

1938 Terraplane  
Models 81, 82, Commercial 80, 88  
Tune-Up Specifications

**MODEL IDENTIFICATION**

**SERIAL NUMBER:** - First number 80101 (80), 88101 (88), 81101 (81), 82101 (82)-First two figures indicate model. Stamped on plate on right front door hinge pillar post.

**ENGINE NUMBER:** - First number 80101 (80), 88101 (88), 81101 (81), 82101 (82). On boss on left side of block near top front or on top of block between #1 and #2 exhaust manifold flanges.

**TUNE-UP**

**COMPRESSION:** - Ratio and pressure as follows:

Ratio	Compression Pressure
6.25-1 std. C. I. head	103 lbs. @ 170 R.P.M.
7.0-1 Optl. Al. head	119 lbs. @ 170 R.P.M.

**NOTE** - 7.0-1 aluminum head Super Power Dome.

**VACUUM READING:** - Gauge should show steady reading of 18-21", idling at 350 RPM. or 6 MPH.

**FIRING ORDER:** 1-5-3-6-2--4. See diagram.

**SPARK PLUGS:** Champion Type J-8A (Std. 6.25-1 Eng.), Type H-10 (Optl. 7.0-1 Eng.). 14 mm. Metric type.

**Gaps**-.032".

**IGNITION:** See Coil, Condenser, and Distributor.

**Breaker Gap** - .020". Cam Angle 35° (closed).

**Automatic Advance** - 14° max at 1580 RPM (distributor).

**IGNITION TIMING:** See Ignition Timing.

**Standard Setting** - At TDC. with flywheel mark "UDC. 1-6/1" at indicator in inspection hole in left front face of housing above starter.

**CARBURETION:** See Carburetor & Carb. Equipment.

**Idle Setting (Single Carb.)** - Idle screw ¼-1 turn open. Idle speed 6 MPH.

**Idle Setting (Dual Carb.)** - Both idle screws ¼-¾ turn open. Idle speed 6 MPH.

**Float Level (Single Carb.)** - 3/8" gasket seat on cover to top of float at free end (invert to check).

**Float Level (Dual Carb.)** - 15/64" from gasket seat on cover to top of float at each end.

**Accelerating Pump (Single Carb.)** - Center hole (medium) Normal. Inner hole (Summer), Upper hole (Winter) for extreme temperatures.

**Accelerating Pump (Dual Carb.)** - Inner hole Summer, Outer hole-Winter.

**Fuel Pump Pressure:** 4½ lbs. maximum.

**MANIFOLD HEAT CONTROL:** - **80,81,88** - Manual adjustment type at center of exhaust manifold behind carburetor. Make seasonal adjustments as follows:

**Setting** - To adjust, loosen nuts on strut bar on face of valve cover, turn cover so that pointer is in line with 'W' mark on manifold (Winter temperatures), straight up (Normal Summer temperatures), toward front in line with 'S' mark (Extremely hot temperatures).

**Model 82:** - Automatic thermostatic type. No adjustment required.

**VALVES:** See Valve Timing.

**Tappet Clearance** - .006" Intake, .008" Exhaust, Hot.

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

**IGNITION**

**Ignition Switch:** - Mitchellock Model 24-B, Type 7642.

**Ignition Lock** - Briggs & Stratton, Mitchell No. 6095.

**COIL:** Auto-Lite Model IG-4650. Service Winding (coil less switch and cable) IG-3224JB.

**Ignition Current** - 5-6 amperes stopped.

**CONDENSER:** Auto-Lite Part No. IGB-1025J.

Capacity - 20-25 microfarad.

**DISTRIBUTOR:** Auto-Lite Model IGW-4104-A (Std. 80, 81,88), IGW-4103-A (Std. 82, Opt]. 80,81,88). Single breaker, 6 lobe cam, full automatic advance type.

**NOTE** - Resistor unit used on IGW-4104A (mounted on distributor terminal connected in primary circuit). When voltage regulator is installed (for cars with radio), resistor should be removed or IGW4-103A type distributor installed.

**Breaker Gap** - Set at .020".

**Cam Angle or Dwell** - 35° (closed), 25, (open).

**Breaker Arm Spring Tension** - 16-20 ounces.

**Rotation** - Clockwise viewed from the top.

**Automatic Advance**

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	300	0	600
3	400	6	800
7	825	14	1650
11	1255	22	2510
14	1580	28	3160

**Fuel Compensator** - Provides manual adjustment at distributor for octane rating of fuel used. See Fuel Compensator Setting (following).

**Distributor Removal:** - Mounted on right side of crankcase. To remove, take out hold-down screw in advance arm.

**IGNITION TIMING**

**IGNITION TIMING:** - Initial Setting as shown. See Fuel Compensator Setting following.

Flywheel Degrees	Piston Position
All engines 0° TDC	.000" TDC

**NOTE** - High octane fuel must be used in engines with 7.0-1 'Super Power Dome' head.

**To Set Timing** - With #1 piston on compression, turn engine over until flywheel mark IUDC.1-6/' lines up with pointer in left front face of flywheel housing. Loosen hold-down screw in advance arm, rotate distributor clockwise to limit of slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw.

## Ignition Timing (Cont'd)

**To Set Timing (Using Synchroscope)** - Recommended method. Clip lead to #6 spark plug, fill in timing mark with white chalk and direct light on flywheel through hole in housing.

**Fuel Compensator Setting** - Road test car and note performance when accelerating from 10-15 M.P.H. with wide open throttle on level road (engine must be warm). Slight spark knock should be evident. Adjust by loosening hold-down screw and rotating distributor one graduation on scale counter-clockwise (if no knock), clockwise (if knock too severe). Repeat test. Final setting must not be advanced beyond 3/4" before "UDC.1-6/" mark on flywheel.

## CARBURETOR MODELS 80, 81, 88

**Carter Model W1 Vacumeter Type 397-S.** 1/4" single barrel, downdraft type with manual choke control.

**Idle Adjustment** - Engine must be warm so that choke valve is wide open and throttle cracker inoperative. Set throttle lever stop-screw to idle engine at 6 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 1/4-1 turn open from inner seated position. Readjust throttle stop-screw for correct idling speed.

Float Level - 3/8" from gasket seat on cover to top of float at free end (invert to check).

**Accelerating Pump Setting (397-S)** - Lever under dust cover at top of carburetor has three holes for pump link engagement. Set as follows:

Lower Hole (medium stroke) - Normal setting.

Inner Hole (min. stroke) - Hot temp., hi-test fuel.

Outer Hole (max. stroke) - Cold temp., low-test fuel.

## CARBURETOR SUPER MODEL 82

**Carter Model WDO, Type 402-S.** 1", Dual (double barrel), downdraft type with Fast Idle and Carter Climatic Control (automatic choke).

**Idle Adjustment** - With engine warm and idling at hot or slow idle speed (automatic choke and fast idle inoperative), set throttle stop-screw to idle engine at 6 MPH., adjust both idle adjusting screws (2 used, one for each barrel) in succession until engine fires smoothly on all cylinders. Final setting of both idle screws should be 1/4-3/4 turn open from inner seated position. Readjust throttle stop-screw for correct idle speed.

Float Level - 15/64" from gasket seat on cover to top of float with valve seated. Invert assembly to check and measure to each side of soldered seam on float.

**Accelerating Pump Setting (402-S)** - Adjustable for minimum and maximum stroke as follows:

Short Stroke (Inner Hole) - Hot Temperatures.

Long Stroke (Outer Hole) - Cold Temperatures,

## CARBURETOR EQUIPMENT

**Throttle Cracker (397-S):** - With choke valve closed, throttle opening should be .036-.040"

**Fast Idle (402-S):** - Carter stepped-cam type.

**Adjustment** - With choke valve closed, adjust fast idle screw for .018" throttle opening.

**Setting** - Centered (at index).

**Air Cleaner:** - AC Oil-wetted Type 1528159 (Standard 80, 81, 88), 1528161 (Standard. 82), 1528158 (80,81,88 with Electric Hand), 1528160 (82 with Electric Hand). United Heavy duty oil bath type Optional on all models.

**Fuel Pump:** - AC. Type. AX # 1523289 (LHD), # 1523313 (RHD), diaphragm type, standard. Type AB #1523290 (LHD), #1523314 (RHD), combination fuel-and-vacuum pump optional.

**Gasoline Gauge:** - King-Seeley Electric type. K-8 No. 6783 (Dash Unit 80, 81, 88), 6756 (Dash Unit 82), 5835 Tank Unit - All models).

## BATTERY

**BATTERY:** - **National, Type HT-17 (Original equipment), L-17-IF (Replacement).** 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).

**Starting Capacity** - 120 amperes for 20 minutes.

**Zero Capacity** - 300 amperes for 3.5 minutes.

**Grounded Terminal** - Positive (+) terminal. Grounded to left front fender support bracket. Engine grounded to frame by strap at bellhousing.

**Dimensions** - Length 10-9/16". Width, 7/4", Height 7-15/16".

**Location** - In left front fender under hood. Accessible from engine compartment by taking out 2 slotted screws in cover flange (2 top, 1 rear) and removing cover.

## STARTER

**Auto-Lite Model MAB-4075.** Armature MAB-2112 Drive - Inboard Barrel Type Bendix No. A-1673.

**Rotation** - Counter-clockwise at commutator end.

**Brush Spring Tension** - 42-53 ozs. (new brushes)

**Cranking Engine** - 150 RPM., 120-125 amperes, 5 volts

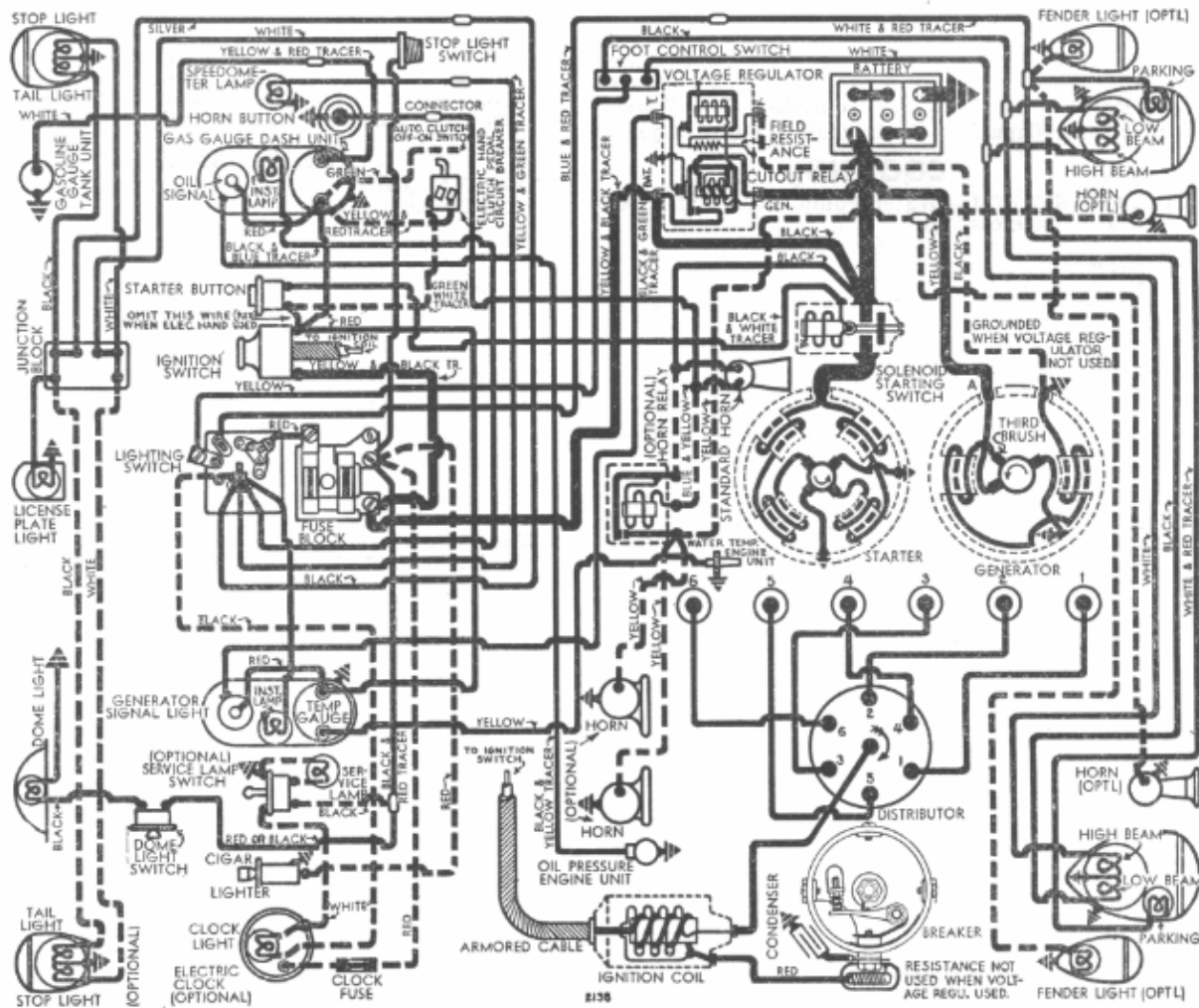
## Performance Data

Torque	R.P.M.	Volts	Amperes
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	582
22.5 " "	Lock	4	775

**NOTE** - Lock torque figures correct without switch.

**Removal:** - Starter flange mounted on left front face of flywheel housing. To remove, take out flange mounting screws.

**Starting Switch:** - Type SS-4001. Magnetic solenoid type mounted an starter. Controlled by pushbutton on instrument board (RBM Model 2815). Operate only with ignition on (and clutch disengaged on cars with Electric Hand).



1938 Terraplane - All Models

### GENERATOR

**Auto-Lite Model GDF-4803A - (Standard 80,81,88), GDF-4802A (Standard 82, Optional 80,81,88).** Third brush control with vibrating voltage regulation (GDF-4802A only). Ventilated by fan on drive pulley.  
**NOTE** - Generator field terminal grounded by ground cup assembled on terminal stud (on cars without regulator). This cup must be removed when regulator installed.

**Maximum Charging Rate** - 16-18 amperes (hot), 17-19 amperes (cold) without regulator. 26.5-29.5 amperes (hot), 29-32 amperes (cold) with regulator. Use test ammeter to check output.

**Charging Rate Adjustment** - Remove commutator cover band, shift third brush by hand, counterclockwise to increase, clockwise to decrease charging rate. Third brush held in position by friction. Do not exceed

maximum rate given above. on cars with regulator, actual charging rate determined by regulator (dependent on battery condition).

**NOTE** - Standard 3rd brush setting 3¾-4 (without regulator), 2-1/8 (with regulator) commutator bars from insulated (nearest) main brush.

### Performance Data--GDF-4803A (Without Regulator)

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
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

**Generator (Cont'd)**

**Performance Data--GDF-4802A  
(With Regulator)**

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	920	0	6.4	1000
4	6.6	1030	4	6.6	1140
8	6.8	1140	8	6.85	1280
12	7.0	1300	12	7.1	1440
16	7.25	1460	16	7.3	1640
20	7.45	1650	20	7.55	1840
24	7.65	1880	24	7.75	2220
28	7.9	2220	28.3	8.0	3200
31	8.0	3100			

**Rotation** - Counter-clockwise at commutator end.

**Brush Spring Tension** - 53 ozs. max. (new brushes).

**Field Current** - 1.90-2.10 amperes at 6.0 volts.

**Motoring Current** - 4.6-5.2 amperes (without regulator), 5.3-5.9 (with regulator) at 6 volts.

**Removal:** - Generator pivot mounted at left front of engine with fan belt drive. To remove, take out clamp and pivot bolts.

**Belt Adjustment:** - Loosen clamp and pivot bolts, swing generator out until slack in belt midway between generator and fan pulleys is 3/4" (measured with straight edge across pulleys).

**CUTOUT RELAY**

**Auto-Lite Model CBA-4003 (With GDF-4803A-1 Generator).** Mounted on engine side of dash. Relay has extra "ground" contacts for Teleflash generator charge indicator control.

**Cuts Out** - 1.5-4.5 amperes discharge current after charging at 16 amperes.

**Contact Gap** - .015-.0451, with upper ground contacts closed (must open when main contacts close).

**Air Gap** - .010-.030" with contacts closed.

**REGULATOR**

**Auto-Lite Model VRD-4008A.** Voltage Type. Cutout Relay and vibrating type Voltage Regulator in case on dash. Cutout Relay has extra "ground" contacts for Teleflash generator charge indicator control.

**Cutout Relay**

**Cuts In** - 6.4-7.0 volts Cold. Approx. 10 M.P.H.

**Cuts Out** - .5 ampere min., 3.0 amperes max. cold.

**Contact Gap** - .015" min-ground contacts closed (must be open with main contacts closed).

**Air Gap** - .034" minimum, .038" maximum with contacts open. Measure at hinge end of core.

**Voltage Regulator**

**Setting** - 7.35-7.65 volts at 70° F. (after 15 minutes operation charging at 10 amperes).

**To Check (cover on)** - Connect ammeter in charging line at 'BAT' terminal on regulator, connect voltmeter between 'BAT' terminal and ground.

Operate generator at speed equivalent to 30 MPH., charging fully charged battery until voltage is constant. Voltmeter reading should be within 7.1-7.8 volts (high limit cold, low limit hot). If outside these limits regulator is defective.

**To Adjust (cover removed)** - Change regulator armature spring tension slightly by bending lower spring hanger. Check setting as directed above.

**Contact Gap** - .010-.020" (armature against stop).

**Air Gap** - .0595-.0625" with contacts just opening.

**LIGHTING**

**LIGHTING: - Headlamps** - Hall, pre-focused type with interchangeable lenses. Upper and lower beams (lower beam deflected slightly to right) controlled by foot selector switch with lighting switch in driving (right hand) position.

**Headlamp Adjustment-** Aim headlamps straight ahead with top of beam 35¼" above floor level at 25' (car unloaded, upper beams lighted). Headlamps aimed by means of two screws on underside of headlamp body. Vertical movement obtained by turning both screws equally In or out, horizontal movement by turning one screw in until half desired movement obtained and completing movement by turning opposite screw out an equal amount.

**Switches**

**Lighting** - R.B.M. #1725.

**Beam Selector** - R.B.M. #1076.

**Bulb Specifications**

Position	Candlepower	Mazda No.
Headlamps	32-32	2331
Headlamps (export)	21-50	2520D
Park, Instrument, Service	1½	55
License, Fender	3	63
Stop-Tail	21-3	1158
Dash Signals	1	51
Dome	15	87

**MISC. ELECTRICAL**

**SIGNAL LIGHTS:** - Teleflash Generator Charging Indicator and Oil Pressure Indicator.

**FUSES:** - Lighting-Two 20 ampere capacity mounted on

## Misc. Electrical (Cont'd)

fuse block on lower flange of Instrument panel

**HORNS:** - Single horn standard. Sparton twin horns with R.B.M, relay (optional - dash mounted).

**Klaxon Model K-33-F** - Type 2117 (left-low note), 2118 (right-high note), twin horns, blended tone with Delco-Remy Horn Relay Optional.

**NOTE** - Data below for Delco-Remy equipment.

Horn Type	Current at 6 volts	Air Gap
2117 (low note)	11-13	.040-.044"
2118 (high note)	9-11	.032-.036"

**Horn Relay:** - Model 271-A (with Klaxon horns' Contacts close 2.7-4.0 volts.

**Contact Gap** - .020". **Air Gap** - .015".

**NOTE** - R.B.M. #780 relay also used.

## ENGINE

**ENGINE SPECIFICATIONS:** - 6 cylinder L head type.

**Bore** - 3"; **Stroke** - 5"; **Displacement** - 212 cu. ins.

**Rated Horsepower** - 21.6 A.M.A.

**Developed Horsepower-** 80,81,88 82  
Standard 6.25-1 . 96 @ 3900 101 @ 4000  
Opt'l 7.0-1 'Super Power' 102 @ 3900 107 @ 4000

**Compression Ratio & Pressure** - Check at cranking speed, spark plugs removed, throttle wide open.

Standard 6.25-1 head - 103 lbs. at 170 R.P.M.

Optional 7.0-1 head - 119 lbs. at 170 R.P.M.

**Vacuum Reading** - 18-21" at 350 RPM or 6 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** - May be removed from above or below.

**Clearance** - .016" top, .002" skirt (see below).

**Original Bore Size:** - See Hudson Service Notes.

**Replacement Pistons:** - See Hudson Service Notes.

**Fitting New Pistons:** - 3-4 lb. tension should be required to withdraw .0015" feeler 1/2" wide from, between piston and cylinder wall on side opposite slot at right angles to pin bosses.

**Installing Pistons:** - Slot away from camshaft side.

**PISTON RINGS:** - Two compression, one oil ring above pin, 1 oil ring below pin. Rings positioned by pin in grooves.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.005-.010"	.001"
Oil (both)	3/16"	.005"	.001"

**Replacement Rings:** - See Hudson Service Notes.

**PISTON PIN:** - Diameter-3/4", **Length** - 2-7/16".

Pin floats in piston and rod, held by locking rings. Pin hole in rod bronze-bushed. Pins furnished std., .002", .005", and .010" oversize.

**Pin Fit in Piston** - .0003" clearance or hand push fit with piston heated to 200° F.

**Pin Fit in Rod Bushing** - .0003" clearance.

## Engine (Cont'd)

**CONNECTING ROD:** - **Weight** 30.3 oz. **Length**

8-3/16". See Hudson Service Notes for Connecting Rod change on late cars.

**Crankpin Journal Diameter** - 1-15/16".

**Lower Bearing** - -Spun-babbitt. Rods exchanged. Finished bearings furnished standard and undersize (special order).

**Clearance** - .001". **Sideplay** - .006-.010".

**Bearing Adjustment:** - None (no shims). Replace rods. See Hudson Service Notes for connecting rod palnut (locknut) installation instructions.

**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 Service Notes for Crankshaft and Vibration Dampener removal, Main Bearing Removal, Installation and Line-Reaming data.

**Journal Diameter** - #1, 2-11/32"; #2, 2-3/8"; #3, 2-13/32".

**Bearing Type** - Bronze-backed, babbitt-lined. Furnished standard and unfinished (1/32" extra stock - ream to desire undersize). **Clearance** - .001".

**Bearing Adjustment:** - Shims. See Hudson Service Notes.

**End Thrust:** - Taken by center bearing. Replace bearing to adjust. Endplay .006-.012".

**CAMSHAFT:** - Three bearing. Gear driven.

**Journal Diameters** - #1, 2"; #2, 1-31/32"; #3, 1 1/2".

**Bearing Clearance** - .0025".

**End Thrust:** - Taken by thrust washer on front face of crankcase and by spring-loaded button in camshaft hub and thrust plate on gear cover. See that spring and button in place under cover.

**Timing Gears:** - Crankshaft gear cast-iron. Camshaft gear GE. or Continental Diamond Fiber Bakelite.

**NOTE:** 1941 Hudson Type Timing Gear Set can be installed on these models (tooth angle redesigned to provide quieter operation). See Hudson Shop Notes for data.

**Camshaft Setting:** - Mesh marked tooth of crankshaft gear between 2 marked teeth on camshaft gear.

**VALVES:** - Lighter valves (smaller stem diameter) used, than on previous models. New pilot size necessary for valve tools. See Hudson Service Notes for data.

	Head Diameter	Stem Diameter	Length
All valves	1-3/8"	11/32"	5-11/32"
	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	11/32"	.003-.005"

**Valve Guides:** 2-9/16" long. Top 1-1/16" below top of block. Finish ream to size after installation.

**Valve Springs:** - Springs are cadmium plated. Dampeners originally used on bottom of all springs, recommended that they be omitted whenever valves are serviced.

## Engine (Valves) – Cont'd

Spring check (out of engine) - 34 lbs. min. at 2".

	Spring Pressure	Spring Length
Valve Closed	44 lbs	2"
Valve Open	102 lbs;	1-21/32"

**Valve Lifters:** - Roller shoe type, fitted In removable guides.

**NOTE** - See Hudson Service Notes for Lifter Removal.

## VALVE TIMING

**Tappet Clearance:** - .006" Intake; .008" Exhaust: Hot.

**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.

**To Check Timing** - Set tappet clearance #1 intake valve at .010". This valve should open with piston 10°40' or .0562" BTDC. when point on flywheel approximately 3.94 teeth before "UDC.1-6/" mark lines up with pointer In hole in left front face of flywheel housing. Reset tappet clearance at .006" hot.

## LUBRICATION

**LUBRICATION:** - Duo-flo (pressure & splash) system.

**Oil Pump:** - Oscillating plunger type, gear driven by camshaft. Mounted on right center 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.

**Checking Oiling System:** - See Hudson Service Notes.

**Crankcase Capacity:** - 5 qts. (refill), 6 qts. (dry).

**NOTE** - Capacity decreased ½ qt. after car #43845.

## COOLING

**COOLING SYSTEM:** - **Water Pump.** Centrifugal, belt driven, packless type.

**Thermostat:** - Standard on 82, optional on others. In water outlet on cylinder head.

**Setting** - Start to open at 150-155° F. Fully open 185° F.

**Water Capacity:** - 12½ quarts.

## CLUTCH

**CLUTCH:** - Own make. Single plate, cork insert type operating in oil.

**Adjustment:** - Pedal free movement must be 1½". To adjust, remove clevis, pin at lower end of connecting link on throw-out shaft lever, loosen locknut, turn clevis. On cars with Automatic Clutch control, check setting whenever clutch adjusted.

## Clutch (Cont'd)

**Driven Member** - 80 Utility coach, coupe and sedan, 81. Thickness .203". Inside Diameter 5.375". Outside Diameter 8.625". Facing 90 cork inserts,

**All others - Thickness** .203". Inside Diameter 6.375". Outside Diameter 9.75". Facing 108 cork inserts.

**Automatic Clutch Control** - Optional equipment.

**Clutch Oil Servicing:** - See Hudson Shop Notes.

**Removal:** - Remove transmission (see Transmission Removal following) take out 16 clutch cover cap screws and remove clutch assembly from below.

## TRANSMISSION

**TRANSMISSION:** - Own make. Constant-mesh, helical gear (second & high), sliding spur (low & reverse).

**Electric Hand:** - Bendix type electro-pneumatic gear shift Optional Equipment.

**Removal:** - Remove Electric Hand and Automatic Clutch Control units and wiring from transmission first, if car model so equipped. Disconnect transmission side bumpers, interlock straps, speedometer cable and drive shaft at front universal. Take out bell housing-to-engine mounting bolts, pull transmission straight back.

## UNIVERSALS

**UNIVERSAL JOINTS:** - Spicer. 1271 (front), 1278 (rear).

## REAR AXLE

**REAR AXLE:** - Own make. Semi-floating, spiral bevel type with Hotchkiss drive.

**Ratio** - 4 1/9-1, 4 5/9-1, 5 1/8-1.

**Backlash** - .0005-.003". Screw adjustment.

**Removal:** - Remove rear wheel and hub assembly (use screw type puller only), take out four nuts on bearing cap bolts, push bolts out through backing plate remove shims, pull wheel bearing and axle shaft, disconnect drive shaft at rear universal, remove 8 nuts from axle housing-to- carrier stud bolts, withdraw differential assembly.

**Wheel Bearing Adjustment:** - Controlled by shims under bearing cap. Measure endplay by dial indicator clamped to backing plate with plunger against end of axle shaft. To adjust, remove bearing caps (as directed above), add or remove shims equally at both wheels.

**Endplay** - .004-.010".

## SHOCK ABSORBERS

**SHOCK ABSORBERS:** - Monroe. 156577 (front), 156578 (rear). Hydraulic, direct acting type.

## FRONT SUSPENSION

**Front Suspension:** - Conventional 'I' beam section front axle with Elliott type ends and semi-elliptic springs. Axle alignment maintained by torque arm at each end (81, 82 - not used on 80, 88).

### STEERING GEAR

**Steering Gear:** Gemmer Model 30, Worm-and-Roller type with "push-pull" adjustments.

### BRAKES

**BRAKES:** - Service - Bendix Hydraulic, Duo-servo, Single anchor type with Mechanical follow-up. Hand lever applies rear service brakes.

### Brakes (Cont'd)

**Drum** - Alloy-steel. Diameter-10-1/16".

**Lining** - Moulded (primary), Woven (secondary),

**Width** - 1<sup>3</sup>/<sub>4</sub>".

**Thickness** - 3/16".

**Length** - 22-1/8" per wheel.

**Clearance** - .010" heel and toe of each shoe.