COOLING SYSTEM

The cooling system servicing is the same for 1959 with the exception of the following: The capacity of the radiator cooling system is 17 quarts with a heater and 16 quarts without a heater.

The radiator oil cooler located in the bottom of the pan in the radiator tank has a new service procedure.

Testing for Leaks

Remove the two oil cooler lines at the radiator. Connect a pressure gauge to one cooler outlet. Connect a source of air pressure with a shut-off valve (closed position) to the other outlet. **Do not use pipe sealers since the sealer may get into transmission oil circuit.** Open valve slightly and admit air pressure not to exceed 50 psi gauge reading, then close valve. If the cooler and all fittings are leak proof, the gauge reading will remain constant.

When a leak is detected, remove radiator from car. Remove radiator lower tank (soft solder). Test the cooler with 50 psi air pressure in water to locate leak. Repair the leak using silver solder. If necessary, have a competent radiator repair shop repair the leak or install a new cooler.

Section VI

ELECTRICAL SYSTEM

DATA AND SPECIFICATIONS

BATTERY

	MC-1, MC-2, MC-3, MY-1
Voltage	12
Capacity	78 Plate 70 Amp Hour
Terminal Ground	Negative

STARTER

	MC-1, MC-2, MC-3, MY-1
Car Model Usage	MDT-6002-1770712
Starter Model	MDT-6002
Voltage	12
No. of Fields	4
No. of Poles	4
Brushes	4
Spring Tension	32 to 48 Ounces
Drive	Solenoid Shift Overrunning Clutch
End Play	.005″ Minimum
Free Running Test	
Voltage	11
Amperage Draw	80 Amps Minimum
Minimum Speed rpm	3800 Minimum
Stall Torque Test	
Torque Foot-Pounds	8.5
Voltage	4
Amperage Draw	350
Pinion to Housing	.070″ to .120″
Clearance	Between Pinion Stop (with Armature End Play removed)

STARTER (Cont'd)

Solenoid Switch	
Pull-in Coil	28.6 to 32.9 Amps at 6 Volts
Hold-in Coil	10.2 to 11.8 Amps at 6 Volts

LIGHT BULBS

	Number Required	Mazda Number	C.P. or Watts	Chrysler Part No.
Headlights Inner (High Beam Only)	2	4001	37½ W	1753435
Headlights Outer (High and Low Beam)	2	4002	50-37½ W	1753436
Headlight Beam Indicator Light	1	57	2	127934
Parking and Front Turn Signal	2	1034	32-4	151567
Rear Tail, Stop and Turn Signal Light	2	1034	32-4	151567
License Plate Light	2	67	3	142450
Glove Box Light	1	57	2	127934
Instrument Lights	4	57	2	127934
Map Light	1	1004	15	151578
Turn Signal Indicator Light	2	57	2	127934
Dome Light	1 or 2	1004	15	151578
Hand Brake Warning Light	1	90	6	142453
Back Up Light	2	1073	32	142456
Transmission Push Button Light	1	57	2	127934
Radio Dial Light	2	1891		
Clock Light	1	57	2	127934
Trunk Light	1	1003	15	151577

CIRCUIT PROTECTORS

Circuit	Type	Rated Capacity	Location
Lighting System	Circuit Breaker	22½ Ampere	Integral with Headlight Switch
Clock	Fuse	1 Ampere	At Fuse Block*
Windshield Wiper	Circuit Breaker	6 Ampere	At Fuse Block*
Radio	Fuse	7½ Ampere	At Fuse Block*
Dome Lamp	Fuse	6 Ampere	At Fuse Block*
Window Lifts	Circuit Breaker	20 Amp-30 Amp	At Terminal Block Behind Left Front Kick Panel
Back-Up Light	Fuse	6 Ampere	At Fuse Block*
Cigar Lighter	Fuse	14 Ampere	At Fuse Block*
Six-Way Seat	Circuit Breaker	40 Ampere	At Terminal Block Behind Left Front Kick Panel
Rear Defroster	Fuse	6 Ampere	At Fuse Block*
Heater	Circuit Breaker	20 Ampere	At Fuse Block*
Air Conditioner (front)	Circuit Breaker	30 Ampere	At Fuse Block*
Air Conditioner (rear)	Circuit Breaker	20 Ampere	At Fuse Block*
Air Conditioner (dual)	Circuit Breaker	30 Ampere	At Fuse Block*

*Fuse block is located at instrument panel (driver's compartment) to the left of radio.

GENERATORS

Car Model	MC-1		MC-2, MC-3	MY-1	
Generator Model					
Standard	GJM-8001A; 1842801		GJM-8001A; 1842801	GHM-8005A; 1842778	
With Air Conditioning Front Unit Only	GJM-8001A; 1842801		GJM-8002A; 1842797	GHM-8001A; 1842774	
Dual Air Conditioning Front and Rear	GHM-8005B; 1889400		GHM-8001A; 1842774	GHM-8001A; 1842774	
Gas Heater			GHM-8005A; 1842778	GHM-8005A; 1842778	
Heavy Duty	GGA-6003E; 1842603		GGA-6003E; 1842603	GGA-6003E; 1842603	
Heavy Duty True-Level Torsion Aire			GGA-6001N; 1658863	GGA-6001N; 1658863	
Generator Model	GGA-6001N GGA-6003E	GHM-8001A	GHM-8005A GHM-8006B	GJM-8001A	GJM-8002A
Rotation	Clockwise at Drive End	Clockwise at Drive End	Clockwise at Drive End	Clockwise at Drive End	Clockwise at Drive End
Voltage	12	12	12	12	12
Rated Output	40 Amperes	30 Amperes	30 Amperes	35 Amperes	35 Amperes
Control	Vibrating Regulator	Vibrating Regulator	Vibrating Regulator	Vibrating Regulator	Vibrating Regulator
Ground Polarity	Negative	Negative	Negative	Negative	Negative
Poles	2	2	2	2	2
Brushes	2	2	2	2	2
Brush Spring Tension	34 to 41 ounces	35 to 53 ounces	35 to 53 ounces	18 to 36 ounces	18 to 36 ounces
Bearings	Ball—Both Ends	Ball—Both Ends	Ball & Sleeve	Ball & Sleeve	Ball—Both Ends
End Play	.003″-.010″	.003″-.010″	.003″-.010″	.003″-.010″	.003″-.010″
Field Coil Draw (Arm. to field term.)	1.2 to 1.3 Amps at 10 Volts	1.2 to 1.3 Amps at 10 Volts	1.2 to 1.3 Amps at 10 Volts	1.4 to 1.7 Amps at 10 Volts	1.6 to 1.7 Amps at 10 Volts
Motoring Draw	2.9 to 3.4 Amps at 10 Volts	3.3 to 3.8 Amps at 10 Volts	3.3 to 3.8 Amps at 10 Volts	3.8 to 4.3 Amps at 10 Volts	3.8 to 4.3 Amps at 10 Volts
Output Tests (at 70° F.)	10 Amps, 13.4 Volts at 1020 max. rpm 40 Amps, 15 Volts at 1800 max. rpm	10 Amps, 13.5 Volts at 1040 max. rpm 30 Amps, 15 Volts at 1800 max. rpm	10 Amps, 13.5 Volts at 1040 max. rpm 30 Amps, 15 Volts at 1800 max. rpm	10 Amps, 13.4 Volts at 1480 max. rpm 35 Amps, 15 Volts at 2400 max. rpm	10 Amps, 13.4 Volts at 1480 max. rpm 35 Amps, 15 Volts at 2400 max. rpm

REGULATOR

Car Model	MC-1, MC-2, MC-3, MY-1		
Regulator Model	VRX-6301A-1842798 (For 35 Amp Generators)	VRX-6201A-1642333 (For 30 Amp Generators)	VAT-6201-1662137 (For 40 Amp Generators)
Volts	12	12	12
Ground Polarity	Negative	Negative	Negative
Resistors			
Marked 60		55.0 to 70.0 ohms	
Marked 38	34.5 to 45 ohms	34.5 to 42.0 ohms	
Marked 30		28.0 to 34.5 ohms	
Voltage Regulator			
Voltage Winding Resistance		44.0 to 49.0 ohms	
Armature Air Gap		.048 to .052 inch Contacts closed with high limit gauge installed. Contacts open with low limit gauge installed. Gauge on contact side and next to brass stop pin.	

Voltage Setting (operating voltage)
After 15 minutes run at 7 amperes

Temperature in degrees F.	50°	60°	70°	80°	90°	100°	110°	120°
Maximum Setting	15.04	14.97	14.90	14.83	14.76	14.69	14.01	14.54
Minimum Setting	14.42	14.36	14.30	14.23	14.16	14.09	14.62	13.94

Current Limiting Regulator
Armature Air Gap: .048 to .052 inch
Contacts closed with high limit gauge installed.
Contacts open with low limit gauge installed.
Gauge on contact side and next to brass stop pin.

Current Setting (After voltage Regulator Setting)
Operating Amperage after 15 minutes at 7 amperes. Then followed with a 15 minute run at rated current regulator setting below 13.5 volts).

	Temperature (F)	50°	60°	70°	80°	90°	100°
Model VRX-6201A (1642333) 30 Amp.	Max. Setting	35	33	32	31	30	29
	Min. Setting	31	29	28	27	26	25
Model VRX-6301A (1842798) 35 Amp.	Max. Setting	39	38	37	36	35	34
	Min. Setting	35	34	33	32	31	30
Model VAT-6201 (1662137) 40 Amp.	Max. Setting	46	45	44	43	42	41
	Min. Setting	42	41	40	39	38	37

Cut-Out Relay:
Voltage Winding Resistance: 107 to 121 ohms
Air Gap (contacts open): .031 to .034 inch
(Measure gap as near to hinge as possible)

Point Gap (Minimum): .015 inch

Contacts Close (Volts): 12.6 to 13.6 Volts

Contacts Open (after charge of 10 amperes): 8.2 to 9.3 Volts
Discharge Amperes: 0 to 6 amperes (discharge)

DISTRIBUTOR

Car Model	MC-1, MC-2	MC-3, MY-1
Distributor Model	IBP-4006-1842804	IBS-4010A-1842805
Contact Gap	.015 to .018 inch	.015 to .018 inch
Dwell	27° to 32°	(one set points 27° to 32°) (both sets points 34° to 40°)
Condenser Capacity	.25 to .285 Microfarad	.25 to .285 Microfarad
Breaker Arm Tension	17 to 20 ounces	17 to 20 ounces
Drive	Camshaft	Camshaft
Side Play (shaft)	.005 inch Max.	.005 inch Max.
End Play (after assembly)	.003 to .010 inch	.003 to .010 inch
Firing Order	18436572	18436572
Rotation	Counter-clockwise	Counter-clockwise
Timing	10° BTC	10° BTC
Automatic Advance		
Distributor Degrees and rpm	0°@ 270 to 540 0° to 2°@ 540 2° to 4°@ 800 4° to 6°@ 1500 6.5° to 8.5°@ 2350	0°@ 310 to 490 0° to 2°@ 490 3.5° to 5.5°@ 800 6° to 8°@ 1550 8.5° to 10.5°@ 2300
Vacuum Advance		
Distributor Degrees and Inches of Vacuum	0° to 7.2 to 9.1″ 4.5° to 7.5°@ 12″ 9.5° to 12.5°@ 16.5″	0°@ 7.5 to 9.1″ 6.0° to 9°@ 13″ 11.5° to 14.5°@ 18.2″

SPARK PLUGS AND COIL

CAR MODEL	MC-1, MC-2	MC-3, MY-1
Spark Plugs		
Type	A-42	A-42
Size	14 mm	14 mm
Gap	.035 inch	.035 inch

HIGH TENSION CABLES WITH BUILT-IN RESISTANCE

No. 1 Cable 8,300 to 16,600 Ohms
No. 2 Cable 5,500 to 11,000 Ohms
No. 3 Cable 8,100 to 16,200 Ohms
No. 4 Cable 6,000 to 12,000 Ohms
No. 5 Cable 8,800 to 17,600 Ohms
No. 6 Cable 6,300 to 12,600 Ohms
No. 7 Cable 9,400 to 18,800 Ohms
No. 8 Cable 7,200 to 14,400 Ohms

SPARK PLUGS AND COIL (Cont'd)

CAR MODEL	MC-1, MC-2, MC-3, MY-1
Coil	
Model	CAH-4001
Ballast Resistor	PU-5001
Amperes	
Engine Stopped	3.1 Amperes
Engine Idling	2.5 Amperes

HORNS

	All Models
Make	Auto-Lite, Spartan
Current draw at 12.4 volts	9 to 10 amps

ELECTRIC WINDSHIELD WIPER

	All Models
Variable Speed Motor	
Rated Volts	12
Resistor (ohms) (Variable speed wiper)	17-40
Field Current Draw at 13.5 volts	1½ to 2 amps
Motor Current Draw (with dry glass)	
High Speed	1½ amps at 66 to 75 rpm
Low Speed	3 amps at 35 to 40 rpm

POWER SEAT LIFTS

	All Models		
Type Motor	Series Wound		
Rated Voltage	12		
Current Draw with Passenger Load	Pounds	Amps	Volts
Vertical Lift	500	50-60	10.5
	200	40-45	10.6
Horizontal Lift	600	60	10.4
	150	35	11.0

WINDOW LIFTS

	All Models
Type Motor	Series Wound
Rated Voltage	12
Maximum Stall Current	25 amps at 8.9 volts

ELECTRICAL SYSTEM

Servicing the electrical system for the 1959 Chrysler and Imperial Models is the same as for the 1958 models with the following added information.

SPEEDOMETER REMOVAL

Chrysler—Disconnect battery. Disconnect speedometer cable housing. Remove the two nuts and washers from the rear of the speedometer. Slide speedometer out the rear of panel.

Imperial—Disconnect battery. Disconnect speedometer cable housing. Remove 7 screws from the rear of speedometer and pull out speedometer from rear of panel.

SIX-WAY ELECTRIC POWER SEAT — OPTIONAL

The six-way electric power seat is driven by a two-way electric motor which operates through a solenoid and clutch assembly that supplies power through flexible cables to slave units located in the seat tracks.

The control switch is located on the left side of the front seat and is wired through relay to a 40 amp circuit breaker which is located behind the left front kick panel.

CONTROL CIRCUITS

Power is supplied to the motor relay from the circuit breaker. Three wires go to the switch from the motor relay.

One wire (red) is used for power and two wires (white and blue) are used for directional control of the motor.

Three additional wires go from the switch (yellow, green and brown) to the solenoid and clutch assembly which control movement of front, rear and horizontal risers. (See chart below.)

For Forward Horizontal	For Forward Tilt	For Straight Up
Connect Wires: Red, White, Green	Connect Wires: Red, White, Yellow	Connect Wires: Red, White, Yellow, Brown
For Rearward Horizontal	**For Rearward Tilt**	**For Straight Down**
Connect Wires: Red, Blue, Green	Connect Wires: Red, White, Brown	Connect Wires: Red, Blue, Yellow, Brown

REMOVAL AND INSTALLATION OF FLEXIBLE CABLES — POWER SEAT

Refer to the Chrysler Service Manual D-16350 for removing and installing the power seat flexible cables.

CAUTION:

Seat guides should be in the up and forward position when installing cables. Make sure guides are at the same position (in alignment).

REMOVAL AND INSTALLATION OF MOTOR — POWER SEATS

Removal—Disconnect the motor wires at relay. Remove the two nuts holding the motor to the drive unit. Remove the motor from drive unit and rubber coupling.

Installation—Install rubber coupling on motor shaft. Align rubber coupling with the slot on the slave unit shaft. Install motor and reconnect wires to relay.

DRIVE UNIT AND SOLENOID ASSEMBLY — POWER SEATS

Disassembly—Remove the drive unit from the seat assembly. Remove the two screws holding plate and solenoids to the drive unit. Remove the plate and solenoid assembly. Be careful not to lose the three springs under the solenoid when removing the solenoid coils. Bend back the tabs of the solenoid cover. Unsolder the coil ground wire at the cover tab. Remove the cover from the coil. Remove the screws holding the cover on the drive unit. Remove the cover and lift out the clutch lever and shaft.

Assembly—Install the clutch lever and shaft. Make sure the lever is properly seated on the drive collar.

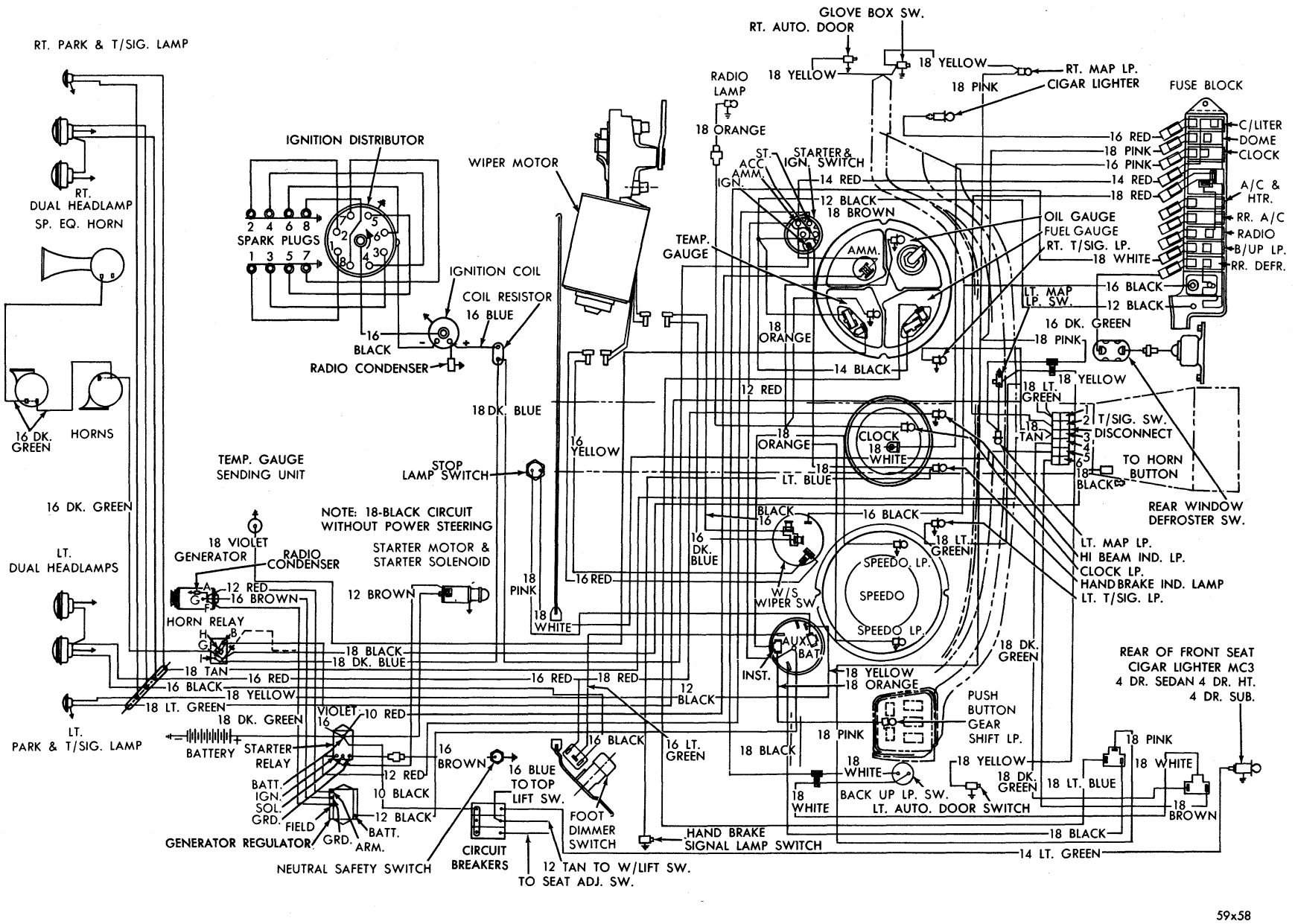


Fig. 30 — Chassis and Instrument Panel Wiring Diagram — Models MC-1, 2 and 3

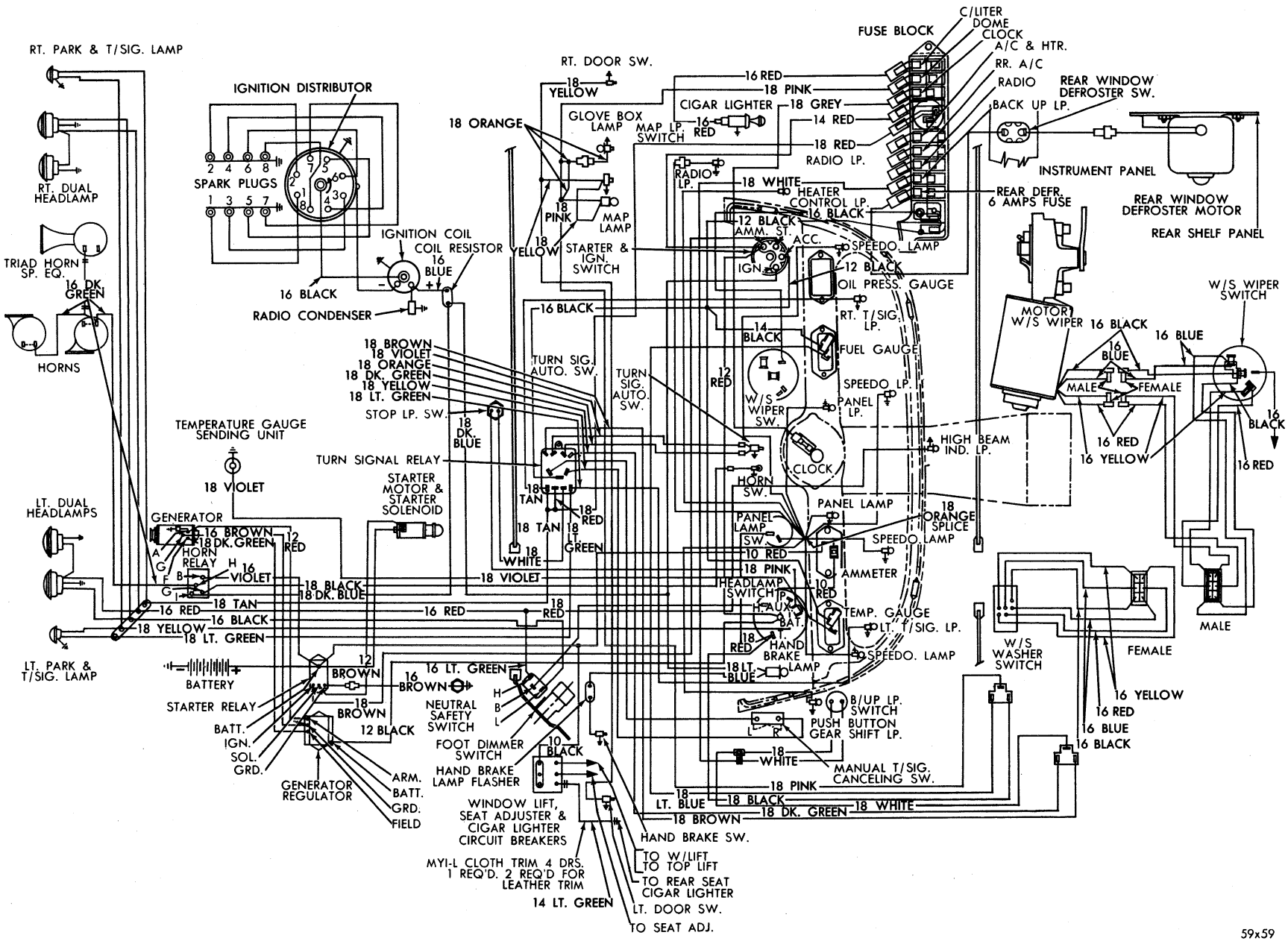


Fig. 31 — Chassis and Instrument Panel Wiring Diagram — Model MY-1

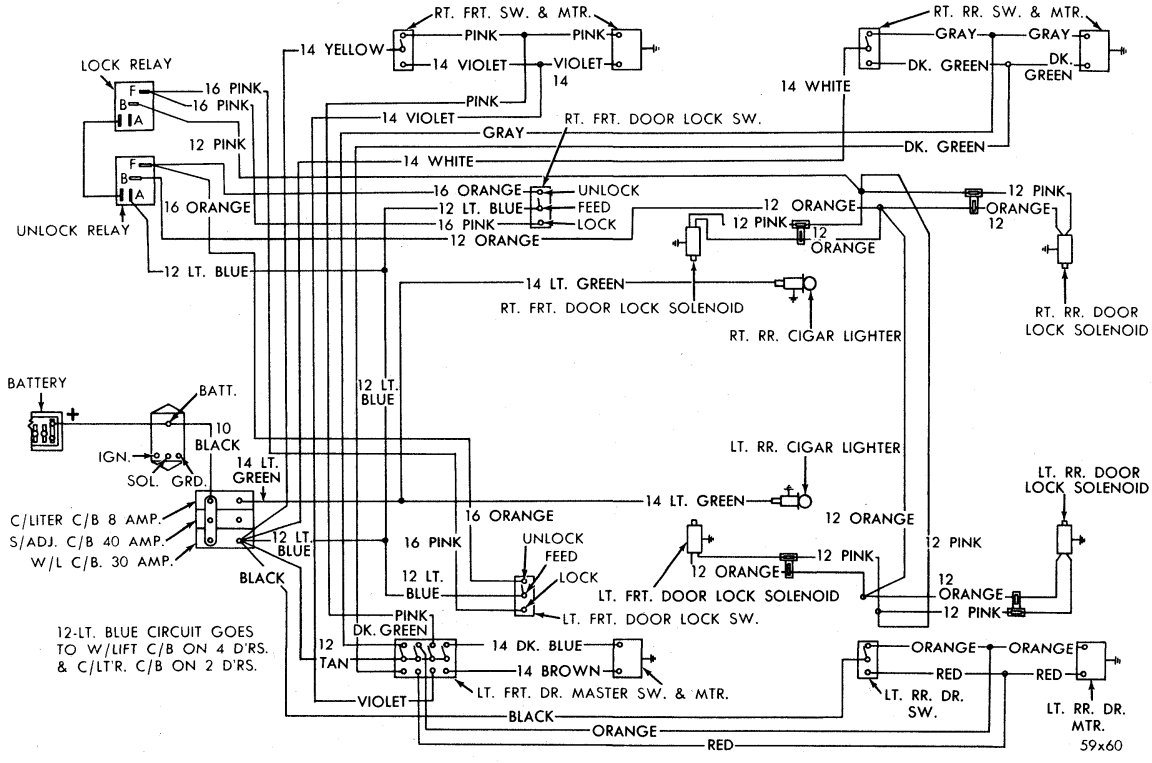


Fig. 32 — Window Lifts, Cigar Lighter and Electric Door Locks Wiring Diagram

Install the cover and screws. Install the coil in the coil cover with the coil ground wire next to one of the tabs. Position the cover tabs in the slots on the coil plate. Bend over the tabs and solder the coil ground wire to the tab and plate.

Install the three solenoid springs and position the solenoids over the springs. Fasten the solenoids to the drive unit. Install the drive unit.

REMOVAL AND INSTALLATION OF SLAVE UNIT — POWER SEATS

Remove the drive unit and cables. With the seat guide in the up and forward position, remove the long clevis pin from the front of the guide.

Remove the front rack clevis pin. To facilitate the removal of the slave unit, remove the slave unit cap. Do not lose the springs under the cap. The springs are between the racks and slave cap. Remove the nuts holding the slave unit to the guide. Remove unit.

Installation—Position the slave unit over the studs on the guide base. Position the racks in the slave unit so they will be in the up and forward position. Fasten the racks to the guide assembly. Position the springs on the rack and install slave unit cap. Install the slave unit mounting nuts. Install the front guide clevis pin. Install cables in slots and check the operation of power seats. Install drive unit and cables.

Figures 30, 31 and 32 show new wiring diagrams for Chrysler and Imperial cars for 1959.

POWER SEAT SERVICE DIAGNOSIS

ENTIRE UNIT INOPERATIVE

Remove all wires from seat switch and connect together as shown in the chart for the six various controls operations, if the operation is normal, by connecting wires. Replace switch.

MOTOR INOPERATIVE

Check red wire at relay with test light. If test light does not light, check for continuity in #10 red feed wire, faulty circuit breaker or poor connection between circuit breaker and starter relay. If test light lights, connect #10 red feed wire with red and black or red and green wires from motor. If motor runs, relay was faulty, replace relay. If motor does not run, the motor is faulty, replace motor.

SEAT INOPERATIVE (MOTOR RUNS)

Jump wire from #10 feed wire to each solenoid terminal on clutch assembly. Solenoids should each "click" as jumper is connected. If solenoid does not click:

(a) Check wire in harness for open circuit. Repair.

(b) Possible seized solenoid armature in coil. Replace coil.

(c) Possible burned-out solenoid. Replace solenoid.

SEAT INOPERATIVE (MOTOR RUNS & SOLENOIDS CLICK)

Check drive unit for stripped or broken gear. Replace drive unit if necessary.

SLAVE UNIT INOPERATIVE (MOTOR, SOLENOIDS & DRIVE UNIT O. K.)

Check for broken drive cable and replace as necessary.

SEAT HAS ROCKING MOTION

Excessive movement between slide and base of track assembly. This condition is possible due to roller being out of position.

(a) Remove power seat assembly from vehicle.

(b) Remove seat drive tubes from slave unit.

CAUTION:

Do not run motor with drive cables and tubes disassembled or unit will be placed out of synchronization.

(c) Remove seat support (B).

(d) Remove seat slave unit from seat track slide (C).

(e) Remove horizontal stops located on slide at (D).

(f) Separate seat slide (C) from base (N) by pressing slide rearward which will allow rollers (A) to jump retaining rivets (E, F, G, H) thereby separating slide from base.

(g) Remove rivet (F) and replace with 5/16-18 x 1/2" cap screw (1) to retain proper position.

NOTE: A frayed drive cable may be repaired by applying light coating of solder and then grinding to cable size.

SEAT TRACK EXCESSIVELY LOOSE

Due to loose rivet joints.

(a) Disassemble upper track seat support (B) by removing cotter keys and pins.

(b) Remove seat support and tighten all riveted joints (J) by peening with a ball peen hammer.

LOOSE FRONT LEVERS

Arc weld front levers (K) to prevent movement between the two sections comprising the front lever assembly.

SEAT CHUCK FORE AND AFT

Due to loose horizontal rack support arm to lower track base.

(a) Remove seat track assembly from vehicle and arc weld.

(b) Tighten rack attaching pins (M) by arc welding.

(c) Check for loose horizontal rack in slave unit gear train. If loose, replace slave unit.

RESISTANCE TYPE SPARK PLUG CABLES

All 1959 Chrysler and Imperial engines incorporate conventional spark plugs (without resistors), along with resistance type spark plug cables to eliminate radio interference.

For identification purposes, this new cable has "RADIO" printed on it.

The new cable uses a graphite or composition type conducting core replacing the copper wire found in the center of conventional spark plug cable. Full contact is made between the core and terminals by means of a short wire pin pushed into the ends of the cable.

Precautions must be observed in handling to prevent damage to the core. The cable should be removed from the spark plug by grasping the cable cover and pulling **straight off** with a steady, even

pull. Pulling sideways could jam the terminal on the spark plug and cause the cable to separate from the terminal. The cable terminal should not be crimped to the point that excessive force is required to remove it from the spark plug.

The cables should never be removed by giving them a quick jerk. Doing so can stretch the core and cause a high resistance or open circuit. If a damaged core is suspected, a resistance check with an ohmmeter should be made. The resistance of the various plug cables will vary because of the different lengths, see chart below:

SPARK PLUG CABLES WITH BUILT-IN RESISTANCE

No. 1 Cable 8,300 to 16,600 Ohms
No. 2 Cable 5,500 to 11,000 Ohms
No. 3 Cable 8,100 to 16,200 Ohms
No. 4 Cable 6,000 to 12,000 Ohms
No. 5 Cable 8,800 to 17,600 Ohms
No. 6 Cable 6,300 to 12,600 Ohms
No. 7 Cable 9,400 to 18,800 Ohms
No. 8 Cable 7,200 to 14,400 Ohms

If any cable has appreciably more resistance than specified, check to be sure the terminals are in contact with the pin and the pins is in full contact with the core. If the terminals and pins are properly installed and the cable resistance is still more than specified, the cable should be replaced with a new resistance type cable.

A new terminal should never be attached to the resistance core cables unless the wire pin is in place; otherwise, contact will not be maintained with the core. This will result in arcing and burning of the core which will cause engine malfunctioning and radio interference.

CAUTION

Resistor type spark plugs are never to be used with the new resistance type cable. The added resistance of the spark plugs may cause malfunctioning of the ignition system. When replacing a spark plug, be sure to use the correct type specified for the particular engine.

SERVICE DIAGNOSIS

If the radio develops excessive noise or if there is a pronounced engine miss, check for faulty or broken cables.

THE AUTOMATIC BEAM CHANGER

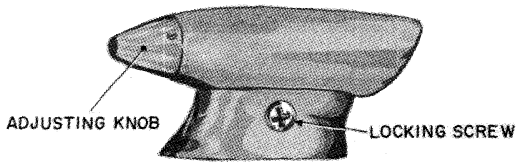
The automatic beam changer is an automatic headlight control unit which senses the headlight intensity from other vehicles and automatically adjusts the headlights (of the vehicle in which it is mounted,) to the upper or lower beam position.

A scanner and base assembly (Fig. 33), is mounted on top of the instrument panel, directly in front of the steering column. The control unit Fig. 33 is mounted on a convenient structural part (grounding purposes) of the vehicle's body. (Figure 34).

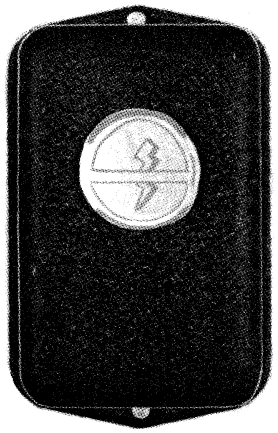
OPERATION

The Automatic Beam Changer will change the headlight to the "lower beam" when an oncoming car is approached at a distance of approximately 1200 feet. The unit will reset the headlights to the "high beam" position within ½ second after the approaching car has passed.

The headlight beam setting can be interrupted by using the conventional dimmer switch. If the unit has an "upper beam" setting and the driver feels that



SCANNER



CONTROL UNIT 59X144

Fig. 33 — Scanner and Control Unit

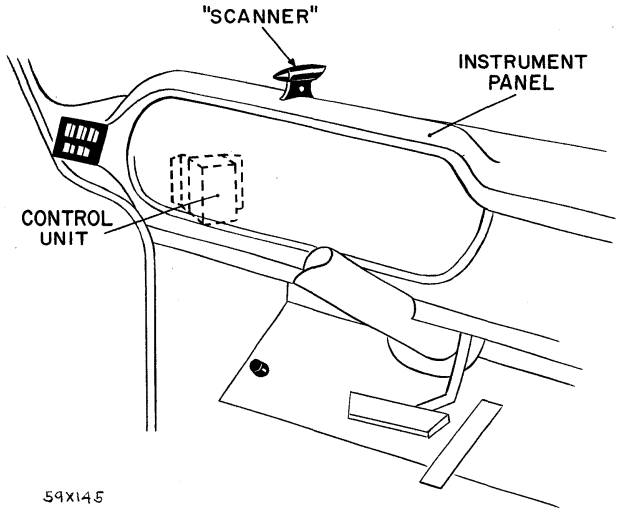


Fig. 34 — Location of Beam Changer Control Unit

the "lower beam" is required, he can override the automatic control by depressing the dimmer switch to obtain the "lower beam" condition. Automatic operation is restored when the driver again depresses the dimmer switch.

DRIVER ADJUSTMENTS

A knob, located at the rear of the scanner unit (Fig. 33), provides a sensitivity adjustment. If the headlights do not change beam quickly enough upon approaching another car, it is an indication that sensitivity is set too low and correction is made by turning the scanner knob clockwise (to the right).

If the headlights "change beam" too soon, the sensitivity can be decreased by turning the scanner knob counter-clockwise (to the left).

AIMING THE AUTOMATIC BEAM CHANGER

PRE-AIMING INSTRUCTIONS

Before attempting to aim the automatic beam changer, complete the following pre-aiming instructions.

Place vehicle on a level floor.

If the vehicle is placed in an area in which the floor is not level, it will be necessary to take this condition into consideration when "aiming" the "scanner" unit. **Refer to aiming the "scanner" unit.**

Check front spring height. Adjust to specifications —if necessary.

Check tire inflation. Tire pressure should not vary more than 3-5 pounds among tires.

Rock vehicle sideways to allow spring shackles, et cetera to assume a normal position.

If gasoline tank is not full, place a 100 pound weight in trunk of vehicle.

There should be no other load in the vehicle, other than the driver.

AIMING THE "SCANNER" UNIT

Vertical alignment of the "scanner" unit is critical. Mount "scanner" aimer, Tool C-3697, on the "scanner" unit, as shown in Figure 35. Make sure that all conditions listed under "pre-aiming instructions" have been performed, before proceeding with the aiming operation.

Loosen the cross-recess head locking screw (Fig. 33) just enough to permit free movement of the "scanner" through its arc, as controlled by the mounting base. (Total angular deflection of the "scanner" unit is six degrees).

Using headlamp aimer kit, Tool C-3674, use the split image transit and target assembly to determine slope of floor, as outlined in the directions contained in the aimer kit.

Move "scanner" forward or backwards on base (through arc) to bring the **leading edge** of the bubble of "scanner" aimer, Tool C-3697, in alignment with the proper "plus" or "minus" value (on level dial) which was obtained from the transit of aimer kit, Tool C-3674.

Example: If transit indicates that a minus 2 correction for slope is necessary, bring **leading edge,** of bubble of aimer Tool, C-3697, to the minus 2 index

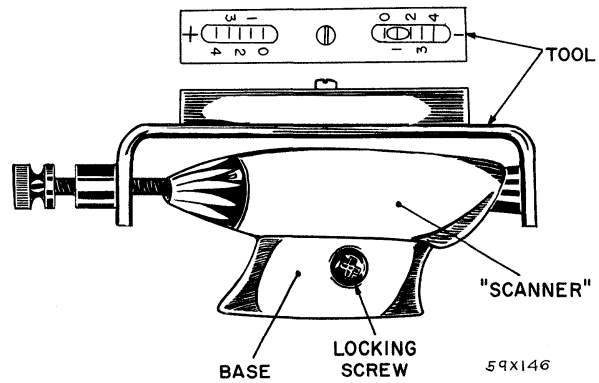


Fig. 35 — Mounting Scanner Aimer Tool

line. (Figure 35). Tighten locking screw (Fig. 33) securely and then recheck position of bubble. If position of bubble has changed, loosen locking screw slightly and make necessary correction to bring bubble once more into desired position. Retighten locking screw securely and remove "scanner" aimer Tool.

THE ELECTRONIC REAR VIEW MIRROR ("MIRROR-MATIC")

The electronically operated rear view mirror (mirror-matic), as shown in Fig. 36 is a self-dimming rear view mirror which provides maximum rearward vision at night, since the bright reflection surface of the mirror is in use except when glaring light strikes its surface.

The electronic glare detecting mechanism is housed entirely within the mirror case. Sensitivity is selected by a three-position switch on the front of the mirror bezel (Fig. 36). "Off" locks the mirror in the normal "bright" position. Selection of either "City" or "Hi-way" switch position permits the mirror to respond to glare conditions. It is less light-sensitive when "City" has been selected and therefore response to neon signs, streetlights, etc. is held to a minimum.

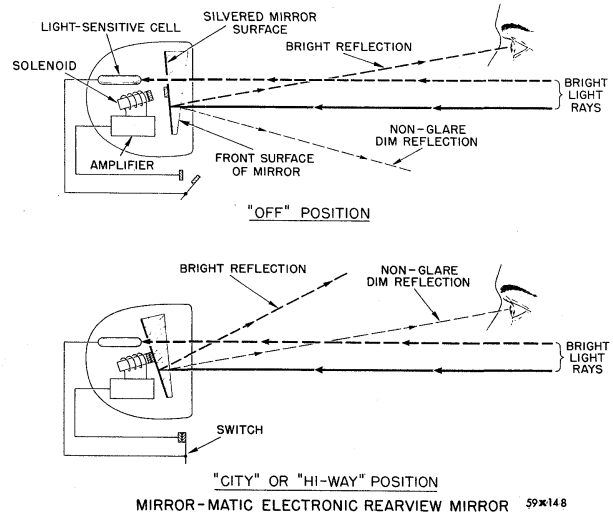


Fig. 37 — Positioning Mirror in Operation

OPERATION (FIG. 37)

The heart of the automatic tripping mechanism is a tiny photo-electric cell which "sees" through a small aperture in the silvered mirror surface (Fig. 36). Light striking the cell generates a small voltage which increases with increasing light intensity. When the light intensity becomes high enough to cause annoying glare, the voltage is enough to activate a miniature amplifier and solenoid assembly which pulls the prism mirror a few degrees upward to reflect a dim image off the front surface of the glass and into the driver's eyes. As long as glare is present, the mirror will remain in its "dim" position, returning immediately to its normal "bright" position when the glare drops below a pre-set level.

DRIVER ADJUSTMENT (POSITIONING MIRROR)

When adjusting the position of mirror-matic for best visibility, first turn off the headlights (headlight circuit energizes mirror system) and set the mirror for brightest image.

When adjustment for best visibility is obtained, lock mirror in position by turning lock nut (clockwise) at the mirror support base.

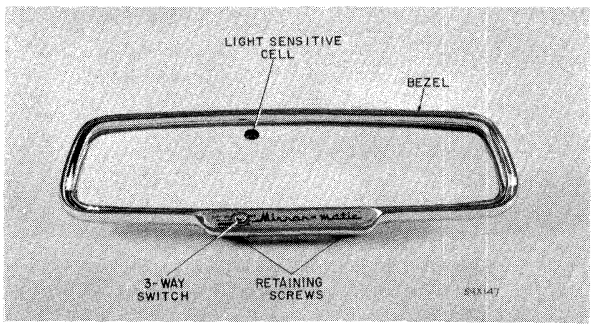


Fig. 36 — Mirror-Matic Rear View Mirror

SERVICE ADJUSTMENTS

If a glare condition exists with the switch (Fig. 37) set either in the "City" or "Hi-way" position, it is an indication that the sensitivity in either or both of these positions is too **low.**

Sensitivity can be raised by making an internal adjustment at the mirror assembly as follows:

(a) Remove plastic knob from 3-position switch (Fig. 36) by carefully pulling outward on plastic knob.

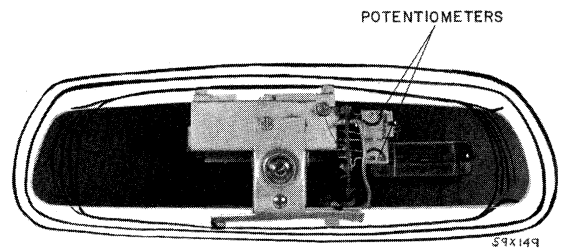


Fig. 38 — Mirror-Matic Back Cover

(b) Remove the two screws and remove bezel by lifting bezel outward and upward (to clear metal retaining tabs).

(c) Expose internal mechanism of mirror assembly by lifting top portion of back cover upward (to clear metal retaining tabs) and moving back cover rearward over mirror support. Move back cover rearward only far enough to provide access to potentiometer adjusters (Fig. 38).

(d) To increase sensitivity of the "City" position, turn the arm of the potentiometer marked "City" in the direction indicated by the arrow.

(e) To increase sensitivity for "Hi-way" driving, turn the arm of the potentiometer marked "Hi-way" in the direction indicated by the arrow.

NOTE: To decrease sensitivity of either or both the potentiometers, turn potentiometer arms in the direction opposite to direction indicated by arrow.

(f) Replace back cover by positioning back cover over the two metal tabs and aligning screw holes in bottom of cover with threaded holes in mirror support.

(g) Install bezel by aligning slots at top of bezel with metal tabs and aligning screw holes in bottom of bezel with threaded holes in mirror support replace screws (Fig. 36) and tighten securely.

(h) Replace plastic switch knob.

(i) Adjust mirror to desired position and test operation of unit.

Section VII
ENGINE
DATA AND SPECIFICATIONS

ENGINE	
Type	90° V
Number of Cylinders	8
Bore—MC-1, MC-2	4.031″
MC-3, MY-1	4.188″
Stroke	3.750″
Piston Displacement—MC-1, MC-2	383 cu. in.
MC-3, MY-1	413 cu. in.
Compression Ratio	10.0 to 1
Compression Pressure at 150 rpm (plugs removed) Wide Open Throttle	150 to 180 lbs.
Maximum Variation Between Cylinders (any one engine)	25 lbs.
Firing Order	1-8-4-3-6-5-7-2
CYLINDER NUMBERING	
Left Bank	1-3-5-7
Right Bank	2-4-6-8
CRANKSHAFT	
Type	Fully Counter-Balanced
Bearings	Steel Backed Babbitt
Journal Diameter	2.7495 to 2.7505″
Crank Pin Diameter	2.374 to 2.375″
Maximum Out-of-Round Permissible	.001″
Number Main Bearings	5
Diametral Clearance Desired	.0005 to .0015″
End Play	.002 to .007″
Thrust Taken By	No. 3 Main Bearing
Finish at Rear Seal Surface	Diagonal Knurling
Interchangeability of Bearings	Upper Nos. 1, 2, 4, 5 Lower Nos. 1, 2, 4, 5

ENGINE (Cont'd)

MAIN BEARINGS (Service) All Available in Standard and the following Undersizes	.001, .002, .003, .010, .012″
CONNECTING RODS AND BEARINGS	
Type	Drop Forged "I" Beam
Length (Center to Center)	6.766—.770″
Weight (less bearing shells)	29.4 oz.
Bearings	Steel-Backed Babbitt
Diameter and Length	2.375 x .927″
Diametral Clearance Desired	.0005 to .0015″
Maximum Allowable before Reconditioning	.0025″
Side Clearance	.009 to .017″
Bearings for Service	Standard .001, .002, .003, .010, .012″ U.S.
Piston Pin Bore Diameter	1.0925 to 1.0928″
CAMSHAFT	
Drive	Chain
Bearings	Steel Backed Babbitt
Number	5
Thrust Taken by	Cylinder Block
Diametral Clearance	.001 to .003″
Maximum Allowable before Reconditioning	.005″
CAMSHAFT BEARING JOURNALS Diameter	
No. 1	1.998 to 1.999″
No. 2	1.982 to 1.983″
No. 3	1.967 to 1.968″
No. 4	1.951 to 1.952″
No. 5	1.748 to 1.749″
CAMSHAFT BEARINGS Diameter (after reaming)	
No. 1	2.000 to 2.001″
No. 2	1.984 to 1.985″
No. 3	1.969 to 1.970″
No. 4	1.953 to 1.954″
No. 5	1.750 to 1.751″
TIMING CHAIN	
Adjustment	None
Number of Links	50
Pitch	.50″
Width	.88″
TAPPETS	
Type	Hydraulic
Clearance in Block	.0005 to .0015″
Body Diameter	.9040 to .9045″
Clearance Between Valve Stem and Rocker Arm Pad	Dry Lash .060 to .210″
PISTONS	
Type	Horizontal Slot w/Steel Struts
Material	Aluminum Alloy Tin Coated

ENGINE (Cont'd)

Land Clearance (diametral)	.041 to .047″
Clearance at Top of Skirt	.0005 to .0010″
Weight (std. through .040 oversize)	
MC-1, MC-2	724 gms.
MC-3, MY-1	780 gms.
Piston Length (overall)	3.95″
Ring Groove Depth	
No. 1—MC-1 & MC-2	.213″
MC-3 & MY-1	.216″
No. 2—MC-1 & MC-2	.213″
MC-3 & MY-1	.216″
No. 3—MC-1 & MC-2	.195″
MC-3 & MY-1	.200″
Pistons for Service	Std. .005, .020, .040″ O.S.
PISTON PINS	
Type	Press Fit in Rod
Diameter	1.0935 to 1.0937″
Length	3.4440 to 3.450″
Clearance in Piston	.00045 to .00075″
Interference in Rod	.0007 to .0012″
Piston Pins for Service	Standard Only
Direction Offset in Piston	Toward Right Side of Engine
PISTON RINGS	
Number of Rings per Piston	3
Compression	2
Oil	1
Width of Rings	
(Compression)	.0775 to .0780″
(Oil)	.1860 to .1865″
Piston Ring Gaps (all)	.013 to .025″
RING SIDE CLEARANCE	
(Compression)	
Upper	.0015 to .0030″
Intermediate	.0015 to .0030″
(Oil)	.0010 to .0030″
VALVES—Intake	
Material	Silicon—Chromium Steel
Head Diameter—MC-1, MC-2	1.95″
MC-3, MY-1	2.08″
Length (to top of valve face)	4.79″
Stem Diameter	.372 to .373″
Stem to Guide Clearance	.001 to .003″
Maximum Allowable Before Reconditioning	.004″
Angle of Seat	45°
Adjustment	None
Lift	.389″
VALVES—Exhaust	
Material	Nitrogen Treated Manganese Chromium—Nickel Steel
Head Diameter	1.60″

ENGINE (Cont'd)

Length (to top of valve face)	4.79″
Stem Diameter	.371 to .372″
Stem to Guide Clearance	.002 to .004″
Maximum Allowable Before Reconditioning	.006″
Angle of Seat	45°
Adjustment	None
Lift	.389″
VALVE SPRINGS	
Number	16
Free Length	2.34″
Load when Compressed to (valve closed)	1.860″ @ 95 —105 lbs.
Load when Compressed to (valve open)	1.470″ @ 188—252 lbs.
Valve Springs I.D.	1.010 to 1.030″
CYLINDER HEAD	
Number Used	2
Combustion Chamber	Wedge Type
Valve Seat Runout (maximum)	.002″
Intake Valve Seat Angle	45°
Seat Width (finished)	.060 to .085″
Exhaust Valve Seat Angle	45°
Seat Width (finished)	.040 to .060″
Cylinder Head Gasket Compressed (thickness)	.022″
ENGINE LUBRICATION	
Pump Type	Rotary, Full Pressure
Capacity (qts.)	5*
Pump Drive	Camshaft
Operating Pressure at 40 to 50 mph	45 to 70 lbs.
Pressure Drop Resulting from Clogged Filter	7 to 9 lbs.

*When Filter Element is Replaced, add 1 qt.

TIGHTENING REFERENCE

	Torque Foot-Pounds	Thread Size
Connecting Rod Nut—Plain	45	3/8–24
Connecting Rod Nut—CST (Black)	40	3/8–24
Cylinder Head Bolt	70	7/16–14
Main Bearing Cap Bolt	85	1/2–13
Spark Plug	30	14 mm
Camshaft Lockbolt	35	7/16–14
Carburetor to Manifold Nut	7	5/16–24
Chain Case Cover Bolt	15	5/16–18
Torque Converter Housing Bolt	30	3/8–16
Clutch Housing Bolt	30	3/8–16
Crankshaft Rear Bearing Seal Retainer	30	3/8–16
Crankshaft Bolt	135	3/4–16
Cylinder Head Cover Stud and Nut	40 in.-lbs.	1/4–28
Distributor Vacuum Line Tube Nut	95 in.-lbs.	3/8–24
Distributor Clamp Bolt	15	5/16–18

TIGHTENING REFERENCE (Cont'd)

Engine Front Mounting to Frame Nut	85	1/2–20
Engine Front Mounting to Block Nut	45	7/16–20
Exhaust Manifold Bolt	30	3/8–16
Exhaust Pipe Flange Nut	40	7/16–20
Exhaust Pipe Clamp Bolt	20	3/8–24
Exhaust Pipe Support Clamp Bolt	20	3/8–24
Fan Attaching Bolt	15–18	5/16–18
Fan Belt Idler Pulley Nut	45	7/16–20
Fan Belt Idler Pulley Bracket Bolt	30	3/8–16
Flywheel Housing to Cylinder Block Bolt	50	7/16–14
Flywheel Housing Cover Bolt	7	1/4–20
Fuel Pump Attaching Bolt	30	3/8–16
Generator Bracket Bolt	50	7/16–14
Generator Mounting Nut	20	5/16–24
Generator Adjusting Strap Bolt	15	5/16–18
Generator Adjusting Strap Mounting Bolt	30	3/8–16
Intake Manifold Bolt	40	3/8–16
Manifold Heat Control Counterweight Bolt	50 in.-lbs.	#10–32
Oil Pan Drain Plug	35	5/8–14
Oil Pan Bolt	15	5/16–18
Oil Pump Cover Bolt	15	5/16–18
Oil Pump Attaching Bolt	35	3/8–16
Oil Filter Attaching Stud	30	3/4–16
Rocker Shaft Bracket Bolt	30	3/8–16
Starter Mounting Bolt	50	7/16–14
Vibration Damper Bolt	15	5/16–18
Valve Tappet Cover End Bolt	8	1/4–20
Water Pump to Housing Bolt	30	3/8–16
Water Pump Housing to Cylinder Block Bolt	30	3/8–16
A/C Compressor to Engine Bolt	30	3/8–16

ENGINE

The new V-8 Engine, as shown in Figure 39, 40 and 41, is one of the finest, most efficient engines to be designed by Chrysler Engineering. It contains many weight reducing features.

Some of the new features, as shown in Figures 42, 43 and 44, are in-line overhead valves, wedge shaped combustion chambers, full length cylinder water jackets, rigid crankshaft and series flow cooling system. In addition, the volume of coolant in the engine has been reduced to improve engine warm up. The ignition distributor is located at the upper front end of the engine for easier servicing.

The lubrication system consists of an externally mounted rotor type oil pump of greater capacity, full flow oil filter and a series of passages where the oil is delivered to the engine. The oil filter can be installed by hand.

The engine has 10:1 compression ratio, is equipped with a dual carburetor on the Windsor Model (MC-1), and a 4-barrel carburetor on all other models, and uses premium fuel. The engine has exceptional smoothness and performance throughout the entire speed range.

MINOR TUNE UP

A periodic engine tune up will assure maximum engine performance and fuel economy. The following procedures should be followed when performing minor engine tune up.

Check battery specific gravity, add water if necessary and clean and tighten battery connections. Clean and adjust the spark plugs (.035 inch gap). Tighten to 30 foot-pounds torque with Tool C-3054. Adjust the distributor contact points (.015 to .018

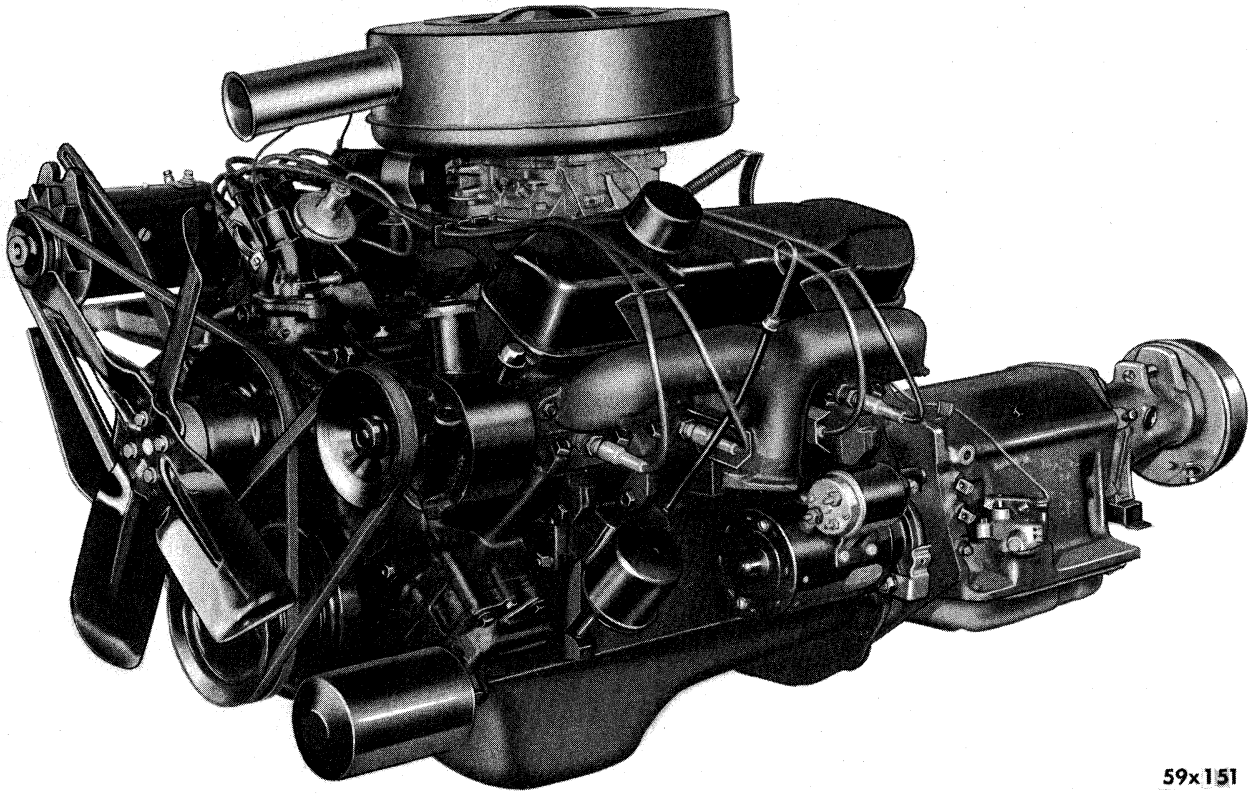


Fig. 39 — Chrysler Engine Assembly

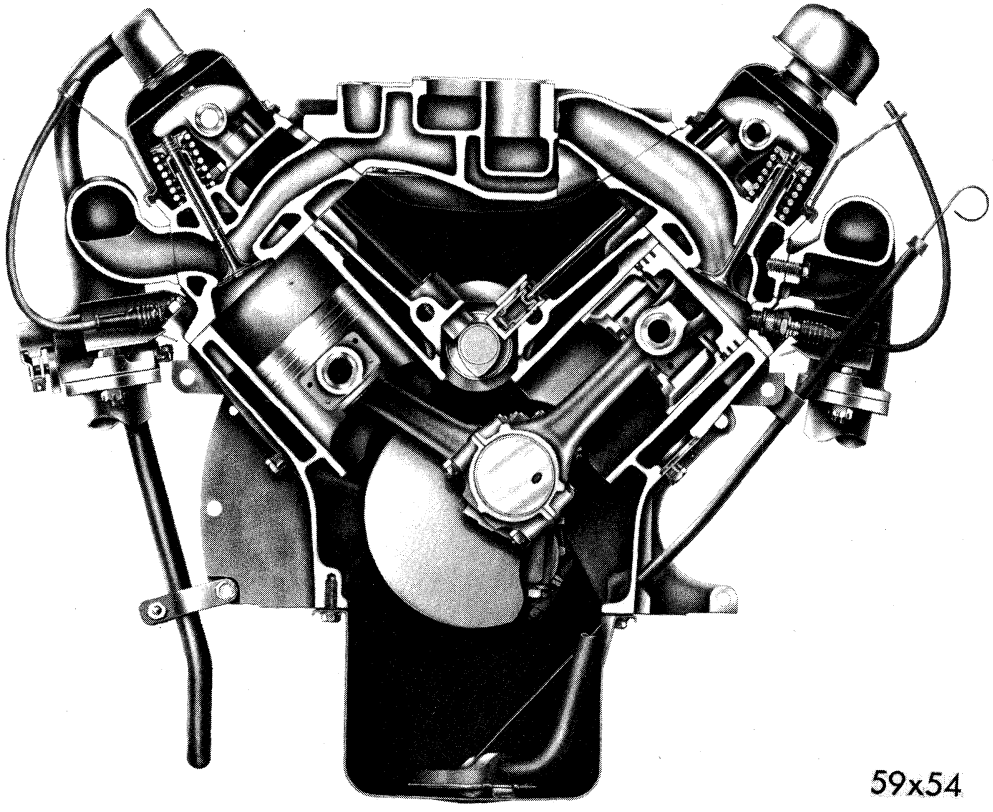


Fig. 40 — Engine End Sectional View

inch gap). Install new points if necessary. Check the distributor cap for cracks and corrosion. Inspect the rotor, rotor spring and plunger. Inspect the distributor to spark plug wires for brittle, cracked or frayed insulation. Inspect small lead wires for tightness, or damaged insulation. Check for excessive play in distributor vacuum advance plate bearing. Install a new plate if necessary. Reset the ignition timing. Inspect accessory belt drives referring to "Accessory Belt Drives," for proper adjustments. Tighten the carburetor flange nuts to **7 foot-pounds torque.** Set carburetor idle mixture adjustment. Adjust the throttle stop screw so engine idles at 450 to 500 rpm. Check manifold heat control valve in the right exhaust manifold for proper operation and apply Manifold Heat Control Valve Solvent Part Number 1879318 to the bushing and shaft, as shown in Lubrication Section.

MAJOR TUNE UP

Perform all the steps of a "Minor Tune Up" and in addition, the following procedures should be followed when performing Major Engine Tune Up. Tighten the manifold nuts. Perform the cylinder compression test. Compression pressures can be read from the top side of engine without interference using a 30 degree bend extension on the gauge. The compression should not vary more than 25 pounds between cylinders.

Refer to specifications for compression pressures. Test the coil, and condenser. Inspect the primary and secondary wires. Service the air cleaner — DO NOT WASH OR OIL. Service more frequently under severe dusty conditions. Replace air cleaner filter cartridge every 15,000 miles. Test fuel pump for pressure and vacuum. Refer to Fuel Section Specifications. Perform a combustion analysis. Adjust the carburetor. Road test the car as a final check.

REMOVAL OF THE ENGINE ASSEMBLY (From Car)

Drain the cooling system and remove the battery. Remove the fan shroud and radiator. Scribe the outline of hinge brackets on hood to assure proper adjustment when installing. Remove the hood. Disconnect fuel lines and wires attached to engine units.

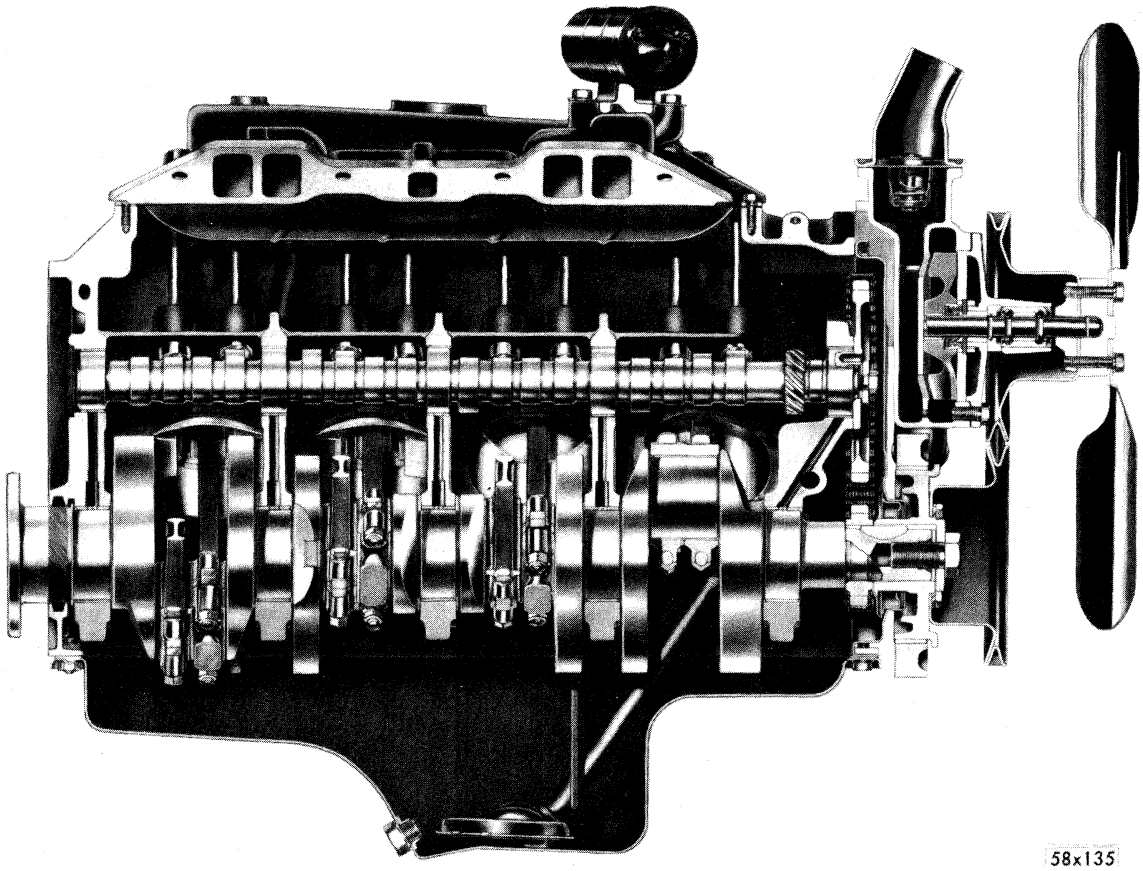


Fig. 41 — Engine Side Sectional View

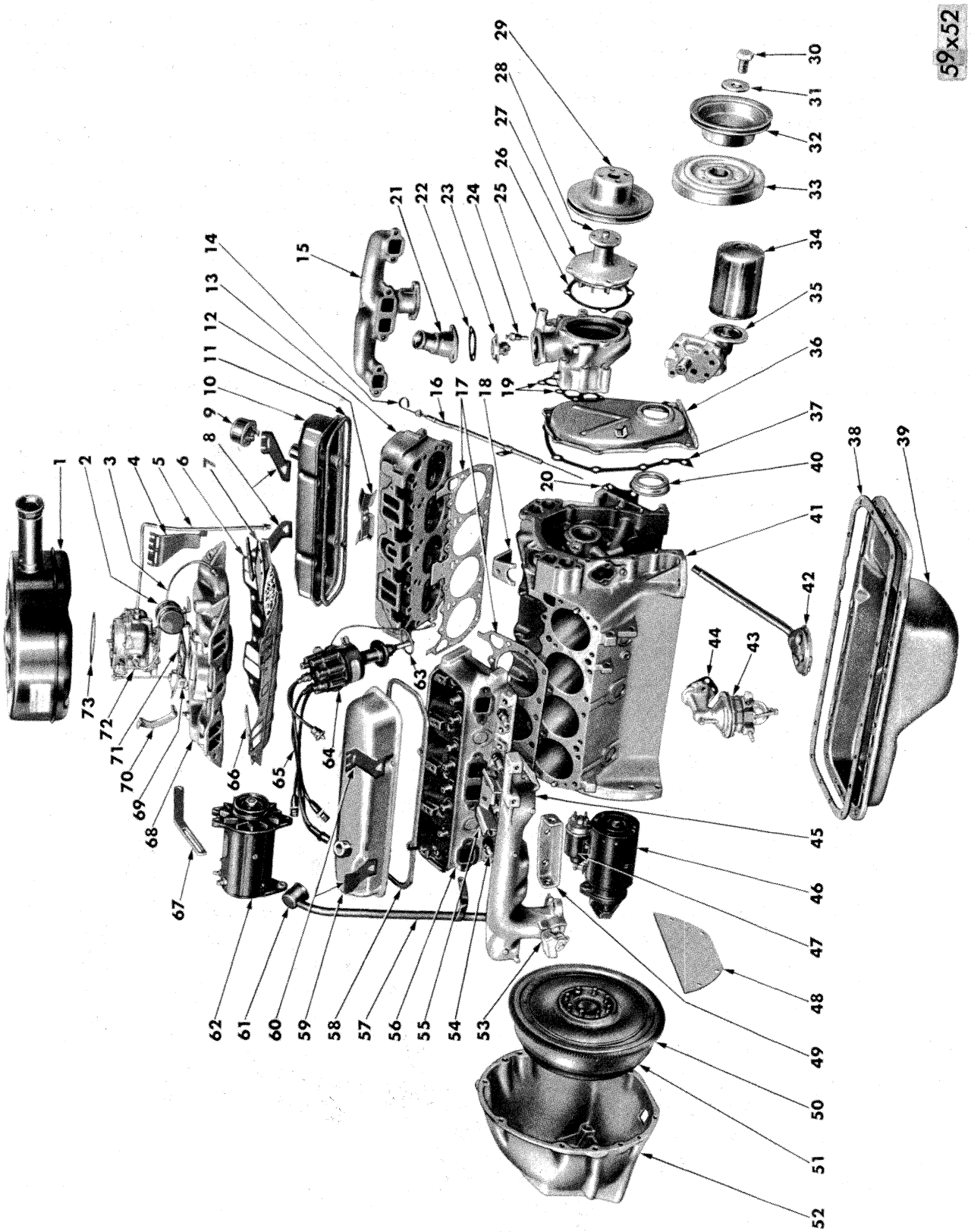


Fig. 42 — Engine External Parts

Fig. 42 — Engine External Parts

1. Carburetor Air Cleaner
2. Coil
3. Vacuum Line
4. Wiring Harness (bracket)
5. Fuel Line
6. Tappet Chamber Cover and Intake Manifold Gasket
7. Reinforcement, silencer and Retainer
8. Wiring Harness (brackets)
9. Oil Filler Cap
10. Rocker Cover L
11. Rocker Cover Gasket L
12. Spark Plug Heat Shield
13. Cylinder Head L
14. Oil Level Indicator
15. Exhaust Manifold L
16. Oil Level Indicator Tube
17. Cylinder Head Gasket
18. Distributor Clamp
19. Water Pump Housing Gasket
20. Oil Pump Housing Gasket
21. Outlet Elbow
22. Outlet Elbow Gasket
23. Thermostat
24. Temperature Sending Unit
25. Water Pump Housing
26. Water Pump Body Gasket
27. Water Pump Body
28. Hub
29. Water Pump Pulley
30. Bolt
31. Washer
32. Crankshaft Pulley
33. Vibration Damper
34. Oil Filter
35. Oil Pump
36. Chain Case Cover
37. Chain Case Cover Gasket
38. Oil Pan Gasket
39. Oil Pan
40. Chain Case Cover Oil Seal
41. Cylinder Block
42. Oil Screen Suction Pipe
43. Fuel Pump
44. Fuel Pump Gasket
45. Exhaust Manifold R
46. Starter
47. Solenoid
48. Torque Converter Housing Dust Shield
49. Generator Bracket
50. Ring Gear
51. Torque Converter
52. Torque Converter Housing
53. Manifold Heat Control Valve
54. Spark Plug
55. Spark Plug Heat Shield
56. Cylinder Head R
57. Crankcase Vent Tube
58. Rocker Cover Gasket R
59. Rocker Cover R
60. Wiring Harness (brackets)
61. Crankcase Vent Tube Cap
62. Generator
63. Distributor Gasket
64. Distributor
65. Wires
66. Reinforcement
67. Generator Adjusting Strap
68. Intake Manifold
69. Automatic Choke
70. Control Spring Bracket
71. Carburetor Gasket
72. Carburetor
73. Carburetor Air Cleaner Gasket

Remove the air cleaner and carburetor. Attach the engine lifting fixture Tool C-3466 to carburetor flange studs on the intake manifold and attach a chain hoist to the fixture eyebolt. Disconnect the propeller shaft, wires and linkage at transmission. Disconnect exhaust pipes at manifolds. Be sure the exhaust system is sufficiently supported while the engine is removed. Remove rear crossmember to transmission support attaching bolts.

NOTE: Place a rollaway jack under the transmission to relieve weight from the crossmember. Place a wood block between jack and transmission to avoid damaging transmission oil pan.

The jack supports the weight of rear of engine and must be able to roll with the power plant as it is removed from the chassis. Remove rear crossmember engine support. Remove front engine mounting nuts. Raise the engine with chain hoist and work the engine out of the chassis. Remove transmission. Place the engine in repair stand C-3167 and Adapter

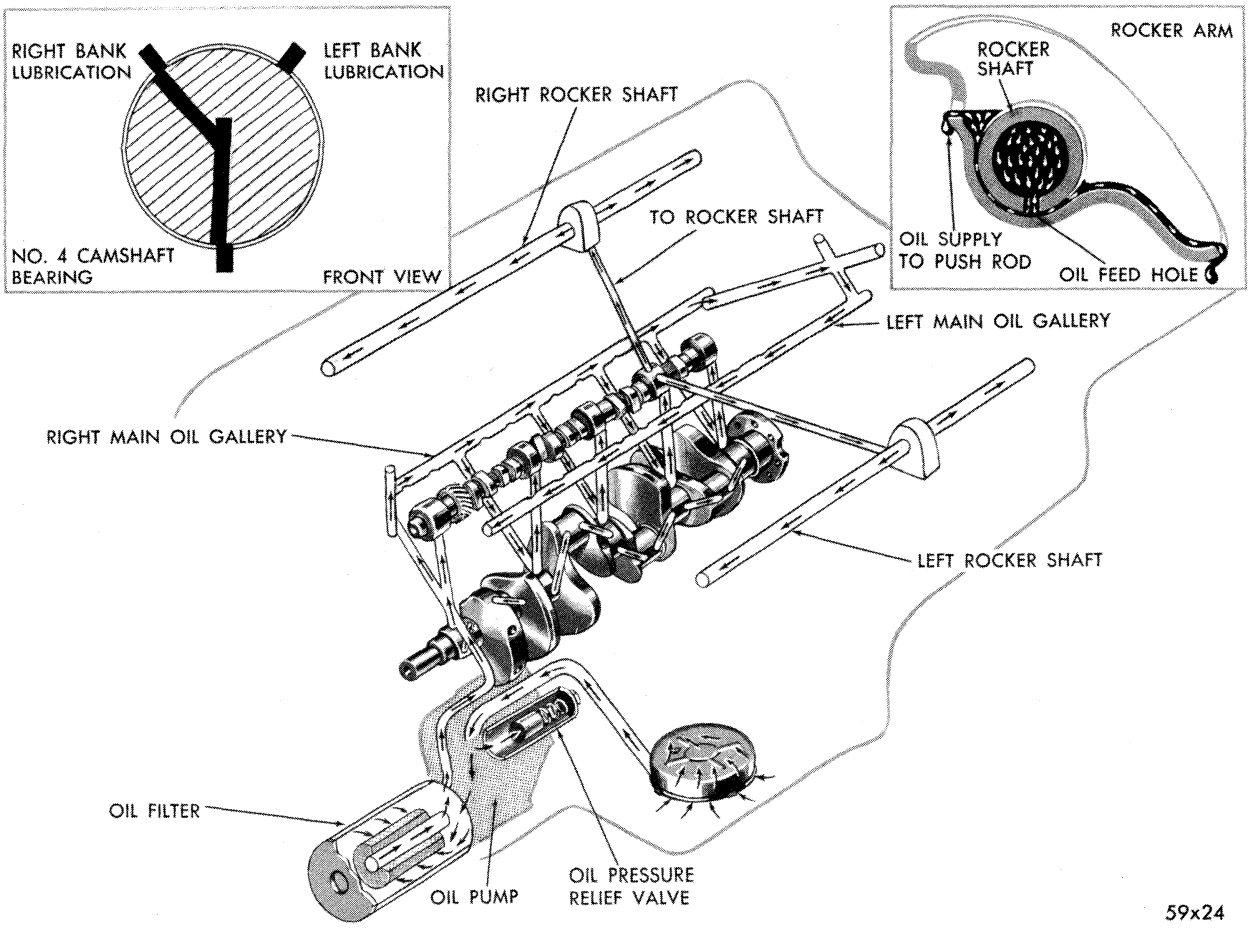


Fig. 43 — Engine Oiling System

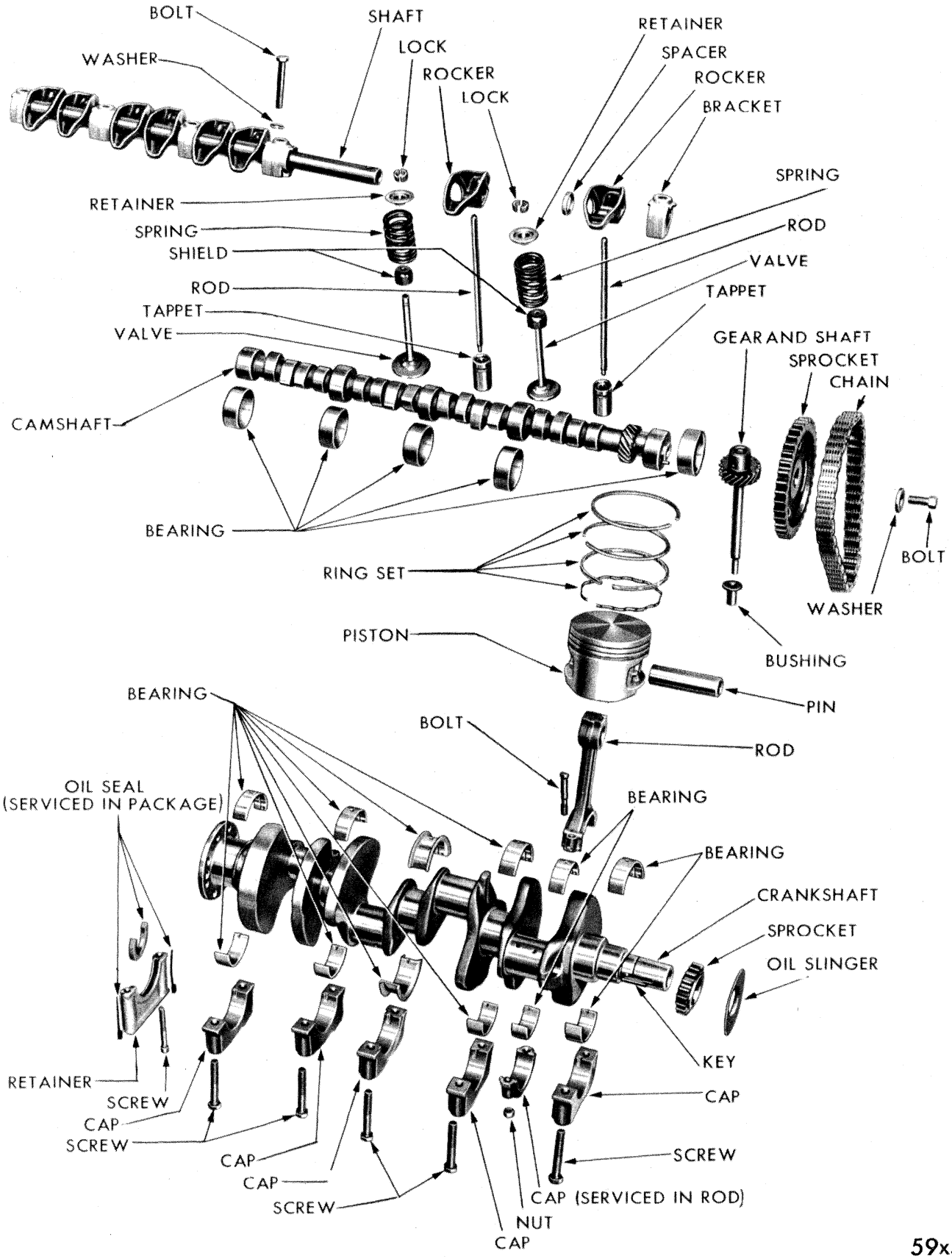


Fig. 44 — Engine Internal Parts

3662 for disassembly using the transmission mounting bolts.

INSTALLING THE ENGINE ASSEMBLY (In Car)

Remove the engine from repair stand and install transmission. Install the engine lifting fixture Tool C-3466 and attach the chain hoist to fixture eyebolt. Raise the engine. Lower the engine carefully into the car until front and rear of engine are approximately positioned. Place a rollaway jack under the transmission to support the weight of rear of the engine. Install the engine rear support crossmember. Position the engine and install the nuts at front engine mounts. Position and install rear engine support bolts and remove the jack, hoist and engine lifting fixture.

Install the carburetor, fuel lines, wiring and linkage. Install the radiator, fan shroud and radiator hoses. Connect exhaust pipes, using new gaskets. Install the hood, being sure to align hood by the scribe marks placed on the inside of hood at disassembly. Connect the propeller shaft at the transmission. Connect linkage and wires. Be sure all drain cocks are closed, and fill cooling system. Fill the engine crankcase and transmission. Refer to the lubrication Section for quantities and lubricants to use. Check the entire system for leaks and correct as necessary.

NOTE: Whenever an engine has been rebuilt and a new camshaft and/or new tappets have been installed, add one quart of factory recommended oil additive to engine oil to aid break-in (MoPar Engine Oil Additive, Part No. 1643234). The oil mixture should be left in engine for a minimum of 500 miles, and drained at the next normal oil change.

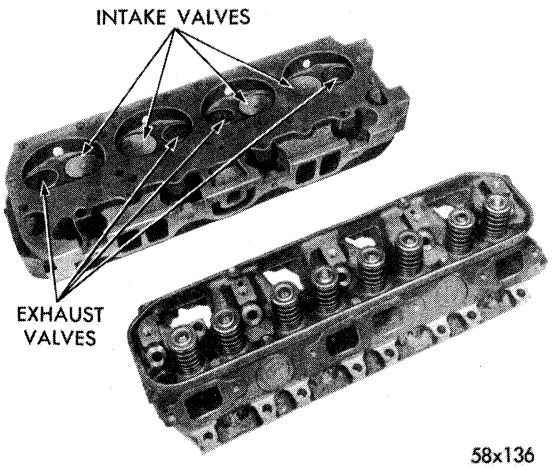


Fig. 45 — Cylinder Heads

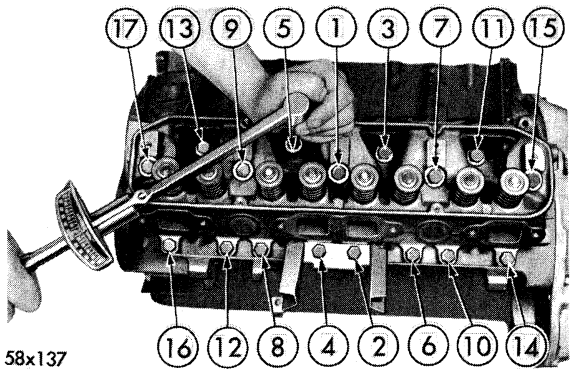


Fig. 46 — Tightening Sequence

Start the engine and run until normal operating temperature is reached. Check the timing and adjust carburetor as necessary. Road test the car.

CYLINDER HEADS

The chrome alloy cast iron cylinder heads as shown in Figure 45 are held in place by 17 bolts. The spark plugs enter the cylinder head horizontally and are located at the wide edge of the combustion chambers.

a. Removal

Drain the cooling system. Remove generator, carburetor air cleaner and fuel line. Disconnect the accelerator linkage. Remove the vacuum control tube at carburetor and distributor. Disconnect the distributor cap, coil wires and heater hose. Disconnect the heat indicator sending unit wire. Remove spark plugs located under the manifolds. Remove the intake manifold, ignition coil and carburetor as an assembly. Remove the tappet chamber cover. Remove cylinder head covers and gaskets.

NOTE: On air conditioned cars, number eight cylinder exhaust valve must be open to allow clearance between the right bank cylinder head cover and the heater housing.

Remove the generator. Remove exhaust manifolds. Remove the rocker arms and shaft assembly. Remove the push rods and place them in their respective slots in holder Tool C-3068. Remove the 17 head bolts from each cylinder head and remove cylinder heads. Place cylinder head in holding fixture Tool C-3626.

b. Installation

Clean the gasket surfaces of cylinder block and cylinder head. Check all surfaces with a straight edge if there is any reason to suspect leakage. Coat the

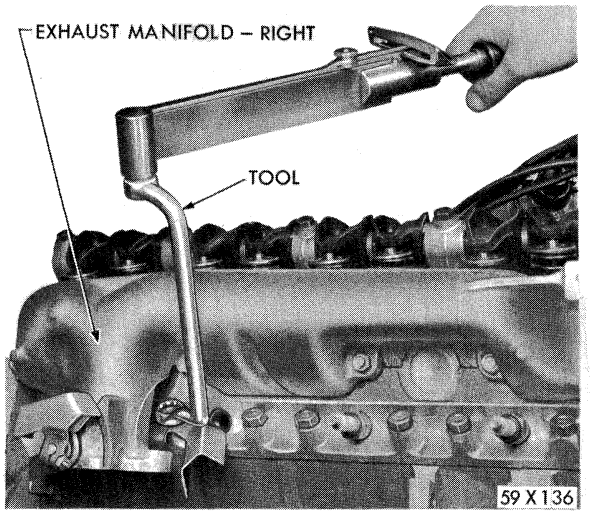


Fig. 47 — Checking Cylinder Head Bolt Torque

new gaskets with a suitable sealer, MoPar Part Number 1122893. Install the gaskets and cylinder heads. Install cylinder head bolts. Starting at top center, tighten all cylinder head bolts to 70 foot-pounds torque in sequence, as shown in Figure 46, and using Tool C-3666 to check torque, as shown in Figure 47.

Repeat the procedure, retightening all head bolts to 70 foot-pounds torque. Inspect push rods and replace worn or bent rods. Install push rods with the small ends in tappets maintaining alignment using rod, as shown in Figure 48.

Install the rocker arm and shaft assembly starting each push rod into its respective rocker arm socket.

NOTE: Use extreme care in tightening bolts 30 foot-pounds torque, so the tappets have time to bleed down to their operating length. Bulged tappet bodies,

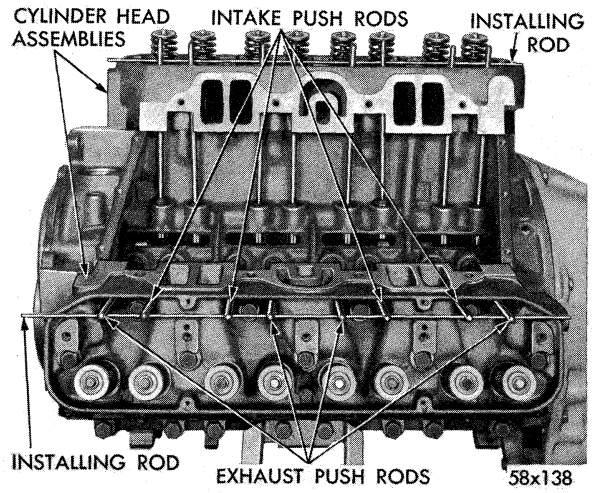


Fig. 48 — Push Rods Installed

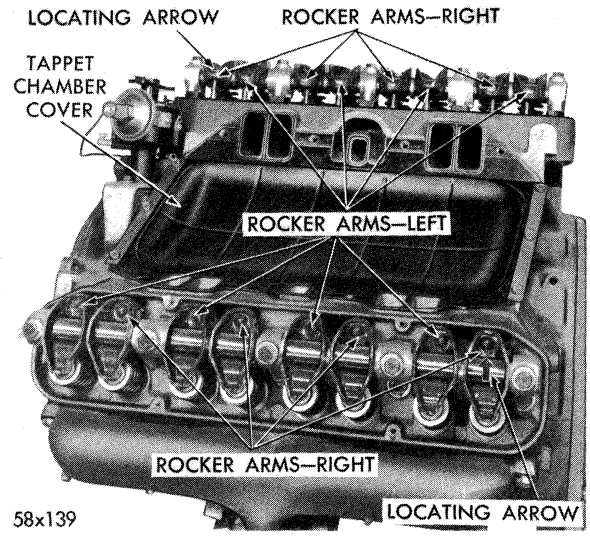


Fig. 49 — Rocker Arms Installed

bent push rods, and permanently noisy operation may result if the tappets are forced down too rapidly.

Place the new cylinder head cover gaskets in position and install cylinder head covers. Tighten the bolts to 40 inch-pounds torque. Install exhaust manifolds and tighten the bolts to 30 foot-pounds torque. Adjust spark plugs to .035 inch gap and install the plugs, and tighten to 30 foot-pounds torque with Tool C-3054. Install the tappet chamber cover and tighten end bolts to 8 foot-pounds torque (Fig. 49).

Install intake manifold, carburetor and ignition coil as an assembly and tighten manifold bolts to 40 food-pounds torque. Install the distributor cap. Connect the coil wire, heat indicator sending unit wire, accelerator linkage, spark plug cables and insulators. Install the vacuum tube from carburetor to distributor. Install generator and tighten generator bracket bolts to 50 foot-pounds torque, and generator mounting nut to 20 foot-pounds torque. Install the fuel line and carburetor air cleaner. Fill the cooling system. Adjust belt tensions as outlined in "Accessory Belt Drives" in this supplement.

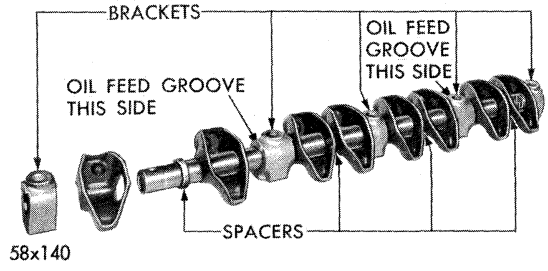


Fig. 50 — Rocker Arms & Shaft Assembly

ROCKER ARMS AND SHAFT ASSEMBLY

The rocker arms are of stamped steel and are arranged on one rocker arm shaft, per cylinder head. The push rod angularity tends to force the pairs of rocker arms toward each other where oilite spacers carry the side thrust at each rocker arm. Five brackets attach each rocker shaft to the cylinder head.

a. Removal

Remove cylinder head cover and gasket. Remove the bolts that attach rocker arm support brackets to cylinder head and remove the rocker arms, brackets and shaft as an assembly.

If the rocker arm assemblies have been disassembled for cleaning, inspection, or replacement, refer to Figure 49 and 50 for proper reassembly.

b. Installation

NOTE: The right and left rocker arms must be installed on rocker shaft, as shown in Figure 49. The stamped arrow on rocker shaft must be on top and the arrow must point toward the push rod socket of the rocker arm. This is necessary to provide proper lubrication to the rocker assemblies. The two wide brackets must be installed with the oil feed grooves facing the push rod side of rocker arm, as shown in Figures 49 and 50.

Install the rocker arms, brackets, and shaft assembly.

NOTE: Use extreme care in tightening the bolts so that tappets have time to bleed down to their operating length. Bulged tappet bodies, bent push rods and permanent noisy operation may result if the tappets are forced down too rapidly.

Tighten the bolts to 30 foot-pounds torque.

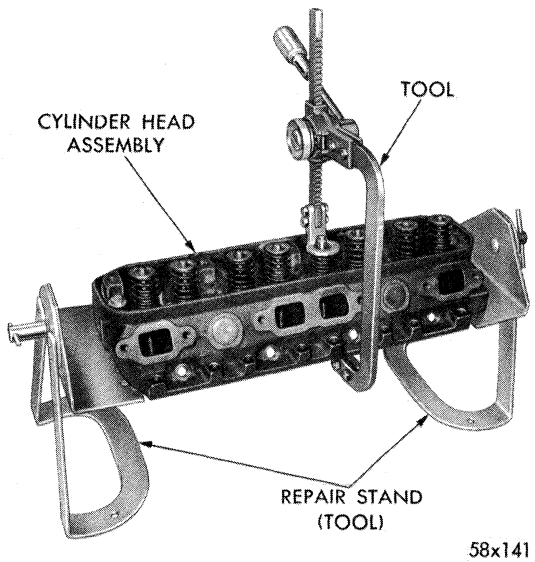


Fig. 51 — Compressing Valve Spring

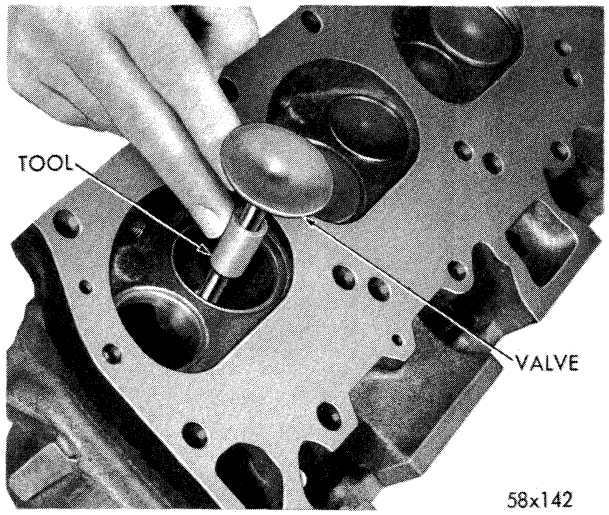


Fig. 52 — Using Sleeve Tool in Checking Wear

VALVES AND VALVE SPRINGS

Valves are arranged in-line in the cylinder heads and inclined 30° outward from vertical. Intake and exhaust valves operate in guides that are integral with the heads.

a. Removal

With the cylinder head removed, compress valve springs using Tool C-3422, as shown in Figure 51.

Remove the valve retaining locks, valve spring retainers, valve stem cup seals and valve springs. Remove the burrs from valve stem lock grooves to prevent damage to the valve guide when valves are removed.

b. Valve Inspection

Clean the valves thoroughly, and discard burned, warped and cracked valves. Measure valve stems for wear. Intake valve stem diameter should measure .372 to .373 inch and exhaust valve stem diameter should measure .371 to .372 inch. If the wear exceeds .002 inch, replace the valve. Remove carbon and varnish deposits from the inside of valve guides with cleaner, Tool C-756.

Measure the valve stem guide clearance as follows: Install sleeve Tool C-3026 over the valve stem, as shown in Figure 52, and install valve.

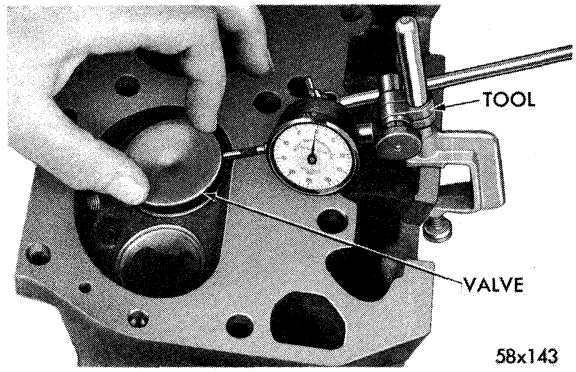


Fig. 53 — Measuring Guide Wear

The special sleeve places the valve at the correct height for checking with a dial indicator. Attach the dial indicator Tool C-3339 to cylinder head and set it at right angle of the valve stem being measured (Fig. 53).

Move valve to and from the indicator. The total dial indicator reading should not exceed .010 inch on intake valves, and .014 inch on exhaust valves. Ream the guides for valves with oversize stems if dial indicator reading is excessive or if the stems are scuffed or scored.

Service valves with oversize stems are available in .005, .015 and .030 inch oversizes. Reamers to accommodate the oversize valve stem are as follows: Reamer Tool C-3433 (.379 to .380 inch) Reamer Tool C-3427 (.404 to .405 inch). Slowly turn reamer by hand and clean guide thoroughly before installing new valve.

CAUTION

Do not attempt to ream the valve guides from standard directly to .030 inch. Use step procedure of .005, .015 and .030 inch so the valve guides may be reamed true in relation to the valve seat.

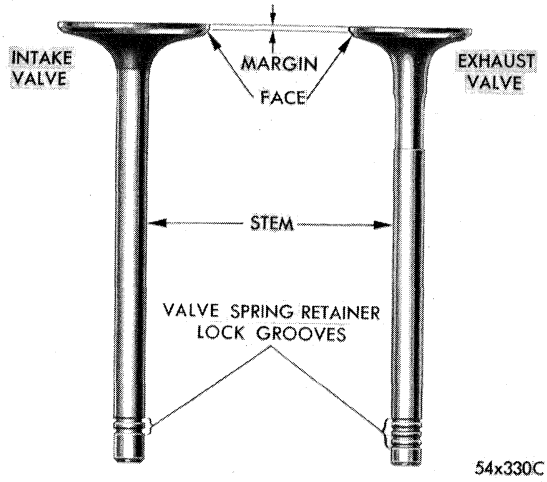


Fig. 54 — Intake and Exhaust Valve

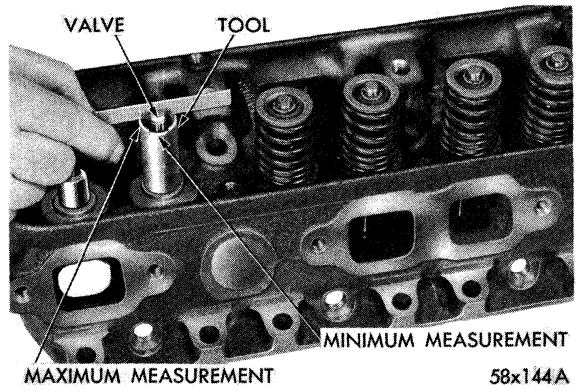


Fig. 55 — Measuring Valve Stem Length

c. Refacing valves and valve seats

The intake and exhaust valve faces have a 45° degree angle. Always inspect the remaining margin after the valves are refaced (Fig. 54). Valves with less than 3/64 inch margin should be discarded.

The angle of both valve and seat should be identical. When refacing the valve seats with Tool MTH-80, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained. Measure the concentricity of valve seat using a dial indicator. The total runout should not exceed .002 inch (total indicator reading). When the seat is properly positioned, the width of intake seats should be 1/16 to 3/32 inch. The width of exhaust seats should be 3/64 to 1/16 inch.

When the valves and seats are reground, the position of the valve in the cylinder head is changed, shortening the operating length of hydraulic tappet. This means that the plunger is operating closer to its bottomed position, and less clearance is available for thermal expansion of valve mechanism during

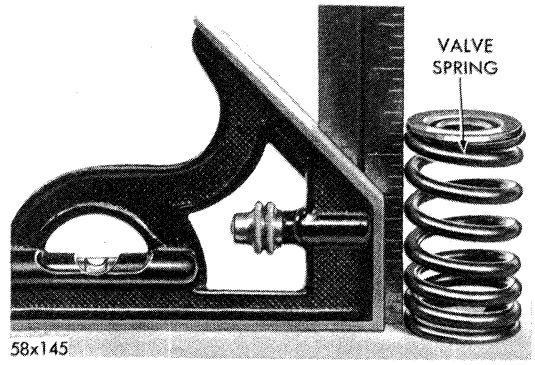


Fig. 56 — Checking Valve Spring Squareness

high speed driving. The design of the valve mechanism includes a safety factor to allow for a limited amount of wear, and the refacing of valves and seats.

To insure that the limits have not been exceeded, the dimension from valve spring seat in head to valve tip should be measured with Gauge, Tool C-3648, as shown in Figure 55.

The end of the cylindrical gauge and the bottom of slotted area represent the maximum and minimum allowable extension of valve stem tip beyond the spring seat. If the tip exceeds maximum, grind the stem tip to within gauge limits. Clean tappets if tip grinding is required.

d. Testing Valve Springs

Whenever the valves have been removed for inspection, reconditioning or replacement, the valve springs should be tested. To test a spring, first determine the length at which the spring is to be tested. As an example, the compressed length of the spring to be tested is 1-15/32 inches. Turn the table of Tool C-647 until surface is in line with the 1-15/32 inch mark on the threaded stud and the zero mark to the front. Place spring over stud on table and lift the compressing lever to set the tone device. Pull on torque wrench until a ping is heard. Take the reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at the test length. Fractional measurements are indicated on the table for finer adjustments. The valve springs should test 183 to 202 lbs. when compressed to 1-15/32 inch. Discard springs that do not meet these specifications.

Inspect each valve spring for squareness with a steel square and surface plate, as shown in Figure 56.

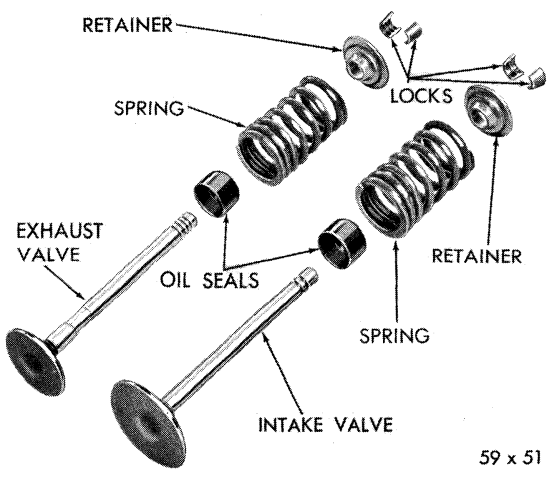


Fig. 57 — Valve Assembly

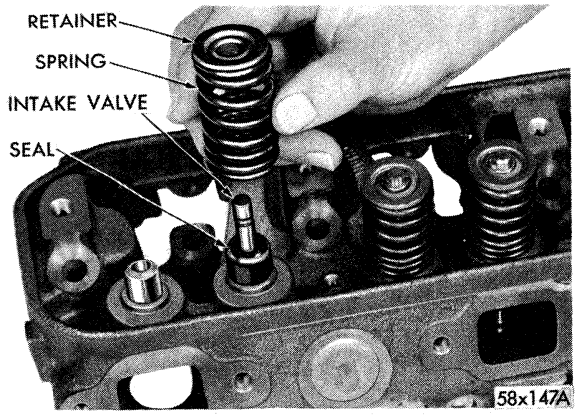


Fig. 58 — Installing Valves and Cup Seals

If the spring is more than 1/16 inch out of square, install a new spring.

e. Installation

Coat the valve stems with lubricating oil and insert them in position in cylinder head. Install the cup seals on intake and exhaust valve stems and over valve guides, as shown in Figure 57 and 58 and install valve springs and retainers.

Compress the valve springs with Tool C-3422. Install locks and release tool.

NOTE: If the valves and/or seats are reground, measure the installed height of springs. Make sure measurement is taken from the bottom of the spring seat in cylinder head to the bottom surface of spring retainer. (If spacers are installed, measure from the top of spacer.) If height is greater than 1-57/64 inches, install a 1/16 inch spacer in head counterbore to bring spring height back to normal 1-53/64 to 1-57/64 inch.

HYDRAULIC TAPPETS

a. Preliminary to Checking Hydraulic Tappets

Before disassembling any part of engine to correct tappet noise, read the oil pressure at gauge and check the oil level in the oil pan. The pressure should be between 45 and 70 pounds at 2000 rpm. The oil level in the pan should never be above "full" mark on dip stick, or below "add oil" mark. Either of these two conditions could be responsible for noisy tappets.

Oil Level Too High — If oil level is above "full" mark on dip-stick, it is possible for the connecting

rods to dip into oil while the engine is running and create foam. Foam in the oil pan would be fed to the hydraulic tappets by the oil pump causing them to go flat and allowing the valves to seat noisily.

Oil Level Too Low — Low oil level may allow the oil pump to take in air which, when fed to tappets, causes them to lose length and allows the valves to seat noisily. Any leaks on intake side of the pump through which air can be drawn will create the same tappet action. When tappet noise is due to aeration, it may be intermittent or constant, and usually more than one tappet will be noisy. When oil level and leaks have been corrected, the engine should be operated at fast idle for sufficient time to allow all of air inside of tappets to be bled out.

b. Tappet Noises

To determine the source of tappet noise, operate the engine at idle with the cylinder head covers removed. Feel each valve spring or rocker arm to detect the noisy tappet. The noisy tappet will cause the affected spring and/or rocker arm to vibrate or feel rough in operation.

NOTE: Worn valve guides or cocked springs are sometimes mistaken for noisy tappets. If such is the case, noise may be dampened by applying side thrust on valve spring. Inspect rocker arm push rod sockets and push rod ends for wear. If noise is not appreciably reduced, it can be assumed the noise is in the tappet.

Valve tappet noise ranges from a light noise to a heavy click. A light noise is usually caused by excessive leakdown around the unit plunger, or by the plunger partially sticking in the tappet body cylinder. A heavy click is caused either by a tappet check valve not seating, or by foreign particles becoming wedged between the plunger and tappet body, causing plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between valve stem and rocker arm as valve closes. In either case, the tappet assembly should be removed for inspection and cleaning.

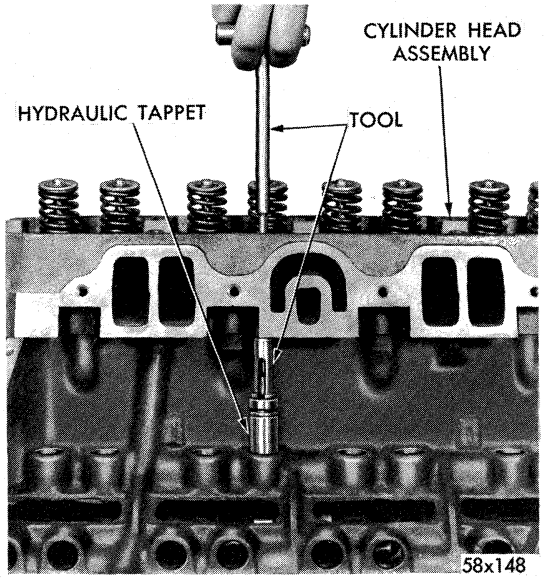


Fig. 59 — Removing Tappet

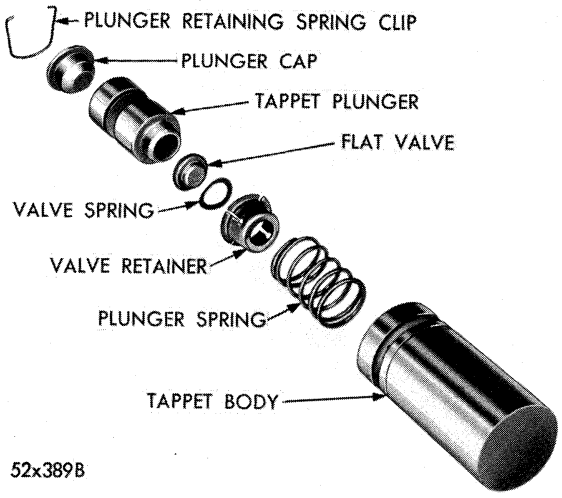


Fig. 60 — Hydraulic Tappet Assembly

c. Removal of Tappets

Tappets can be removed without removing the intake manifold by following this recommended procedure: remove the cylinder head covers. Remove rocker arms and shaft assembly. Remove the push rods and place them in their respective holes in Tool C-3068. Slide puller Tool C-3661 through push rod opening in cylinder head and seat tool firmly in the head of tappet. Pull tappet out of bore with a twisting motion, as shown in Figure 59.

If all tappets are to be removed, remove the hydraulic tappets and place them in their respective holes in tappet and push rod holder, Tool C-3068. This will insure installation of the tappets in their original locations.

NOTE: A diamond shaped marking stamped on the engine numbering pad indicates that all tappet bodies are .008 inch oversize, see Figure 84.

CAUTION

Do not disassemble a tappet on a dirty work bench. The plunger and tappet bodies are not interchangeable. The plunger and valve must always be fitted to the original body. It is advisable to work on one tap-

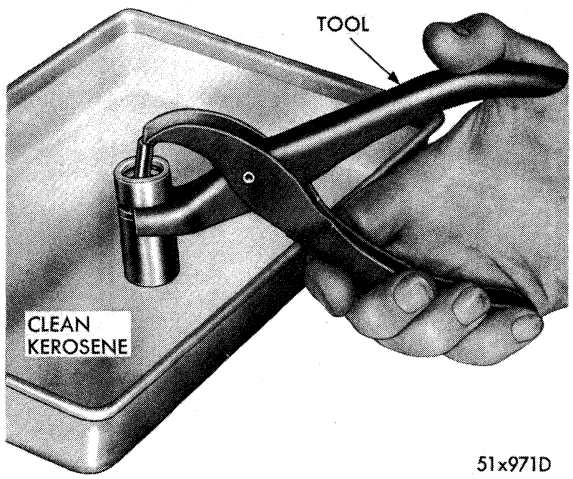


Fig. 61 — Testing Tappet

pet at a time to avoid mixing of parts. Mixed parts are not compatable.

d. Disassembly (Fig. 60)

Pry out plunger retainer spring clip. Clean the varnish deposits from the inside of tappet body above the plunger cap. Invert the tappet body and remove plunger cap, plunger, flat check valve, check valve spring, check valve retainer and plunger spring. Separate the plunger, check valve retainer and check valve spring. Place all parts in their respective place in the tappet holder Tool C-3068.

e. Cleaning and Assembly

Clean all tappet parts in a solvent that will remove all varnish and carbon. Replace the tappets that are unfit for further service with new assemblies. Assemble the tappets, as shown in Figure 56.

f. Inspection

If the tappet or bore in cylinder block is scored, scuffed, or shows signs of sticking, ream the bore to next oversize, using Tool C-3028. If plunger shows signs of scoring or wear and valve is pitted, or if the valve seat on end of plunger indicates any condition that would prevent valve from seating, install a new tappet assembly.

g. Testing

Fill a pan with clean kerosene. Remove cap from plunger and completely submerge the tappet in an upright position.

Allow tappet to fill with kerosene, remove tappet, and replace the cap. Hold the tappet in an upright position and insert the lower jaw of pliers, Tool C-3160, in the groove of tappet body (Fig. 61).

Engage jaw of pliers with top of the tappet plunger. Check leakdown by compressing pliers. If plunger collapses almost instantly as pressure is applied, disassemble tappet, clean and test again. If the tappet still does not operate satisfactorily after cleaning, install a new tappet assembly.

h. Installation

Lubricate the tappets. Install tappets and push rods in their original positions. Install the rocker arm and shaft assembly. Start and operate the engine. Warm up to normal operating temperature.

NOTE: To prevent damage to valve mechanism, the engine must not be run above fast idle until all of hydraulic tappets have filled with oil and have become quiet.

CHECKING VALVE TIMING

Turn crankshaft until the No. 1 exhaust valve is full open and the No. 1 piston is on TDC.

Insert a ¼ inch spacer between the rocker arm pad and the stem tip of the No. 1 intake valve (second valve on the left bank). Install a dial indicator so that the plunger contacts the valve spring retainer as nearly perpendicular as possible. Allow the spring load to bleed the tappet down giving in effect a solid tappet. Zero the indicator.

Turn the crankshaft clockwise (normal running direction) until intake valve has lifted .013 inch. The timing on the timing indicator, located on the chain case cover, should read from 10° BTDC to 2° ATDC. If the reading is not within the specified limits: Check the sprocket index marks, inspect the timing chain for wear, and check the accuracy of the DC mark on the timing indicator. Turn crankshaft counter-clockwise until the valve is closed and remove the spacer.

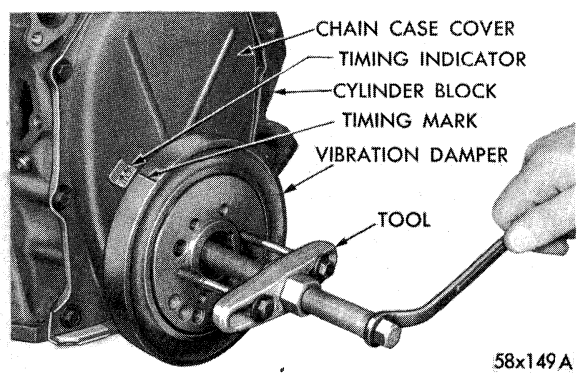


Fig. 62 — Removing Vibration Damper Assembly

CAUTION

Do not turn crankshaft any further clockwise as the valve spring might bottom and result in serious damage.

TIMING SPROCKETS AND CHAIN

The timing chain has 50 links of ½ inch pitch and is ⅞ inch wide. Chain stretch is reduced because of fewer joints to wear.

a. Removal

Drain the cooling system. Remove the radiator and water pump assembly. Remove the bolt holding vibration damper on crankshaft. Remove two of the pulley bolts, install Tool C-3033, and pull the damper assembly off the end of crankshaft, as shown in Figure 62.

Remove the chain cover and gasket. Slide the crankshaft oil slinger off end of crankshaft. Remove the camshaft sprocket attaching bolt. Remove timing chain with crankshaft and camshaft sprockets.

b. Installation

Place both the camshaft sprocket and crankshaft sprocket on the bench with timing marks on exact imaginary center line through both camshaft and crankshaft bores. Place the timing chain around both sprockets. Turn the crankshaft and camshaft to line up with the keyway location in crankshaft sprocket and the dowel holes in the camshaft sprocket. Lift the sprockets and chain, (keep sprockets tight against the chain in position as described). Slide both sprockets evenly over their respective shafts. Use a straight edge to check alignment of the timing marks (Fig. 63). Install the washer and camshaft sprocket bolt and tighten to 35 foot-pounds torque.

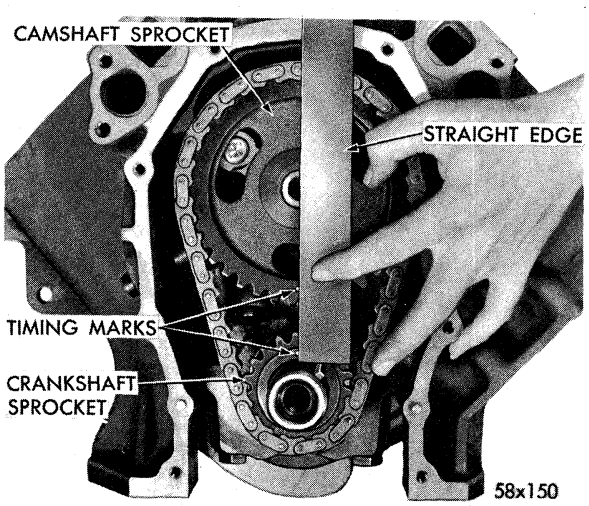


Fig. 63 — Alignment of Timing Marks

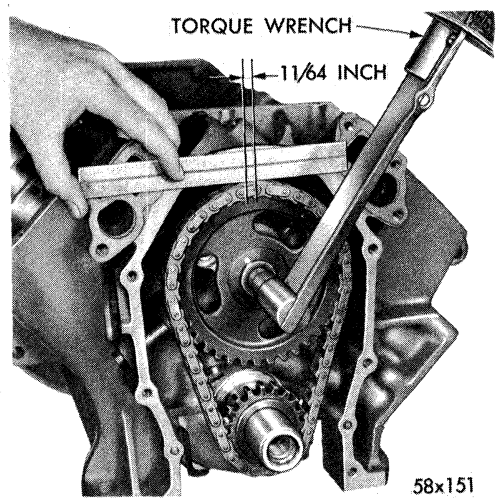


Fig. 64 — Measuring Chain Stretch

c. Checking Timing Chain for Stretch

Place a scale next to timing chain so that any movement of the chain may be measured. Place a torque wrench and socket over the camshaft sprocket attaching bolt and apply torque in the direction of crankshaft rotation to take up the slack; 30 foot-pounds torque (with cylinder heads installed) or 15 foot-pounds torque (cylinder heads removed). Holding a scale with dimensional reading even with edge of a chain link, apply torque in the reverse direction 30 foot-pounds (with cylinder heads installed) or 15 foot-pounds (cylinder heads removed), and note the amount of chain movement, as shown in Figure 64. Install a new timing chain, if its movement exceeds 11/64 inch.

NOTE: With a torque applied to camshaft sprocket bolt, the crankshaft should not be permitted to move. It may be necessary to block the crankshaft to prevent rotation.

If chain is satisfactory, slide the crankshaft oil slinger over shaft and up against the sprocket (flange away from sprocket.)

TIMING CHAIN CASE COVER OIL SEAL REPLACEMENT

a. Removal

Position puller screw of Tool C-3506 through case cover, the inside of case cover up. Position the puller blocks directly opposite each other, and force the angular lip between neoprene and flange of the seal retainer. Place washer and nut on puller screw.

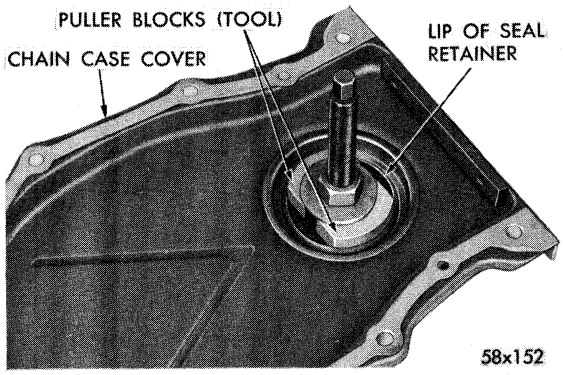


Fig. 65 — Puller Blocks Expanded to Pulling Position

Tighten the nut as tight as possible by hand, forcing blocks into gap to a point of distorting the seal retainer lip (Fig. 65). This is important (puller is only positioned at this point). Place sleeve over the retainer and place removing and installing plate into sleeve. Place the flat washer and nut on puller screw. Hold the center screw and tighten lock nut to remove seal (Fig. 66).

b. Installation of Oil Seal

Insert puller screw through removing and installing plate so that the thin shoulder will be facing up.

Insert puller screw with plate through the seal opening (inside of chain case cover facing up). Place the seal in cover opening, with neoprene down. Place the seal installing plate into the new seal, with protective recess toward lip of seal retainer (Fig. 67). Install the flat washer and nut on puller screw, hold screw and tighten the nut (Fig. 68).

The seal is properly installed when neoprene is tight against the face of cover. Try to insert a .0015 inch feeler gauge between neoprene and cover (Fig. 69). If the seal is installed properly, the feeler gauge cannot be inserted.

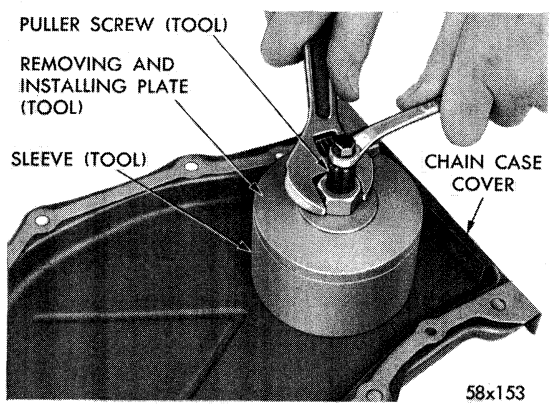


Fig. 66 — Removing Oil Seal

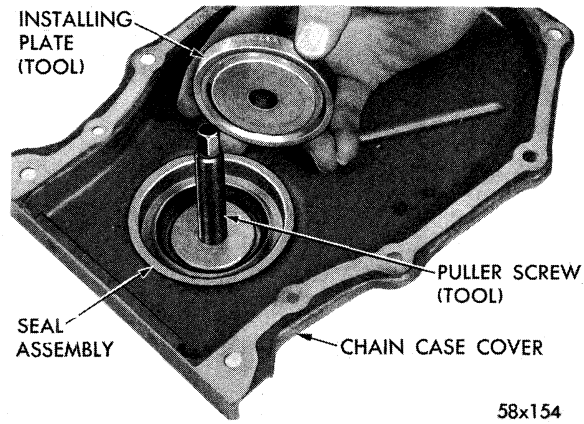


Fig. 67 — Positioning Installer Plate on New Seal

NOTE: It is normal to find particles of neoprene collected between the seal retainer and crankshaft oil slinger after the seal has been in operation.

c. Installing Chain Case Cover

Be sure the mating surfaces of chain case cover and cylinder block are clean and free from burrs. Using

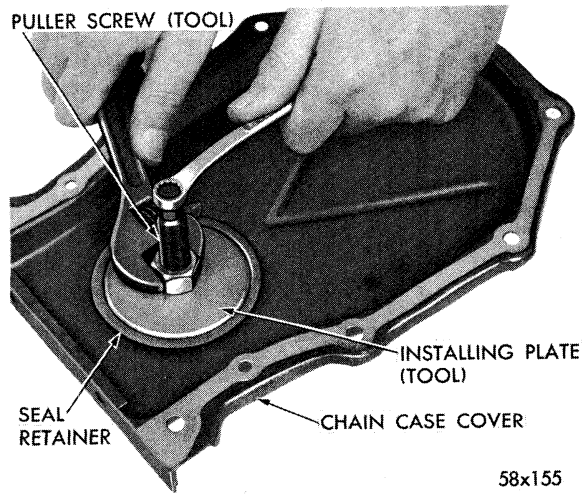


Fig. 68 — Installing New Seal

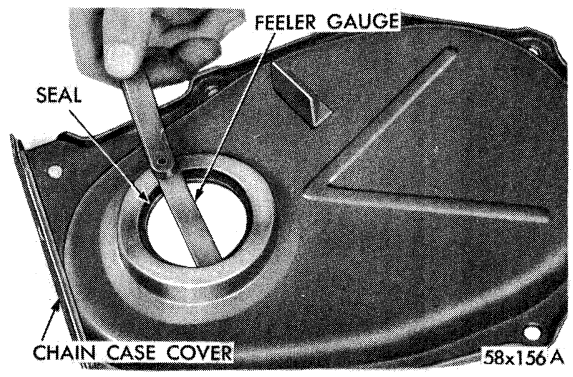


Fig. 69 — Checking Seal for Proper Seating

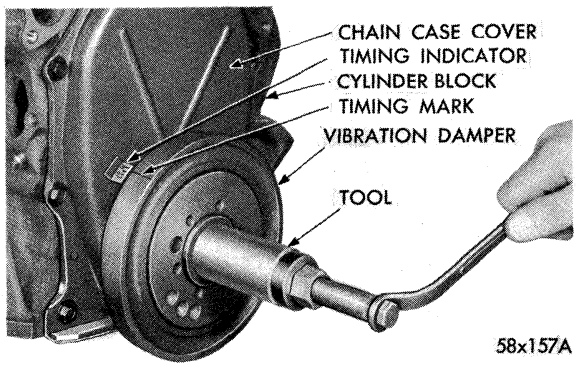


Fig. 70 — Installing Vibration Damper Assembly

a new gasket slide the chain case cover over the locating dowels and tighten bolts to 15 foot-pounds torque.

d. Installing Vibration Damper

Place the damper hub key in slot in crankshaft, and slide hub on crankshaft. Place the installing tool, part of Puller set Tool C-3033 in position and press damper hub on the crankshaft (Fig. 70). Slide the pulley over the shaft and attach with bolts and lockwashers. Tighten the bolts to 15 foot-pounds torque. Install damper hub retainer washer and bolts. Tighten to 135 foot-pounds torque.

CAMSHAFT

The camshaft has an integral oil pump and distributor drive gear and fuel pump eccentric, as shown in Figure 71.

Rearward camshaft thrust is taken by the rear face of the cast iron camshaft sprocket hub, bearing directly on the front of the cylinder block, eliminating the need for a thrust plate. The helical oil pump and distributor drive gear and the camshaft lobe taper both tend to produce only a rearward thrust.

Removal

With the tappets and timing sprockets removed, remove distributor and lift out oil pump and distributor drive shaft. Remove the fuel pump to allow the push rod to drop away from the cam eccentric. Remove the camshaft being careful not to damage the cam bearings with the cam lobes.

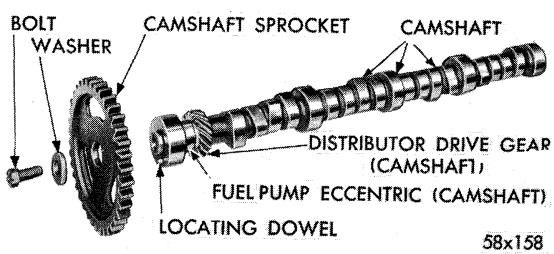


Fig. 71 — Camshaft and Sprocket Assembly

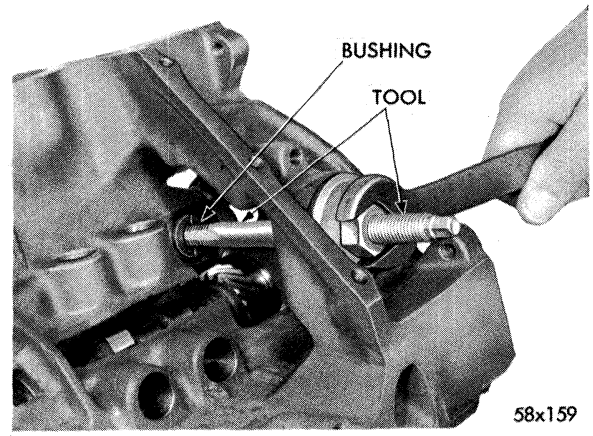


Fig. 72 — Removing Distributor Drive Shaft Bushing

DISTRIBUTOR DRIVE SHAFT BUSHINGS

a. Removal

Insert Tool C-3052 into old bushing and thread down until a tight fit is obtained (Fig. 72). Hold the puller screw and tighten puller nut until bushing is removed.

b. Installation

Slide new bushing over burnishing end of Tool C-3053 and insert the tool and bushing into bore, as shown in Figure 73.

Drive bushing and tool into position, using a soft hammer. As the burnisher is pulled through bushing by tightening puller nut, the bushing is expanded tight in block and burnished to correct size, as shown in Figure 74. DO NOT REAM THIS BUSHING.

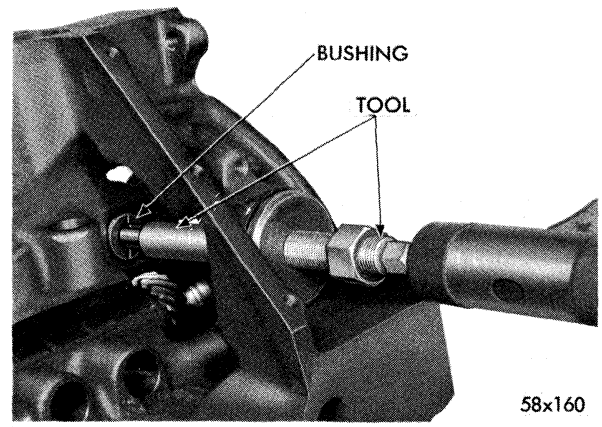


Fig. 73 — Installing Distributor Drive Shaft Bushing

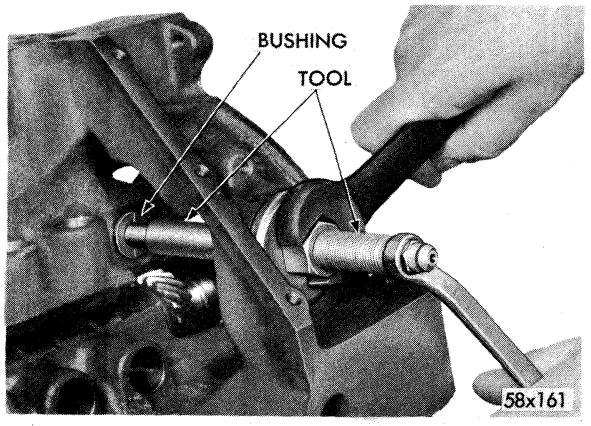


Fig. 74 — Burnishing Distributor Drive Shaft Bushing

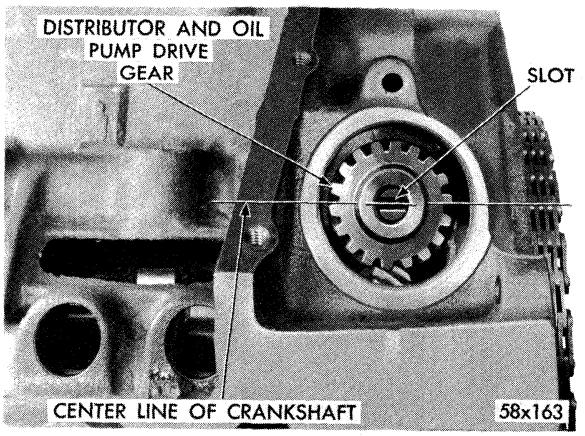


Fig. 76 — Distributor Drive Gear Installation

c. Camshaft Installation

Lubricate the camshaft lobes and camshaft bearing journals and insert the camshaft to within 2 inches of its final position in the cylinder block. Modify Tool C-3509 by grinding off the index lug holding upper arm on the tool and rotate arm 180°. Install Tool C-3509 in place of distributor drive gear and shaft, as shown in Figure 75. Hold the tool in position with distributor lock plate screw. This tool will restrict the camshaft from being pushed in too far and prevent knocking out the welch plug in the rear of the cylinder block. **The tool should remain installed until the camshaft and crankshaft sprockets and timing chain have been installed.**

NOTE: Whenever an engine has been rebuilt and a new camshaft and/or new tappets have been installed, one quart of factory recommended oil additive should be added to the engine oil to aid in break-in. The oil mixture should be left in the engine for a minimum of 500 miles. Drain the oil mixture at the next normal oil change.

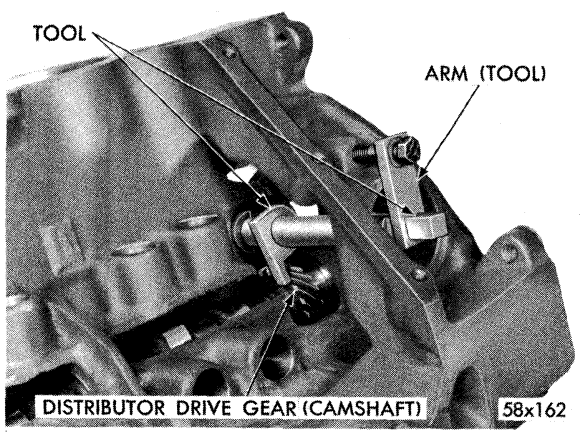


Fig. 75 — Camshaft Holding Tool

NOTE: Whenever the camshaft is replaced, all of the tappet faces must be inspected for crown with a straight edge. If any negative crown (dish) is observed, the tappet must be replaced.

d. Distributor (Basic) Timing

Before installing the distributor and oil pump drive shaft, time engine as follows: Rotate the crankshaft until No. 1 cylinder is at top dead center on firing stroke. When in this position, the straight line on the vibration damper should be under (DC) on the timing indicator. Coat shaft and drive gear with engine oil. Install the shaft so that after the gear spirals into place, it will index with oil pump shaft, so that the slot in top of drive gear will be parallel with center line of crankshaft as shown in Figure 76.

e. Installation of Distributor

Hold distributor over the mounting pad on cylinder block with the vacuum chamber pointing toward the center of engine. Turn the rotor until it points forward and to the approximate location of the No. 1 tower terminal in the distributor cap. Place distributor gasket in position. Lower distributor and en-

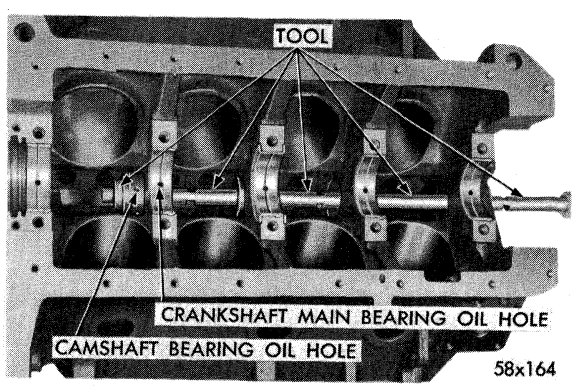


Fig. 77 — Removing Camshaft Bearing

gage shaft in slot of distributor drive shaft gear. Turn distributor clockwise until the breaker contacts are just separating and install hold down clamp.

REMOVAL AND INSTALLATION OF CAMSHAFT BEARINGS (Engine Removed from Car)

a. Removal

With the engine completely disassembled, drive out the rear cam bearing welch plug. Install proper size adapters and horse shoe washers (part of Tool C-3132A) at back of each bearing shell to be removed and drive out the bearing shells.

b. Installation

Install the new camshaft bearings with Tool C-3132-A by sliding the new camshaft bearing shell over the proper adapter. Position bearing in the tool. Install horse shoe lock and by reversing removal procedure, carefully drive bearing shell into place, as shown in Figure 77. Install remaining shells in like manner.

NOTE: Install the No. 1 camshaft bearing 1/32" inward from front face of the cylinder block.

The oil holes in camshaft bearings and cylinder block must be in exact alignment to insure proper lubrication (Fig. 77).

Camshaft bearing index can be checked after installation by inserting a pencil flashlight in the bearing shell. The camshaft bearing oil hole should be perfectly aligned with the drilled oil passage from the main bearing. Another oil hole in the camshaft bearings should be visible by looking down on the left bank oil hole above and between No. 6 and No. 8 cylinders to No. 4 camshaft bearing and on the right bank above and between No. 5 and 7 cylinders to No. 4 camshaft bearings. If the camshaft bearing shell oil holes are not in exact alignment, remove and reinstall them correctly. Use Tool C-897 to install a new welch plug at the rear of camshaft. **Be sure this plug does not leak.**

CYLINDER BLOCK

The cylinder block is of the deep block design which eliminates the need for a torque converter housing adapter plate. Its sides extend three inches below the crankshaft centerline.

Cleaning and Inspection

Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking. If new core hole plugs are installed, coat the edges of plug and core hole with a suitable sealer and drive plugs in place with driver, Tool C-897. Examine block for cracks or fractures. Remove the top ridge of cylinder bores with a reliable ridge rearmer before removing the pistons from cylinder block. **Be sure to keep the tops of pistons covered during this operation.**

NOTE: Pistons and connecting rods must be removed from the top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so each connecting rod is centered in the cylinder bore.

Remove connecting rod cap. Install Tool C-3221 on one connecting rod bolt and protector over the other bolt and push each piston and rod assembly out of the cylinder bore. After removal, install bearing cap on mating rod.

a. Checking Cylinder Bores

The cylinder bores should be checked for out-of-round and taper with Tool CM-119. If the cylinder bores show more than .005 inch out-of-round or a taper of more than .010 inch the cylinder block should be rebored and honed, and new pistons and rings fitted.

b. Honing Cylinder Bores

To remove light scoring, scuffing, or scratches from the cylinder walls, use Tool C-823. Usually a few strokes will clean up a bore and maintain the required limits. The cylinder walls should be deglazed, using cylinder surfacing hone Tool C-3501 equipped with 280 grit stones, prior to installation of the new rings or to smooth down the cylinder walls after rough honing. A satisfactory finish can be obtained by

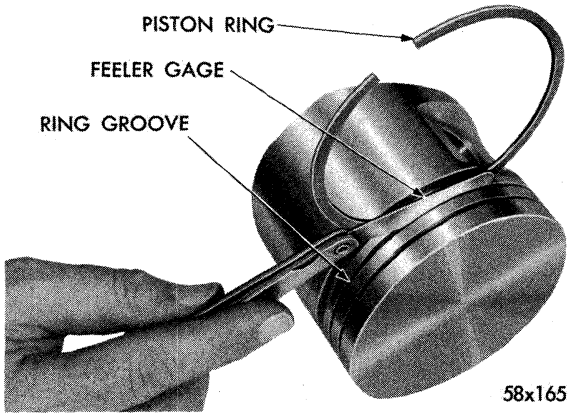


Fig. 78 — Measuring Piston Ring Clearance

giving each cylinder wall 20 strokes in 20 seconds with the hone so that a cross hatch pattern will be obtained.

After honing, it is necessary that the block be cleaned again to remove all traces of abrasives, and to prevent excessive wear of engine parts. **The hone may be safely used for removal of metal up to .005 inch and as high as .010 to .015 inch by an experienced operator.**

CAUTION

Be sure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and water be used with a brush and then thoroughly dried. If this is impossible, use SAE 10 engine oil and CLEAN cloth. When the bore can be wiped with a clean white cloth and be withdrawn clean, the bore is clean.

c. Cylinder Walls

Cylinder walls which are badly scored, scuffed, scratched, or worn beyond specified limits should be rebored. Whatever type of boring equipment is used, boring operation should be closely coordinated with the fitting of pistons and rings in order that specified clearance may be maintained.

d. Fitting Pistons

The piston and cylinder wall must be clean and dry. The specified clearance between the piston and the cylinder wall is .0005 to .0010 inch.

The piston diameter should be measured at the top of skirt 90° to the piston pin axis. The cylinder bores on used engines should be measured halfway down the cylinder bore and transverse to the engine crankshaft centerline.

NOTE: Pistons and cylinder bores should be measured at normal room temperature 70° F.

All service pistons include pins, and are available in standard and the following oversizes, .005, .020 and .040 inch.

e. Fitting Rings

Measure the piston ring gap about two (2) inches from bottom of cylinder bore in which it is to be fitted. (An inverted piston can be used to push the rings down to insure positioning rings squarely in the cylinder wall before measuring.) Insert the feeler stock in gap (Fig. 78).

The ring gap should be between .013 to .025 inch.

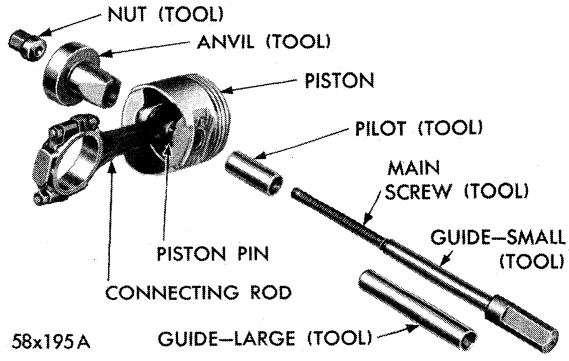


Fig. 79 — Tool Arrangement of Removing Piston Pin

This measurement is the same for all rings. Measure the side clearance between piston ring and ring land. The clearance should be .0015 to .003 inch for the top compression ring, .001 to .0025 inch for the intermediate ring, and .001 to .003 for the oil control ring. Starting with the oil ring expander, place expander ring in the lower ring groove and install oil control ring. Install the compression rings in middle and top grooves. Use ring installer, Tool C-3629 for the MC-1 and MC-2 engine and Tool C-3628 for the MC-3 and MY-1 engine.

NOTE: Be sure the mark "Top" on each compression ring is to the top of piston when the ring is installed.

REMOVAL OF PISTON PIN

Arrange Tool C-3624 parts for the removal of piston pin, as shown in Figure 79. Install pilot on the main screw. Install the screw through piston pin. Install anvil over the threaded end of the main screw with small end of anvil against the piston boss.

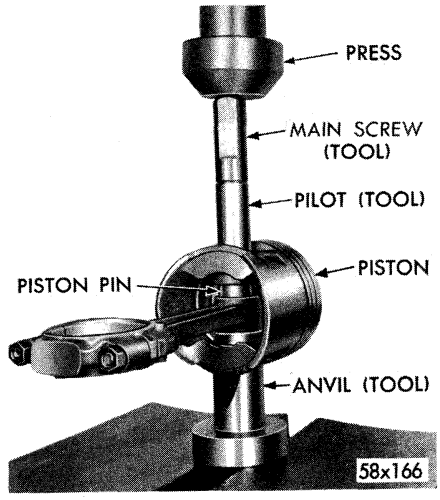


Fig. 80 — Removing Piston Pin

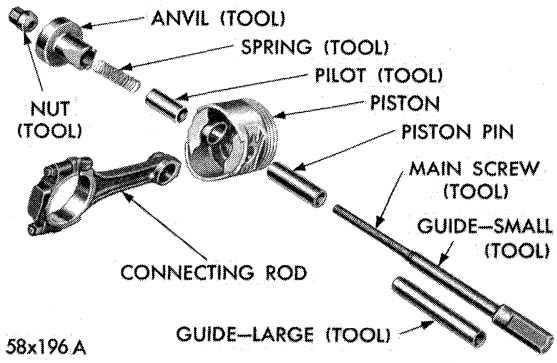


Fig. 81 — Tool Arrangement for Installing Piston Pin

NOTE: Be sure spring is removed from the anvil.

Install nut loosely on the main screw and place the assembly on a press, as shown in Figure 80. Press the piston pin out of connecting rod.

NOTE: When the pin falls free from connecting rod, stop the press to prevent damage to bottom of the anvil.

Remove the tool from the piston.

INSTALLATION OF PISTON PIN

Check the piston pin fit in the piston. It should be a sliding fit in the piston at 70°F. Piston pins are supplied in standard sizes only. Lubricate piston pin holes in the piston and connecting rod.

Arrange the tool parts for installation of piston pin, as shown in Figure 81. Install the spring inside the pilot and install the spring and pilot in the anvil. Install the piston pin over main screw. Place piston, with "front" up, over pilot so that the pilot extends through the piston pin hole. Position connecting rod over the pilot which extends through the piston hole.

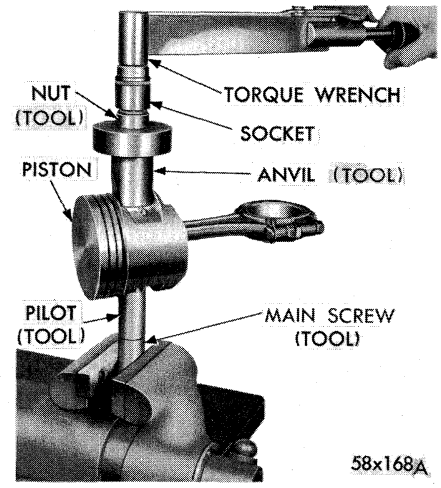


Fig. 83 — Testing Fit on Piston Pin in Connecting Rod

NOTE: Assemble rods to pistons of the right cylinder bank (2, 4, 6, and 8) with the indent on the piston head opposite to the larger chamfer on the large bore end of connecting rod. Assemble the rods to pistons of the left cylinder bank (1, 3, 5, and 7) with the indent on the piston head on the same side as the large chamfer on the large bore end of connecting rod.

Install the main screw and piston pin in the piston, as shown in Figure 81.

Install the nut on puller screw to hold assembly together. Place assembly on a press, as shown in Figure 82. Press in the piston pin until piston pin bottoms on the pilot properly positioning the pin in the connecting rod. Remove the tool and arrange tool parts and piston assembly in the same manner, as shown in Figure 79.

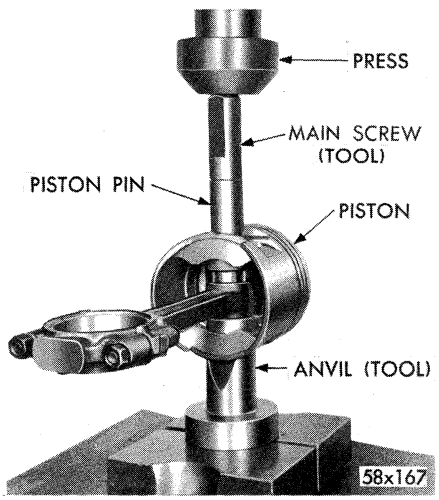


Fig. 82 — Installing Piston Pin

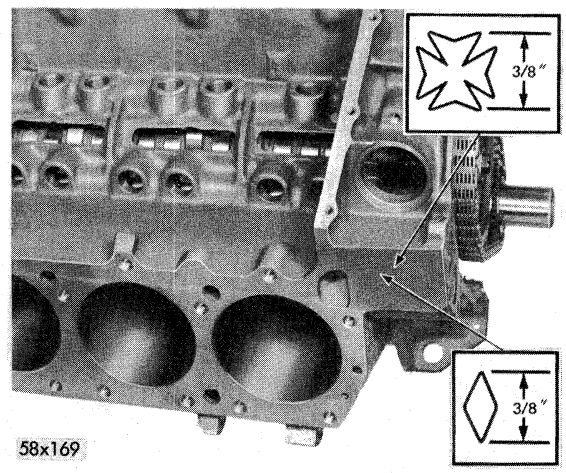


Fig. 84 — External Identification

Place the assembly in a vise, as shown in Figure 83.

Attach the torque wrench to nut and check torque up to 15 foot-pounds torque. If the connecting rod moves downward on piston pin, reject this connecting rod and piston pin combination. Obtain a connecting rod with proper small end bore diameter and repeat the installation and checking procedure.

If connecting rod does not move under 15 foot-pounds torque, the piston pin and connecting rod interference is satisfactory, the tool may be removed.

CONNECTING RODS

IMPORTANT

A Maltese Cross stamped on the engine numbering pad (Fig. 84) indicates that engine is equipped with a crankshaft which has one or more connecting rods and main bearing journals finished .001 inch undersize. The position of the undersize journal or journals will be stamped on machined surface of No. 3 counterweight (Fig. 85).

Connecting rod journals will be identified by the letter "R" and main bearing journals by the letter "M." Thus "M-1" indicates that No. 1 main bearing is .001 inch undersize.

INSTALLING CONNECTING ROD BEARINGS

NOTE: Fit all rods on one bank until completed. Do not alternate from one bank to another, because when the rods are assembled to pistons correctly, they are not interchangeable from one bank to another.

Each bearing cap has a small "V" groove across the parting face. When installing the lower bearing shell, make certain that the "V" groove in shell is in line with "V" groove in cap. This allows lubrication of the cylinder wall. The bearing shells should always be installed so that small formed tang fits into machined grooves of rods. The side play should be from .009 to .017 inch (two rods).

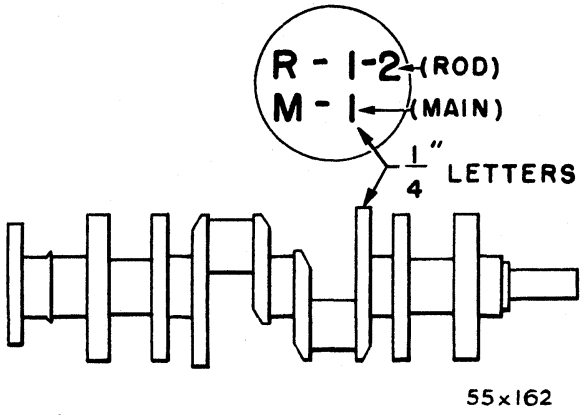


Fig. 85 — Internal Identification

Limits of taper or out-of-round on any crankshaft journals should be held to .001 inch. Bearings are available in .001, .002, .003, .010 and .012 inch undersize.

NOTE: Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.

CHECKING THE CONNECTING ROD BEARING CLEARANCE (PLASTIGAGE METHOD)

Connecting rod bearing clearance measurements can be made by the use of Plastigage with the engine in the chassis. After removing the connecting rod cap, wipe off the oil from the journal and inserts. Place the Plastigage on bearing parallel with crankshaft. Reinstall the cap and tighten attaching nuts alternately to specified torque.

Remove cap and measure the width of the compressed material with the graduated scale to determine the bearing clearance. Allowable clearance is from .0005 to .0015 inches. If taper of the compressed material is evident, measure with the graduated scale. If the taper appears to exceed .005 inch, the journal should be checked with micrometers.

INSTALLING PISTON AND CONNECTING ROD ASSEMBLY IN CYLINDER BLOCK

Before installing the pistons, rods, and rod assemblies in bore, be sure that compression ring gaps are diametrically opposite one another and not in line with oil ring gap. The oil ring expander gap should be toward the outside of the "V" of the engine. The oil ring gap should be turned toward the inside of the "V" of engine. Immerse the piston head and rings in clean engine oil, slide the ring compressor, Tool C-385, over the piston and tighten with the special wrench (part of Tool C-385). Be sure the position of rings does not change during this operation. Screw the connecting rod bolt protector (part of Tool C-3221) on one rod bolt, and insert the rod and piston into cylinder bore.

NOTE: Rotate the crankshaft so that connecting rod journal is on center of the cylinder bore.

Attach the puller part of Tool C-3221 on the other bolt, and guide the rod over the crankshaft journal, as shown in Figure 86.

Tap piston down in the cylinder bore, using the

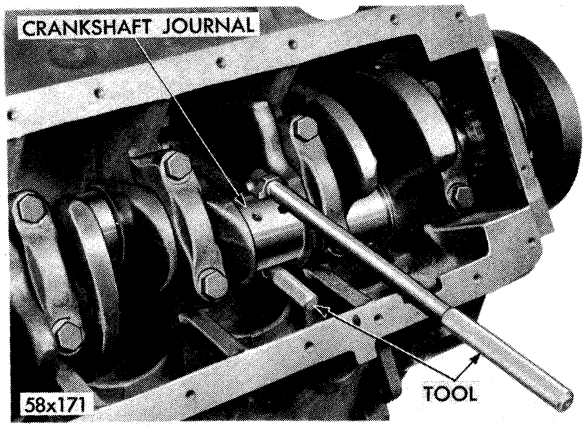


Fig. 86 — Removing and Installing Connecting Rod

handle of a hammer. At the same time, guide connecting rod into position on crankshaft journal. The notch or groove on the top of the piston must be pointing toward front of the engine and the larger chamfer of the connecting rod bore must be installed toward crankshaft journal fillet. Install the rod caps, tighten nuts to 45 foot-pounds torque.

CRANKSHAFT MAIN JOURNALS

The crankshaft journals should be checked for excessive wear, taper and scoring. Journal grinding should not exceed .012 inch under the standard journal diameter. DO NOT grind the thrust faces of No. 3 main bearing. **DO NOT** nick the crankpin or main bearing fillets. After regrinding, remove the rough edges from crankshaft oil holes and clean out all oil passages.

CRANKSHAFT MAIN BEARINGS

The lower main bearing halves of 1, 2, 4 and 5 numbers are interchangeable, as shown in Figure 87. The upper main bearing halves of 1, 2, 4 and 5 numbers are interchangeable. Upper and lower bearing halves are not interchangeable because the upper bearing is grooved and the lower is not.

The upper and lower No. 3 bearing halves are flanged to carry the crankshaft thrust loads and are not interchangeable with any other bearing halves in the engine.

NOTE: Bearings that are not badly worn or pitted must be reinstalled in the same position.

The bearing caps are not interchangeable and should be marked at removal to insure correct assembly. Bearing shells are available in standard and the following undersizes: .001, .002, .003, .010 and .012 inch. Never install an undersize bearing shell that will reduce the clearance below specifications.

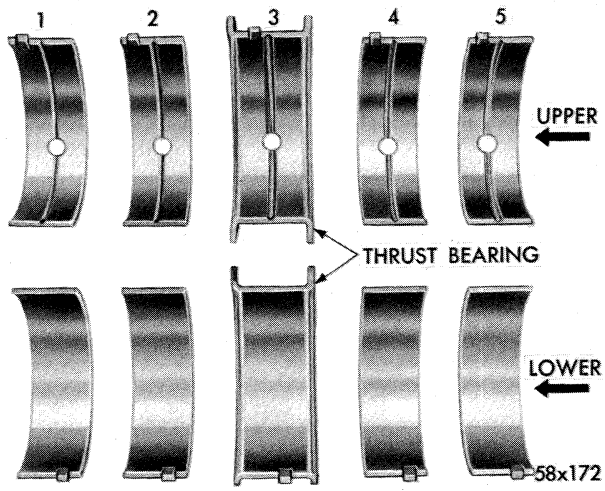


Fig. 87 — Main Bearing Identification

REMOVAL AND INSTALLATION OF THE MAIN BEARINGS

a. Removal

Remove the oil pan and mark bearing caps before removal. Remove bearing caps one at a time. Remove upper half of bearing by inserting Tool C-3059 (Fig. 88) into the oil hole of crankshaft. Slowly rotate crankshaft clockwise, forcing out upper half of bearing shell.

Checking the Main Bearing Clearance

Plastigage Method. Use the same technique as described in "Checking the Connecting Rod Bearing Clearance."

CAUTION

If bearings are measured with the engine in the chas-

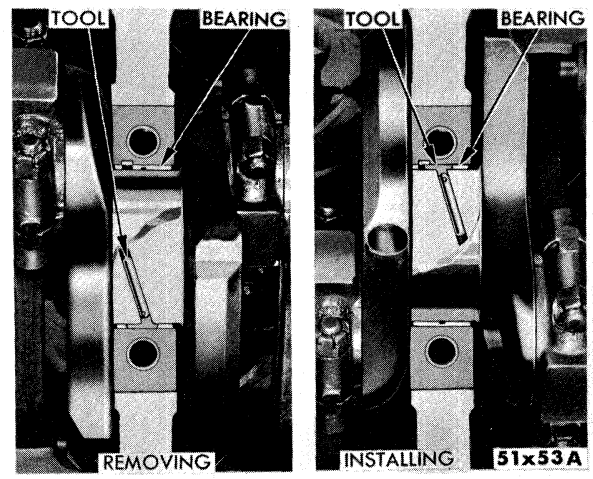


Fig. 88 — Removing and Installing Main Bearing Upper Shell

sis, the crankshaft must be supported in order to take up clearance between the upper bearing insert and the crankshaft journal. This can be done by snugging bearing caps of the adjacent bearings with .005 to .015 inch cardboard between lower bearing shell and journal. Use extreme caution when this is done to avoid unnecessary strain on the crankshaft or bearings, or false reading may be obtained. Do not rotate crankshaft while plastigage is installed. Be sure to remove cardboard before reinstalling oil pan.

It is permissible to use one .001 inch undersize bearing shell with one standard bearing shell or one .002 inch bearing shell. Always use the smaller diameter bearing half as the upper. Never use a new bearing with a used bearing and never use an upper bearing half more than .001 inch smaller than the lower bearing half.

b. Installation of the Upper Main Bearing

NOTE: When installing a new upper bearing shell, slightly chamfer the sharp edge from the plain side.

Start bearing in place, and insert Tool C-3059 into the oil hole of crankshaft (Fig. 88). Slowly rotate the crankshaft counter-clockwise sliding the bearing into position. After all bearings have been fitted, tighten all caps to 85 foot-pounds torque. The crankshaft end play should be .002 to .007 inch.

OIL PAN (ALL MODELS)

a. Removal

Drain the oil and remove dipstick. Disconnect the steering linkage from steering arm to allow the steering linkage to be lowered. On single exhaust system, the exhaust crossover pipe must be removed. Be sure the rest of exhaust system is sufficiently supported. It may be necessary to pull the brake line located across the crossmember slightly forward to allow enough clearance for pan removal. Remove oil pan attaching bolts and lower the oil pan on MC-1 only. Disconnect throttle linkage at transmission and at carburetor. Rotate the crankshaft until the centerline of the front counterweight is in the 10 o'clock position. Remove the front engine mounting nuts and raise the engine one inch. Remove the oil pan.

b. Installation

NOTE: Check the alignment of the oil strainer. The bottom of strainer must be on a horizontal plane machined surface of the cylinder block. The foot of strainer should touch bottom of the oil pan. Clean pan thoroughly and install new gasket, oil pan and attaching bolts. Tighten bolts to 15 foot-pounds torque. Lower the engine and install front engine mounting nuts and tighten to 85 foot-pounds torque.

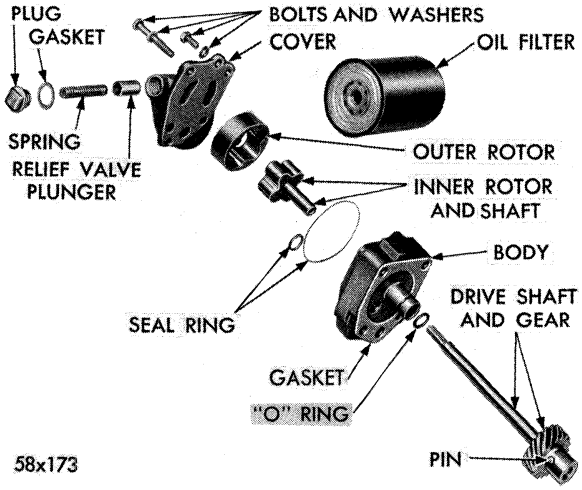


Fig. 89 — Oil Pump and Filter Assembly

Connect exhaust pipes (if removed) and steering, throttle and carburetor linkage. Refer to Transmission Section in this manual. Refill the crankcase.

OIL PUMP

a. Removal

Remove oil pump attaching bolts and remove pump and filter assembly from bottom side of the engine.

b. Disassembly

Remove the filter base and oil seal ring. Remove pump rotor and shaft and lift out the outer pump rotor. Remove oil pressure relief valve plug and lift out spring and plunger (Fig. 89).

c. Inspection and Repair

Clean all parts thoroughly. The mating face of oil

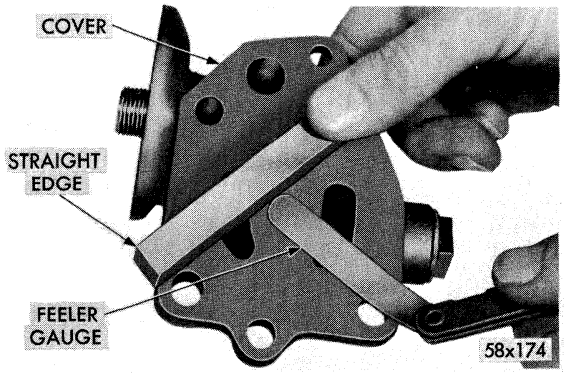


Fig. 90 — Checking Oil Pump Cover Flatness

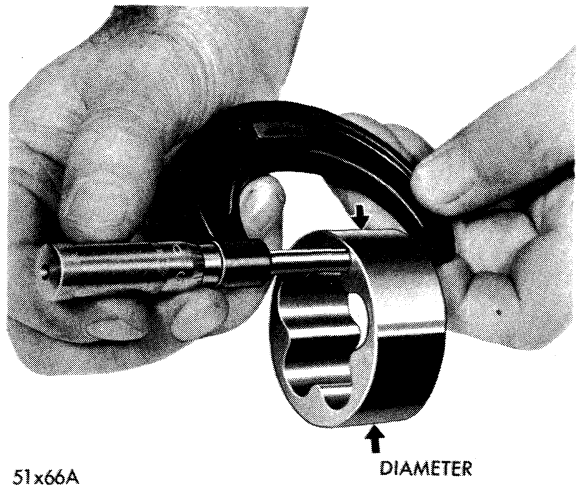


Fig. 91 — Measuring Outer Rotor Thickness

pump cover should be smooth. Replace cover if it is scratched or grooved.

Lay a straight edge across the oil pump cover surface (Fig. 90). If a .0015 inch feeler gauge can be inserted between the cover and straight edge, the cover should be replaced. If outer rotor length measures less than .943 inch (Fig. 91), and diameter less than 2.469 inches, replace outer rotor.

If the pump inner rotor length measures less than .943 inch (Fig. 92) a new pump rotor should be installed.

Slide outer rotor and inner rotor into pump body and place a straight edge across the face (between the bolt holes), as shown in Figure 93.

If a feeler gauge of more than .004 inch can be inserted between rotors and straight edge, replace pump body. Remove pump inner rotor and shaft leaving the outer rotor in pump cavity. Press the outer rotor body to one side with fingers and measure the clearance between outer rotor and pump body (Fig. 94). If measurement is more than .012

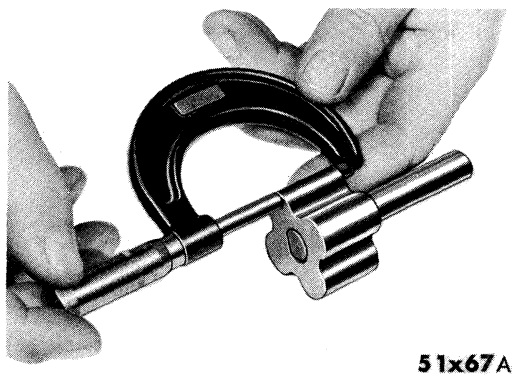


Fig. 92 — Measuring Inner Rotor Thickness

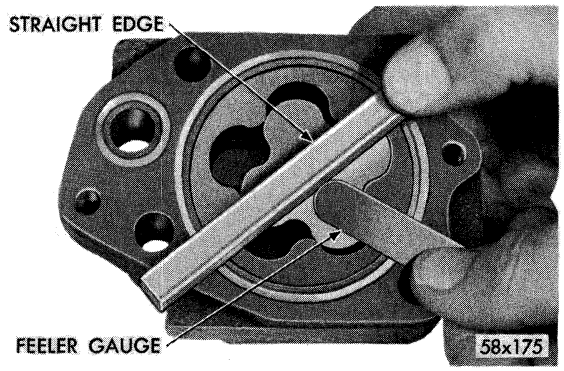


Fig. 93 — Measuring Clearance over Rotors

inch replace the oil pump body. If clearance between inner rotor and outer rotor (Fig. 95) is more than .010 inch, replace the inner and outer rotors.

Check the oil pump relief valve plunger for scoring and for free operation in its bore. If the plunger is scored, replace the plunger. The spring should conform to specifications on chart. If, for any reason, the spring has to be replaced, the same color spring should be used. An exception is where oil pressure is either above or below specifications. **When assembling oil pump, be sure to use new oil seal rings between filter base and body.** Tighten the attaching bolts to 35 foot-pounds torque.

Installation

Install the oil pump on engine.

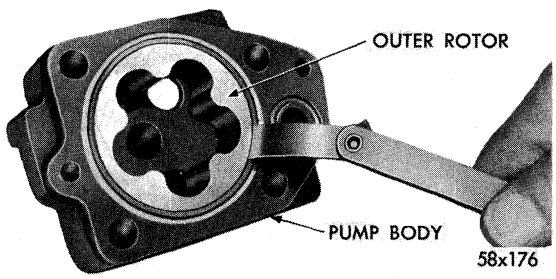


Fig. 94 — Measuring Outer Rotor Clearance

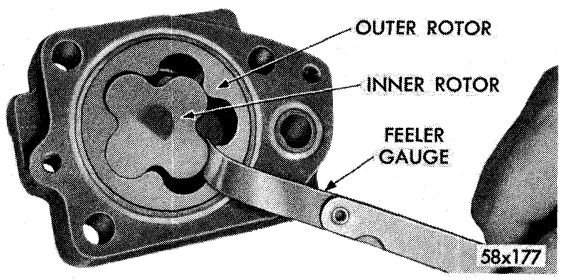


Fig. 95 — Measuring Clearance Between Rotors

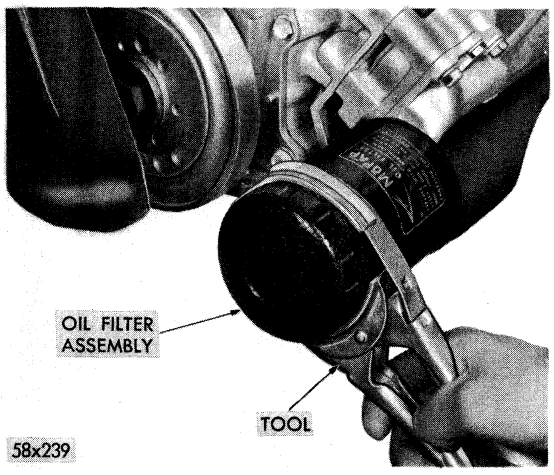


Fig. 96 — Removing Oil Filter with Tool

RELIEF VALVE SPRING CHART

Color	Free Length	Loaded Length	Compression Pounds
Gray (Lt.).....	2.19	1.60	11.85 to 12.85
Red (Std.).....	2.29	1.60	14.85 to 15.85
Brown (Hvy.)....	2.39	1.60	17.9 to 18.9

REMOVAL AND INSTALLATION OF OIL FILTER

The oil filter should be replaced every 5,000 miles to coincide with an engine oil change as follows:

Use care so as not to damage transmission oil cooler lines. Using Tool C-3654, unscrew the filter from base on bottom side on engine and discard. Wipe the base clean. Screw new filter on base, as shown in Figure 96, until gasket on filter contacts base. Tighten ½ turn more by hand. Start engine and check for leaks.

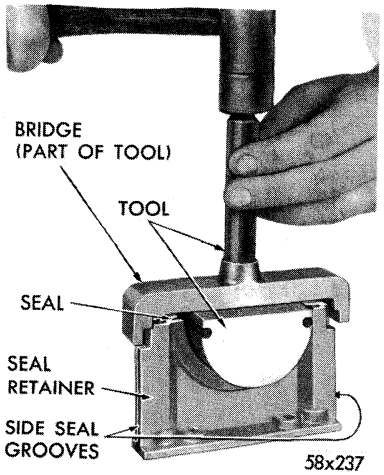


Fig. 97 — Installing Rear Main Bearing Lower Oil Seal

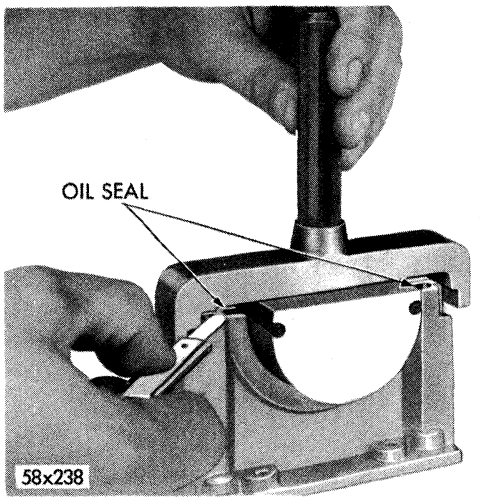


Fig. 98 — Trimming Rear Main Bearing Lower Oil Seal

REPLACEMENT OF THE REAR MAIN BEARING OIL SEAL (Crankshaft Removed)

Remove Allen screws and seal retainer. Install a new rear main bearing oil seal in the cylinder block so that both ends protrude. Tap seal down into position, using Tool C-3625 until the tool is seated in bearing bore. Hold tool in this position and cut off portion of seal that extends above the block on both sides.

NOTE: Be sure the bridge is removed from tool.

Install a new seal in the seal retainer so that the ends protrude (Fig. 97). Install bridge on tool and tap the seal down into position with Tool C-3625 until tool is seated. Trim off the portion of the seal that protrudes above the cap (Fig. 98). Install the two side seals in grooves in seal retainer. Install seal retainer and tighten screws to 30 foot-pounds torque.

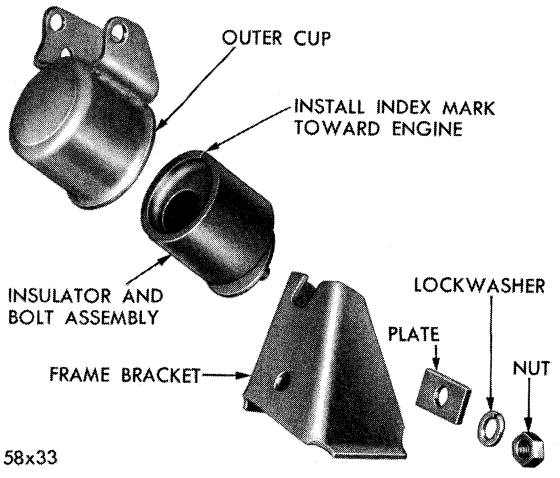


Fig. 99 — Right Front Engine Support

FRONT ENGINE MOUNTS

a. Removal

Disconnect throttle linkage at transmission and at carburetor. Remove the nuts, washers, plates from front engine mounts and raise the engine sufficiently enough to remove the insulator and stud assembly.

b. Installation

Install the insulator and stud assembly with the index mark on the insulator facing toward the engine, as shown in Figure 99.

Lower the engine aligning the stud with the slots in frame brackets.

CAUTION

Be sure the insulator stud does not interfere with the bottom of the slot in the frame bracket.

Install plates, washers and nuts. Neutralize the engine, and tighten nuts to 85 foot-pounds torque. Connect throttle linkage to transmission and to carburetor. Refer to Transmission Section in this manual for adjustment.

Section VIII

FUEL AND EXHAUST SYSTEM

DATA AND SPECIFICATIONS

Model	MC-1
FUEL PUMP	
Make	Carter
Model	M-2769S
Type	Mechanical
Driven By	Camshaft
Pump Pressure (pounds)	5 to 7
CARBURETOR	
Type	Dual Throat Downdraft
Model	BBD-2795S-2872S
ADJUSTMENTS	
Idle Mixture (both screws)	One full turn open
Idle Speed	500 rpm
Fast Idle	.017″
Fast Idle Cam	On Index
Choke Unloader	¼ inch
Accelerator Pump Travel	1 in. + or —1/64
Float Setting	9/32 + or —1/64
CHOKE	
Control	Cross over type
Setting	On Index
Fast Idle Speed Setting	1375 to 1425 rpm

Model	MC-2, MC-3 and MY-1
FUEL PUMP	
Make	Carter
Model	M-2769S
Type	Mechanical
Driven By	Camshaft
Pump Pressure (pounds)	5 to 7