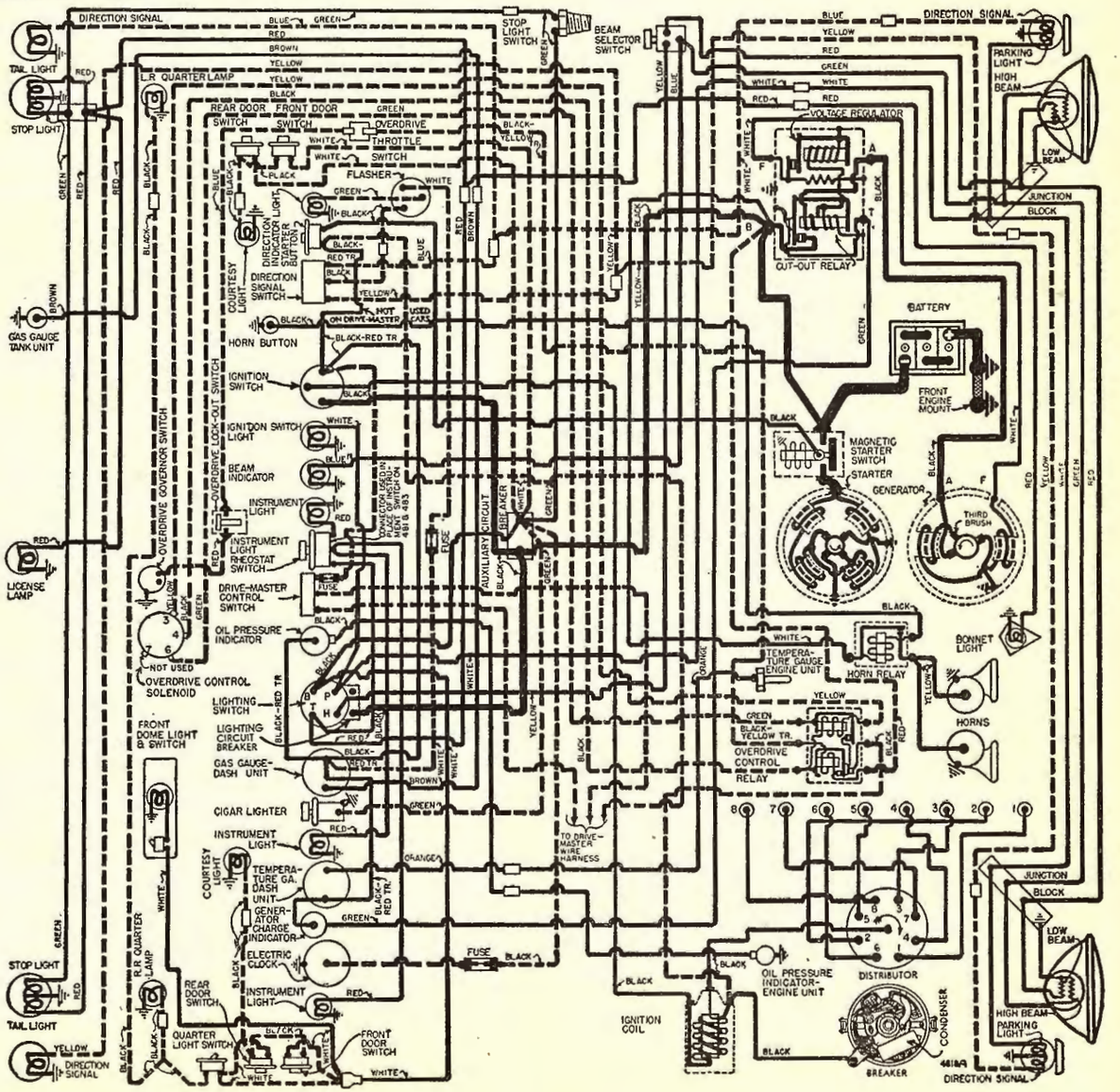

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advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGT-4204A-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
2°	4°	10½"
4°	8°	11⅝"
6°	12°	12⅝"
8.5°	17°	14"

Vacuum Advance—IGT-4204B-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	12½"
1°	2°	13¼"
2°	4°	14"
3°	6°	14¾"
4°	8°	15¾"

Distributor Removal: On right side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

IGNITION TIMING

Std. Setting.....At Top Dead Center
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Flywheel Mark—"UDC-1/" (#1 and #8 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark (opening behind starter).
NOTE—Early flywheels marked "UDC-1-8/", later flywheels marked "UDC-1/".
Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.
Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 600 RPM., adjust distributor (as directed above) until mark lines up with lower edge of opening.
Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**

CARBURETOR

(1948-49) Carter WDO, No. 648S. (Casting No. 542). 1¼" dual barrel downdraft type with Carter Climatic Control.
See Carburetor Section for complete data.

►**ACCELERATION "STUMBLE" CORRECTION**—*See "Carter WDO" in Carburetion Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump: *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Dual (WDO) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.

Automatic Choke: Carter Climatic Control (Dual).
See Carburetion Equipment Section for complete data.
Setting—Coil housing centered (at index).

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Optl. oil bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.

Fuel Pump (std.): AC Type AH No. 1539109.
Optl. (Fuel-&-Vacuum)—AC Type AJ No. 1539108.
Replacement Pump—No. 584 (for AH), 583 (AJ).
Pressure—(Carter) 4-5 lbs., (AC)—3-4 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 42120 ('48-49 Super), 42135 ('48-49 Commander).
Tank Unit—K-S No. 41765 ('48-49).
See Carburetion Equipment Section for complete data.

BATTERY

National S17-2HF, 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

STARTER

Auto-Lite Model MCL-6006. Armature MCH-2023.
Drive—Bendix No. A-1806. Inboard Barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Removal: On left front face of rear motor support. To remove, take out flange mounting bolts.

Starting Switch: Auto-Lite Magnetic type SS-4001 on starter with pushbutton (Hudson No. 300646) on instrument panel. Operative only with ignition "on" (clutch disengaged on Vacumotive or Drive-Mstr).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature GDZ-2006F. Third brush control with voltage regulation.
Maximum Charging Rate—43 amperes (Cold), 37 amperes (Hot), at approx. 35 MPH. Ground "F" terminal when checking generator output.
Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Adjust 3rd brush.

Cold		**Performance Data**	Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amps. at 6.0 volts.

Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp screws and nuts.

Belt Adjustment: ¾" belt deflection between generator and pump. Loosen clamp, swing generator out.

REGULATOR

Auto-Lite Model VRR-4001A. Voltage type.
NOTE—Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-6.6 volts.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.1-7.4 volts at 70°F.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—
See Electrical Equipment Section for complete data.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Contact Gap—.012" min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—
See Electrical Equipment Section for complete data.

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".

Direction Signal: Optl. ***See Electrical Equipment Section.***
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Door Switch—Hudson No. 300796.
Front Dome Light—Hudson No. 211312.
Rear Quarter Pillar—Hudson No. 160091.
Stop Light—Auto-Lite 100810K.
Direction Signal—Hudson No. 300875 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.

FUSES: Electric Clock—3 ampere. Behind clock.

Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.

Weather Control—14 ampere. On heater.

Drive-Master—15 ampere (supersedes 10 ampere type used on 1948 & early 1949 cars). On back of Drive-Master Control Switch.

Overdrive—30 ampere. In insulated fuse holder in overdrive relay feed wire on left front side of dash.

►*OVERDRIVE FUSE INSTALLATION NOTE*—This fuse not used on 1948 & early 1949 cars but should be installed if damage caused by short-circuits.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on instrument panel (to left of gas gauge). Should light with ignition on, go out as soon as engine started.
See Electrical Equipment Section for complete data.

HORNS: Sparton or Auto-Lite Model HW-4021 (Low HW-4022 (High). Dual horns operated by relay.
Air Gap—.027-.029" for high pitch (short horn), .032-.034" low pitch (long horn).

Horn Relay: Hudson No. 164401. On engine dash.
Contacts Close—3 volts min., 4 volts max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. 8 cylinder, "L" head type.

Bore—3". *See "Original Bore & Pistons" in Hudson Special Data.*
Stroke—4½".
Displacement—254 cubic inches. **Rated HP**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio (Std.)—6.50-1, cast iron head.
Compression Ratio (Optl.)—7.00-1, aluminum head.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CYLINDER HEAD DIAGRAM: *See Hudson Shop Notes.*

OIL PAN REMOVAL: *See Hudson Shop Notes.*

ENGINE REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*

PISTONS: Aluminum alloy, Cam ground, T-slot type.
Weight—10¼ ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above or below.
Clearance—.002-.0025" (skirt).
See "Original Bore & Pistons" in Hudson Special Data.

Replacement Pistons: *See Hudson Shop Notes.*

Fitting New Pistons: Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888-A Piston Feeler Scale to measure pull.

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.004-.009"	.001"
Oil (upper)	3/16"	.004-.009"	.001"
Oil (lower)	5/32"	.004-.009"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.

Replacement Rings: *See Hudson Shop Notes.*

PISTON PIN: Dia.—.7497-.750". **Lgth.**—2.4375". Floating type with diamond-drilled pin holes in piston and bronze bushing (with oil grooves at sides) in connecting rod. Lock ring used at each end of pin.
Pin Fit in Piston—.0000-.0003" at 70°F., or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.

Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8 3/16".
Weight—31.36 ozs. (with bearings).
Crankpin Journal Diameter—1.935-1.936".
Lower Bearing—Babbitt-lined, spun type.
Clearance—.0003-.0006". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or caps. Palnuts used on bolt nuts.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Rods: Std. size and .010" undersize.

Installing Rods: Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.

►**INOPERATIVE VIBRATION DAMPENER (Causing Engine Roughness at 24-26 MPH.)**—*See "Vibration Dampener" in Hudson Special Data.*

►*CAUTION—Crankshaft not interchangeable with earlier 8 cylinder shaft. 1948-49 shaft longer at rear end between oil slinger and flywheel flange.*

Journal Diameter—#1, 2.279-2.280"; #2, 2.311-2.312"; #3, 2.341-2.342"; #4, 2.373-2.374"; #5, 2.404-2.405".
Bearing Diameter—#1, 2.2805-2.2815"; #2, 2.3125-2.3135"; #3, 2.3425-2.3435"; #4, 2.3745-2.3755"; #5, 2.4055-2.4065".
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearing shells retained by brass screws.*
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Bearings: Reamed bearings furnished standard size and .010" Undersize. Unfinished bearings also supplied. *For Line-Reaming of Unfinished Replacement Bearings, see "Crankshaft & Main Bearings" in Hudson Shop Notes.*

End Thrust: Taken by center (#3) bearing. Replace bearing if endplay excessive.
Endplay—.006-.012".

CAMSHAFT: Five bearing type. Helical gear drive.
Bearing Diameter—#1, 2.028-2.030"; #2, 1.997-1.999"; #3, 1.965-1.967"; #4, 1.9345-1.9365"; #5, 1.497-1.499".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit and line ream to .001" larger than individual camshaft journals.

►*CAUTION*—Install all bearings with notch at top.

End Thrust: Bakelite thrust washer between gear and crankcase. Spring loaded button in front end of camshaft bears against hardened plate on gear cover.

Timing Gears: Crankshaft gear Cast-iron, camshaft gear Aluminum. Teeth have 20° pressure angle and are slightly crowned for quiet operation.
Identification of Gears—Figure "20" on front face of gears (crankshaft gear also marked "FRONT").
Replacement Gear Caution—Camshaft gear not furnished singly (set only). Crankshaft gear furnished singly or in matched set.
Backlash—.002-.004".

Camshaft Setting: Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 1/2"	.3402-.3412"	5.094"
Exhaust	1.380"	.3402-.3412"	5.094"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.003-.005"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable type pressed in block.
Guide Removal & Installation—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-3 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122 to remove carbon and scale out of guides (pay particular attention to carbon in counterbore at top of exhaust guide).

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	46 lbs.	2"
Valve Open	80 lbs.	1.656"

NOTE—Reject springs if pressure less than 34 pounds. Free length 2.343".

Valve Lifters: Roller shoe type, fitted in removable guides in cylinder block.

VALVE TIMING

Tappet Clearance: .008" Int., .010" Exh. at normal operating temperature. *This setting supersedes earlier data.*
NOTE—Removable apron in right front fender.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC.
Above figures correct with .010" tappet clearance.
Valve Timing Check—Adjust #1 intake tappet to .010" hot. Insert .002" feeler gauge between valve and tappet and turn engine in direction of rotation until exhaust valve begins to close, then continue

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to turn engine until a slight drag is felt on feeler gauge. The first of the five timing marks on flywheel (the one furthest from UDC mark) will be 9/16" above lower edge of opening in engine plate. One tooth out of time is equivalent to approximately 1½" on flywheel. Reset valve tappet clearance to .008" hot.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.

►**Oil Leakage (through machining locating hole in crankcase flange) Correction**—*See "Oiling System" in Hudson Special Data.*

►**Oil Baffle Installation (for improved engine lubrication)**—*See "Oiling System" in Hudson Special Data. NOTE*—This oil baffle installed on late 1949 & 1950 cars.

Crankcase Capacity—9 quarts.

Oil Filling Note—Whenever pan removed, install 2 quarts in upper tray before pan installed, then 7 quarts through oil filler after pan in place on engine.

Oil Pan Removal: *See Hudson Shop Notes.*

Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure indicator below).

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. *See Electrical Equipment Section for complete data.*

Checking Oiling System:—*See Hudson Shop Notes.*

Crankcase Ventilation: Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Cooling System: Positive circulation with pump on front of engine and by-pass type thermostat.

Capacity—18 quarts.

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.

See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.

Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge: King-Seeley Electric.

Dash Unit—K-S 42125 ('48-49 Super), 42140 ('48-49 Com'dre), 42918 (All 1950).

Engine Unit—K-S No. 41085.

See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil. 10" type used on all models.

See Clutch Section for complete data.

Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Clutch Oil Servicing: *See Hudson Special Data.*

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.

See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.65:1 (Std.) 1948-49, 1.82:1 (cars with Drive-Master 1948-49) and all 1950 cars. NOTE—1.65 ratio discontinued in production and only 1.82 ratio gears furnished.

►**Transmission Main Drive Gear Stop Ring Production Change**—New Main Drive Gear with Stop Ring used on 1.65-1 Ratio Transmissions beginning Dec. 29, 1948 (after first 22645 "490 Series" cars) and on other transmissions after Jan. 18, 1949, to correct overshift in high gear position resulting in premature wear of Shift Sleeve & Fork.

See "Hudson Transmission" in Transmission Section for Stop Ring installation.

►**High Gear Overshift Correction (1948 & Early 1949 Cars)**—See Main Drive Gear Stop Ring Production Change above for correction of overshift in high gear resulting in wear of Shift Sleeve & Fork.

See Transmission Section for complete data.

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.

See Transmission Section for complete data.

►**Drive-Master Fuse Change**—15 ampere fuse, No. 71406, used on late 1949 & 1950 cars. **Replace previous type 10 ampere fuse with new 15 ampere fuse on earlier cars.**

Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.

See Transmission Section for complete data.

OVERDRIVE

Warner Model AS2-R9B (1948), Model AS1-R10D (1949)—Optl. equip. used with the Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down."

See Transmission Section for complete data.

►**OVERDRIVE FUSE INSTALLATION**—On 1948 & early 1949 cars without overdrive fuse, 30 ampere fuse (in Holder Assy. 302566) should be connected in overdrive circuit at regulator "B" terminal. **Install this fuse in all instances where short-circuits have caused damage to relay or solenoid.**

Overdrive Fuse—30 ampere. In lead from regulator "B" terminal on left front side of dash. NOTE—See fuse installation note above for first cars where fuse not used.

Overdrive Solenoid—Hudson No. 301757.

Lock-Out Switch—Hudson No. 301755.

Throttle Switch—Hudson No. 164438.

Governor—Hudson No. 165829 (standard), Hudson No. 165831 (cars with Drive-Master).

Relay—Hudson No. 165826. On left fender shield.

Removal: Same as standard transmission removal (above) except that overdrive control cable and wiring must also be disconnected.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.

See Universals Section for complete data.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball

bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratios	Std.	Optl.
1948-49 Std. & Drive-Master	4.1-1	4.59-1
1948-49 With Overdrive	4.95-1	4.1-1

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets on cross member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear end of springs, slide axle assembly out toward rear of car.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	Front	Rear
Light Scale		
Monroe	300350	300351
Delco	301240	301241
Heavy Scale		
Monroe	301767	301768
Delco	301769	301770
Extra Heavy Scale		
Delco	301637	301638

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.

See Front Suspension Section for complete data.

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe In—1/32" ± 1/32". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders Diam. front wh'l. 1⅛", rear 15/16".

Drums—11" centrifuse type.

Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).

Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.

See Brake Section for complete data.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door hinge pillar post and stamped vertically on upper right front end of block. 1951 model designation (4A) appears only in the separate space above the serial number.

1950 Numbers—500101 Up.

Identification—First three figures of number indicate Series and Model: 500101 Pacemaker Six.

1951 Numbers—1001 Start. Cars will be consecutively numbered regardless of model or body type.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. min. Compression between cylinders should not vary more than 10 lbs.

VACUUM READING: 17-18" idling at 540-560 RPM. (Std.), 580-600 RPM. (Vacumotive, Drive-Master or Super-Matic).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs (Early 1950)—Champion J-7 (Cast-iron Head), H-10 (Aluminum Head). 14 mm.

DISTRIBUTOR: Breaker Gap—.020".
Cam Angle—38° Closed. 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC.1/" aligned with lower edge of rear engine support plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed (Std.)—540-560 RPM., or 7½-8 MPH.
Idle Speed (with Vacumotive, Drive-Master or Super-Matic Drive)—580-600 RPM.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
Accelerating Pump—Outer hole (Normal). Inner hole if less charge required.

Choke Setting: Centered at index.

Fuel Pump Pressure: (Carter)—3½-4½ lbs. at carburetor, **(AC)**—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type.

VALVE TAPPET CLEARANCE: .008" Int., .010" Exh., Hot.
NOTE—Self-locking tappet adjusting screws used. Remove apron in right front fender for access.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite No. CR-6012-A. Located on left side of engine above distributor.

Ignition Current—1.5-2.0 amperes idling, 5 stopped.

CONDENSER: Auto-Lite.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: (1950) Auto-Lite Model IAT-4002. (1951) Auto-Lite Model IAT-4009. New "Pivoted Breaker Plate" type with automatic advance, Vacuum Spark Control and Fuel Compensator adjustment.
See Electrical Equipment Section for data.

►**Breaker Plate Binding Correction on First Cars**—*See Electrical Equipment Section for data.*

Breaker Gap—.020".

Cam Angle—38° Closed, 22° Open.

Breaker Arm Spring Tension—17-20 ounces.

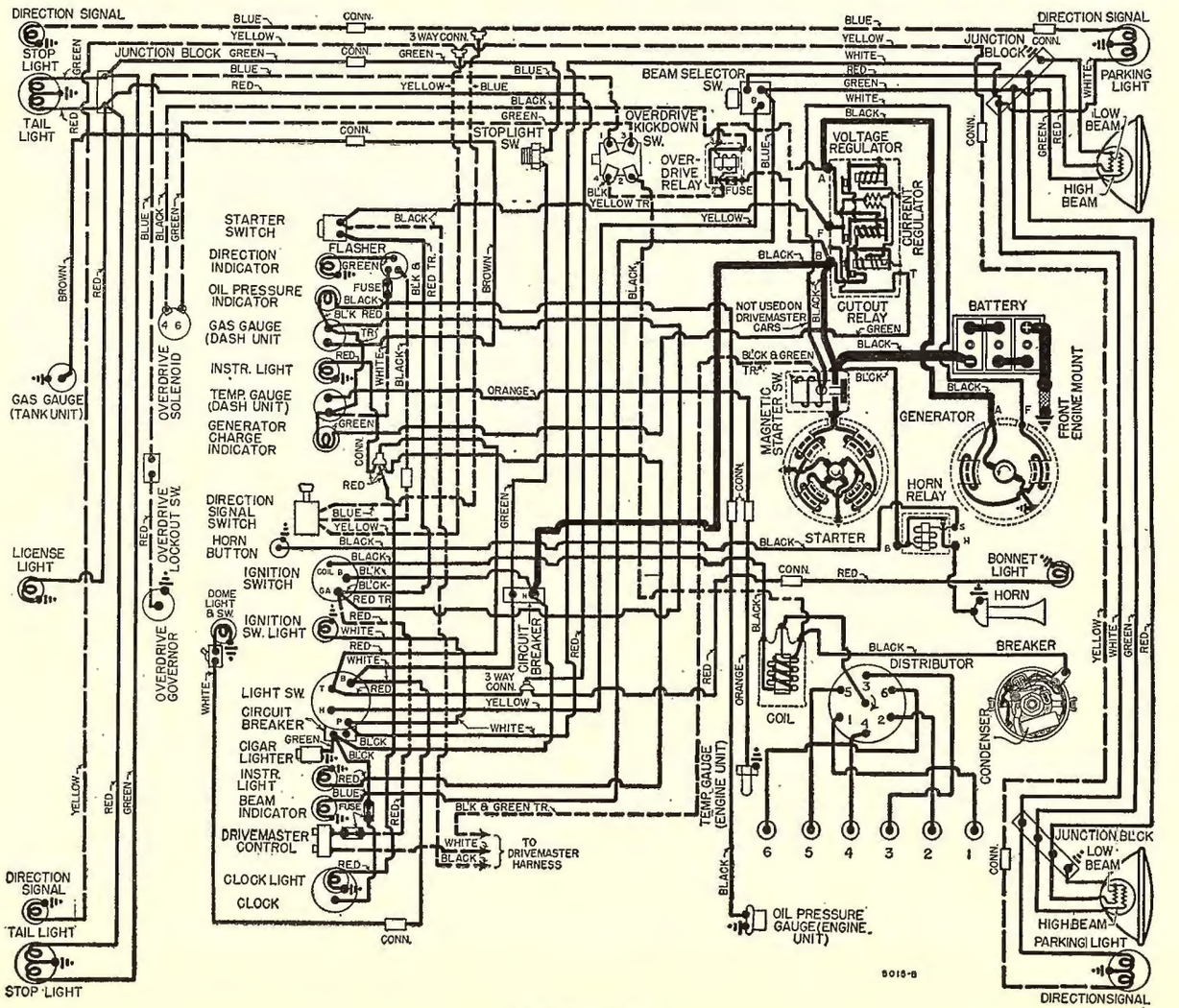
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	365	2	730
3	400	6	800
9	1090	18	2180
10	1200	20	2400

Fuel Compensator: 10° advance or retard adjustment at distributor. See Ignition Timing.

Vacuum Spark Control: Auto-Lite. Integral type. Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.



1950 MODELS

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
1°	2°	10"
3°	6°	11"
4°	8°	11½"
5°	10°	12"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

►***INSTALLATION CAUTION—If oil pump removed, refer to Oil Pump installation directions in Hudson Special Data.***

IGNITION TIMING

Std. Setting.....At Top Dead Center

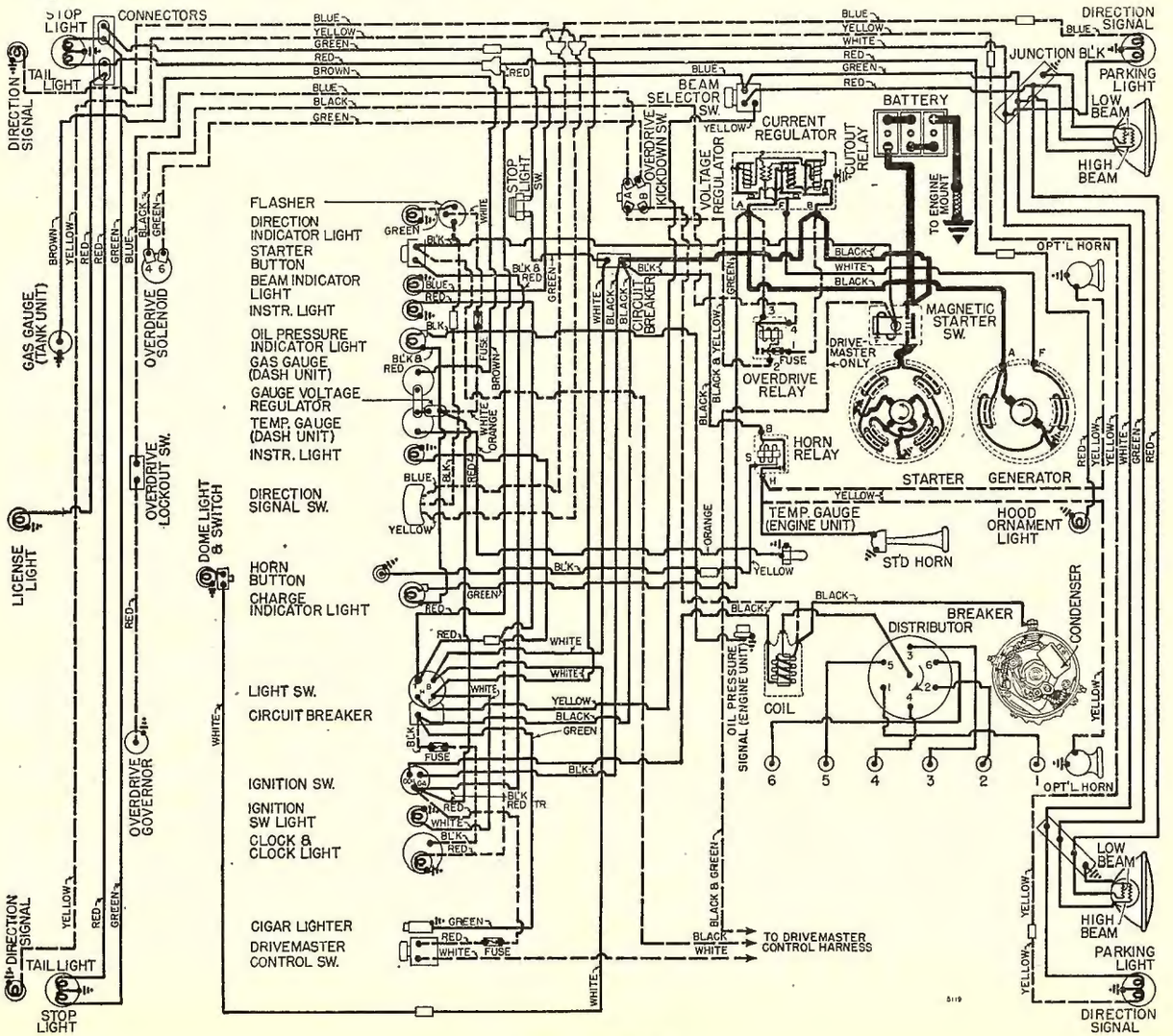
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

Flywheel Mark—"UDC.1/" (#1 and #6 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark. Visible in opening behind starter.

Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.

Timing (with Neon Timing Light)—Mark long line on flywheel with white chalk and loosen hold-down screw in distributor quadrant. Operate the engine at idle speed with timing light aimed at flywheel opening and rotate distributor until chalk mark lines up with pointer. Tighten quadrant screw.

Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (1st short line) ahead of "UDC-1/" flywheel mark.**



1951 MODELS

CARBURETOR

Carter WA1-749S. 1¼" single barrel downdraft type with Carter Climatic Control.
Casting No. on Flange—682.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—Center at index.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted Std., Oil-bath Optl.
Servicing (oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.
Servicing (oil-bath type)—Service same as oil-wetted type except that filter element not oiled and refill to level with engine oil.

Fuel Pump (Std.): Carter Model M729SZ.
Optl. (Fuel & Vacuum)—AC type "AJ".
Pressure—(Carter) 3½-4½ lbs. at carb. **(AC)** 3-4 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42916.
Tank Unit—K-S No. 42696.

Gasoline Gauge (1951): King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—K-S No. 45675.
Tank Unit—K-S No. 44513.
See Carburetion Equipment Section for complete data.

BATTERY

National Type OE-2L-100. 6 volt, 17 Plate, 100 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

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STARTER

Auto-Lite Model MZ-4159 (1950).

Auto-Lite Model MZ-4164 (1951).

Drive—Bendix No. A-1806. Inboard Barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.5	70
4.4 "	Lock	2.0	280

Removal: On left front face of rear motor support. To remove, take off Drivemaster mounting bracket bolts (on cars equipped with Drivemaster), disconnect linkage, and pull bracket out and forward, disconnect cables from solenoid switch, remove two starter mounting stud nuts and remove starter motor assembly.

Starting Switch: Auto-Lite No. SS-4001 ('50). SS-4030 ('51). On starter with pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Vacumotive Drive, Drive-Master or Super-Matic).

See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GDZ-6001B. Armature GGY-2006F. Two brush (shunt) type with voltage and current regulation. Ventilated.

Maximum Charging Rate—35 amperes at 8 volts.

Charging Rate Adjustment—None (see Regulator).

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amps. at 6.0 volts.

Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp screws and nuts.

Belt Adjustment: ¾" belt deflection between generator and pump pulleys. Loosen bolts, swing generator out.

REGULATOR

Auto-Lite Model (1950) VRP-6002A, (1951) VRP-6101A. Voltage and Current regulators.

NOTE—VRP-6002A Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control. VRP-6101A Cutout Relay does **not** have extra set of points. "Teleflash" Indicator light is operated from the "A" terminal on the regulator.

NOTE—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Contact Gap—.012" Min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section for complete data.***

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Contact Gap—.012" min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section for complete data.***

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on."

Direction Signal: ***Optl. See Electrical Equipment Section.***
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.

MISC. ELECTRICAL

See 1950-51 Hudson Six Pages for Circuit Breakers, Generator Charge & Oil Presure Signals, and Horns.

ENGINE

ENGINE SPECIFICATIONS: Own Make. Six cylinder, "L" head type.
Bore—3 9/16". ***See "Original Bore & Pistons" in Hudson Special Data.***
Stroke—3 7/8".
Displacement—232 cu. ins. **Rated HP**—30.4.
Developed Horsepower—112 at 4200 RPM.
Compression Ratio (Std.)—6.70-1 cast-iron head.
Compression Ratio (Optl.)—7.20-1 aluminum head.
Compression & Vacuum Reading—***See Tune-Up.***

ORIGINAL BORE & PISTONS: ***See Hudson Special Data.***

ORIGINAL BEARING SIZES: ***See Hudson Special Data.***

TIGHTENING TORQUES: ***See Hudson Special Data.***

CYLINDER HEAD: ***CAUTION—NOT INTERCHANGEABLE with other engines.***

►**Head Diagram & Tightening Torques**—***See Hudson Special Data.***

OIL PAN REMOVAL: ***See Hudson Special Data.***

PISTONS: Aluminum alloy, Cam ground, T-slot type.

►***CAUTION—Pistons NOT INTERCHANGEABLE with other engines*** (greater height from pin hole to top—2.310-2.314" on Pacemaker, 2.060-2.064" other Sixes).
Weight—18⅛ ozs. (stripped). **Length**—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0025" to .002" (skirt).
See "Original Bore & Pistons" in Hudson Special Data.
Piston Fitting—Insert piston in cylinder with .002" feeler gauge. Using Piston Feeler Scale (Tool J-888), pull to withdraw feeler, 3 to 4 lbs.

Replacement Pistons: ***See Hudson Special Data.***

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap.

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.006-.014"	.001"
Oil (upper)	3/16"	.006-.014"	.001"
Oil (lower)	5/32"	.006-.014"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.

Replacement Rings: ***See Hudson Special Data.***

PISTON PIN: Diameter—.9684-.9687". **Lgth.**—2.9375". Floating type with diamond-drilled pin holes in piston and rolled steel babbitt faced bearing in connecting rod. Pin retained by lock ring at each end.
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—Hand push fit at 70°F.

Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8⅛".
NOTE—Connecting Rods are interchangeable with other Six Cylinder engines.
Weight—34.24 ozs. (without bearings).
Crankpin Journal Diameter—2.1244-2.1254".
See "Original Bearing Size" in Hudson Special Data.
Lower Bearing—steel-backed, babbitt-lined type with upper and lower halves interchangeable. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Bearings: Large std., small std., .010" US.

Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
NOTE—Crankshaft not interchangeable with other Six Cylinder engines.
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".
See "Original Bearing Size" in Hudson Special Data.
Bearings—Removable steel-backed, babbitt-lined type. Upper and lower halves of each bearing are interchangeable.
Clearance—.0005-.0015".
Front & Rear Oil Seals—***See "Crankshaft & Main Bearings" in Hudson Special Data.***

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft by using Tool KMO-734.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Bearings: Std., optl. std., .010" US.

End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive.
Endplay: .003-.009".

CAMSHAFT: 4 bearing type. Non-adjustable chain.

ENGINE

CONTINUED FROM PRECEDING PAGE

Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-1.4975".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Finished-reamed or unfinished.
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than individual camshaft journals.
►*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks.

Timing Chain: Morse. 60 links. ⅜" pitch. Width 1¼".
Chain Tension Shoe—Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC.) NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 53/64"	.3412-.3422"	5.730"
Exhaust	1 9/16"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides as follows:
Intake Guide—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-.3442".
Exhaust Guides—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442". Counterbored 9/16" deep to diameter of 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	77 lbs.	2 3/16"

NOTE—Reject springs if pressure less than 60 lbs. Free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out.
NOTE—Inner sides of guide clamps should be in full contact at all points with matching flat surfaces of front face of each pair of tappet guides within .0015".
Clearance—.00075-.0015".
Replacement Lifters—.002", .004", .010" Oversize.

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot. Self-locking tappet screws are used. Remove right front fender apron for access to valve compartment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exhaust Valves—Open 53°18' BLDC. Close 7°42' ATDC. These figures correct with .010" tappet clearance, Hot or .012" Cold.
Valve Timing Check—Remove front tappet cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately ⅝" above index of timing hole in rear engine support plate. Reset tappet clearance to .008" Hot, or .010" Cold.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, piston pins, valve lifters, and timing chain.
Crankcase Capacity—7 qts. (refill), 7½ qts. (dry).
Normal Oil Pressure—40 lbs. at 30 MPH. No gauge used. See Oil Pressure Indicator below.
Oil Pressure Relief Valve—Non-adjustable release valve and spring under plug on left side of engine ahead of starter.

Oil Pan Removal: *See Hudson Special Data.*

Oil Pump: Rotor type consisting of inner and outer rotor, shaft, body, and cover. Angle mounted on right side of crankcase and driven from camshaft.

Removal & Overhaul—*See "Oil Pump" in Hudson Special Data.*

Oil Pressure Indicator: Hudson Signal Light with Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—Carter No. A815S or King-Seeley No. 47100 (Hudson No. 300828). On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed (no adjustment).
See Electrical Equipment Section for complete data.

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.
Servicing—Wash filter element in gasoline and re-oil when changing oil.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and brass water distribution tube in cylinder block.
Capacity (1950)—18 qts. 19 qts. with heater.
Capacity (1951)—18½ qts. 19½ qts. with heater.
Pressure Cap—Optl. AC #850005 or Stant #AAX-0417.

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42918.
Engine Unit—K-S No. 41085.

Temperature Gauge (1951): King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—K-S No. 45675.
Engine Unit—K-S No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Own Make—Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil. 9" type used on standard models, 10" type used with Drive-Master.
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 9" (Std.), 10" (With Drive-Master), 90 corks (9"), 108 corks (10"), .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Clutch Oil Servicing: *See Hudson Special Data.*

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over 1/3 revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

STANDARD

Own Make—All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
Second Speed Ratio—1.82:1.
See Transmission Section for complete data.

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.
►*SLIPPING OUT OF HIGH & SECOND GEAR CORRECTION—See Transmission Section for complete data.*

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross-member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Re-

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move breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening (NOTE—Hoist J-1502 can be used to lift transmission out).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.

See Transmission Section for complete data.

Drive-Master Fuse—15 ampere, Part No. 71406. Located in wiring circuit 6" from control switch.

Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

OVERDRIVE

Warner Type AS2-R10D (Early '50), AS3-R10D (Late '50), AS4-R10D (Late '50 & '51). (Models AS3,4 have centered ring gear). Optl. with Hudson Transmission. Part of Super-Matic Drive. Has simplified control (2-terminal solenoid, Relay & Throttle Kick-down Switch).

Removal: Same as standard transmission removal (above) except that overdrive control cable and wiring must also be disconnected.

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.

See Transmission Section for complete data.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**

Spicer No. 1268-102X.....**Intermediate**

Needle bearing type. Three used with intermediate universal to rear of propeller shaft center bearing.

See Universals Section for complete data.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross-members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratios	Std.	Optl.
Std. Transmission	4.1-1	4.55 or 3.82-1
With Drive-Master	4.1-1	4.55 or 3.82-1
With Overdrive	4.55-1	4.1-1
With Super-Matic	4.1-1	4.55-1

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets, on cross-member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear spring at axle housing, and at rear shackle, lower rear end of springs, slide axle out toward rear.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly.

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	Front	Rear
Light Scale		
Monroe	303060	300351
Delco	303062	301241
Heavy Scale		
Monroe	303061	301768
Delco	303063	301770
Extra Heavy Scale		
Monroe	302431	302431
Delco	303063	301770

APPLICATION NOTE—**Light Scale** front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.

See Front Suspension Section for complete data.

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe In—1/32" ± 1/32". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry—Inner wheel 30° .Outer 25°.

STEERING GEAR

Gemmer Model 335—"3-tooth" Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameters: Front wheel 1 1/16", Rear wheel 15/16".

Drums—11" centrifuse type.

Lining—Molded. Width 1¾" (front & rear). Length per shoe 11" (except rear secondary 11 1/16").

Clearance—.010" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand brake) linkage which causes rear wheel brakes to be applied mechanically by pedal if hydraulic system not operating.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

See Brake Section for complete data.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*

Windshield Wipers: Cable operated—Vacuum type. *See Miscellaneous Section for complete data.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door pillar post and stamped vertically on upper right front corner of block. Model designation (5A, 6A, etc.) on 1951 models appears only in the separate space above the serial number.

1950 Serial Number—Super 6, 501101 Up. Commodore 6, 502101 Up. First three figures of number indicate model.

1951 Serial Number—All Models, 1001 Up. Cars will be consecutively numbered regardless of model or body type.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs. min. at 125 RPM. but not less than 100 lbs. min. and not over 10 lbs. max. variation between cylinders.

VACUUM READING: 17-18" idling at 540-560 RPM. (Std.), 580-600 RPM. (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".

Plugs (Early 1950)—Champion J-7 (Cast-iron Head), H-10 (Aluminum Head). 14 mm.

Plugs (1950-51)—Champion H-8 14 mm. (all Heads).

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".

Cam Angle—38° ('50), 39° ('51) Closed.

Breaker Arm Spring Tension—17-20 ounces.

Automatic & Vacuum Advance—*See Ignition.*

Condenser Capacity—.25-.28 microfarads ('50). .20-.25 microfarads ('51).

IGNITION TIMING: TDC (top dead center).

Timing Procedure—See Ignition Timing.

Flywheel Mark—"UDC-1/" aligned with pointer in rear engine support plate opening behind starter.

Octane Selector Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:

Idle Setting: (WDO-647SA—Early 1950)—1¼-1¾ turns open, **(WGD-776S—1950-51)**—1-1½ turns open. Turn screws out for richer mixture.

Idle Speed: (Std.)—540-560 RPM. or 7½-8 MPH.

Vacumotive or Drive-Master—580-600 RPM.

Hydra-Matic Drive—490-510 RPM.

Float Level—3/16". Measured from top of float to gasket seat (machined surface) on bowl cover with needle valve seated. **776S NOTE**—Measured from center highest point of float.

Accelerating Pump—Outer hole, max. (Normal). **776S Note**—No seasonal pump adjustment.

Choke Setting: Coil housing 1 point lean (WDO), 2 points lean (WGD).

►*CAUTION*—2 point setting on WGD Carb. supersedes original setting of 1 point lean.

Fuel Pump Pressure: (Carter)—3½-4½ lbs. at carburetor. **(AC)**—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Int., .010" Exh. Hot. NOTE—Self-locking tappet adjusting screws used. Remove apron in right front fender for access.

Valve Timing Check—See Valve Timing.

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite No. CE-6006A (Early), CR-6012A (Late '50 & '51).

Location—Left side of engine above distributor.

Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite IG-3927G ('50).

Capacity—.25-.28 microfarads ('50). .20-.25 microfarads ('51).

DISTRIBUTOR: (1950) Auto-Lite Model No. IGS-4213A-1. (1951) Auto-Lite Model No. IAT-4009A. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.

NOTE—IAT-4009A new "Pivoted Breaker Plate" type.

See Electrical Equipment Section for complete data.

Breaker Plate Identification—Number stamped on plate (at pivot arm pin) indicates maximum vacuum advance.

Breaker Gap—.020". Limits .019-.022".

Cam Angle—38° ('50), 39° ('51) Closed. 22° Open.

Breaker Arm Spring Tension—17-20 ounces.

Rotation—Clockwise viewed from above.

Automatic Advance IGS-4213A-1, IAT-4009A

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	500	0	1000
1	670	2	1340
4	1150	8	2300
8	1825	16	3650
9	2000	18	4000

Fuel Compensator: 10° advance or retard adjustment at distributor. *See Ignition Timing.*

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IGS-4213A-1, IAT-4009A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	13⅜"
1°	2°	14"
2°	4°	14¾"
3°	6°	15⅜"
3.75°	7.50°	16"

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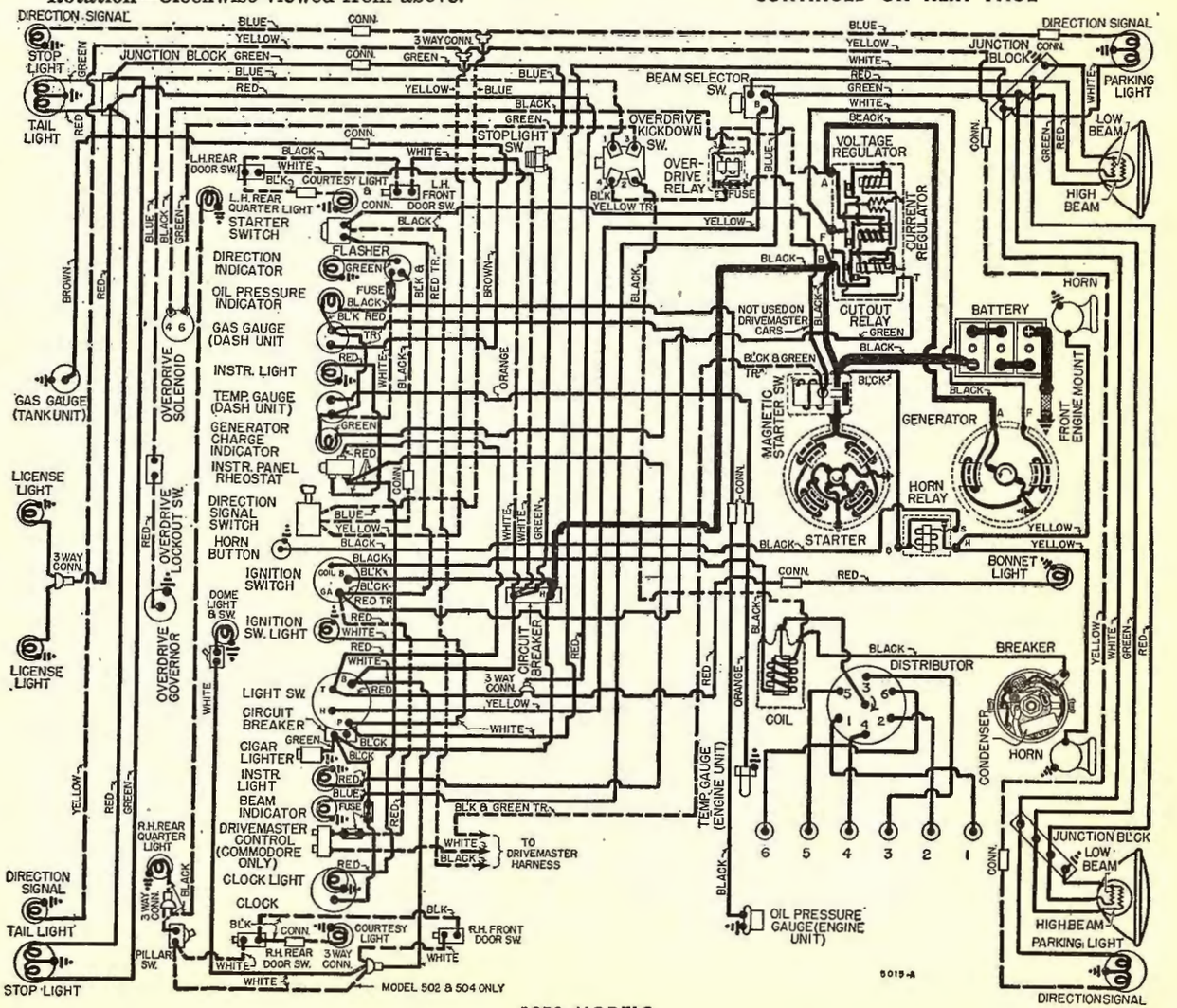

1950 MODELS

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Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

►***INSTALLATION CAUTION—If oil pump removed, refer to Oil Pump Installation in Hudson Special Data.***

IGNITION TIMING

Std. Setting ..... ***At Top Dead Center***

NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

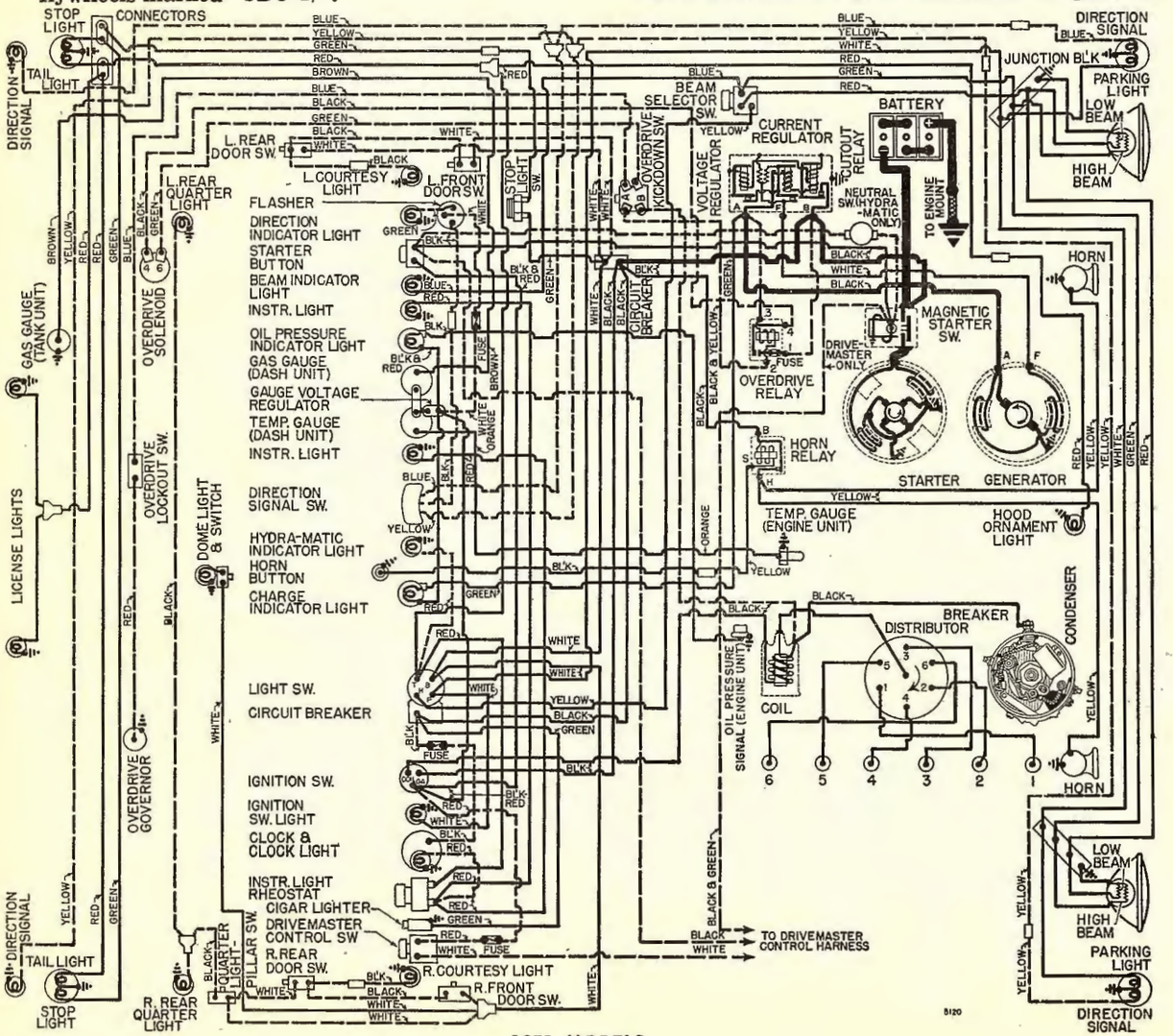
Flywheel Mark—"UDC-1/" (#1 and #6 piston top dead center position) with 4 short marks (1¼" apart) ahead of this mark (opening behind starter).

NOTE—Early flywheels marked "UDC-1-6/", later flywheels marked "UDC-1/".

Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.

Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 800 RPM., adjust distributor (as directed above) until mark lines up with lower edge of opening.

Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**



1951 MODELS

CARBURETOR

(1950 Early) Carter WDO-647SA.
(1950 Late and 1951) Carter WGD-776-S. 1¼" dual downdraft with Carter Climatic Control.
Casting No. on Flange (647SA)—542.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

►***776S METERING ROD & FLOAT VALVE PRODUCTION CHANGE—See Carburetor Section for complete data.***

Fast Idle: Carter Dual (WDO) or (WGD) Carburetor type.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Setting (WGD Carb.)—.026" throttle opening with choke valve closed. Check with thermostatic coil housing, gasket, and baffle plate removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" adjust by bending connector rod at lower angle.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.
Setting—Set coil housing 1 point lean (WDO), 2 points lean (WGD).

►***WGD CAUTION***—2 point lean setting supersedes original setting of 1 point lean.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Optl. oil bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.
Fuel Pump (Std.): Carter Model M729SL or SZ.
Optional (Fuel & Vacuum)—AC Type AJ-1539108.
Replacement Pumps—No. 583 (AJ).
Pressure—(Carter) 3½-4½ lbs., (AC) 3-4 lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge (1950): King-Seeley Electric.
Dash Unit—K-S No. 42916, **Tank Unit** No. 42696.
Gasoline Gauge (1951): King-Seeley "CV" (Constant Voltage).
Dash Unit—K-S No. 45675, **Tank Unit** No. 44513.
See Carburetion Equipment Section for complete data.

BATTERY

National OE-2L-100. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

STARTER

1950—Auto-Lite MZ-4159, Armature MZ-2312.
1951—(Except Hydra-Matic) Auto-Lite No. MCH-6109. Armature No. MCH-2023.
1951—(Hydra-Matic) Auto-Lite No. MCH-6107. Armature No. MCH-2028.
Drive—Bendix No. A-1806 (on MZ-4159, MCH-6109 Starters). Bendix No. A-1792 (on MCH-6107 Starter). A-1806 is Inboard Barrel type. A-1792 Outboard Barrel type.
Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 140-160 amperes at 120 RPM. (warm engine).

Performance Data—MZ-4159

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Performance Data—MCH-6107, 9

0 ft. lbs.	4300	5.0	65
4.0 "	Lock	2.0	335

Starting Switch—Auto-Lite No. SS-4001. On left front fender splash apron, with pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Vacumotive Drive, Drive-Master or Super-Matic). Hydra-Matic selector lever must be in neutral to operate starter. *See Electrical Equipment Section for complete data.*
Removal: On left front face of rear motor support. To remove, take off Drivemaster mounting bracket bolts (on cars equipped with Drivemaster), disconnect linkage, and pull bracket out and forward, disconnect cables from solenoid switch, remove two starter mounting stud nuts and remove starter.

GENERATOR

Auto-Lite GDZ-6001B, Armature GGY-2006F.
Two brush (shunt) type with voltage and current regulation. Ventilated.
Maximum Charging Rate—35 amperes at 8 volts.
Charging Rate Adjustment—None (see Regulator).

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amps. at 6.0 volts.
Belt Adjustment: ¾" deflection between generator and pump. Loosen clamp, swing generator out.

REGULATOR

Auto-Lite Model VRP-6002A ('50), VRP-6101A ('51). Vibrating Voltage and current regulators.
►*NOTE*—VRP-6002A Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control. VRP-6101A Cutout Relay does **not** have extra set of points. "Teleflash" indicator light is operated from the "A" terminal on the regulator.
►*NOTE*—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for other temperatures.
Contact Gap—.012" Min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Contact Gap—.048-.052" contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".
Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Direction Signal—Hudson No. 305081 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting—Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.

FUSES: Electric Clock—3 ampere. Behind clock.
Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.
Drive-Master—15 ampere. In Drive-Master control switch lead on instrument panel.
Overdrive—30 ampere. In insulated fuse holder in overdrive relay feed wire on left front side of dash.

GAUGE VOLTAGE REGULATOR: King-Seeley—Consists of a thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ignition switch, and the gauge circuits. See Wiring Diagram.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). *See Electrical Equipment Section for complete data.*

OIL PRESSURE SIGNAL: Red indicator on instrument panel (to left of gas gauge). If pressure drops below approximately 13 lbs., red dash signal lights.
Oil Pressure Warning Switch—Carter No. A815S or King-Seeley No. 47100, Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. Not adjustable.

HORNS: Sparton or Auto-Lite Model HW-4021 (Low Pitch), HW-4022 (High Pitch). Dual horns.
Air Gap—.027-.029" (high pitch), .032-.034" (low pitch).

ENGINE

ENGINE SPECIFICATIONS: Own make. 6 cylinder, "L" head type.

Model	Bore	Stroke	Displacement
5A, Super	3 9/16"	4⅜"	262 Cu. In.
6A, Commodore	3 9/16"	4⅜"	262 Cu. In.
7A, Hornet	3 13/16"	4½"	308 Cu. In.

Rated Horsepower—(5A Super & 6A Commodore) 30.4. (7A Hornet) 34.9.
Developed Horsepower—(5A Super & 6A Commodore) 123 at 4000 RPM., (7A) 145 at 3800 RPM.

Compression Ratio	Standard	Optional
5A, 6A	6.7-1	7.2-1
7A	7.2-1	6.7-1

NOTE—6.7-1 ratio is for cast-iron head. 7.2-1 ratio is for aluminum head.
Compression and Vacuum Reading—*See Tune-Up.*
ENGINE REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*
CYLINDER HEAD & TIGHTENING TORQUE: *See Hudson Special Data.*
►*1951 CYLINDER HEAD & GASKET CHANGE*—New cylinder head and/or gasket not interchangeable with earlier 6 cyl. engines. Impaired cooling will result if incorrect head or gasket used.
OIL PAN REMOVAL: *See Hudson Special Data.*
PISTONS: Aluminum Alloy, Cam Ground, "T" Slot.
Original Bore & Pistons—*See Hudson Special Data.*
CAUTION: DIFFERENT PISTONS used early 1950 cars. New type used in production beginning Car Serial 50163216, Super & Commodore.
CAUTION—New type pistons must not be used for replacement of previous type except in sets.
Weight—(5A, 6A) 18½ ozs., (7A) 18⅝ ozs. (stripped.)
Length—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0025 "to .002" (skirt).
Piston Fitting—Insert piston in cylinder with .002" feeler gauge. Pull to withdraw feeler 3 to 4 lbs. using Tool J-888 Piston Feeler Scale to measure pull.
Replacement Pistons: *CAUTION*—Two different types required. *See Hudson Special Data.*
Installing Pistons: Slot away from camshaft.
PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap).

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.007-.012"	.001"
Oil (upper)	3/16"	.007-.012"	.001"
Oil (lower)	5/32"	.007-.012"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.
NOTE—7A top compression ring chrome-plated.
Replacement Rings: *See Hudson Special Data.*
PISTON PIN: Dia.—.9684-.9687". **Length**—2.9375".
Floating type with diamond-drilled pin holes in piston and rolled steel babbitt faced bearing in connecting rod. Pin retained by lock ring at each end.
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.
Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**
CONNECTING ROD: Length—8⅛".
Weight—34.24 ozs. (without bearings).
Crankpin Journal Diameter—2.1244-2.1254".
►*See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—Steel-backed, babbitt-lined type with upper and lower halves alike. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus ¼-⅓ turn.
Replacement Bearings: Furnished Std. ("Large" & "Small"), & .0005", .002", .010", .012" Undersize.
Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.
CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".
►*See "Crankshaft Size Code" in Hudson Special Data.*
Bearings—Removable steel-backed, babbitt-lined

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

upper and lower halves of each bearing alike.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft with Tool KMO-734.
Palnuts—Tighten finger tight, plus ⅓ turn.

Replacement Bearings: Furnished Std. & .001", .002", .010", .012" Undersize.

End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive. **Endplay**—.003-.009".

CAMSHAFT: 4 bearing type. Non-adjustable chain.
Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-1.4975".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit).
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than journals.

►*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks.

Timing Chain: Morse. 60 links, ⅜" pitch. Width—1¼".
Chain Tension Shoe—Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC). NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 53/64"	.3412-.3422"	5.730"
Exhaust	1 9/16"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—No valve inserts used. Stem clearance worn limit .005" max.

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides as follows:
Intake Guide—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-.3442" (.3437" preferred).
Exhaust Guides—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442" (.3437" preferred). Counterbored 9/16" deep to 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	77 lbs	2 3/16".

NOTE—Reject springs if pressure less than 60 lbs. Free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out. Service by installing oversize lifter.
NOTE—Inner sides of guide clamps should be in full contact at all points with matching flat surfaces of front face of each pair of guides within .0015".
Clearance—.00075-.0015".
Replacement Lifters—.002", .004", .010" Oversize.

VALVE TIMING

Tappet Clearance: Intake—.008" (Hot), .010" (Cold).
Exhaust—.010" (Hot), .012" (Cold).
Self-locking tappet screws are used. Remove right front fender apron for access to valve compartment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exhaust Valves—Open 53°18' BLDC. Close 7°42' ATDC. These figures correct with .010" tappet clearance Hot or .012" Cold.

Valve Timing Check—Remove front tappet cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately ⅝" above index of timing hole in rear engine support plate. Reset tappet clearance to .008" Hot, or .010" Cold.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, valve lifters and timing chain.

►**Oil Pump & Camshaft Gear Change**—Camshaft driving gear & mating oil pump gear have "Granoseal" finish to reduce wear (may be identified by black velvety appearance).
Crankcase Capacity—7 qts. (refill), 7½ qts. (dry).
Normal Oil Pressure—40 lbs. at 30 MPH. No gauge used. See Oil Pressure Indicator below.
Oil Pressure Relief Valve—Non-adjustable release valve and spring under plug on left side of engine ahead of starter.
Oil Pump: Rotor type consisting of inner and outer rotor, shaft, body, and cover. Angle mounted on right side of crankcase and driven from camshaft.

►*CAUTION*—New granoseal type oil pump gear must be installed when installing new camshaft.

Oil Pressure Indicator: Hudson "Teleflash" with Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—Carter No. A815S or King-Seeley No. 47100. Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. No adjustment. *See Electrical Equipment Section for data.*

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.
Servicing—Wash filter element in gasoline and re-oil when changing oil.

COOLING

►*1951 CYLINDER HEAD AND GASKET CAUTION*—Impaired cooling will result if incorrect head or gasket used. 1951 cylinder head and gasket not interchangeable with earlier 6 cyl. engines.

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and brass water distribution tube in cylinder block.
Pressure Cap (1950)—AC No. 85005 or Stant No. AAX-0417.
Capacity—(1950) 19 qts. without heater, 20 qts. with heater. (1951) 18½ qts. without heater, 19½ qts. with heater.

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge (1950): King-Seeley electric type.
Dash Unit—K-S No. 42918, **Engine Unit** No. 41085.

Temperature Gauge (1951)—King-Seeley "CV" (Constant Voltage).
Dash Unit—K-S No. 45675, **Engine Unit** No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member) operating in Hudsonite oil. 10" type used on all models.
See Clutch Section for complete data.
Facings—Cork insert type. Inside diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

STANDARD

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
See Transmission Section for complete data.

►*SLIPPING OUT OF HIGH & SECOND GEAR CORRECTION—See Transmission Section for complete data.*

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross-member (CAUTION—use block of wood on jack to prevent damage

to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening. (NOTE—Hoist J-1502 can be used to lift transmission out).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control). *See Transmission Section for complete data.*

Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.

►**Drive-Master Fuse**—15 ampere, Part No. 71406. Located in wiring circuit 6" from control switch.

Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl. *See Transmission Section for complete data.*

OVERDRIVE

Warner Type AS2-R10D (Early '50), AS3-R10D (Late '50), AS4-R10D (Late '50 & '51). (Models AS3, 4 have centered ring gear). Optl. With Hudson Transmission. Part of Super-Matic Drive. Has simplified control (2-terminal Solenoid, Relay & Throttle Kick-down Switch). *See Transmission Section for complete data.*

Overdrive Relay—Hudson No. BT303107.

Throttle Switch—Hudson No. BT303254.

Overdrive Fuse—30 ampere. On fuse block on side of overdrive relay.

Removal: Same as standard transmission removal, except that overdrive control cable and wiring must be disconnected.

HYDRA-MATIC TRANSMISSION

Four speed planetary type automatic transmission and fluid coupling. *1951 MODELS*—Modulated pressure and hydraulically operated reverse mechanism. *See Transmission Section for complete data including Testing & Trouble Shooting.*

Lubrication—Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type "A".

Capacity—11 qts. (approx.). 12 qts. (after reassembly).

Checking Fluid Level—Operate engine at normal operating temperature. Manual control lever in "N" position. Hand brake on. Dipstick located under inspection cover placed on right side under floor mat. Oil level must be just to the full mark on the dip stick. *DO NOT OVERFILL.*

CAUTION—Do not check oil level when transmission temperature is excessively high and do not fill above "F" on dip stick (will cause foaming when hot).

Draining and Refilling—*See "Hydra-Matic Drive" in Transmission Section.*

Hydra-Matic Linkage Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

Removal—*See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.
See Universals Section for complete data.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

1950 Ratios:	**Std.**	**Optl.**
Std. & Drive-Master	4.1-1	4.55-1
With Overdrive	4.55-1	4.1-1
With Super-Matic	4.1-1	4.55-1
1951 Ratios:	**Std.**	**Optl.**
Std. Trans.	4.1-1	①4.55-1
With Overdrive	4.55-1	4.1-1
With Super-Matic Drive	4.55-1	4.1-1
With Hydra-Matic Drive	3.58-1	———

①—3.58-1 also on 7A Hornet model.

Backlash—.004-.006", Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets, on cross-member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear spring at axle housing, and at rear shackle, lower rear end of springs, slide axle out toward rear.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly.

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	**Front**	**Rear**
Light Scale		
Monroe	303060	300351
Delco	303062	301241
Heavy Scale		
Monroe	303061	301768
Delco	303063	301770
Extra Heavy Scale		
Monroe	302431	302431
Delco	301637	301638

APPLICATION NOTE—Light Scale front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer. *See Front Suspension Section for complete data.*

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe In—1/32" ± 1/32" measured at wheel rim. Center steering arm on frame must be at center of car. To adjust loosen clamps at ends of each tie rod and adjust tubes equally.

Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments. *See Steering Gear Section for complete data.*

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes. *See Brake Section for complete data.*

Wheel Cylinders—Diameters: Front wheel 1⅛", Rear wheel 15/16".

Drums—11" centrifuse type.

Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).

Clearance—.010" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating. *See Brake Section for complete data.*

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump. *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type. *See Miscellaneous Section for complete data.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: (1950-51) Serial Number stamped on plate on right front door hinge pillar post. (1950) Engine Number stamped on top of cylinder block between No. 1 and No. 2 exhaust manifold flanges, and (1951) vertically on upper right front of block. Model designation (8A) appears in separate space above the serial number.
1950 Serial Number—Super 8, 503101 Up. Commodore 8, 504101 Up. First three figures of number indicate model.
1951 Serial Number—Start 1001 Up.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs. min. at 125 RPM. Minimum 100 lbs. with not more than 10 lbs. variation between cylinders.

VACUUM READING: 18-21" idling at 540-560 RPM. (Std.), 580-600 RPM. (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs (Early 1950)—Champion J-7 (Cast-iron Head), H-10 (Aluminum Head), 14 mm.
Plugs (1950-51)—Champion H-8 14 mm. (all heads).

DISTRIBUTOR: Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° closed with .017" gap.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC-1/" aligned with pointer in rear engine support plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting—(648S) 1-1½ turns open. (773S) ½-1 turn open. Turn screw out for richer mixture.
Idle Speed (Std.)—540-560 RPM.
Vacumotive or Drive-Master—580-600 RPM.
Hydra-Matic Drive—490-510 RPM.
Float Level—(648S) 13/64", (773S) 3/16" measured from top of float to gasket seat (machined surface) on bowl cover with needle valve seated (invert to check). **773S Note**—measured from center highest point of float.
Accelerating Pump—(648S) Outer hole—Normal, Inner hole if less charge required. (773S) No seasonal adjustment.
Choke Setting: Centered (at index).
Fuel Pump Pressure: (Carter)—4-5 lbs., **(AC)**—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust at normal operating temperature.
NOTE—Remove apron in right front fender for access to valve compartment.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite CE-6006A (Early), CR-6012A (late).
Location—Right side of engine above distributor.
Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Auto-Lite No. IG-2671G.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGT-4204B-1. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.
Breaker Plate Identification—Number stamped on plate (opposite vacuum control unit), indicates maximum vacuum advance.
Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° closed with .017" gap.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance IGT-4204B-1

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

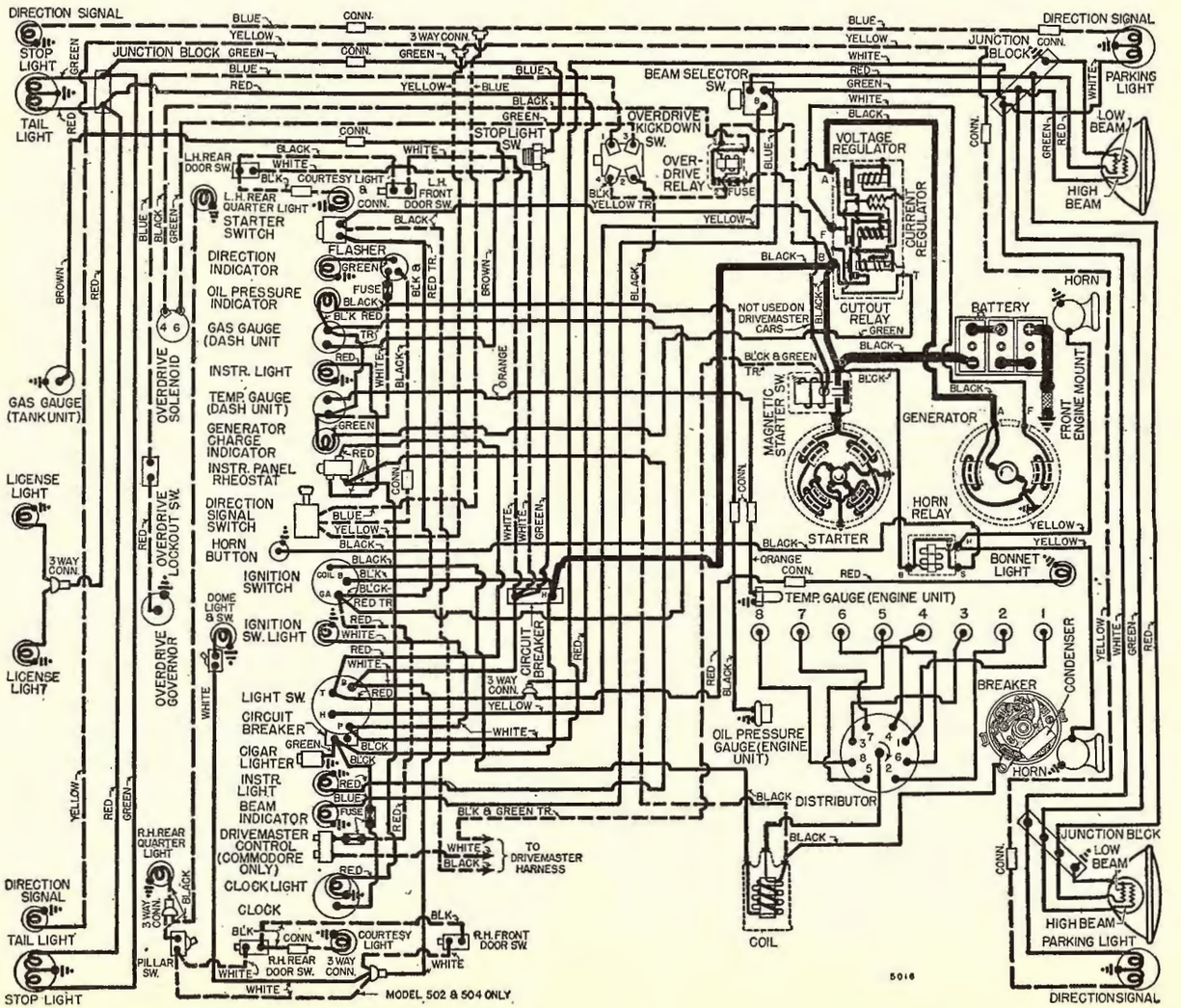
Fuel Compensator: 10° adjustment at distributor. See Ignition Timing for adjustment and setting.

Vacuum Spark Control: Auto-Lite. Integral type. Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGT-4204B-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	13⅜"
1°	2°	14"
2°	4°	14¾"
3°	6°	15⅜"
3.75°	7.5°	16"

Distributor Removal: On right side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.



1950 MODELS

IGNITION TIMING

Std. Setting.....At Top Dead Center
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Flywheel Mark—"UDC-1/" (#1 and #8 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark (opening behind starter).
Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.
Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 600 RPM., adjust distributor (as directed above) until mark lines up with lower edge of opening.
Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**

CARBURETOR

(Early 1950) Carter WDO, No. 648S. (Casting No. 542.)
(1950-51) Carter WGD, No. 773S. 1¼" dual barrel downdraft types with Carter Climatic Control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump: *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
►*773S FLOAT VALVE PRODUCTION CHANGE*—*See Carburetor Section for complete data.*
Fast Idle: Carter Dual (WDO) or (WGD) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Setting (WGD Carb.)—.026" throttle opening with choke valve closed. Check with thermostatic coil housing, gasket, and baffle plate removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" adjust by bending connector rod at lower angle.
Automatic Choke: Carter Climatic Control (Dual).
See Carburetion Equipment Section for complete data.
Setting—Coil housing centered (at index).

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Optl. oil-bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.
Servicing (oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.
Servicing (oil-bath type)—Service same as oil-wetted type except that filter element not oiled. Refill to level with engine oil.
Fuel Pump (Std.): Early 1950—AC Type AH No. 1539109.
Optl. (Fuel-and-Vacuum)—AC Type AJ No. 1539108.
Replacement Pump—No. 584 (for AH), 583 (AJ).
Fuel Pump (Std.): Late 1950-51—Carter Models M729-SL or SZ.
Optional (Fuel-and-Vacuum)—AC Type AJ No. 1539108.
Replacement Pump—No. 583 (AJ).
Pressure—(Carter) 3½-4½ lbs., (AC) 3-4 lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42916.
Tank Unit—K-S No. 42696.
Gasoline Gauge (1951): King-Seeley "CV" (Constant Voltage).
Dash Unit—K-S No. 45675.
Tank Unit—K-S No. 44513.
See Carburetion Equipment Section for complete data.

BATTERY

National OE-2L-100, 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to engine and frame with a single strap.
Location—On left side under hood.

STARTER

1950—Auto-Lite No. MCL-6006. Armature No. MCH-2023.
1951—(Except Hydra-Matic) Auto-Lite No. MCH-6109. Armature No. MCH-2084.

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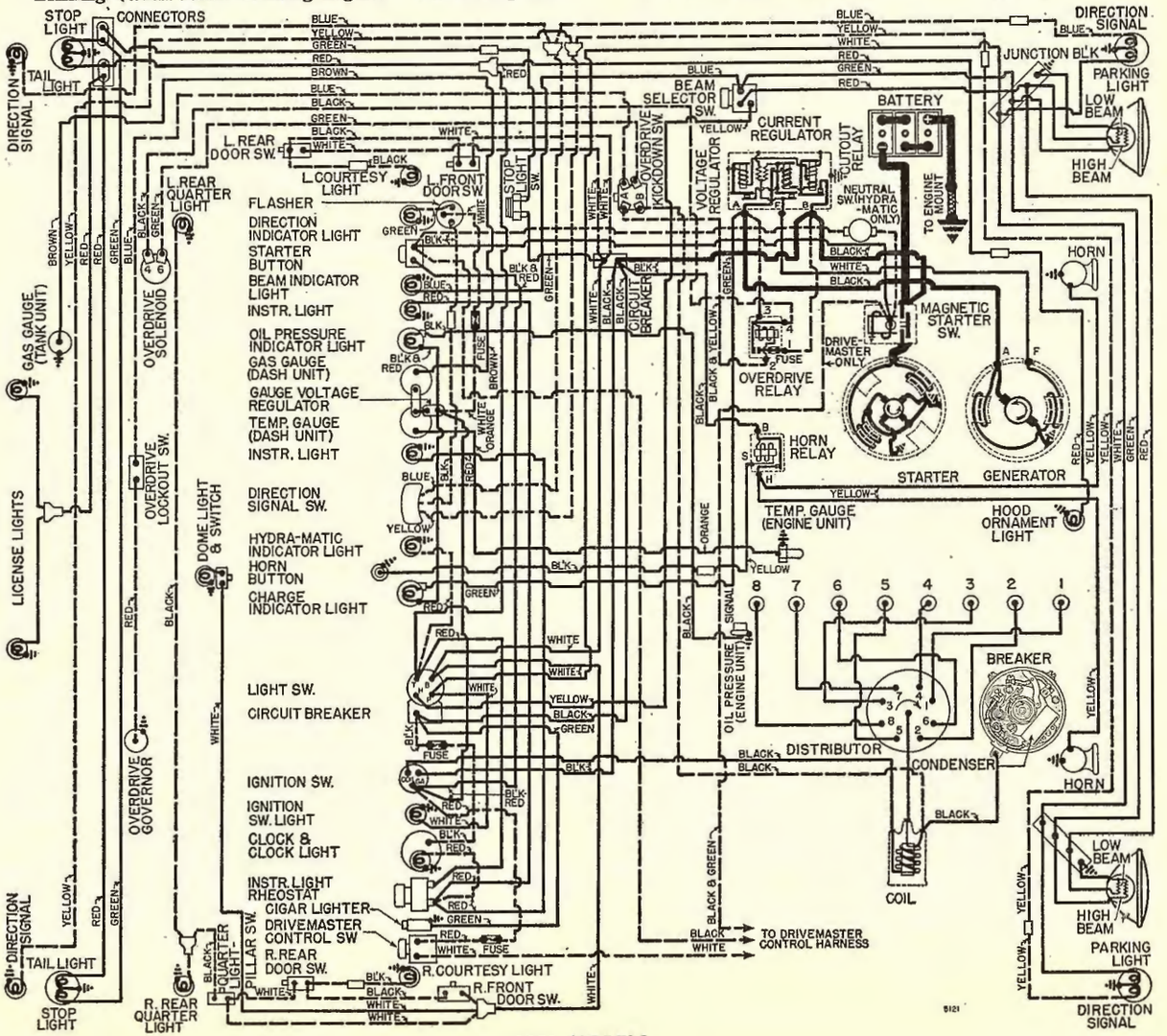

1951 MODELS

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1951—(Hydra-Matic) Auto-Lite No. MCH-6007. Armature No. MCH-2028.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data—MCL-6006 (1950)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Performance Data—MCH-6107, 9 (1951)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
4.4 "	Lock	2.0	335

Starting Switch: Auto-Lite Magnetic type SS-4001 ('50), SS-4030 ('51) on left front fender splash apron, with pushbutton on instrument panel. On Drive-Master and Super-Matic, operative only with ignition "on", and on Hydra-Matic, with ignition switch "on" and gear shift lever in "N" position. *See Electrical Equipment Section for complete data.*
Removal: On left front face of rear motor support. To remove, take out flange mounting bolts.

GENERATOR

Auto-Lite No. GDZ-6001B. Armature No. GGY-2006F.
Two brush (shunt) type with voltage and current regulation. Ventilated.
Maximum Charging Rate—35 amperes at 8 volts.
Charging Rate Adjustment—None (see Regulator).

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amps. at 6.0 volts.

REGULATOR

Auto-Lite Model VRP-6002A ('50), VRP-6101A ('51). Vibrating type Voltage and Current regulators (with Cutout Relay).
►*NOTE*—VRP-6002A Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control. VRP-6101A Cutout Relay does **not** have extra set of points. "Teleflash" Indicator light is operated from the "A" terminal on the regulator.
►*NOTE*—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Contact Gap—.012" Min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Contact Gap—.012" min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".
Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Door Switch—Hudson No. 300796.
Front Dome Light—Hudson No. 211312.
Rear Quarter Pillar—Hudson No. 160091.
Stop Light—Auto-Lite 100810K.
Direction Signal—Hudson No. 305081 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting—Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.
FUSES: Electric Clock—3 ampere. Behind clock.
Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.
Weather Control—14 ampere. On heater.
Drive-Master—15 ampere fuse. In Drive-Master control switch on instrument panel.
Overdrive—30 ampere. In insulated fuse holder in overdrive relay feed wire on left front side of dash.
GAUGE VOLTAGE REGULATOR: King-Seeley—Consists of a thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ignition switch, and the gauge circuits. See Wiring Diagram.
GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). Should light when ignition turned on and should go out when generator begins to charge. *See Electrical Equipment Section for complete data.*
OIL PRESSURE SIGNAL: Red indicator in instrument panel (to left of gas gauge). If pressure drops below approximately 13 lbs. red dash signal lights. *See Electrical Equipment Section for complete data.*
HORNS: Sparton or Auto-Lite Model HW-4021 (Low), HW-4022 (High). Dual horns operated by relay.
Air Gap—.027-.029" for high pitch (short horn), .032-.034" low pitch (long horn).
Horn Relay: Hudson No. 164401. On engine dash.
Contacts Close—3 volts min., 4 volts max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. 8 cylinder, "L" head type.
Bore—3". **Stroke**—4½".
Displacement—254 cubic inches. **Rated HP**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio: (Std.)—Cast-iron head 6.7-1.
Compression Ratio: (Optl.)—Aluminum head 7.2-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Hudson Special Data.*

CYLINDER HEAD: *See Hudson Special Data.*

OIL PAN REMOVAL—*See Hudson Special Data.*

PISTONS: Aluminum alloy, Cam ground, T-slot type.
Weight—10¾ ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above or below.
Clearance—.002-.0025" (skirt).
See "Original Bore & Pistons" in Hudson Special Data.
Replacement Pistons: *See Hudson Special Data.*
Fitting New Pistons: Use .002" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888 Piston Feeler Scale to measure pull.
Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.004-.009"	.001"
Oil (upper	3/16"	.004-.009"	.001"
Oil (lower)	5/32"	.004-.009"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.
Replacement Rings: *See Hudson Special Data.*

PISTON PIN: Dia.—.7497-.750". **Lgth.**—2.4375". Floating type with diamond-drilled pin holes in piston and bronze bushing (with oil grooves at sides) in connecting rod. Lock ring used at each end of pin.
Pin Fit in Piston—.0000-.0003" at 70°F., or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.
Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8 3/16".
Weight—31.36 ozs. (with bearings).
Crankpin Journal Diameter—1.935-1.936".
►*See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—Babbitt-lined, spun type.
Clearance—.0003-.0006". **Sideplay**—.007-.013".
Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or caps. Palnuts used on bolt nuts.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.
Replacement Rods: Std. size and .010" undersize.
Installing Rods: Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT: Five bearing type with integral counter weights and vibration dampener on forward end.
►*VIBRATION DAMPENER PRODUCTION CHANGE*—New softer material, Part No. 304781. Identified by white dot on side of facing.

Journal Diameter—#1, 2.279-2.280"; #2, 2.311-2.312"; #3, 2.341-2.342"; #4, 2.373-2.374"; #5, 2.404-2.405".
Bearing Diameter—#1, 2.2805-2.2815"; #2, 2.3125-2.3135"; #3, 2.3425-2.3435"; #4, 2.3745-2.3755"; #5, 2.4055-2.4065".
►*See "Crankshaft Size Code" in Hudson Special Data.*
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
►*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearing shells retained by brass screws.*

Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Bearings: Reamed bearings furnished standard size and .010" Undersize. Unfinished bearings also supplied.

End Thrust: Taken by center (#3) bearing. Replace bearing if endplay excessive.
Endplay—.006-.012".

CAMSHAFT: Five bearing type. Helical gear drive.
Bearing Diameter—#1, 2.028-2.030"; #2, 1.997-1.999"; #3, 1.965-1.967"; #4, 1.9345-1.9365"; #5, 1.497-1.499".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit and line ream to .001" larger than individual camshaft journals.
►*CAUTION*—Install all bearings with notch at top.

End Thrust: Bakelite thrust washer between gear and crankcase. Spring loaded button in front end of camshaft bears against hardened plate on gear cover.

Timing Gears: Crankshaft gear Cast-iron, camshaft gear Aluminum. Teeth have 20° pressure angle and are slightly crowned for quiet operation.
Identification of Gears—Figure "20" on front face of gears (crankshaft gear also marked "FRONT").
Replacement Gear Caution—Camshaft gear not furnished singly (set only). Crankshaft gear furnished singly or in matched set.
Backlash—.002-.004".

Camshaft Setting: Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 1/2"	.3407-.3417"	5.094"
Exhaust	1.380"	.3392-.3402"	5.094"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.003-.005"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable type pressed in block.
Guide Removal & Installation—Use Tool J-1188 to drive guides out. Install guides with Tool J-383-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-3 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122 to remove carbon and scale out of guides (pay particular attention to carbon in counterbore at top of exhaust guide).

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	46 lbs.	2"
Valve Open	80 lbs.	1.656"

NOTE—Reject springs if pressure less than 34 pounds. Free length 2.343".

Valve Lifters: Roller shoe type, fitted in removable guides in cylinder block.
NOTE—Inner sides of guide clamps should be in full contact at all points with matching flat surfaces of front face of each pair of tappet guides within .0015".

VALVE TIMING

Tappet Clearance: .008" Int., .010" Exh. at normal operating temperature.
NOTE—Removable apron in right front fender.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC. Above figures correct with .010" tappet clearance, Hot or .012" Cold.
Valve Timing Check—Remove front tappet cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately 5/8" above index of timing hole in rear engine support plate. Reset tappet clearance to .008" Hot, or .010" Cold.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.
Crankcase Capacity—(Dry) 8 qts. (Refill) 7 qts.
►*NOTE*—Whenever pan removed, install 1 qt. in upper tray before pan installed, then 7 qts. through oil filler after pan in place on engine.
Normal Oil Pressure—Approximately 13 lbs. at normal operating temperature. No gauge used (see Oil Pressure indicator below).

Oil Check Valve: Located on right side of crankcase at rear. Opens at 11-15 lbs. Operates dash signal to indicate oil flow.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. *See Electrical Equipment Section for complete data.*

Crankcase Ventilation: Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Cooling System: Positive circulation with pump on front of engine and by-pass type thermostat.
Capacity—18½ quarts. 19½ quarts with heater.

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42918.
Engine Unit—K-S No. 41085.

Temperature Gauge (1951): King-Seeley "CV" (Constant Voltage).
Dash Unit—K-S No. 45675.
Engine Unit—K-S No. 44200. New type sender unit.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil). 10" type used on all models.
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

STANDARD

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
►*SLIPPING OUT OF HIGH & SECOND GEAR CORRECTION—See Transmission Section for complete data.*

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of

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engine about ½" off frame cross member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening.

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.
See Transmission Section for complete data.
►**Drive-Master Fuse**—15 ampere, Part No. 71406. Located in wiring circuit 6" from control switch.
Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission 3-speed automatic shift plus ultra-low). Optl.
See Transmission Section for complete data.

HYDRA-MATIC TRANSMISSION

Four speed planetary type automatic transmission and fluid coupling. *1951 MODELS*—Modulated pressure and hydraulically operated reverse mechanism.
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use automatic Transmission Fluid "A".
Capacity—11 qts. (approx).
Checking Fluid Level—Operate engine at normal operating temperature. Manual control lever in "N" position. Hand brake on. Dipstick located under inspection cover placed on right side under floor mat. Oil level must be just to the full mark on the dipstick. *DO NOT OVERFILL.*
►*CAUTION—Do not check oil level when transmission temperature is excessively high and do not fill above "F" on dip stick (will cause foaming when hot).*
Draining and Refilling—*See "Hudson Hydra-Matic Drive" in Transmission Section.*
Hydra-Matic Linkage Adjustment—*See "Hudson Hydra-Matic Drive" in Transmission Section.*
Removal—*See "Hudson Hydra-Matic Drive" in Transmission Section.*

OVERDRIVE

Warner Type AS2-R10D (Early '50), AS3-R10D (Late '50), AS4-R10D (Late '50 & '51). (Models AS3, 4 have centered ring gear). Optl. with Hudson Transmission. Part of Super-Matic Drive. Has simplified control (new 2-terminal Solenoid, Relay & Throttle Kick-down Switch).
See Transmission Section for complete data.
Overdrive Relay—Hudson No. BT303107.
Throttle Switch—Hudson No. BT303254.
Overdrive Fuse—30 ampere. On fuse block on side of overdrive relay.
Removal—Same as for standard transmission removal, except that overdrive control cable and wiring must be disconnected.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.
See Univerals Section for complete data.
Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint).
2) Rear shaft with slip joint at forward end.
Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.
Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

1950 Axle Ratios

Make	Std.	Optl.
Std. & Drive-Master	4.1-1	4.55-1
With Overdrive	4.55-1	4.1-1
With Super-Matic	4.1-1	4.55-1

1951 Axle Ratios

Make	Std.	Optl.
Std. Trans.	4-1-1	4.55-1
With Overdrive	4.55-1	4.1-1
With Hydra-Matic	3.58-1	———

Backlash—.004-.006". Screw adjustment.
Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets on cross member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear end of springs, slide axle assembly out toward rear of car.
Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly.
Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).
Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Light Scale

Make	Front	Rear
Monroe	303060	300351
Delco	303062	301241

Heavy Scale

Monroe	303061	301768
Delco	303063	301770

Extra Heavy Scale

Monroe	302431	302431
Delco	301637	301638

►**APPLICATION NOTE—Light Scale** front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.
See Front Suspension Section for complete data.
Kingpin Inclination—3°36' crosswise.
Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.
Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.
Toe In—1/32" ± 1/32" measured at wheel rim. Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).
Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders Diam. front wh'l. 1⅛", rear 15/16".
Drums—11" centrifuse type.
Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).
Clearance—.010" at both ends of secondary shoe with primary shoe forced out against drum.
Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.
See Brake Section for complete data.
Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.
Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*
Windshield Wiper: Cable Operated—Vacuum type
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

NOTE: Army designation for this model is "¼ Ton 4x4 Truck." Built by Ford and Willys to same design under the following model designations which are stamped on name plate on right hand side of instrument panel:

Ford.....GPW. Willys.....MB.

SERIAL NUMBER: Stamped on Name Plate on right hand side of instrument panel.

ENGINE NUMBER: Stamped on boss on right front upper corner of engine block near water pump.

TUNE-UP

COMPRESSION: Pressure—110 lbs. at cranking speed of 185 RPM for Std. 6.48-1 Cast Iron Head.

VACUUM READING: Steady 21-23" idling at 8 MPH.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUGS: Auto-Lite Type AN-7 or A-7. 14 mm. **Gaps**—.030".

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020". **Cam Angle** 47° closed (IGC-4705), 41° closed (IAD-4008).
Automatic Advance—Starts at 250 RPM. Maximum advance 11° at 1500 RPM (Distr. degrees & RPM).

IGNITION TIMING: See Ignition Timing.
Std. Setting—5° BTDC (72 Octane Fuel), At TDC (68 Octane Fuel) with flywheel mark "IGN" (5° BTDC setting), "TC" (TDC setting) at center of inspection hole in right front face of housing.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Idle screw 1-2 turns open (turn screw out for richer mixture). Idle speed 8 MPH.
Float Level—⅜" from top of float at free end to machined surface (gasket seat) on bowl cover. Invert assembly to check. Do not compress spring in valve stem.
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 4½ lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment required. When installing assembly, see that thermostatic spring end rests on top of spring stop bracket on manifold.
CAUTION—Check valve for free operation when tuning up engine.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control Valve on manifold. ***See Crankcase Ventilator (following CARB. EQUIPMENT) for data.***

VALVES: See Valve Timing.
Tappet Clearance—.014" All Valves, Hot or Cold.
NOTE—Adjusting screws are self-locking type (no locknuts).

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

IGNITION SWITCH: Douglas Model 6282.

COIL: Auto-Lite No. IG-4070L. Service Coil IG-4070NS. **or No. IG-4070U.** Service Coil IG-4070. Mounted on right side of engine block near distributor.
Ignition Current—2.5 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IGW-3139.
Capacity—.18-.26 microfarad.

DISTRIBUTOR: Auto-Lite Model IGC-4705 or IAD-4008. Single breaker, 4 lobe cam, full automatic advance type.
Breaker Gap—.020". Limits .020-.024".
Cam Angle (IGC-4705)—47° (closed), 43° (open).
Cam Angle (IAD-4008)—41° (closed), 49° (open).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	250	0	500
3	580	6	1160
6	930	12	1860
9	1270	18	2540
11	1500	22	3000

Distributor Removal: Mounted on right hand side of engine. To remove, take out hold-down screw in advance arm.

Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to cylinder #1 firing position (see Timing), turn distributor rotor to #1 distributor cap segment position (see diagram), insert distributor drive shaft in drive housing on engine, rock shaft back and forth until drive lug on end of shaft enters slot in drive coupling, push distributor down into place and install hold-down screw. Check Ignition Timing.

IGNITION TIMING

Std. Setting	Flywheel Degs.	Piston Position
72 Octane Fuel	5° BTDC	.010" BTDC
68 Octane Fuel	At TDC	.000" TDC

NOTE—Set timing as specified in accordance with Octane Rating of fuel customarily used.
Timing—With #1 piston on compression, turn crankshaft until piston reaches firing position (see Timing Table above), with flywheel mark "IGN" (5° BTDC setting) or "TC" (At TDC setting) centered in inspection hole in right front face of flywheel housing below starter. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open (press rotor clockwise to eliminate backlash), tighten clamp bolt. See that rotor is at #1 segment in distributor cap and check spark plug cable connections (see diagram).
NOTE—Manufacturer recommends that ignition timing be checked with a Neon Timing Light with engine warm and running at idling speed.

CARBURETOR

Carter Model WO, Type 539-S. 1", Single Barrel, Downdraft type with manual choke control (interconnected with throttle to provide fast idle).
See Carburetor Section for complete data.
Idle Adjustment—With engine warm (choke valve

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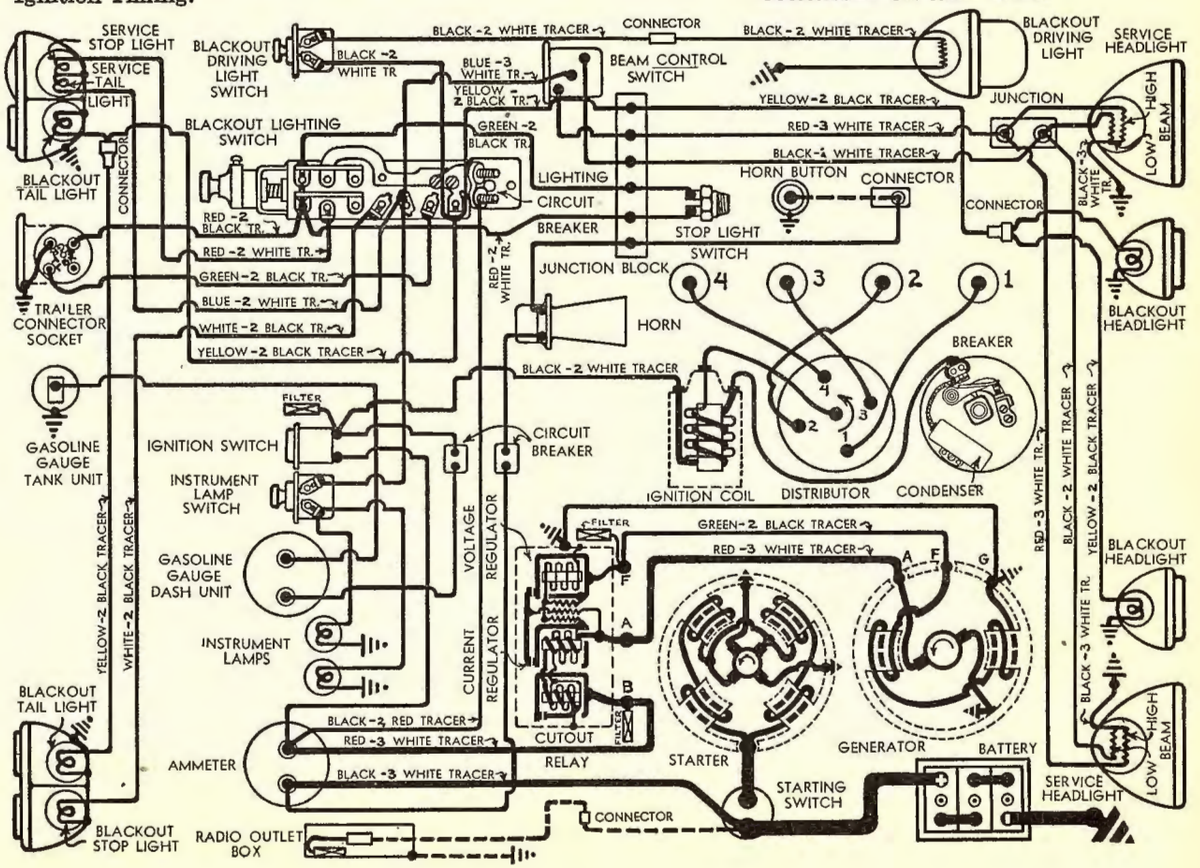

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wide open and fast idle inoperative), set throttle stopscrew for idling speed of 600 Engine RPM or 8 MPH. Turn idle adjusting screw out until engine begins to roll, then turn screw in until engine fires smoothly. Final setting of idle screw should be 1-2 turns open. Recheck idle speed.

Accelerating Pump—No seasonal adjustment.

Float Level—⅜" from top of float at free end to machined surface (gasket seat) on cover with valve seated. To check, invert assembly and allow float to hang freely. Do not compress spring in valve stem.

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Fast Idle: Choke valve interconnected with throttle valve to open throttle to fast idle position when choke in use. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: Oakes Model No. 613300. Oil-bath type. **Capacity**—1¼ pints SAE No. 20 or 30 (Summer), 10 (Winter) engine oil. Change oil at 2000 mile intervals; more often if required by operating conditions.

Fuel Pump: AC Type No. 1523096 or 1538312. Diaphragm type fuel pump. NOTE—Pump has hand lever on side of pump body for hand operation (priming).

Pressure—1½-2½ lbs. (4½ lbs. max. at 1800 RPM).

Fuel Strainer: Type T2, AC No. 1595848. Disc type mounted on right side of dash.

Servicing—Remove plug and drain bowl, remove bowl and filter element, clean element in solvent, wash out bowl, re-install (weekly).

Gasoline Gauge: Auto-Lite (Motometer) Electric type.

Dash Unit—No. NG-10026D or No. NG-9799D.

Tank Unit—No. NG-9979T.

See Carb. Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Consists of Air Intake Pipe from Air Cleaner to Crankcase Oil Filler (Oil Filler Cap has gasket and must seat tightly to prevent air leaks at this point) and Air Outlet Pipe from Valve Chamber Cover to Intake Manifold. There is a Vacuum Valve at the manifold connection and this **valve must close at idling speed** for satisfactory engine idling performance.

Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. Remove and clean control valve when tuning engine or whenever system does not operate satisfactorily.

Vacuum Control Valve: Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold, clamp valve in vise and remove top of housing, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type TS-2-15 or Willard Type SW-2-119 (Orig. Equip.), Auto-Lite TG-2-15 or Willard MW-2-125 (Replacement). 6 volt, 15 plate, 118 Ampere Hour Capacity (Auto-Lite), 6 volt, 17 plate, 125 Ampere Hour Capacity (Willard) at 20 hour rate.

Starting Capacity—140 amperes (Auto-Lite), 160 amperes (Willard) for 20 minutes.

Zero Capacity—300 amperes for 4.0 min. (Auto-Lite), 5.3 min. (Willard). Five second voltage 4.15 volts (Auto-Lite), 4.4 volts (Willard).

Grounded Terminal—Negative (—) to frame.

Engine Ground—Strap connector at left front engine mounting bracket and additional ground strap between cylinder head (at rear) and dash.

Location—In engine compartment on right side.

STARTER

Auto-Lite Model MZ-4113. Armature No. MZ-2089.

Drive—Special Bendix Drive No. A2233.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Cranking Engine—185 RPM, 150-175 amps., 5 volts.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4300	5.5	70
.65 "	2500	5.5	100
2.55 "	1325	5.0	200
4.95 "	750	4.5	300
7.65 "	220	4.0	400
7.8 "	Lock	3.0	420
11.7 "	Lock	4.0	560

Removal: Starter flange mounted on right front face of flywheel housing. To remove, take out two flange mounting capscrews and one bolt in bracket at commutator end.

Starting Switch: Auto-Lite Model SW-4001 or SW-4015. Mounted on toeboard and operated manually by switch button.

GENERATOR

Auto-Lite Model GEG-5001A, GEG-5002D or GEG-5101D. Armature No. GEG-2120F (GEG-5001A, 2D), GEG-2134F (5101D). Two brush with external vibrating type voltage and current regulation.

►*CAUTION*—Internal wiring of this generator (and regulator) is not similar to other Auto-Lite units and **these generators and regulators must always be used together.**

Maximum Charging Rate—40 amperes, 8.0 volts, 1465 RPM. Actual charging rate controlled by regulator and dependent on battery condition.

Charging Rate Adjustment—None. See Regulator.

Performance Data

Amperes	Volts	RPM
8	7.0	930
8	7.6	955
40	7.6	1460
40	8.0	1465

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—64-68 ozs. (new brushes).

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.7-5.2 amperes at 6.0 volts.

Belt Adjustment: Make certain generator brace is locked (pull generator out until brace locks), loosen brace nut, move generator out until belt deflection midway between generator and fan pulleys is 1", tighten brace nut.

NOTE—Generator brace is designed to stop fan and generator rotation when desired. Lifting up on brace handle slackens off drive belt.

Removal: Special pivot mounting at right front of engine with fan belt drive. To remove, pull up on brace handle to slacken off drive belt, move generator toward engine, remove belt, take out generator brace bolt and two pivot bolts, lift generator out.

REGULATOR

Auto-Lite No. VRY-4203-A,B,E, or G. Voltage-Current Type. Regulator case mounted on right side in engine compartment. Consists of Cutout Relay and vibrating type Voltage and Current Regulators.

►*CAUTION*—Internal wiring of this regulator (and generator) is not similar to other Auto-Lite units and **these regulators and generators must always be used together.**

Cutout Relay

Cuts In—6.5-7.0 volts.

Cuts Out—.5-6.0 ampere discharge current.

Contact Gap—.025" minimum.

Air Gap—.0595-.0625" with contacts open.

Voltage Regulator

Setting—7.35 volts at 70° F.

To Check—Connect ammeter in charging line at regulator "B" terminal (use short heavy leads), connect voltmeter between "B" terminal and ground. Operate generator at speed equivalent to 30 MPH charging a fully charged battery until voltage is steady (charging rate approx. 10 amperes), note voltmeter reading which should agree with setting above.

To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. Increase tension to increase operating voltage, decrease tension to decrease voltage.

Contact Gap—.010-.012". **Spring Tension** 7-8 ozs.

Air Gap—.040-.042" with the contacts just opening (.010-.016" between contact spring and armature stop).

Current Regulator

Setting—40-42 amperes.

To Check—Connect test meters as for voltage check (above). Operate generator at speed equivalent to 30 MPH charging battery, turn on car lights and accessories or connect load (bank of headlamp bulbs, etc.) between ammeter and battery so that generator charges at peak rate and current regulator operates. Note ammeter reading which should agree with Setting above.

To Adjust (with cover removed)—Same as for Voltage Regulator (above).

Contact Gap—.030-.033". **Spring Tension** 7-8 ozs.

Air Gap—.047-.049" with the contacts just opening (.010-.016" between contact spring and armature stop).

LIGHTING

Lighting System—Two distinct lighting systems provided, both controlled by the main lighting switch (Blackout Lighting Switch) as follows:

Blackout (1st Switch "On" Position)—Blackout Headlights, Blackout Tail Lights (right & left) and Blackout Stop Light (right side) operative. Blackout Driving Light (on left fender) operative with Blackout Driving Light Switch "on".

Service (2nd Switch "On" Position)—Service Headlights, Service Tail Light (left side) and Stop Light (left side) operative. Panel Lights operative with Panel Light Switch "on". Headlight upper and lower beams are controlled by Beam Selector Switch on toeboard.

Day Driving (3rd Switch "On" Position)—Switch knob must be placed in this position to make the Service Stop Light operative for daytime driving (stop light lead taken through switch—see diagram). NOTE—Switch knob has lock button which must be pressed down to enable switch to be placed in any other position than "Off" and "Blackout."
Service Headlamps—Sealed Beam type. Headlamps are adjusted so that center of Upper Beam "hot spot" is aimed straight ahead and 7" below lamp center height at 25 feet.
Blackout Driving Light—Special shielded Sealed Beam type. This light adjusted so that center of beam "hot spot" is aimed straight ahead and 2.1" below lamp center height at 10 feet.

Switches

Blackout Lighting (Main) Switch—To remove switch, loosen setscrew in knob, unscrew knob, loosen hex. head screw at side of switch bushing on front of panel, press Blackout control button in and pull bushing off, remove mounting nut, take switch out from under panel, mark all wires before disconnecting them.

Blackout Driving Light Switch—Clum. To remove, loosen setscrew in knob, unscrew knob, remove mounting nut on front of panel, remove switch from under panel, disconnect wires.
Panel Light Switch—Clum. Removed in same manner as Blackout Driving Light Switch.
Beam Control Switch—Clum Model 9634.
Stop Light Switch—Auto-Lite No. 100810F. Hydraulic type.

Bulb Specifications

Position	Candlepower	Mazda No.
Service Headlamps	(Sealed Beam)	4031
Blackout Headlamps	3	1235①
Blackout Driving Light	(Sealed Beam)	2405S
Service Tail & Stop	21-3	1158
Panel Lights	3	63②
Blackout Stop	3	63①
Blackout Tail	3	63①

①—Replace as unit (lense, gasket, reflector, bulb).
②—To replace, pry off shield, pull light socket out of shield, remove lamp from socket. Re-install in same manner.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Mounted on back of lighting switch. Vibrating thermostatic type. Protects lighting circuits by limiting current to 30 amperes. No adjustment.

GASOLINE GAUGE & HORN CIRCUIT BREAKERS: Mounted on back of instrument panel. Vibrating thermostatic types. Protect circuits by limiting current. No adjustment.

HORN: Vibrator type. Mounted on left side of dash in engine compartment.

ENGINE REMOVAL

ENGINE REMOVAL: To remove engine from chassis as required for such service items as crankshaft and camshaft overhaul, perform the following operations in sequence:

1. Drain Cooling System. Drain cocks located at lower left corner of radiator and right front corner of cylinder block.

2. Remove Battery. Disconnect battery cables, remove battery from box on right side of engine.

3. Remove Radiator. Disconnect and remove upper and lower hoses, radiator stay rod, and hold-down nuts, lift radiator out. Do not lose radiator mounting pads. NOTE—Not necessary to remove radiator grille.

4. Remove Air Cleaner. Disconnect and remove air cleaner hose connection, remove wing nuts on mounting bracket and lift cleaner out.

CAUTION—Use care not to spill oil in cleaner.

5. Remove Starter. Disconnect cable at starter terminal. Remove two flange mounting capscrews and bolt in support bracket at commutator end, pull starter forward to clear Bendix Drive and lift out.

6. On Right Side of Engine, disconnect generator leads and ignition coil leads to distributor. Remove heat indicator bulb from cylinder head (CAUTION—Use care not to kink or break tube), disconnect engine ground strap (at right front engine mounting bracket), remove two bolts in engine mounting.

7. On Left Side of Engine, disconnect throttle and choke control rods at carburetor, and governor dash control cable at governor (if used). Disconnect and remove horn. Remove fuel tank filler cap (to relieve pressure), disconnect fuel line at fuel pump. Disconnect oil gauge lines at crankcase, remove accelerator linkage rod. Disconnect exhaust pipe at manifold. Remove two bolts in left front engine mounting.

8. Underneath Engine, disconnect rear end of engine stay cable at frame cross-member (left side) remove bell housing attaching bolts **leaving one bolt at each side to support engine weight.**

9. Remove Engine. Attach chain hoist to engine and take up on hoist just enough to support engine without binding remaining bell housing bolts, remove these bolts. Swing engine forward to withdraw clutch shaft from bushing in flywheel, lift engine out.

INSTALLATION CAUTION—Place small amount of grease in clutch shaft bushing in flywheel before installing engine.

CYLINDER HEAD

CYLINDER HEAD: Installation—Use a torque indicating wrench to tighten cylinder head stud nuts and capscrews, tighten in correct sequence.

Tightening Torque—See Tightening (Torque Wrench) Specifications below.

TIGHTENING (TORQUE WRENCH) SPECIFICATIONS

TIGHTENING TORQUES: Use a torque indicating wrench to tighten capscrews or bolt nuts retaining the parts listed below and tighten to tensions listed:

	Ft. Lbs.	In. Lbs.
Cylinder Head Capscrews	65-70	780-840
Cylinder Head Stud Nuts	60-65	720-780
Main Bearing Capscrews	65-70	780-840
Connecting Rod Bolts	50-55	600-660
Manifold Attaching Stud Nuts (Intake & Exhaust)	31-35	372-420
Spring Clip "U" Bolts	50-55	600-660
Torque Reaction Spring Bolt	60-65	720-780
Spring Pivot Bolt	27-30	324-360

ENGINE

ENGINE SPECIFICATIONS: Own Make. Four cylinder, "L" Head type. Cylinder block and crankcase cast enbloc. Cylinders offset from center-line of crankshaft toward camshaft side of engine.
Bore—3⅛" (3.125-3.127"). **Stroke**—4⅜".
Displacement—134.2 cubic inches.
Rated Horsepower (SAE)—15.63
Developed Horsepower—54 at 4000 RPM.
Compression Ratio—6.48-1 Std. Cast Iron Head.
Compression Pressure—110 lbs. at cranking speed of 185 RPM (70 lbs. minimum). All cylinders must be equal within 10 lbs.
Vacuum Reading—Steady 21-23" idling at 8 MPH.

PISTONS: Lynite Lo-Ex Aluminum Alloy, "T" Slot, Cam ground, tin-plated type with heat insulation groove above top piston ring.
Length—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0205-.0225" top, .003" skirt.

Replacement Pistons: Finished pistons furnished .010", .020", .030" Oversize. CAUTION—Pistons must not be "lapped" in (will destroy tin-plating).

Fitting New Pistons: Use .003" feeler stock, ¾" wide, inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.008-.013"	.0005-.001"
Oil Contr.	3/16"	.008-.013"	.001-.0015"

Replacement Rings: Furnished .010", .020", .030" Oversize. See "Installing Rings" for types used.

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

PISTON PIN: Diameter .8117-.8119". Length 2 25/32". Pin is locked in connecting rod by clampscrew.
NOTE—On new pistons, pin hole is .8118-.8120" in diameter and is diamond-bored and tin-plated.
Pin Fit in Piston—.0001-.0005" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: Furnished Standard and .001", .002", .003" Oversize.

CONNECTING ROD: Length 9.1875".
Crankpin Journal Diameter—1 15/16".
Lower Bearing—Steel-backed, babbitt-lined, replaceable type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.
Clearance—.0005-.0025". **Sideplay**—.005-.009".
NOTE—"Palnuts" used as locknuts on connecting rod bolts. To install palnut, after regular bolt nut tightened to 50-55 ft.lbs., turn palnut up against regular nut (flat face in), then tighten palnut ½ turn additional.

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps.

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ENGINE

CONTINUED FROM PRECEDING PAGE

NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

Installing Rods: Lower bearing offset. Install rods with offset (wider side) away from nearest main bearing or toward front of engine (#2, #4), toward rear (#1, #3). Oil spray hole in lower end of rod away from camshaft.

CRANKSHAFT: Three bearing type with four integral counterweights.

Journal Diameters—2.3340. (all bearings).

Bearings—Steel-backed, babbitt-lined, replaceable type. Bearing shells are dowelled in bearing caps and crankcase.

Clearance—.001-.0025" (.0005-.001" new).

NOTE—Replace bearings when clearance exceeds .006" or when endplay exceeds .018".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing data below.*

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing. *See Engine Removal instructions (above).*

Crankshaft Servicing: Main Bearing Replacement—Make certain that oil holes in bearings line up with oil holes in crankcase and see that bearings fit snugly on dowel pins in crankcase and bearing caps.

Rear Bearing Oil Seal—Consists of a wick type packing installed in grooves in bearing cap and crankcase. To install new packing, insert packing in groove, use round piece of wood or steel to "roll" packing into groove, working from both ends toward center. With packing firmly seated in groove, cut off ends flush with surface. NOTE—Crankshaft must be removed to install packing in upper (crankcase) half of bearing.

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case. When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. CAUTION—Do not cut off this protruding portion of the packing.

Front (Timing Cover) Oil Seal—Braided asbestos type impregnated with graphite and oil. Seal is installed in recess in inner face of timing chain cover and retained by steel retainer. To remove seal, pry out retainer and seal assembly.

CAUTION—Always use new steel retainer when installing new seal.

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft sprocket thrust washer and sprocket. NOTE—Crankshaft sprocket must be removed with a gear puller in order to make endplay adjustments.

Endplay—.004-.006".

CAMSHAFT: 4 bearing. Non-adjustable chain drive.

Journal Diameters—#1, 2.188"; #2, 2¼"; #3, 2 3/16"; #4, 1¾".

Bearings—Removable steel-backed, babbitt-lined bushing (front), machined in crankcase (all others).

Clearance—.002-.0035". Service limit .006" (front), .008" (all others).

Camshaft Servicing: Removal—Drain both radiator and cylinder block, remove radiator and grille, cylinder head, manifold, valves, and valve springs. Remove oil pump, fuel pump, oil pan, crankshaft pulley (use puller), fan and governor drive belts, and fan assembly. Remove nuts on front engine support rubber insulators. Remove timing chain cover, take out camshaft sprocket mounting screws, remove sprocket and chain. Block up all valve lifters (can be tied up by string from adjusting screw to manifold mounting studs). Place jack under crankcase (use block on jack to avoid damage to pan), raise front end of engine until camshaft will clear front cross-member, pull camshaft out.

Camshaft Front Bearing—Consists of a steel-backed, babbitt-lined bushing which takes thrust. When installing this bushing, make certain oil hole lines up with drilled oil hole in crankcase, stake bearing in place to prevent turning in service.

Camshaft Thrust Plunger—Plunger and spring should be installed in camshaft hub with round end out. Stationary pin on timing chain cover must be perpendicular so as to bear on spring-loaded plunger.

End Thrust: Taken by thrust washer behind camshaft sprocket and spring loaded plunger in forward end of camshaft which bears against stationary thrust pin on chain case cover. NOTE—Make certain that plunger and spring are in place when installing chain case cover.

Timing Chain: Link-Belt two-sprocket (non-adjustable) type. Width 1". Pitch ½". Length 47 links or 23½".

Camshaft Setting: With #1 piston on top dead center, mesh chain with marks on sprockets adjacent and in line with a straightedge across the shaft centers.

NOTE—Camshaft sprocket mounting screw holes offset to insure correct position of sprocket on shaft.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.373"	5¾" (overall)
Exhaust	1 15/32"	.3725"	5¾" (overall)

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.0015-.00325"
Exhaust	45°	23/64"	.002 -.00375"

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place to following dimensions:

Intake Guide—Top of guide 1 5/16" below top face of block. The shorter smaller-diameter section end of the guide should be up.

Exhaust Guide—Top of guide 1" below top face of block. Taper end (counter-bored end) of guide should be up.

Valve Springs: Install springs with closed-coil end up toward cylinder block. Spring free length 2½".

	Spring Pressure	Spring Length
Valve Closed	50 lbs.	2 7/64"
Valve Open	116 lbs.	1 3/4"

Valve Lifters: Mushroom type operating in reamed holes in block. Serviced by installing oversize lifters. Lifters furnished .004" Oversize.

Lifter Diameter—.6240-.6245".

Lifter Clearance—.0005-.002".

NOTE—Camshaft must be removed for lifter removal.

VALVE TIMING

Tappet Clearance: .014" All Valves, Hot or Cold.

NOTE—Tappet adjusting screws are "self-locking" type (no locknuts).

Valve Timing: See Camshaft Setting (above).

Intake Valves—Open 9° BTDC. Close 50° ALDC.

Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

Valve Timing Check—Set tappet clearance #1 intake valve at .020". This valve should open with #1 piston 9° or .039" before top dead center with flywheel mark "I.O." centered in inspection hole on right front face of flywheel housing below starter. Reset tappet clearance to .014" running clearance.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, and camshaft bearings and to timing chain. Oil pump mounted externally on left side of crankcase.

Crankcase Capacity—5 qts. (Dry—when filter drained or replaced), 4 qts. (refill).

Normal Oil Pressure—40-50 lbs. (20-25 lbs. actual) at normal speeds or 10 lbs. minimum idling.

NOTE—On first cars, oil pressure was 75 lbs. (40 lbs. actual) at 30 MPH.

Oil Pressure Relief Valve—Located under plug on oil pump cover. Opens at 25 lbs. (50 lbs. gauge pressure). Adjustable by adding or removing shims above spring within plug.

Oil Pump: Planetary gear type. Mounted on left hand side of crankcase.

Pump Removal—Remove oil pump cover nuts on three mounting studs, slide pump off studs. To disassemble pump, remove one screw in pump cover, lift off cover, remove idler gear and rotor disc. To remove rotor shaft assembly, file off end of pin in drive gear hub, drive pin through shaft, using a small drift, remove gear, withdraw rotor shaft assembly from housing.

Pump Installation—Turn flywheel to #1 piston firing position with flywheel mark "IGN" centered in inspection hole in right front face of flywheel housing below starter. Turn distributor shaft to #1 firing position with distributor rotor finger opposite #1 terminal in distributor cap. Hold oil pump in same relative position as when installed on engine, turn pump shaft until tongue offset is upward (widest part of shaft down) and line up gear retaining pin with right hand side of slot in pump body. Slide pump into place on mounting studs, recheck rotor position. NOTE—If distributor rotor not at #1 terminal with pump installed, remove pump, turn shaft as required, and re-install.

Oil Filter: Mounted on bracket on right side of engine. Oil Filter Element Purolator No. 26637.

CAUTION—Filter should be drained at 1000 mile intervals and filter element replaced at 6000 mile intervals for normal service.

Oil Pressure Gauge: Auto-Lite No. G-10024 or G-10017.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap.
Capacity—11 quarts.
Pressure Valve—AC No. 846709 (Radiator Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).

Water Pump: Centrifugal, packless, ball bearing type.
Pump Removal—Loosen drive belt adjustment and remove belt, disconnect hose, remove pump mounting screws. Lift out pump and fan assembly.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In outlet elbow on cylinder head.
Setting—Starts to open 145-155°F. Fully open 170°F.

Temperature Gauge: Auto-Lite Type H-10014 (not electric type).

See Miscellaneous Section for complete data.

CLUTCH

Atwood Model TP-2B-7-1 with Borg & Beck No. 11123 Driven Member. Single plate, dry disc type.

See Clutch Section for complete data.

Facings—One Woven, one Molded Asbestos. Inside Diameter 5⅛", Outside Diameter 7⅞". Thickness ⅛" (.125").

Adjustment: Pedal free travel ¾" (provides 1/16" clearance between release bearing and clutch release levers). To adjust, loosen locknut on clutch fork connecting cable clevis at cross-shaft connection, screw cable end out of clevis, tighten locknut.

Removal: Remove Transmission & Transfer Case Assembly (see Transmission Removal below), remove flywheel bell housing. Mark clutch pressure plate and flywheel to insure re-installation in same relative position. Take out mounting screws in clutch cover flange, turning all screws out evently to relieve spring pressure, remove clutch assembly and driven member.

TRANSMISSION

Transmission: Warner Model T84J. Three-speed type with conventional shift lever mounted on top of case. Constant-mesh, synchro-mesh, helical gears (Second & High), sliding spur gear (Low & Reverse).

See Transmission Section for complete data.

Transfer Case: Spicer Model 18. Two-speed auxiliary transmission and front-wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front-wheel drive engagement (left hand lever).

See Transmission Section for complete data.

Removal: Remove transmission and transfer case as an assembly. Remove transmission floor cover, remove shift lever by unscrewing control housing cap and withdrawing lever. Remove transfer case shift lever pivot pin setscrew and lubricator fitting in right end of shaft, drive out shaft and remove shift levers. Remove exhaust pipe guard and exhaust pipe clamp on skid plate, remove skid flanges at transfer case end. Disconnect front and rear propeller shafts at transfer case universal joints, tie propeller shafts up to frame. Place support jack under engine oil pan. Disconnect speedometer cable at transfer case, remove transfer case rubber snubber bolt nut on right hand side of cross-member. Remove clevis pin in lower end of hand brake cable, remove hand brake retracting lever. Disconnect engine stay cable at cross-member, bonding strap on transmission and transfer case, and clutch pedal pull back spring. Remove nuts on engine rear support insulator studs at cross-member. Place second support jack under transmission. Remove frame-to-cross member bolts at each end and remove cross-member. CAUTION—With cross-member removed, entire engine and transmission weight will be supported on the jacks. Push transmission to right until clutch control cross-shaft can be freed from ball stud end on transfer case. Remove inspection cover on bell housing, disconnect and remove clutch fork and cable assembly. Remove four transmission mounting bolts in bell housing, slide transmission straight back until clutch shaft clears bell housing (lower jack under engine just enough so that transmission will clear floor pan), lower transmission and remove from beneath car.

Transmission Removal from Transfer Case—Drain transmission and transfer case, remove transfer case rear cover and gasket. Remove cotter pin, nut and washer on rear end of transmission main shaft, pull off main shaft gear and oil slinger. Remove control housing on top of transmission by taking out four mounting screws, remove shifter plate spring and shifter plate. Retain second speed gear by looping a piece of wire around gear and fastening wire tightly to front of transmission case. Remove transfer case mounting screws on rear of transmission, withdraw transfer case by tapping lightly on rear end of main shaft while pulling case to the rear. CAUTION—Do not lose transmission interlock plunger located in groove between transmission and transfer cases.

UNIVERSALS

Front & Rear Drive Propeller Shaft Joints: Spicer Model 1261 (transmission end), Model 1268 (axle end). Needle roller bearing types.

See Universals Section for complete data.

Front Axle Shaft Joint: Bendix or Rzeppa Constant-velocity type. One joint used at outer end of each shaft (within steering knuckle housing).

See Universals Section for complete data.

FRONT AXLE

Spicer Model 25. Full floating, hypoid gear type. Differential assembly (ring & pinion gear assembly) is identical with Rear Axle and is serviced in the same manner.

See Rear Axle Section for complete data.

Ratio—4.88-1 Std.
Backlash—.005-.007". Shim adjustment.

Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and steering linkage (at idler lever on frame front cross-member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear ends of springs and lower the springs, remove axle assembly from beneath the car.

Axle Shaft & Universal Joint Assy Removal: Remove wheel, hub cap, axle shaft cotter pin, nut, and washer. Remove drive flange capscrews and washers. remove flange with a puller. Bend lip on bearing nut lockwasher out and remove locknut, lockwasher, adjusting nut, and bearing lockwasher. Remove wheel hub and bearing assembly (CAUTION—use care not to damage oil seal). Disconnect brake tube, take out mounting screws on backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal assembly out of axle housing.

INSTALLATION CAUTION—Adjust front wheel bearings and bleed brake line when installation completed.

Wheel Bearing Adjustment: Jack up the front wheel, remove the hub cap, then remove axle shaft nut, washer, and driving flange (use puller to remove flange). Bend lip of adjusting nut lockwasher back to free nut, remove locknut. Tighten adjusting nut until wheel binds (turn wheel while tightening nut), back off nut 1/6 turn or until wheel rotates freely Replace lockwasher and locknut, tighten locknut securely and bend ear of lockwasher up against nut to prevent loosening in service. Check adjustment of bearings by grasping front and rear of tire and shaking wheels from side to side. A barely perceptible shake should be felt in the bearings. Install flange shims and flange. On cars with Bendix Universals, check axle shaft endplay (below) before completing assembly. NOTE—On cars with Rzeppa Universals, disregard endplay note below and install shim pack of .060" under flange.

Axle Shaft Endplay Check (With Bendix Universal Joints)—Tighten the flange nut (do not install lockwasher), swing wheel to maximum left or right position with punchmark on end of axle shaft straight up or down. Back off flange nut until clearance between nut and flange is .050" (measure with feeler gauge). Tap end of shaft with a soft hammer (shaft will move in an amount equal to the endplay). Recheck clearance between nut and flange with a feeler gauge. **Subtract this measured clearance from the original .050" clearance.** If resulting figure is less than .015", add shims to shim pack under flange, if figure is more than 035", remove shims from shim pack under flange. With correct thickness of shim pack under flange, install axle shaft lockwasher, nut, and cotter pin.

REAR AXLE

Spicer Model 23-2. Full floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—4.88-1 Std.
Backlash—.005-.007". Shim adjustment.

Removal: Support rear end of car securely with a chain hoist and support placed under frame ahead of rear springs, remove rear wheels. Disconnect rear shock absorbers, rear brake line (at frame connection), and propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove pivot bolts at front end of springs and lower the springs, remove axle assembly from beneath the car.

INSTALLATION CAUTION—Bleed brake lines after axle re-installed and lines connected.

Axle Shaft Removal: Remove six capscrews and washers holding axle shaft driving flange on wheel hub, thread two of these screws into "extra" holes (between regular mounting screw holes) and turn

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screws up evenly to pull axle shaft out, withdraw axle shaft from housing.

Wheel Bearing Adjustment: Remove the six axle shaft flange screws, turn two of these screws into "extra" holes in flange to start shaft, withdraw axle shaft. Adjust bearings in same manner as front wheels (above). When re-installing axle shaft, make certain that gasket installed under flange.

NOTE—Disregard the axle Shaft Endplay Check instructions required for front wheels only.

SHOCK ABSORBERS

Monroe. Direct acting, double acting, hydraulic, adjustable type with rubber-bushed end fittings.
See Shock Absorber Section for complete data.

Adjustment: Remove mounting bolt at lower end, fully collapse shock absorber by pressing up on lower end until adjusting key within unit engages slot in adjusting plate (can be determined by feel), turn unit in clockwise direction until limit of adjustment is reached (full range of adjustment is four turns), back off adjustment by turning unit counter-clockwise **exactly two turns** for standard setting. CAUTION—See that adjusting key does not slip out of engagement with slot while making adjustment.

Refilling: Requires dismantling of unit.

FRONT SUSPENSION

Front Axle—Spicer Model 25. Special full-floating driving unit. *See Front Axle data (above).*
Kingpin Inclination—7½° crosswise.
Caster—3°. No adjustment. If caster incorrect, check entire front end and correct by installing new parts.
Camber—1½°. No adjustment. Correct by installing new parts. Do not attempt to correct camber by cold bending or heating of parts.
Toe In—3/64-3/32" (1/32" each wheel). To adjust, first set each front wheel straight ahead (see Note below), then set toe in by shortening right hand tie rod only. This procedure necessary to maintain correct position of steering idler arm.
NOTE—To set front wheels straight ahead, first set tie rod end of steering bell crank (idler lever on frame front cross-member) exactly at right angles to front axle. Check front wheels by using a straight edge or sighting along rear and front wheels. Adjust each tie rod (loosen end clamp bolts and turn rod) until front wheels are exactly straight ahead. Then make toe in adjustment as directed above. Tie rod lengths between ball end centers should be 17 11/32" (left), 24¼" (right).

Steering Geometry—With inner wheel turned 20°, outer wheel should be turned exactly 19°45'.

Steering Knuckle Bearings: The Steering Knuckle is mounted on two "stub" kingpins with Timken roller bearings in ball ends of axle housing. Bearings are adjustable by adding or removing shims located under kingpin bearing caps (upper cap integral with steering arm). Bearings must be disassembled for adjustment as follows:

Disassembly—With Axle Shaft & Universal Joint Assembly removed (see Front Axle data above). Remove eight screws holding oil seal retainers in place on inner face of knuckle support, remove oil seal retainer halves. Remove four nuts and lockwashers on lower bearing cap, remove bearing cap and bearing adjusting shims (under cap). Remove four nuts and lockwashers on upper bearing cap (steering arm), remove brake hose shield, steering arm, and bearing adjusting shims (under steering arm). Remove steering knuckle (CAUTION—Do not allow lower bearing cone and roller assembly to fall when knuckle is pulled off).

Bearing Adjustment—Install steering knuckle on axle housing (reverse order of disassembly directions) **without the oil seal** placing one each of the following shims under both the upper and lower bearing caps—.003", .005", .010", .030" (total shim thickness at each end .048"), tighten bearing cap stud nuts securely. Then check bearing tension by hooking spring scale in tie rod hole at end of steering arm and noting pull required to turn steering knuckle on axle end. This pull or bearing tension should be 25-35 in. lbs. with oil seals out. Adjust by adding or removing shims under bearing caps. CAUTION—Total shim thickness under upper and lower bearing caps must be equal. Shims furnished in thicknesses of .003", .005", .010", .030" for this purpose.

Oil Seal Replacement—Felt type mounted in metal retainers bolted on inner face of steering knuckle. When replacing oil seal, make certain that spherical surface of axle housing is not scored or scratched (smooth down any roughness with emery cloth), bolt seal retainer halves on housing using lockwashers under mounting screw heads, make certain that felts have good fit at point where upper and lower halves join.

STEERING GEAR

Ross Model T-12. Cam-and-Twin Lever type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Four wheel, Hydraulic, Double anchor type. Hand lever applies independent brake on drive shaft at rear of transfer case.
See Brake Section for complete data.
Drum Diameter—9".
Lining—Width 1¾". Thickness 3/16". Length per shoe 10 7/32" (forward shoes), 6 39/64" (rear shoes). NOTE—Manufacturer recommends use of new or replacement shoe assemblies with factory-installed linings.
Clearance—.008" toe, .005" heel, for each shoe.

Hand Brake: Mechanical type. External, contracting band on drum mounted on driveshaft at rear of transfer case.
Drum Diameter—8".
Lining—Woven type. Width 2". Thickness 5/32". Length 18 9/16".
Adjustment—Place hand brake lever under instrument panel in fully released position, check brake lever to make certain that cable is free and released. Remove brake band anchor adjusting screw lockwire, turn adjusting screw until .005" feeler is just snug between lining and drum at this point, reinstall adjusting screw lockwire. Tighten adjusting nut (at lower end of large adjusting bolt) until brake band is tight on drum, loosen bracket bolt locknut and back off inner bracket bolt nut two turns, tighten locknut. Back off adjusting nut until brake band has approximately .010" clearance on drum at each end.

HOOD ASSEMBLY

HOOD REMOVAL: Lift hood. At each hood hinge, remove two capscrews from inside hood and two additional capscrews from outside (on lower edge of hood), remove hood props if used, lift hood off.

HOOD REPLACEMENT: Place hood in position on hinges, install one inside and one outside capscrew in each hinge (use punch to align screw holes), then install remaining capscrews in each hinge, install hood props (first type hinge only), check hood alignment and adjust for proper fit by loosening hood hinge capscrews and shifting hood on hinges (screw holes are slotted to permit this adjustment).

Hood Hinge Replacement Note—Whenever hood hinges require replacement, install new type hinges with heavier coil springs and larger (⅜") mounting studs. Hood props not required with this hinge.

NOTE—1949-50 Hoods not interchangeable with earlier type hoods.

TIGHTENING SPECIFICATIONS

1947-48 MODELS

	Ft.Lbs.	In.Lbs.
Cylinder Head Bolts①	40-50	480-600
Spark Plugs	5-10	60-120
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mtg. Bolts	36-40	432-480
Camshaft Sprocket Bolts	35-40	420-480
Camshaft Retaining Nut	30-35	360-420
Filler Block Screws	14-16	168-192
Int. & Exh. Manifolds	31-35	372-420
Oil Pan Screws	10-14	120-168

①—Tighten cold and recheck with engine at 150°.

1949-51 MODELS

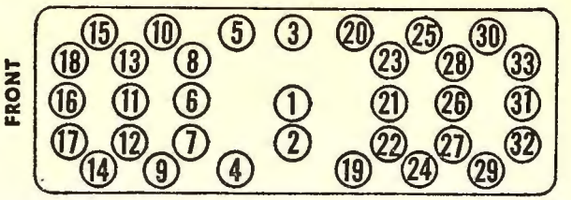
	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	30-35	360-420
Spark Plugs	30	360
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mounting Bolts	35-40	420-480
Camshaft Sprocket Nut	35-40	420-480
Camshaft Thrust Plate	12-15	144-180
Timing Gear Cover	12-15	144-180
Eng. Front End Plate 5/16"	12-15	144-180
Eng. Front End Plate 7/16"	40-50	480-600
Int. & Exh. Manifolds	30-35	360-420
Oil Pan Screws	12-15	144-180
Water Pump Mtg. Bolts	12-15	144-180
Vibration Dampener Bolt	100-130	1200-1560
Steering Wheel Nut	10-15	120-180
Steering Gear Mtg. Bolts	25-30	300-360
Pitman Arm Nut	110 min.	1320
Rear Spring "U" Bolt Nuts	45-55	540-660
Wheel Mtg. Nuts or Bolts	85-90	1020-1080
Differential Bearing Caps	38-42	456-504
Rear Axle Shaft Nut	160 min.	1920

CAUTION—Torque figures given are for clean and dry threads. If threads oiled, reduce torque approx. 10%.

CYLINDER HEAD

CYLINDER HEAD INSTALLATION: Use a Torque Indicating Wrench to tighten cylinder head bolts, tighten in correct sequence as shown in diagram. Heads should be tightened cold and rechecked after engine temperature reaches 150°F.

Tightening Torque: See Tightening Specifications.



ENGINE REMOVAL

ENGINE REMOVAL: Proceed as follows:

1. Remove Hood (see Hood Assembly above).
2. Drain cooling system.
3. Disconnect windshield wiper hose at manifold (or at vacuum pump), disconnect fuel line at point where fuel pump flexible line connected to tubing at frame, disconnect exhaust pipe at manifold.
4. Remove Radiator (see Radiator removal below).
5. Remove Battery. Disconnect cables, lift out.
6. Disconnect Wiring. Disconnect ground cable near left front engine mounting, disconnect wiring at starter, generator, and distributor.
7. Remove Air Cleaner.
8. Disconnect Temperature Gauge by removing lead wire at cylinder head. Disconnect Oil Gauge lead at engine unit.
9. Disconnect throttle linkage at carburetor.

ORIGINAL BORE & PISTONS

BORE & PISTON SIZES: Engines originally equipped at factory with special oversize pistons may be identified by code letter following engine number:
"N"—Pistons are .020" Oversize.
"AN"—Pistons .020" Oversize. Main and connecting rod bearings Undersize (See Original Bearing Sizes).
"NX"—Pistons .020" Oversize. Main bearings are Undersize (see Original Bearing Sizes following).

PISTONS

PISTON IDENTIFICATION: Two types of aluminum alloy pistons used which can be identified as follows:

►*CAUTION—Piston weight different on each type.*

Strut Type Piston—Has wide strut embedded within skirt at each piston pin boss and drilled oil drain holes in both #3 and #4 ring grooves.

T-Slot Type Piston—Has horizontal slot in lower (#4) ring groove and short vertical slot on one side of piston skirt. #3 oil ring groove has drilled oil drain holes.

REPLACEMENT PISTONS: See "Piston Identification" for types used. Each type piston furnished in following sizes:

	Kaiser-Frazer Part No.	
Piston Size	Strut Type	T-Slot Type
Standard	200108	201947
.005" Oversize	200357	201949
.010" Oversize	200358	201950
.020" Oversize	200359	201951
.025" Oversize	202484	202487
.030" Oversize	200360	201952
.040" Oversize		203751
.050" Oversize		203752
.060" Oversize		203753

►*CAUTION—Piston weight different on each type.*

PISTON RINGS

REPLACEMENT RINGS: Rings furnished as single rings (12 Compression, 12 Oil Rings required), or in complete sets (1 Set per car) as follows:

Single Rings

Ring Size	Compression—Part No.	Oil
Standard	200111	200112
.010" Oversize	200361	200364
.020" Oversize	200362	200365
.030" Oversize	200363	200366

Ring Sets

Ring Size	Cyl. Size①	Part No.
Standard	St. to .009" OS	203145
.020" Oversize	.010" to .029" OS	203146
.040" Oversize	.030" to .049" OS	203147
.060" Oversize	.050" to .069" OS	203148

①—Use ring indicated for oversize cylinders within this range (check End Gap).

ORIGINAL BEARING SIZES

MAIN & CONNECTING ROD BEARING SIZES: Engines originally equipped with special undersize main and connecting rod bearings may be identified by code letter following engine number:
"A"—Main & Connecting Rod Bearings .010" Undersize.
"X"—Main Bearings .002" Undersize.
"AN"—Main & Connecting Rod Bearings .010" Undersize and Pistons Oversize (see Original Bore and Pistons).
"NX"—Main Bearings .002" Undersize and Pistons Oversize (see Original Bore and Pistons).

CRANKSHAFT & MAIN BEARINGS

FRONT MAIN BEARING CHANGE: Two types of front main bearing used (flanged & unflanged). This bearing takes end thrust (see Endplay Adjustment).
1)—**Front Main Bearing (Flanged Type).** End Thrust taken by flange on bearing.
2)—**Front Main Bearing (Not Flanged).** End Thrust taken by thrust washer installed in front of bearing.

FRONT MAIN BEARING ASSEMBLY
Flanged Type Bearing①

K-F Part No.		K-F Part No.	
200070	Bearing Std.	200065	Thrustwasher
201928	" .002" US.	200067	.002" Shim
202062	" .004" US.	200068	.008" Shim
200337	" .010" US.	200066	Thrust Plate

①—Original type Bearing Cap used with flanged bearings not furnished for service (use No. 202689).

Bearing without Flange

202686	Bearing Std.	202685	Thrustwasher
202687	" .002" US.	202684	" pins (3)
202691	" .010" US.	200065	Thrustwasher
202689	Bearing Cap	200067	.002" Shim
202690	" Cap Dowel	200068	.008" Shim
		200066	Thrust Plate

Replacement Note—Both types of front main bearings are interchangeable. Flanged type can be used to replace unflanged type by removing thrustwasher and dowel pins.

CRANKSHAFT ENDPLAY ADJUSTMENT: Requires removal of radiator, vibration dampener, timing gear cover, timing gears and chain (remove as an assembly), thrustplate, and shims.

CONTINUED ON NEXT PAGE

CRANKSHAFT & MAIN BEARINGS

CONTINUED FROM PRECEDING PAGE

NOTE—Endplay can be checked at flywheel (with clutch pan off) without further disassembly.

Endplay Adjustment: *CAUTION*—Two thrust washers (1 at each side of front bearing) must be in place when checking endplay. With front end of crankshaft disassembled as described above, re-install thrust plate (**do not install shims at this time**), install checking sleeve No. KF-28 on end of shaft, secure sleeve on shaft with vibration dampener bolt and lockwasher. Mount dial indicator at front of engine with button against front end of shaft. Pry shaft to rear, set indicator at zero and then pry shaft forward, reading will be endplay. Select shim pack (shims furnished .002" and .008" thick) so that when installed, endplay will be .004-.006".

►*CAUTION—Make certain that clearance exists between slinger on rear end of crankshaft and upper and lower filler blocks in rear end of crankcase.*

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket). Rear filler blocks (additional **upper filler block guard** in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger. Filler blocks can be removed and replaced without disturbing crankshaft as follows:

Front Filler Block (Lower) Servicing: Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block. When installing filler block, first install oil pan side gaskets (No. 200266), install filler block (use Perma-tex), install new end gasket (No. 200267) on block.

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal). Remove and discard old gasket or seal. Install new seal (no. 204654) in same manner as described below for Rear Filler Block (Upper) Guard. Install lower filler block **after** upper filler block guard has been installed.

Rear Filler Block (Upper) Guard Servicing: Guard is seated in groove in crankcase and can be "rotated" out without disturbing crankshaft after lower filler block removed. Remove and discard old gasket or seal, clean out seal groove. Install new graphite impregnated seal (no. 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard). **Do not use shellac or sealing compound in groove.**

►*CAUTION*—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft. If necessary, seal can be built up using 1/32" thick gasket material, 3/16" wide, as shims shellacked to groove in block or guard behind seal.

CAMSHAFT & BEARINGS

CAMSHAFT CHANGE (1947): Two different camshafts are used (camshaft changed when fuel pump mounting location changed) and can be identified as follows:

Early Cars—Fuel pump mounted at rear of engine.

Later Cars—Fuel pump mounted at front of engine.

Replacement Camshafts for All Engines

K-F Part No. 200113.....Fuel Pump at Rear
K-F Part No. 203017.....Fuel Pump at Front

CAMSHAFT REMOVAL: Camshaft can be removed with radiator off and engine in car as follows:

1. Remove timing gears (remove both gears and chain as an assembly). This requires removal of vibration dampener and pulley, timing gear cover.
2. Remove cylinder head.
3. Remove fuel pump.
4. Remove oil pan, oil pan return tube & oil pump.
5. Lift valves, using valve spring lifter tool C-482 (see Note below), block valves up by inserting a clothespin or block of wood under each valve head.

NOTE—Remove right front tire and wheel and take off splash shield under fender for access to valves.

6. Block up valve Lifters (lift each lifter up by hand and fasten in upper position with a wire).
7. Remove Camshaft Thrustplate by taking out two screws retaining thrustplate on crankcase.
8. Pull camshaft out through front of engine.

Camshaft Bearing Replacement Note—Requires removal of engine from car for access to plug at rear of block which must be removed.

TAPPET CLEARANCE ADJUSTMENT

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below). Remove right front wheel and access cover in fender splash shield for access to valve compartment. Remove spark plugs so that engine can be turned over by moving fan or fan belt. By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment.**

Valve Tappet Adjustment Order (numbered from FRONT of engine)

Fully Raise Valve	Then ADJUST Valve:
Nos. 1 and 3	Nos. 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos. 2 and 6	Nos. 7 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 5	Nos. 8 and 9
Nos. 7 and 11	Nos. 2 and 6

Tappet Clearance—Prior to Engine No. 10769, tappet clearance should be .010" Intake, .014" Exhaust. Beginning Engine No. 10769 tappet clearance is .014" for both Intake and Exhaust valves.

VALVE SYSTEM

VALVE LIFTER REMOVAL: Lifters can be removed **on some cars,** without disturbing head, as follows: Remove splash shield under right front fender for access to valve compartment. Remove valve spring seat lock (retaining pin on early cars, split type locks on later cars). Turn tappet clearance adjusting screw down as far as possible, remove valve spring. Working through spark plug hole, lift valve up with a wire to provide clearance. Turn tappet clearance adjusting screw up free of the lifter barrel, tilt adjusting screw and locknut to clear valve stem and lift these parts out of the lifter barrel. Raise lifter barrel up until lower end clears hole in block, then tilt barrel and remove.

►*NOTE—If lifter barrel cannot be emoved in this manner, remove cylinder head and remove valve.*

OIL PAN REMOVAL

OIL PAN REMOVAL: Raise front end of car and support it securely on stands. Disconnect steering drag link at idler arm on frame, turn wheels to right and work drag link clear of oil pan. Drain oil, remove oil pan capscrews and lockwashers, slide pan to rear.

►INSTALLATION NOTE—Lower Filler Blocks (front and rear) must be removed to install new oil pan side gaskets. See "Front & Rear Filler Blocks" under Crankshaft & Main Bearings (above) for data.

OIL PUMP

OIL PUMP SERVICING: Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling. Service pump as follows:

Disassembly—Take out cotter pin and remove screen float assembly. Remove cover and gasket. Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear. remove idler gear (remove idler shaft if required). Take off lower drive gear (press fit and keyed to shaft).

Oil Pump Clearances—Check as follows:

1)—Pump Body Bushing: if over .005" clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to .500-.501".

2)—Pump Shaft: shaft diameter .4990-.4985".

3)—Lower Drive Gear: end of gear should be .001-.006" beyond gasket seat on pump body.

4)—Upper Drive Gear: .002-.004" clearance between underside of gear and upper end of pump body. Controlled by pressing lower drive gear on shaft until this clearance obtained.

NOTE—Cover plate should be replaced if worn from contact with gears, or if cracked.

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose). Replace by using drift inserted in distributor drive shaft bore from top of block. Install new bushing from below (must be flush with bottom of block).

Reassembly—Press upper drive gear on shaft with pin hole at right angles to tongue on shaft. Insert new pin and peen ends flush with gear. Install shaft and gear in pump body. Press lower drive gear on shaft (with key in place) until .002-.004" clearance obtained between upper drive gear and upper end of pump body. Press idler gear shaft in body, install idler gear. Install cover using new gasket and pin oil screen float assembly on cover. Check shaft and gears—must rotate freely when turned by hand.

Oil Pump Installation—Set #1 piston at top dead center. Insert distributor main drive shaft from top of block. Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx. parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut. Remove distributor shaft for cyl. head installation.

►*CAUTION—Check Ign. Timing after pump installed.*

RADIATOR

RADIATOR REMOVAL: Drain water, disconnect hose connections. Disconnect two tie rods at top of radiator. Remove nuts on mounting studs underneath radiator, lift radiator up and out.

RADIATOR REMOVAL: Drain water, disconnect hose connections. Take out radiator-to-shroud screws, 6 total (3 each side). Lift core out, tilting upper end to rear as core being raised.

PROPELLER SHAFT

CENTER SUPPORT BEARING: Consists of a ball bearing on rear end of front propeller shaft mounted in rubber in steel plate mounted on frame.

Removal & Disassembly—Disconnect front and intermediate universal joints, take off nuts on center support frame mounting bolts, remove front shaft and support bearing assembly. Clamp front shaft in a vise, remove bolt, lockwasher, and plain washer on rear end of shaft (in universal joint companion flange), pull companion flange using Puller C-452. Remove rear dust shield. Pull support plate off bearing insulator, remove bearing insulator. Use jaw type puller (KF-56) and pull bearing off shaft, remove front dust shield.

►***CAUTION—Do not wash bearing in gasoline or solvent.***

Reassembly—Install front dust shield and bearing (use driver KF-11) on splined end of front propeller shaft (bearing must support shield firmly). Place rubber insulator over bearing (small diameter to rear). Coat outer surface of insulator with liquid soap and slip support plate in place over insulator (flanged end of sleeve to front, insulator bottomed against bead on inside of sleeve). Install rear dust shield, companion flange, flat washer, lock washer, and bolt. Tighten bolt until flange and dust shield bottom against shaft shoulder (25-30 ft.lbs. torque).

Bearing Support Installation: When installing front propeller shaft and support bearing assembly in car, install washers and insulators on each support stud on frame cross-member in the following order: Spacer, Bushing, Front Support Insulator (fluted end to rear), Front Support Washer (has large hole), Support Bearing Plate, Rear Support Insulator (fluted end forward), Rear Support Washer (has small hole), and nut (tighten to 15-20 ft. lbs.).

►***CAUTION—Install center bearing support on frame studs so that sleeve in which bearing seated slopes downward toward the rear to provide correct propeller shaft angularity.***

HOOD LOCK: Hood is Alligator type. To raise hood, pull out on control button under left side of instrument panel, press down on safety catch tab beside latch under front edge of hood.
Hood Removal & Replacement—*See "Hood Assembly" in Kaiser Special Data.*

MODEL IDENTIFICATION

STARTING SERIAL NUMBERS

	Model	Serial Numbers
1947 Kaiser	K-100	K-100-001001 Up
1947 Kaiser Custom	K-101	K-101-2000001 Up
1948 Kaiser	K-481	K-481-001001 Up
1948 Kaiser Custom	K-482	K-482-001001 Up

SERIAL NUMBER: On left front door hinge post.
Body Number Note—Stamped on plate on left side of cowl or on right front face of dash.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Nameplate on left side of crankcase. NOTE—Numeral following Engine Model Designation (first part of Engine Number) indicates Engine Plant as follows: 4—Detroit, 8—Muskegon.
►**Engine Number Symbol (Special Bore & Bearing Sizes).** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Kaiser Special Data.* Note—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 115-125 lbs. (for 6.86-1 Heads), 120-130 lbs. (7.3-1 Heads) at cranking speed of 140 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.
►*NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.*

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .032"
Plug Type—Auto-Lite A-5 (normal driving), A-7 (for short runs or to correct hard-starting in cold climates). 14 mm. metric type.

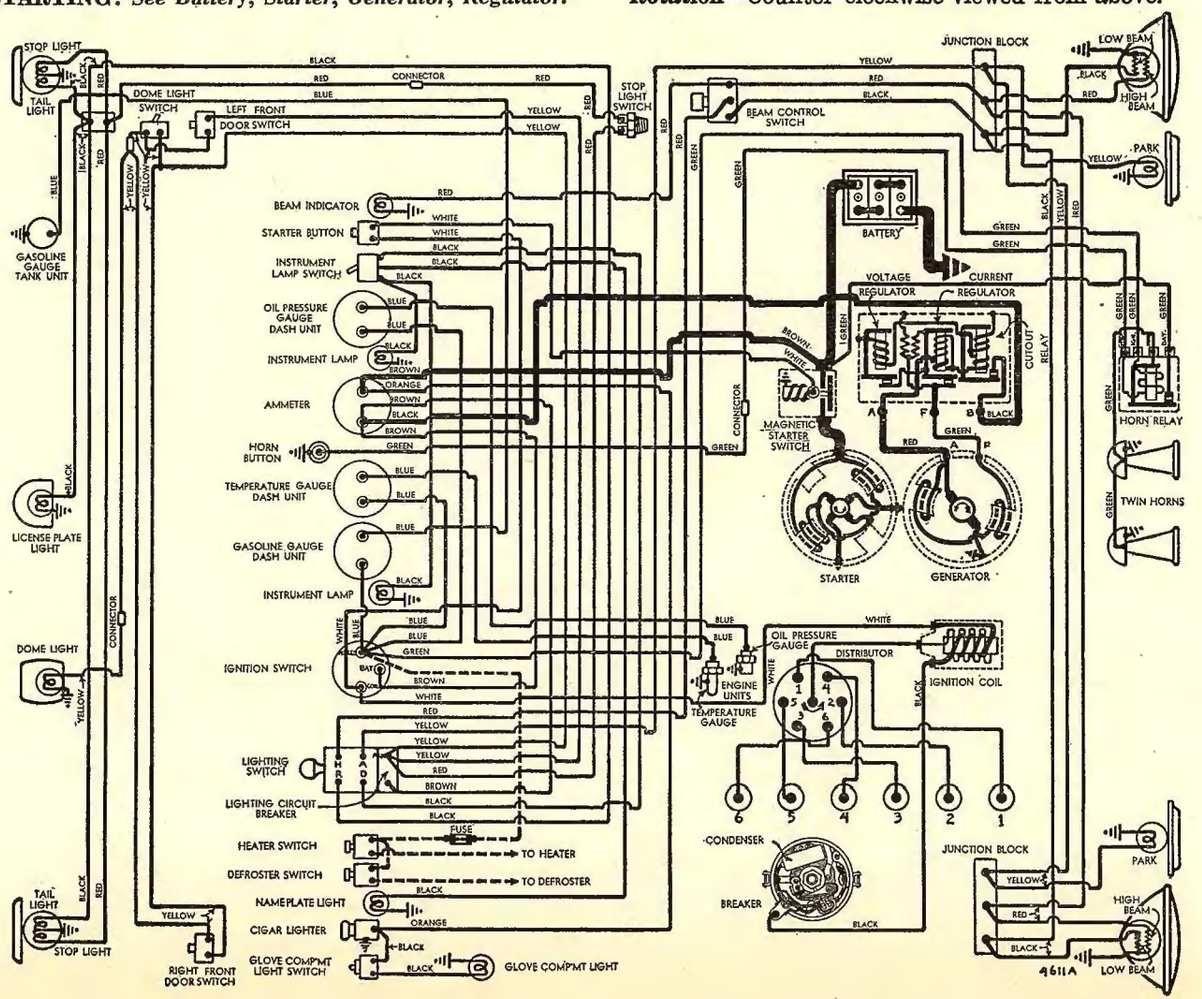
IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle or Dwell—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: TDC. (at Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—Mark "DC" on flywheel (first cars), on vibration dampener (beginning Eng. No. 17160).
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—¾-1¼ turn open—one screw (WA1 Carb.), 1¼-2¼ turns open—one screw (W1 Carb.), 1-1¾ turns open—2 screws (WCD Carb.). Turn screws out for richer mixture.
Idle Speed—550 RPM.
Float Level (WA1 Carb.)—5/16" (610S), ⅜" (622S with first Float and Inlet Valve), ½" (622SA, SB & 622S with late type Float and Inlet Valve). Measure from top of projection on bowl cover to top of soldered seam on free end of float with bowl cover assembly inverted.
Float Level (W1)—½" from top of float at free end to gasket seat on cover.
Float Level (WCD Carb.)—9/64" (685S with first type Inlet Valve), 1/16" (685S & 685SA with later type Inlet Valve) from top of each float to gasket seat on cover with valve closed (bowl cover assembly inverted).
Accelerating Pump—Lower Hole (med.) Normal.
NOTE—Pump on 574S has no seasonal adjustment.
Fuel Pump Pressure: 3½-4½ lbs. (for pump mounted at rear of engine), 3-4¼ lbs. (pump mounted at front of engine).
►*CAUTION—Pump pressure must not exceed 4½ lbs.*
►**VALVE TAPPET CLEARANCE:** *CAUTION—Two settings used.*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.
►**Adjustment Procedure**—*See Kaiser Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*
STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Douglas or Mitchellock. Kaiser Frazer No. 201354 (Before Kaiser No. K-100-65372 & Kaiser Custom No. K-101-2005405), No. 203186 (After above numbers).
Lock Cylinder—K-F No. 201898 (with key).
COIL: Auto-Lite Model IG-4093. Mounted on left side of cylinder head opposite distributor.
Ignition Current—3 amperes idling, 5 amperes at 6.4 volts (stopped).
CONDENSER: Auto-Lite No. IG-2671K.
Capacity—.20-.25 microfarad.
DISTRIBUTOR: Auto-Lite Model IGS-4211. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
IGS-4214 (Used on later '48 Cars)—*See "1949-50 Kaiser" for data on this Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.



Automatic Advance—IGS-4211

Distributor Degrees	RPM.	Engine Degrees	R.P.M.
Start	350	0	700
1	365	2	730
3	400	6	800
7	1150	14	2300
10	1700	20	3400

Octane Selector—Manual adjustment at distributor providing 10° advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGS-4211

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	8"
2°	4°	9½"
4°	8°	11¼"
6°	12°	12¾"
7.5°	15°	14"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting ..... At TDC.

TIMING MARK NOTE—Timing mark located on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 up). Consists of "DC" mark or "0" mark at top dead center with 1° graduations before and after this point.

Timing (with Timing Light C-693)—Mark "DC" or "0" top dead center mark on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 Up) with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at **400 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen clampscrew in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten clampscrew. Check octane selector setting.

►CAUTION—Reset engine idling speed at **550 RPM.**

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

CARTER WA-1

Carter WA1 Type 622SB superseding 622S & 622SA (All Models). 1¼" Single Barrel, Downdraft type with Fast Idle and Climatic Control.

►NOTE—622S carburetor can be converted to 622SA by installing new Float and Inlet Valve assembly and changing float level.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle (WA1 Carburetors): Carter Single Barrel

See Carburetion Equipment Section for data.

Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

Automatic Choke (WA1 Carburetors): Carter Climatic Control (Single Carburetor Type).

See Carburetion Equipment Section for complete data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER WCD

Carter WCD Type 685S superseded by 685SA (Optl. on Custom K-482). 1⅛" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.

►NOTE—685S carburetor can be converted to 685SA by installing new intake Needle & Valve Assembly and resetting float level to 685SA specifications.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle (WCD Carburetors): Carter Dual (WCD)

See Carburetion Equipment Section for complete data.

Setting—.016" throttle opening with choke valve held closed and throttle lever stopscrew backed off (adjust by turning fast idle screw in or out).

Automatic Choke (WCD Carburetors): Carter Climatic Control (Dual Carburetor Type).

See Carburetion Equipment Section for data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER W1

Carter W1 Type 574S. 1¼" Single Barrel, downdraft type with manual choke.

NOTE—This carburetor used for part production starting with following numbers: **K-100 51361, K-101 2000001.**

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

CARB. EQUIPMENT

Air Cleaner: AC Oil-bath type. Kaiser-Frazer No. 200618 (All Models with WA1 or W1 Carburetors), No. 203372 (K-482 Custom with WCD Carburetor).

Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with approx. 1 pint SAE No. 50 engine oil (No. 20 for below freezing tem.) at 1000 mile intervals or when engine tuned up (more often if required by operating conditions).

Fuel Pump (Early type—mounted at rear of engine): AC No. 1539057, K-F No. 200281. Diaphragm type.

►***CAUTION—Install this pump with rocker arm OVER camshaft eccentric.***

See Carburetion Equipment Section for data.

Pressure—3½-4½ lbs. maximum.

Fuel Pump (Later type—mounted at front of engine): AC No. 1539073 (K-F No. 201509) Diaphragm type fuel pump or AC No. 1539074 (K-F No. 202319) combination Fuel-and-Vacuum Pump.

Replacement Pump—AC No. 574 (for 1539073), No. 582 (for 1539074 fuel-and-vacuum pump).

►***CAUTION—Install these pumps with rocker arms UNDER camshaft eccentric.***

See Carburetion Equipment Section for data.

Pressure—3-4¼ lbs.

Gasoline Gauge: King-Seeley electric type.

Dash Unit—K-S No. 41405, Kaiser-Frazer No. 201545 (First Type—Ivory on Green), K-S No. 42015, Kaiser-Frazer No. 202786 (Later Type—White on Beige).

Tank Unit—K-S No. 7916, Kaiser-Frazer No. 201546.

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).

Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.

Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4043. Armature MAW-2128.

Drive—Barrel type Bendix Drive No. A1792.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
5.75 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
18.0 "	Lock	4.0	670

Starting Switch: Auto-Lite Model SS-4001 magnetic switch. Mounted on starter and controlled by push-button on instrument panel.

See Electrical Equipment Section for complete data.

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cables, take out flange mounting screws.

GENERATOR

Auto-Lite Model GDZ-4818A. Armature GDZ-2006F. Two brush type with voltage and current regulation.

Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM. or approximately 20 MPH.

Charging Rate Adjustment—None (see Regulator).

Cold Performance Data Hot					
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.

Belt Adjustment: ⅛" belt deflection midway between generator and fan pulleys (adjust by pulling generator out with 15 lb. force with all bolts loose).

REGULATOR

Auto-Lite Model VRP-4004F-2. Vibrating type Voltage and current regulators (with Cutout Relay) in case on left fender shield.

See Electrical Equipment Section for complete data.

NOTE—Regulator cover sealed. Warranty void if seals broken.

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Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel on left side of instrument panel (above starter button). Lighted when upper (country beams) in use.
Direction Signal (Custom Models): Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights above instrument dials. Lighted when direction signal on same side of car is operating.

Switches

Lighting—Kaiser-Frazer No. 200819.
Beam Selector—Kaiser-Frazer No. 201605.
Direction Signal—Kaiser-Frazer No. 202692.
Instrument—Kaiser-Frazer No. 200821 (Before Kaiser No. K100-46044), No. 202715 (Kaiser after No. K100-46044 & all Custom cars).

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Parking	3	63
Beam Ind., Clock	1	51
Instrument, Nameplate	1½	55
Stop & Tail	21-3	1154
Rear License	3	63
Dome, Glove Compt.	21	1129

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type. On back of lighting switch.
FUSES: Clock—2 ampere. In clock lead.
Direction Signal—9 ampere. In flasher lead under instrument panel to left of steering column.
HORNS: Auto-Lite. Model HT-4021 or HT-4023 (Low Note), HT-4022 or HT-4024 (High Note). Twin horns.
Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16". **Stroke**—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.86-1 (First Cars), 7.3-1 (All Cars after Eng. No. 304305—Detroit, 66125—Muskegon).
►*NOTE—7.3 Heads marked by "73" stamped on left front directly above engine number on block.*
Compression & Vacuum Reading—*See Tune Up data.*
TIGHTENING TORQUES: *See Kaiser Special Data.*
CYLINDER HEAD INSTALLATION: *See Kaiser Special Data.*
ENGINE REMOVAL: *See Kaiser Special Data.*
PISTONS: Two types used. Aluminum alloy, Cam-ground, Tin-plated, strut type with split skirt, or T-slot type. Length 3 9/16" (both types).
NOTE—Pistons can be identified by drilled oil drain holes in fourth ring groove and strut within skirt at each pin boss (Strut Type), or by horizontal slot in fourth ring groove and short vertical slot on one side of skirt (T-slot Type).
►*CAUTION—Piston weight different for each type.*
Weight—15.58 ozs. (strut type), 14.28 ozs. (T-slot).
Clearance—.0255-.0315" (Top Land). See Fitting new pistons.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.
Replacement Pistons—*See Kaiser Special Data.*
Installing Pistons: Slot in skirt toward left or away from camshaft (all types). NOTE—On pistons marked by arrow on head, arrow toward front of car.
PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled for oil drainage (all types), fourth groove drilled (strut type pistons), slotted (T-slot pistons).

Ring	Width	End Gap	Side Clearanec
Compr. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Compr. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3, 4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.
Replacement Rings—*See Kaiser Special Data.*
PISTON PIN: Diameter—55/64". **Length**—2 13/16". Floating type, with lock ring at each end.
Pin Fit in Piston—Tight fit (—.0003" clearance). or push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing: +.0003" clearance. When installing oversize pins or new bushings, ream bushings for this clearance with DD-82-2 Reamer (used also to ream piston pin bore in piston).
Replacement Pins: Std. size and .003", .005" Oversize.
CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
►*CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0023". **Sideplay**—.006-.010".
Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.
Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.
Installing Rods: Rods and bearing caps marked. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).
CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752".
►*CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0015-.002".
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation *See "Crankshaft & Main Bearings" in Kaiser Special Data.*
Replacement Bearings: Furnished Std. size and .002", .004", 010" Undersize. NOTE—Two types of #1 bearings (flanged & unflanged). See Endplay data.
End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between bearing journal and thrustwasher. **Endplay**—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*
CAMSHAFT: Four bearing. Two-sprocket chain drive. NOTE—Two different camshafts used due to relocation of fuel pump. Camshaft No. 200113 (first cars—pump at rear), No. 203017 (later cars—pump at front).
Journal Diameters—#1, 1 7/8"; #2, 1 13/16"; #3, 1 3/4"; #4, 1 1/4".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".
Bearing Adjustment: None. Replace bushings with camshaft removed.
End Thrust: Taken by thrust plate on front of engine Between front bearing journal and sprocket.
Camshaft Removal: *See "Camshaft & Bearings" in Kaiser Special Data.*
Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.
Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3395-.3387"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

NOTE—Valves with drilled stem (for lock pin) used on first cars, valves with grooved stem (for split type locks) used on later cars.
Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Use Driver DD-849. Drive old guide down and out, drive new guide down into place (same height as old guide with mark on driver stem in line with top face of block). NOTE—Tapered end of guide must be upward.
Valve Springs: Check spring with tester C-647. Pressure should be 101±3 lbs. at 1⅜". Spring free length 1 15/16".

ENGINE

CONTINUED FROM PRECEDING PAGE

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. NOTE—Lifters can be removed (some engines only) without disturbing cylinder head. *See "Valve System" in Kaiser Special Data.*
Clearance—.0005-.0018". With correct clearance, lifter should rotate in bore with a slight drag.
Replacement Lifters—Furnished Std. size and .0005", .001", .0015", .002" Oversize.

VALVE TIMING

►**Tappet Clearance:** *CAUTION—Two settings used:*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.
►**Adjustment Procedure**—*See Kaiser Special Data.*
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With tappet clearance set at .014" (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with the ten-degree mark after the dead center mark "DC" at indicator in flywheel housing inspection hole (before Eng. No. 17160). Beginning with Eng. No. 17160, marks located on dampener.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Under plug on right side of crankcase between #4 & #5 cylinders. Opens at 35 lbs. Adjustable by adding or removing washer, No. 200272, between end of spring and plug.
Oil Pan Removal: *See Kaiser Special Data.*
Crankcase Ventilation: Filter element in oil filler cap Outlet pipe located on front valve cover plate.
Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Kaiser Special Data.*
Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.
Oil Pressure Gauge: King-Seeley electric type.
Dash Unit—K-S No. 41410, Kaiser-Frazer No. 201539 (First Type—Ivory on Green), K-S No. 42020, Kaiser-Frazer 202787 (Later—White on Beige).
Engine Unit—K-S No. 40767, K-F No. 201540.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostat.
Capacity (First 22" Radiator)—15 qts. (14 qts. at driving level). **(Later 17" Radiator)** 13½ qts. (13 qts. at driving level).
Pressure Valve—AC. No. 846740 (Radiator Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).
Radiator: Two types used as follows:
First Cars—No. 200445 (22" wide). Service by installing later type (No. 202906) and installing Radiator Shroud Side Panel Extension No. 203100 (two required), using No. 576 screws (10 required).
Later Cars—Radiator No. 202906 (17" wide).
Radiator Removal—*See Kaiser Special Data.*
Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 148-155°F.
Temperature Gauge: King-Seeley electric type.
Dash Unit—K-S No. 41415, Kaiser-Frazer No. 201543 (First Type—Ivory on Green), K-S No. 42025, Kaiser-Frazer 42025 (Later—White on Beige).
Engine Unit—K-S 40380, Kaiser-Frazer 201550.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck.....**Model 9A7**
Auburn (Some Cars).....**Model 9251-15**
Clutch Identification—Types can be identified by number of pressure plate springs—3 (Auburn), 9 (Borg & Beck—cover also stamped "951").
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven asbestos, 2 required. I.D. 6". O.D. 9¼". Thickness ⅛".
Facings (Auburn)—Moulded metallic or Raybestos, 2 required. I.D. 6". O.D. 9¼. Thickness .135".
Pedal Adjustment: Pedal free travel ¾-1". To adjust, position nut on pedal assist spring link (at rear end of spring) so that it is lined up with spring adjusting gauge, KF-10, installed on spring.
Removal: Remove transmission (see Transmission Removal below), remove clutch housing underpan, disconnect clutch pedal cross-shaft from pedal linkage. Install Clutch Plate Aligning Arbor, C-360, to hold clutch parts in alignment, take out mounting screws in clutch cover flange (rotate flywheel so that all screws accessible through pan opening). Remove aligning arbor, remove clutch cover assembly and driven member through underpan opening.

TRANSMISSION

Warner Model AS11-T86E. All helical gear type. Constant-mesh, synchro-mesh (Second and High), sliding gear (Low and Reverse).
See Transmission Section for complete data.
Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.
Removal: Disconnect front propeller shaft at front universal joint (take out bolts in transmission companion flange), move shaft out of the way. Disconnect speedometer drive cable and transmission control levers at transmission case, free parking brake cable support bracket from frame cross-member. Remove four bolts mounting engine support on frame cross-member (support comes out with transmission). Loosen all four bolts mounting transmission on clutch housing, remove two lower bolts only (CAUTION—two upper bolts must support transmission until ready for removal). Remove flywheel housing underpan, raise rear end of engine (place jack under flywheel, use wood block between jack and flywheel) for sufficient clearance for transmission removal. Remove the two upper transmission mounting bolts, move transmission back until clear of clutch, slide tranmission clear of cross-member and remove from beneath car.

UNIVERSALS

Detroit Series 4200. Ball-and-trunnion type or **Mechanics.** Roller bearing type. Three used with intermediate universal at propeller shaft support
See Universals Section for complete data.
Propeller Shaft & Support Bearing: Two shafts used:
Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Kaiser Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.09-1 Std., 3.73-1 Special.
Backlash—.003-.006". Shim adjustment.
Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out using Puller KF-15.
Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential pinion), then adjust endplay at left wheel. **Endplay**—.001-.006".

SHOCK ABSORBERS

Monroe. Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

	Front	Rear
Kaiser-Frazer No. (Std.)	201490	201493
Kaiser-Frazer No. (Exp.)	202864	202866

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾—5¾° crosswise.
Caster—0° preferred (—1° to +1°).
Camber—¼° preferred (0° to ¾°).
Toe-In—1/16". Adjust by turning both tie rods
Steering Geometry (Toe-out): Inner wheel 23°. Outer wheel 20°. No adjustment. Check for bent steering arms.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
NOTE—Both "2-tooth Roller" and "3-tooth Roller" types used. Both gears are similar design.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 11"
Clearance—.008" at heel and toe of each shoe.
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Hand Brake: See Service brake data (above).

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1949 Numbers—Model K-1491—K-491-001000 and up, Deluxe K-492—K-492-001000 and up.
1950 Numbers—Prefixed by K-501 (Special and Traveler), K-502 (Deluxe).
Body Number Note—Stamped on plate on right front face of dash in engine compartment.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.
NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes).** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Kaiser Special Data.* Note—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. (7.3-1 Heads) at cranking speed of 70 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.
NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4 .See diagram.

SPARK PLUG GAPS: .032".
Plug Type—Auto-Lite A-5 or AR5.

DISTRIBUTOR: Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.

►***CAUTION—Engine must be idling below 450 RPM. when setting timing.***
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:
Idle Setting—(WA1) ¾-1¾ turns open—one screw. (WCD) 1-1½ turns open—two screws. Turning screws out gives richer mixture.
Idle Speed—550 RPM.
Float Level (WA1 Carb.)—½" from top of projection on bowl cover to top of soldered seam on free end of float (bowl cover inverted).
Float Level (WCD Carb.)—Flush to 1/32" from top of each float to gasket seat on cover with valve closed (floats must hang free on inverted cover).
Accelerating Pump—(WA1) Lower Hole, med., Normal. (WCD) Lower Hole, short stroke, Normal.

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4½ lbs. (pump mounted at front of engine).

►***CAUTION—Pump pressure must not exceed 4½ lbs.***

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.

►**Adjustment Procedure**—*See Kaiser Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Kaiser&Frazer No. 204485.
Lock Cylinder—Kaiser-Frazer No. 203885 (with key).

COIL: Auto-Lite IG-4093, IG-6001 or 9A. On left side of engine opposite distributor.
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.

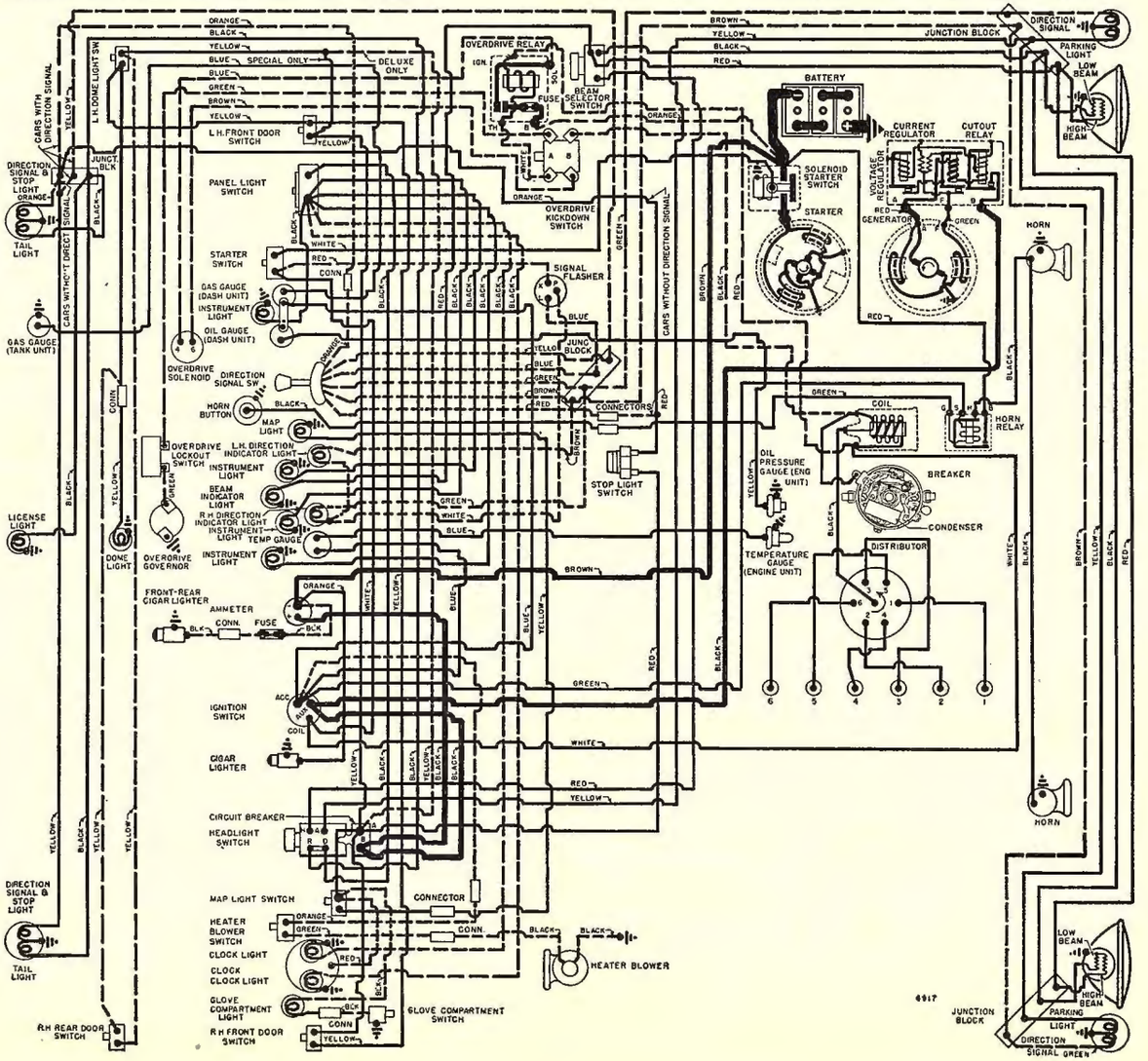
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.



Vacuum Advance		
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting.....4° BTDC.
Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.
Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine **below 450 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten cap screw. Check octane selector setting.
►*CAUTION—Reset engine idling speed at 550 RPM.*
Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

CARTER WA-1

Carter WA1 Type 622SB. (Special). 1¼" Single Barrel, Downdraft with Carter Climatic Control.
Casting No. on Flange—309.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle (WA1 Carburetors): Carter Single Barrel.
See Carburetion Equipment Section for data.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).
Automatic Choke (WA1 Carburetors): Carter Climatic Control (Single Carburetor Type).
See Carburetion Equipment Section for data.
Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER WCD

Carter WCD Type 723S (Deluxe)—1¼ Dual (Double barrel), Downdraft type with Fast Idle and Climatic Control.
Casting No. on Flange—550.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Dual (WCD) type.
See Carburetion Equipment Section for complete data.
Setting—.018" throttle opening with choke valve held closed and throttle lever stopscrew backed off.
Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
See Carburetion Equipment Section for data.
Setting—Centered (coil housing at index mark).

CARB. EQUIPMENT

Air Cleaner: (Special). AC #1544029 Oil-bath type.
Element—AC No. 7-S.
Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with SAE No. 50 engine oil (No. 20 for below freezing temp.) at 2000 mile intervals or when engine tuned.
Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.
►*CAUTION—Install pump with rocker arms UNDER camshaft eccentric.*
See Carburetion Equipment Section for data.
Pressure—3-4¼ lbs.
Gasoline Gauge: King-Seeley electric type.
Dash Unit—K-S No. 42455.
Tank Unit—K-S No. 7916.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100D—6 Volt, 15 Plate, 105 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4054. Armature MAW-2128.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data			
Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
8.50 "	400	4.0	400
6.0 "	Lock	2.0	335

Starting Switch: Magnetic switch K-F Part No. 204752 on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.
Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws.

GENERATOR

35 Amp.....Auto-Lite GDZ-4818A. Arm. GDZ-2006F.
45 Amp.....Auto-Lite GGU-6001B. Arm. GGU-2006F.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance Data (GDZ-4818A)			
Amperes	Volts	Cold—R.P.M.—	Hot
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GGU-6001B)			
45	8.0	1550 Max.	———

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.60-1.78 amperes at 6.0 volts, (GGU) 1.6-1.8 —amperes at 6.0 volts.
Motoring Current—(GDZ) 4.16-4.60 amps. at 6.0 volts, (GGU) 5.5-6.5 amperes at 6.0 volts.
Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.
Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

REGULATOR

35 Amp.—Auto-Lite VRP-4004F-2.....for GDZ Gen.
45 Amp.—Auto-Lite VAV-4002C.....for GGU Gen.
Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—As follows:
VAV-4002C 44-46 amperes (marked '45' on cover).
VRP-4004F-2 34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: (Deluxe) Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Lighting—Kaiser-Frazer No. 203830.
Beam Selector—Kaiser-Frazer No. 204545.
Instrument Panel—Kaiser-Frazer No. 203833.
Courtesy (on Instrument Panel)—K-F No. 203662.
Door—Kaiser-Frazer No. 204229.
Dome Lamp—Kaiser-Frazer No. 204779.
Stop Lamp—Kaiser-Frazer No. 201466.
Direction Signal—Kaiser-Frazer No. 204551.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.
FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Cigar Lighter—30 amperes. In lead back of instrument panel.
HORNS: Auto-Lite or Sparton—A-L HW-4017 (Low Note), HW-4018 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.

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Horn Relay: Auto-Lite Model HRL-4101—Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core.

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145"). *See "Original Bore & Pistons" in Kaiser Special Data.*
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower (with Single Carb.)—100 at 3600 RPM.
Developed Horsepower (with Dual Carb.)—112 at 3600 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

TIGHTENING TORQUES: *See Kaiser Special Data.*

CYLINDER HEAD INSTALLATION: *See Kaiser Special Data.*

ENGINE REMOVAL: *See Kaiser Special Data.*

PISTONS: Aluminum alloy, Cam-ground. Tin-plated, T-slot type. Length 3 9/16".
Clearance—See Fitting new pistons.

►*CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.*

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.
Replacement Pistons—*See Kaiser Special Data.*
Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.
Replacement Rings—*See Kaiser Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-.8595" for new std. pins.
►**CAUTION**—Pin bushing must protrude 1/64" in each side of rod.
Replacement Pins: Std. size and .003", .005" Oversize.
CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".

►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.
Replacement Bearings: Furnished Std .Size and .001", .002", .010", .012" Undersize.
CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.
Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".

►*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Bearings—Removable, steel-backed, babbitt-lined.
Clearance—.0005-.0015".
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*
Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.
End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between front crankshaft thrust washer (ahead of #1 bearing) and crankshaft thrust plate (behind crankshaft sprocket).
Endplay—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*

CAMSHAFT: Four bearing. Two-sprocket chain drive.
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I. D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".
Bearing Adjustment: None. Replace bushings with camshaft removed.
Replacement Bushings: Replace as set (furnished finished line-bored and do not require reaming after installation). Use KF-4 Camshaft Bearing Remover & Replacer.
►*CAUTION—Align oil hole in bushings and block.*
End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket **Endplay**—.003-.007".
Camshaft Removal: *See "Camshaft & Bearings" in Kaiser Special Data.*

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.

►*Timing Chain Caution—Morse and Link Belt chains used. Interchangeable only as complete sets with both sprockets.*
Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.
Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. Two types used and are interchangeable. One type using tappet adjusting screw with locknut, other type is self-locking.
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize. Oversize identified as follows: "A" .0005", "B", .001", "C", .0015", "D", .002", "K" .005", "S", .008".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.
►**Adjustment Procedure**—*See Kaiser Special Data.*
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .014" tappet clearance (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Located in right side of cylinder block below the valve chamber and toward the rear of engine. Adjustable by replacing spring or install washers No. 200272 between end of spring and plug.
Oil Pan Removal: *See Kaiser Special Data.*
Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine. NOTE—Two types of valve cover and outlet pipe assemblies used—can be identified by angle of cut-off at lower end of tube: (Early 1949 Cars) angular cut-off faces **forward.** (Later 1949 Cars) angular cut-off faces toward **rear.**
►*CAUTION—Do not install later valve cover & outlet pipe assembly on early cars (may cause loss of oil through tube).*

Oil Pump: Gear type. In crankcase.
Oil Pump Servicing—*See Kaiser Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

Oil Pressure Gauge: King-Seeley electric type.
Dash Unit—K-S No. 42460.
Engine Unit—K-S 40767 (1949), 40790 (1950).
See Miscellaneous Section for complete data.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostatic control.
Capacity—13½ qts. (13 qts. at driving level).
Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Radiator: No. 202906 (17" wide). Side mounted to shroud with six bolts.
Radiator Removal—*See Kaiser Special Data.*

Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley electric type.
Dash Unit—K-S No. 42465.
Engine Unit—K-S 40380 (212°), 42553 (224°).
See Miscellaneous Section for complete data.

CLUTCH

Pass. Cars.....Auburn 9251-15 or Borg & Beck 9A7
Taxi.....Borg & Beck 10A7

►**Clutch Identification**—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (Borg & Beck—cover marked 951 (9A7), 948 (10A7).
See Clutch Section for complete data.
Facings (Auburn)—Moulded metallic or Raybestos. 2 required. I. D. 6". O. D. 9¼". Thickness .135".
Facings (Borg & Beck)—Woven asbestos, 2 required. I. D. 6" (7" 10A7), O. D. 9¼" (10" 10A7). ⅛" thick.

Pedal Adjustment: Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bellcrank. Turn clevis end in or out to obtain correct pedal free movement. Install adjusting link clevis on bellcrank, insert clevis pin, cotter pin, and return spring.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, using Flywheel Turning Tool C-771 and loosen six bolts equally before removing. Remove clutch pressure plate and cover assembly and clutch disc.

TRANSMISSION

Warner Model AS23-T86E (Std.), Model AS24-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, disconnect propeller shaft at front companion flange. Free engine rear support from crossmember by taking out two insulator bolts at transmission. Disconnect and remove master cylinder operating rod. Disconnect hand brake cable at equalizer and engine rear crossmember. Remove eight bolts at frame side rails and remove crossmember. Remove four bolts holding transmission to clutch housing and pull out the transmission. (If overdrive is installed it will be removed with transmission).

OVERDRIVE

Warner Type R10B (with special AS24-T86E Transmission)—Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."
See Transmission Section for complete data.
Overdrive Solenoid—D-R 1118132, K-F No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001 or 1A. Has 20-ampere fuse on BAT terminal.
Kick-down Switch—Kaiser-Frazer No. 203451.
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Disconnect front propeller shaft at front companion flange and move shaft away from housing. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

UNIVERSALS

Detroit Series 4200. Ball-and-Trunnion. 3 used with intermediate universal at propeller shaft support.
See Universals Section for complete data.

Propeller Shaft & Support Bearing: Two shafts used with support bearing on frame cross member at intermediate universal. *See "Propeller Shaft" in Kaiser Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (491)—4.09-1 Std., 3.73-1 or 3.91-1 Optl.
Ratio (492)—3.91-1 Std., 4.27-1 or 4.55-1 with O. D., 3.73-1 or 4.09-1 Optl.
Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABSORBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5½° preferred (4¾-5¾° crosswise).
Caster—0° preferred (—1° to +1°).
Camber—¼° preferred (0° to ¾°).
Toe-In—1/16". Adjust by turning both tie rods.
Steering Geometry (Toe-out)—Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
►*SELF ADJUSTING BRAKE NOTE*—Used on a limited number of cars during 1949-50 production. *See "Wagner Lockheed" Brakes in Brake Section for complete data.*
Drums—Composite (cast-iron & steel). Diameter 11"
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Clearance—.008" at heel and toe of each shoe.
Braking Power—56% Front wheels, 44% Rear.

Hand Brake: See Service brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate located on left front pillar post.

Body Number Note—Stamped on plate on right front face of dash in engine compartment.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.

NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes).** ***See "Original Bore & Pistons" Kaiser Special Data.***

NOTE—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. at cranking speed.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See Diagram.

SPARK PLUG GAPS: .032" (A-5 plug), .040" (AR-5 plug).

Plug Type—Auto-Lite A-5 or Resistor type AR-5. 14 mm.

DISTRIBUTOR (Delco-Remy): Breaker Gap—.022".
Cam Angle—31°-37°.
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—***See Ignition.***
Condenser Capacity—.18-.23 microfarad.

DISTRIBUTOR (Auto-Lite): Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—***See Ignition.***
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—***See Ignition Timing.***
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.

►***CAUTION—Engine must be idling below 450 RPM. when setting timing.***

Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:
Idle Setting—½ to 1 turn open—2 screws. Turn screws out for richer mixture.
Idle Speed—550-600 RPM (Std.), 425-450 RPM (Hydra-Matic).
Float Level—(Early Production, Spring Loaded Needle & Seat assembly)—7/64". (Later Production, Solid Needle & Seat assembly) ¼", measured from machined surface of bowl cover to top of float with bowl cover inverted.

►***CAUTION—When measuring float level do not depress float lip against spring in needle, but let float rest of its own weight. Adjust by bending lip of float, not float arm.***

Accelerating Pump—No seasonal adjustment. ***See Carburetor Section for complete data.***

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4½ lbs. (pump mounted at front of engine).

►***CAUTION—Pump pressure must not exceed 4½ lbs.***

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.

►**Adjustment Procedure**—***See Kaiser Special Data.***
Valve Timing Check—***See Valve Timing.***

STARTING: ***See Battery, Starter, Generator, Regulator.***

IGNITION

DELCO-REMY

IGNITION SWITCH: Kaiser & Frazer No. 207760.

COIL: Delco-Remy No. 1115328.
Ignition Current—5 amperes at 6 volts (stopped).

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

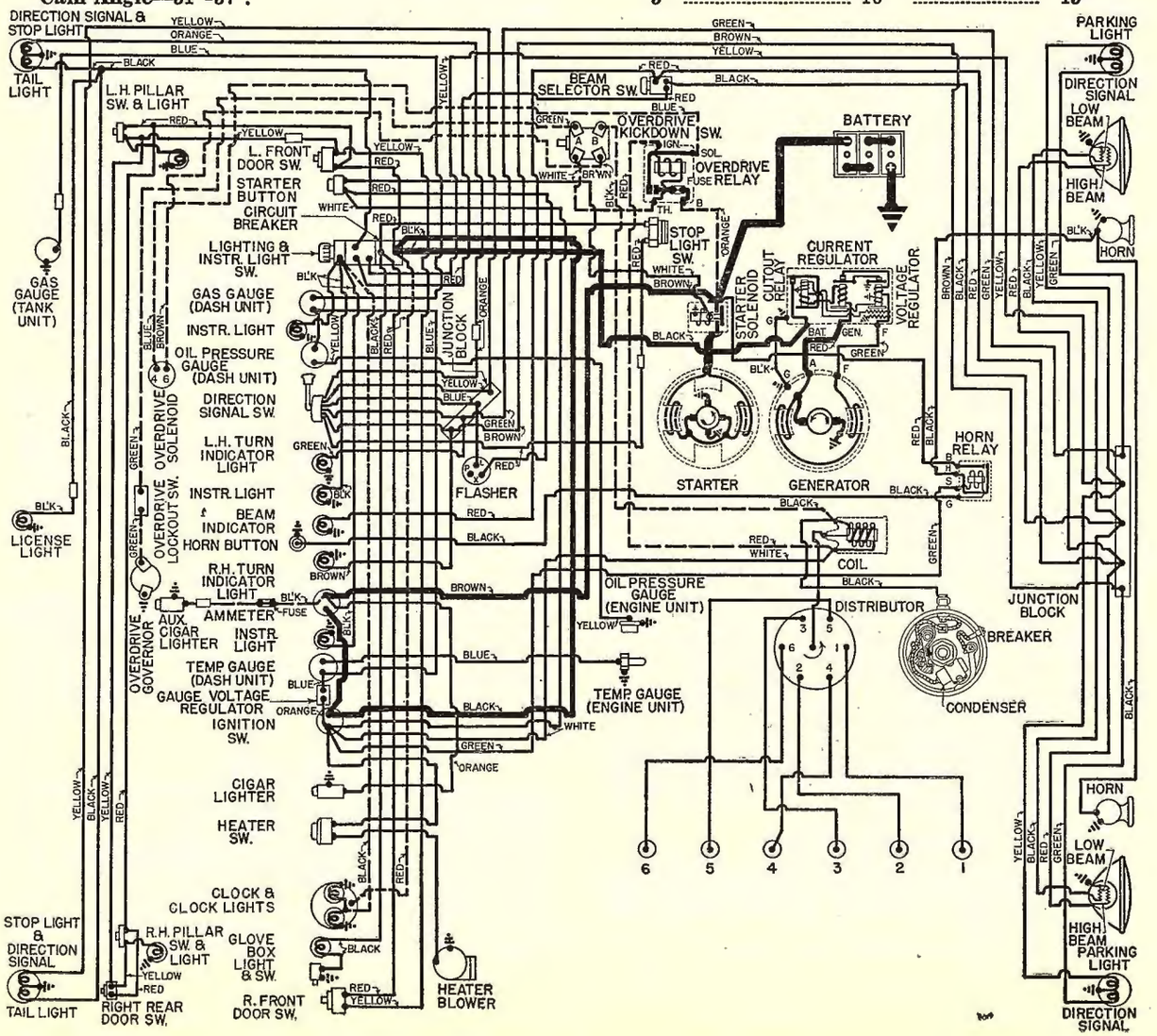
DISTRIBUTOR: Delco-Remy No. 1110224. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
Breaker Gap—.022".
Cam Angle—31°-37°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Engine Degrees	Engine R.P.M.
Start	300	0	600
2	600	4	1200
6	1180	12	2360
8	1460	16	2920
10	1600	20	3200

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Delco-Remy (integral type).

Vacuum Advance Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"



AUTO-LITE

COIL: Auto-Lite No. CR-6009A.
Ignition Current—4.8 amperes at 6.3 volts (stopped)
CONDENSER: Auto-Lite No. IG-2671K.
Capacity—.20-.25 microfarad.
DISTRIBUTOR: Auto-Lite No. IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	Eng. R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.
Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

IGNITION TIMING

Std. Setting—**4° BTDC.**
Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.
Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine **below 450 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten cap screw. Check octane selector setting.
►*CAUTION*—Reset engine idling speed to 550 RPM on cars with Synchro-mesh transmission.
Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

Carter WGD Type 781S. 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.
Casting No. on Flange—774.
See Carburetor Section for complete data.
►**CARBURETOR CHANGE (to Correct Hard Starting & Flooding)**—***See Carburetor Section for complete data.***
Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***
Fast Idle: Carter Dual (WGD) type.
Setting—With thermostatic coil housing gasket and baffle plate removed, crack throttle valve and hold choke valve closed. There should now be .018" to .023" clearance (gauge T109-29) between throttle valve and bore of carburetor (side opposite idle port). Adjust by bending the choke connector rod at lower angle bend.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
Setting—Centered (coil housing at index mark).
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: (Special). AC #1544029 Oil-bath type.
Element—AC No. 7-S.
Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.
►***CAUTION—Install pump with rocker arm UNDER camshaft eccentric.***
Pressure—3-4½ lbs.
See Carburetion Equipment Section for data.
Gasoline Gauge: King-Seeley "CV" (Constant Voltage) type, with voltage regulator.
Dash Unit—K-S No. 45507.
Tank Unit—K-S No. 44504.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100D—6 Volt, 15 Plate, 105 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

DELCO-REMY

Delco-Remy No. 1107087 (Standard), Delco-Remy No. 1107088 (Hydra-Matic). Armature No. 1878077.
Drive—Barrel type Bendix Drive. D-R No. 1878079.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	5000	5.0	65
12 ft. lbs.	Lock	3.4	525

Starting Switch: Magnetic switch on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.

AUTO-LITE

Auto-Lite Model MAW-4054. Armature MAW-2138.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
12.0 "	Lock	3.0	505
6.0 "	Lock	2.0	335

GENERATOR

DELCO-REMY

Delco-Remy No. 1102733. Armature No. 1879002.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None. ***See Regulator.***
Maximum Charging Rate—35 amperes, cold, at 8 volts, 1800-2000 RPM.

Performance Data

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

①—Not maximum output. See Current Regulator
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.
Field Current—1.75-1.90 amps. at 6 volts.
Motoring Current—4.2-4.6 amps. at 6 volts.
Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

AUTO-LITE

Auto-Lite Model GDZ-6001F. Armature No. GGY-2006F. Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance (GDZ-6001F)

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
17	8.0	1350-1500 — 1550-1700
35	8.0	1800-2000 — 2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 amperes at 5.0 volts.
Motoring Current—3.9-4.4 amperes at 5.0 volts.
Belt Adjustment: See Belt Adjustment (above).

REGULATOR

DELCO-REMY

Delco-Remy 1118302. Voltage Current type.
►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

Current Regulator

Setting—32-40 amperes hot, (set at 36 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

AUTO-LITE

Auto-Lite No. VRP-6001A (for GDZ-6001F generator).
Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts ,approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (Without Breaking Seal) & Adjustment—***See Electrical Equipment Section.***
Contact Gap—.012: Min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

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Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (Without Breaking Seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: (Deluxe) Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Headlight & Instrument—Kaiser-Frazer No. 207782.
Beam Selector—Kaiser-Frazer No. 204545.
Dome Lamp—Kaiser-Frazer No. 204779.
Direction Signal—Kaiser-Frazer No. 204551.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.

FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Rear Seat Cigar Lighter—30 ampere. In lead back of instrument panel.

HORNS: Auto-Lite, Sparton or Delco-Remy—A-L HW-4017 (Low Note), HW-4018 (High Note). D-R No. 1999649 (Low Note), D-R No. 1999650 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.

Horn Relay: Relay connected through ignition switch (horns operative only with ignition switch "on").

GAUGE VOLTAGE REGULATOR: King-Seeley—No. 45550. Thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ignition switch, and the gauge circuits. See Wiring Diagram.

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145").
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3
Developed Horsepower—115 at 3650 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Kaiser Special Data.*

PISTONS: Aluminum alloy, Cam-ground. Tin-plated, T-slot type. Length 3 17/32".
Clearance—See Fitting new pistons.
►***CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.***

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.

Replacement Pistons: *See Kaiser Special Data.*

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.

Replacement Rings: *See Kaiser Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-.8595" for new std. Pins.
►***CAUTION***—Pin bushing must protrude 1/64" on each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
►***CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.***
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0018". Side Play—.006-.010".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.
CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".
►***CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.***
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0007-.002".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.

End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between front crankshaft thrust washer (ahead of #1 bearing) and crankshaft thrust plate (behind crankshaft sprocket).
End Play—.002-.006".

CAMSHAFT: Four bearing. Two-sprocket chain drive.
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I.D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set. Use KF-4 camshaft bearing remover and replacer.
►***CAUTION—Align oil hole in bushings and block.***

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket. **Endplay**—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.
►***Timing Chain Caution—Morse and Link Belt chains used. Chains and sprockets not interchangeable.***

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	30°	.3520"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width: 5/64" (max.).

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.

Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32". Free length 1 31/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. Two types used and are interchangeable. One type using tappet adjusting screw with locknut, other type is self-locking.
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize. Oversize identified as follows: "A", .0005", "B", .001", "C", .0015", "D", .002", "K", .005", "S", .008".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.
►**Adjustment Procedure**—*See Kaiser Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .020" tappet clearance, #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Adjust by replacing spring or install washers between end of spring and plug.

Oil Pan Removal: *See Kaiser Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine.

Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Kaiser Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

Oil Pressure Gauge—King-Seeley "CV" (Constant Voltage) type, with voltage regulator.
Gauge Voltage Regulator used. *See Misc. Electrical.*
Dash Unit—K-S No. 45511.
Engine Unit—K-S No. 44030.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with thermostatic control.
Capacity—13½ qts. (13 qts. at driving level).
Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) type, with voltage regulator.
Dash Unit—K-S No. 45514.
Engine Unit—K-S No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 9251-18 or Borg & Beck 9A7 No. 951. Single plate dry disc type.
Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (Borg & Beck). Borg & Beck cover marked 951.
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven Asbestos, 2 required. Inside Diam. 6". Outside Diam. 9¼". Thickness ⅛".
Facings (Auburn)—Molded metallic or Raybestos. 2 required. I.D. 6". O.D. 9¼". Thickness .135".

Pedal Adjustment—Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bell-crank. Turn clevis end in or out to obtain correct pedal free movement.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, and loosen six bolts equally before removing.

TRANSMISSION

Warner Model AS49-T86E (Std.), Model AS50-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, and disconnect propeller shaft. Free engine rear support from crossmember by removing insulator bolts at transmission. Disconnect master cylinder. Disconnect hand brake cable to clear crossmember. Remove bolts from side rails holding crossmember and remove crossmember. Remove transmission to clutch housing mounting bolts and pull out transmission.

OVERDRIVE

Warner Type R10B (with special AS50-T86E Transmission)—Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle "kickdown."
See Transmission Section for complete data.
Overdrive Solenoid—D-R 1118132, K-F No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001A, K-F Part No. 201636. Has 20-ampere fuse on BAT terminal.
Kick-down Switch—Kaiser-Frazer No. 203451.
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

HYDRA-MATIC DRIVE

Four-speed planetary type automatic transmission and fluid coupling.
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Automatic Transmission Fluid Type "A").
Capacity—Approx. 11 qts. (refilling and draining). 12 qts. (when transmission disassembled).
Checking Fluid Level—Check only with transmission warm (set hand brake, run engine with selector in "N"). With transmission oil hot, idle engine for at least two minutes, then check with engine running and selector in "N". Dip stick located under inspection hole cover in floor pan under front floor mat. Add fluid as required to bring level up to "F" mark on stick.

►*CAUTION—Do not fill above "F" mark on dip stick.*
Draining & Refilling—*See "Kaiser-Frazer Hydra-Matic Drive" in Transmission Section.*

Removal: *See "Hydra-Matic" in Transmission Section.*
►**Hydra-Matic Neutral Switch—Delco-Remy No.** 1997846. At lower end of steering column.
►**Neutral Switch Adjustment**—*See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer—Two used. Needle bearing cross type. Front yoke slides on transmission mainshaft splined extension.
See Universals Section for complete data.

REAR AXLE

Spicer (Salisbury) Model 41-2—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Ratio—3.9-1 (Std.), 4.55-1 (with O.D.), 3.54-1 (with Hydra-Matic).
Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft, hydraulic brake line at axle housing, rear shock absorbers, and parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.

Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABSORBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5½° preferred (4¾-5¾° cross-
King Pin Inclination—5½° preferred.
Camber—½° preferred (0° to ¾°).
Toe-In—1/8" preferred (1/16-1/8"). Adjust by turning both tie rods.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter11"
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Clearance—.010" at heel and toe of each shoe.
Braking Power—55.5% Front wheels, 44.5% Rear.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

WINDSHIELD WIPER: (Deluxe Models)—Auto-Lite No. EWJ-4004. Electric type. **(Standard Models)**—Vacuum type, cable operated.
See Miscellaneous Section for complete data.

ENGINE HOOD & SIDE PANEL REMOVAL:—*See Cadillac Shop Notes for complete instructions.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER:—First number 2290601. Stamped on left side of crankcase at rear of left cylinder block and on left frame side member opposite steering gear.

TUNE-UP

COMPRESSION:—Ratio—6.25-1 Std., 5.75-1 Optl.

Pressure—155 lbs. at 1000 R.P.M. or approximately 110-115 lbs. at cranking speed for Std. head.

VACUUM READING: Steady 20-21" idling at 7-8 MPH.

FIRING ORDER: 1-8-7-3-6-5-4-2. See diagram for cylinder numbering and spark plug cable connections.

SPARK PLUGS: AC No. 104. 10 mm. Metric type.

Gaps—.025-.030"

NOTE—Do not tighten these small plugs excessively (7-10 ft. lbs. tension).

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.015" **Cam Angle** 31° (closed).

Automatic Advance—12° max. at 2000 RPM (distr.).

IGNITION TIMING: See Ignition Timing.

Std. Setting—5° BTDC. with crankshaft pulley mark "IGA" at indicator on front of engine.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Both idle screws ½-1½ turns open. Idle speed 7-8 MPH.

Float Level—⅛" from top of float to gasket seat on cover with valve seated (invert to check).

Accelerating Pump—Not adjustable.

Fuel Pump Pressure: 4½ lbs. maximum.

VALVES: See Valve Timing.

Tappet Clearance—None in Service (hydraulic type take-up used).

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Delco-Remy No. 1865711. Connected to coil by armored cable.

Ignition Lock—Briggs & Stratton No. 45792. Key Series—8000 to 9499. Groove—No. 15.

COIL: Delco-Remy No. 1115128. Mounted on dash.

Ignition Current—2.2 amperes idling, 4.4 stopped.

CONDENSER: Delco-Remy Part No. 1869704.

Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110604. Single breaker, 8 lobe cam, full automatic advance type with manual adjustment at distributor.

Breaker Gap—.0125-.0175".

Cam Angle or Dwell—31° closed, 14° open (distr.).

Breaker Arm Spring Tension—22 ounces.

Rotation—Clockwise viewed from the top.

Automatic Advance

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	500	1	1000
3	820	6	1640
6	1200	12	2400
9	1600	18	3200
12	2000	24	4000

Manual Adjustment—Permits 10° advance or retard from center position. See Ignition Timing for adjustment.

Removal:—Distributor mounted between cylinder banks at rear of engine. To remove, take out two capscrews in mounting bracket. NOTE—When installing distributor, turn crankshaft to firing position for #1 piston, mesh distributor drive gear so slot in upper end of shaft is offset toward rear or left hand side of engine.

IGNITION TIMING

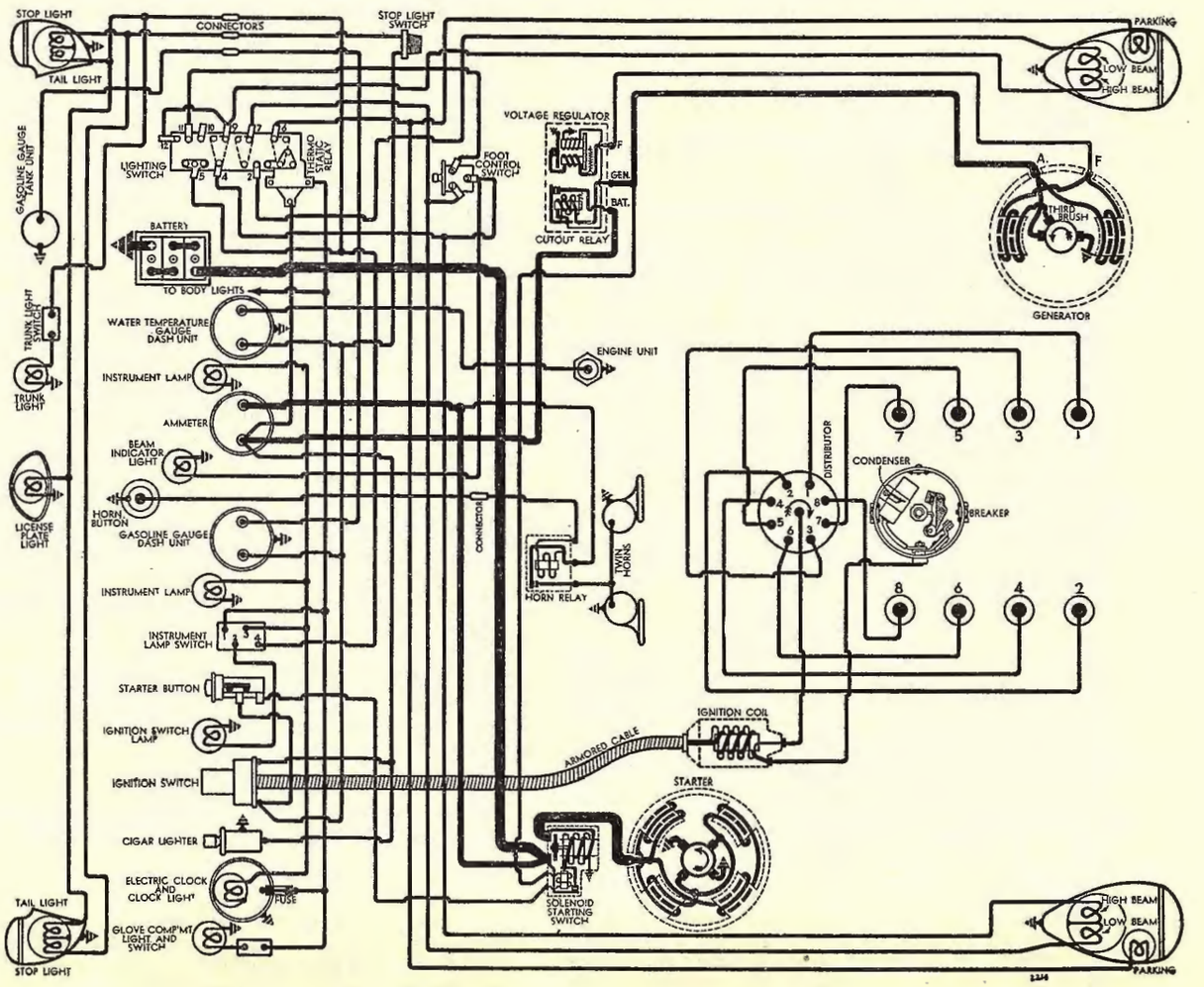
IGNITION TIMING:—As given below for fuel of 70 octane rating. See Manual Adjustment (following) for correction dependent on fuel regularly used.

Flywheel Degrees	Piston Position
5° BTDC	.0114" BTDC

Timing (With Synchroscope)—This method recommended by manufacturer. Clip synchroscope lead to #1 spark plug, direct light on crankshaft pulley, idle engine. Loosen hold-down screw in advance arm, rotate distributor until 'IG/A' mark on pulley (5° before dead center mark 'C.1/6') appears in line with pointer on chain case cover, tighten hold-down screw. Adjust for fuel (see Manual Adjustment).

Timing (Without Synchroscope)—Turn engine over to firing position for #1 piston (front piston, left bank) with crankshaft pulley mark 'IG/A' (5° before dead center mark 'C.1/6') lined up with pointer on chain case cover. Loosen hold-down screw in advance arm, center pointer on scale, tighten screw. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt, check Manual Adjustment.

Manual Adjustment—Should be set for slight ping when accelerating engine with wide open throttle at speeds below 15 M.P.H. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if ping too severe), counter-clockwise (if no ping noted) one graduation at a time until correct performance secured. NOTE—Check engine for faulty spark plugs, excessive carbon deposits, localized hot spots, lean carburetor setting before changing adjustment to correct pinging.



CARBURETOR

CARBURETION:—Carburetor—Carter Model WDO Type 423-S (marked 248 on face of flange). 1⅛" dual, downdraft type.
For complete data, refer to Carburetor Index.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Fast Idle:—Integral type (part of carburetor).
For complete data, refer to Carburetion Equip. Index.
Setting—Adjust fast idle screw for .030" throttle opening (measured with T-109-29 gauge between throttle valve edge and wall on side opposite idle port) with choke valve tightly closed.

Automatic Choke:—Carter Climatic Control.
For complete data, refer to Carburetion Equip. Index.
Setting—Mark on thermostatic coil housing should be in line with reference mark on mounting plate.

CARB. EQUIPMENT

Air Cleaner:—AC #1528940 oil-both type used in conjunction with #864384 crankcase ventilator cleaner.

Fuel Pump:—AC Type AB #1523865. Diaphragm type, combination fuel-and-vacuum pump.
For complete data, refer to Carburetion Equip. Index.

Gasoline Gauge:—AC Electric type. #1515361 (dash unit), #1515485 (tank unit).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—Delco Model 17K-1. 6 volt, 17 plate, 112 A.H. Capacity (20 hour rate).
Starting Capacity—135 amperes for 20 minutes.
Grounded Terminal—Positive (+) grounded to frame (engine grounded to same point on right side of frame by strap—second ground at left front corner of engine on some models).
Location—Under left front floor.

Commercial Battery—Delco Model 19-Q. 6 volt, 19 plate, 122 A.H. Capacity (20 hour rate).
Starting Capacity—140 amperes for 20 minutes.
Grounded Terminal, Location—See 17K-1 above.

STARTER

Delco-Remy Model 1107912 (Std.), 1107913 (RHD), Armature No. 820158 (all models).
Drive—Solenoid pinion shift (overrunning clutch).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5500	5.0	60
16 "	Lock	3.0	600

Removal:—Flange mounted on right front face of flywheel housing. To remove, take out flange mounting screws, pull starter forward and remove from below.

Starting Switch:—Solenoid Switch Type 1542 (all). Mounted on starter, controlled through relay (in switch) by Control Switch Type 1996003 on instrument panel.
For complete data, refer to Electrical Equipment Index.

GENERATOR

Delco-Remy Model 1101056. Armature No. 1866789. Split field type with fixed third brush and vibrating type voltage regulator control.
For complete data, refer to Electrical Equipment Index.
Charging Rate Adjustment—See regulator setting below. Do not attempt to change third brush position.

Maximum Charging Rate—29 amperes, 8.0 volts, 4000 R.P.M., 50 M.P.H. with discharged battery. Actual charging rate determined by regulator and dependent on battery condition. To check charging rate, connect ammeter in charging line at regulator 'BAT' terminal, voltmeter between 'GEN' terminal and ground, ground regulator 'F' terminal to eliminate regulator action. NOTE—Do not operate generator on open-circuit.

Performance Data

	Amperes	Volts	R.P.M.
Cold	27-31	8.0	4000
Hot	25-28	8.0	4200

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. (main), 17 ozs. (3rd).
Field Current—1.44-1.56 amperes at 6.0 volts (shunt field), .89-.94 amperes at 6 volts (third brush field).

Removal:—Flange mounted between cylinder banks at front of engine, belt driven in tandem with water pump (separate belt for fan). To remove, take out flange mounting bolts.
IMPORTANT AIR SCOOP NOTE—When installing air scoop on generator, make certain that raised portion provides clearance at terminals and that scoop does not cover drive end oil cup.

Belt Adjustment:—Loosen generator mounting bolts, lift generator up until only slight slack evident in belt (new type belt engages bottom of pulley groove not sides), tighten bolts. Generator pivots on left hand bolt, right bolt hole slotted. NOTE—Fan belt adjustment provided at fan bracket.

REGULATOR

Delco-Remy Model 5860. Double Core Type Voltage Regulator (No 'IGN' Terminal). Cutout Relay and vibrating type Voltage Regulator in case on dash.
For complete data, refer to Electrical Equipment Index.

Cutout Relay

Cuts In—6.3-6.9 volts (relay compensated for temperature—closing voltage same Cold and Hot).
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020". Air Gap—.020" (closed).

Voltage Regulator

Setting—7.5-7.9 volts at 70°F., 7.4-7.6 volts at 150°F. Regulator over-compensated for temperature and must be checked at these points.
Adjustment—Connect ammeter in charging line at regulator 'BAT' terminal, voltmeter between 'BAT' terminal and ground. Operate generator at 2800-3000 RPM., adjust charging rate to 8-10 amperes (use variable rheostat or 'AVR' set), adjust regulator by bending spring hanger at lower end of armature spring slightly to secure setting shown above.
CAUTION—Regulator cover must be in place when testing. Do not operate generator on open-circuit.
Contact Gap—.020". Contact Spring Tension 3.5 ozs.
Air Gap—.063" between armature and center of core with armature down, .010" between fibre bumper and stop with armature up.

LIGHTING

LIGHTING:—**Headlamps**—Guide Multi-beam, pre-focused type (lenses not interchangeable, marked 'Right' and 'Left'). Asymetrical passing beam (upper beam left lamp, lower beam right lamp) controlled by beam selector switch with lighting switch in Country Driving position. NOTE—With lighting switch in City (second) position, beam selector switch controls upper and lower driving beams.
Headlamp Adjustment—Adjust only with lenses in place. Aim left hand lamp so that top edge of high intensity spot is at horizontal line at lamp center height and entire high intensity spot to right on lamp vertical center-line. Aim right hand lamp for same height and center high intensity spot on lamp vertical center-line. Adjusting screw for vertical movement at bottom of lamp, screw for horizontal movement at engine side of lamp body under snap-in plug.
Beam Indicator—Above center of speedometer dial Lighted whenever Driving or upper beams in use.

Switches

Lighting—D-R. No. 1994506, 480-R Export.
Beam Selector—D-R No. 1997002 or 471-T.

MISC. ELECTRICAL

THERMOSTATIC RELAY:—**No. 1865577.** On lighting switch. Contacts remain closed with 25 amperes but open in 2 minutes with 38 amperes at 70°F. Not adjustable.

HORNS:—Klaxon Model K-33-H. No. 1999501 (low note), 1999502 (high note). New 'Seashell', vibrator type, blended tone, twin horns operated by relay.

Type	Current (at 6 volts)	Air Gap
1999501 (low note)	10-12 amperes	.042-.046"
1999502 (high note)	9-11 amperes	.032-.036"

Horn Relay:—D-R. Models 271-A, 1116775.
Contact Gap—.020". **Air Gap .015"** (closed).
Contacts Close—2.3-3.5 volts.

ENGINE

ENGINE SPECIFICATIONS:—**Own. 8** cylinder, 90° Vee, 'L' head type. Upper crankcase and cylinder blocks cast enbloc. **Bore—3⅜". Stroke—4½".**
Displacement—322 cu. ins. **Rated HP.**—36.45.
Developed Horsepower—125 at 3400 R.P.M.
Compression Ratio—6.25-1 Std., 5.75-1 Optl.
See Cadillac Shop Notes for cylinder head identification and shims for lowering compression ratio.
Compression Pressure—155 lbs. at 1000 R.P.M. or approx. 105-110 lbs. at cranking speed (std. head).
Vacuum Reading—Steady 20-21" idling at 7-8 MPH.

PISTONS:—Lynite or Bohn Lo-Ex aluminum alloy, 'T' slot, Cam Ground type with Anodized finish (special hard oxide bearing surface). **Length—4⅛".**
Weight—16.88 ozs. (stripped), 25.12 ozs. (complete).
Removal—Pistons and rods removed from above.
Clearance—Skirt .0020-.0025". See Fitting Pistons.

Replacement Pistons:—*See Cadillac Shop Notes.*

Fitting New Pistons:—Check piston diameter with micrometer gauge at right angles to pin hole just below lower ring groove and also ½" above lower edge. If feeler gauges (⅜x½" wide, 7-10" long) used, insert feeler next to T-slot. Piston should fall through bore of own weight on .002" feeler, and hold on .0025" feeler. NOTE—Cylinder bore out-of-round .0005" max., taper .0003".

Installing Pistons:—Slot to left, for all pistons.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

PISTON RINGS:—Two compression, two oil control rings per piston, all above pin.

Ring	Width	End Gap	Side Clearance
Comp. (Top)	3/32"	.007-.012"	.0023-.0041"
Comp. (#2)	1/8"	.007-.012"	.0013-.0026"
Oil Control	5/32"	.007-.015"	.0013-.0026"

Replacement Rings:—.003", .005", .010", .015", .030" O.S.

PISTON PIN:—Diameter—7/8". Length—2 15/16". Pin floats in piston and rod. Held by locking rings.
See Cadillac Shop Notes for special pin removal and installation instructions.
Pin Fit in Piston—.0004" press fit (ribbed end), .0000" clearance or free fit at 70° F. (plain end).
Pin Fit in Rod Bushing—.0002-.0008" clearance (new), .0018" (worn limit).

CONNECTING ROD:—Weight 37.472 ozs. Length 8¾".
Crankpin Journal Diameter—2.4590-2.4595".
Lower Bearing—Steel-backed, babbitt-lined type.
Clearance—.0015-.0025" (new), .0045" Max. (worn).
Sideplay—.008-.014".
Bearing Adjustment:—None (no shims). Replace bearings. Do not file rod or caps. *See Cadillac Shop Notes for connecting rod and bearing installation data.*
Installing Rods:—Numbers on rods and bearing caps on same side and installed in same numbered cylinders with marks down to oil pan.

CRANKSHAFT:—3 bearing, 6 counterweights.
See Cadillac Shop Notes for main bearing servicing and rear main bearing oil seal renewal.
Journal Diameters—2.4990-2.4995".
Bearings—Steel or bronze backed, babbitt-lined.
Clearance—.0015-.0025" (new), .005" (worn).
Bearing Adjustment:—None (no shims). Replace bearings. Do not file bearing caps. Upper halves can be rotated out without removing crankshaft.
End Thrust:—Taken by center (#2) bearing.
Endplay—.001-.005" (new), .010" Max. (worn).

CAMSHAFT:—3 bearing, non-adjustable chain drive.
See Cadillac Shop Notes for Camshaft Bushing data.
Journal Diameters—#1 and #2, 2.4071-2.4078"; #3, 2.0009-2.0016".
Bearing Type—Steel-backed, babbitt-lined.
Clearance .0015-.0033" (new), .0045" (worn).
End Thrust:—Taken by thrust plate behind camshaft sprocket. No endplay should be permitted.
Timing Chain:—Morse Type C #3682-R Side Guide type. Width 1¼". Pitch ⅜". Length 23¼" or 62 links. NOTE—Install chain 'endless' as an assembly with sprockets. Use Tool J-836 to pilot camshaft sprocket.
Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:—	Head Diameter	Stem Diameter	Length
Intake	1.876-1.886"	.3415-.3425"	5 33/64"
Exhaust	1.626-1.636"	.3405-.3415"	5 33/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.335"	.0012-.0032"
Exhaust	45°	.345"	.0022-.0042"

NOTE—Worn limit for stem clearance .005" (all valves). Valve heads not slotted.
See Cadillac Shop Notes for Valve Servicing data.
Valve Guides:—Press in (long stepped end down).
Valve Lifters:—Wilcox-Rich 'Zero-lash' type hydraulic lifters. Lifters are mushroom type operating in removable guide brackets.
See Miscellaneous Section for complete data.
Clearance—.0010-.0024" (new), .0035" (worn).

Valve Springs:—Free length 2.210".

	Spring Pressure	Length
Valve Closed	66 lbs.	1.926"
Valve Open	145 lbs.	1.581"

VALVE TIMING

Tappet Clearance:—None in service (hydraulic type lifter). *See Valve Servicing in Cadillac Shop Notes.*
Valve Timing:—See Camshaft Setting above.
Intake Valves—Open at TDC. Close 42° ALDC.
Exhaust Valves—Open 52° BLDC. Close 10° ATDC.
To Check Timing—#1 cylinder (front—left bank) intake valve should open with piston at TDC and mark 'C.1/6' on crankshaft pulley aligned with chain case cover pointer.

LUBRICATION

LUBRICATION:—Pressure (gear type oil pump in crankcase). *See Cadillac Shop Notes for oil pump data.*
Normal Oil Pressure:—15 lbs. idling. 25 lbs. at 30 MPH.
Oil Pressure Regulator:—Opens at 30 lbs. On oil pump. Non-adjustable type.
Crankcase Capacity:—7 quarts.

COOLING

COOLING SYSTEM:—Capacity—25 quarts.
See Cadillac Shop Notes for radiator core removal and fan pulley replacement instructions.
Water Pump:—Self-adjusting packing type.
See Water Pump Section for complete data.
Removal—Drain water, remove pump belt, hose and pump mounting screws. Lift pump out.
Thermostat:—Mounted in radiator top tank, linked to radiator shutters by rod on forward side.
Setting—(Std. Type) Starts to open 148-153°F., fully open at 170°F. (High Reading Type—use with Heaters) Starts to open 163-168°F. Fully open 185°F.
Shutter Adjustment—Adjust clevis on threaded end of rod to secure 1/16" tension (shutters closed).
Temperature Gauge:—AC. Electric. #1510773 (dash unit). #1510774 (engine unit).
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—Long Model 11CF-10½CI (before engine unit 2-D-701), 10CF-CI (after engine unit 2-D-700). Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven joined type, 2 required. Inside Diam. 6½" (early), 6" (late). Outside Diam. 10½" (early), 10" (late). Thickness .123-.127".
Adjustment:—Free movement of pedal should be ⅞-1⅛" (adjusting nut on connector link at fork).
Removal:—Remove transmission (see below), drop clutch housing pan, punch mark clutch cover, pressure plate, and flywheel (re-install to these marks), remove 6 cover screws (release tension evenly), remove assembly. *See Cadillac Shop Notes for clutch locking pin removal (on replacement clutches) and clutch balancing data.*

TRANSMISSION

TRANSMISSION:—Own Make. Constant-mesh, synchro-mesh, all helical gear (sliding gear, low & reverse) with remote shift.
See Transmission Section for complete data.
Transmission Control:—Remote steering col. shift.
See Transmission Section for complete data.
Removal:—Support engine with jack under rear end of oil pan (use wooden block to avoid damage to pan), remove propeller shaft (disconnect front and rear universals), free transmission extension at engine rear support, remove crossmember with engine rear support, disconnect speedometer cable, remove shifter rods from levers at transmission, support transmission at rear, take out mounting screws, pull straight back (plug clutch connection shaft bearing drain hole as soon as accessible to prevent lubricant loss), lower front end of transmission and remove from car. NOTE—*For linkage adjustments, refer to Transmission Section for La Salle Transmission Control.*

UNIVERSALS

UNIVERSAL JOINTS:—Mechanics Model 3C. Needle bearing type. Two used.
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—Own Make. Hypoid gear, semi-floating type with Hotchkiss drive.
See Rear Axle Section for complete data.
NOTE—Manufacturer recommends Differential Carrier Assembly be returned to factory for servicing.
Ratio—3.92-1.
Backlash—.004-.010". Screw adjustment.
Removal:—Disconnect drive shaft at rear universal, remove axle shafts (see below), remove capscrews on carrier flange, pull carrier assembly out.
Axle Shaft Removal—Remove rear wheels, take off axle shaft nut, pull wheel hub and brake drum, disconnect brake line and remove backing plate. Pull shaft and bearing assembly out (use Tool J-838).
Wheel Bearing Adjustment:—None (sealed type).

SHOCK ABSORBERS

SHOCK ABSORBERS:—Delco. Front 1946-G (right), H (left). Rear 1751-V (right), W (left). Double acting, hydraulic types (front and rear).
See Shock Absorber Section for complete data.

FRONT SUSPENSION

Front Suspension:—Independent linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5°6' crosswise.
Caster—Neg. ¼° to Neg. 2¼°. Adjustable.
Camber—Neg. ¼° to Pos. ¾°. Adjustable.
Toe In—1/32-3/32" (at rest), 0-1/16" (in motion). NOTE—Adjusting sleeve at wheel end of each tie rod provided for toe in adjustment.
Steering Geometry (Toe out on turns)—Inner wheel turned 22¼-23¾°. Outer wheel 20°.

STEERING GEAR

Steering Gear: Saginaw Model. Worm-and-Double Roller type.
NOTE—New type steering linkage with idler arm attached to right frame sidemember.
See Steering Gear Section for complete data.

BRAKES

BRAKES:—Service—Bendix hydraulic, duo-servo, single anchor type (no eccentric adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Centrifuse. Diameter—11.995-12.005". Drum out-of-round .007", turn down limit .030".
Lining—Moulded. Length per shoe—Front 11 17/32", Rear 12 31/32". Width 2". Thickness 3/16".
Clearance—.015" both ends of secondary shoe.
Braking Power—45½% rear, 54½% front.
Hand Brake:—See Service Brakes.

ENGINE HOOD, SIDE PANEL REMOVAL & FRONT SHEET METAL ASSEMBLY ALIGNMENT:—*See Cadillac Shop Notes.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER:—First number (50) 2320001, (52) 4320001. Stamped on crankcase at rear of left cylinder block and on left frame side member opposite steering gear.

TUNE-UP

COMPRESSION:—Ratio—6.25-1 Std., 5.75-1 Optl.

Pressure—155 lbs .at 1000 RPM or approximately 105-110 lbs. at cranking speed for Std. head.

VACUUM READING:—Steady 20-21" idling at 7-8 MPH.

FIRING ORDER: 1-8-7-3-6-5-4-2. See diagram for cylinder numbering and spark plug cable connections.

SPARK PLUGS: AC No. 104. 10 mm. Metric type.

Gaps—.025-.030"

NOTE—Do not tighten these small plugs excessively (7-10 ft. lbs. tension).

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.015" **Cam Angle** 31° (closed).

Automatic Advance—12° max. at 2000 RPM (distr.).

Vacuum Advance—9° distr. with 15-18" vacuum.

IGNITION TIMING: See Ignition Timing.

Std. Setting—5° BTDC. with crankshaft pulley mark "IGA" at indicator on front of engine.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Both idle screws ½-1½ turns open. Idle speed 7-8 MPH.

Float Level—⅛" from top of float to gasket seat on cover with valve seated (invert to check).

Accelerating Pump—Not adjustable.

Fuel Pump Pressure: 4½ lbs. maximum.

VALVES: See Valve Timing.

Tappet Clearance—None in Service (hydraulic type take-up used).

STARTING: See Battery, Starter, Generator, Regulator.

IGNITION

Ignition Switch:—Delco-Remy Model 1116282. Connected to coil by armored cable.

Ignition Lock—Briggs & Stratton No. 45792. Key Series—8000 to 9499. Groove—No. 15.

COIL: Delco-Remy No. 1115128. Mounted on dash.

Ignition Current—2.2 amperes idling, 4.4 stopped.

CONDENSER: Delco-Remy Part No. 1869704.

Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy Model 1110806. Single breaker, 8 lobe cam, full automatic advance type with auxiliary vacuum spark control and manual adjustment.

Breaker Gap—.0125-.0175".

Cam Angle or Dwell—31° closed, 14° open (distr.).

Breaker Arm Spring Tension—19-23 ounces.

Rotation—Clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	500	1	1000
12	2000	24	4000

Vacuum Spark Control 1116020. Integral type (on distributor, linked to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. Plunger travel 13/64" maximum

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5.5-7.5"
9°	18°	15-18"

Manual Adjustment—Permits 10° advance or retard from center position. See Ignition Timing for adjustment.

Removal:—Distributor mounted between cylinder banks at rear of engine. To remove, disconnect vacuum line, take out two hold-down screws in advance arm, lift out. NOTE—When installing distributor, turn crankshaft to firing position for #1 cylinder, mesh distributor drive gear with slot in upper end of drive shaft offset toward left-hand or rear side of engine (narrow portion of coupling to rear).

IGNITION TIMING

IGNITION TIMING:—Setting for 72 octane fuel. See Manual Adjustment (following) for correction dependent on operating conditions and fuel regularly used.

Flywheel Degrees	Piston Position
5° BTDC	.0114" BTDC

Timing (With Synchroscope)—This method recommended by manufacturer. Clip synchroscope lead to #1 sparkplug, direct light on crankshaft pulley, idle engine. Loosen hold-down screw in advance arm, rotate distributor until 'IG/A' mark on pulley (5° before dead center mark 'C.1/6') appears in line with pointer on chain case cover, tighten hold-down screw. Adjust for fuel (see Manual Adjustment).

Timing (Without Synchroscope)—Turn engine over to firing position for #1 piston (front piston, left bank) with crankshaft pulley mark 'IG/A' (5° before dead center mark 'C.1/6') lined up with pointer on chain case cover. Loosen hold-down screw in advance arm, center pointer on scale, tighten screw. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt, check Manual Adjustment.

Manual Adjustment—Should be set for slight ping when accelerating engine with wide open throttle at speeds below 15 M.P.H. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if ping too severe), counter-clockwise (if no ping

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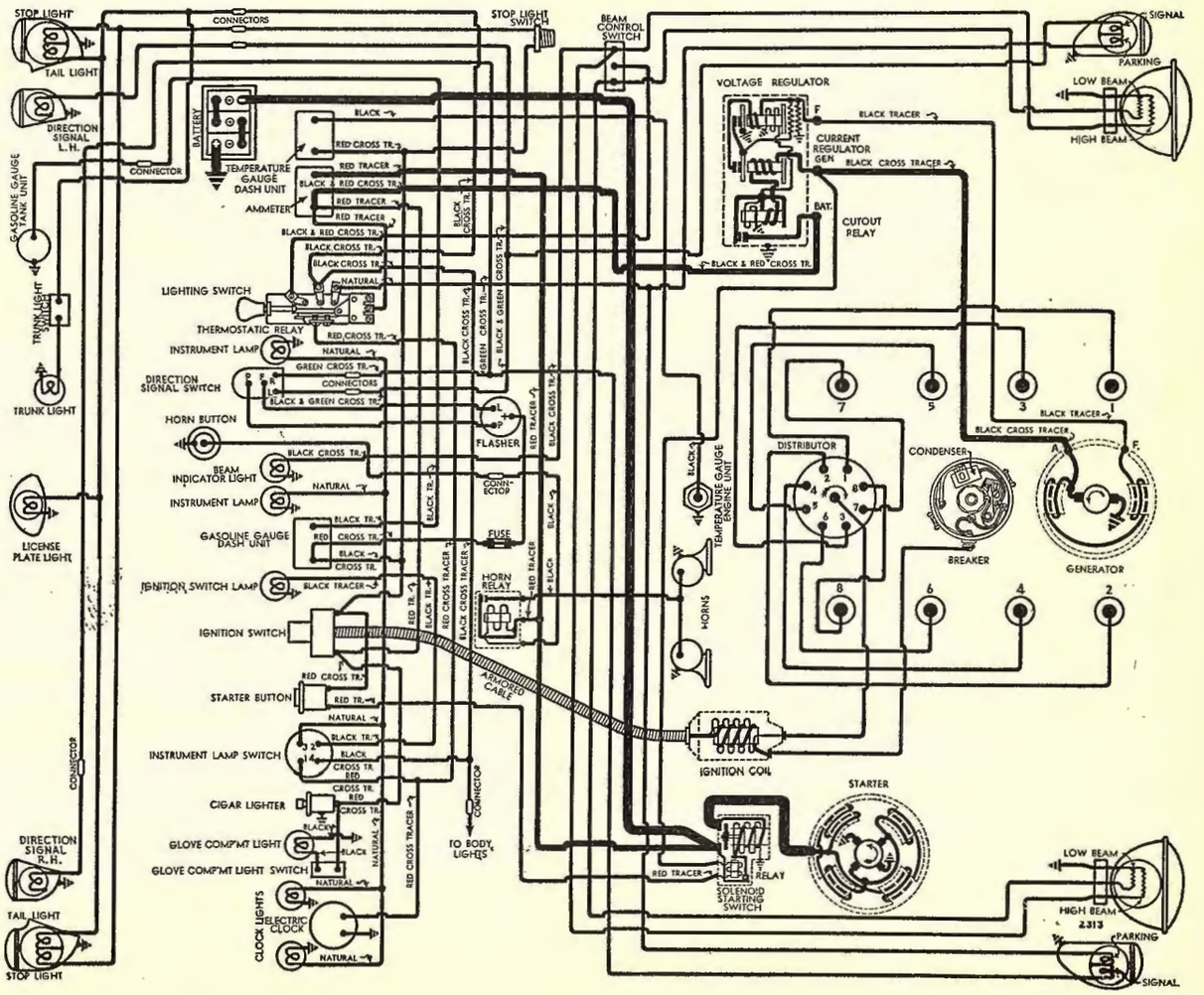

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noted) one graduation at a time until correct performance secured. NOTE—Check engine for faulty spark plugs, excessive carbon deposits, localized hot spots, lean carburetor setting before changing adjustment to correct pinging.

CARBURETOR

CARBURETION:—Carburetor—Carter Model WDO Type 460-S (marked 277 on face of flange). 1¼" dual downdraft type with Carter Climatic Control.
For complete data, refer to Carburetor Index.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up Data.*
Fast Idle:—Integral type (part of carburetor).
For complete data, refer to Carburetion Equip. Index.
Setting—Adjust fast idle screw for .023" throttle opening with choke valve fully closed.
Automatic Choke:—Carter Climatic Control.
For complete data, refer to Carburetion Equip. Index.
Choke Setting—Set center index mark to coincide with mark on carburetor flange.

CARB. EQUIPMENT

Air Cleaner:—AC #1529297 heavy duty oil-bath type.
Fuel Pump:—AC Type AX #1537083. Diaphragm type combination fuel-and-vacuum pump.
For complete data, refer to Carburetion Equip. Index.
Gasoline Gauge:—AC Electric type. #1515368 (dash unit), #1516155 (tank unit).
For complete data, refer to Carburetion Equip. Index.

BATTERY

BATTERY:—Delco Model 17K-2. 6 volt, 17 plate, 115 ampere hour capacity (20 hour rate).
Starting Capacity—137 amperes for 20 minutes.
Grounded Terminal—Positive (+) terminal.
Engine Ground—Strap connector at right front engine support.
Location—Under left front floor boards.
Commercial Battery—Delco Model 19Q-1. 6 volt, 19 plate, 125 A. H. Capacity (20 hour rate).
Starting Capacity—145 amperes for 20 minutes.
Grounded Terminal, Location—See 17K-2 above.

STARTER

Delco-Remy Model 1107912 (Std.), 1107913 (RHD), Armature No. 820158 (all models).
Drive—Solenoid pinion shift (overrunning clutch).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.0	65
16 "	Lock	3.0	600

Removal:—Flange mounted on right front face of flywheel housing. To remove, take out flange mounting screws, pull starter forward and remove from below.
Starting Switch:—Solenoid Switch Type 1542 (all). Mounted on starter, controlled through relay (in switch) by Control Switch Type 1996005 on instrument panel.
For complete data, refer to Electrical Equipment Index.

GENERATOR

Delco-Remy Model 1102661. Armature No. 1878211. Two brush type with voltage-current control.
Charging Rate Adjustment—No adjustment at generator. Charging rate controlled by Voltage Regulator and maximum output by Current Regulator.
See Regulator data following.
Maximum Charging Rate—32 amperes min. (hot), 8.0 volts, 2450 RPM, 27 MPH and above with load or discharged battery (Current Regulator setting). Actual charging rate controlled by Voltage Regulator and dependent on battery condition.

Performance Data

	Amperes	Volts	R.P.M.
Cold	30*	8.0	1750

*—Not maximum output—See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Field Current—1.67-1.82 amperes at 6.0 volts.
Brush Spring Tension—25 ounces each.
Removal:—Flange mounted between cylinder banks at front of engine, belt driven in tandem with water pump (separate belt for fan). To remove, take out flange mounting bolts.
IMPORTANT AIR SCOOP NOTE—When installing air scoop on generator, make certain that raised portion provides clearance at terminals and that scoop does not cover drive end oil cup.
Belt Adjustment:—Loosen generator mounting bolts, lift generator up until only slight slack evident in belt (new type belt engages bottom of pulley groove not sides), tighten bolts. Generator pivots on left hand bolt, right bolt hole slotted. NOTE—Fan belt adjustment provided at fan bracket.

REGULATOR

Delco-Remy Model 1118202. "Single Core" Type. Cutout Relay and vibrating type Voltage and Current Regulators in case on dash.
CAUTION—Check generator for grounded fields before changing regulator settings.
For complete data, refer to Electrical Equipment Index.

Cutout Relay

Cuts In—6.2-6.7 volts (hot).
Cuts Out—0-4.0 amperes discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with points just closed).

Voltage Regulator

Setting—7.2-7.4 volts hot (operating temperature). Regulator over-compensated for temperature.
To Check—Connect ammeter in charging line at 'BAT' regulator terminal, voltmeter between 'BAT' terminal and ground. Operate generator at 2800 RPM, adjust charging rate to 8-10 amperes (use variable rheostat or 'AVR' set). With regulator at hot operating temperature, retard generator speed until cut-out relay points open, then increase generator speed to 2800 RPM and check hot voltage setting (above).
To Adjust—Change regulator armature spring tension slightly by bending lower spring hanger for light (left) spring (or one spring if both alike) only. If further adjustment required, see Single Core Regulator article in Electrical Equipment Section for Heavy (or other spring) adjustment.
Air Gap—.070" between center of core and armature with contacts just closed.

Current Regulator

Setting—34-36 amperes hot (at operating temp.).
To Check—Remove cover, connect short jumper from voltage regulator frame to upper contact support bracket (shorting out Voltage Regulator). Connect ammeter in charging line at 'BAT' regulator terminal. Turn on lights and accessories, operate generator and increase speed until output remains stationary (run until hot). Check setting with regulator at operating temperature.
To Adjust—Change regulator armature spring tension slightly by bending lower spring hanger for one spring. If further adjustment required see Single Core Regulator article in Electrical Equipment Section for adjustment of other spring.
Air Gap—.080" (check same as Voltage Regulator).

LIGHTING

LIGHTING:—Headlamps—Guide 'Sealed Beam' type.
For complete data, refer to Electrical Equipment Index.
Headlamp Adjustment—Aim upper beam straight ahead with center of hot spot 3" below lamp center
Beam Indicator—On speedometer face. Lighted whenever Country (upper) beam in use.
Direction Signal—*Refer to Electrical Equip. Index.*
*—When replacing Rear Indicator Bulb use same type bulb as formerly used (1154 double contact—1133 single contact) in order for circuit to function properly.

Switches

Lighting—Delco-Remy 1995010.
Beam Selector—Delco-Remy 1997002.

MISC. ELECTRICAL

THERMOSTATIC RELAY:—Delco-Remy. On lighting switch. Contacts remain closed with 30 amperes, open in 3 minutes with 42 ampere load at 70° F. Non-adjustable type.
FUSES:—Direction Signal—9 ampere. In Flasher lead under instrument panel.
Fog Lights—20 ampere. On switch.
Radio & Under Seat Heater—14 amperes each.
HORNS:—Delco-Remy Model K-33-H. No. 1999501, 519 (low note), 1999502, 520 (high note). Vibrator type, blended tone, operated by horn relay. Horn set 1999501 & 502 used on early cars.

Type	Current (at 6 volts)	Air Gap
1999501 (Low)	16-18 amperes	.044-.049"
1999502 (High)	15-17 amperes	.034-.039"
1999519 (Low)	19-21 amperes	.044-.049"
1999520 (High)	18-20 amperes	.034-.039"

Horn Relay:—Delco-Remy Model 1116775.
Contact Gap—.020". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS:—Own. 8 cylinder, 90° Vee, 'L' head type. Upper crankcase and cylinder blocks cast Enbloc. **Bore**—3⅜". **Stroke**—4½".
Displacement—322 cu. ins. **Rated HP 36.45.**
Developed Horsepower—130 at 3400 RPM.
Compression Ratio—6.25-1 Std. 5.75-1 Optl.
See Cadillac Shop Notes for cylinder head identification and shims for lowering compression ratio.
Compression Pressure—155 lbs. at 1000 RPM or approx. 105-110 lbs. at cranking speed (Std. head).
Vacuum Reading—Steady 20-21" idling at 7-8 MPH.
PISTONS:—Lynite or Bohn Lo-Ex aluminum alloy, 'T' slot, Cam Ground type with Anodized finish (special hard oxide bearing surface). **Length**—4⅛".
Weight—16.88 ozs. (stripped), 25.12 ozs. (complete).
Removal—Pistons and rods removed from above.
Clearance—Skirt .0020-.0025". See Fitting Pistons.
Replacement Pistons:—*See Cadillac Shop Notes.*
Fitting New Pistons:—Check piston diameter with micrometer gauge at right angles to pin hole just below lower ring groove and also ½" above lower edge. If feeler gauges (¼-½" wide, 7-10" long) used, insert feeler next to T-slot. Piston should fall through bore of own weight on .002" feeler, and hold on .0025" feeler. NOTE—Cylinder bore out-of-round .0005" maximum, taper .0003".
Installing Pistons:—T-slot to left, for all pistons.

ENGINE

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PISTON RINGS:—2 compression, 2 oil control rings per piston, all above pin. Oil ring grooves drilled for oil drains.

Ring	Width	End Gap	Side Clearance
Compr. (Top)	3/32"	.007-.012"	.0023-.0041"
Compr. (#2)	1/8"	.007-.012"	.0013-.0026"
Oil Control	5/32"	.007-.015"	.0013-.0026"

Replacem't Rings:—.003",.005",.010",.015",.030" oversize.

PISTON PIN:—**Diameter**—7/8". **Length**—2 15/16". Pin floats in piston and rod. Held by locking rings.
See Cadillac Shop Notes for special pin removal and installation instructions.
Pin Fit in Piston—.0004" press fit (ribbed end), .0000" clearance or free fit at 70° F. (plain end).
Pin Fit in Rod Bushing—.0002-.0008" clearance (new), .0018" (worn limit).

CONNECTING ROD:—**Weight** 37.472 ozs. **Length** 8¾".
Crankpin Journal Diameter—2.4590-2.4595".
Lower Bearing—Steel-backed, babbitt-lined type.
Clearance—.0015-.0025" (new), .0045" Max. (worn).
Sideplay—.008-.014".
Bearing Adjustment:—None (no shims). Replace bearings. Do not file rod or caps. *See Cadillac Shop Notes for connecting rod and bearing installation data.*
Installing Rods:—Numbers on rods and bearing caps on same side and installed in same numbered cylinders with marks down toward oil pan.

CRANKSHAFT:—3 bearing with 6 counterweights.
See Cadillac Shop Notes for main bearing servicing and rear main bearing oil seal renewal.
Journal Diameters—2.4990-2.4995".
Bearings—Removable steel-backed, babbitt-lined.
Clearance—.0015-.0025" (new), .005" Max. (worn).
Bearing Adjustment:—None (no shims). Replace bearings. Do not file bearing caps.
End Thrust:—Taken by center (#2) bearing.
Endplay—.001-.005" (new), .010" Max. (worn).

CAMSHAFT:—3 bearing, non-adjustable chain drive.
See Cadillac Shop Notes for camshaft bushing data.
Journal Diameters—#1 and #2, 2.4071-2.4078"; #3, 2.0009-2.0016".
Bearing Type—Steel-backed, babbitt bushings.
Clearance—.0015-.0033" (new), .0045" Max. (worn).
End Thrust:—Taken by thrust plate behind camshaft sprocket. No endplay should be permitted.
Timing Chain:—Morse Type C #3682-R Side Guide type. Width 1¼". Pitch 3/8". Length 23¼" or 62 links.
NOTE—Install chain 'endless' as an assembly with sprockets. Use Tool J-836 to pilot camshaft sprocket.
Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:—	Head Diameter	Stem Diameter	Length
Intake	1.876-1.886"	.3415-.3425"	5 33/64"
Exhaust	1.626-1.636"	.3405-.3415"	5 33/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.335"	.0012-.0032"
Exhaust	45°	.345"	.0022-.0042"

NOTE—Stem clearance worn limit .005" (all valves).
See Cadillac Shop Notes for valve servicing.
Valve Guides:—Press in block (long step end down).
Valve Lifters:—Wilcox-Rich 'Zero-lash' type hydraulic lifters (Mushroom type) in removable brackets.
See Miscellaneous Section for complete data.
Clearance—.0010-.0024" (new), .0035" (worn).
Valve Springs:—Free length 2.210".

	Spring Pressure	Spring Length
Valve Closed	66 lbs.	1.926"
Valve Open	145 lbs.	1.581"

VALVE TIMING

Tappet Clearance:—None in service (hydraulic type lifter). *See Valve Servicing in Cadillac Shop Notes.*
Valve Timing:—See Camshaft Setting above.
Intake Valves—Open at TDC. Close 42° ALDC.
Exhaust Valves—Open 52° BLDC. Close 10° ATDC.
Valve Timing Check—#1 cylinder (front-left bank) intake valve should open with piston at TDC and mark 'C.1/6' on crankshaft pulley aligned with chain case cover pointer (on right side).

LUBRICATION

LUBRICATION:—Pressure type (gear type pump in crankcase). *See Cadillac Shop Notes for oil pump data.*
Normal Oil Pressure:—15 lbs. idling, 25 lbs. at 30 MPH.
Oil Pressure Regulator:—Opens at 30 lbs. On oil pump. Non-adjustable type.
Crankcase Capacity:—7 quarts.

COOLING

COOLING SYSTEM:—**Capacity**—25 quarts.
See Cadillac Shop Notes for radiator core removal.
Water Pump:—Self-adjusting packing type.
See Water Pump Section for complete data.
Removal—Drain water, remove pump belt, hose and pump mounting screws. Lift pump out.
Thermostat:—Mounted in radiator top tank, linked to radiator shutters by rod on forward side.
Setting—(Std. Type) Starts to open 153-158° F., fully open at 175° F. (High Reading Type—use with Heaters) Starts to open 168-173° F. Fully open 190°.
Shutter Adjustment—Adjust clevis on threaded end of rod to secure 1/16" tension on thermostat with shutters closed.
Temperature Gauge:—AC Electric. #1510773 (dash unit). #1510774 (engine unit).
See Miscellaneous Section for complete data.

CLUTCH

CLUTCH:—**Long Model 10CF-TI.** Semi-centrifugal, single plate, dry disc type.
NOTE—Borg & Beck Model 11A6 (marked #946) Single plate, dry disc type with 'Borglite' driven member used on early cars.
See Clutch Section for complete data.
Facings (Long)—Spiral or chevron wound woven (spiral grooved). Inside Diam. 6¾". Outside Diam. 10". Thickness .137".
Pedal Adjustment:—Pedal free travel 7/8-1⅛" (adjusting nut on connector link at clutch fork).
Removal:—Remove transmission (see below), drop clutch housing pan, punch mark clutch cover, pressure plate, and flywheel (re-install to these marks), remove 6 cover screws (release tension evenly).
NOTE—Install driven disc with oil guard (cover over dampener springs) to rear.
See Cadillac Shop Notes for clutch locking pin removal (on replacement clutches) and balancing data.

TRANSMISSION

TRANSMISSION:—**Own Make.** All helical gear, constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse) with remote shift.
See Transmission Section for complete data.
Transmission Control:—Remote steering col. shift.
See Transmission Section for complete data.
Removal:—Support engine with jack under rear end of oil pan (use wooden block to avoid damage to pan), remove propeller shaft (disconnect front and rear universals), free transmission extension at engine rear support, remove crossmember with engine rear support, disconnect speedometer cable, remove shifter rods from levers at transmission, support transmission at rear, take out mounting screws, pull straight back (plug clutch connection shaft bearing drain hole as soon as accessible to prevent lubricant loss), lower front end of transmission and remove.

UNIVERSALS

UNIVERSAL JOINTS:—**Mechanics 3C.** Needle bearing.
See Universals Section for complete data.

REAR AXLE

REAR AXLE:—**Own Make.** Hypoid gear, semi-floating type with Hotchkiss drive.
See Rear Axle Section for complete data.
NOTE—Manufacturer recommends Carrier assembly be serviced by factory.
Ratio—3.92-1.
Backlash—.004-.010". Screw adjustment.
Removal:—Disconnect rear universal, remove axle shafts (see below), carrier flange capscrews and carrier.
Axle Shaft Removal:—Remove wheel, axle shaft nut, dust seal from rim of drum, pull off hub and drum, disconnect brake line and remove backing plate. Pull shaft and bearing assembly (use Tool J-838).
Wheel Bearing Adjustment—None.

SHOCK ABSORBERS

SHOCK ABSORBERS:—**Delco.** 1946-G, H (front), 1751-V, W (rear). Double acting, hydraulic type.
See Shock Absorber Section for complete data.

FRONT SUSPENSION

Front Suspension:—Independent linked parallelegram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5°6' crosswise.
Caster—Negative 1¾° to Neg. 2¾°. Adjustable.
Camber—0° to Positive ¾°. Adjustable.
Toe In—1/32-3/32" (at rest). Adjusters at outer end of each tie rod. Adjust equally.
Steering Geometry (Toe-out on Turns)—Inner wheel turned 22¼-23¾°. Outer wheel 20°.

STEERING GEAR

Steering Gear: Saginaw Model. Worm-and-Double Roller type.
See Steering Gear Section for complete data.

BRAKES

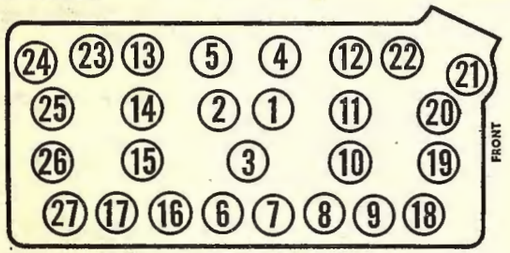
BRAKES:—**Service.** Bendix hydraulic, duo-servo, single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Centrifuse. Diameter—11.995-12.0005". Drum out-of-round .007", Turn down limit .030" cut.
Lining—Molded. Length—Primary 11 17/32", Secondary 12 31/32". Width 2" (50,52), 2¼" (50 Com'l front), 2½" (50 Com'l rear). Thickness 3/16".
Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.
Braking Power—45½% front wheels, 54½% rear.
Hand Brake:—See Service Brakes above.

CYLINDER HEAD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten head stud nuts. Tighten in sequence from center of head outwards.

Cast Iron Heads—With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all nuts.

Aluminum Heads—With the engine cold, tighten all nuts to correct tension. Run engine until thoroughly warm, allow engine to cool off, and then recheck all nuts. Do not tighten aluminum heads when warm.



1949-51 MODELS

TIGHTENING SPECIFICATIONS

1949-51 LINCOLN & LINCOLN COSMOPOLITAN

	Ft Lbs.	In. Lbs.
Cylinder Head Stud Nuts	50-55	600-660
Cylinder Head Capscrews	65-70	780-840
Main Bearing "Place Bolts"	120-130	1440-1560
Connecting Rod Nuts	52-60	624-720
Flywheel to Crankshaft	75-85	900-1020
Vib. Damper to Crankshaft	120-130	1440-1560

1939-48 MODELS

	Ft. Lbs.	In. Lbs.
All Aluminum Heads	40	480
All Cast Iron Heads	50	600
Spark Plugs:		
7/8-18 Cast Iron Head	34-38	408-456
14 MM. Cast Iron Head	24-28	288-336
14 MM. Aluminum Head	20-24	240-288
18 MM. Aluminum Head	24-28	288-336

ENGINE REMOVAL

1946-47-48 MODELS

ENGINE REMOVAL (For Servicing or Exchange): To remove engine from chassis, drain cooling system and crankcase, then proceed as follows:

1. Disconnect and remove battery.
2. Remove hood (disconnect horn lead at relay, mark hood hinge location on dash, remove hinges).
3. Disconnect all radiator hoses, remove hoses and thermostats, remove radiator.
4. Disconnect all electrical wires and cables at engine accessories (remove spark plug wires and conduits, disconnect ground strap at rear of engine).
5. Disconnect control cables (hand throttle and choke cables—free hand throttle cable clamp at dash and loop cable out of the way by hooking it back of generator regulator, dispose of choke cable similarly by hooking it back of battery box), disconnect fuel line at fuel pump.
6. Remove all engine accessories (except water pumps and starter), remove oil filler pipe.
7. Remove two engine front support bolts.
8. Loosen clamp on exhaust cross-pipe, disconnect both exhaust pipes at exhaust manifolds.
9. Attach hoist to engine sling, take up slack in sling and hoist cables.
10. Remove front floor pan, place support under front end of transmission case, take out capscrews mounting transmission on flywheel housing.
11. Move engine straight forward to disengage clutch shaft, then lift engine out of car.

1949-51 MODELS

1. Drain oil and water.
2. Remove hood, battery, generator, air cleaner.
3. Remove air deflector top panel, radiator and hoses.
4. Remove carburetor fuel line, throttle rods, vacuum lines, engine to dash bonding strap.
5. Disconnect coil wire to distributor, temp. gauge wiring and starter cable.
6. Disconnect universal joint (rear) and remove drive line, (slip yoke at front end slides out of transmission).
7. Disconnect transmission shift rods, exhaust pipe at manifold, and remove front and rear engine mounting bolts.
8. Lift engine out, guiding the rear at the same time.

Hydra-Matic Cars—Follow steps 1 to 6 above and proceed as follows:

1. Remove transmission levers, bell crank rods, accelerator bell crank and accelerator cross shaft.
2. Support rear of engine on jack.
3. Remove cross member and rear mount supporting transmission.
4. Lift engine out with man beneath guiding the transmission.

CYLINDER SLEEVES

1939-48 MODELS

CYLINDER SLEEVES: Cast iron, dry type cylinder sleeves available for replacement where bore size worn beyond Oversize Piston limit.

Sleeve Installation—Rebore cylinder to size .0012" smaller than outside diameter of sleeve to provide correct press fit, counterbore top of cylinder to fit flange on upper end of sleeve, press sleeve in place.

NOTE—These sleeves are furnished with finished cylinder bore to fit a standard size piston. No finishing operations are necessary.

PISTONS

1940-48 MODELS

REPLACEMENT PISTONS: Finished pistons are furnished in the sizes listed below with each size graded in steps as follows:

MODELS 06H ('40), 16H, 168H ('41)
MODEL 66H (Late 1946 & 1947-48)②

Part No.	Standard Pistons Size
06H-6110-B2	2.8732-2.8735"
06H-6110-B4	2.8743-2.8746"
06H-6110-B6	2.8755-2.8758"
06H-6110-B8	2.8767-2.8770"

.015" Oversize

06H-6110-C2	2.8882-2.8885"
06H-6110-C4	2.8893-2.8896"

.030" Oversize

06H-6110-D2	2.9032-2.9035"
06H-6110-D4	2.9043-2.9046"

②—Engines with 2.875" Bore (Eng. #138052 and Up)

MODELS 26H, 268H (1942)
MODEL 66H (Early 1946)①

Part Number	Nominal Size	Actual Size
26H-6110-A2	Standard	2.9357-2.9360"
26H-6110-A3	"	2.9362-2.9365"
26H-6110-A4	"	2.9368-2.9371"
26H-6110-A6	"	2.9380-2.9383"
26H-6110-A8	"	2.9392-2.9395"
26H-6110-D2	.020" Oversize	2.9557-2.9560"
26H-6110-D3	"	2.9562-2.9565"
26H-6110-D4	"	2.9568-2.9571"
26H-6110-C2	.030" Oversize	2.9657-2.9660"
26H-6110-C3	"	2.9662-2.9665"
26H-6110-C4	"	2.9668-2.9671"
26H-6110-E2	.040" Oversize	2.9757-2.9760"
26H-6110-E3	"	2.9762-2.9765"
26H-6110-E4	"	2.9768-2.9771"

①—Engines with 2.937" Bore (To No. 138051).

Early 1949 4-Ring Pistons

Part Number	Size
8EL-6110-A	Standard
8EL-6110-B	.0025" Oversize
8EL-6110-C	.020" Oversize
8EL-6110-D	.030" Oversize
8EL-6110-E	.040" Oversize

Late 1949, 1950-51 3-Ring Pistons

OEL-6110-A	Standard
OEL-6110-B	.0025" Oversize
OEL-6110-C	.020" Oversize
OEL-6110-D	.030" Oversize
OEL-6110-E	.040" Oversize

PISTON RINGS

1939 MODELS

REPLACEMENT PISTON RINGS: Piston rings (and Expanders for #2 Compression and Oil Ring) furnished in sets and singly in following sizes:

1939 RING SETS IN CARTONS

Part Number	(3/16" Oil Rings)	Size
96HS-6149-A	(Steel Segment Type)	Standard
96HS-6149-B	(Steel Segment Type)	.015" Oversize
96HS-6149-C	(Steel Segment Type)	.030" Oversize

1940-51 MODELS

1940-41 & LATE 1946-47-48②
RING SETS IN CARTONS

Part No.	(Steel Segment Type) Size
06HS-6149-A	Standard
06HS-6149-B	.015" Oversize
06HS-6149-C	.030" Oversize

②—Engines with 2.875" Bore (Eng. #138052 and Up)

Early 1949 4-Ring Piston (Sets)

Part Number	Size
8EL-6149-F	Standard
8EL-6149-G	.020" Oversize
8EL-6149-H	.030" Oversize
8EL-6149-J	.040" Oversize

Late 1949 & 1950-51 3-Ring Piston

OEL-6149-A	Std.

PISTON PINS

1939-48 MODELS

REPLACEMENT PISTON PINS: Piston pins furnished for service in the following sizes:

1939-48 PISTON PINS

Part Numbers 1939	1940-48	Size
H-6135-B	06H-6135-A	Standard
H-6135-C	06H-6135-B	.001" Oversize
H-6135-D	06H-6135-C	.002" Oversize

Part Number	Size
8EL-6135-A	Standard
8EL-6135-B	.001" Oversize
8EL-6135-C	.002" Oversize

1939-48 MODELS

PISTON PIN FITTING: Pins can be removed and installed without heating pistons. New pins, pistons, and connecting rods are held to close limits so that no fitting is required. Check pin fit as directed below. Oversize pins can be fitted in old pistons (and rod bushings) if clearances excessive and diameter of pin hole does not exceed .7536". Ream and burnish pin holes to size providing correct clearance for .001" or .002" Oversize.

CAUTION—Do not use oversize pins in **new pistons.** If connecting rod bushing worn so that clearance excessive with new Standard Size Pin (as used with new pistons), install new bushing in rod (following).

Pin Fit in Piston: Pin should be light hand push fit with piston and pin at room temperature (70°F) or .0003-.0009" clearance (new), .0015" (worn).

Pin Fit in Rod Bushing: Pin should pass through bushing slowly of own weight. Clearance (new) should be .0002-.0005" and the worn limit is .0015".

1949-51 MODELS

Pin Fit in Piston: Heat piston in hot water (210°F.) when removing or installing piston pins otherwise piston may be distorted. **Never drive pins in or out of pistons.**

Pin Fit in Bushing: Light thumb push fit. Clearance .0001-.0003".

1939-48 MODELS

CONNECTING ROD BUSHING SERVICING: Drive old bushing out of connecting rod (use suitable driver to avoid damage to rod). Press new bushing in place, drill four oil holes (to same size as holes in rod), ream and burnish or hone bushing to inside diameter of .7503-.7506" which will provide correct fit for new standard size pin.

CAUTION—Check alignment of the connecting rod after bushing installed and correct any misalignment caused by this operation.

CONNECTING ROD & BEARINGS

1939-51 MODELS

REPLACEMENT CONNECTING ROD BEARINGS: Bearing halves (upper and lower halves have same part number) furnished in Standard Size and following Undersizes:

1939-48 CONNECTING ROD BEARINGS

Part Numbers 1939-41	1942-47	Size
H-6211-C	26H-6211-A	Standard
H-6211-D	26H-6211-B	.0015" Undersize
H-6211-G	26H-6211-C	.003" Undersize
H-6211-F①	26H-6211-D①	.020" Undersize
H-6211-E②	26H-6211-E②	.040" Undersize

①—Used with .020" Undersize Crankshaft.
②—Used with .040" Undersize Crankshaft.
NOTE—24 pieces (2 halves) required for set.

1949-51 CONNECTING ROD BEARINGS

Part Number	Size
8EL-6211-A	Standard
8EL-6211-B	.002" Undersize
8EL-6211-C	.010" Undersize
8EL-6211-D	.020" Undersize
8EL-6211-E	.030" Undersize
8EL-6211-F	.040" Undersize

1949-51 CONNECTING RODS

Connecting Rod Installation: The numbered side of the connecting rods must be towards the outside of the engine. Left bank rod numbers must be towards the left side of engine and right bank rod numbers to the right side.

Clearance (Bearing to Journal): .0004-.0024".

CRANKSHAFT & MAIN BEARINGS

1939-51 MODELS

REPLACEMENT MAIN BEARINGS: Bearing halves (upper and lower halves have same part number) furnished in following sizes:

1939-48 MAIN BEARINGS

Bearing Part Numbers Front	#2 & #3	Rear	Size
H-6338-C	H-6342-C	H-6337-C	Standard
H-6338-D	H-6342-D	H-6337-D	.0015" U.S.
H-6338-G	H-6342-G	H-6337-G	.003" U.S.
H-6338-F	H-6342-F	H-6337-F	①.020" U.S.
H-6338-K	H-6342-K	H-6337-K	.030" U.S.
H-6338-E	H-6342-E	H-6337-E	②.040" U.S.

①—Used with .020" Undersize Crankshaft.
②—Used with .040" Undersize Crankshaft.

1949-51 MAIN BEARINGS

Front	Center	Rear	Size
8EL-6338-A	8EL-6342-A	8EL-6331-A	Standard
8EL-6338-B	8EL-6342-B	8EL-6331-B	.002" U.S.
8EL-6338-C	8EL-6342-C	8EL-6331-C	.010" U.S.
8EL-6338-D	8EL-6342-D	8EL-6331-D	.020" U.S.
8EL-6338-E	8EL-6342-E	8EL-6331-E	.030" U.S.
8EL-6338-F	8EL-6342-F	8EL-6331-F	.040" U.S.

1949-51 MODELS

Crankshaft Replacement: Use 8EL-6303-A or B for replacement in engines with standard clutch and transmission, and 8EL-6303-B, or C, crankshaft in engines with Hydra-Matic transmission. "C" shaft is the same as "B" shaft except the pilot bushing and retainer for the Hydra-Matic have been installed.

Flywheel Replacement: If a new crankshaft is installed with an old flywheel or a new flywheel used with an old crankshaft on Hydra-Matic cars, new oversize dowels must be installed. A special Lincoln reaming tool is made for this purpose. Oversize dowels (.005" O/S Part No. 8EL-6387-D, .015" O/S No. 8EL-6387-E) are furnished for service.

TIMING GEARS

1940-48 MODELS

TIMING GEARS: Camshaft Gear. New type aluminum alloy camshaft gear is bolted on camshaft hub flange by four offset capscrews and can be replaced without removing camshaft from engine. To remove gear, remove screw in front end of crankshaft, pull fan and dampener assembly (use Puller 6360-A), remove timing gear cover. Bend back lockplate tangs and take out four camshaft gear mounting screws, remove gear. When replacing gear, make certain that marks on camshaft gear and crankshaft gear are lined up and see that lockplate tangs are bent up against flats on mounting screws. Use 6360-B Dampener Replacer tool to install dampener.

NOTE—Camshaft gear mounting screw holes are offset so that gear can only be installed in correct position.

Crankshaft Gear—To replace crankshaft gear, pull fan and dampener assembly (see Camshaft Gear Removal above), use 6306-C puller to remove crankshaft gear, 6306-D Gear Replacer to install gear.

Timing Gears: Camshaft Gear (Aluminum Alloy) furnished in .006" Oversize (1GA-6256-B), and .012" Oversize (1GA-6256-C).

1949-51 MODELS

Timing Gear Removal: Same procedure as 1940-48 models.

CAMSHAFT & BEARINGS

1949-51 MODELS

Oversize Camshaft Bearings: Some engines in production have .080" oversize outside diameter camshaft bearings installed. Can be identified by the fact they are not the split type. Engines with these bearings are stamped on the valve cover gasket surface near the left water pump with an "F," "G," or "H" indicating front, center, or rear bearing is oversize. Part Nos. are #1 & #2, 8EL-6262-D, #3, 8EL-6263-D.

VALVE SYSTEM

1939-48 MODELS

VALVE SERVICING: Complete valve assembly (valve, spring, guide) should be removed from the engine and dismantled on the bench as follows:

Valve Assembly Removal—Use special bar type lifter, VZ-185, inserting end of lifter through spring coils to engage flanged lower end of guide, pull guide down slightly to release retaining 'C' washer, pull 'C' washer out, lift valve assembly out through top of block.

CAUTION—Mark valve assembly with cylinder number to insure re-installation in same position.

CAUTION—Mark valve guide halves to insure each assembly being kept together and re-installed in same cylinder.

Valve Installation Note—Intake valve guides have relief groove cut on one edge of each guide half Install guides with this relief groove up.

CONTINUED ON NEXT PAGE

VALVE SYSTEM

CONTINUED FROM PRECEDING PAGE

1939-51 MODELS

Hydraulic Valve Lifter Servicing:—When lifters removed they should be installed dry (will fill with oil and become quiet more rapidly than if installed with oil film between plunger and cylinder which will trap air in unit). Whenever lifters removed from engine, service as follows:

Cleaning Hydraulic Valve Lifters: Manufacturer recommends using paint thinner which rapidly dissolves varnish accumulations. Soak the lifters before taking apart. **Never scrape away carbon or use an abrasive.** Soak lifters until they can be wiped off clean.

CAUTION—Plunger is selective fit in lifter body and must not be interchanged. Make certain that plunger re-installed in lifter from which removed.

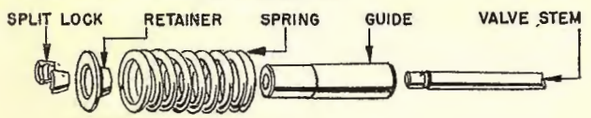
Initial Valve Lifter Clearance: With lifter dry and compressed clearance between lifter and valve is as follows—**1939-48 Models. .030-.070". 1949-51 Models .040-.090".**

See "Wilcox-Rich Zero Lash" Hydraulic Lifters in Miscellaneous Section.

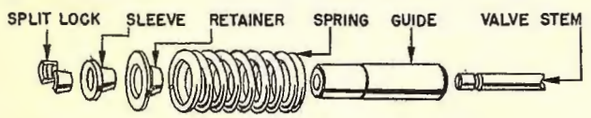
1949-51 MODELS

ROTATABLE VALVES: Consists of new 2 piece type retainer and sleeve. 1949-50 and Early 1951 engines not equipped with rotatable valves can be changed over by changing the retainer and installing the new sleeve.

NOTE—Valve gap setting does not change with the installation of the new parts.



CONVENTIONAL TYPE



ROTATABLE TYPE

VALVE SERVICING: Valve assemblies are not removed as an assembly. Remove and install as follows:

Removal—With Tool 6513, compress valve spring and remove retainer keys. (NOTE—Crank engine until tappet is at lowest position before compressing spring). Hold spring up and remove lower spring retainer, then drop spring over tappet and while holding upper retainer up, spring will clear the guide. Remove spring, and upper retainer. Remove hydraulic valve assemblies.

Installation—Install hydraulic tappet assemblies in tappet bodies. Place upper valve spring retainers, valve springs, and lower spring retainers in position and insert valve. Compress valve spring with Tool 6513 and install retainer keys. NOTE—Turn crankshaft until tappets are at the lowest position before compressing each valve spring.

Valve Seat Width: Valve seat width should be held to 1/16-5/64". If wider than this they should be narrowed down by grinding the seat at bottom 30° and top 60°. Center valve head face contact is desired. Seat contact on valve can be raised by grinding block seat with 30° grinder and lowered with a 60° grinder. If the original seat has been ground to a point where the contact with the valve face is too near the outer edge a **.070" oversize intake valve** (Part No. 8EL-6507-B) should be installed. To install the oversize valve, grind the seat down with a 45° grinder **until the valve does not protrude more than .030" above the block,** (for head clearance).

Valve Timing Check—Remove valve cover (intake manifold) and right cylinder head. With intake valve (#1 cyl.) just opening, line up timing mark on dampener with pointer. Raise #1 exhaust valve and insert a piece of ⅛" stock between lifter plunger and valve stem, release the valve and allow the lifter to collapse completely. Crank engine backwards about 45° and place contact point of dial indicator on head of #1 exhaust valve and set indicator to ZERO. Crank engine forward until timing mark and pointer again line up. If the valve timing is correct the indicator will read .020" to .040". If the reading falls back it indicates the lifter is not completely collapsed and it will be necessary to repeat the procedure. If the camshaft is one or more teeth out of time the dial reading will be considerably outside the limits given.

OIL PUMP

1939-48 MODELS

OIL PUMP: Removal & Disassembly—To remove pump from engine, remove locking wire and take out mounting screw in pump mounting flange, pull pump down and out (NOTE—Pump body fits in recess in cylinder block and it may be necessary to jar it slightly to loosen it). To dismantle pump, remove 4 screen cover capscrews, take out screen cover, pump cover plate, screen, and screen cover gasket. Lift out pump driven gear. Remove relief valve plug, spring, and plunger (on side of pump housing). If pump shaft and driving gear are to be removed, drive out pin in drive (upper) gear, place pump in arbor press with support under oil screen cover gasket seat (below relief valve), press shaft and driving gear out through lower end of housing.

Servicing—Clean out all oil passages in pump housing with compressed air. Replace all worn parts when clearances exceed following limits:

Pump Shaft & Bushings—Shaft clearance in bushing should be .001-.003" and bushings should be replaced if clearance exceeds .005". Replace shaft if pump gear worn or if bearing surface worn to diameter of less than .497". Replace bushings if worn to inside diameter greater than .502" (check by pushing shaft gear from side-to-side in pump housing, replace bushings if play greater than .005". Remove old bushings with driver, press new bushings in place, line ream to inside diameter of .499".

Pump Driven Gear & Shaft—Clearance between driven gear and stub shaft in pump housing should be .002-.0035". Replace shaft if clearance exceeds .005" or shaft diameter under .434". To replace shaft, drive old shaft out of housing, press new shaft in place (make certain end of shaft will clear cover when installed).

Oil Pump Relief Valve—Check relief valve spring tension. Replace if not within limits as follows:

Spring Number	Pressure & Length
H-6670 ("H" & "86H" pumps)	134-144 ozs. @ 1.06"
06H-6670 (for "06H" pumps)	95-101 ozs. @ 1.195"
41A-6654 (for "56H" pumps)	78-87 ozs. @ 1.38"

Pump Assembly—Insert pump shaft in housing, press drive gear on shaft until clearance between gear hub and end of housing (endplay) is .017", drill new 5/32" hole through shaft in line with hole in gear, install 5/32" pin and peen both ends of pin. Complete assembly by reversing disassembly (above). CAUTION—Make certain that pump mounting screw is locked with wire and lockwashers used under screen cover capscrews. Stake oil relief valve plug in place with punch.

1939-48 MODELS

OIL PUMP DRIVE (Camshaft Gear): Pump drive gear is pressed on rear end of camshaft. Remove old gear with gear puller, No. 6254-A, drive new gear on shaft with a fibre block (support shaft in vise with brass jaws). NOTE—Late design camshafts have flat on oil pump drive gear hub and gears have similar flat to prevent the gear turning in service. These gears and camshaft must be used together and flats must be lined up when installing gear. Drive gear on shaft until it is firmly seated against the shoulder on the shaft.

Oil Pump Idler Gear: This gear located in rear end of cylinder block between camshaft gear and oil pump drive gear on pump shaft.

Removal & Disassembly—Take out capscrews in cover on rear face of cylinder block, lift off cover and gear assembly, and gasket.

Servicing—Replace all worn parts when clearances exceed following limits:

Idler Gear & Bushing—Clearance on shaft should be .0005-.002". Replace bushing if worn to inside diameter greater than .752" or if clearance exceeds .005". To replace bushing, drive old bushing out, press new bushing in gear, ream bushing to provide shaft clearance of .0005-.002".

Idler Gear Shaft—Replace shaft if scored or worn to diameter less than .747". To replace shaft, press old shaft out of cover, press new shaft in until end of shaft is flush with face of cover.

1939-48 MODELS

OIL-PRESSURE REGULATOR (Relief Valve): Relief valve located under plug directly above **front** camshaft bearing (under valve cover) on all engines. Oil pump relief valve located on side of oil pump. Additional hydraulic lifter by-pass valve located above **rear** camshaft bearing (under valve cover) on cars with hydraulic valve lifters starting with 1939. Check relief valve spring tension and replace all springs which are not within limits listed below. CAUTION—Correct type spring must be used.

Front Cylinder Block Relief Valve (Engines without Hydraulic Valve Lifters)—Replace valve spring if not within limits of 36-43 ozs. compressed to 1.38".

Front Cylinder Block Relief Valve (Engines equipped with Hydraulic Valve Lifters)—Replace valve spring if not within 33-36 ozs. compressed to .53".

Rear Cylinder Block Hydraulic Lifter By-Pass Valve—Replace by-pass valve if spring broken or if valve