GROUP 8

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BATTERY

		Standard
Voltage		12 Volts
Capacity		70 Amp. Hour
Ground Terminal		Negative
Number of Plates		13
Model	Auto-Lite	12HB-70B
	Willard	MB-27-70

DATA AND SPECIFICATIONS—CONT'D.

STARTING MOTOR

DIRECT DRIVE

Models SC-1, SC-2 with Manual Transmission

Part Number	1889200
Make	Chrysler
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	78 Amps. Maximum
Minimum Speed rpm	3800 rpm
Stall Torque Test	
Torque Foot-Pounds	8.5
Voltage	4
Amperage Draw	350
Pinion to Housing Clearance	1/8" plus or minus 1/32" Between Pinion Stop and End of Pinion
Solenoid Switch	
Pull-in Coil	20.0-22.2 Amps. @ 6 volts
Hold-in Coil	11.2-12.4 Amps. @ 6 volts

STARTING MOTOR

(REDUCTION GEAR TYPE)

MODELS SC-1, SC-2, SY-1 (With Automatic Transmission)

Chrysler Part No.	2095150
Make	Chrysler Built
Voltage	12
No. of Fields	4
No. of Poles	4
Brushes	4
Spring Tension	32 to 48 ounces
Drive	Overrunning Clutch
End Play	.010–.035"
Free-Running Test	
Voltage	11
Amperage Draw	85
Minimum Speed rpm	1950

DATA AND SPECIFICATIONS—CONT'D.

STARTING MOTOR (REDUCTION GEAR TYPE)

Stall Torque Test	
Torque Foot-Pounds	24.0
Voltage	4
Amperage Draw	475
Solenoid Switch	
Pull-in Coil	14.4-16.0 Amps. @ 6.0 volts
Hold-in Coil	11.5-12.6 Amps. @ 6.0 volts

DATA AND SPECIFICATIONS

ALTERNATOR

	Standard Equipment	Special Equipment Heavy Duty	Special Equipment Air Conditioning
Rated Output	35 Amperes	40 Amperes	40 Amperes
Voltage	12 Volts	12 Volts	12 Volts
Alternator Pulley Diameter	2.75 in. Single Groove	2.75 in. Single Groove	3.00 in. Twin Groove
Brushes	2	2	2
Condenser Capacity	.158 microfarad (min.)	.158 microfarad (min.)	.158 microfarad (min.)
Field Coil Draw	2.3 amperes minimum to 2.7 amperes maximum at 12 volts, rotating alternator by hand; or 3.00 amperes minimum to 3.50 amperes maximum at 15 volts at 70 degrees Fahrenheit, alternator operating at 750 rpm.		
Current Output (Minimum at 15 volts; 1250 Engine rpm Cold) (Plus or minus 3 amperes allowed)	35 Amperes	39 Amperes	39 Amperes

ALTERNATOR VOLTAGE REGULATOR

Alternator Voltage	
Regulator Number	2098300
Volts	12
Ground Polarity	Negative
Point Gap	.015 inch plus or minus .001 inch
Air Gap	.048 to .052 inch

Measure gap with gauge back of stop. Contacts close with .052 inch gauge installed. Contacts open with .048 inch gauge installed.

Temperature in Degrees	75°	95°	118°	140°
Minimum Setting	13.7 to	13.6 to	13.5 to	13.4 to
Maximum Setting	14.3	14.2	14.1	14.0

DATA AND SPECIFICATIONS—CONT'D.

IGNITION SYSTEM

Model Number	2095836 (Chrysler Built)	2095841 (without Tachometer) 2098313 (with Tachometer) Autolite Built and (both with Double Breaker)	2095987 (Chrysler Built)
Engine Model	361, 383 cubic inch	413 cubic inch	413 cubic inch
Vehicle Model	SC-1, SC-2 (with 2 bbl. Carb.)	SC-2-300H (with 4 bbl. Carb.)	SC-3, SY-1 (with 4 bbl. Carb.)
Advance—Automatic (Distributor Degrees at Distributor rpm)	0° @ 250 to 450 0 to 2° @ 450 2.5 to 4.5° @ 700 10.5 to 12.5 @ 2150	0° @ 325 to 475 0 to 4.0° @ 475 4.5 to 6.5° @ 640 9 to 11° @ 2400	0° @ 310 to 490 0 to 2° @ 490 3.5 to 5.5° @ 800 8.5 to 10.5° @ 2300
Advance-Vacuum (Distributor Degrees at inches of Mercury)	0° @ 4.5″ to 8″ 6 to 9° @ 12″ 11.5 to 14.5° @ 16.5″	0° @ 7.2 to 8.9″ 4.5 to 7.5° @ 12″ 7.5 to 10.5° @ 14.5″	0° @ 6″ to 9″ 4.5 to 7.5° @ 12″ 8.3 to 11° @ 15″
Breaker Point Gap	.014″ to .019″	.014″ to .019″	.014″ to .019″
Dwell Angle	27° to 32°	27° to 32° (one set Points) 34° to 40° (both sets Points)	27° to 32°
Breaker Arm Spring Tension	17 to 21.5 oz.	17 to 21.5 oz.	17 to 21.5 oz.
Timing	10° BTC	10° BTC	10° BTC
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play	.000″ to .003″*	.000″ to .003″*	.000″ to .003″*
Shaft End Play (After Assembly)	.003″ to .010″	.003″ to .010″	.003″ to .010″
Rotation	Counter-Clockwise	Counter-Clockwise	Counter-Clockwise
Spark Plugs	J-12Y Champion	A-32 Auto-Lite	J-12Y Champion
Size	14 MM—⅜ Reach	14 MM—⅜ Reach	14 MM—⅜ Reach
Gap	.035 inch	.035 inch	.035 inch
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler 1688212	Auto-Lite 200567	Chrysler 2095223 / Essex 62-160-2
Primary Resistance @ 70°-80° F.	1.65–1.79 ohms		1.41–1.55 ohms
Secondary Resistance @ 70°-80° F.	9400–11700 ohms		9200–10600 ohms
Ballast Resistor	2095501	2095501	2095501
Resistance @ 70°-80° F.	0.5–0.6 ohms	0.5–0.6 ohms	0.5–0.6 ohms
Current Draw (Coil and Ballast Resistor in Circuit)			
Engine Stopped	3.0 Amperes	3.0 Amperes	3.0 Amperes
Engine Idling	1.9 Amperes	1.9 Amperes	1.9 Amperes

*When distributor is new or after rebuilding (new bushings and/or shaft installed). Service wear tolerance should not exceed .006″.

LAMP CHART

Location	Imperial Lamp No.	Chrysler Lamp No.
Dual Headlamps (Sealed-Beam)		
High and Low Beam Outer Lamp	4002	4002
High Beam Inner Lamp	4001	4001
Tail Stop and Turn Signal Lamps	1034	1034
Park and Turn Signal	1034	1034
Map Lamp	1004	1004
Dome Lamp	1004	1004
Back-up Lamps	1073	1073
Luggage Compartment Lamp	1003	1003
Under-Hood Lamp	1003	1003
Rear License Plate Lamp	67	67
Headlamp High Beam Indicator Lamp	1445	57
Transmission Push Button Controls Lamp	El *	1816
Parking Brake Warning Lamp	57	1816
Turn Signal Indicator Lamps	1816	57
Speedometer Lamp	EL *	EL *
Heater Controls Lamp	EL *	EL *
Ignition Switch Lamp	None	1816
Auto-Pilot Lamp	EL *	1816
Glove Compartment Lamp	1891	1891
Ash Receiver Lamp	53	53
Clock	EL *	EL *
Radio	EL *	EL *

*Electroluminescent Lighting

FUSES

Auto-Pilot	10 ampere
Radio	7½ ampere
Clock	2 ampere
Cigar Lighter	14 ampere
Instrument Panel Lamps	2 ampere
Dome and Stop Lamp	9 ampere
Park and Tail Lamps	9 ampere
Back-up Lamps	6 ampere
Glove and Trunk Compartments	9 ampere
Rear Window Defroster	6 ampere
Air Conditioning or Heater	20 ampere

CIRCUIT BREAKERS

Circuit	Rated Capacity	Location
Lighting System	22½ ampere	Integral with the lighting switch
Windshield Wiper (Variable)	5 ampere	Back of wiper switch
Window Lifts	20 ampere	Behind left front kick panel
	(Special 4 Door) 30 ampere	
Six-Way Seat	40 ampere	Behind left front kick panel

GROUP 8

ELECTRICAL AND INSTRUMENTS

BATTERY VISUAL INSPECTION

(1) Protect the fender paint finish with fender covers.

(2) Inspect the battery carrier for damage caused by loss of acid from the battery.

(3) Remove the battery hold-down clamp and clean the top of the battery with clean warm water and baking soda. Scrub areas with a stiff bristle brush being careful not to scatter corrosion residue with the bristles. Finally wipe off with a cloth moistened with ammonia or baking soda in water.

CAUTION

Keep cleaning solution out of battery cells to eliminate weakening the electrolyte.

(4) Inspect the cables. Replace damaged or frayed cables.

(5) Inspect the terminal posts to see that they are not deformed nor broken. Clean the tapered battery terminals and the inside surfaces of the clamp terminals with the terminal cleaning tool, as shown in Figures 1 and 2.

(6) Examine the battery for cracks in the case, and raised cells. Inspect sealing compound for leaks. Reseal as necessary.

(7) Tighten the battery hold-down screw nuts to 3 foot-pounds torque.

(8) **Observe the polarity of the terminals of battery to be sure the battery is not reversed** and connect the cable clamps to the battery posts and tighten securely. Coat all connections with light mineral grease or petrolatum.

(9) If the electrolyte level is low, fill to recommended level with mineral-free water.

SPECIFIC GRAVITY TEST

A hydrometer is used to measure the specific gravity of the electrolyte in the battery cells. This gives an indication of how much unused sulphuric acid remains in the solution. **Hydrometer floats are calibrated to indicate correctly only at one fixed temperature.**

The specific gravity of the battery electrolyte varies not only with the quantity of acid in solution but also with temperature. Draw electrolyte in and out of the hydrometer barrel several times to bring the temperature of the hydrometer float to that of the acid in the cell and then measure the electrolyte temperature in the cell. The temperature correction amounts to .004 specific gravity points for each 10 degrees Fahrenheit change in temperature.

The liquid level of the battery cell should be at normal height and the electrolyte should be thoroughly mixed with any battery water which may have just been added by charging the battery before taking any hydrometer readings. See "Adjustment

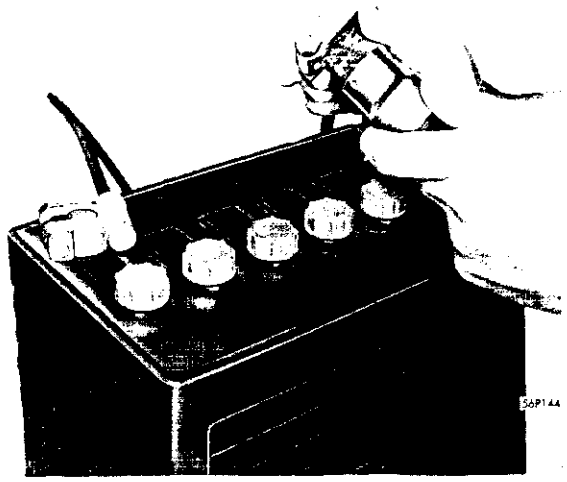

Fig. 1—Cleaning the Inside of the Cable Clamp

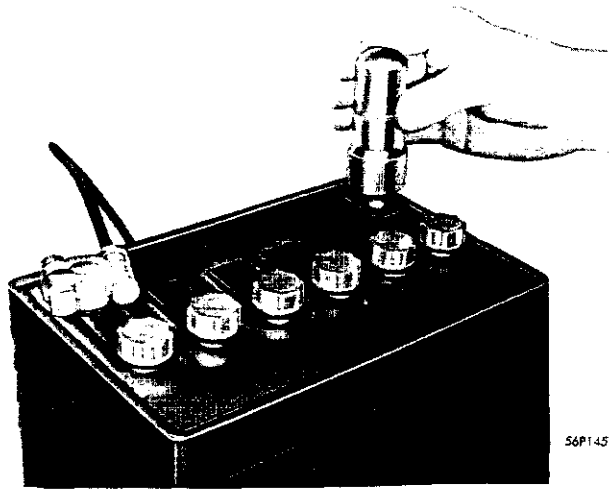

Fig. 2—Cleaning the Outside of the Battery Post

of Acid Gravity".

A fully charged battery has a specific gravity reading of 1.260 plus .015 minus .005 (all batteries for use in temperate climates).

If the battery specific gravity is below 1.220, recharge the battery to a full charge, then proceed with the battery "Voltage Tests" and "Battery Capacity Tests".

VOLTAGE TESTS

NOTE: Freshly charged batteries may have a "surface charge" which causes high and inaccurate readings unless properly dissipated. If battery is in the vehicle, turn the headlights on for one to three minutes to remove surface charge. Then turn lights off and wait several minutes before taking another reading.

To make a battery test, contact the meter prods (Tool MT-379) to the proper cell terminals (red to positive, black to negative), using caution not to connect across more than one cell. The point of prod will have to be pushed through sealing compound to make contact with buried link for each cell reading.

The individual cell readings should not vary more than 0.15 volt between any two cells. A battery varying more than 0.15 volt between any two cells should be **recharged** and "high rate discharge tester" used to test the battery before discarding the battery as unsuitable for use.

CAUTION

Do not use an open flame near the battery.

HIGH RATE DISCHARGE TEST OF BATTERY CAPACITY

Satisfactory capacity tests can be made only when battery equals or exceeds 1.220 specific gravity at 80 degrees Fahrenheit. If reading is below 1.220, the battery should be slow charged until fully charged in order to secure proper test results.

(1) Turn the control knob of the battery starter tester to the **OFF** position.

(2) Turn the voltmeter selector switch to the 4 volt position.

(3) Connect the test ammeter and voltmeter positive leads to the battery negative terminal and ammeter and voltmeter negative leads to the battery positive terminal (Fig. 3).

NOTE: The voltmeter clips must contact the battery posts or cable clamps and not the ammeter clips.

(4) Turn the control knob clockwise until ammeter reading is 200 amperes.

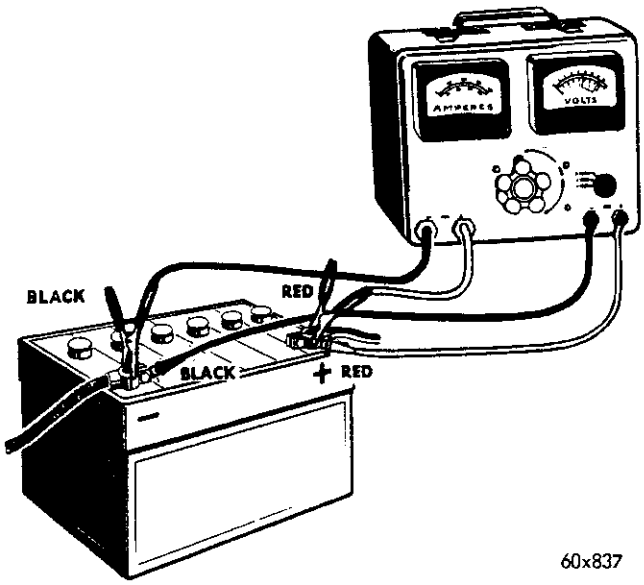

Fig. 3—High Rate Discharge Test

(5) Maintain the load for 15 seconds, voltmeter should read 9.5 volts or more, which will indicate battery has good output capacity.

(6) Turn the control knob to the OFF position.

CHARGING THE BATTERY

If the voltage in "High Rate Discharge Test" was under 9.5 volt, the battery should be test charged to determine whether the battery can be satisfactorily charged.

a. Three Minute Charge Test (Fig. 4)

NOTE: This test should not be used if battery temperature is below 60 degrees F.

(1) Connect the positive (+) charger lead to the battery positive terminal and the negative (—) lead to the battery negative terminal.

(2) Trip the power switch to **ON** position. Turn charger timer switch past "three minutes" then back to "three minutes."

(3) Adjust the charge switch to the highest possible rate not exceeding 40 amperes.

(4) When the timer switch cuts off at end of 3 minutes, turn back to fast charge.

(5) Use the 4 volt scale of the battery starter tester voltmeter and quickly measure the voltage across each cell while the battery is being fast charged. A faulty cell or cells will be detected by a cell voltage variation of more than .1 volt.

(6) If the cell voltages are even within .1 volt, use 16 volt scale of the battery starter tester and meas-

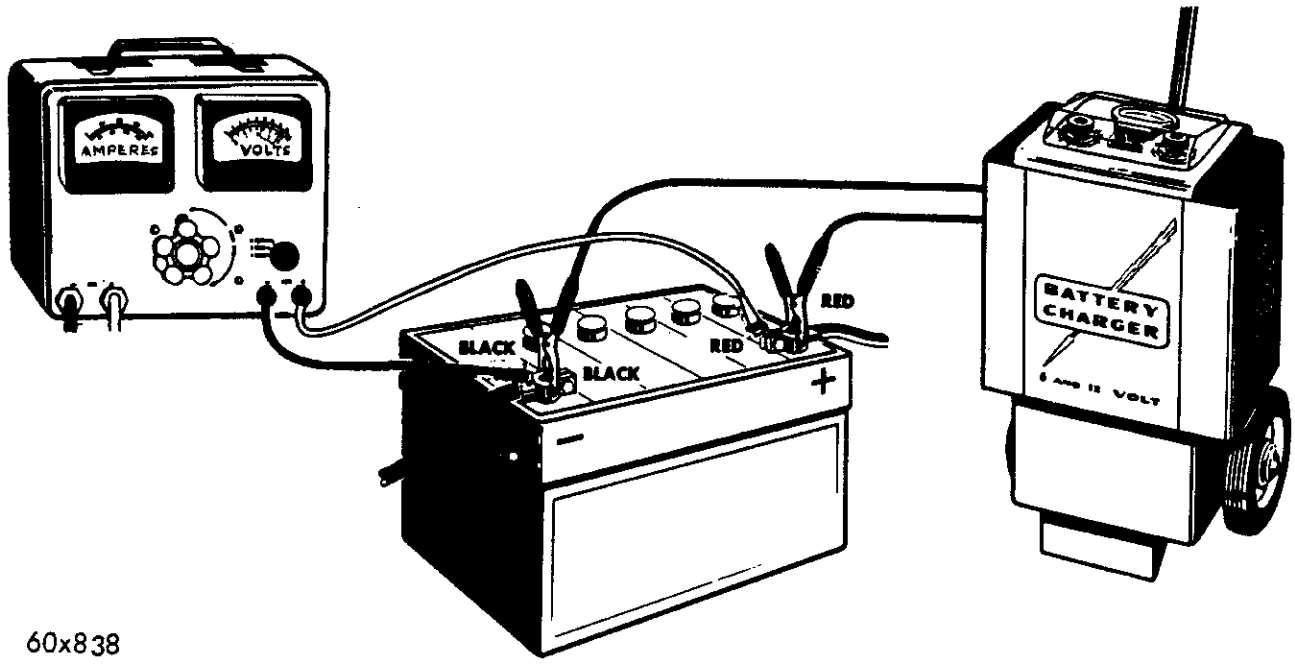

Fig. 4—Three Minute Charge Test

ure the total voltage of the battery posts while the battery is being fast charged. If the total voltage during the charge exceeds 15.5 volts, the battery is sulphated and should be cycled and slow-charged until specific gravity reaches 1.260. (See "Slowing Charging").

If the specific gravity remains constant after testing the battery at one hour intervals for three hours, the battery is at its highest state of charge.

(7) Make another capacity test. If the capacity test does not meet specifications, replace the battery.

NOTE: A slow charge is preferable to bring the battery up to a full charge.

Safe slow charging rates are determined by allowing one ampere per positive plate per cell the proper slow charging rate would be 6 amperes for a 70 ampere hour battery.

b. Fast Charging the Battery (Fig. 5)

If adequate time for a slow charge is not available, a high rate (FAST) charge is permissible and will give a sufficient charge in one hour, enabling the battery and alternator to continue to carry the electrical load.

Connect the positive (+) charger lead to the battery positive terminal and the negative (—) charger lead to the battery negative terminal.

CAUTION

The battery can be damaged beyond repair unless the following precautions are taken:

(1) The battery electrolyte temperature must **NEVER** exceed 125 degrees Fahrenheit.

If this temperature is reached, the battery should be cooled by reducing the charging rate or remove the battery from the circuit.

(2) As the batteries approach full charge the electrolyte in each cell will begin to gas or bubble. Excessive gassing must not be allowed.

(3) Do not fast charge longer than one hour.

The battery is fully-charged when three successive hourly hydrometer readings show no rise in specific gravity. Remember to use the temperature correction when checking specific gravity.

If the battery does not show a significant change

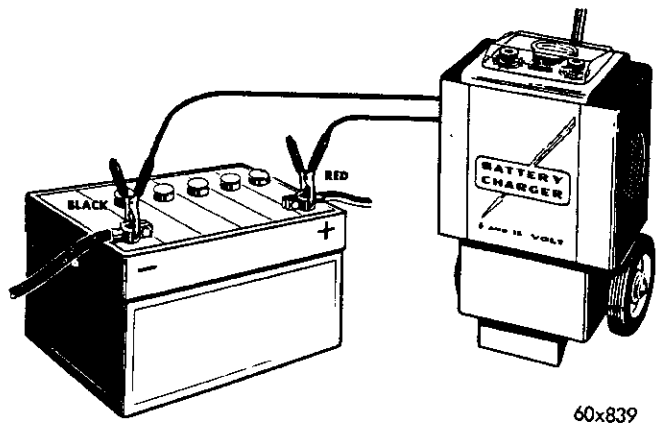

Fig. 5—Fast Charging the Battery

in the specific gravity after one hour of "FAST" charge, the slow charge method should be used.

NOTE: The manufacturers of high rate charging equipment generally outline the precautions and some models have thermostatic temperature limiting and time limiting controls.

WARNING

When batteries are being charged an explosive gas mixture forms beneath the cover of each cell. Keep all sparks and open flames away from the battery.

c. Slow Charging Batteries to Remove Sulphation

To condition a battery that is sulphated, charge the battery for a minimum of 24 hours at a maximum charging rate of (4) amperes. As the battery approaches full charge, test the specific gravity at hourly intervals. With no rise in specific gravity for three successive readings, the battery is charged to its peak capacity.

STARTING MOTOR

(DIRECT DRIVE)

The Chrysler Corporation built Starting Motor (Fig. 6) is a 12-volt, four coil assembly. The starter drive is an overrunning clutch type with a solenoid shift type switch mounted on the starting motor.

The brush holders are riveted to a separate brush plate and are not serviced individually. Brush replace-

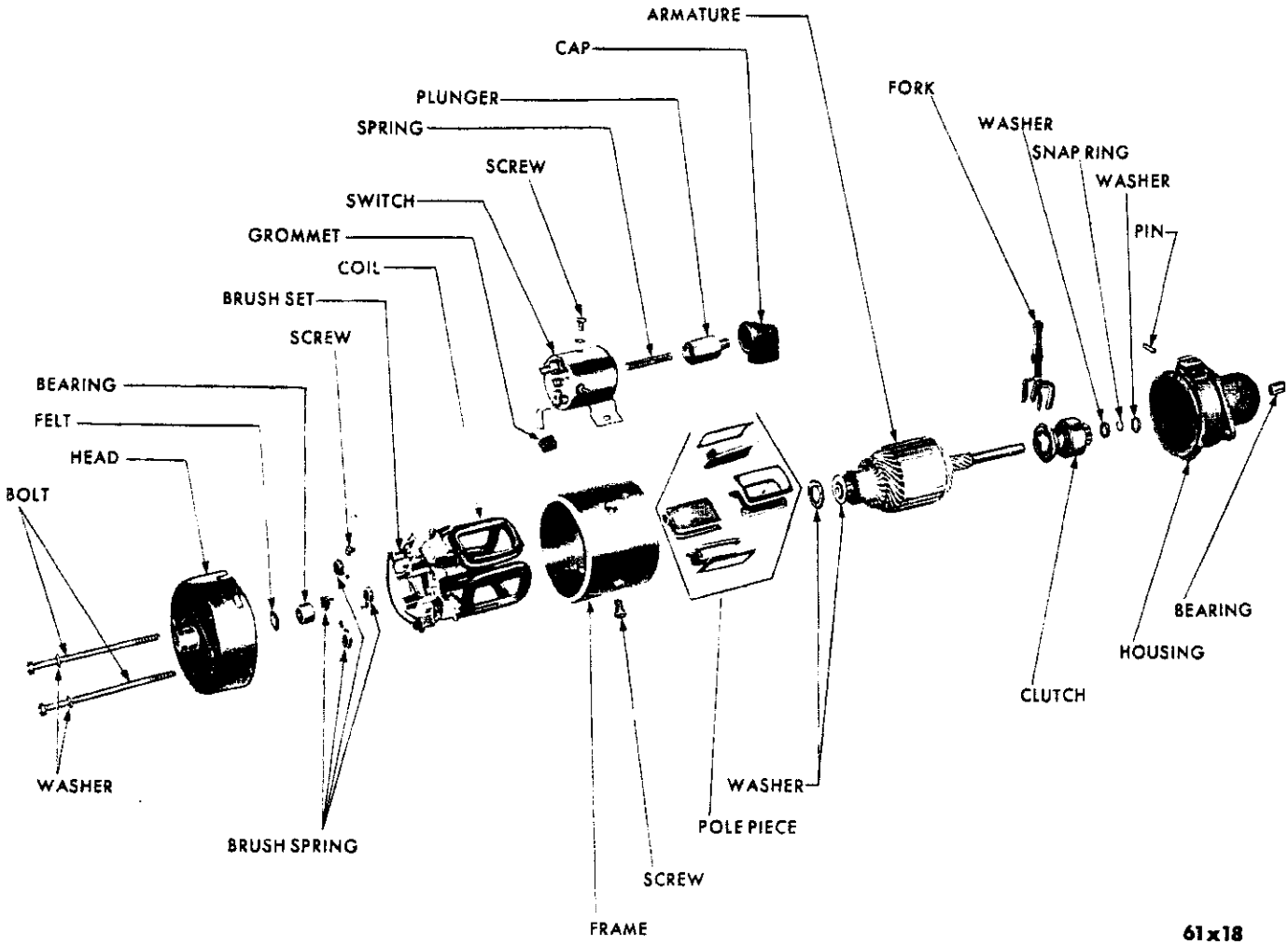

Fig. 6—Starting Motor (Disassembled View) (Typical)

ment can be made by removing the commutator bearing end head.

STARTING MOTOR CIRCUIT TESTS

a. Insulated Circuit Test

(1) Test the battery electrolyte specific gravity. The specific gravity should be 1.220 or above. If the battery specific gravity is below 1.220, recharge the battery to a full charge before proceeding with the test.

(2) Turn the voltmeter selector switch to the 4 volt position.

(3) Disconnect the ignition coil secondary cable.

(4) Connect the voltmeter positive lead to the battery positive post and the voltmeter negative lead to the solenoid connector which connects to the starter field coils.

NOTE: The voltmeter will read off the scale to the right until the starter is actuated.

(5) Connect the remote control switch to the battery and the solenoid terminal of the starter relay.

(6) Crank the engine with a remote starter control starter switch and observe the voltmeter reading. The voltmeter reading should not exceed .3 volt. A voltmeter reading of .3 volt or less indicates the voltage drop is normal in the cables, starter relay switch, solenoid switch and connections between the battery and the starting motor is normal. See "Starter Ground Circuit Test".

If the voltmeter reading is more than .3 volt, it indicates high resistance in the starter insulated circuit. Make the following test to isolate the point of excessive voltage loss.

(7) Remove the voltmeter lead from the solenoid connector and connect to the following points, repeating the test at each connection. The starter terminal of the solenoid, battery terminal of the solenoid, battery cable terminal at the solenoid, starter relay and the cable clamp at the battery.

(8) A small change will occur each time a normal portion of the circuit is removed from the test. A definite change in the voltmeter reading indicates that the last part eliminated in the test is at fault.

Maximum allowable voltage loss is as follows:

Battery insulated cable	.2 volt
Solenoid switch	.1 "
Each connection	.0 "

Replace the faulty cables. Clean and tighten all connections.

b. Starter Ground Circuit Test

(1) Connect the voltmeter positive lead to the starter housing and the negative voltmeter lead to the battery negative post.

(2) Crank the engine with a remote control starter switch and observe the voltmeter reading. The voltmeter reading should not exceed .2 volt. A reading of .2 volt or less indicates voltage loss in the ground cable and connections are normal. If the voltmeter reading is more than .2 volt, it indicates excessive voltage loss in the starter ground circuit. Make the following tests to isolate the point of excessive voltage loss. Repeating the test at each connection.

(a) Starter drive housing.

(b) Cable terminal at the engine.

(c) Cable clamp at the battery.

A small change will occur each time a normal portion of the circuit is removed from the test. A definite change in the voltmeter reading indicates that the last part eliminated in the test is at fault.

Maximum allowable voltage loss is as follows:

Battery ground cable	.2 volt
Engine ground circuit	.1 "
Each connection	.0 "

SERVICE PROCEDURES

STARTING MOTOR

Removal

(1) Disconnect the ground cable at the battery.

(2) Remove the starter cable at the starter.

(3) Disconnect the solenoid lead wire from the solenoid.

(4) Remove the bolts attaching the starting motor to the flywheel housing and remove the starting motor and housing removable seal.

TESTING THE STARTING MOTOR (BENCH TEST)

a. Free Running Test

(1) Place the starter in a vise equipped with soft jaws and connect a fully-charged, 12 volt battery to the starter.

(2) Connect a test ammeter (100 amperes scale) and carbon pile rheostat in series with the battery positive post and the starter terminal.

(3) Connect the voltmeter (15 volt scale) across

the starter.

(4) Rotate the carbon pile to the full-resistance position.

(5) Connect the battery cable from the battery negative post to the starter frame.

(6) Adjust the rheostat until the battery voltage shown on the voltmeter reads 11 volts.

The current draw should be 78 amperes maximum at 3800 minimum rpm.

b. Stall Test

(1) Install the starting motor in the test bench.

(2) Follow the instructions of the test equipment manufacturer and check the stall torque of the starter against the following specifications.

(3) With the applied battery voltage adjusted to 4 volts, the stall torque should be 8.5 foot-pounds minimum with a current draw of 350 amperes.

STARTER DISASSEMBLY (Fig. 6)

(1) Remove the through bolts and tap the commutator end head from the field frame.

(2) Remove the thrust washers from the armature shaft.

(3) Lift the brush holder springs and remove the brushes from the brush holders.

(4) Remove the brush plate (Fig. 7).

(5) Disconnect the field coil leads at the solenoid connector (Fig. 8).

(6) Remove the solenoid attaching screws and remove the solenoid and boot assembly (Fig. 9).

(7) Drive out the over-running clutch shift fork pivot pin (Fig. 10).

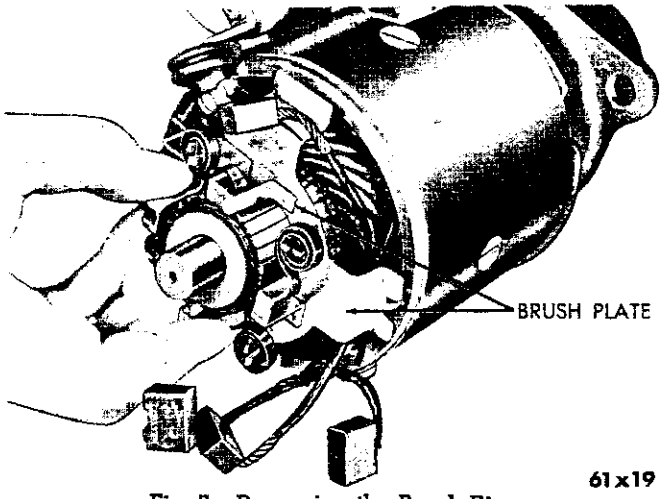

Fig. 7—Removing the Brush Ring

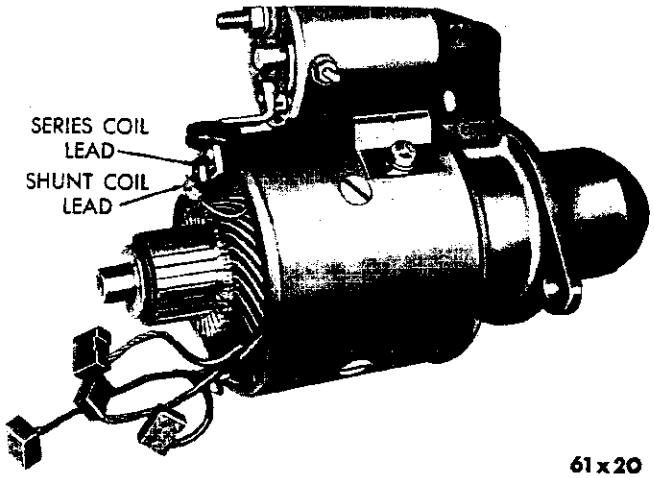

Fig. 8—Field Coil Leads Disconnected from the Solenoid Connector

(8) Remove the drive end pinion housing and spacer washer.

(9) Note the position of the shifter fork on the starter and remove the shifter fork (Fig. 11).

(10) Slide the over-running clutch pinion gear toward the commutator end of the armature, drive the stop retainer toward the clutch pinion gear to

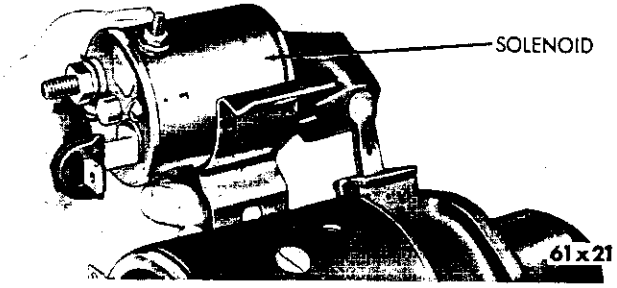

Fig. 9—Removing the Starter Solenoid

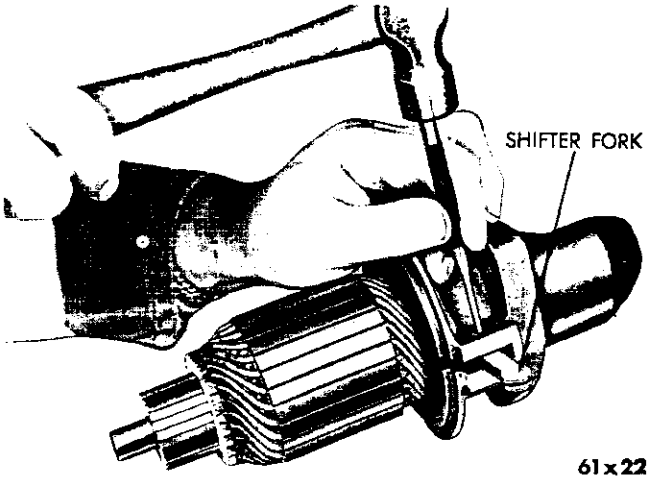

Fig. 10—Removing the Shifter Fork Pivot Pin

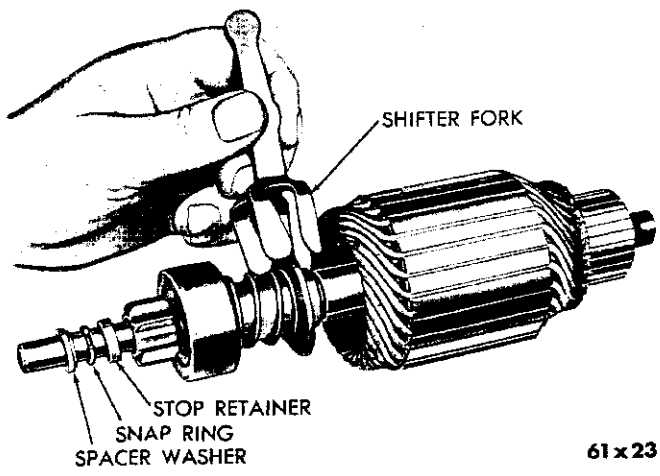

Fig. 11—Removing the Shifter Fork

expose the snap ring and remove the snap ring.

(11) Slide the over-running clutch drive from the armature shaft.

(12) If it is necessary to replace the field coils, remove the ground brushes terminal attaching screw and raise the brushes with the terminal and shunt wire up and away from the field frame (Fig. 12). Remove the pole shoe screws with a special pole shoe impact screwdriver, Tool C-3475.

Cleaning and Inspection

(1) Do not immerse the parts in a cleaning solvent. Immersing the field frame and coil assembly and/or armature will damage the insulation. Wipe these parts with cloth **only.**

(2) Do not immerse the drive unit in a cleaning solvent. The drive clutch is pre-lubricated at the factory and solvent will wash the lubrication from the clutch.

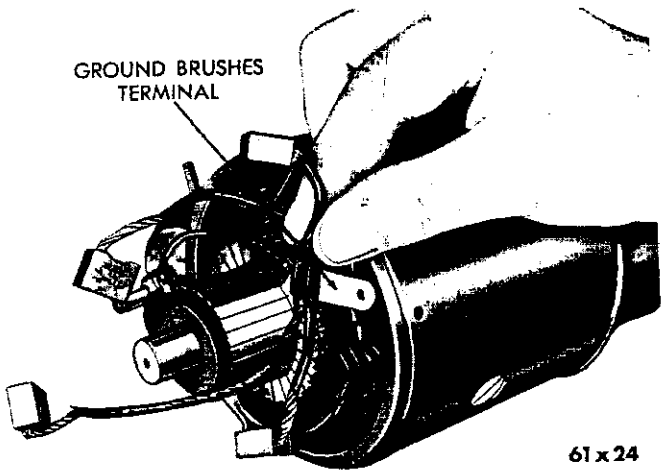

Fig. 12—Removing the Ground Brushes Terminal

(3) The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

BRUSHES AND SPRINGS—REPLACEMENT

(1) The brushes that are worn more than ½ the length of the new brush, or are oil-soaked, should be replaced. The brushes and springs can be replaced after removing the commutator end head and the brush plate.

(2) Lift the brushes; disengage the brushes from the brush holders and remove the brush plate.

(3) Disconnect the field lead wires at the solenoid connector (Fig. 8).

(4) Remove the screw attaching the ground brush terminal to the field frame and raise the brushes and terminal up and away from the field frame (Fig. 12). **NOTE: The leads are not equal in length. Check the brush leads before cutting, to insure the proper length at installation.**

(5) Clip the brush leads at the ground terminal and at the field coils.

(6) Open the brush lead retaining clips to remove the old brush leads.

(7) When resoldering the brush leads, make a strong, low resistance connection using a high temperature solder and resin flux. Do not use acid. **Do not** break the shunt wire when removing and installing the ground brushes.

(8) The brush springs can be removed by spreading the retainers and disengaging the springs from the retainer legs.

(9) Measure the brush spring tension with a spring scale hooked under the spring near the end. Pull the scale on a line parallel to the edge of the

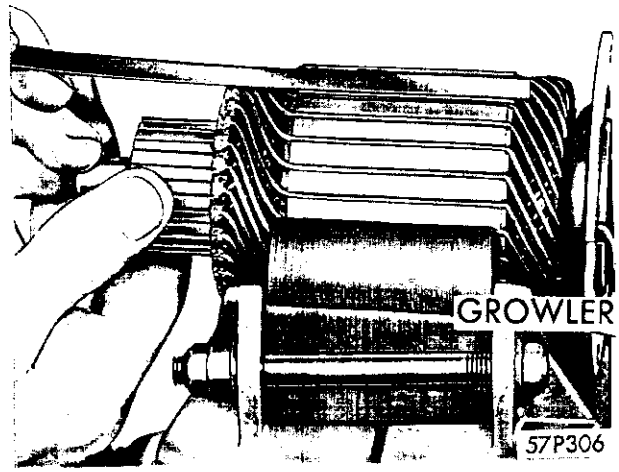

Fig. 13—Testing the Armature for Short

brush and take a reading just as the spring end leaves the brush. The spring tension should be 32 to 48 ounces. Replace the springs that do not meet specifications.

TESTING THE ARMATURE

a. Testing the Armature for Short Circuit

Place the armature in the growler (Fig. 13) and hold a thin steel blade parallel to the core and just above it, while slowly rotating the armature in the growler. A shorted armature will cause the blade to vibrate and be attracted to the core. Replace a shorted armature.

b. Testing Armature for Ground

Touch the armature shaft and end of a commutator bar with a pair of test lamp test prods (Fig. 14). If the lamp lights, it indicates a grounded armature. Replace the grounded armature.

c. Testing Commutator Runout, Refacing and Undercutting

Place the armature in a pair of "V"blocks and measure the runout with a dial indicator. Test both the shaft and the commutator. A bent shaft requires replacement of the armature. When the commutator runout exceeds .003 inch, the commutator should be refaced. Remove only sufficient metal to provide a smooth, even surface.

TESTING THE FIELD COILS FOR GROUND

(1) Remove the through bolts and remove the commutator end frame.

(2) Remove the brushes from the brush holders and remove the brush ring (Fig. 7).

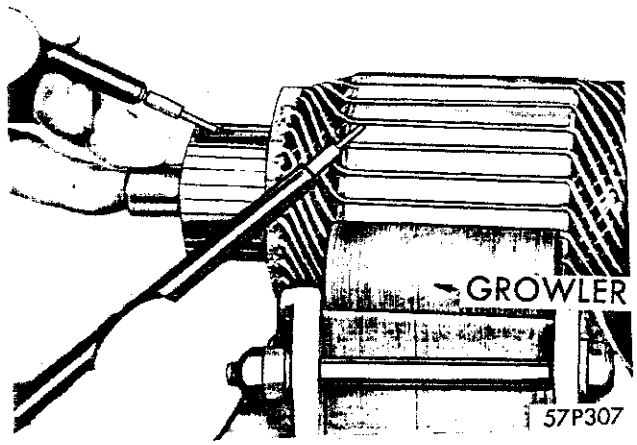

Fig. 14—Testing the Armature for Ground

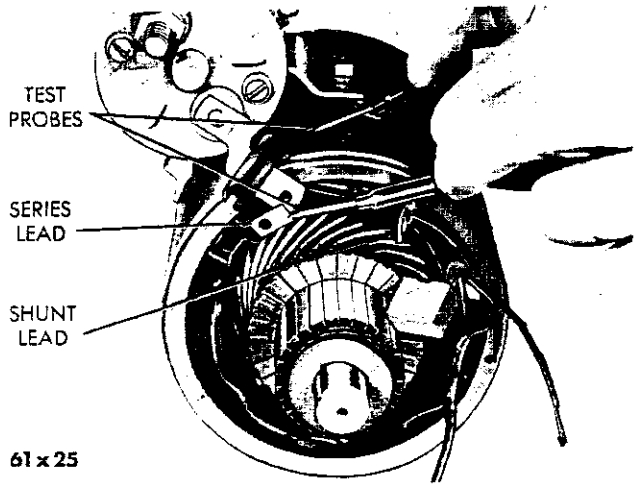

Fig. 15—Testing the Series Coil for Ground

(3) Disconnect the field lead wires at the solenoid connector and separate the field leads to make sure they do not touch the solenoid connector (Fig. 8).

(4) Remove the ground brushes attaching screw and raise the brushes with the terminal and shunt wire up and away from the field frame (Fig. 12).

(5) Touch one probe of the test lamp to the series field coil lead and the other probe to the field frame (Fig. 15). The lamp should not light.

(6) Touch one probe to the shunt field coil lead and the other probe to the field frame (Fig. 16).

If the lamp lights in either test steps (5) or (6), the field coils are grounded. If the field coils are grounded, test each coil separately after unsoldering the connector wires. Replace the grounded field coils.

(7) Touch each of the brush holders with one test probe, while holding the other test probe against the brush ring. Two brush holders that are 180 degrees

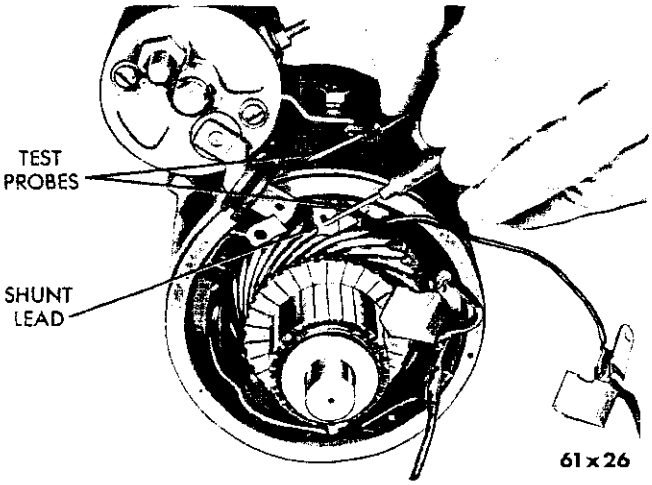

Fig. 16—Testing the Shunt Coil for Ground

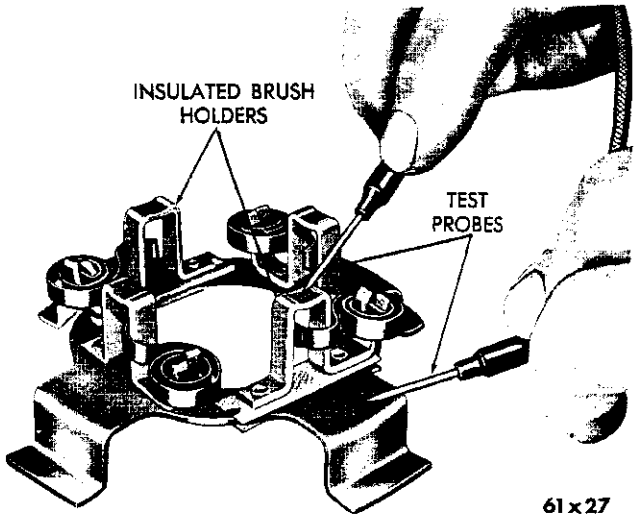

Fig. 17—Testing the Insulated Brush Holders for Ground

apart should cause the test lamp to light as they are intentionally grounded. The other two brush holders (Fig. 17) should not cause the lamp to light when tested, as they are insulated. If the insulated brush holders cause the lamp to light when tested, it indicates that the brush holders on the brush ring are grounded. Replace the brush ring assembly if the brush holders are grounded.

REPLACING THE FIELD COILS

A pole shoe impact screwdriver Tool C-3475 should be used to remove and install the field coils to prevent damage to the pole shoe screws and for proper tightening. The pole shoes that are loose and not properly seated may cause the armature core to rub the pole shoes. This will decrease the starter efficiency and damage the armature core.

SERVICING THE BRUSHES

Inspect the armature shaft bearing surfaces and bushings for wear by placing the armature core in a vise equipped with soft jaws. Do not squeeze tightly. Try the commutator end frame, the drive end frame, and armature support bushings for wear by placing them on shafts and inspecting for side play. Replace the commutator end frame and bushing assembly if the bushing is worn, also, replace the drive end bushing if it is worn. The bushing should be well soaked in SAE 30W engine oil before it is installed.

SERVICING THE DRIVE UNIT

Place the drive unit on the shaft and, while holding the armature, rotate the drive pinion. The drive pinion should rotate smoothly in one direction (not necessarily easily), but should not rotate in the opposite direction. If the drive unit does not function properly, or the pinion is worn or burred, replace the drive unit.

STARTER ASSEMBLY (Fig. 6).

(1) Lubricate the armature shaft and splines with SAE 10W oil or 30W rust preventive oil.

(2) Install the starter drive, stop collar (retainer), the lock ring and the spacer washer.

(3) Install the shifter fork over the starter drive spring retainer washer with the narrow leg of fork toward commutator (Fig. 11). This is important, if the fork is not properly positioned, the starter gear travel will be restricted causing a lockup in the clutch mechanism.

(4) Install the drive end (pinion) housing on the armature shaft, indexing the shifting fork with the slot in the drive end of the housing.

(5) Install the shifter fork pivot pin (Fig. 10).

(6) Install the armature with the clutch drive, shifter fork, and pinion housing; slide the armature into the field frame until the pinion housing indexes with the slot in the field frame.

(7) Install the solenoid and boot assembly (Fig. 9). Tighten bolts 60 to 70 inch-pounds torque.

(8) Install the ground brushes (Fig. 12).

(9) Connect the field coil leads at the solenoid connector (Fig. 8).

(10) Install the brush holder ring (Fig. 7) indexing the tang of the ring in the hole of the field frame.

(11) Position the brushes in the brush holders. Be sure the field coil lead wires are properly enclosed behind the brush holder ring and that they do not interfere with the brush operation.

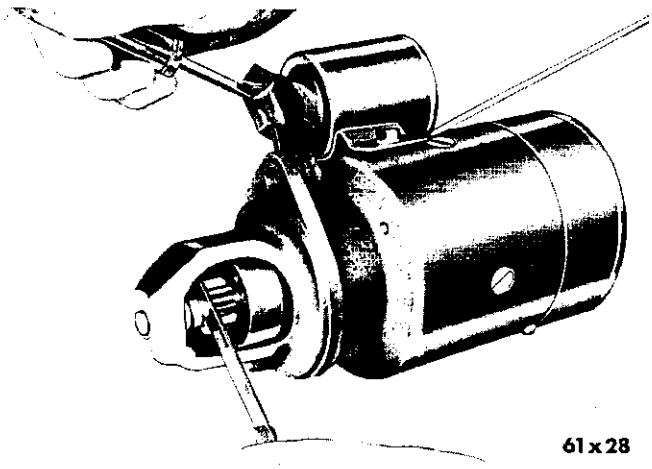

Fig. 18—Measuring the Starter Drive Pinion Clearance

(12) Install the thrust washers on the commutator end of the armature shaft to obtain .010 inch minimum end play.

(13) Install the commutator end head.

(14) Install the through bolts and tighten 40 to 50 inch-pounds torque.

ADJUSTING STARTER DRIVE GEAR (PINION) CLEARANCE

(1) Place the starter assembly in a vise equipped with soft jaws and tighten the vise sufficiently to hold the starter.

NOTE: Place a wedge or screwdriver between the bottom of the solenoid and the starter frame to eliminate all deflection in the solenoid when making the pinion clearance check. (Fig. 18).

(2) Push in on the solenoid plunger link (Fig. 18) (NOT THE FORK LEVER) until the plunger bottoms.

(3) Measure the clearance between the end of the pinion and pin stop with plunger seated and pinion pushed toward the commutator end. The clearance should be ⅛ inch. Adjust for proper clearance by loosening the solenoid attaching screws and move the solenoid fore and aft as required.

(4) Test the starter operation under a free running test (Paragraph "Testing the Starter Motor (Bench Test)").

STARTER INSTALLATION

(1) Before installing the starter, be sure the starter and flywheel housing mounting surfaces are free of dirt and oil. These surfaces must be clean to make good electrical contact.

(2) Position the starter to the flywheel housing removable seal.

(3) Install the starter from beneath the engine.

(4) Tighten the attaching bolts securely.

(5) Attach the wires to the solenoid switch and the starter terminal.

(6) Install the battery ground cable and test operation of the starter for proper engine cranking.

STARTING MOTOR (REDUCTION GEAR TYPE)

The reduction-gear starting motor has an armature-to-engine crankshaft ratio of 45 to 1; a 3.5 to 1 reduction gear set is built into the motor assembly, which is housed in an aluminum die casting (Fig. 19). The starting motor utilizes a solenoid shift device, the housing of the solenoid is entegral with the starting motor drive end housing.

TESTING STARTER RESISTANCE AND CURRENT DRAW

(1) Test the battery electrolyte specific gravity. Specific gravity should be 1.220 or above. If the battery specific gravity is below 1.220, recharge the battery to full charge before proceeding with the test.

(2) Disconnect the positive bettery lead from the battery terminal post. Connect an 0 to 300 scale ammeter between the disconnected lead and the battery terminal post.

(3) Connect a test voltmeter with 10 volt scale division between the battery positive post and the starter switch terminal at the starter solenoid.

(4) Crank the engine and observe the readings on the voltmeter and ammeter. The voltage should not exceed .3 volt. A reading of voltage that exceeds .3 volt indicates there is high resistance caused from loose circuit connections, a faulty cable, burned starter relay or solenoid switch contacts. A current that is high and is combined with slow cranking speed, indicates that the starter should be removed and repaired.

STARTER GROUND CIRCUIT TEST

(1) Connect the voltmeter positive lead to the starter housing and the negative voltmeter lead to the battery negative post.

(2) Crank the engine with a remote control starter switch and observe the voltmeter reading. The voltmeter reading should not exceed .3 volt. A reading of .3 volt or less indicates voltage in the ground cable and connections is normal. If the voltmeter reading is more than .3 volt, it indicates excessive voltage loss in the starter ground circuit. Make the following tests to isolate the point of excessive voltage loss. Repeating the test at each connection.

(a) Starter drive housing.

(b) Cable terminal at the engine.

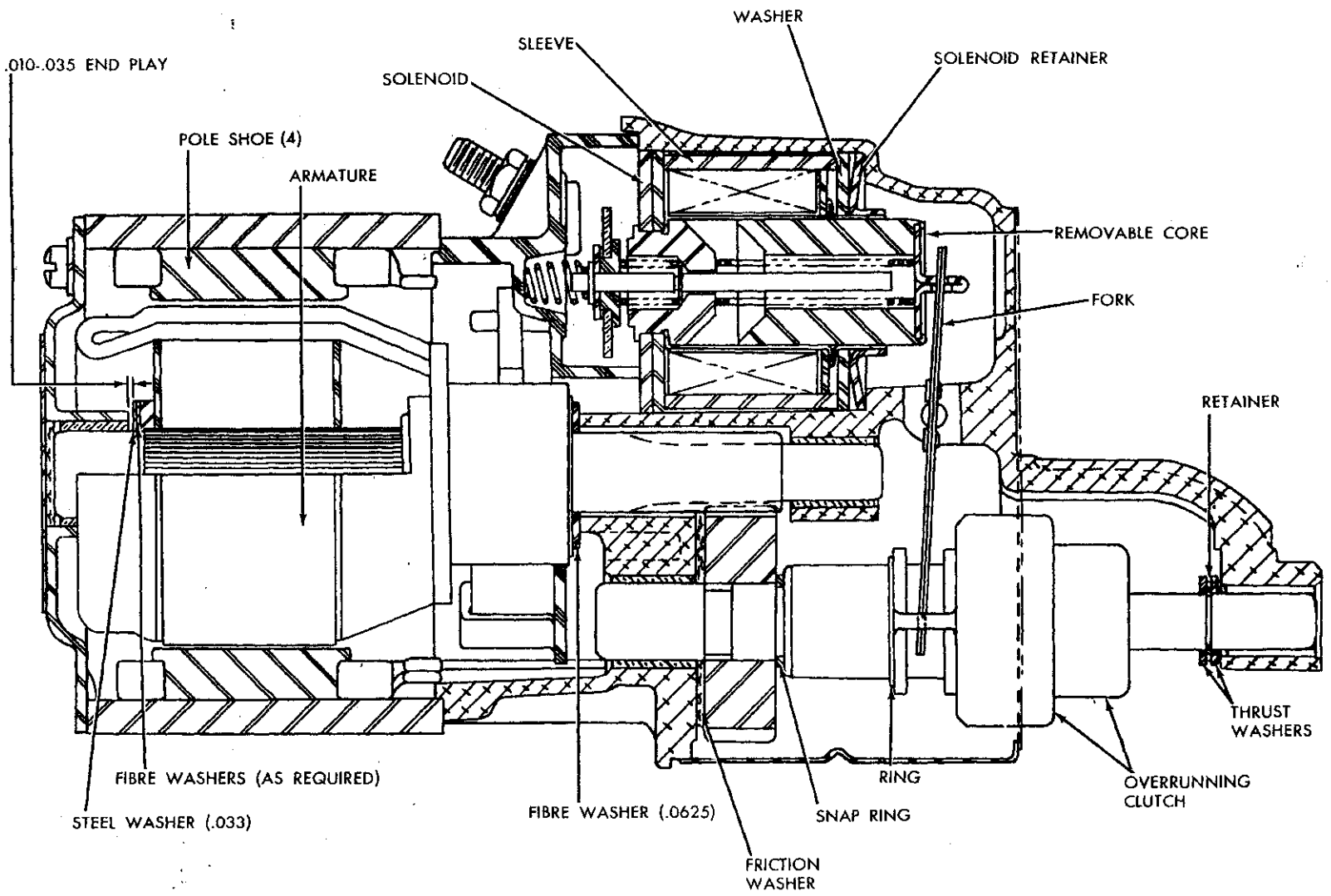

Fig. 19—Starting Motor Cross Section

(c) Cable clamp at the battery.

A small change will occur each time a normal portion of the circuit is removed from the test. A definite change in the voltmeter reading indicates that the last part eliminated in the test is at fault.

Maximum allowable voltage loss is as follows:

Battery ground cable	.2 volt
Engine ground circuit	.1 "
Each connection	.0 "

STARTING MOTOR

Removal

(1) Disconnect the ground cable at battery.

(2) Remove the cable at the starter.

(3) Disconnect the solenoid lead wire at the solenoid terminals.

(4) Remove the one stud nut and one bolt attaching the starting motor to the flywheel housing and remove the starting motor, housing and removable seal.

TESTING THE STARTING MOTOR (BENCH TEST)

a. Free Running Test

(1) Place the starter in a vise and connect a fully-charged, 12 volt battery to the starter as follows:

(2) Connect a test ammeter (100 amperes scale) and carbon pile rheostat in series with the battery positive post and the starter terminal.

(3) Connect a voltmeter (15 volt scale) across the starter.

(4) Rotate the carbon pile to a full-resistance position.

(5) Connect the battery cable from the battery negative post to the starter frame.

(6) Adjust the rheostat until the battery voltage shown on the voltmeter reads 11 volts.

(7) The current draw should be 85 amperes maximum at 1950 minimum rpm.

b. Stall Test

(1) Install the starter in a test bench.

(2) Follow the instructions of the test equipment manufacturer and test the stall torque of the starter against the following specifications.

(3) With applied battery voltage adjusted to 4 volts, the stall torque should be 24.0 foot-pounds minimum with a current draw of 475 amperes.

SERVICE PROCEDURES

DISASSEMBLY

(1) Place the gear housing of the starter in a vise equipped with soft jaws. Use the vise as a support fixture only. **DO NOT** clamp.

(2) Remove the two through bolts and the starter end head assembly.

(3) Carefully pull the armature up and out of the gear housing, and the starter frame and field assembly. Remove the steel and fiber thrust washer.

NOTE: The wire of the shunt field coil is soldered to the brush terminal. One pair of brushes are connected to this terminal. The other pair of brushes is attached to the series field coils by means of a terminal screw. Carefully pull the frame and field assembly up just enough to expose the terminal screw and the solder connection of the shunt field at the brush terminal. Place two wood blocks between the starter frame and starter gear housing (Fig. 20) to facilitate removal of the terminal screw and the unsoldering of the shunt field wire at the brush terminal.

(4) Support the brush terminal by placing a finger behind the terminal and remove the terminal screw (Fig .20).

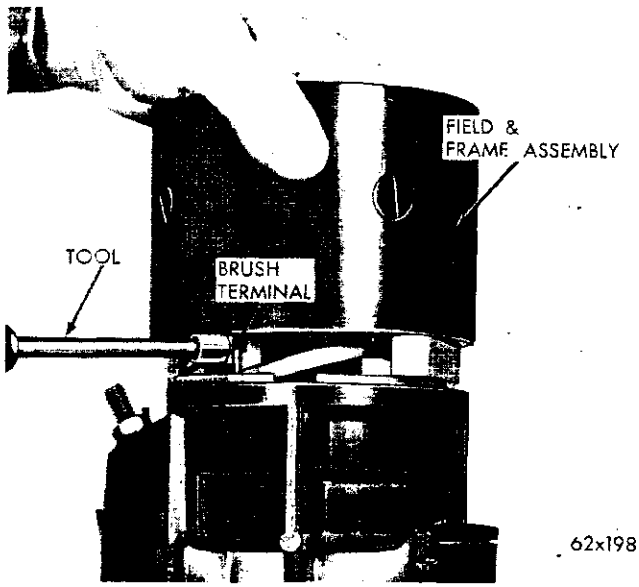

Fig. 20—Removing the Brush Terminal Screw

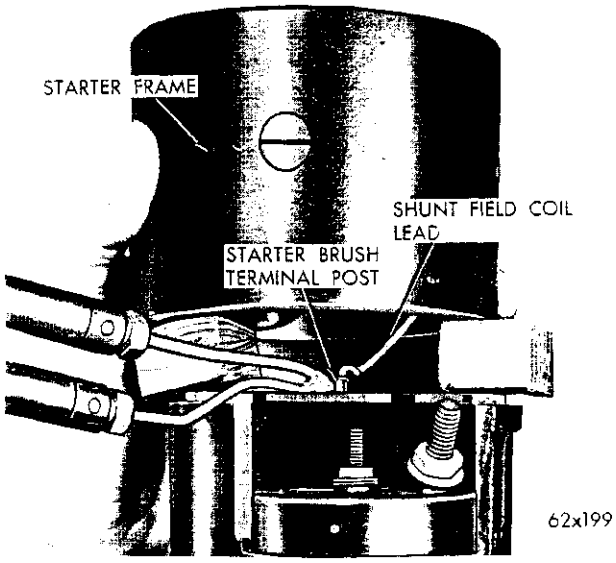

Fig. 21—Unsoldering the Shunt Coil Lead Wire

(5) Unsolder the shunt field coil lead from the starter brush terminal (Fig. 21).

(6) Remove the brush insulator which prevents contact between the brush terminal and the gear housing (Fig. 22).

NOTE: The brush holder plate with the brush terminal, contact and brushes is serviced as an assembly.

(7) Remove the screw attaching the brush holder plate to the starter gear housing (Fig. 22).

(8) Remove the brush holder plate with the brushes and solenoid as an assembly (Fig. 23).

(9) Unsolder the solenoid winding from the starter brush terminal (Fig. 24).

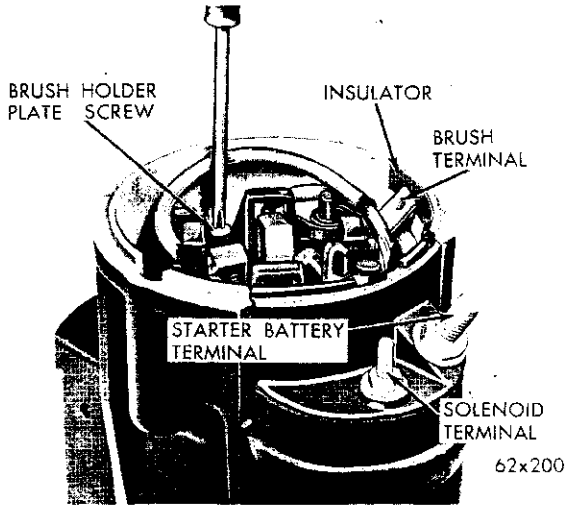

Fig. 22—Removing the Brush Holder Plate Screw

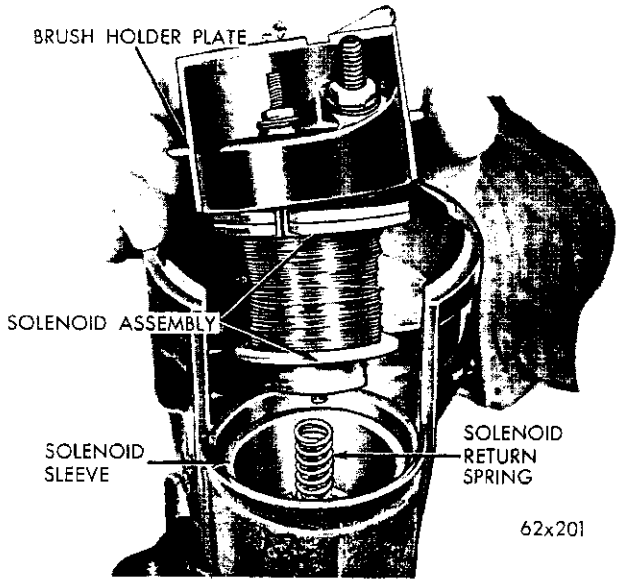

Fig. 23—Removing the Brush Holder Plate

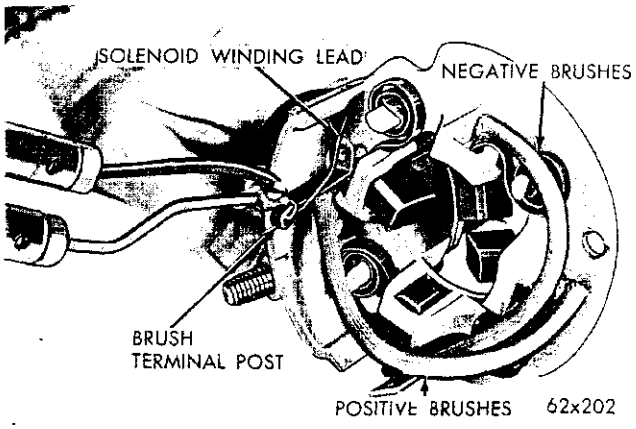

Fig. 24—Unsoldering the Solenoid Winding Lead

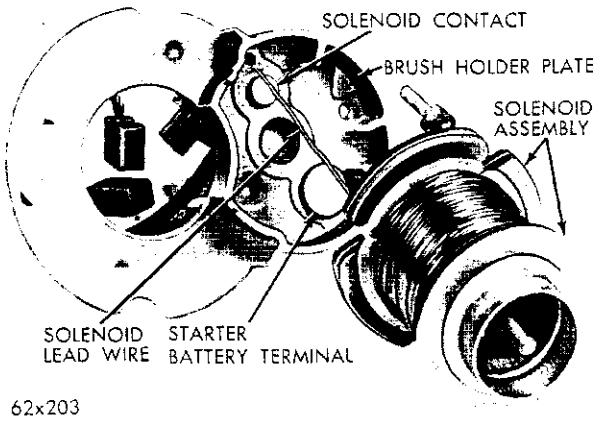

Fig. 25—Separating the Solenoid from the Brush Holder Plate

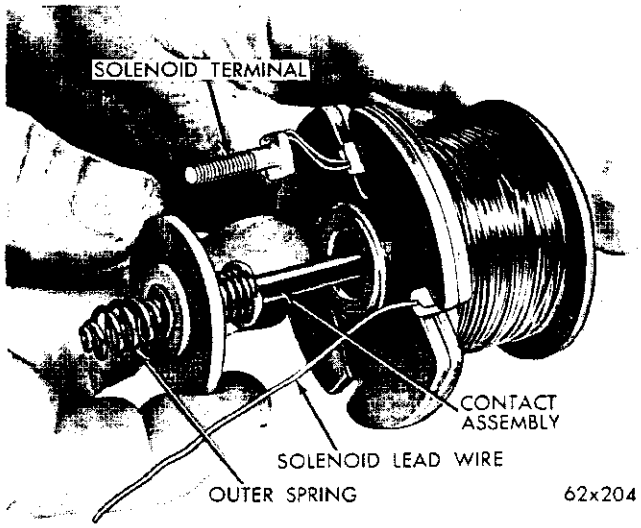

Fig. 26—Removing the Contact Assembly

Fig. 27—Removing the Solenoid Coil Sleeve

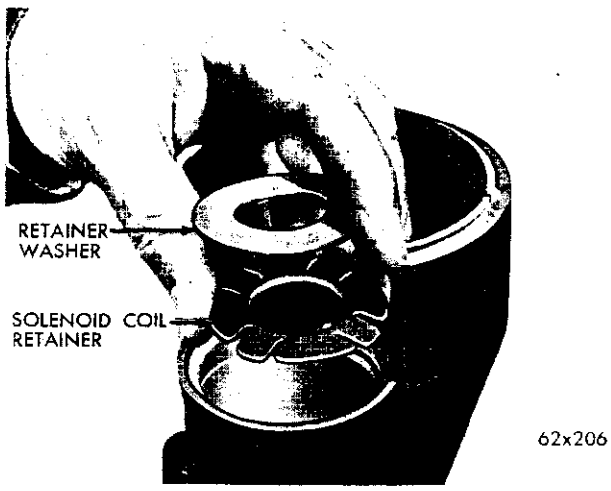

Fig. 28—Identification of the Solenoid Coil Retainer and the Retainer Washer

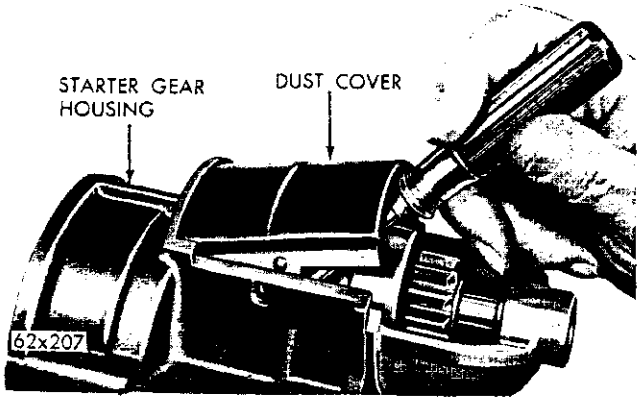

Fig. 29—Removing the Dust Cover

(10) Remove the nut ($1\frac{1}{32}$ wrench), steel washer and nylon washer from the solenoid terminal.

(11) Separate the brush holder plate from the solenoid (Fig. 25).

(12) Remove the nut, steel washer and nylon washer from the starter battery terminal.

(13) Remove the starter battery terminal from the holder plate.

(14) Remove the solenoid contact assembly (Fig. 26).

(15) Remove the solenoid coil sleeve (Fig. 27).

(16) Remove the solenoid return spring from the well of the solenoid housing moving core (See Fig. 23).

(17) Remove the solenoid coil retainer washer and solenoid coil retainer from the solenoid housing (Fig. 28).

(18) Remove the dust cover from the gear housing (Fig. 29).

(19) Release the snap ring that positions the driven gear on the pinion shaft (Fig. 30).

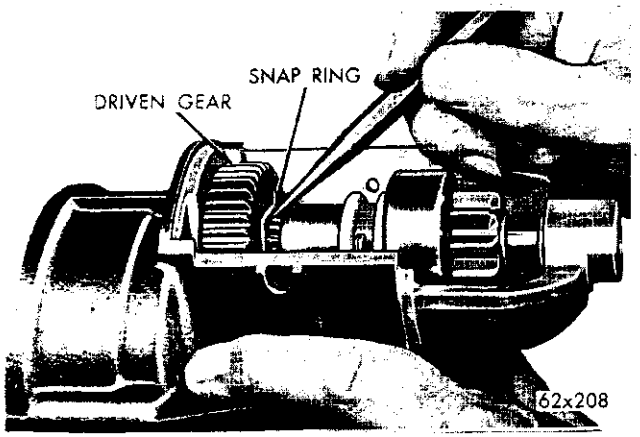

Fig. 30—Removing the Driven Gear Snap Ring

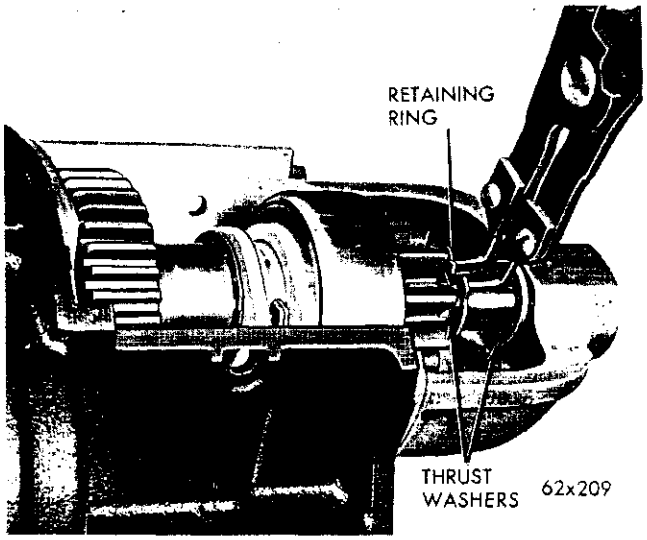

Fig. 31—Removing the Pinion Shaft Retainer Ring

CAUTION

The ring is under tension and a cloth should be placed over the ring to prevent the ring from springing away after removal.

(20) Release the retainer ring at the front of the pinion shaft (Fig. 31).

NOTE: Do not spread the retainer ring any greater than the outside diameter of the pinion shaft otherwise the lock ring can be damaged.

(21) Push the pinion shaft towards the rear of the housing (Fig. 32) and remove the snap ring and thrust washers, clutch and pinion assembly, with the two shifter fork nylon actuators (Fig. 33).

(22) Remove the driven gear and friction washer.

(23) Pull the shifting fork forward and remove the solenoid moving core (Fig. 34).

(24) Remove the shifting fork retainer pin (Fig. 35) and remove the clutch shifting fork assembly.

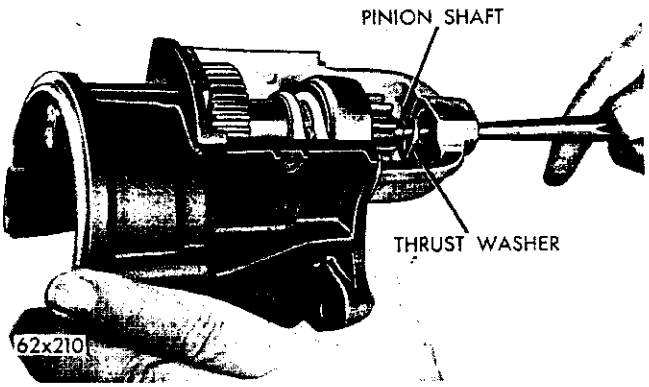

Fig. 32—Removing the Pinion Shaft

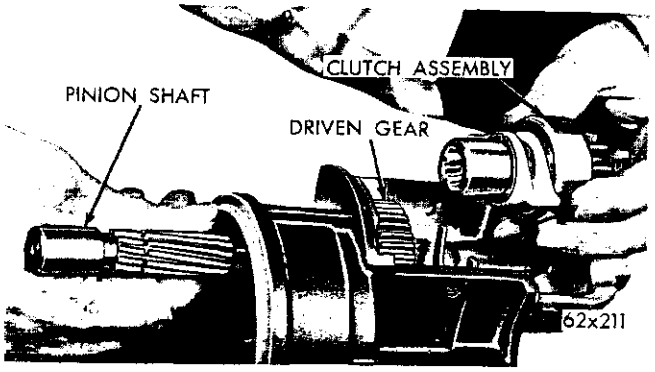

Fig. 33—Removing the Clutch Assembly

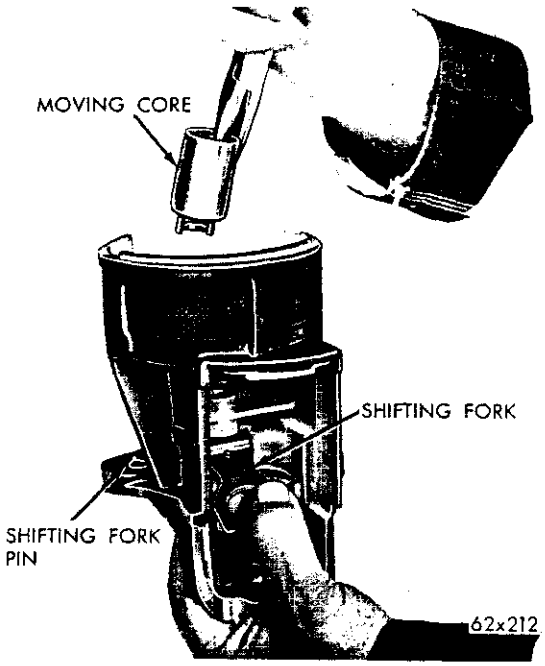

Fig. 34—Removing the Moving Core

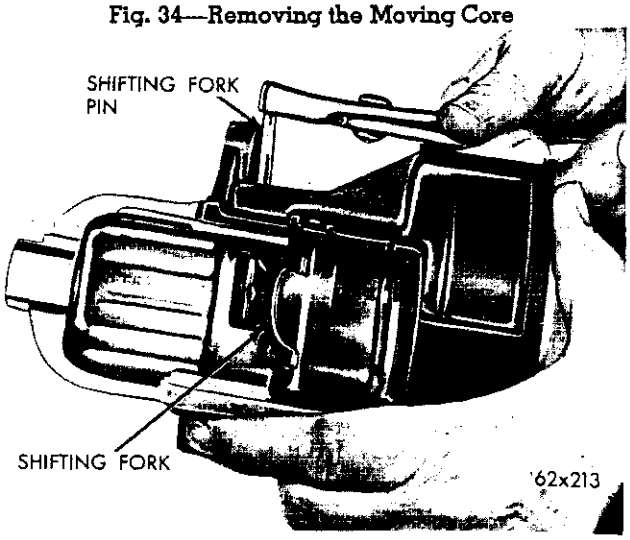

Fig. 35—Removing the Shifting Fork Pin

(25) The gear housing is serviced with the pinion shaft and armature shaft bushings as an assembly.

CLEANING THE STARTER PARTS

(1) Do not immerse the parts in cleaning solvent. Immersing the field frame and coil assembly and/or armature will damage the insulation. Wipe these parts with a clean cloth **only.**

(2) Do not immerse the clutch unit in cleaning solvent. The clutch is pre-lubricated at the factory and solvent will wash the lubrication from the clutch.

(3) The starter clutch outer housing and pinion gear may be cleaned with a cloth moistened with cleaning solvent and wiped dry with a clean dry cloth.

REPLACEMENT OF BRUSHES AND SPRINGS

(1) Brushes that are worn more than ½ the length of the new brushes, or are oil-soaked, should be replaced.

(2) When resoldering the shunt field and solenoid lead, make a strong, low resistance connection using a high temperature solder and resin flux. **Do not use acid nor acid core solder. Do not** break the shunt field wire when removing and installing the brushes.

(3) Measure the brush spring tension with a spring scale hooked under the spring near the end. Pull the scale on a line parallel to the edge of the brush and take a reading just as the spring end leaves the brush. The spring tension should be 32 to 48 ounces. Replace the springs that do not meet specifications.

TESTING THE ARMATURE

a. Testing the Armature for Short Circuit

Place the armature in the growler and hold a thin steel blade parallel to the core and just above it, while slowly rotating the armature in the growler. A shorted armature will cause the blade to vibrate and be attracted to the core. Replace any armature that is shorted.

b. Testing Armature for Ground

Contact the armature shaft and each of the commutator riser bars with a pair of test lamp test prods. If the lamp lights, it indicates a grounded armature. Replace any grounded armature.

c. Testing Commutator Runout, Refacing and Undercutting

Place the armature in pair of "V" blocks and measure the runout with a dial indicator; measure both the shaft and the commutator. A bent shaft requires replacement of the armature. When the commutator runout exceeds .003 inch, the commutator should be refaced and undercut using Tool C-770. Remove only sufficient metal to provide a smooth, even surface.

d. Testing Field Coils for Ground

(1) Remove the field frame assembly from the starter.

(2) Carefully drill out the rivet that attaches the series field coil (ground) lead and shunt field coil lead to the field frame.

(3) Insulate the field coil leads from the field frame.

(4) Test for ground using a 110 volt test lamp. Touch one prod of test lamp to series field coil lead and other prod to the field frame. The lamp should not light. Repeat procedure for the shunt field coil.

If the lamp lights, it indicates that the field coils are grounded and require replacement.

REPLACING THE FIELD COILS

A pole shoe impact screwdriver Tool C-3475 should be used to remove and install the field coils to prevent damage to the pole shoe screws and for proper tightening. The pole shoes that are loose and not properly seated may cause the armature core to rub the pole shoes. This will decrease starter efficiency and damage the armature core.

NOTE: Make sure the area between the leads and the field frame is clean. Peen a new rivet securely to insure a good electrical contact.

SERVICING THE BUSHINGS

Inspect the armature shaft bearing and pinion shaft surfaces and bushings for wear. Try the bushings for wear by placing them on shafts and testing for side play. Replace the commutator end head and bushing assembly if the bushing is worn. Replace the starter gear housing if the bushings are worn.

SERVICING THE STARTER CLUTCH UNIT

Do not immerse the starter clutch unit in a cleaning solvent. The starter clutch is pre-lubricated at the factory and the solvent will wash the lubricant from the clutch.

The starter clutch outer housing and pinion gear may be cleaned with a cloth moistened with cleaning solvent and wiped dry with a clean dry cloth.

Rotate the pinion. The pinion gear should rotate

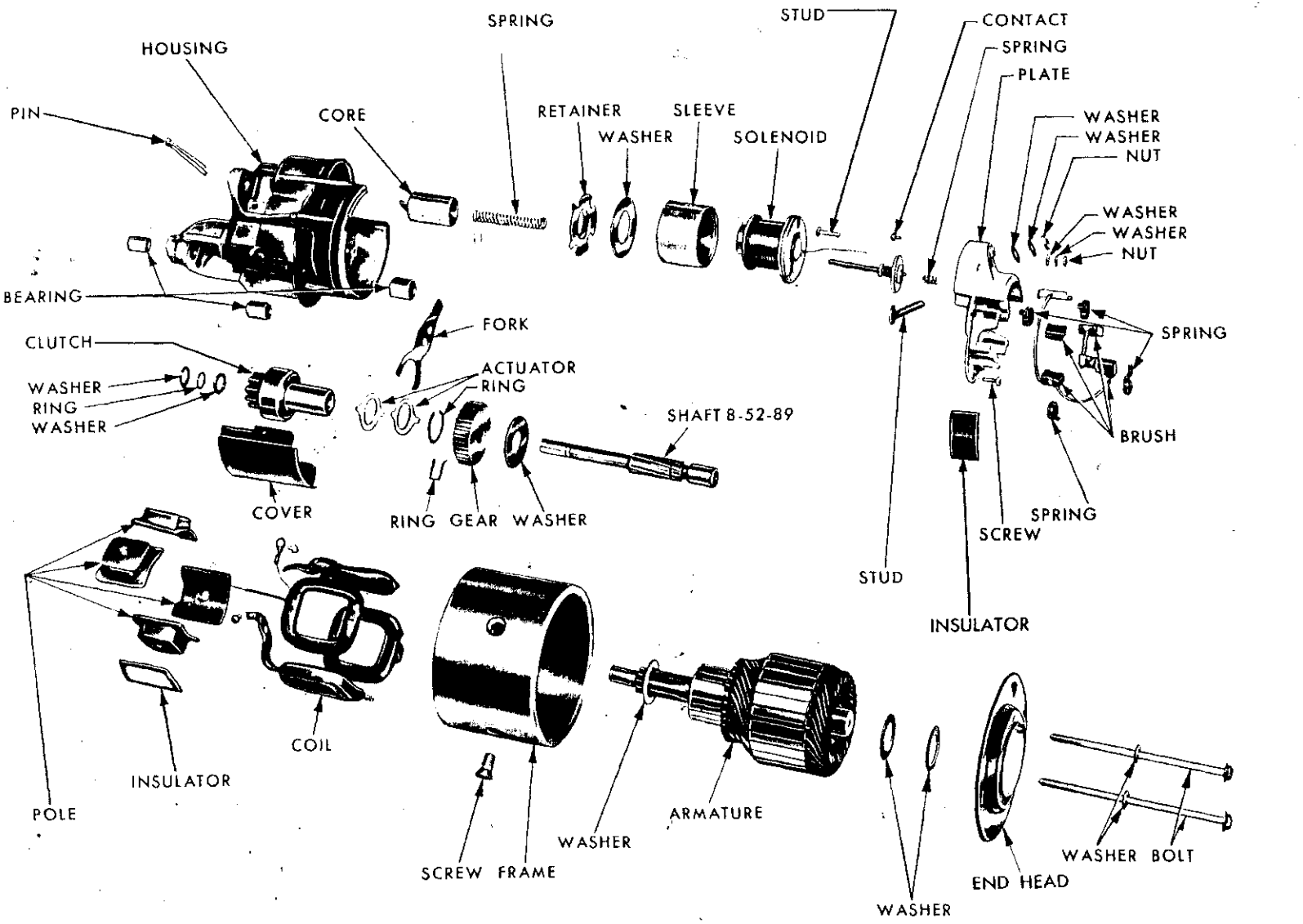

Fig. 36—Starting Motor (Disassembled View)

smoothly in one direction, but should not rotate in the opposite direction. If the starter clutch unit does not function properly, or the pinion is worn, chipped or burred, replace the starter clutch unit.

ASSEMBLY (Fig. 36)

NOTE: The shifter fork consists of two spring steel plates assembled with two rivets (Fig. 37). There should be approximately 1/16 inch side movement, as shown in Figure 37 to insure proper pinion gear engagement. Lubricate between the plates sparingly with SAE 10 engine oil.

(1) Position the shifter fork in the drive housing and install the shifting fork retainer pin (Fig. 35). One tip of pin should be straight, the other tip should be bent at a 15 degree angle away from the housing. Fork and retainer pin should operate freely after bending the tip of pin.

(2) Install the solenoid moving core and engage the shifting fork (Fig. 34).

(3) Enter the pinion shaft into the drive housing, and install the friction washer and driven gear.

(4) Install the clutch and pinion assembly. (Fig. 33), thrust washer, retaining ring and the thrust washer.

(5) Complete the installation of the pinion shaft engaging the shifting fork with the clutch actuators. Figure 38 shows the correct relation of the parts at the assembly.

NOTE: The friction washer must be positioned on the shoulder of the splines of the pinion shaft before the driven gear is positioned.

(6) Install the driven gear snap ring (Fig. 31).

(7) Install the pinion shaft retaining ring (Fig. 31). Make sure the ring fits tightly in the shaft groove.

(8) Install the solenoid coil retainer (Fig. 28) (with tangs down).

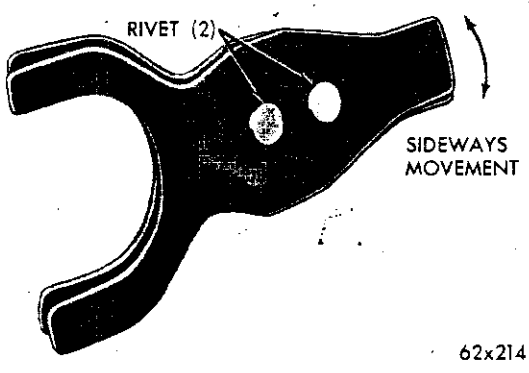

Fig. 37—Shifter Fork Assembly

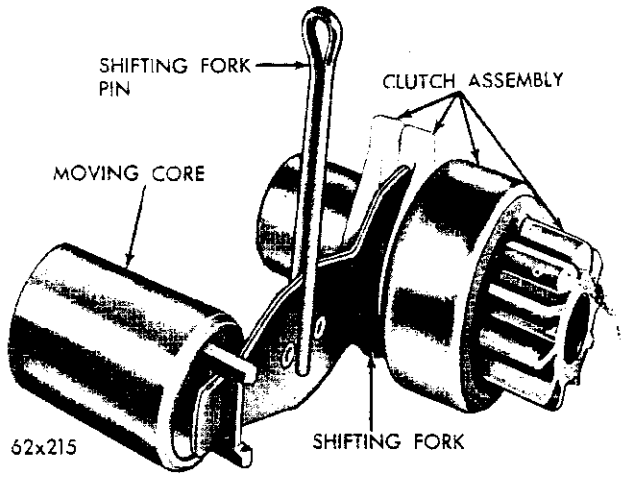

Fig. 38—Shifter Fork and Clutch Arrangement

NOTE: Space the retainer in the housing bore so that the four tangs rest on the ridge in the housing bore and not in the recesses.

(9) Install the solenoid coil retainer washer.

(10) Install the solenoid return spring. (Refer to Fig. 23).

NOTE: Inspect the condition of the starter solenoid switch contacting washer, if the top of washer is burned from arcing, disassemble the contact switch assembly and reverse the washer.

(11) Install the solenoid contact assembly into the solenoid (Fig. 26). Make sure the contact spring is positioned on the solenoid contact assembly.

NOTE: Inspect the condition of the contacts in the brush holder plate. If the contacts are badly burned, replace the brush holder with brushes and contacts as an assembly.

Fig. 39—Installing the Solenoid Coil and Sleeve

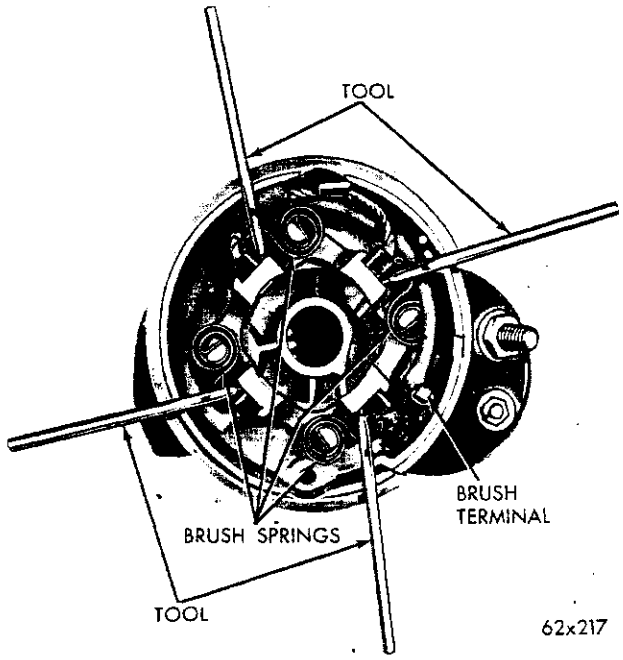

Fig. 40—Positioning the Brushes with Tool Set C-3855

(12) Enter the solenoid lead wire through the hole in the brush holder (Fig. 25) and solenoid stud, insulating washer, flat washer and the nut.

(13) Solder the solenoid lead wire to the solenoid contact terminal (Fig. 24). Wrap the wire securely around the terminal, and solder securely with a high temperature solder and **resin flux.**

(14) Carefully enter the solenoid coil and solenoid coil sleeve into the bore of the gear housing and position the brush plate assembly into the gear housing. (Fig. 39). Align the tongue of the ground terminal with the notch in the brush holder.

(15) After the brush holder is bottomed in the housing, install the attaching screw (Fig. 22). Tighten the screw 10 to 15 inch pounds. Install the flat insulating washer and hold in place with friction tape.

(16) Position the brushes with Tool C-3855, as shown in Figure 40.

(17) Position the field frame to the exact position and resolder the field coil lead (Fig. 21).

(18) Install the brush terminal screw (Fig. 20).

(19) Install the armature thrust washer on the brush holder plate (Fig. 19) and enter the armature into the field frame and gear housing (Fig. 41); carefully engaging the splines of the shaft with the reduction gear.

(20) Remove the brush positioning Tools C-3855 (Fig. 42).

(21) Install the thrust washer (fibre) and washer (steel) on the armature shaft.

(22) Position the starter end head assembly and install the starter frame screws and lockwashers. Tighten the screws securely.

(23) Install the gear housing dust cover. Make sure the dimples on the cover are securely engaged in the holes provided in the gear housing.

STARTING MOTOR INSTALLATION

(1) Before installing the starting motor, make sure the starter and flywheel housing mounting surfaces are free of dirt and oil to insure a good electrical contact.

(2) Position the starter to the flywheel housing removable seal.

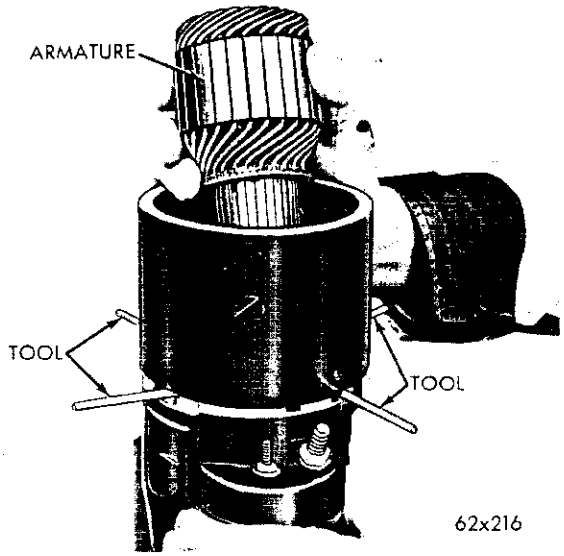

Fig. 41—Installing the Starter Armature

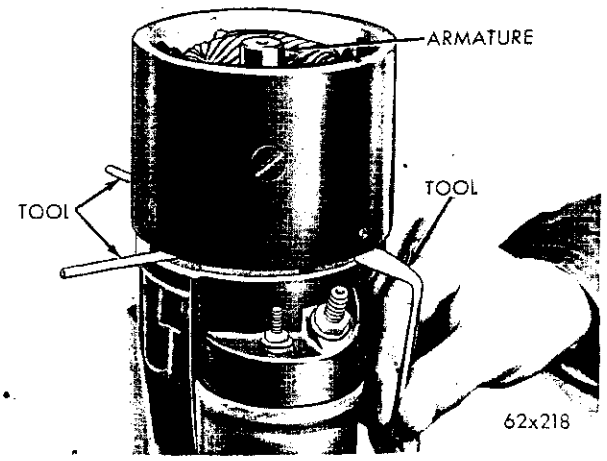

Fig. 42—Removing the Brush Positioning Tools

(3) Install the starting motor, washer and bolt and washer and nut.

NOTE: When tightening the attaching bolt and nut be sure to hold the starting motor moved away from the engine to insure the proper alignment.

(4) Attach the wire at the solenoid switch terminal and cable to the starter terminal.

(5) Connect the battery ground cable and test the operation of the starting motor for proper engine cranking.

ALTERNATOR

The alternator (Fig. 43) is fundamentally an A.C. current generator, with six (6) built-in silicon rectifiers, that convert the A.C. current into D.C. current. D.C. current is available at the "output" "BAT" terminal. A voltage regulator (Fig. 44) is used in the field circuit to limit the output voltage.

The main components of the alternator are the rotor, the stator, the rectifiers, the two end shields and the drive pulley. (See Fig. 45.)

VOLTAGE REGULATOR

The only function of the regulator is to limit the output voltage. The voltage regulator accomplishes this by controlling the flow of current in the rotor field coil, and in effect controls the strength of the rotor magnetic field.

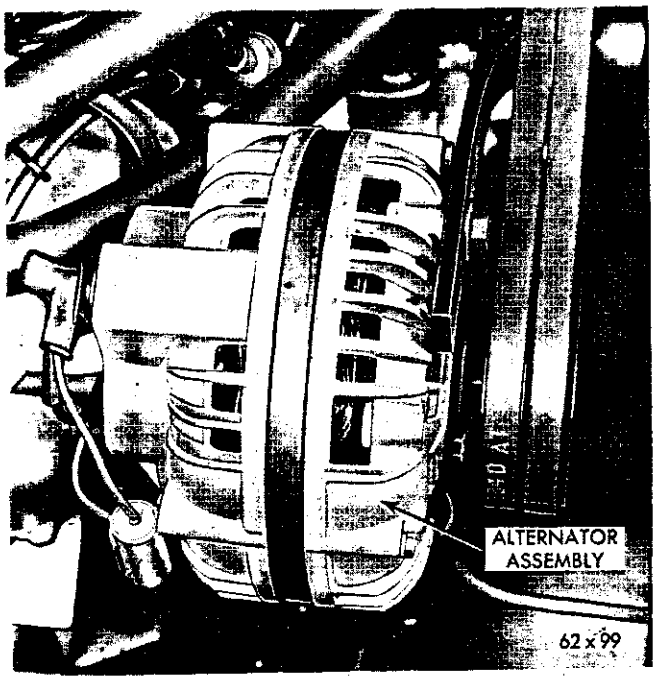

Fig. 43—Alternator Installed

TESTING THE ALTERNATOR SYSTEM (On Vehicle)

a. Charging Circuit Resistance Test

Test the condition of the battery and state of charge. With the battery in good condition and fully charged, proceed with the tests as follows:

(1) Disconnect the lead at the alternator "BAT" terminal. Connect a 0-50 ampere scale D.C. ammeter in series between the "BAT" terminal and "BAT" lead which was disconnected from the terminal (Fig. 46).

(2) Connect the positive lead of a test D.C. voltmeter to the "BAT" lead, and connect the negative voltmeter lead to the battery positive (+) terminal.

(3) Start and operate the engine at a speed to obtain 10 amperes flowing in the circuit. Observe the voltmeter reading. The voltmeter reading should not exceed .2 volt. If a higher voltage drop is indicated, inspect, clean and tighten all the connections in the charging circuit. A voltage drop test may be performed at each connection to locate that connection with excessive resistance.

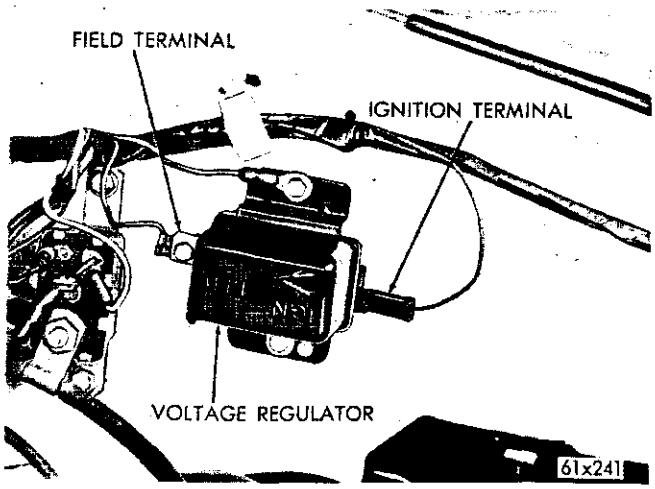

Fig. 44—Voltage Regulator Installed (Typical)

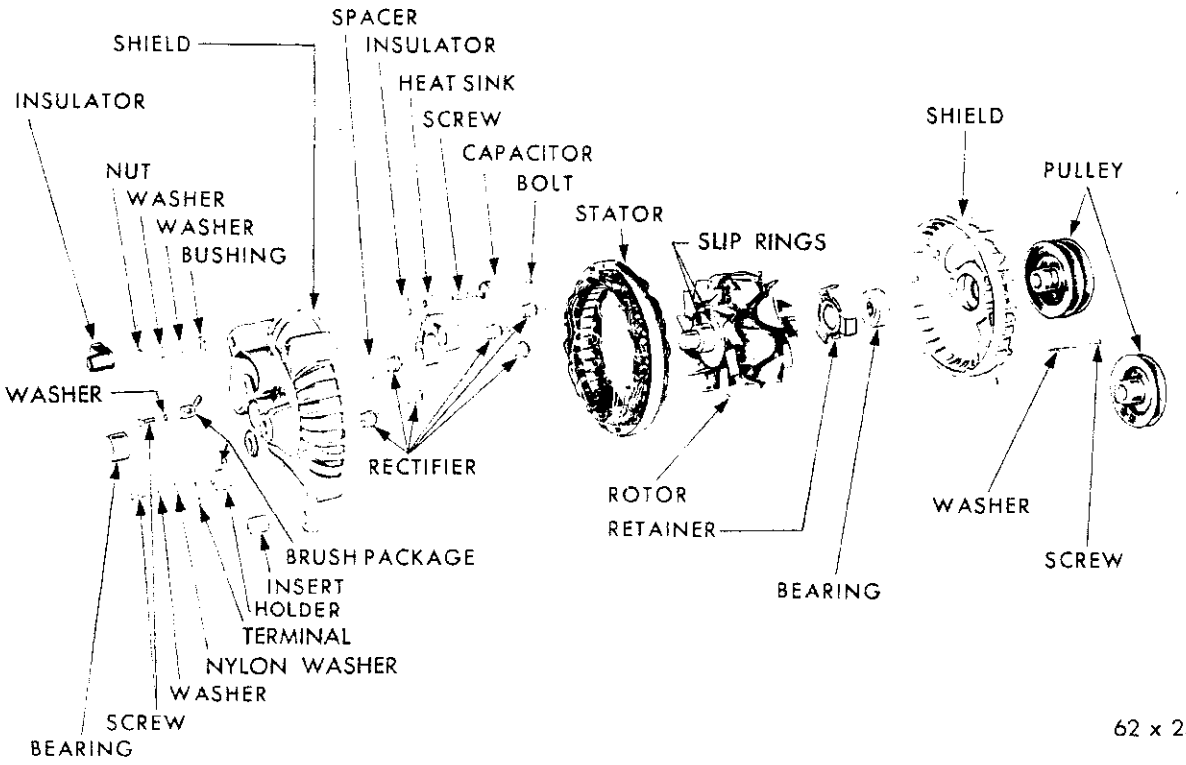

Fig. 45—Alternator (Disassembled View)

(4) Disconnect the test instruments. Connect the "BAT" lead to the alternator "BAT" terminal and tighten securely.

b. Field Circuit Resistance Test (Fig. 47)

(1) Disconnect the ignition wire at the coil side of the ballast resistor and connect a D.C. voltmeter between the voltage regulator "FLD" (field) terminal and battery positive post.

(2) Turn the ignition switch on and turn the voltmeter selector switch to the low voltage scale and read the meter. The votage should not exceed .3

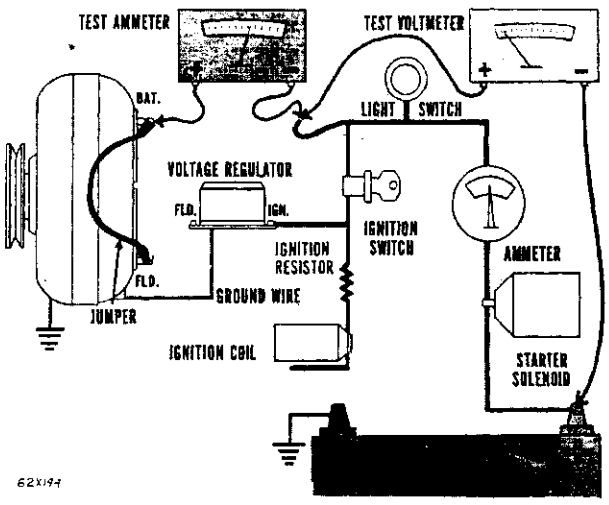

Fig. 46—Charging the Circuit Resistance Test

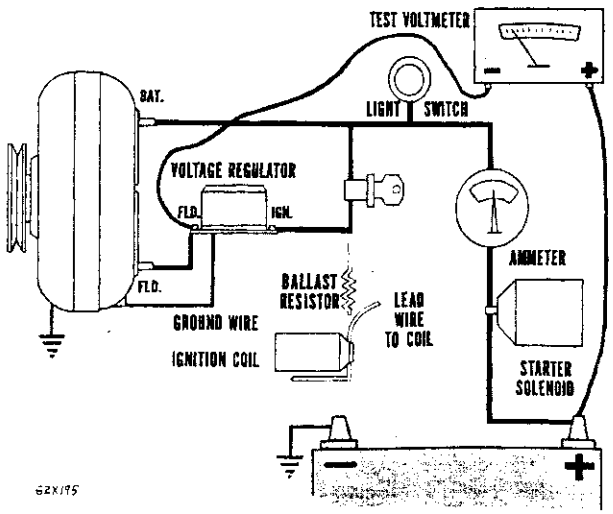

Fig. 47—Field Circuit Resistance Test

volt. A reading in excess of .3 volt indicates high resistance in the field circuit between the battery and the voltage regulator field terminal.

(3) If high resistance is indicated, move the negative voltmeter lead to each connection along the circuit towards the battery. A sudden drop in voltage indicates a loose or corroded connection between that point and the last point tested. To test the terminals for tightness, attempt to move the terminal while observing the voltmeter. Any motion of the meter pointer indicates looseness.

NOTE: Resistance in the regulator wiring circuit will cause flickering headlights and fluctuations in the ammeter.

c. Current Output Test (Fig. 48)

(1) Disconnect the battery ground cable.

(2) Disconnect the "BAT" lead at the alternator output "BAT" terminal.

(3) Connect a 0-50 ampere scale D.C. ammeter in series between the alternator "BAT" terminal and the disconnected "BAT" lead.

(4) Connect the "positive" lead of a test voltmeter to the output "BAT" lead. Connect the "negative" lead of the test voltmeter to ground.

(5) Disconnect the field "FLD" lead at the alternator and at the regulator.

(6) Connect a "jumper" lead from the alternator field "FLD" terminal to the alternator output "BAT" terminal. Be sure the ammeter lead is satisfactorily connected to the output "BAT" terminal.

(7) Connect the engine tachometer. Connect the battery ground cable.

(8) Connect a battery-starter tester (equipped with a variable carbon pile) to the battery terminals.

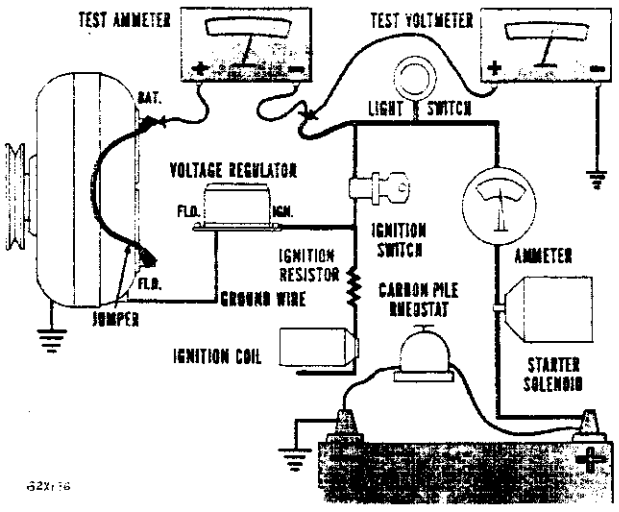

Fig. 48—Current Output Test

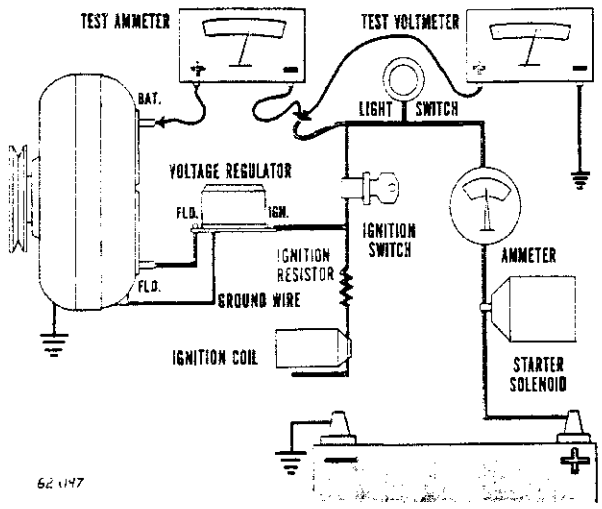

Fig. 49—Voltage Regulator Test

(9) Start and operate the engine at 1250 rpm.

(10) Adjust the "carbon pile" to obtain a reading of 15 volts on the test voltmeter.

(11) Observe the reading on the test ammeter. The current output should be within the limits shown in the specifications.

If the output is slightly less (5 to 7 amperes) than that specified above, it may be an indication of possible "open" rectifier or other alternator internal problem. If the output is considerably lower than that specified above, it may be an indication of a possible "shorted" rectifier or other alternator internal problem. In either case the alternator should be removed and tested on the bench before disassembly.

d. Voltage Regulator Test (on the Vehicle—Engine at Normal Operating Temperature (Fig. 49)

(1) If the alternator current output tested satisfactorily; turn off the ignition switch and remove the jumper lead from the alternator "field" terminal and "output" terminal. Connect the field lead at the alternator field "FLD" terminal and regulator field "FLD" terminal. The test ammeter and test voltmeter leads remain connected as for the current output test.

NOTE: If the field circuit is grounded on the field terminal side of the regulator circuit when removing or installing the lead, while the ignition is ON, the fuse wire in the regulator circuit will be blown and the regulator may be damaged.

(2) Start and operate the engine at 1250 rpm. Turn on the lights and electrical accessories to obtain a 15 ampere output as registered on the test ammeter. Operate the engine at this speed and load for 15 minutes to make sure the entire regulator system is stabilized.

(3) Measure the temperature at the regulator by holding a reliable thermometer two (2) inches from the regulator.

(4) Turn off the lights and other electrical load. Turn on the instrument panel lights. Read the test voltmeter. With a fully charged battery and 15 amperes flowing in the circuit, the voltmeter reading should be within specifications.

NOTE: No current reading on the test ammeter would indicate a blown fuse wire inside the voltage regulator between the upper stationary contact and the "IGN" terminal. Correct the cause and replace the fusible wire.

(5) Increase engine speed to 2200 rpm. Turn off all lights and/or accessories. Voltage should **increase** and amperage should **decrease.**

NOTE: There will be a slightly higher voltage at higher engine speeds above 2200 rpm, however, this increased voltage must not exceed the voltage specified by more than .7 volt at any temperature range. If the voltage reading is less than .2 volt from readings in Step (4), test the battery specific gravity to be sure battery is fully charged.

(6) If the regulator setting is outside the limits shown, the regulator must be removed to remove the cover. To adjust the voltage setting, bend the regulator lower spring hanger **down** to **increase** voltage setting, or **up** to **decrease** voltage setting. Use an insulated tool to bend the spring hanger. (See Fig. 50). The regulator must be installed, correctly connected, and retested after each adjustment of the lower spring hanger.

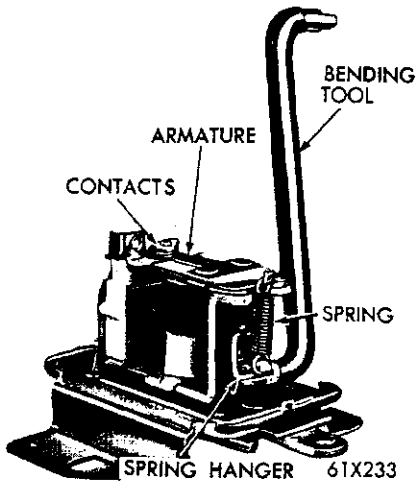

Fig. 50—Adjusting the Spring Tension

NOTE: If repeated readjustment is required, it is permissible to use a jumper wire to ground the regulator base to the fender splash shield for testing, in lieu of reinstalling the regulator each time. However, it is important that the regulator cover be reinstalled, the regulator connections correctly connected, and the regulator satisfactorily insulated by the fender cover to prevent grounding the regulator terminals or resistances. When testing, the regulator must be at the same attitude (or angle) as when installed on the vehicle.

(4) If the alternator and regulator tested satisfactorily, turn the ignition switch "OFF". Disconnect the battery ground cable. Disconnect the test instruments. Correctly connect the leads at the alternator and regulator. Connect the battery ground cable.

CAUTION

Be sure the negative post of the battery is always connected to ground. Incorrect battery polarity may result in wiring harness damage and may damage the alternator rectifiers. Do not ground the alternator field circuit, as this may damage the regulator.

SERVICE PROCEDURES

REGULATOR

Regulator Mechanical Adjustments

If the regulator cannot be satisfactorily adjusted for voltage control, or if the regulator performance is erratic or malfunctions, it may be necessary to adjust the regulator air gap and contact point gap.

(1) Remove the regulator from the vehicle. Remove the regulator cover.

(2) Insert a .048 inch wire gauge between the regulator armature and the core, next to the stop pin on the spring hanger side (Fig. 51).

(3) Press down on the armature (not the contact spring) until it contacts the wire gauge. The

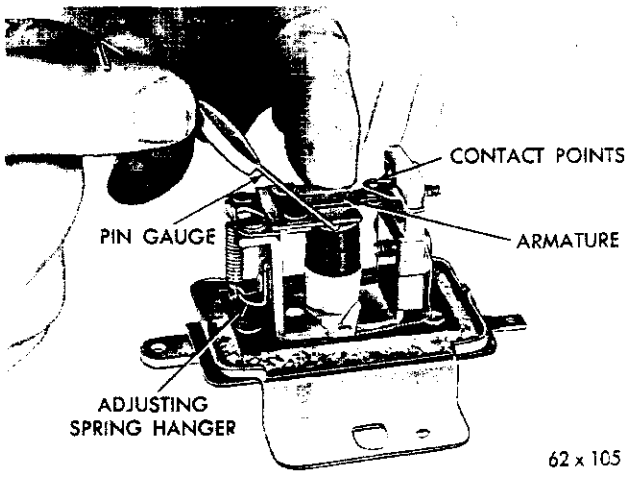

Fig. 51—Testing the Air Gap

upper contacts should just "open".

NOTE: A 12 volt battery and test light connected in series to the "IGN" and "FLD" terminals may be used to accurately determine the contact opening. When the contacts open, the test light will go "dim".

(4) Insert a .052 inch wire gauge between the armature and the core, next to the stop pin on the spring hanger side.

(5) Press down the armature until it contacts the wire gauge. The contacts should remain "closed", and the test light should remain "bright".

(6) If adjustment is required, adjust the air gap by loosening the screw and moving the stationary contact bracket; make sure the air gap is measured with attaching screw fully tightened. Remeasure the air gap as described in steps (2), (3), (4) and (5.)

(7) Remove the wire gauge from under the armature. Measure the lower contact gap with a feeler gauge. The lower contact gap should be .015 inch (plus or minus .001"). Adjust the lower contact gap by bending the lower stationary contact bracket.

(8) Install the regulator cover. Install the regulator. The electrical adjustment must be performed on the vehicle after installation of the regulator.

ALTERNATOR

Removal

If the alternator performance does not meet current output specification limits, it will have to be removed and disassembled for further test and servicing.

(1) Disconnect the battery ground cable.

(2) Disconnect the alternator output "BAT" and field "FLD" leads and disconnect the ground wire.

(3) Remove the alternator from the vehicle.

BENCH TESTS

a. Field Coil Draw

If the alternator field coil draw has not been tested on the vehicle it may be tested on the test bench as follows:

(1) Connect one lead of a test ammeter to one terminal of a fully charged battery. Connect a jumper wire to the other terminal of the battery, and ground it to the alternator end shield. Connect the other ammeter lead to the field terminal of the alternator.

(2) Slowly rotate the alternator rotor by hand. Observe the ammeter reading. The field coil draw should be 2.3 amperes to 2.7 amperes at 12 volts.

NOTE: A low rotor coil draw is an indication of high resistance in the field coil circuit, (brushes, slip rings, or rotor coil). A higher rotor coil draw indicates a possible shorted coil or a grounded rotor.

b. Testing Alternator Internal Field Circuit for a Ground

(1) To test the internal field circuit for a ground, remove the ground brush. Touch one test prod from a 110 volt test lamp to the alternator insulated brush terminal and the remaining test prod to the end shield. If the rotor assembly or insulated brush is not grounded, the lamp will not light.

(2) If the lamp lights, remove the insulated brush assembly (noting how the parts are assembled) and separate the end shields by removing the three thru bolts.

(3) Again test by placing one of the test prods to a slip ring and the remaining test prod to the end shield. If the lamp lights, the rotor assembly is grounded and requires replacement. If the lamp does not light after removing the insulated brush and separating the end shields, the cause of the ground at the first ground test was that the insulated brush is grounded.

(4) Examine the plastic insulator and the screw. The screw is a special size and must not be substituted by another size.

(5) Install the insulated brush holder, terminal, insulated washer, shake proof washer and screw. If the parts were not assembled in this order or if the wrong screw was used this could be the cause of the ground condition.

c. Disassembly

To prevent possible damage to the brush assemblies, they should be removed before proceeding with the disassembly of the alternator. The insulated brush is mounted in a plastic holder that positions the brush vertically against one of the slip rings.

(1) Remove the retaining screw lockwasher, insulated washer, and field terminal, and carefully

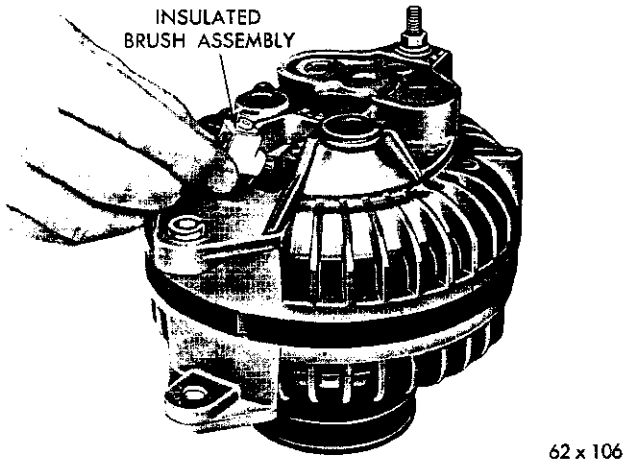

Fig. 52—Removing the Insulated Brush

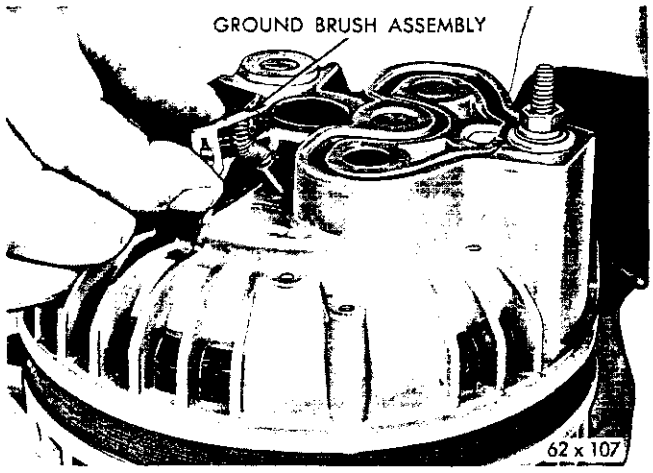

Fig. 53—Removing the Ground Brush

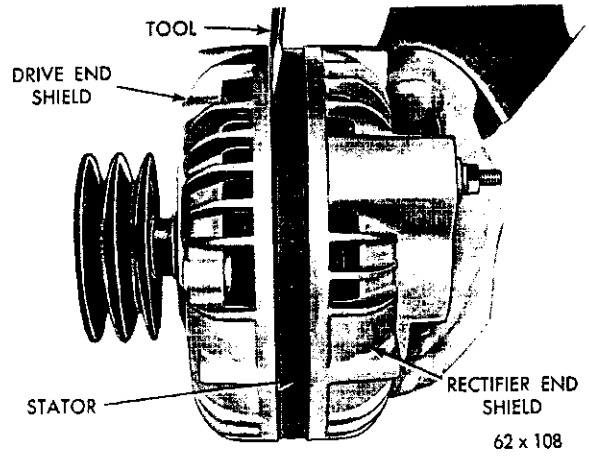

Fig. 54—Separating the Drive End Shield from the Stator

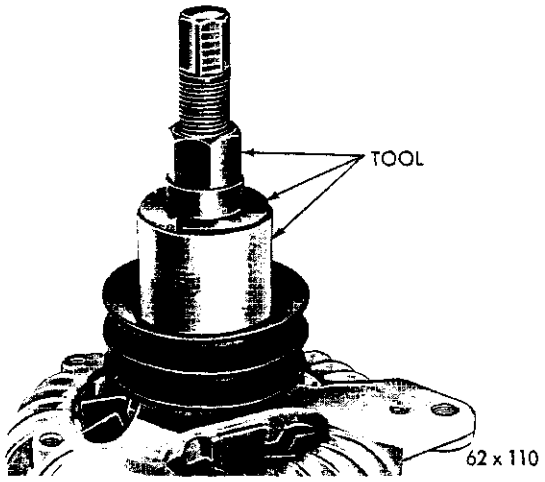

Fig. 55—Removing the Pulley

lift the plastic holder containing the spring and brush assembly from the end housing (Fig. 52).

(2) The ground brush is positioned horizontally against the remaining slip ring and is retained in a holder that is integral with the end shield. Remove the retaining screw and lift the clip, spring and brush assembly from the end shield (Fig. 53).

CAUTION

The stator is laminated, do not burr stator or the end shield.

(3) Remove the through bolts and pry between the stator and drive end shield with the blade of a screwdriver (Fig. 54). Carefully separate the drive end shield, pulley and rotor assembly away from the stator and the rectifier shield assembly.

(4) The pulley is an interference fit on the rotor shaft. Remove the pulley with puller Tool C-3615 and special adaptor SP-3002 (Fig. 55).

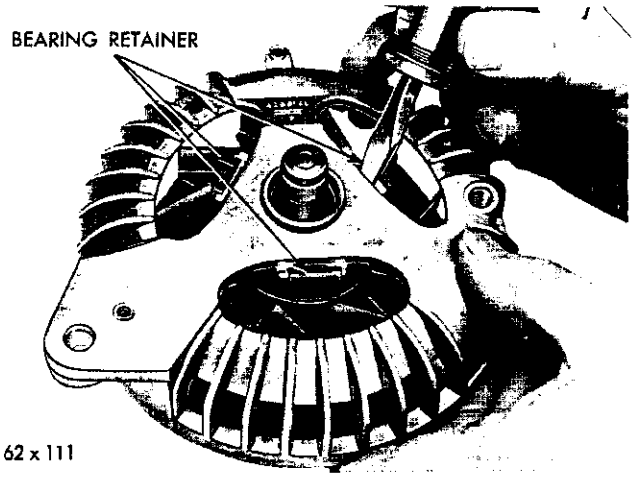

Fig. 56—Disengaging the Bearing Retainer from the End Shield

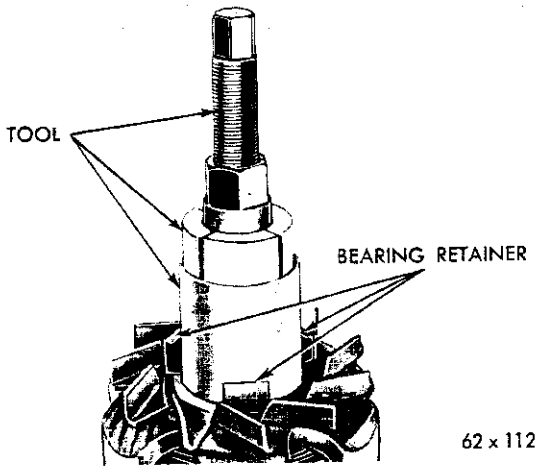

Fig. 57—Removing the Bearing from the Rotor Shaft

(5) Pry the drive end bearing spring retainer from the end shield with a screwdriver (Fig. 56).

(6) Support the end shield and tap the rotor shaft with a plastic hammer to separate the rotor from the end shield.

If the drive end bearing is to be replaced, always use the new bearing Part Number 2095653.

NOTE: The new bearing is lubricated with a predetermined amount of special lubricant and does not require additional lubrication.

(7) The drive end ball bearing is an interference fit with the rotor shaft. Remove the bearing with puller Tool C-3615 and adapter as follows:

(a) Position the center screw of Tool C-3615 on the rotor shaft.

(b) Place the thin lower end of the adapters SP-3375 under the bearing equally spaced and the upper end of the adapters around the center screw.

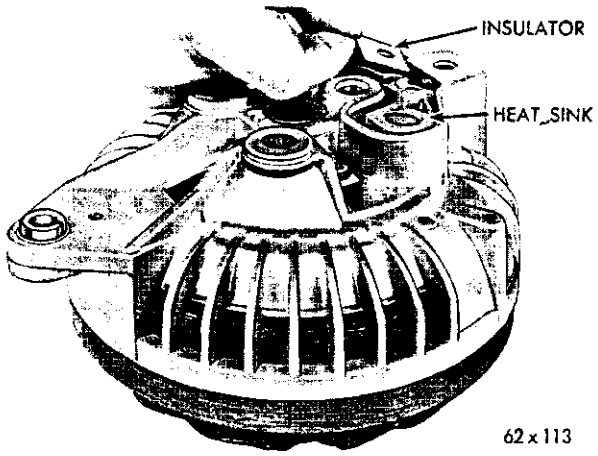

Fig. 58—Removing the Heat Sink Insulator

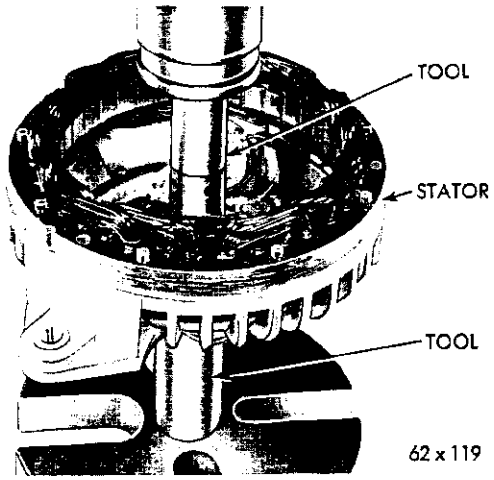

Fig. 59—Removing the Rectifier End Shield Bearing

(c) Hold the adapters and center screw in position with the tool sleeve.

CAUTION

Tool sleeve must bottom on bearing, otherwise, the adapters may be damaged.

(d) Turning the center screw while holding the outer body of tool (Fig. 57) will withdraw the bearing from the rotor shaft.

NOTE: No further disassembly of the rotor is required, as the balance of the rotor assembly is not serviced separately.

(8) Remove the D.C. output terminal nuts and washers and remove the terminal screw and inside capacitor (on units so equipped).

NOTE: The heat sink is also held in place by the terminal screw.

(9) Remove the insulator (Fig. 58).

(10) The needle roller bearing in the rectifier end shield is a press fit. If it is necessary to remove the rectifier end frame needle bearing, protect the end shield by supporting the shield with Tool SP-3383 when pressing the bearing out with Tool C-3770 (Fig. 59).

NOTE: The new bearing is prelubricated and no additional lubricant should be added, as an excessive amount of lubricant will contaminate the slip rings and cause premature brush and rotor failures.

TESTING THE RECTIFIERS WITH TOOL C-3829

The new Rectifier Tester Tool C-3829 provides a quick, simple and accurate method to test the alternator rectifiers without the necessity of disconnecting the soldered rectifier leads. With the alternator rectifier and end shield separated from the drive end housing proceed with rectifier tests as follows:

Positive Case Rectifier Test (Fig. 60)

(a) Place the alternator on an insulated surface. Connect the test lead clip to the alternator ("BAT"). output terminal.

(b) Plug in the Tool C-3829 power source lead into a 110 volt A.C. power supply. Touch the exposed bare metal connections, of each of the positive case rectifiers, with the test prod.

CAUTION

Do not break the sealing around the rectifier lead wire, or on the inner end of the rectifier. The sealing material is for protection against corrosion. Always touch the test prod to the exposed metal connection nearest the rectifier.

The reading for satisfactory rectifiers will be 1¾ amperes or more. The reading should be approximately the same for the three rectifiers.

When two rectifiers are good and one is shorted, the reading taken at the good rectifiers will be low, and the reading at the shorted rectifier will be zero. Disconnect the lead to the rectifier reading zero and retest. The reading of the good rectifiers will now be within the satisfactory range.

When one rectifier is open it will read approximately one ampere, and the two good rectifiers will read within the satisfactory range.

Negative Case Rectifier Test (Fig. 61)

(a) Connect the test lead clip to the rectifier end housing.

(b) Touch the exposed connection of each of the negative case rectifiers with the test prod.

The test specifications are the same, and the test results will be approximately the same as for the positive case rectifiers, except the meter will read on the opposite side of the scale.

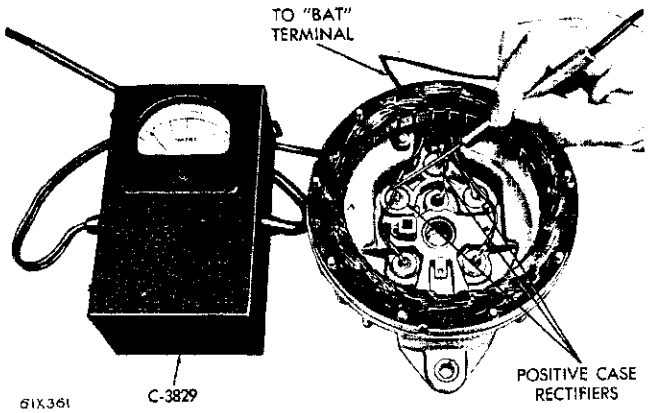

Fig. 60—Testing the Positive Rectifiers

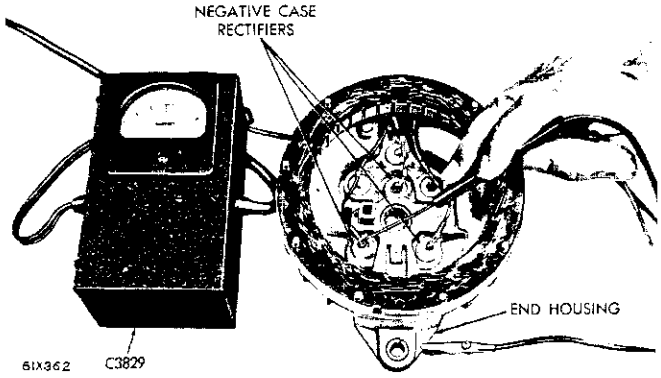

Fig. 61—Testing the Negative

TESTING THE RECTIFIERS AND STATOR (WITHOUT TOOL C-3829)

(a) Separate the three (3) stator leads at the "Y" connection. (See Fig. 62).

NOTE: Cut the stator connections as close to the connector as possible because they will have to be soldered together again. If they are cut too short it may be difficult to get them together again for soldering.

(b) Test the rectifiers with a 12 volt battery and a test lamp equipped with a number 67 bulb (4 candle power) by connecting one side of test lamp to the positive battery post; the other side of the test lamp to a test probe with the other test probe connected to the negative battery post.

(c) Contact the outer case of the rectifier with one probe and the other probe to the wire in the center of the rectifier. (See Fig. 63.)

(d) Reverse the probes, moving the probe from

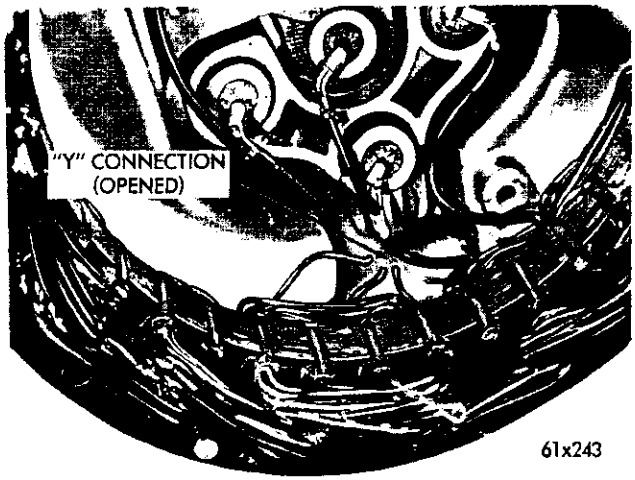

Fig. 62—Separating the Three Stator Leads (Typical)

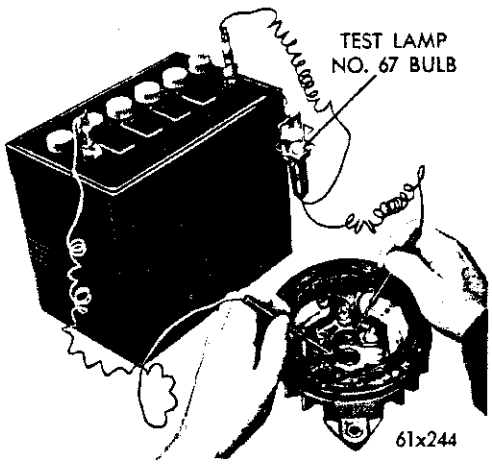

Fig. 63—Testing the Rectifiers with a Test Lamp (Typical)

the rectifier outer case to the rectifier wire, and the probe from the rectifier wire to the rectifier outer case.

If the test lamp "lights" in one direction but does "not light" in the other direction, the rectifier is satisfactory. If lamp lights in "both directions", the **rectifier** is "shorted". If the test lamp does "not light" in either direction, the rectifier is "open".

NOTE: The usual cause of an open or a blown rectifier is a faulty capacitor or a battery that has been installed in reverse polarity. If the battery is installed properly and the rectifiers are open, test the capacitor capacity — .158 microfarad (minimum).

(e) Disconnect the rectifiers from the stator leads.

(f) Test the stator for grounds using a 110 volt test lamp (Fig. 64). Use wood slats to insulate the stator from the rectifier shield. Contact one prod of the test lamp to the stator pole frame, and contact the other prod to each of the three stator leads. The test lamp should "not light". If the test lamp lights, the stator windings are "grounded".

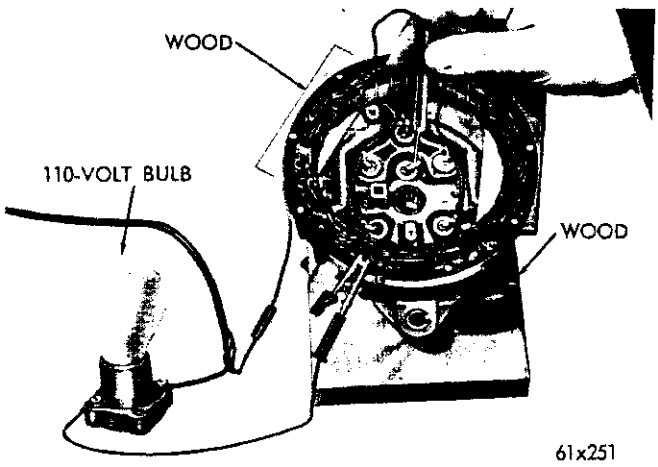

Fig. 64—Testing the Stator for Grounds (Typical)

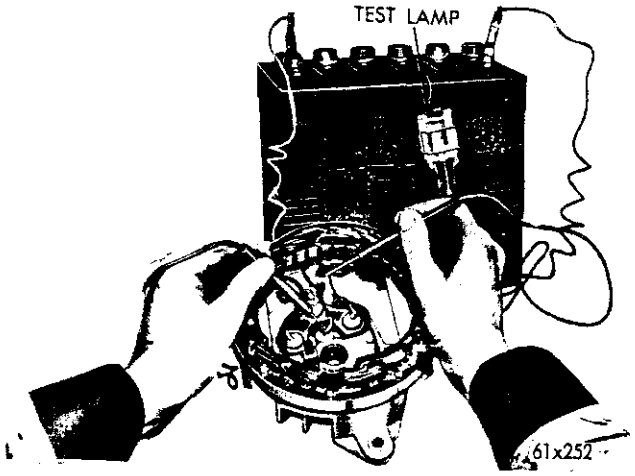

Fig. 65—Testing the Stator Windings for Continuity (Typical)

(g) Test the stator winding for continuity, by contacting one prod of the test lamp to **all** three stator leads at the "Y" connection. Contact each of the three stator leads (disconnected from the rectifiers). The test lamp should "light" when the prod contacts each of the three leads. If the test lamp does not light the stator winding is "open". (See Fig. 65).

(h) Install a new stator if the one tested is "grounded" or "open". If the rectifiers must be replaced unsolder the rectifier wire at the soldered joint.

NOTE: Three rectifiers are pressed into the heat sink and three in the end shield. When removing the rectifiers, it is necessary to support the end shield and/or heat sink to prevent damage to these castings.

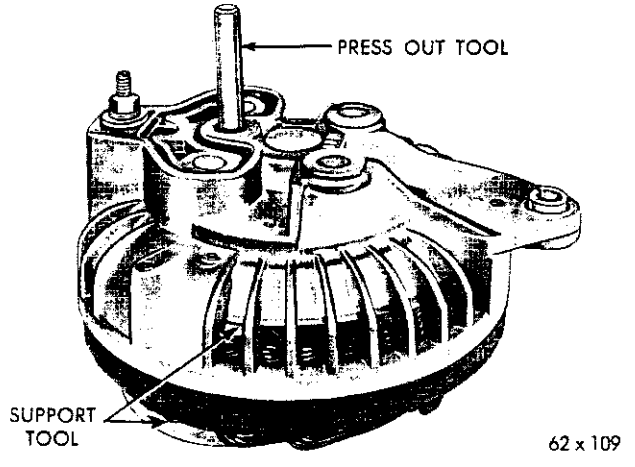

Fig. 66—Removing the Rectifier

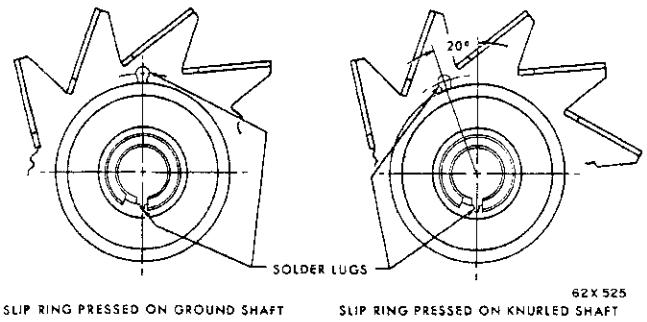

Fig. 67—Slip Ring Solder Lugs

(i) Support the rectifier shield on Tool C-3771 welded to a support plate.

NOTE: This tool is cut-away and slotted to fit over the wires and around the bosses in the shield. Make sure that the bore of the tool completely surrounds the rectifier, then press the rectifier out of the shield using a suitable press out tool Fig. 66.

REPLACING SLIP RINGS

Slip rings that are damaged can be replaced as follows:

(1) Unsolder the field coil leads at the solder lugs (Fig. 67).

(2) Cut through the copper of both slip rings at opposite points (180° apart) with a chisel (Fig. 68).

(3) Break the insulator and remove the old ring.

(4) Clean away dirt and particles of the old slip ring from the rotor.

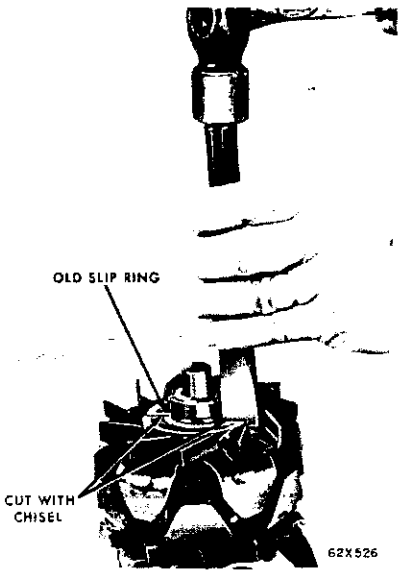

Fig. 68—Cutting the Old Slip Rings

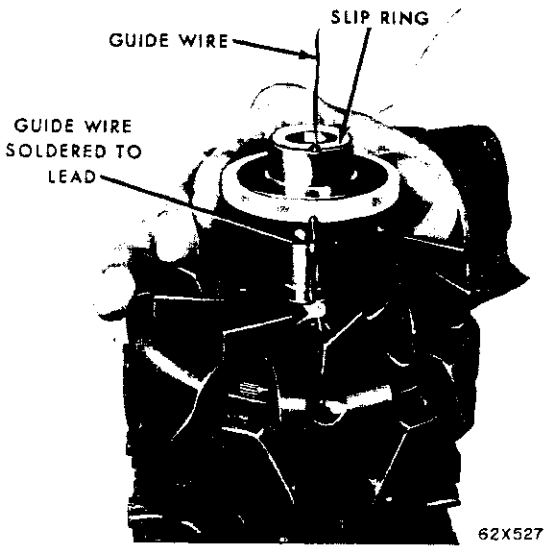

Fig. 69—Aligning the Slip Ring with the Field Wire Guide Wire

(5) Scrape the ends of the field coil lead wires clean for good electrical contact.

(6) Scrape one end (about $\frac{3}{16}$ inch) of a piece of bare wire (approx. 18 gauge) three inches long (to be used as a guide wire).

(7) Tin the scraped area of the guide wire with resin core solder. Lap the tinned end of the wire over the field coil lead to the insulated ring and solder the two together.

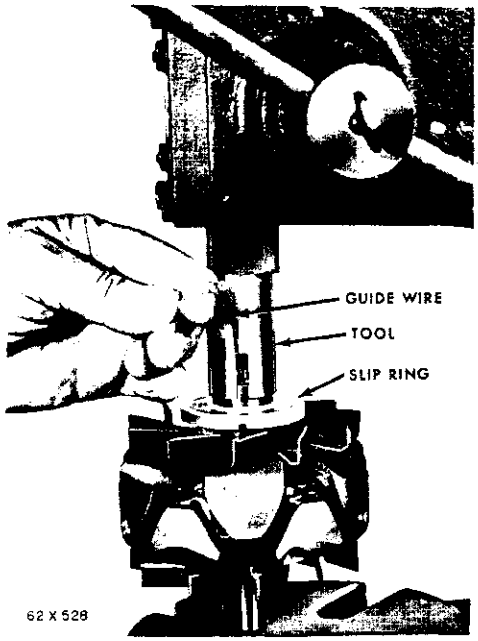

Fig. 70—Installing the Slip Ring

(8) Position the new slip ring carefully over the guide wire and the rotor shaft so the wire will lay in the slip ring groove (Fig. 69). The groove in the slip ring must be in line with the insulated brush field lead to provide room for the lead without damaging it.

(9) Place installing Tool C-3900 over the rotor shaft with the guide wire protruding from the slot in the tool.

(10) Position the rotor, slip ring and tool assembly in an arbor press (Fig. 70). Pull upon the guide wire being careful to guide the insulated field lead into the slip ring groove. While guiding the insulated field lead through the groove, press the slip ring on the shaft. When the slip ring is bottomed on the rotor fan the end of the field lead should be visible at the solder lug (Fig. 71).

(11) Unsolder the guide wire from the insulated brush slip ring lead. Press the field lead into the solder lug and solder to lug with resin core solder.

CAUTION

Do not use acid core solder. A short circuit may result and corrosion will definitely occur.

(12) Coil the ground brush ring field lead around the solder lug (Fig. 71) and solder with resin core solder.

(13) Test the slip rings for ground with a 110 volt test lamp by touching one test lead prod to the rotor pole shoe and the remaining prod to the slip rings. The test lamp should not light. If the lamp lights,

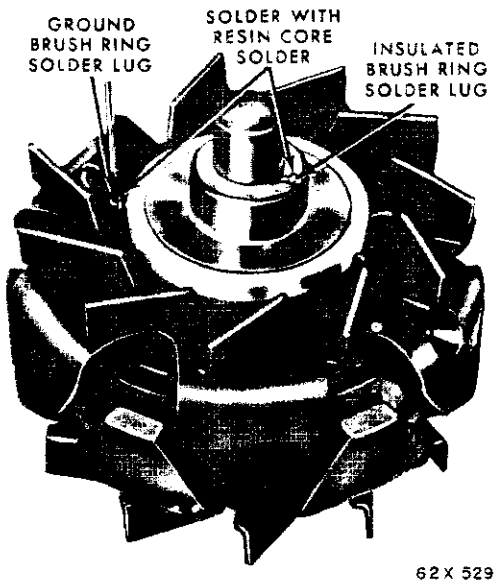

Fig. 71—Solder Points—Slip Ring Installed

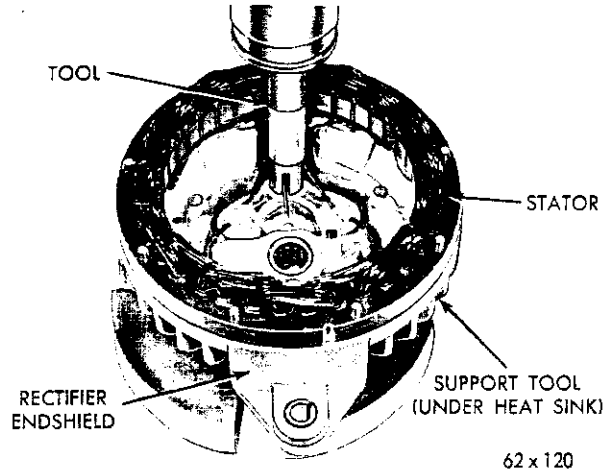

Fig. 72—Installing a Rectifier

the slip rings are shorted to the ground, possibly due to a grounding insulated field lead when installing the slip ring.

If the rotor is not grounded, lightly clean the slip ring surfaces with -00- sand paper and assemble the alternator.

Assembly

(1) Support the heat sink or rectifier end shield on the circular plate Tool SP-3377.

NOTE: Remove the output terminal nuts before installing new rectifiers.

(2) Note the rectifier identification to make sure the correct rectifier is being installed. Refer to the Parts List for the rectifier identification.

(3) Start the new rectifier into the casting squarely and press the rectifier into the casting with Tool C-3772 (Fig. 72).

CAUTION

The outer counterbore of the installing Tool C-3772 must clear the outside diameter of the rectifier (diode) and the .515 inch inner counterbore of the tool must clear the plastic dome (units so equipped) to insure that all pressing force is applied on the outside rim of the rectifier. Do Not Use a hammer to start the rectifier into its bore in the end shield. Use an arbor press and Tool C-3772 to install the rectifier.

DO NOT HAMMER OR SHOCK the rectifier in any manner as this will fracture the thin silicon wafer in the rectifier causing complete rectifier failure.

(4) Solder the wire lead to the wires disconnected at removal. Hold the wire lead with pliers (Fig. 73) while soldering it. This will help to dissipate heat,

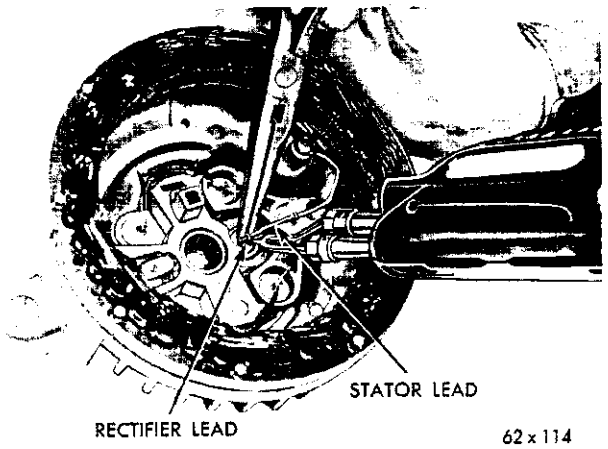

Fig. 73—Soldering the Rectifier and Stator Leads

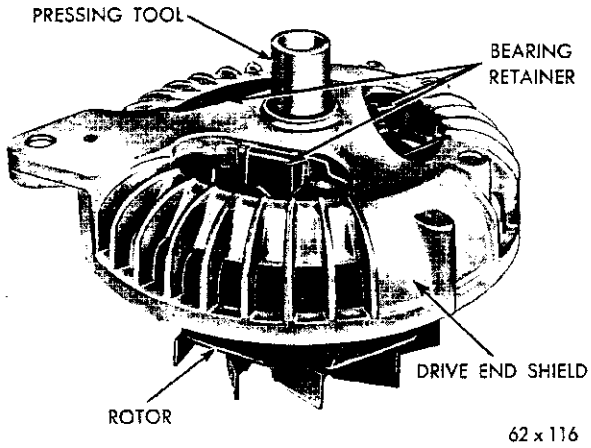

Fig. 75—Installing the Drive End Shield and Bearing

protecting the rectifier.

(5) Support the end shield on Tool SP-3383 so that the notch in support tool will clear the raised section of the heat sink and press the bearing into position with Tool SP-3381 (Fig. 74).

NOTE: New bearings are pre-lubricated, additional lubrication is not required.

(6) Insert the drive end bearing in the drive end shield with the shielded side of bearing toward the rotor and install the bearing retainer plate to hold the bearing in place.

(7) Position the bearing and drive end shield on the rotor shaft and, while supporting the base of the rotor shaft, press the bearing and shield into position on the rotor shaft with the arbor press and Tool C-3769 (Fig. 75).

CAUTION

Make sure that the bearing is installed squarely at installation; otherwise, damage to the bearing will result. Press the bearing on the rotor shaft until the bearing contacts the shoulder on the rotor shaft.

(8) Install the pulley on the rotor shaft. The shaft of the rotor must be supported in a manner so that all pressing force is on the pulley hub and rotor shaft (Fig. 76).

NOTE: Do not exceed 6800 pounds pressure. Press the pully on the rotor shaft until the pulley contacts the inner race of the drive end bearing.

(9) The alternators have the capacitor mounted internally. Make sure the heat sink insulator is in place.

(10) Install the output terminal screw with the capacitor attached through the heat sink and end shield (Fig. 77).

(11) Install the insulating washers, lockwashers and lock nuts.

(12) Make sure the heat sink and insulator are

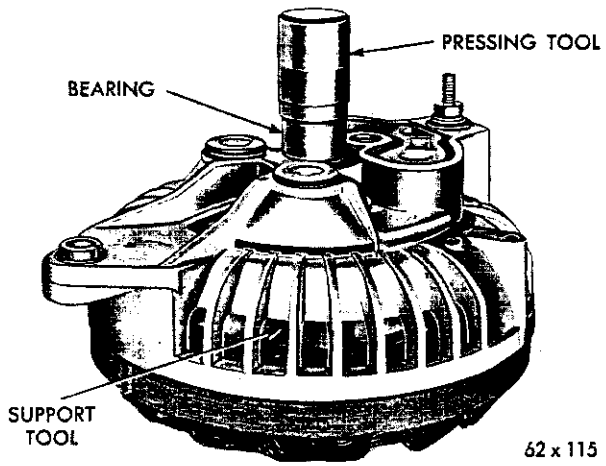

Fig. 74—Installing the Rectifier End Shield Bearings

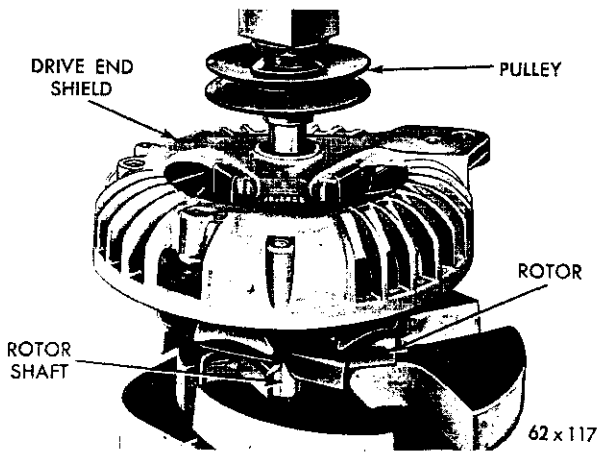

Fig. 76—Installing the Alternator Pulley

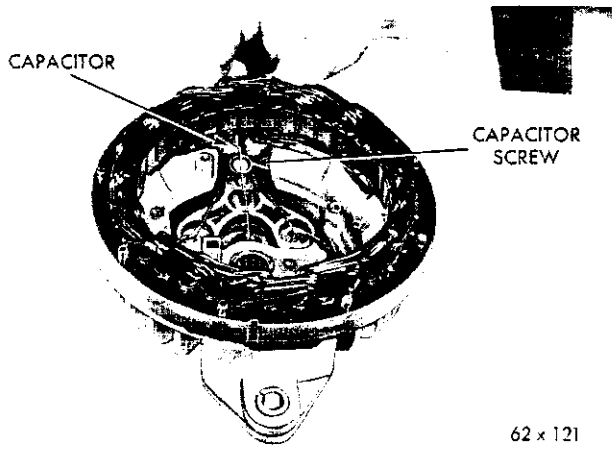

Fig. 77—Installing the Inside Capacitor

in position and tighten the lock nut.

(13) Position the stator on the rectifier end shield.

(14) Position the rotor end shield assembly on the stator and rectifier end shield. Align the through bolt holes in the stator, rectifier end shield and drive end shield.

(15) Compress the stator and both end shields by hand and install the through bolts, washers and nuts.

(16) Install the insulated brush in the rectifier end. Place the bronze terminal on the plastic holder with the tab of the terminal in the recess in the plastic holder.

(17) Place the nylon washer on the bronze terminal and install the lockwasher and attaching screws.

(18) Install the ground brush and attaching screw.

(19) Rotate the pulley slowly by hand to be sure that the rotor fans do not hit the rectifiers, capacitor lead, and stator connections.

(20) Install the alternator and adjust the drive belt according to the instructions in "ACCESSORY BELT DRIVE" Group 7A of this Service Manual.

(21) Connect the output "BAT" and the field "FLD" leads and connect the ground wire.

(22) Connect the battery ground cable.

(23) Start and operate the engine, and observe the alternator operation.

(24) Test the surrent output and regulator voltage setting, if necessary.

IGNITION SYSTEM

The ignition system consists of two separate circuits. The battery, ammeter, ignition switch, ballast resistor, primary winding of the ignition coil, distributor contacts and condenser, vehicle frame, and the primary wiring make up the low voltage primary circuit. The secondary high voltage circuit includes the coil secondary winding, the distributor cap and rotor, the spark plug cables, the spark plugs and the vehicle frame.

SECONDARY CIRCUIT INSPECTION

The coil to distributor cap wire and the spark plug wires should make good, clean contact in the ignition coil, the distributor cap towers and on the spark plugs. Wires that are loose or are not inserted all the way into the towers or on the plugs will corrode and increase the resistance as well as cause carbon tracking of the coil or cap towers.

The ignition coil tower, if oily or dirty, should be wiped clean and inspected for cracks, carbon tracking or oil leaks. Replace the coil if faulty.

Inspect the distributor cap for oil film, dirt or metal particles on the inside surface. Any contamination, however slight, can become conducting and cause hard starting in wet weather. Thoroughly wash the cap in a **weak** solution of liquid soap or detergent in warm water. Do not use a concentrated solution or soak the cap in the solution. Scrub the inner surfaces with a stiff bristle nylon brush to clean between the ribs and the crevices. Rinse well in hot water, shake out excess of water and dry thoroughly. Do not use compressed air to dry or blow out the water. Carefully inspect for cracks or carbon tracking on the inner or outer surfaces. Replace the cap if faulty.

The secondary cables, cap and rotor should be tested, using Tool C-3296. This tester provides high voltage which is sufficient for testing secondary insulation. Test the resistance of the spark plug cables.

Replace the cable if resistance is more than 30,000 ohms. Replace the cable if the terminal has pulled off.

NOTE: Pulling the wires to disconnect them from the plugs can stretch them and increase secondary resistance. To remove the wire, grasp the boot at the end of the wire and rotate the boot slightly to break the adhesion between it and the spark plug insulator.

The rotor and distributor cap electrodes should be inspected for burning. Replace the rotor if the electrode is burned on the top or if the electrode is worn too short.

DISTRIBUTOR RESISTANCE TEST

This test indicates the resistance of the ignition primary circuit from the distributor side of the coil, through the points and the distributor ground. Excessive resistance in this portion of the ignition system will prevent the coil from producing sufficient output for good over-all ignition. To perform test, proceed as follows:

(1) Turn the Selector Switch of a tach-dwell unit to the CALIBRATE position and adjust the Dwell Calibrator until the Dwell Meter reads on the set line (test leads separated).

(2) Leave selector Switch in the CALIBRATE position, connect the tach-dwell red lead to the distributor terminal of coil and the black lead to a good ground.

(3) Turn ignition switch "ON". Observe dwell meter reading. Meter pointer should be well within the black bar marked "DISTRIBUTOR RESISTANCE". If reading is zero or outside of black bar, crank the engine with the starter until the meter pointer moves as far to right as possible. (This will indicate that breaker points are closed.) A reading now within the black indicates a normal distributor primary circuit.

If the reading is outside the black bar, high resistance is present in the distributor primary circuit.

(4) Remove the test lead from the distributor terminal of coil and connect to the following points:

(a) Distributor primary terminal (outside)

(b) Distributor primary terminal (inside)

(c) Breaker point terminal bracket (insulated bracket)

(d) Ground side of contact points.

(e) Distributor housing.

(5) Repeat test at each connection until a noticeable change occurs in the meter reading. If a poor connection or faulty lead is indicated, clean, tighten or replace as necessary and repeat test (3).

If faulty contact points are indicated, remove distributor for complete inspection, service, testing and calibration.

IDLE RPM TEST

The engine idle rpm setting should be tested and recorded as it is when the vehicle is first brought into the shop for testing. This will assist in diagnosing complaints of engine stalling or complaints of creeping and hard shifting on vehicles equipped with automatic transmissions.

Test procedures are as follows:

(1) Turn the Selector Switch to the CALIBRATE position and adjust the Dwell Calibrator until the Dwell Meter reads on the SET line (test leads separated).

(2) Connect the red lead of the test unit to the distributor primary terminal at the coil and the black lead to a good ground.

(3) Turn the Selector Switch to the 8 LOBE position.

(4) Turn the tachometer rpm switch to the 1000 rpm position.

(5) With the engine at normal operating temperature (off fast idle), momentarily open the throttle and release to make sure there is no bind in the linkage and that the idle speed screw is against its stop.

(6) Note engine rpm on 100 rpm scale and adjust carburetor idle speed screw to obtain 550 engine rpm.

DISTRIBUTOR POINT DWELL

The degrees of distributor dwell are the degrees of rotation through which the breaker contact points remain closed. This is also commonly referred to as "dwell angle" or "cam angle".

The correct distributor point dwell is essential for good ignition performance and contact point life.

Test procedures are as follow:

(1) Connect the Tach-Dwell red lead to the distributor terminal of coil and black lead to a good ground.

(2) Turn the Selector Switch to the 8 LOBE position.

(3) Start the engine and operate at 550 rpm.

(4) Observe the dwell meter reading. If the dwell reading is within "Specifications", the point gap, cam rubbing block and breaker arm are all in satisfactory condition.

If the dwell reading is not within specifications, incorrect point gap, worn cam, worn rubbing block or distorted breaker arm may be indicated.

DUAL BREAKER POINTS

Block one set of contacts with a clean insulator and

adjust the opposite set of contacts 27 to 32 degrees on the dwell meter.

NOTE: Loosen the stationary contact lock screw just enough, so that the stationary contact can be moved with a slight drag; otherwise it will be difficult to set the contacts accurately.

When the one set of contacts has been adjusted for the correct clearance, tighten the stationary contact lock screw.

Block the adjusted set of contacts with an insulator and adjust the remaining set of contacts in the same manner as the first set 27 to 32 degrees. Remove insulator and recheck tightness of the stationary contact lock screw.

If the contacts have been properly adjusted, the dwell should be 34 to 40 degrees for both sets of points.

DWELL VARIATION

This test indicates the mechanical condition of the distributor. Excessive wear in distributor mechanical parts cause dwell variations which will affect ignition timing.

Test procedures are as follows:

(1) With the engine at idle speed, the vacuum hose disconnected, and with the test leads connected as in Paragraph, "Point Dwell Test", turn the Tachometer rpm Switch to the 5000 rpm position.

(2) Slowly increase the engine speed to 1500 rpm, then slowly reduce to idle speed while observing the dwell meter reading.

If the dwell reading varies more than 2 degrees from initial reading between idle speed and 1500 rpm, probable wear in the distributor shaft, bushings or breaker plate is indicated. Remove distributor for complete inspection and testing on a distributor tester.

NOTE: Dwell variation at speeds above 1500 rpm does not necessarily indicate distributor wear.

IMPORTANT

Dwell and gap of the points must both be within their specified tolerance at the same time. If this cannot be accomplished, it is probable that wrong points are installed or the cam lobes are badly worn.

IGNITION TIMING

To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give the proper ignition timing.

The ignition timing test will indicate the timing of the spark at No. 1 cylinder at idle (only).

Test procedures are as follows:

(1) Disconnect the vacuum hose at the distributor.

(2) Connect the secondary lead to the Power Timing Light to No. 1 spark plug, red primary lead to positive terminal of battery and black primary lead to the negative battery terminal.

NOTE: Do not puncture the wires, boots or nipples with test probes. Always use adapters. Puncturing spark plug wires with a probe will damage the wires. The probe can separate the conductor of linen cord impregnated with carbon and cause high resistance. In addition, breaking the rubber insulation may permit secondary current to arc to ground.

(3) Start the engine and set the idle to 475-500 rpm, engine at normal operating temperature (transmission in neutral).

(4) Using a timing light, observe the position of timing mark on the crankshaft damper and check against the specifications.

(5) Loosen the distributor hold down lock plate screw and rotate the distributor housing so that the specified timing mark on damper aligns with the specified "BTC" mark on the timing plate. Moving the distributor "clockwise" advances the timing and "counterclockwise" retards the timing.

(6) Tighten the distributor hold down lock plate screw after the timing has been set and recheck the timing adjustment with a Power Timing Light.

(7) When the ignition timing is correct, connect the vacuum hose to the distributor.

NOTE: As the engine speed is increased, the timing mark should move down on the vibration dampener below the pointer if advance units are functioning.

SERVICE PROCEDURES

DISTRIBUTOR

a. Removal

(1) Disconnect the vacuum hose at the distributor.

(2) Disconnect the primary lead wire at the coil.

(3) Unfasten the distributor cap retaining clips and lift off the distributor cap.

(4) Scribe a mark on the edge of the distributor

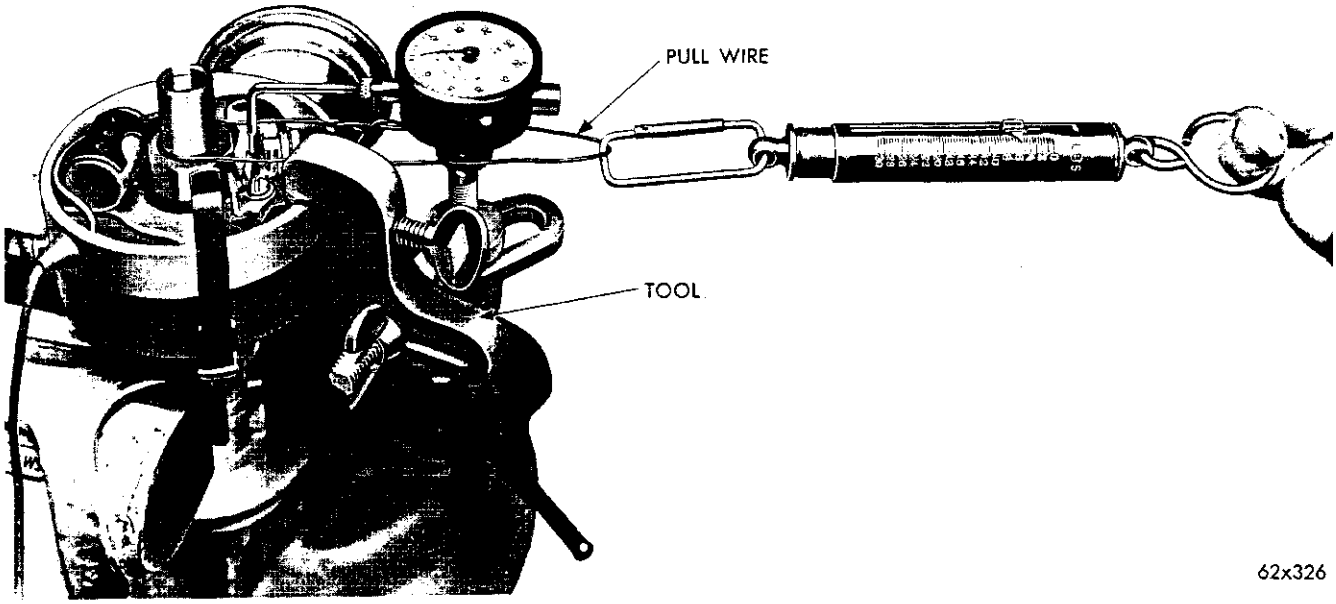

Fig. 78—Shaft and Bushing Wear Test

housing to indicate the position of the rotor as reference when reinstalling the distributor.

(5) Remove the distributor hold-down clamp screw and the clamp.

(6) Carefully lift the distributor from the engine.

b. Shaft and Bushing Wear Test

(1) Remove the distributor rotor.

(2) Clamp the ribbed section of the distributor housing lightly in a vise equipped with soft jaws and attach the dial indicator to the body of the distributor with the indicator plunger arm resting against the moveable breaker arm with the rubbing block of the breaker arm on the highest point of the cam lobe (Fig. 78).

(3) Place one end of a wire loop around the top of the distributor shaft. Hook a spring scale in the other end of the wire loop and pull on a line with the plunger of the indicator gauge. Be sure the wire loop on the shaft end is down on the shaft to insure a straight pull and also that the wire loop does not interfere with the indicator or holding bracket. Apply a five pound pull and read the movement of the plunger on the indicator dial. (Be sure the rubbing block of breaker arm is on the highest point of the cam lobe during this test). If the plunger movement exceeds .006 inch, replace the bushings and/or distributor shaft, see "Distributor Disassembly".

c. Disassembly (Figs. 79 and 80)

(1) Remove the distributor rotor.

NOTE: The distributor cap clamp springs on Chrysler built distributors are held in place by peened metal around the openings and should not be removed.

(2) Remove the retainer attaching the vacuum advance unit to the breaker plate advance arm.

(3) Remove the two screws and lockwashers attaching the vacuum advance unit to the distributor housing and remove the unit.

(4) Remove the primary lead wire and rubber grommet as an assembly. Push the grommet towards the inside of distributor to remove. Do not pull the wire.

(5) Remove the two screws and lockwashers attaching the breaker plate to the housing and lift out the breaker plate, points and condenser as an assembly.

(6) Remove the oil wick from the distributor cam (Fig. 81). Remove the spring clip from the oil well in the cam and remove the cam and yoke assembly and spacer.

If the side play exceeds .006 inch in the "Shaft and Bushing Wear Test", replace the bushings and/or distributor shaft as follows:

(a) Remove the distributor drive collar retaining pin and slide the collar off the end of the shaft.

(b) Use a fine file to clean the burrs from around the pin hole in the shaft and remove the lower thrust washer.

(c) Push the shaft up and remove it through the top of the distributor body. Remove the upper thrust washer.

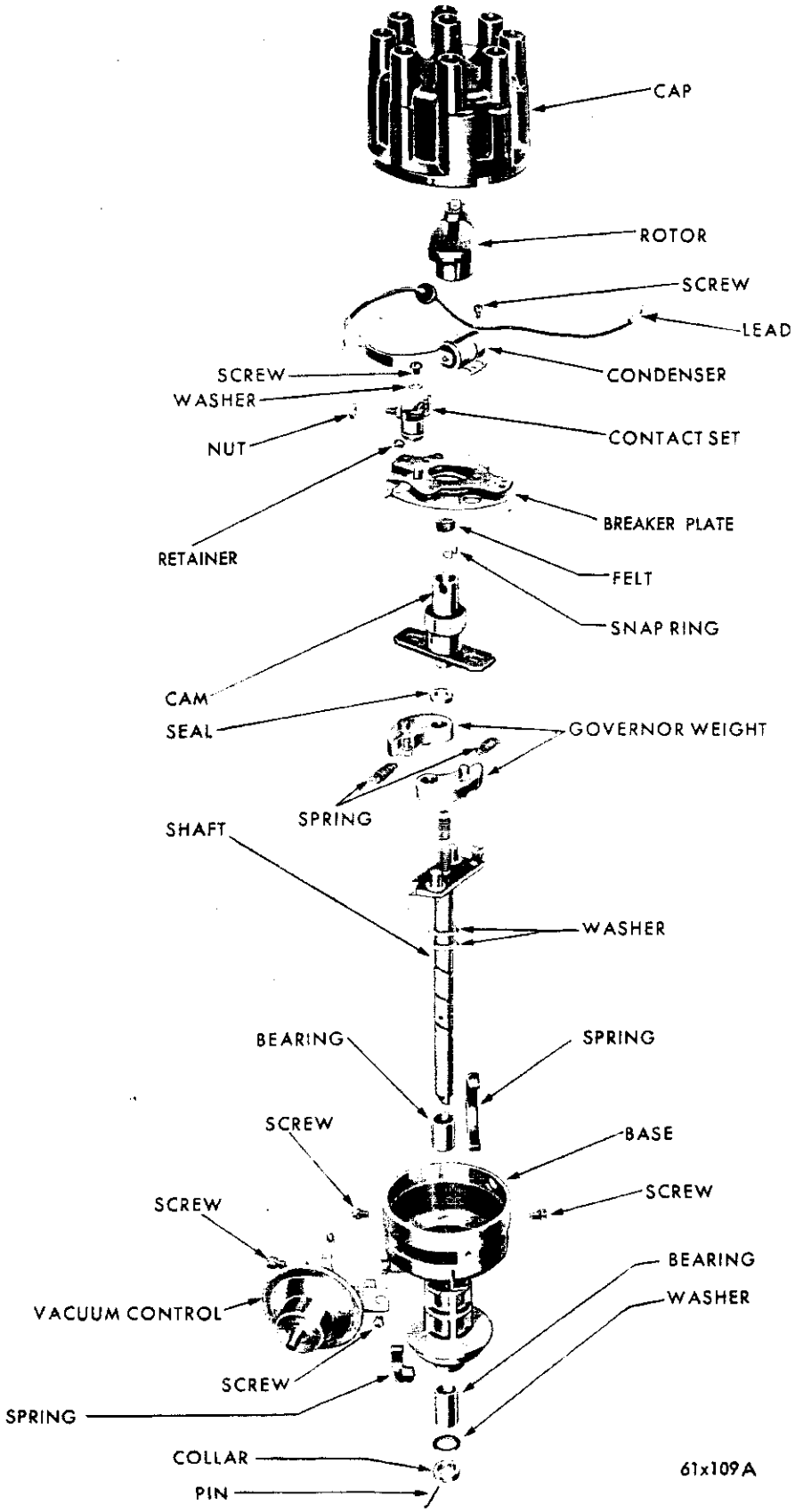

Fig. 79—Distributor—Disassembled View (Chrysler Built)

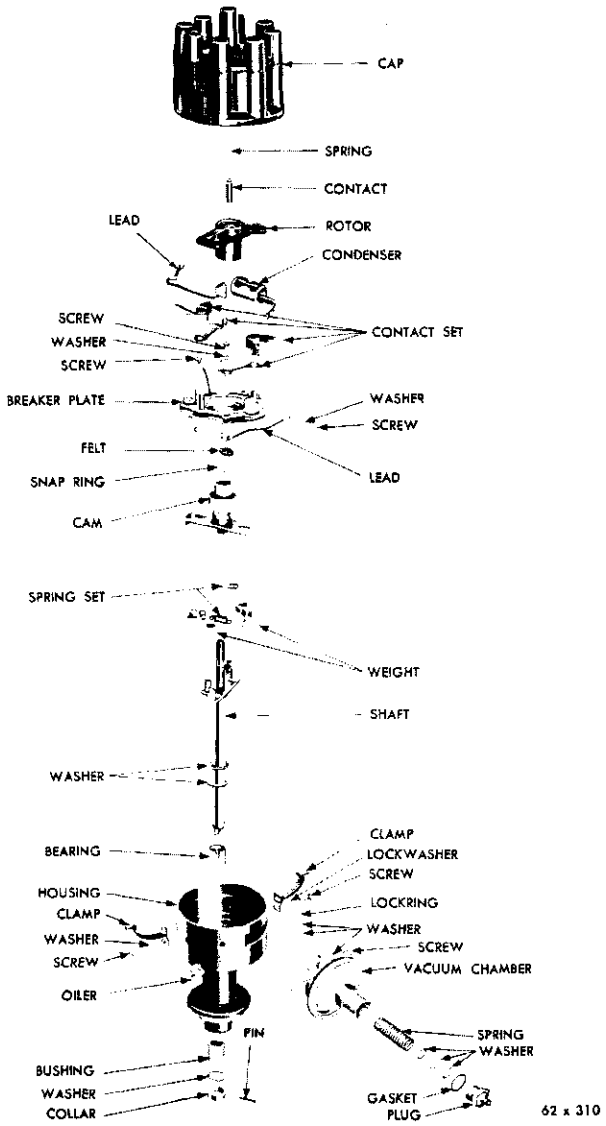

Fig. 80—Distributor—Disassembled View (Auto-Lite)

(d) Remove the shaft oiler and lift out the oiler wick.

CAUTION

On Chrysler Built distributors, do not drive the bushings out of the housing.

(e) Remove the upper bushing with Tool C-3744 (Fig. 82) by threading the tap securely into the bushing. Place the spacer over the tap. Install the tool nut and, while holding the tap, tighten the tool nut to remove the bushing. Invert the housing and remove the lower bushing in the same manner.

On AutoLite built distributors, place the housing in an arbor press and press out the upper and lower bushings from the bottom of the housing using Driver Tool C-3041.

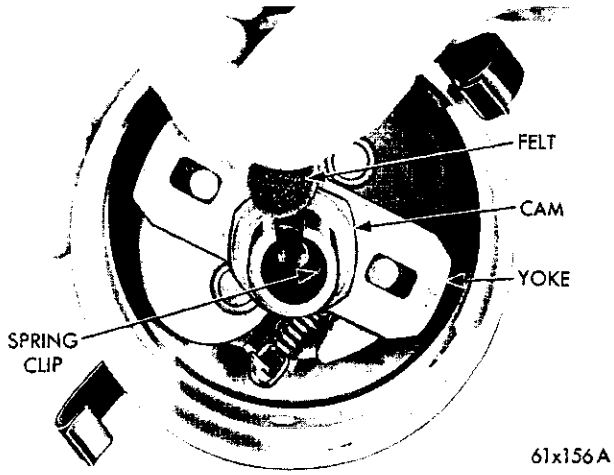

Fig. 81—Removing the Distributor Cam Felt Wick

(f) Soak the new bushings in light engine oil for approximately 15 minutes.

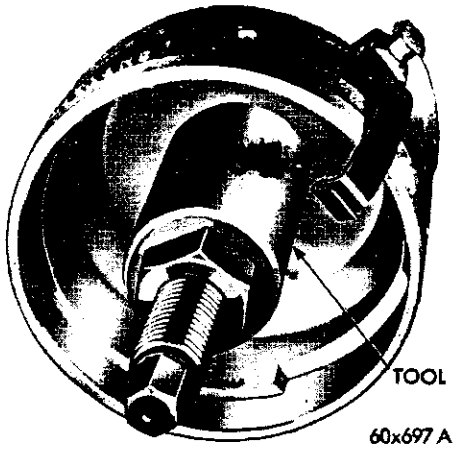

Fig. 82—Removing the Distributor Housing Upper Bushing

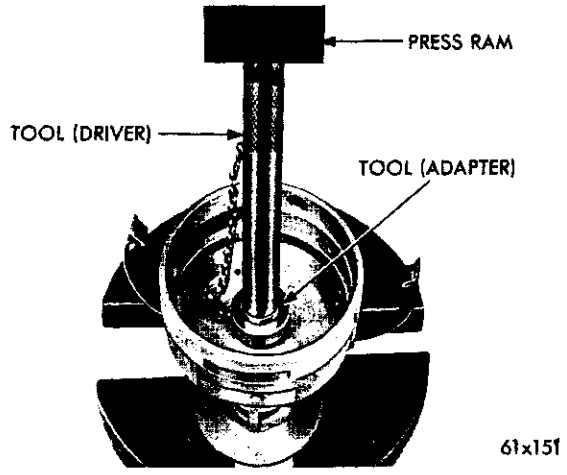

Fig. 83—Installing the Distributor Housing Upper Bushing

(g) Position the new upper bushing with the hole in the bushing **up** and in line with the oil hole in the housing, then press the bushing into the distributor housing with Tool C-3041 and adapter (Fig. 83). The bushing will measure .094 inch below the top of the housing bore for AutoLite distributors. For the Chrysler built distributors use Tool C-3041 with the flat face of adapter contacting the bushing then press the bushing into the distributor until top of bushing is 1.613 inches from top machined face of distributor housing. Place a straight-edge on machined surface of housing and measure from the bottom face of the straight-edge to the top of the bushing. Invert the housing and install the other bushing (Fig. 84) flush with the face of the distributor base.

(h) Insert a $\frac{3}{32}$ inch rod through the housing oiler hole to see if the hole in the bushing indexes with the oiler hole in the housing. If the rod cannot be inserted through the housing and the bushing, drill a $\frac{1}{8}$" hole through the upper bushing by drilling through the oil wick hole. Remove burrs caused by the drilling operation.

(i) Install the burnishing tool part of C-3041 Tool set and force the burnisher through both the bushings (Fig. 85). The correct bushing inside the diameter is .4995 to .5000 inch.

d. Assembly

(1) Test the operation of the centrifugal weight and inspect the weight springs for distortion. Lubricate the governor weights.

(2) Inspect all the bearing surfaces and pivot pins for roughness, binding or excessive looseness.

(3) Install the cam spacer, chamfered end down on the distributor shaft.

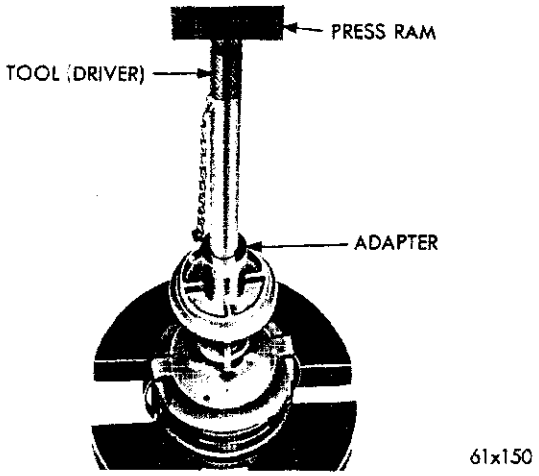

Fig. 84—Installing the Distributor Housing Lower Bushing

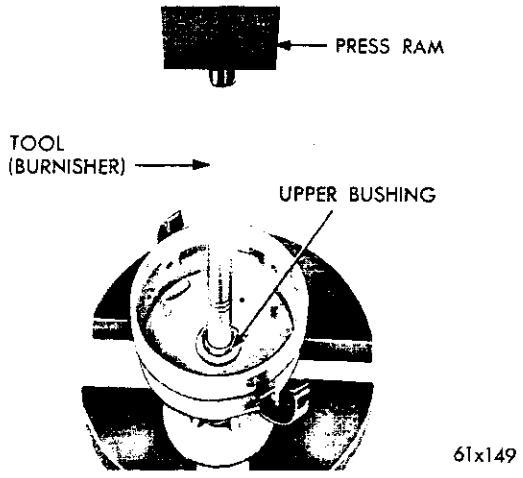

Fig. 85—Burnishing the Distributor Housing Bushings

(4) Slide the cam and yoke on the distributor shaft, engage the weight lugs with the slots in the yoke (Fig. 86). Install the cam retaining spring clip. Be sure it is properly seated in the groove of the distributor shaft.

(5) Lubricate and install the two concave upper thrust washers for AutoLite distributors or a single flat thrust washer for Chrysler-built distributors. Position the washers on the distributor shaft and slide the shaft into the distributor body. Position the lower thrust washer and drive the collar on the lower end of the shaft. Install the retainer pin.

(6) Install the oiler wick and oiler.

(7) Install the breaker plate assembly. Align the condenser lead, breaker point spring, primary lead and install the attaching screws.

(8) Install the felt wick in the top of the distributor cam.

(9) Attach the vacuum advance unit arm to the breaker plate and install the retainer. Install the vacuum unit attaching screws and washers.

(10) Test the breaker arm spring tension, and adjust the contact gap.

(11) Lubricate the felt pad in the top of the dis-

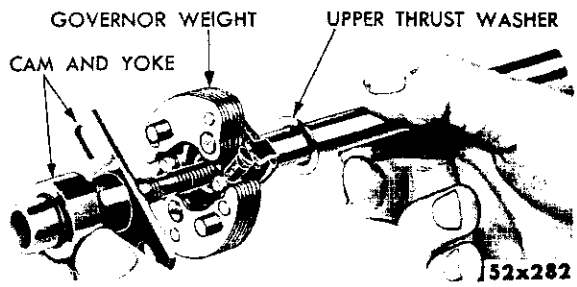

Fig. 86—Distributor Shaft Assembly

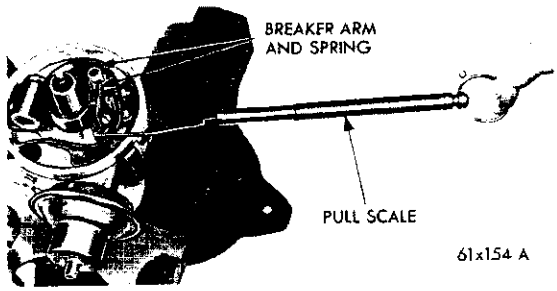

Fig. 87—Testing the Breaker Arm Spring Tension

tributor cam with 3 to 5 drops of light engine oil and install the rotor.

TESTING BREAKER ARM SPRING TENSION

(1) Hook a spring scale Tool MTU-36 on the breaker arm and pull in a straight line at right angles to the point surfaces (Fig. 87). Take a reading as the points start to separate under the slow and steady pull of the scale. The spring tension should be 17 to 21.5 ounces. If the reading is outside these limits, loosen the screw which holds the end of the breaker arm spring, and slide the end of the spring in or out, as necessary.

(2) Tighten the screw and measure the spring tension.

NOTE: Spring tension that is too great, will cause excessive wear on the distributor cam and on the nylon block of the movable breaker arm. Spring tension that is too weak, is unable to keep the points in contact with each other when they close. This is particularly true as engine speed is increased, causing high-speed misfiring.

INSTALLING AND ALIGNING CONTACT POINTS

(1) Remove the old contact points and install a new set.

NOTE: Touching the contact point faces with fingers during installation will cause burning of points during operation.

(2) Align the contacts to obtain contact in the center of the points, by bending the stationary contact bracket only. **Never bend** the movable arm to obtain alignment.

(3) After aligning the contact points, readjust the point clearance to specifications using a dial indicator (Fig. 88).

(4) Test the dwell angle to show proper degree of closure. See Paragraph, "Distributor Point Dwell".

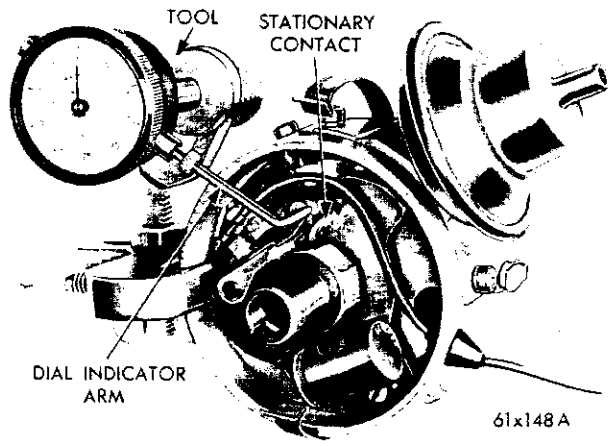

Fig. 88—Adjusting the Point Clearance with a Dial Indicator

The lock screw should be loosened just enough so that the stationary bracket can be moved with a slight drag; otherwise, it will be difficult to set the points accurately. After setting the points to correct the gap, tighten the lock screw.

DISTRIBUTOR LUBRICATION

(1) Add 3 to 5 drops of SAE 10W oil to the oiler on the outside of distributor base.

(2) Lubricate the felt pad under the rotor in the top of the distributor cam with 3 to 5 drops of SAE 10W oil.

(3) Wipe old grease from surface of the breaker cam. Apply a light film of new distributor cam lubricant number 1473595. **Do not over-lubricate, keep oil and grease away from the breaker points.**

TESTING DISTRIBUTOR ADVANCE

a. Centrifugal Advance Curve

Note the model number of the distributor and refer to the specifications before making this test.

Mount the distributor assembly (less cap and rotor) in a reliable stroboscope-type distributor tester and proceed with tests as follows:

NOTE: Clamp around the rib section of the distributor housing. The bottom section of the distributor housing is not a machined surface and concentricity would be affected, causing a wobble.

(1) Turn the Tach-Dwell switch to the 8 "LOBE" position and the motor switch to the correct direction of rotation. Refer to "Distributor Advance Specifications" in this manual.

(2) Turn the battery switch "ON".

(3) Regulate the tester speed control to operate

the distribution at 200 distributor rpm.

(4) Hold the distributor breaker plate in the full retard position and align the "0" of the distributor tester degree ring with any one of the arrow flashes.

(5) Regulate the tester speed control to operate the distributor at speeds called for under "Specifications" and observe arrow flashes opposite tester degree ring to determine degrees of advance.

(6) If the advance is not according to specifications, corrections can be made by bending the primary and secondary spring on the cam yoke, to increase or decrease the spring tension. The governor spring tabs can be reached through the access hole at the breaker plate. Rotate the shaft until the proper spring and tab lines up with the access holes. Insert a screwdriver blade through the access hole and bend the spring tab toward the distributor cam to decrease spring tension and advance the spark, or away from the distributor cam to increase the spring tension and retard the spark.

NOTE: The light tension spring controls the lower end of the advance curve, and the heavier spring controls the upper end of the advance curve.

d. Vacuum Diaphragm Leak Test

With the distributor mounted in the distributor tester and with the vacuum unit attached to the distributor, proceed as follows:

(1) Place the thumb over the end of the vacuum pump hose and adjust the regulator control knob to give a reading 20 inches with hose closed off to be sure tester hose does not leak.

(2) Attach the vacuum pump hose to the tube on the vacuum unit. The vacuum gauge should hold on maximum vacuum obtainable if no leaks exist.

(3) Observe the breaker plate while performing the leak test to test response of the breaker plate. There should be instant response to the pull of the diaphragm, moving the plate without a drag or bind.

(4) If leakage is indicated, replace the vacuum unit assembly.

c. Vacuum Advance Curve

Connect the tester vacuum pump hose to the distributor vacuum advance unit and perform operations 1 through 5 under "Centrifugal Advance Curve". Then proceed as follows:

(1) Turn the tester vacuum pump "ON". Adjust the vacuum pump regulator to vacuum test specifications. See "Specifications" and observe the arrow flashes on the tester degree ring to determine the degrees of advance.

(2) If the vacuum advance is above or below specifications, replace the vacuum advance unit. Retest the vacuum advance curve.

INSTALLATION OF DISTRIBUTOR

(1) Position the distributor on the engine. Align the rotor with marks previously scribed on the distributor housing.

(2) Engage the tongue of the distributor shaft with the slot in the distributor and oil pump drive gear.

NOTE: If the engine has been cranked while the distributor is removed, it will be necessary to establish the proper relationship between the distributor shaft and the No. 1 piston position as follows:

(3) Rotate the crankshaft until the number one piston is at top of the compression stroke.

(4) Rotate the rotor to the position of the number one distributor cap terminal.

(5) Lower the distributor into the opening, connect the primary lead and install the distributor cap. Make sure all high tension wires "snap" firmly in the cap towers. Install the distributor hold-down clamp screw. Tighten the screw finger tight.

(6) Connect the secondary lead of a Power Timing Light to the No. 1 spark plug (using proper adapter). Connect the red primary lead to the positive terminal of the battery and the black primary lead to the negative battery terminal.

(7) Start and operate the engine at 475-500 rpm. Rotate the distributor housing so that the specified timing mark and the pointer are in alignment. (Moving the distributor housing "clockwise" advances the timing and "counterclockwise" retards the timing.

(8) Tighten the distributor clamp screw after the timing has been set and recheck the timing adjustment with a Power Timing Light.

(9) If the timing is correct, connect the vacuum hose to the distributor and remove the timing light from the engine.

SPARK PLUGS

Cleaning and Inspection

Remove the spark plugs. Examine the firing ends of the plugs for evidence of oil fouling, gas fouling, burned or overheating conditions. Clean and reset the gaps to .035 inch.

NOTE: Use new gaskets when installing the spark plugs, tighten plugs to 30 foot-pounds torque.

Inspect the spark plug cables, coil secondary (high

tension) cable, nipples and cups for cracks, wear and fraying. Always use the neoprene insulating nipples whenever it becomes necessary to replace high tension cables or nipples. Inspect for loose terminals.

IGNITION COIL

The ignition coil is designed to operate with an external ballast resistor. When testing the coil for output, include the resistor in tests.

Inspect the coil for external leaks and arcing. Always make two tests when testing the coil. One when the coil is cold, the other after the coil has been warmed up.

Test the coil according to the coil tester manufacturer's instructions. Test the coil primary resistance. Test the ballast resistor resistance. Test the coil secondary resistance. Replace any coil or ballast resistor that does not meet specifications.

LIGHTING SYSTEM

DUAL HEADLAMPS

The dual headlamp system consists of four sealed beam headlamps.

The two outer lamps (Fig. 89) are of the two filament type for low and high beam and are marked by a numeral 2 moulded in the lamp lens.

The two inner lamps have only one filament and are marked with a numeral 1 molded in the glass.

The lamps cannot be installed wrong, as the number one (1) lamps have a two blade terminal connector and the number two (2) lamp has a three blade terminal connector, with a wider spacing than the two blade terminal connector.

The number one (1) lamp provides the high intensity "reach" down the highway and the off focus filament in the number 2 lamp provides the "body" light which illuminates the side of the road, ditches, etc.

AIMING THE HEADLAMPS

a. Pre-Aiming Instructions

(1) Test the dimmer switch for faulty operation.

(2) **Test the high beam indicator:** Indicates that high beam is in operation when lighted.

(3) **For badly rusted or defective headlamp assemblies:** These conditions must be corrected before a satisfactory adjustment can be made.

(4) Place the vehicle on a level floor.

(5) **Measure the front suspension height:** Adjust to specifications as necessary.

(6) Inspect the tire inflation.

(7) Rock the vehicle sideways to allow the vehicle to assume its normal position.

(8) If the gasoline tank is not full, place a weight in the trunk of vehicle to simulate the weight of the gasoline normally carried in the tank (6¼ pounds per gallon).

(9) There should be no other load in the vehicle other than the driver or a substituted weight of approximately 150 pounds placed in the driver's position.

(10) Remove the headlamp front trim panel. Do not remove the seal beam retainer rims.

(11) Thoroughly clean the headlamp lenses.

(12) Measure the aimer calibration.

b. Compensating and Mounting the Aimers

(1) For mechanical aim the slope of the floor should be known.

(2) Place the transit on the floor in line with a vertical center line of the right front wheel (Fig. 90). Place the split image target in like position at the right rear wheel.

(3) Adjust the range screw on the transit until the target split image coincides or merges into one unbroken line.

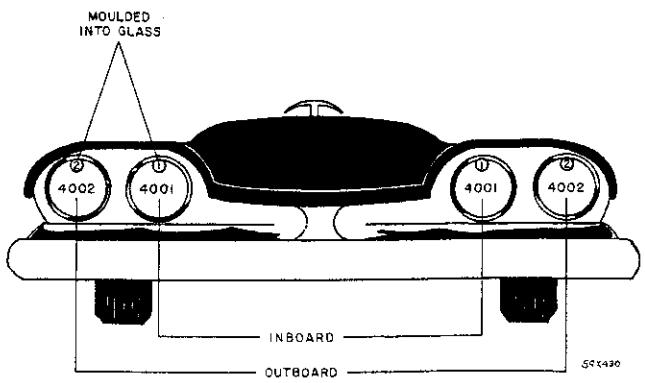

Fig. 89—Headlamp Arrangement (Typical)

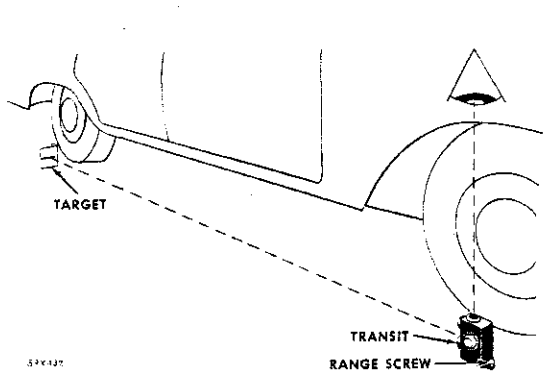

Fig. 90—Determining the Slope of the Floor (Typical)

NOTE: Make sure that the line of sight is perpendicular from the eye to the viewing port of the transit and that target image is centered in the viewing port of the transit.

(4) Turn the dial on the side of the transit until the bubble in the spirit level is centered.

(5) When the bubble is centered, note "plus" or "minus" reading on the compensator scale. This figure indicates the degree of slope of the floor and must be transferred to each aimer as follows:

(6) With a screwdriver, turn the adjusting slot of the floor level compensator in each aimer, until the correct plus or minus figure (or fractional part) appears in the proper window (Fig. 91).

TESTING AIMER FOR CALIBRATION (Fig. 92)

(1) Using a carpenter or stone mason level of known accuracy, locate a true vertical plate glass window or smooth surface.

(2) Set the DOWN-UP pointer on DOWN 2.

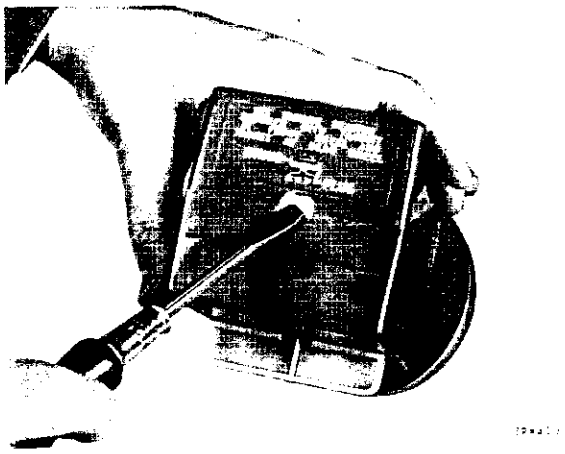

Fig. 91—Adjusting the Floor Level Compensator in the Aimers

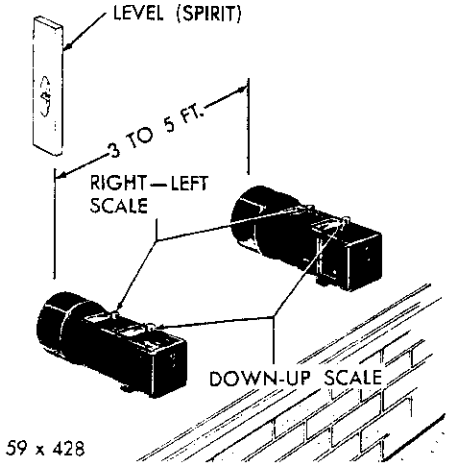

Fig. 92—Inspecing the Aimer for Calibration

(3) Set the RIGHT-LEFT pointer and the floor level compensator at "O".

(4) Secure the aimers to the glass or smooth surface three to five feet apart so that the split image targets can be located in the viewing ports.

(5) If the bubble is centered in the vial, the vertical calibration is correct. If the bubble is not centered, make the down-up adjustment by rotating level adjusting screw until the bubble is centered in the spirit level.

(6) The horizontal aim is correct if the targets on opposite aimers are aligned in the viewing ports. If the targets are not aligned in the viewing ports, rotate the mirror adjusting screw until the target split image becomes aligned.

c. Mounting and Adjusting the Aimers (Fig. 93)

(1) While holding an aimer in alignment with the lens of one outer headlamp, bring the aimer up to and against the headlamp lens.

NOTE: Make certain that the headlamp lens pads

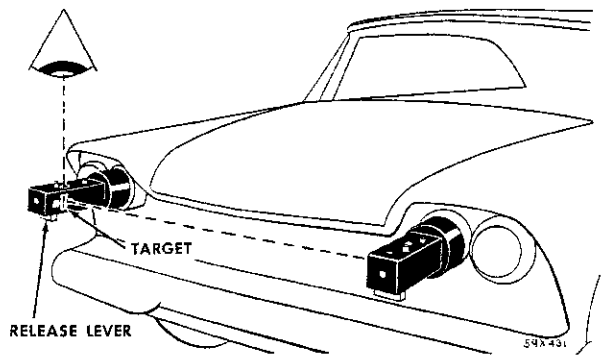

Fig. 93—Mounting and Adjusting the Aimers (Typical)

are making full contact with the aimer mounting flange and that the aimer target is facing inboard.

(2) Push the release lever forward (to expel air from the suction cup) and while holding the aimer firmly against the headlamp aiming pads, slowly pull the release lever back until the spring lock engages in the slot.

(3) Mount the second aimer on the other outer headlamp, in the same manner.

(4) On each aimer, set the pointer to the numeral 2 on the DOWN side of the **DOWN UP** scale.

(5) On each aimer position the pointer of the **RIGHT LEFT** scale at **ZERO.**

TESTING HEADLAMP AIM

Follow the instructions as outlined in Paragraph "Aiming the Headlamps" and proceed as follows:

NOTE: Do not remove the headlamp rims.

a. Horizontal Test

Turn the **RIGHT LEFT** scale knob until the split image is in alignment. If the **RIGHT** or **LEFT** portion of the scale exceeds the following values, the lamps should be aimed.

Values given represent inches at 25 feet.

	RIGHT	LEFT
No. 1 UNIT	4	4
No. 2 UNIT	4	0

b. Vertical Test

Turn **DOWN-UP** scale knob until the spirit level is centered. If **DOWN** or **UP** portion of the scale exceeds the following values, the lamps should be aimed.

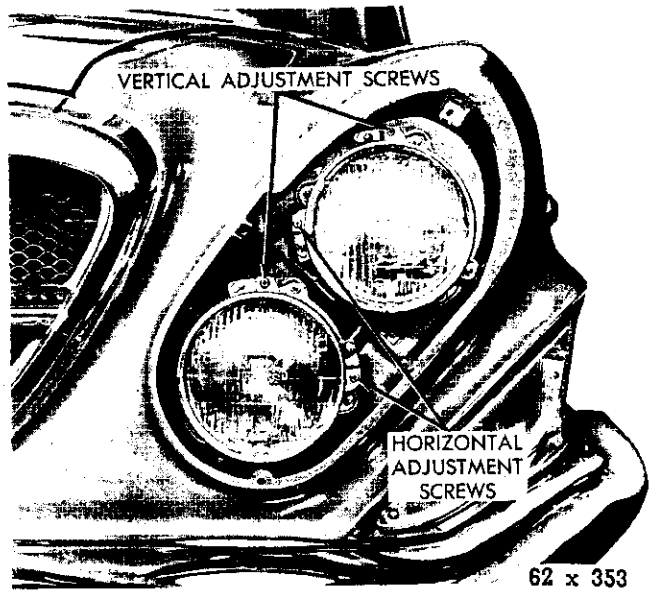

Fig. 94—Headlamp Adjustment Points (Chrysler)

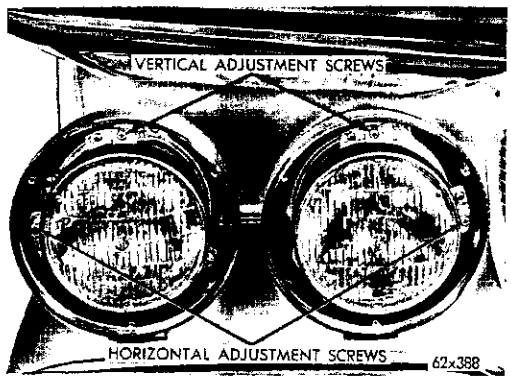

Fig. 95—Headlamp Adjustment Points (Imperial)

	DOWN	UP
No. 1 UNIT	½ to 3½	0
No. 2 UNIT	½ to 3½	0

ADJUSTING THE HEADLAMPS (Figs. 94 and 95)

a. Horizontal Adjustment

(1) With the pointer of the **RIGHT-LEFT** Scale still set at **ZERO,** sight through the aimer viewing port.

Make sure that the line of sight is perpendicular from the eye to the viewing port of the aimer and that the target image is centered in the viewing port of the aimer.

(2) While sighting through the viewing port of the aimer, turn the horizontal adjusting screw (Figs. 94 and 95) on the headlamp until the split image target line merges into one unbroken line. **To remove the backlash, be sure to make a final adjustment by turning the headlamp horizontal adjusting screw in a clockwise direction.**

(3) Make the horizontal adjustment on the other **outboard** headlamp in the same manner.

(4) Remove the aimers, from the outboard headlamps, by releasing the spring lock at the rear (bottom) of the aimer and pushing the release lever forward. **Do not attempt to remove the aimers by pulling them away from the headlamp lens — slide the suction cup downward and away from the lens.**

b. Vertical Adjustment

(1) Turn the vertical adjusting screw on the headlamp in a counter-clockwise direction to bring the bubble of the spirit level on the aimer to the vehicle side of center. Use care to avoid disturbing the installed position of the aimers. Then turn the

screw clockwise until the bubble is centered for correct aim and elimination of backlash.

(2) Make the vertical adjustment on the other outer unit in the same manner.

(3) Recheck the target alignment on each side and readjust the horizontal aim, if necessary.

Proceed to adjust the inner units by following the instructions as outlined for the outer headlamps. Install the headlamp trim panels, when the adjustments have been performed.

HEADLAMP SEALED-BEAM REPLACEMENT

Lens, filament and reflector are sealed into one unit which can be removed as follows:

(1) Remove the screws from the headlamp panel and remove the panel.

(2) Remove the screw from the interior retaining ring, and remove the ring.

NOTE: Do not disturb the headlamp aiming screws.

(3) Pull out the sealed-beam unit and disconnect the connector, pulling it straight off.

(4) Install the new sealed-beam unit.

(5) Install the unit retaining ring and headlamp panel.

NOTE: Each lamp in the dual headlamp assembly can be removed in the above manner.

HORNS

TESTING (Horns "A" and "B")

Touch a jumper wire from relay "S" terminal to a ground. If the horn blows, the difficulty is in the horn button contact ring or in the wire from "S" terminal to the horn button. If the horn fails to blow, connect a jumper wire from "B" to "H" terminal, now if the horns operate, the relay is defective. If the horns fail to operate, the difficulty is in the wire to the horns, in the horns or wire to horn relay "B" terminal.

ADJUSTING

Horn "A"

(1) Disconnect the connections at each horn to determine which horn is not operating.

(2) Remove the horn and bracket assembly. Do not remove the horn from the bracket. (The bracket is retained to the horn by a self-threading screw.)

(3) Pry the cover off (Fig. 96).

(4) Turn the adjusting nut counter-clockwise until there is no vibration (sound).

(5) Turn the adjusting nut clockwise, approximately ¼ turn at a time until the tone has a clear mellow sound. Do not turn nut while horn is blowing.

NOTE: The adjustment will only clear up the sound and cannot change the horn tone frequency.

(6) Check the horn wire leads, make sure they are securely wrapped on the horn solenoid coil leads (Fig. 97). If the lead wires are loose, solder them securely to the coil leads. Use resin core solder.

(7) Check the horn contacts. If the contacts are badly burned, check the resistor for continuity. If

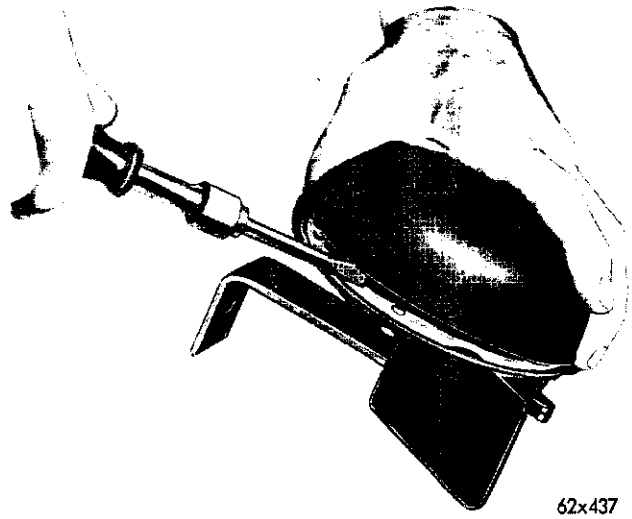

Fig. 96—Removing the Cover (Horn "A")

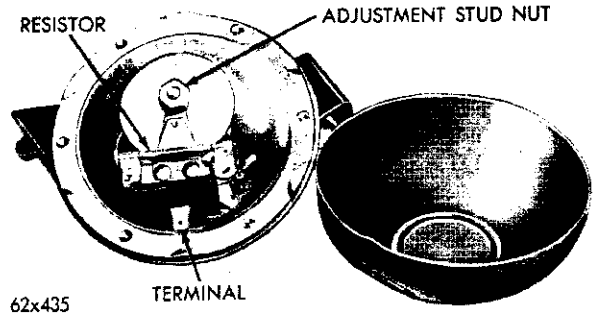

Fig. 97—Cover Removed (Horn "A")

the contacts are separated, when the adjusting nut is removed from the adjusting stud; the contacts have taken a permanent set and horn should be replaced.

(8) Connect a test ammeter between the positive post of a 12 volt battery and the horn terminal post. Connect a jumper lead from the negative battery post to the horn base. Turn the adjusting screw to obtain a reading of eight amperes minimum to ten amperes maximum at 12.5 volts. **Must not exceed ten amperes maximum.**

Horn "B"

(1) Disconnect the connections at each horn to determine which horn is not operating.

(2) Remove the horn and bracket assembly. Do not remove the horn from the bracket. (The bracket is retained to the horn by a self-threading screw).

(3) Turn the tone adjuster with a suitable spanner wrench (Fig. 98) to turning it counter-clockwise until there is no vibration (sound).

(4) Turn the adjusting nut clockwise, approximately ¼ turn at a time until the tone has a clear mellow sound. Do not turn adjuster while horn is blowing.

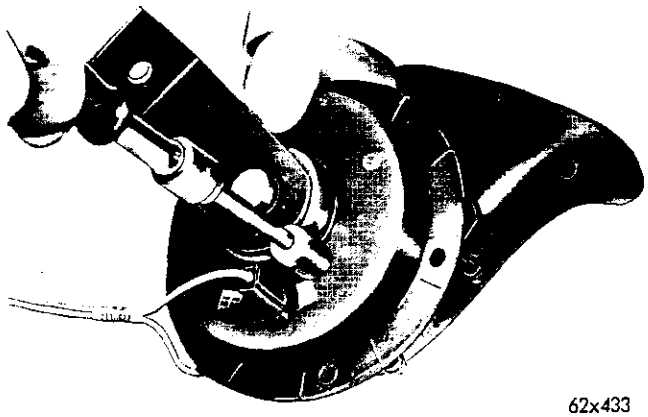

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Fig. 98—Adjusting the Horn ("B")

NOTE: The adjustment will only clear up the sound and cannot change the horn tone frequency.

(5) Connect a test ammeter between the positive post of a 12 volt battery and horn terminal post. Connect a jumper lead from the negative battery post to the horn base. Turn the adjusting screw to obtain a reading of six amperes minimum to eight amperes maximum at 12.5 volts. **Must not exceed eight amperes maximum.**

ELECTRIC LOCKING DOOR LOCKS (SY-1 ONLY)

The electric door lock is operated by a push-pull double acting solenoids attached by a connecting rod to the door latch locking lever. By pressing the single pole double throw switch mounted on the right and left front door trim panel, a solenoid in each of the four doors is actuated, moving the latch locking lever into the lock or unlock position.

All doors may be locked or unlocked either mechanically or electrically. To lock mechanically push the front door handle to the forward position and depress the rear door locking button. To lock electrically depress the switch to lock or lift upward to unlock the doors.

SOLENOID

a. Removal

Remove the door trim panel. Disconnect the lock to solenoid connecting rod at the solenoid. Disconnect wires and remove solenoid.

b. Installation

Fasten the solenoid to the door and connect up the wires. Tighten the solenoid mounting screws finger tight. Reconnect the lock connecting the rod to the solenoid. Adjust the solenoid by moving up or down in the slotted holes, so that the solenoid will push and pull the lever far enough to accomplish locking and unlocking. Reinstall the trim panel.

ELECTRIC WINDOW LIFTS

A master switch group, on the left front door, operates all the windows and the individual switches are located on their respective doors. The circuit breakers are above the left front cowl panel. The normal operating amperage draw per window is 12 to 16 amperes for all models.

SERVICE PROCEDURES

a. Removal

(1) Disconnect the battery and remove the garnish molding.

(2) Remove the door trim panel and disconnect the wires from switch.

(3) Remove the clips from the regulator pins holding the lower glass channel.

(4) Raise the glass manually and prop in the up position.

(5) Remove the regulator attaching screws, pivot the guide retaining pin and remove the motor and regulator through the opening in the door.

(6) If it is necessary to replace the gear box, remove the regulator counter-balance spring.

NOTE: Be sure to remove the counter-balance spring before disassembling the gear box.

The gear box is replaced as an assembly only and is lubricated at assembly. No further lubrication is required.

b. Installation

(1) Place the motor and regulator through the door opening and insert the pivot arm pin into the guide on the inner panel.

(2) Install the regulator screws finger tight. DO NOT tighten at this time.

(3) Remove the window prop and lower the glass.

(4) Insert the control arms into the glass channel, using a leather washer on each side of the channel and secure with a clip.

(5) Connect the wires to the motor and connect the battery.

(6) Operate the window several times and stop the glass halfway.

(7) Tighten the regulator screws.

(8) Check the glass alignment.

(9) Connect an ammeter into the electrical circuit and operate the window. The ammeter reading should be constant without fluctuation as follows: approximately 14 amperes, all models except rear doors of four-door hard top models, and approximately 20 amperes for the rear doors of the four-door hard top models. If the ammeter reading fluctuates, there is a bind in the glass or in the linkage. The down stop should be adjusted so that the window is flush with the garnish moulding. Install the trim panel, garnish molding, and other parts.

POWER SEATS

The power seat can be moved six ways — forward, backward, upward, downward and tilt. The horizontal travel is five inches and horizontal plane of seat track is inclined eleven degrees. The vertical travel is one inch at front and two inches at rear.

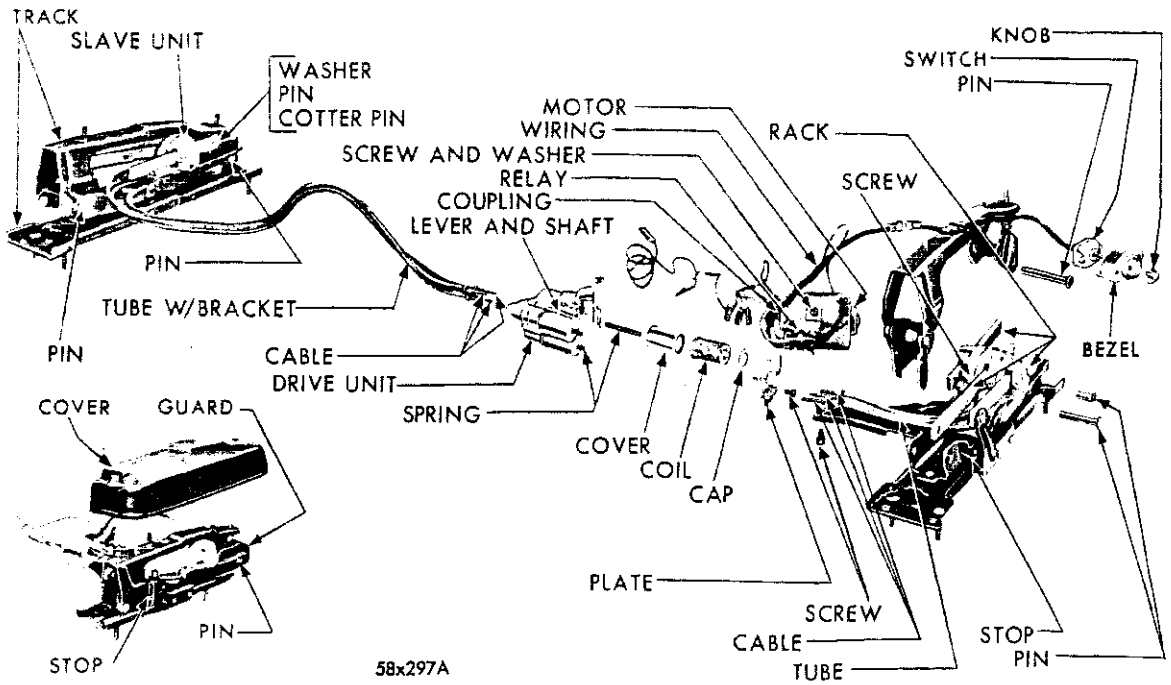


Fig. 99—Power Seat Arrangement

The available tilt is 8 degrees forward and 7½ degrees rearward from neutral.

OPERATION

The motor operates a gear drive train which supplies power to the slave units, located in the seat tracks, through flexible cables (Fig. 99). The control switch is on the left side of front seat and is wired through a relay to a 40 ampere circuit breaker, located next to the window lift circuit breaker above the left cowl panel.

The wire from the bulkhead disconnect supplies power to the circuit breaker. On vehicles equipped with electric window lifts the power is supplied by a brass jumper parallel with the window lift circuit breakers. Power is supplied to the relay from the circuit breaker.

Six wires go to the switch. One used for power, two for motor field current, which also actuates the relay for motor armature current and three wires attach to solenoids controlling the movement of the front riser, rear riser and horizontal movement.

The right and left tracks are each replaced as an assembly only. They cannot be adjusted and are not interchangeable.

FRONT SEAT ASSEMBLY AND ADJUSTER

a. Removal

(1) Disconnect the battery ground cable.

(2) Remove the four mounting stud nuts which hold the front seat to the adjuster and tilt the complete seat back assembly forward.

(3) Disconnect the control wires at the 6-way connector.

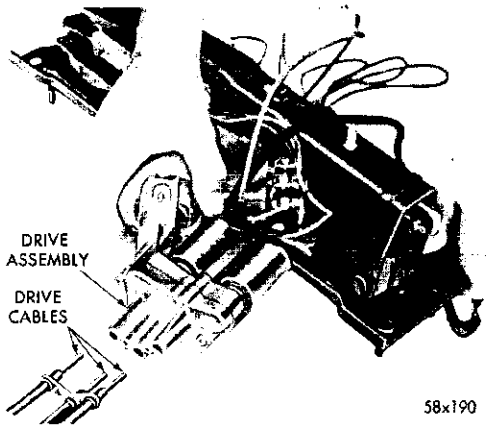


Fig. 100—Removing the Left Guide and Drive Assembly

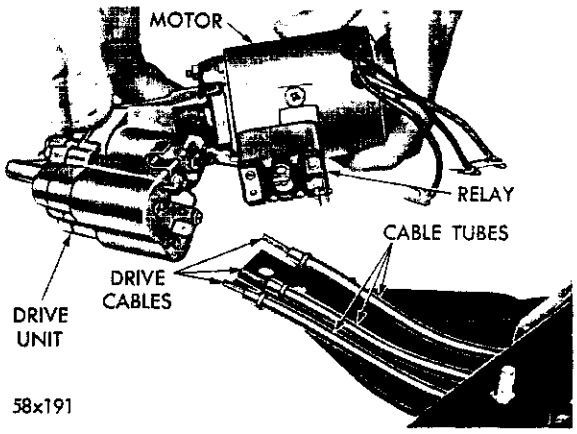


Fig. 101—Removing the Drive Assembly from the Left Slave Unit (Typical)

(4) Remove the front seat and cushion assembly.

(5) Disconnect the seat adjuster red feed wire.

(6) Remove the seat guide attaching stud nuts and remove the adjuster.

b. Installation

(1) Install the adjuster and stud nuts.

(2) Reconnect the seat adjuster red feed wire.

(3) Install the front seat and cushion assembly.

(4) Reconnect the control wires to the switch and tighten the mounting stud nuts securely.

(5) Reconnect the battery ground cable.

FLEXIBLE CABLES

a. Removal

(1) Remove the front seat and cushion assembly.

(2) Disconnect the red feed wire.

(3) Remove the retainer plate that holds the right side tubes to the drive assembly.

(4) Remove the left seat guide attaching stud nuts and remove the guide and the drive assembly (Fig. 100).

NOTE: Be careful not to bend or damage the right side tubes when sliding the tubes out of the drive assembly.

(5) Pull the flexible cables from the right side tubes.

(6) Remove the bolts that hold the motor and drive assembly to the left guide bracket.

(7) Remove the drive assembly with tubes from the left slave unit (Fig. 101).

(8) Remove the flexible cables from the tubes.

b. Installation

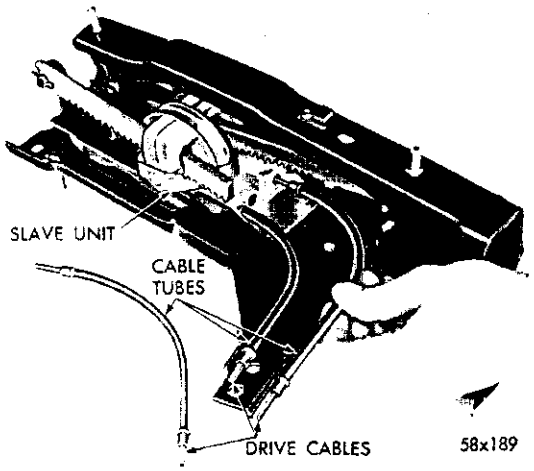


Fig. 102—Installing the Cable Tubes in the Slave Unit

CAUTION

The seat guides should be in the up and forward position when installing the cable. Make sure both guides are at the same position (in alignment).

(1) Place the three left cable tubes into the left slave unit (Fig. 102).

(2) With the shortest tube on the inside and longest on the outside, install the flexible cables in the tubes. Make sure the cables seat in the slave unit.

(3) Position the drive unit on the left side tubes. Make sure the flexible cables seat in the slot in the drive unit.

(4) Bolt the drive unit to the guide bracket.

(5) Place the right side flexible cables in the right side tubes.

(6) Position the left guide and drive assembly on the right side tubes. Make sure the cables seat in the drive assembly.

(7) Install the right side tubes retainer plate.

(8) Bolt the left guide assembly to the floor.

(9) Install the seat and cushion assembly.

(10) Reconnect the red feed wire and check the operation of the seat.

MOTOR ASSEMBLY

a. Removal

(1) Disconnect the motor wires at the relay.

(2) Remove the two nuts holding the motor to the drive unit.

(3) Remove the motor from the drive unit and rubber coupling.

(4) Remove the relay from the motor.

b. Installation

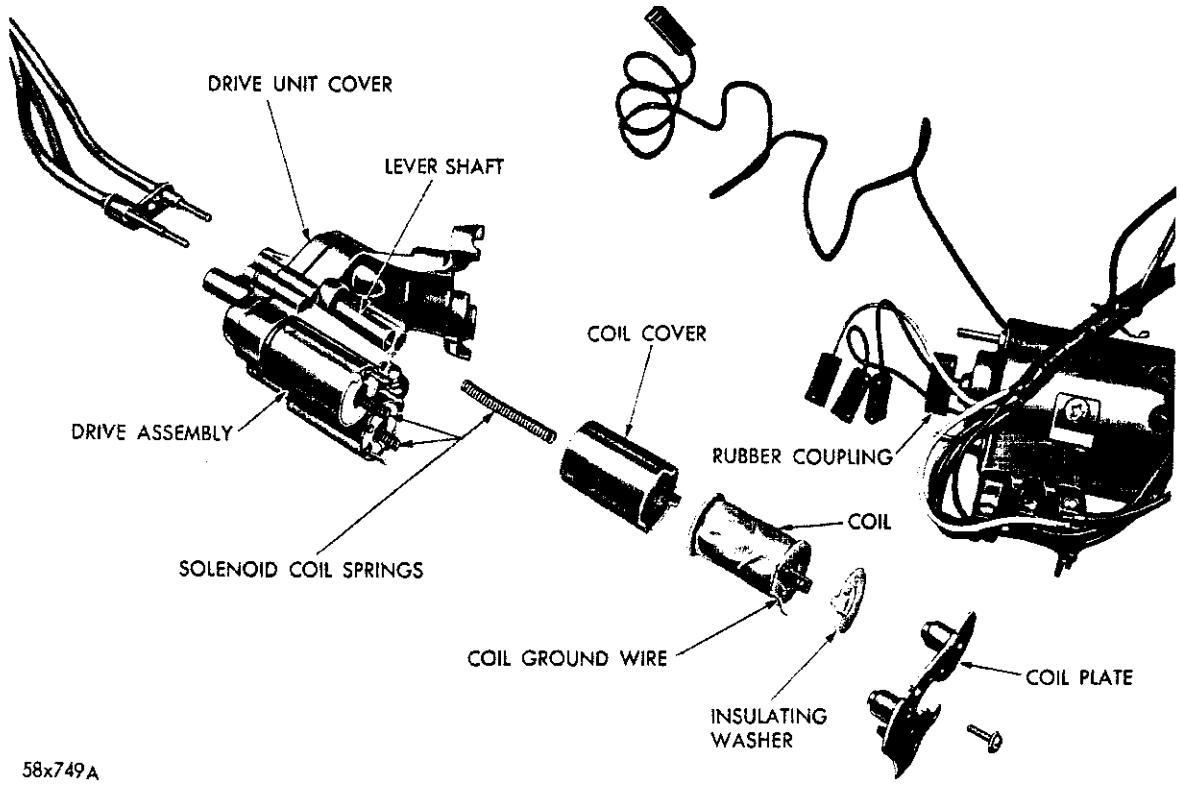


Fig. 103—Solenoid and Coil (Disassembled View)

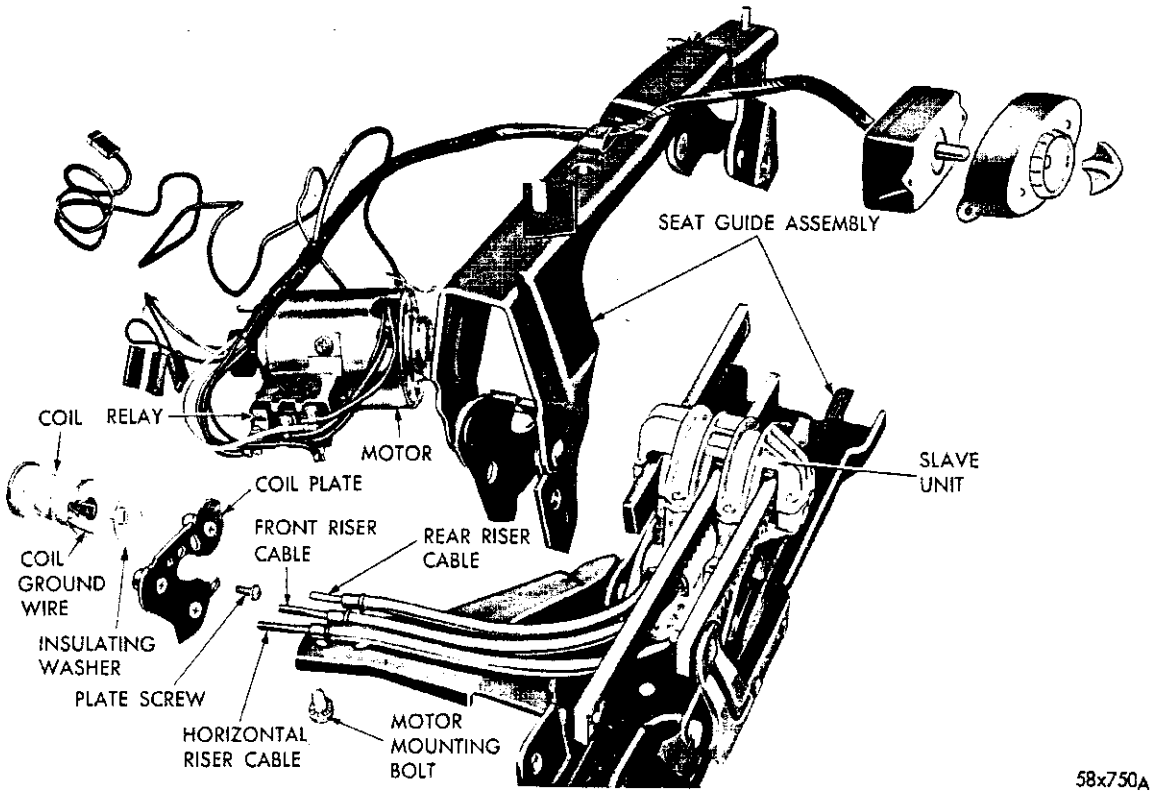


Fig. 104—Seat Track and Motor (Disassembled View)

(1) Install the relay on the motor.

(2) Install the rubber coupling on the motor shaft (Fig. 103).

(3) Align the rubber coupling with the slot on the slave unit shaft.

(4) Install the motor and reconnect the wires to the relay.

DRIVE UNIT AND SOLENOID ASSEMBLY

a. Disassembly

(1) Remove the drive unit from the seat assembly. Refer to, "Removal and Installation of Flexible Cables".

(2) Remove the two screws holding the plate and solenoids to the drive unit (Fig. 104).

(3) Remove the plate and solenoid assembly. Be careful not to lose the three springs under the solenoid.

(4) To remove the solenoid coils, bend back on the tabs of the solenoid cover. Unsolder the coil ground wire at the cover tab and remove the coil cover from the coil.

(5) Remove the screws holding the cover on the drive unit.

(6) Remove the cover and lift out the clutch lever and shaft.

b. Assembly

(1) Install the clutch lever and shaft. Make sure the lever is properly seated on the drive collar.

(2) Install the cover and screws.

(3) Install the coil in the coil cover with the coil ground wire next to one of the cover tabs.

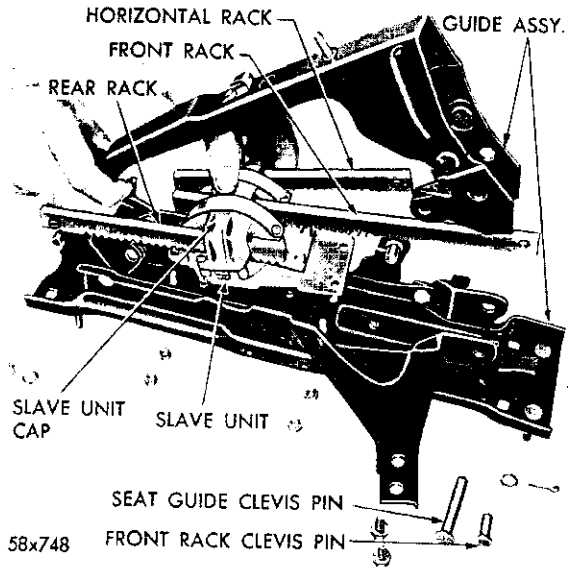


Fig. 105—Removing the Sleeve Unit

(4) Position the cover tabs in the slots on the coil plate.

(5) Bend over the tabs and resolder the coil ground wire to the tab and plate.

(6) Install the three solenoid springs and position the solenoids over the springs.

(7) Fasten the solenoids to the drive unit.

(8) Install the drive unit. Refer to "Removal and Installation of Flexible Cables".

SLAVE UNIT

a. Removal (Fig. 105)

(1) Remove the drive unit and the cables. Refer to "Removal and Installation of Flexible Cables". The seat guide should be in the up and forward position.

(2) Remove the long clevis pin from the front of the guide (Fig. 106).

(3) Remove the front rack clevis pin.

(4) To facilitate the removal of the slave unit, remove the slave unit cap.

NOTE: Be careful not to lose the springs under the cap. The springs are between the racks and the slave cap.

(5) Remove the nuts holding the slave unit to the guide.

(6) Remove the slave unit.

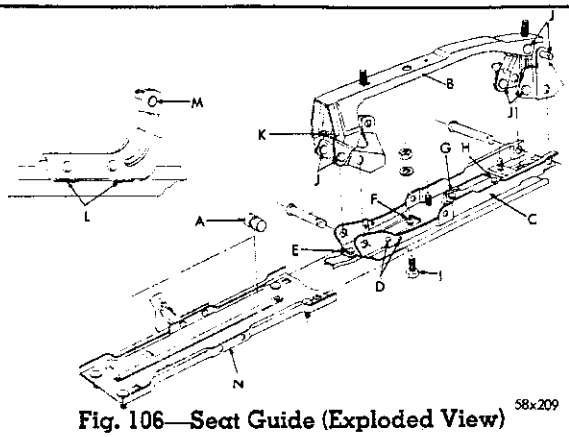


Fig. 106—Seat Guide (Exploded View) 58x209

b. Installation

(1) Position the slave unit over the studs on the guide base.

(2) Position the racks in the slave unit so they will be in the up and forward position.

(3) Fasten the racks to the guide assembly.

(4) Position the springs on the racks and install the slave unit cap.

(5) Install the slave unit mounting nuts.

(6) Install the front guide clevis pin (Fig. 106).

(7) Install the cables in their slots and try operation of guide.

Install drive unit and cables. Refer to "Removal and Installation of Flexible Cables".

WINDSHIELD WIPERS

The single speed wiper motor (Fig. 107) is connected to the wiper switch and from the wiper switch "B" terminal to the "ACC" accessory terminal of the ignition-starter switch so that the wiper motor is actuated only when the ignition switch key is turned to the right or left position. The variable speed wiper motor (Fig 107 and 108) is connected from the wiper motor to the wiper switch and from a circuit breaker to the ignition switch. Refer to the "Wiring Diagrams" at the back of this Electrical Group. The single speed wiper motor is protected by a circuit breaker built into the wiper switch. The variable speed motor is protected by a circuit breaker which is attached to the "B" terminal of the switch.

The variable speed motor has an "off glass parking" feature which is accomplished by reversing the motor and the use of parking cams at the pivot pins of the intermediate crank arm. When the switch is turned to the "off" position, the motor reverses direction and at the same time the parking cams rotate 180 degrees, lengthening the linkage slightly to park the blades against the windshield moulding. The linkage shortens when the motor runs in the wiping direction.

WIPER BLADE ADJUSTMENT

To proper position the wiper blades, adjust the motor switch plate so that the blades park as low as possible. Loosen the blade arms at the pivots. Position the blades against the windshield moulding on the variable speed motors and tighten the pivot attaching nuts. Position the blades of the single speed motors one inch from the windshield moulding.

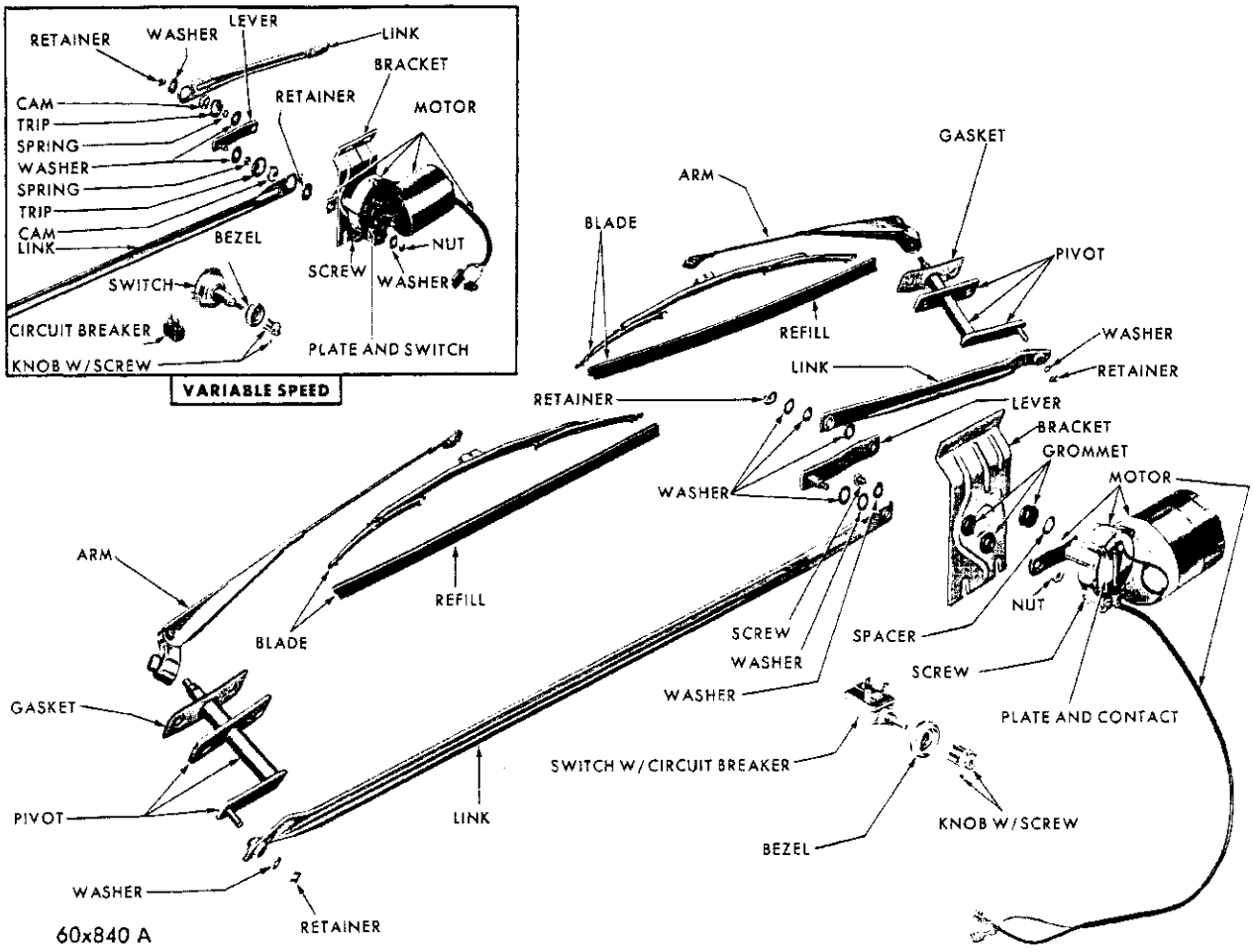


Fig. 107—Windshield Wiper—Variable and Single Speed (Disassembled)

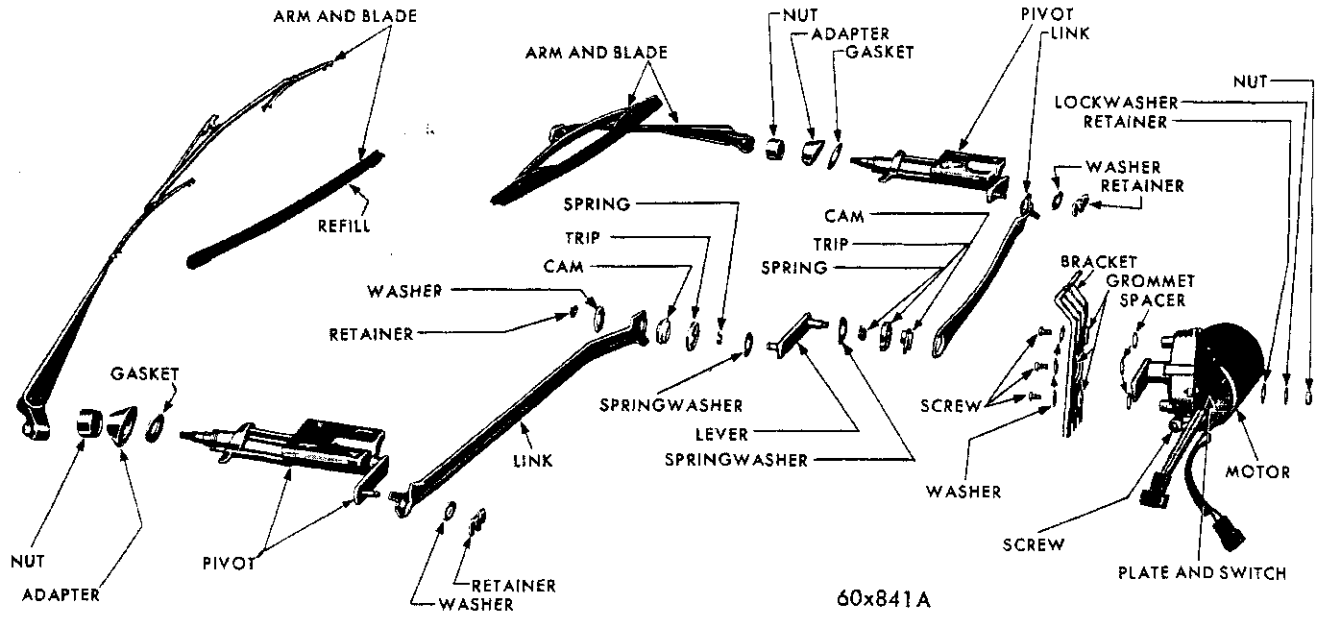


Fig. 108—Windshield Wiper Variable Speed (Disassembled)

SERVICE PROCEDURES

WINDSHIELD WIPERS

Removal

(1) Remove the glove compartment door.

(2) Remove the glove compartment.

(3) Remove the nuts attaching the wiper motor bracket to the cowl panel and to the instrument panel brace.

(4) Disconnect the wires at the wiper motor.

(5) Disconnect the links at the pivot cranks. The clips are removed by lifting the top tab and sliding it sideways out of engagement with the groove in the pivot crank pin.

(6) Remove the spacing washer and remove the link from the pivot crank.

(7) Slide the complete wiper with the links far enough towards the left so that the right hand link will clear the glove compartment opening in the instrument panel and remove assembly, as shown in Figure 109. Use care so as not to bend the links.

DISASSEMBLY OF THE LINES

(1) Remove the clip holding the left-hand link to the crank arm.

(2) Remove the bevel washers and the link.

(3) Remove the parking cam and the spring release.

(4) Remove the coil spring by spreading the ends of the spring.

(5) Disassemble the right-hand link in the same manner after removing the crankarm to lever nut and the spacing washers between the link crank arm and lever.

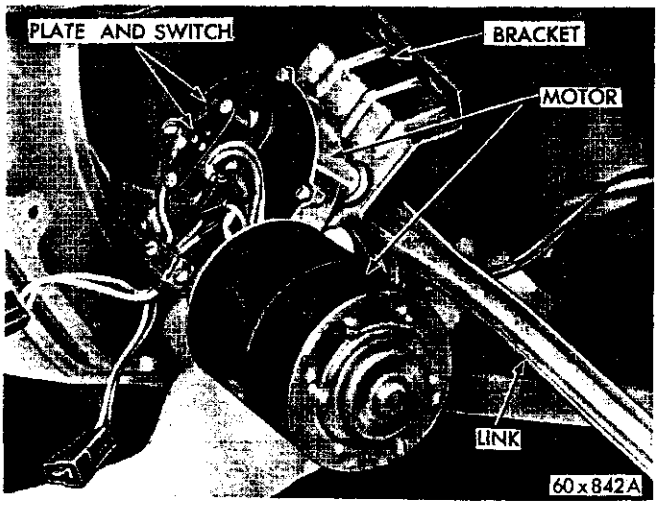


Fig. 109—Removing the Windshield Wiper Motor and Link Assembly (Typical)

DISASSEMBLY OF THE WIPER MOTOR

a. Single Speed Motor (If So Equipped)

(1) Remove the switch plate first.

(2) Remove the motor crank nut, washers and motor crank arm.

(3) Lift out the nylon gear, noting position of the gear.

(4) Remove the end head through bolts and carefully pull off the end head. The armature can then be removed.

b. Variable Speed Motor

(1) Remove the end head through bolts and pull out the end head using care so as not to break the lead wire to the brush holder.

(2) Remove the switch plate and the cover screws.

(3) Remove the crank arm nut, washers, crank arm, gear and armature in that order.

INSPECTION

(1) Thoroughly inspect the motor parts for wear, corrosion or damage.

(2) Clean the armature commutator with 00 or 000 sandpaper or if necessary, turn down the commutator.

(3) Replace worn or oil soaked brushes.

(4) Check the armature and crankshaft in their respective bushings and replace worn parts if any looseness is detected. The end play in the armature shaft is controlled by a thin thrust washer in the end plate.

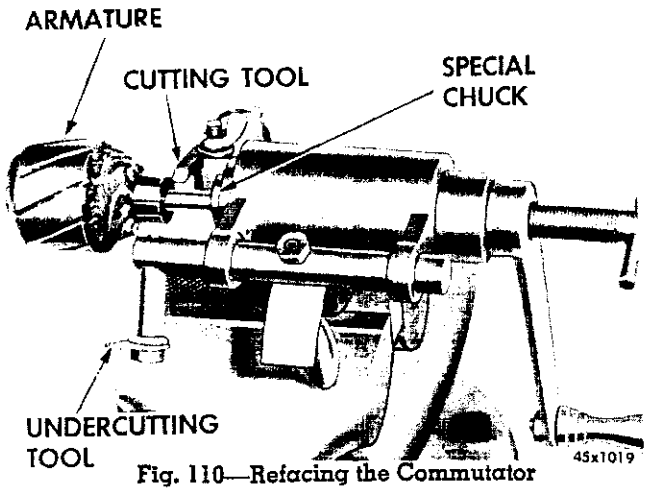


Fig. 110—Refacing the Commutator

(5) Inspect the gears for worn or broken teeth and replace those showing damage or excessive wear.

REFACING COMMUTATOR

If the armature commutator is rough or out of round, burned or the bakelite material is even with or extends above the surface of the commutator bars, the commutator should be turned down. Remove only enough metal to provide a clean smooth surface. Operation can be performed on a suitable lathe or by using Tool C-770, as shown in Fig. 110.

UNDERCUTTING BAKELITE

Undercut the bakelite segments to a depth of 1/16 inch, using Tool C-770 with special blade SP-839, as shown in Figure 111. Be sure to undercut the bakelite squarely. After undercutting, polish the commutator with 00 or 000 sandpaper to remove burred edges.

CAUTION:

Be sure the commutator is clean and free from oil or grease. A dirty, greasy commutator will cause a high resistance and greatly impair the efficiency of the wiper.

WINDSHIELD WIPER SWITCH

a. Single Speed Motor (If So Equipped)

The switch contains a built-in circuit breaker to protect the motor and is serviced only as an assembly. To test the switch, refer to the proper wiring diagram at the back of the "Electrical Group," disconnect the lead wires and remove the switch from the instrument panel. Connect a test lamp between the "B" terminal of the switch and the negative battery post. Connect a jumper wire from the positive battery terminal to the "P" terminal of the switch. The lamp should light when the switch is in the "off" position and go out when the switch is turned to the "on" position.

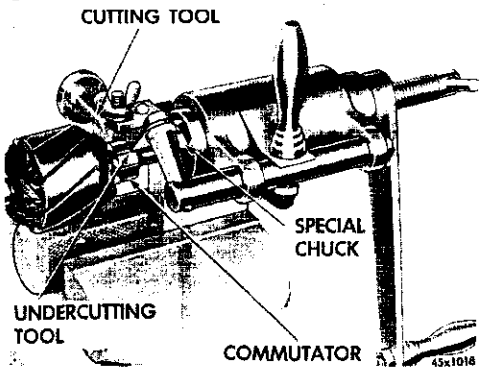


Fig. 111—Undercutting the Bakelite

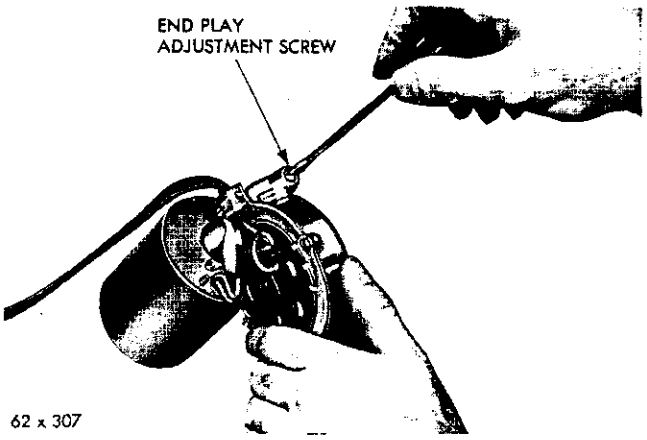


Fig. 112—End Play Adjustment

Connect the positive battery to the "R" terminal of the switch. The lamp should light when the switch is turned "on" and go out when turned "off."

b. Variable Speed Motor

The switch contains a bar resistance plate which provides a means of controlling the amount of current flow to the motor field as the switch control shaft is rotated. In addition, the switch is designed to provide a circuit to the motor to reverse the direction of the current to the field winding thus providing a means of reversing the armature. A separate circuit breaker is attached to the "B" terminal of the switch to protect the motor.

To test the switch, refer to the proper wiring diagram at the back of the "Electrical Group," disconnect the lead wires and remove the switch. Connect a jumper wire from the battery positive terminal to the case of the switch and another jumper wire from the battery positive terminal to the "FI" terminal of the switch. Connect a test lamp between the battery negative terminal and the "B" terminal of the switch. Lamp should light when switch is turned on and gradually dim as switch is turned "off." The switch is turned "off." The switch is serviced only as an assembly.

END PLAY ADJUSTMENT

To adjust the armature shaft end play turn the adjustment screw in until it bottoms and back off 1/4 turn (Fig. 112).

BENCH TESTING MOTOR

before bench testing a motor, the lead wires should be inspected for opens or shorts, and for poor connections at the switch plate.

a. Single Speed Motor (If So Equipped)

Connect the battery positive terminal to the wiper motor ground strap. Connect the black and blue wires of the motor to the negative battery terminal. Motor should continue to run. Remove black wire with blue connected. The motor should park.

b. Variable Speed Motor

Connect the yellow wire to the motor ground strap. Connect the battery positive terminal to the motor ground strap. Connect the red and black wires to the battery negative terminal. The motor should run in the wipe direction.

To park the motor, connect the blue and yellow wire to the battery negative terminal. Connect the battery positive terminal to the motor ground strap. Connect the red wire to the motor ground strap. Momentarily touch the black wire to the yellow and blue wire. The motor should park.

ASSEMBLY OF WIPER MOTOR

Make sure the gear teeth are adequately covered with long fibre grease.

The correct indexing of the contact plate (constant speed motor) or the contact follower (variable speed motor) on the nylon gear is important. After the armature, nylon gear, and crank arm are installed, index the contact plate (constant speed motor) on the nylon gear with the slot pointing in the same direction as the motor crank arm. Install the contact follower (variable speed motor) with open end pointing in the same direction as the motor crank arm.

ASSEMBLY OF WIPER LINK—VARIABLE SPEED

Install the spring washer, concave surface toward the crank arm. Install the crank pivot coil spring on the pivot. Install the spring release.

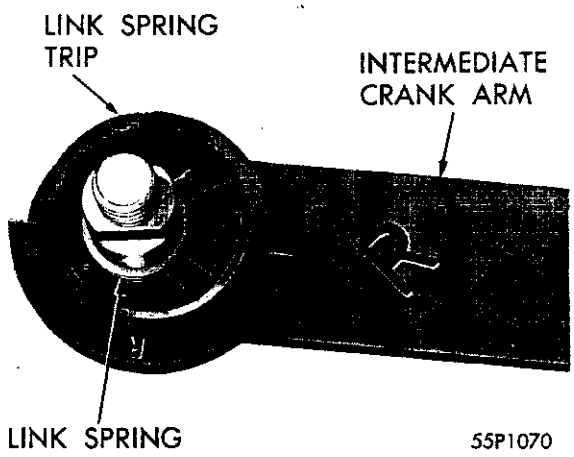


Fig. 113—Link Spring Trip Installed (Variable Speed)

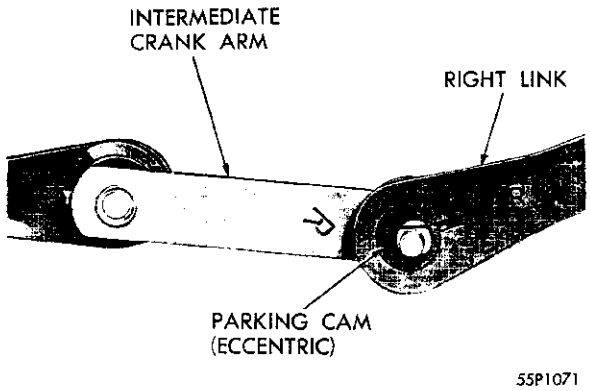


Fig. 114—Link Arm Installed (Variable Speed)

Install the parking cam to index with the spring release and engage the spring ends, between the release and parking cam in the openings at point of index (Fig. 113).

If the intermediate crank is held so that the letter "L" is visible, install the cam release so that the letter "L" can be seen from that position. The opposite side will show three letters "R."

Install the spring washer, convex surface toward the cam assembly. Install the link arm with the stop projection on the link arm toward the cam assembly. Install the retaining bolts and nut (Fig. 114). Assemble the left link and cam assembly in the same manner locking in place with a clip.

WINDSHIELD WIPER MOTOR INSTALLATION

(1) Enter the wiper motor, bracket and links through the glove box opening and attach the link arms to the pivot crank pins.

(2) Install the spring washer and lock clips on the crank pins.

(3) Install the wiper motor and bracket attaching nuts. Tighten the nuts securely.

(4) Adjust the wiper parking position by moving the wiper motor parking switch plate.

(5) Connect the wires at the wiper motor.

(6) Install the glove compartment and the compartment door.

REPLACING WIPER PIVOT

Remove the wiper blade. Disconnect the link from the pivot. Remove the pivot retaining plate pivot and gasket.

Install a new gasket and pivot.

Tighten the retaining nuts securely. Re-install wiper link. Install the wiper arm and blade.

ELECTROLUMINESCENT LIGHTING, INSTRUMENTS, GAUGES, AND DIRECTIONAL INDICATORS

MODELS SC-1, SC-2, SC-3, SY-1

OPERATION

Electroluminescent panel lighting used in all Chrysler and Imperial Models, achieves a soft uniform glow that illuminates the panel instruments without objectionable intensity or annoying glare. Light level is adjusted by means of a manually controlled knob.

Electroluminescent lighting has no filaments or gases, but instead is composed of laminated layers of material which glow when an alternating current is applied. A typical lamp (Fig. 115) is composed of several layers as follows:

(1) A sheet of vitreous enameling steel forms the instrument back.

(2) A layer of solid ceramic similar to porcelain is applied to the steel sheet.

(3) A layer is then added which has panelescent phosphor suspended in ceramic.

(4) A transparent electrically conducting layer is then added.

(5) A finish layer of transparent glass coating is sprayed on.

This lamp is electrically a condenser. When A/C potential is applied between the steel plate and the transparent electrically conducting layer, the electric field excites the dielectric causing a solid state, which results in visible light. (The phosphorescent surface acts as a dielectric between the two conducting surfaces and it also has the property of glowing when excited by a high frequency high voltage current.) The layer principle is also applied to the pointers, and, as a result the instrument pointers are a light source in themselves, as are the instrument dials.

Electroluminescent is powered from a transistor oscillator, which connects the 12 volt D/C to 200 volts A/C at 250 cycles per second. This power pack (Fig. 116) is mounted on the cowl side panel underneath the instrument panel.

The main components of the electroluminescent panel lighting is composed of:

(1) The A/C power pack.

(2) The individual instrument lighting.

(3) The connecting wiring.

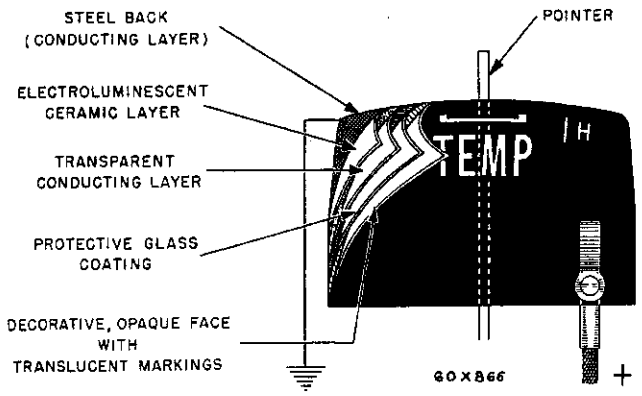


Fig. 115—Electroluminescense Panel Lighting

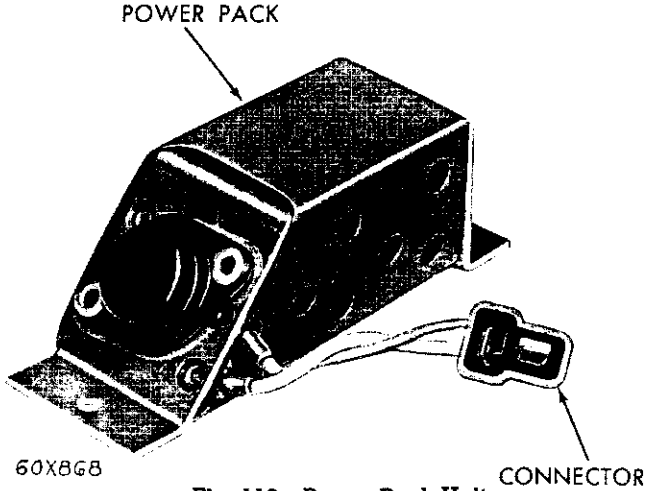


Fig. 116—Power Pack Unit

INSTRUMENT CLUSTER AND SPEEDOMETER HEAD

a. Removal (Models SC-1, SC-2, SC-3)

(1) Disconnect the battery ground cable.

(2) Remove the steering wheel as described in "Steering" Group 19.

(3) Remove the steering jacket tube cover from underside of the jacket tube (Fig. 117).

(4) Disconnect all the wires at the terminals before loosening the cluster attaching screw. Disconnect the instrument ground wire.

(5) Remove the screws which attach the instrument cluster bezel to the instrument panel. Remove the bezel (Fig. 118). Disconnect the speedometer cable.

(6) Loosen the two screws (one on each side of the steering jacket tube) and remove the steering

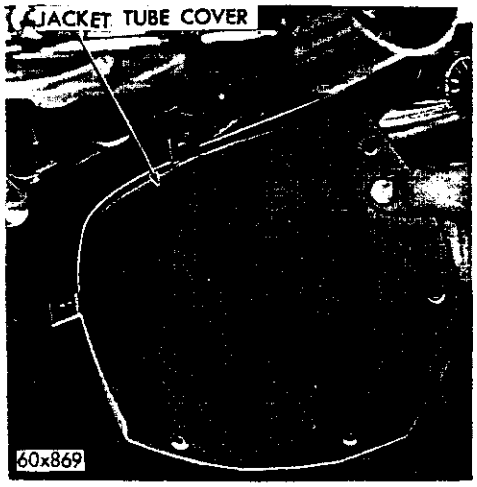


Fig. 117—Removing the Jacket Tube Cover

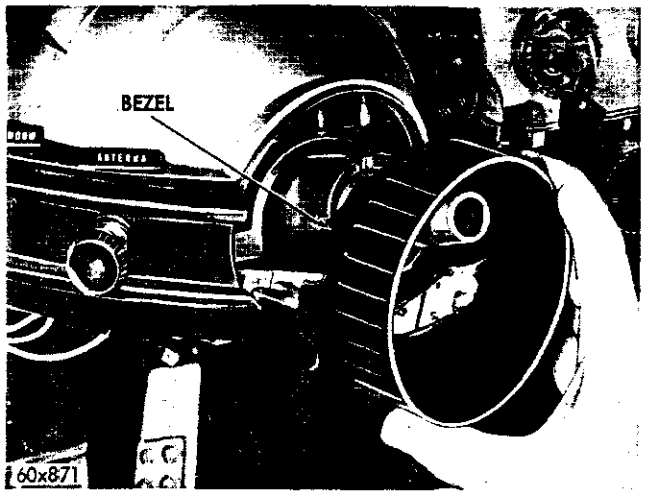


Fig.119—Removing the Jacket Tube Collar

tube collar (Fig. 119).

(7) Remove the two long screws and spacers attaching the dome and cluster assembly to the dome support. These screws are located just behind the steering tube collar attaching screws. (See Fig. 119.)

(8) Remove the four screws attaching the plastic dome to the instrument panel.

(9) Carefully release the base of the dome from the supports at each side and with a pointed instrument, carefully move the dome away from the opening in the instrument panel, so that the top of the dome and cluster can be tipped outward, towards you far enough, in order to reach the parking brake warning lamp socket.

NOTE: In some cases where the dome fits tightly in the support, it may be necessary to remove the six (6) slotted machine screws that attach the cluster to the dome. Push the cluster up into the dome, and

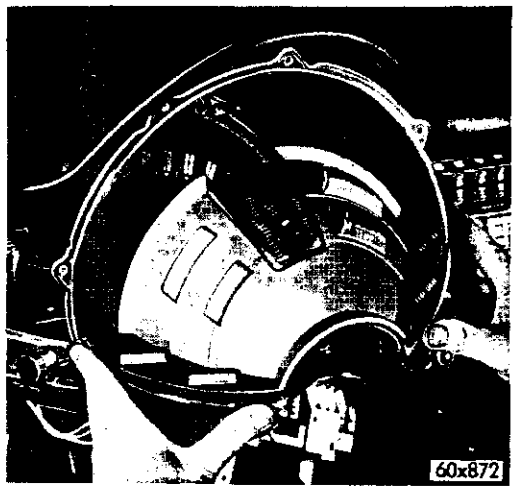


Fig. 120—Removing the Instrument Cluster and Dome

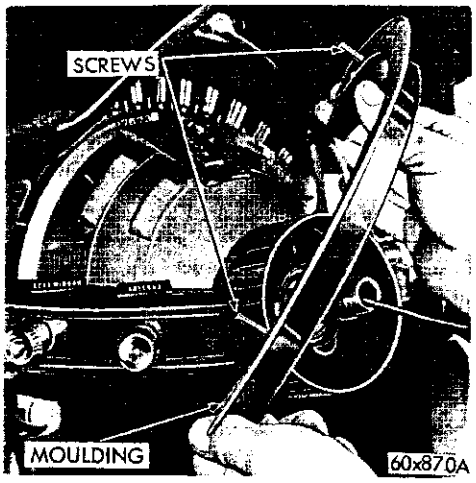


Fig. 118—Removing the Instrument Cluster Dome Moulding

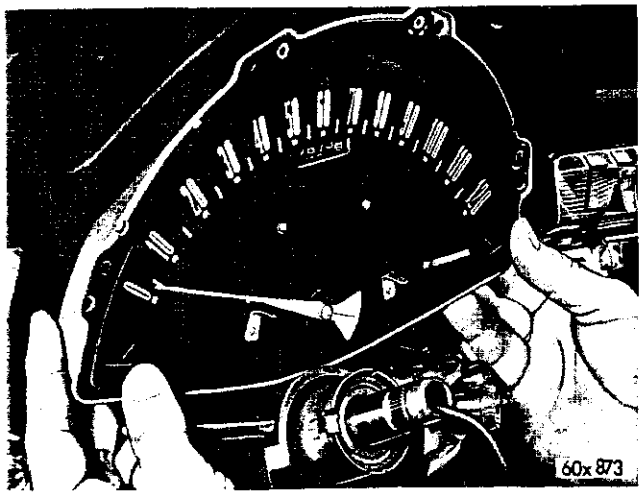


Fig. 121—Removing the Speedometer Head Assembly

the dome can then be carefully compressed to clear the supports on removal.

(10) Snap out the brake lamp socket and lamp and remove the dome and cluster assembly from the car, as shown in Fig. 120.

(11) Remove the four screws and remove the speedometer head assembly (Fig. 121).

(12) The plastic dome is attached to the cluster by six slotted machine head screws (Fig. 122).

b. Installation

(1) Install the speedometer head assembly (Fig. 121). Install and tighten the speedometer to panel attaching screws.

(2) Position the instrument cluster in the instrument panel housing and install the parking brake warning lamp in the cluster well socket.

(3) Work the dome and cluster carefully into position, entering the right corner of the dome base into the dome supports. Carefully move the assembly with a slight rocking motion until the dome and cluster assembly is in position on the instrument panel. (Springing down slightly on the dome supports will aid the installation.)

(4) Install the four screws attaching the plastic dome to the instrument panel.

(5) Install the two dome cluster spacers and screws. (Near the steering tube.) (See Fig. 119.)

(6) Install the steering tube collar and tighten the two collar attaching screws (Fig. 119).

(7) Connect all the wires disconnected at the time of removal (including ground).

(8) Install the instrument dome molding (Fig. 118). Connect the speedometer cable.

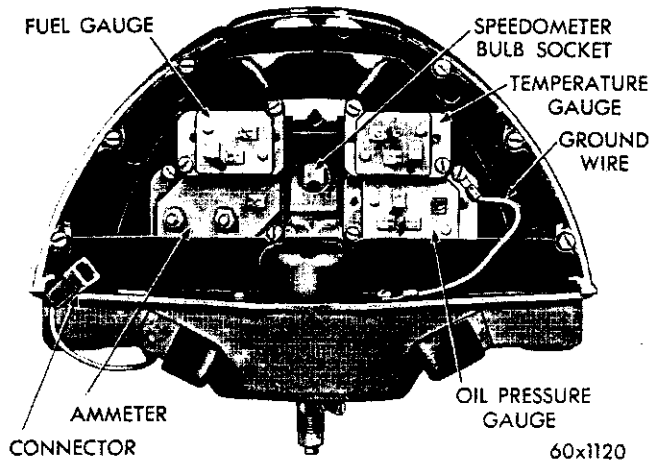


Fig. 122—Instrument Panel Cluster (Back View)

(9) Install the jacket tube cover and the cover attaching screws (Fig. 117).

(10) Install the steering wheel and steering wheel nut. Tighten to 40 foot-pounds torque. Install the horn blowing components, as described in "Steering" Group 19.

(11) Connect the battery ground cable.

INSTRUMENT

Removal (Models SC-1, SC-2, SC-3)

(1) Disconnect the battery ground cable.

(2) Remove the steering jacket tube cover (Fig. 117).

(3) Disconnect the wires at the instrument to be replaced (Fig. 122).

(4) **Oil Pressure Gauge:** When removing the oil pressure gauge, remove the ground wire and the two screws from the speedometer dust shield. Loosen the temperature gauge attaching screws. Remove the oil pressure gauge attaching screws. Carefully remove the oil pressure gauge.

(5) **Ammeter:** When removing the ammeter, remove the two screws from the speedometer dust shield. Loosen the fuel gauge attaching screws. Remove the ammeter attaching screws. Carefully remove the ammeter.

(6) **Fuel Gauge:** When removing the fuel gauge, remove the fuel gauge attaching screws, and carefully remove the fuel gauge.

(7) **Temperature Gauge:** When removing the temperature gauge, remove the temperature gauge attaching screws, and carefully remove the temperature gauge.

Installation

(1) **Temperature Gauge:** Carefully install the temperature gauge into position, and start the attaching screws. Be sure the pointer does not interfere with the cluster dial. Tighten the attaching screws.

(2) **Fuel Gauge:** Carefully install the fuel gauge, and start the attaching screws. Be sure the pointer does not interfere with the cluster dial. Tighten the attaching screws.

(3) **Ammeter:** When installing the ammeter, be sure the fuel gauge screws are loosened, and the screws are removed from the speedometer dust shield, so that the ammeter may be carefully installed. Start the ammeter attaching screws. Be sure the ammeter pointer is not distorted, and does not interfere with the cluster dial. Tighten the ammeter

attaching screws. Align the fuel gauge, and tighten the fuel gauge attaching screws. Install the speedometer dust shield attaching screws and ground wire. Tighten the screws.

(4) **Oil Pressure Gauge:** When installing the oil pressure gauge, be sure the temperature gauge screws are loosened, and that the speedometer dust shield screws are removed. Carefully install the oil pressure gauge. Be sure the oil pressure gauge pointer is not distorted, and does not interfere with the cluster dial. Install the oil pressure gauge attaching screws and ground wire. Tighten the oil pressure gauge attaching screws. Align the temperature gauge and tighten the attaching screws.

Install the speedometer dust shield screws and ground wire, and tighten the screws.

(5) Connect the instrument wires. Connect the instrument panelescent lighting wires. (See Fig. 122.)

(6) Connect the battery ground cable, and test the instrument operation and lighting.

(7) Install the steering jacket tube cover. (See Fig. 117.)

INSTRUMENT CLUSTER AND SPEEDOMETER HEAD

a. Removal (Models SY-1)

(1) Disconnect the battery ground cable.

NOTE: If vehicle is equipped with either a heater or air conditioning, or both, it will be necessary to remove the defroster and spot cooler hoses.

(2) Disconnect the speedometer cable at the speedometer head.

(3) Disconnect the odometer reset cable at the instrument panel cluster.

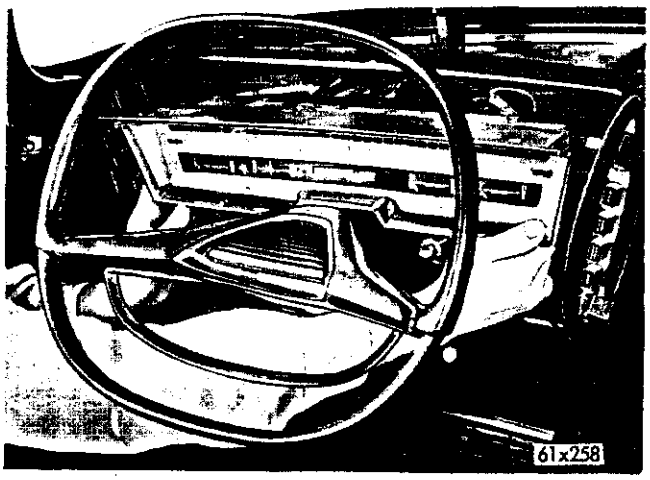


Fig. 123—Removing the Instrument Cluster Panel

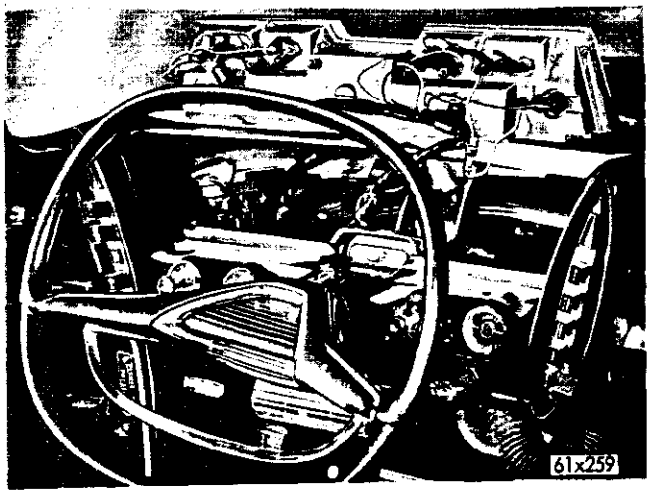


Fig. 124—Instrument Cluster Panel Removed

NOTE: To avoid scratching the paint finish on the instrument panel when the instrument cluster is removed, it is recommended that several strips of masking tape be placed on each side of the steering jacket tube.

(4) Remove the five screws securing the instrument cluster to the instrument panel. Carefully remove the instrument cluster (Fig. 123) by tilting the lower end of the cluster outward.

NOTE: For speedometer or complete cluster removal, disconnect all electrical connections, and disengage the wire harness loom from harness clips and remove the cluster to the work bench for further disassembly (Fig. 124).

b. Installation

(1) Connect all electrical connections that were disconnected at removal, and engage the wire harness loom securely on the wire harness clips.

(2) Carefully install the instrument cluster in position on the instrument panel, and install and tighten the five instrument cluster to instrument panel attaching screws.

(3) Connect the speedometer and odometer cables to the instrument panel cluster. Make sure that the speedometer cable is properly retained in the attaching clips provided and that it is free of any sharp bends.

NOTE: If vehicle is equipped with either a heater or air conditioning, or both, connect the defroster and spot cooler hoses.

(4) Connect the battery ground cable.

INSTRUMENT

a. Removal (Models SY-1)

(1) Disconnect the battery ground cable.

NOTE: The following instruments and switches can be removed and installed from underneath the instrument panel without removing the instrument cluster. If vehicle is equipped with either a heater or air conditioning, or both, it will be necessary to remove the defroster and spot cooler hoses.

(2) Disconnect the wires at the instrument to be replaced.

(3) **Oil Pressure Gauge:** Remove the one attaching screw at the outer end holding the oil pressure gauge. Remove the center screw attaching both the oil pressure gauge and ammeter, then carefully remove the oil pressure gauge.

(4) **Ammeter:** Remove the one attaching screw at the outer end holding the ammeter. Remove the center screw attaching both the ammeter and oil pressure gauge, then carefully remove the ammeter.

(5) **Fuel Gauge:** Remove the one attaching screw at the outer end holding the fuel gauge. Remove the center screw attaching both the fuel gauge and the temperature indicator, then carefully remove the fuel gauge.

(6) **Temperature Indicator:** Remove the one attaching screw at the outer end holding the temperature indicator. Remove the center screw attaching both the temperature indicator and the fuel gauge, then carefully remove the temperature indicator.

b. Installation

(1) **Temperature Indicator:** Carefully install the temperature indicator in position and start the center fuel gauge and temperature indicator attaching screw, then install the one attaching screw at the outer end. Tighten both attaching screws. Connect the instrument wires.

(2) **Fuel Gauge:** Carefully install the fuel gauge in position and start the center temperature indicator and fuel gauge attaching screw, then install the one attaching screw at the outer end. Tighten both attaching screws. Connect the instrument wires.

(3) **Ammeter:** Carefully install the ammeter in position and start the center ammeter and oil pressure gauge attaching screws, then install the one attaching screw at the outer end. Tighten both attaching screws. Connect the instrument wires.

(4) **Oil Pressure Gauge:** Carefully install the oil pressure gauge in position and start the center oil pressure gauge and the ammeter attaching screw, then install the one attaching screw at the outer end. Tighten both attaching screws. Connect the instrument wires.

NOTE: After each instrument is installed, connect the battery cable, and test the operation of the instrument removed. If the car is equipped with either heater or air conditioning, or both, connect the defroster and spot cooler hoses.

HEADLAMP SWITCH

a. Removal (Model SY-1)

(1) Disconnect the battery ground cable.

(2) Remove the headlamp switch knob by releasing the retainer on the body of the switch. (Knob must be in the full "IN" position before the knob stem can be released.)

(3) Remove the switch chrome bezel nut.

(4) Remove the switch chrome plate.

(5) Remove the switch back dial plate and the dial lamp.

(6) Remove the switch retaining nut.

(7) Remove the light switch from the panel.

(8) Disconnect the connector plugs and connections.

b. Installation

(1) Connect the wires and connections, and position the light switch on the instrument panel.

(2) Install the light switch retainer nut.

(3) Install the switch back dial plate and the dial lamp.

(4) Install the switch chrome plate.

(5) Install the switch chrome bezel nut.

(6) Install the headlamp switch knob and stem.

(7) Connect the battery cable.

WINDSHIELD WIPER AND WASHER SWITCH

a. Removal (Model SY-1)

(1) Disconnect the battery ground cable.

(2) Loosen the set screw and remove the control knob and automatic windshield washer control stem.

NOTE: Use care when removing the windshield wiper control so as not to damage washer control stem.

(3) Remove the bezel nut and the dial plate.

(4) Remove the back dial plate and the dial lamp to uncover the switch retaining nut, remove the nut.

(5) Remove the switch from the rear of the instrument panel.

(6) Disconnect the wires and connections and remove switch.

(7) Remove washer switch from wiper switch.

b. Installation

(1) Install the washer switch on wiper switch.

(2) Connect the wires and connections.

(3) Position the switch on instrument panel and install and tighten switch retaining nut.

(4) Install the dial lamp and dial back plate.

(5) Install the dial plate and bezel nut.

(6) Position the washer control stem and install control knob and tighten set screw.

(7) Connect the battery cable.

IGNITION SWITCH

a. Removal (Model SY-1)

(1) Disconnect the battery ground cable.

(2) Remove the switch bezel nut.

(3) Remove the dial plate and back dial.

(4) Remove the dial lamp and switch retaining nut.

(5) Remove the switch from rear of instrument panel.

(6) Disconnect all wires and remove switch assembly.

b. Installation

(1) Connect all wires and connectors.

(2) Position the switch on instrument panel.

(3) Install the switch retaining nut.

(4) Install the switch dial lamp and dial face.

(5) Install the dial plate.

(6) Install the switch bezel nut.

(7) Connect the battery cable.

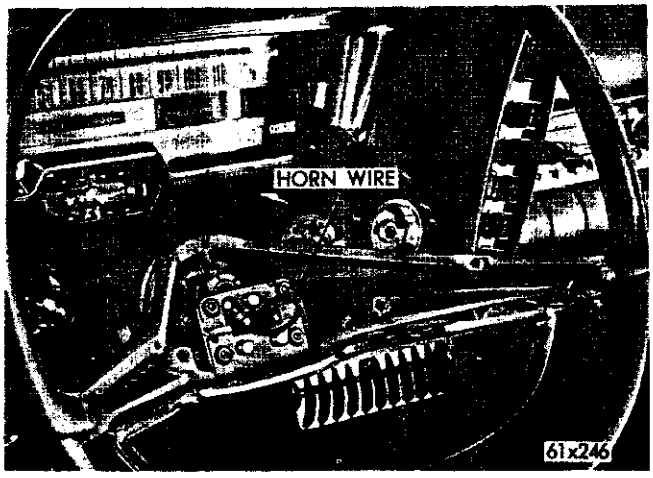


Fig. 125—Horn Switch and Horn Wire

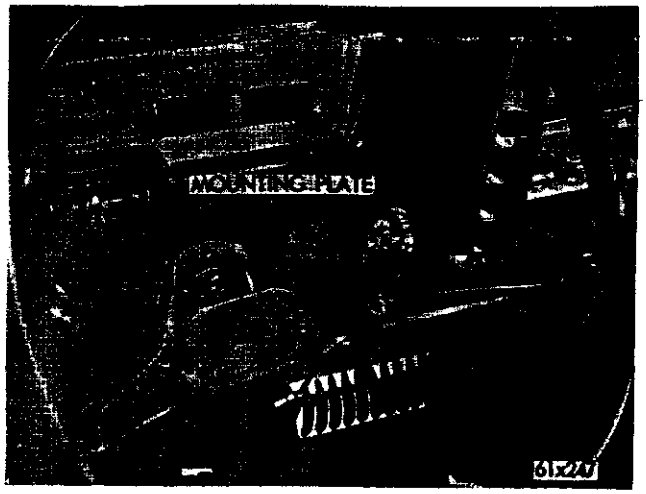


Fig. 126—Horn Blowing Ring Mounting Plate

NOTE: The brake warning lamps, high beam lamp, turn signal lamps can be reached from underneath the instrument panel without removing the instrument cluster.

DIRECTIONAL SWITCH (Model SY-1)

Removal

(1) Disconnect the cable at the battery negative post.

(2) Remove the two screws from the underside of the steering wheel and remove the horn blowing actuator and steering wheel cover.

(3) Disconnect the horn wire at the horn blowing switch.

(4) Remove the four screws and insulators and remove the horn blowing switch (Fig. 125).

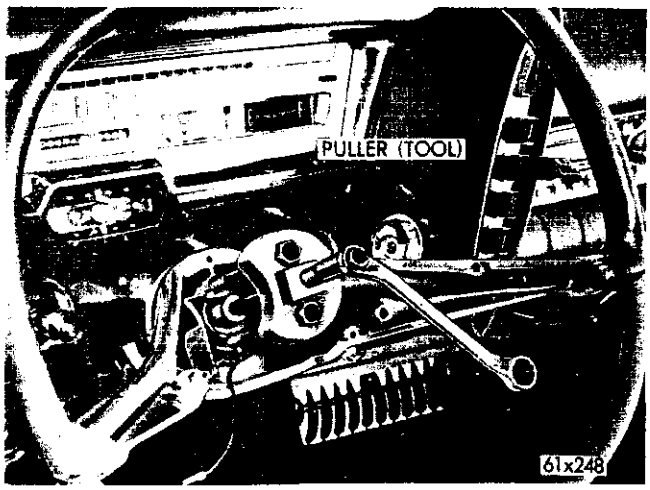


Fig. 127—Removing the Steering Wheel

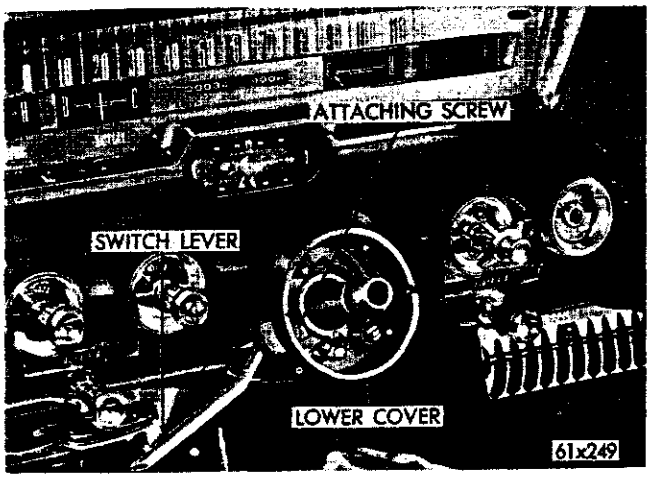


Fig. 128—Directional Switch and Lever—Steering Wheel Removed

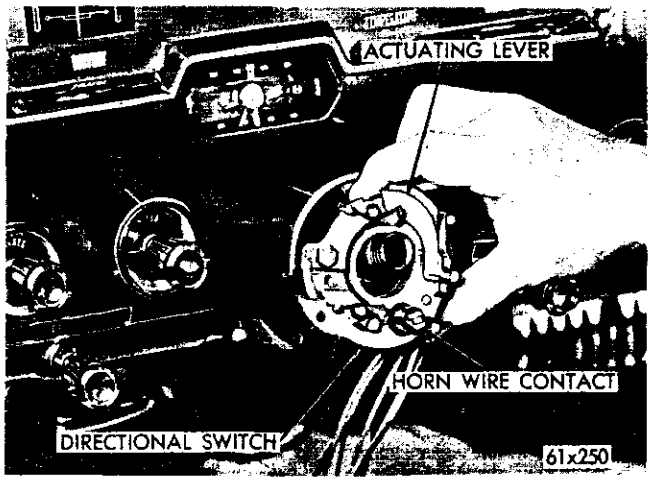


Fig. 129—Removing the Directional Switch

(5) Remove the four screws and remove the horn blowing switch (Fig. 126).

(6) Loosen the steering wheel nut several turns and install the Steering Wheel Puller Tool C-3428 (Fig. 127) and remove the steering wheel nut and steering wheel.

(7) Remove the directional switch lever (Fig. 128).

(8) Remove the steering column lower cover.

(9) Remove the two screws and disconnect the switch wires at the connection and remove the directional switch and wires (Fig. 129).

Installation

(1) Position the directional switch, install the attaching screws and wire connections.

(2) Install the steering column lower cover.

(3) Install the directional switch lever.

(4) Install the steering wheel and steering wheel nut, tighten the nut to 40 foot-pounds torque. Test the operation of the cancelling lever.

(5) Install the horn blowing switch mounting plate and the four attaching screws.

(6) Install the horn blowing switch, insulators and attaching screws. Connect the horn wire.

(7) Install the horn blowing actuator, steering wheel cover and attaching screws.

(8) Connect the battery cable at the battery negative post.

DIRECTIONAL SIGNAL SWITCH

a. Removal (Models SC-1, SC-2, SC-3)

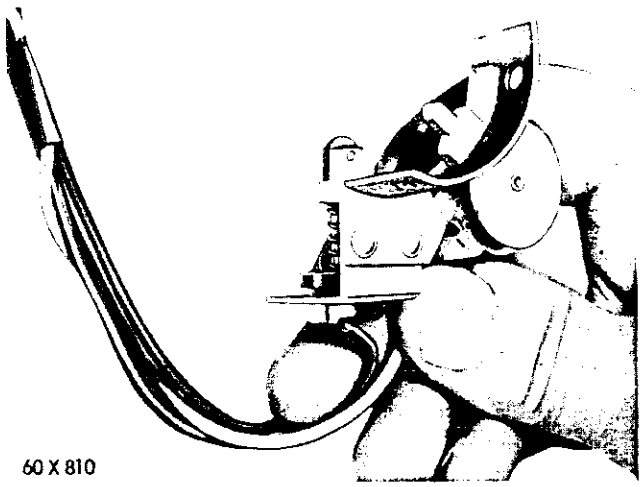


Fig. 130—Removing the Turn Signal Switch

(1) Disconnect the battery ground cable.

(2) Disconnect the directional signal wires at the connectors.

(3) Remove the directional signal switch (held to the jacket tube by two screws) (Fig. 130).

b. Installation

(1) Connect the directional signal switch wires at the connectors.

(2) Position the turn signal switch on the column tube making sure the column jacket does not restrict switch movement and install the two attaching screws.

THERMAL TYPE GAUGES

OPERATION

Thermal type gauges operate on a principle of constant voltage being applied, and are sensitive only to changes in fuel level, oil pressure or temperature.

The constant voltage is connected in parallel to the gauges and provides the same regulated voltage to the gauges.

The constant voltage is provided through the use of a voltage regulator contained inside the oil pressure gauge case on Models SC-1, SC-2, SC-3 and in the temperature gauge on Model SY-1.

The terminals on the gauge that houses the constant voltage regulator internally is marked as follows:

"A"—is the output terminal for the controlled voltage from the regulator.

"I"—is the 12 volt input voltage terminal to the voltage regulator.

"S"—is the terminal for the connection to the sending unit.

The gauges (related to the thermal system) that do not contain the regulator will have only the controlled voltage terminal and the terminal for the connection to the sending unit.

a. Tank Unit

A float is hinged to allow the float to raise or lower dependent on the fuel level. The float connects to a variable resistance that provides a change in the resistance with any up or down motion of the float through a wiping contact in the gauge body (Fig. 131).

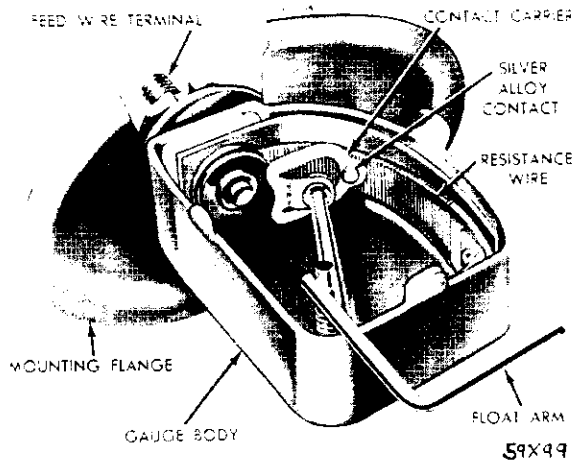


Fig. 131—Tank Unit (Typical)

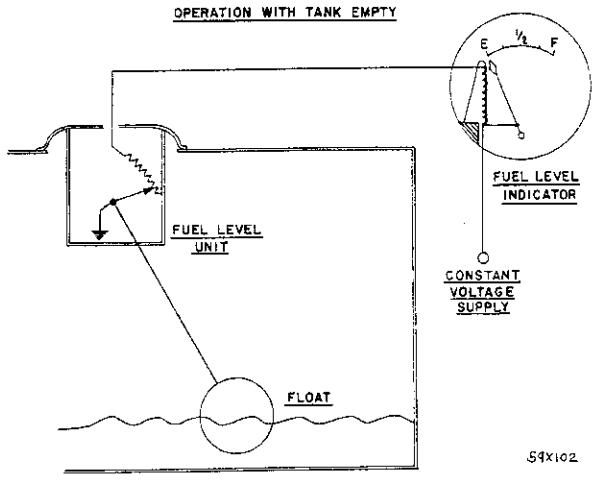


Fig. 132—Operation with the Tank Empty

b. Fuel Level Indicating System

Turning the ignition key on connects the system to the battery or charging system voltage. The function of current in the circuit is high. The panel gauge voltage from the car battery or charging system to a constant voltage or approximately 5 volts D.C.

When the fuel level is low or empty, the resistance is increased which decreases the current flow and consequently positions the panel gauge pointer to low or empty (Fig. 132).

When the tank is full, the float level is at the top, the minimum resistance is in the circuit and the flow of current in the circuit is high. The panel gauge pointer will be moved across the dial to indicate a full tank (Fig. 133).

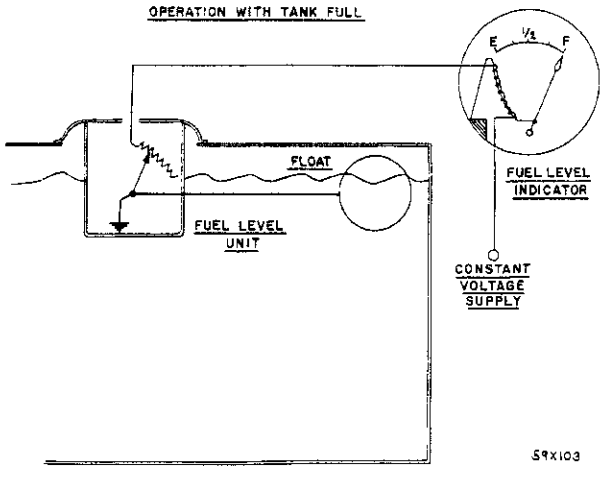


Fig. 133—Operation with the Tank Full

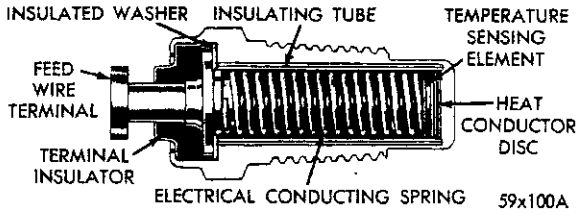


Fig. 134—Engine Temperature Sending Unit

c. Engine Temperature Sending Unit (Fig. 134)

This unit like the fuel level tank unit operates on a principle of varying resistance.

d. The Temperature Indicating System

The operation of the temperature indicating system is identical in operation with fuel system with the exception of the method of varying the resistance of the sending unit.

When the engine is cold the resistance of the disc in the temperature sending unit is high. Low temperature will be indicated (Fig. 135).

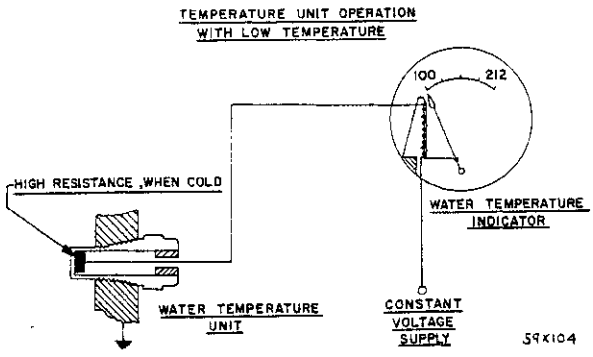


Fig. 135—Operation at Low Temperature

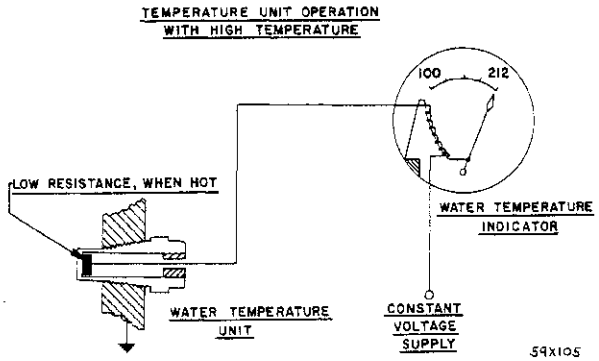


Fig. 136—Operation at High Temperature

As the engine temperature increases the resistance of the temperature sending unit disc starts to decrease. A resultant increase in the current flow will occur causing the gauge pointer to indicate the increase in engine temperature (Fig. 136).

e. Oil Pressure Sending Unit (Fig. 137) (SC-1, SC-2, SC-3)

This unit consists of a spring loaded diaphragm and a variable resistance unit. The electrical circuit for the oil pressure system grounds through the pin in the diaphragm.

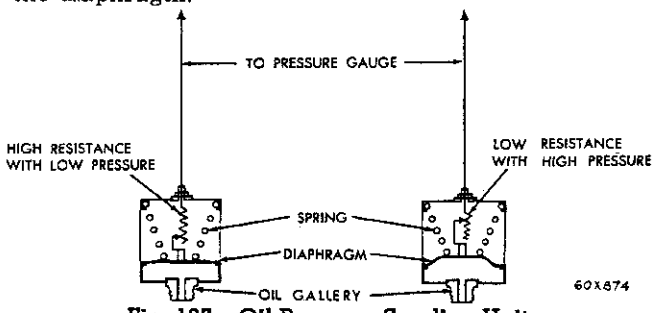
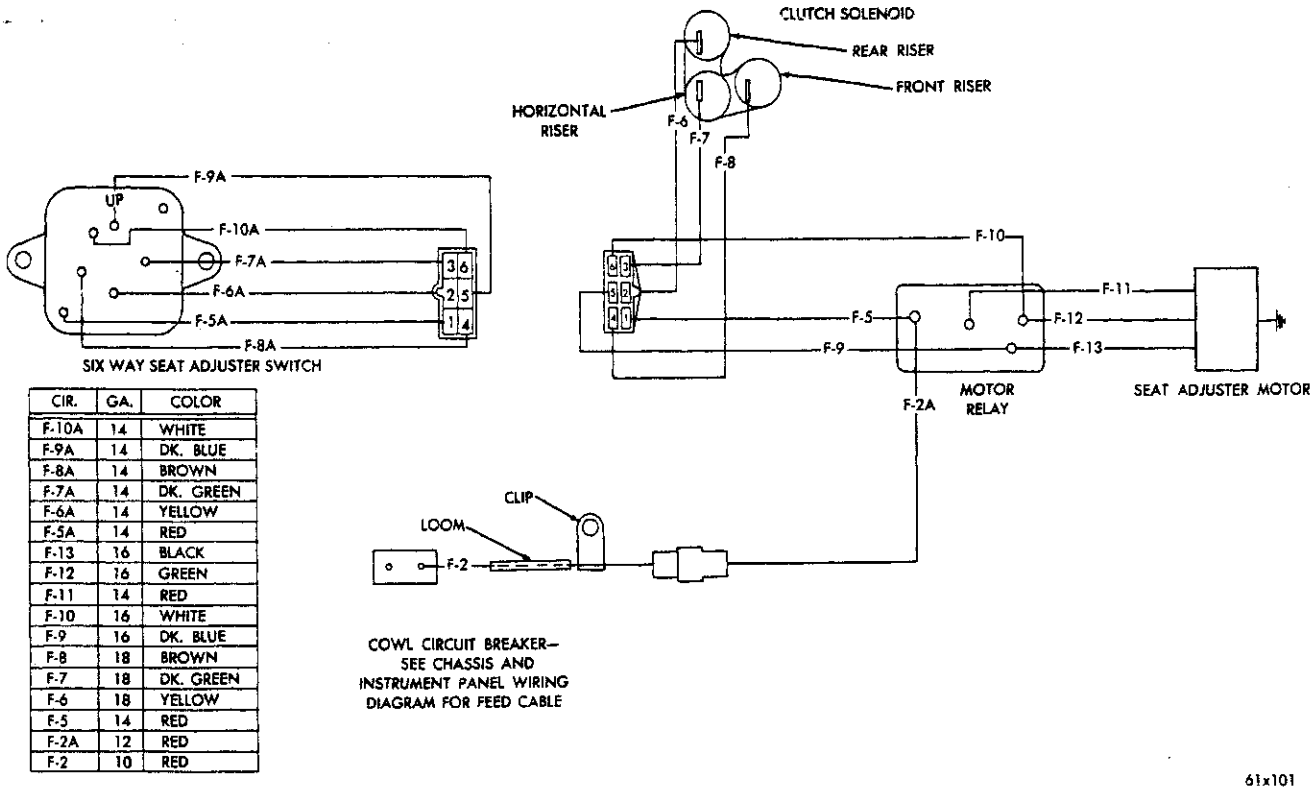
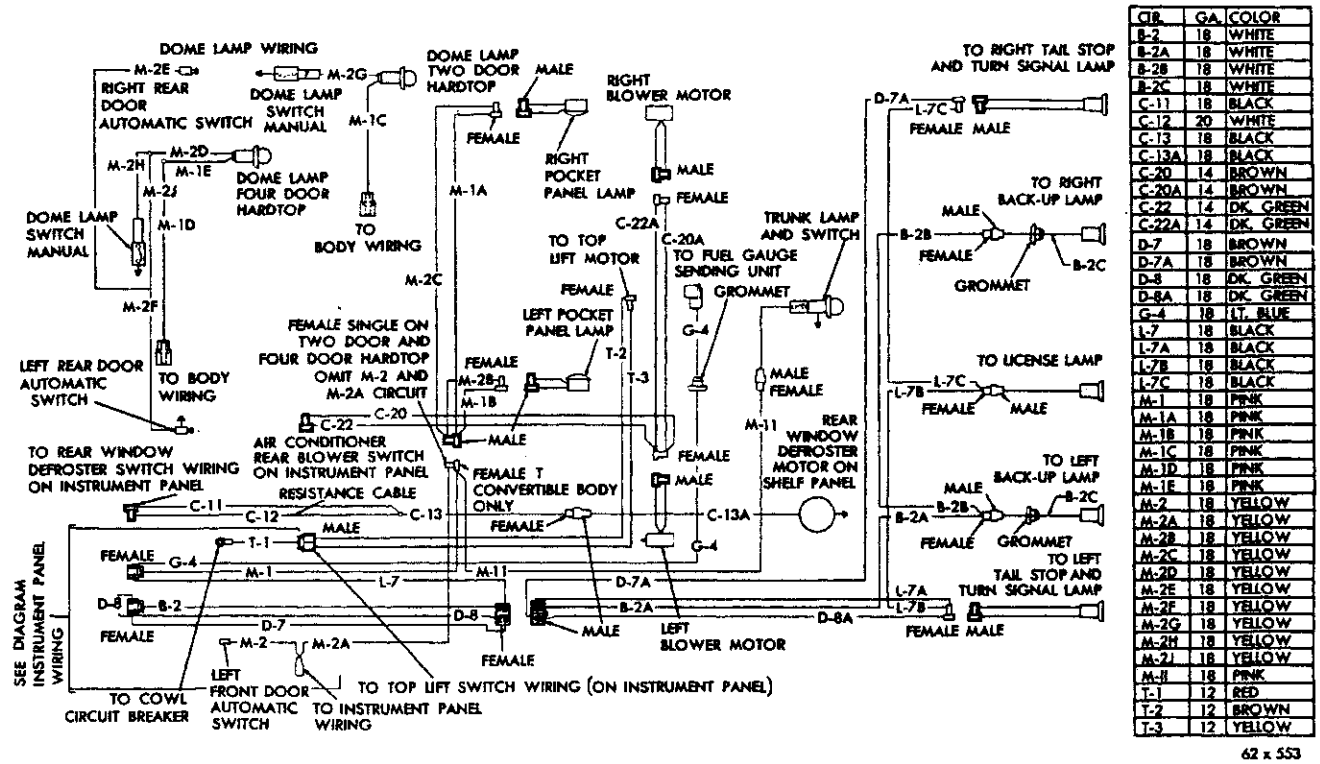


Fig. 137—Oil Pressure Sending Unit



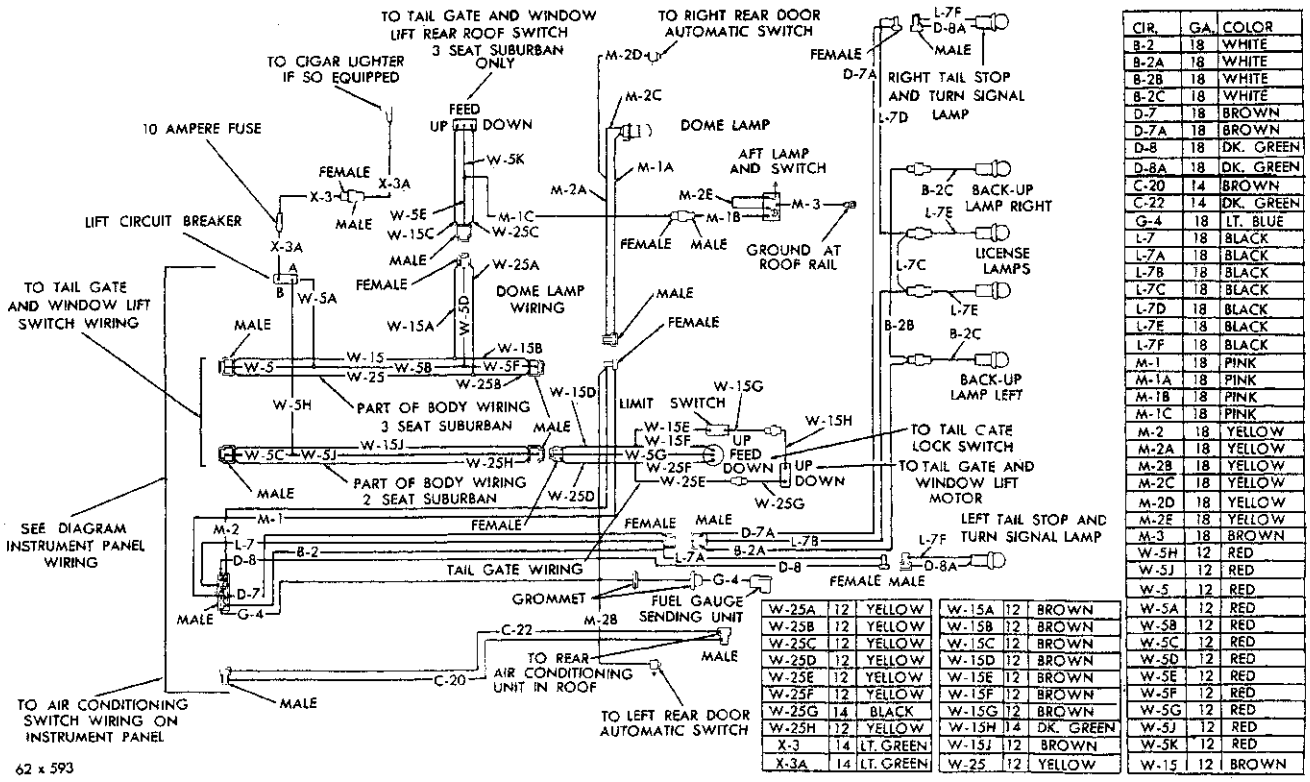
CIR.	GA.	COLOR
F-10A	14	WHITE
F-9A	14	DK. BLUE
F-8A	14	BROWN
F-7A	14	DK. GREEN
F-6A	14	YELLOW
F-5A	14	RED
F-13	16	BLACK
F-12	16	GREEN
F-11	14	RED
F-10	16	WHITE
F-9	16	DK. BLUE
F-8	18	BROWN
F-7	18	DK. GREEN
F-6	18	YELLOW
F-5	14	RED
F-2A	12	RED
F-2	10	RED

Fig. 138—Six Way Seat Adjusting Wiring Diagram



CIR.	GA.	COLOR
B-2	18	WHITE
B-2A	18	WHITE
B-2B	18	WHITE
B-2C	18	WHITE
C-11	18	BLACK
C-12	20	WHITE
C-13	18	BLACK
C-13A	18	BLACK
C-20	14	BROWN
C-20A	14	BROWN
C-22	14	DK. GREEN
C-22A	14	DK. GREEN
D-7	18	BROWN
D-7A	18	BROWN
D-8	18	DK. GREEN
D-8A	18	DK. GREEN
G-4	18	LT. BLUE
L-7	18	BLACK
L-7A	18	BLACK
L-7B	18	BLACK
L-7C	18	BLACK
M-1	18	PINK
M-1A	18	PINK
M-1B	18	PINK
M-1C	18	PINK
M-1D	18	PINK
M-1E	18	PINK
M-2	18	YELLOW
M-2A	18	YELLOW
M-2B	18	YELLOW
M-2C	18	YELLOW
M-2D	18	YELLOW
M-2E	18	YELLOW
M-2F	18	YELLOW
M-2G	18	YELLOW
M-2H	18	YELLOW
M-2J	18	YELLOW
M-11	18	PINK
T-1	12	RED
T-2	12	BROWN
T-3	12	YELLOW

Fig. 139—Body and Dome Lamp Wiring Diagram (Except Town and Country) (Chrysler)

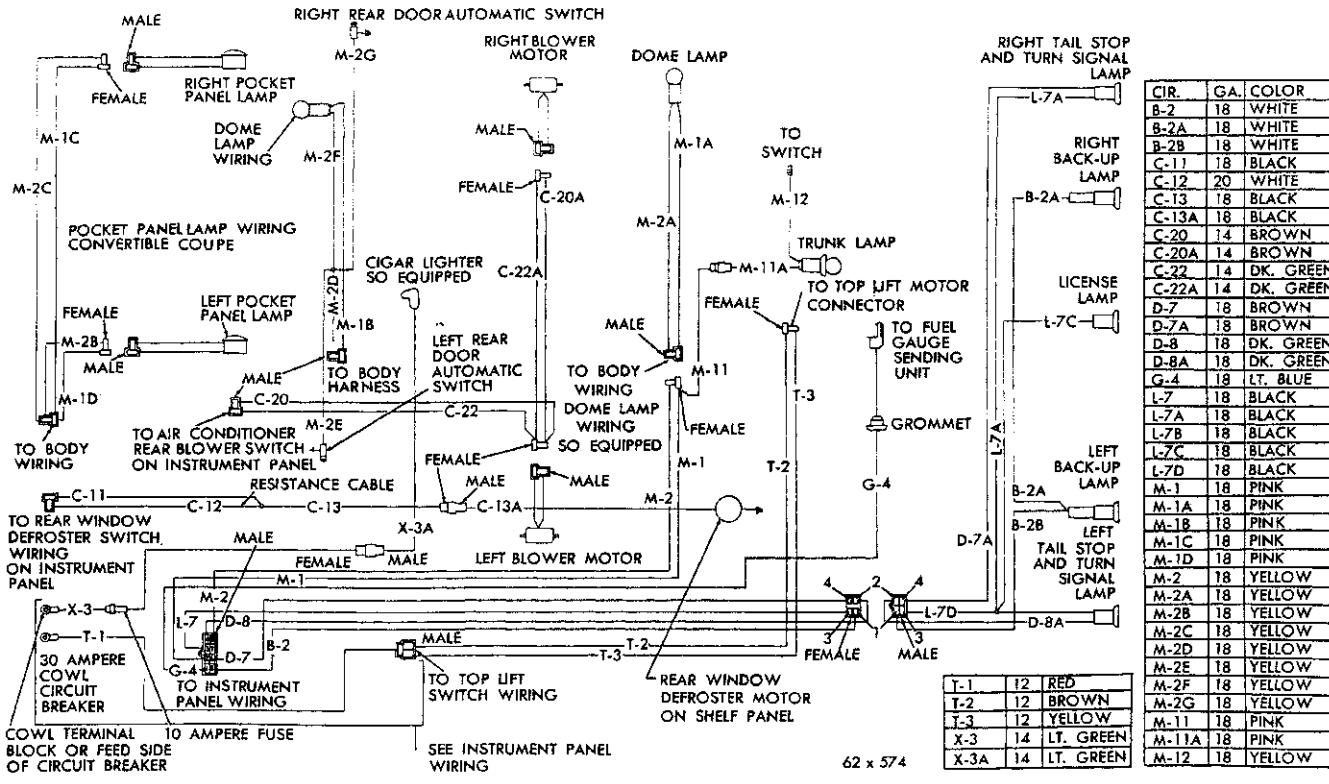


CIR.	GA.	COLOR
B-2	18	WHITE
B-2A	18	WHITE
B-2B	18	WHITE
B-2C	18	WHITE
D-7	18	BROWN
D-7A	18	BROWN
D-8	18	DK. GREEN
D-8A	18	DK. GREEN
C-20	14	BROWN
C-22	14	DK. GREEN
G-4	18	LT. BLUE
L-7	18	BLACK
L-7A	18	BLACK
L-7B	18	BLACK
L-7C	18	BLACK
L-7D	18	BLACK
L-7E	18	BLACK
L-7F	18	BLACK
M-1	18	PINK
M-1A	18	PINK
M-1B	18	PINK
M-1C	18	PINK
M-2	18	YELLOW
M-2A	18	YELLOW
M-2B	18	YELLOW
M-2C	18	YELLOW
M-2D	18	YELLOW
M-2E	18	YELLOW
M-3	18	BROWN
W-5H	12	RED
W-5J	12	RED
W-5	12	RED
W-5A	12	RED
W-5B	12	RED
W-5C	12	RED
W-5D	12	RED
W-5E	12	RED
W-5F	12	RED
W-5G	12	RED
W-5J	12	RED
W-5K	12	RED
W-15	12	BROWN

W-25A	12	YELLOW
W-25B	12	YELLOW
W-25C	12	YELLOW
W-25D	12	YELLOW
W-25E	12	YELLOW
W-25F	12	YELLOW
W-25G	14	BLACK
W-25H	12	YELLOW
X-3	14	LT. GREEN
X-3A	14	LT. GREEN

W-15A	12	BROWN
W-15B	12	BROWN
W-15C	12	BROWN
W-15D	12	BROWN
W-15E	12	BROWN
W-15F	12	BROWN
W-15G	12	BROWN
W-15H	14	DK. GREEN
W-15J	12	BROWN
W-25	12	YELLOW

Fig. 140—Body and Dome Lamp Wiring Diagram (Town and Country) (Chrysler)



CIR.	GA.	COLOR
B-2	18	WHITE
B-2A	18	WHITE
B-2B	18	WHITE
C-11	18	BLACK
C-12	20	WHITE
C-13	18	BLACK
C-13A	18	BLACK
C-20	14	BROWN
C-20A	14	BROWN
C-22	14	DK. GREEN
C-22A	14	DK. GREEN
D-7	18	BROWN
D-7A	18	BROWN
D-8	18	DK. GREEN
D-8A	18	DK. GREEN
G-4	18	LT. BLUE
L-7	18	BLACK
L-7A	18	BLACK
L-7B	18	BLACK
L-7C	18	BLACK
L-7D	18	BLACK
M-1	18	PINK
M-1A	18	PINK
M-1B	18	PINK
M-1C	18	PINK
M-1D	18	PINK
M-2	18	YELLOW
M-2A	18	YELLOW
M-2B	18	YELLOW
M-2C	18	YELLOW
M-2D	18	YELLOW
M-2E	18	YELLOW
M-2F	18	YELLOW
M-2G	18	YELLOW
M-11	18	PINK
M-11A	18	PINK
M-12	18	YELLOW

T-1	12	RED
T-2	12	BROWN
T-3	12	YELLOW
X-3	14	LT. GREEN
X-3A	14	LT. GREEN

Fig. 141—Body and Dome Lamp Wiring Diagram (Imperial)

CIR.	GAUGE FOR BODY 21 23 27	41 45	43 46	COLOR
W-24C	12	12	12	BLACK
W-24B	12	14	12	BLACK
W-24A	12	14	12	DK. GREEN
W-24	12	14	12	DK. GREEN
W-23C	12	12	12	LT. GREEN
W-23B	12	14	12	RED
W-23A	12	14	12	RED
W-23	12	14	12	RED
W-22C	12	12	12	BLACK
W-22B	12	14	14	VIOLET
W-22A	12	14	14	VIOLET
W-22	12	14	14	VIOLET
W-21A	12	12	12	LT. GREEN
W-21	14	16	12	BROWN
W-14C	12	12	12	LT. GREEN
W-14B	12	14	12	GRAY
W-14A	12	14	12	GRAY
W-14	12	14	12	GRAY
W-13C	12	12	12	BLACK
W-13B	12	14	12	ORANGE
W-13A	12	14	12	ORANGE
W-13	12	14	12	ORANGE
W-12C	12	12	12	LT. GREEN
W-12B	12	14	14	PINK
W-12A	12	14	14	PINK
W-12	12	14	14	PINK
W-11A	12	12	12	BLACK
W-11	14	16	14	DK. BLUE
W-4	12	14	12	WHITE
W-3	12	14	12	BLACK
W-2	12	14	14	YELLOW
W-1	12	12	12	TAN
W-2A	12	12	12	YELLOW

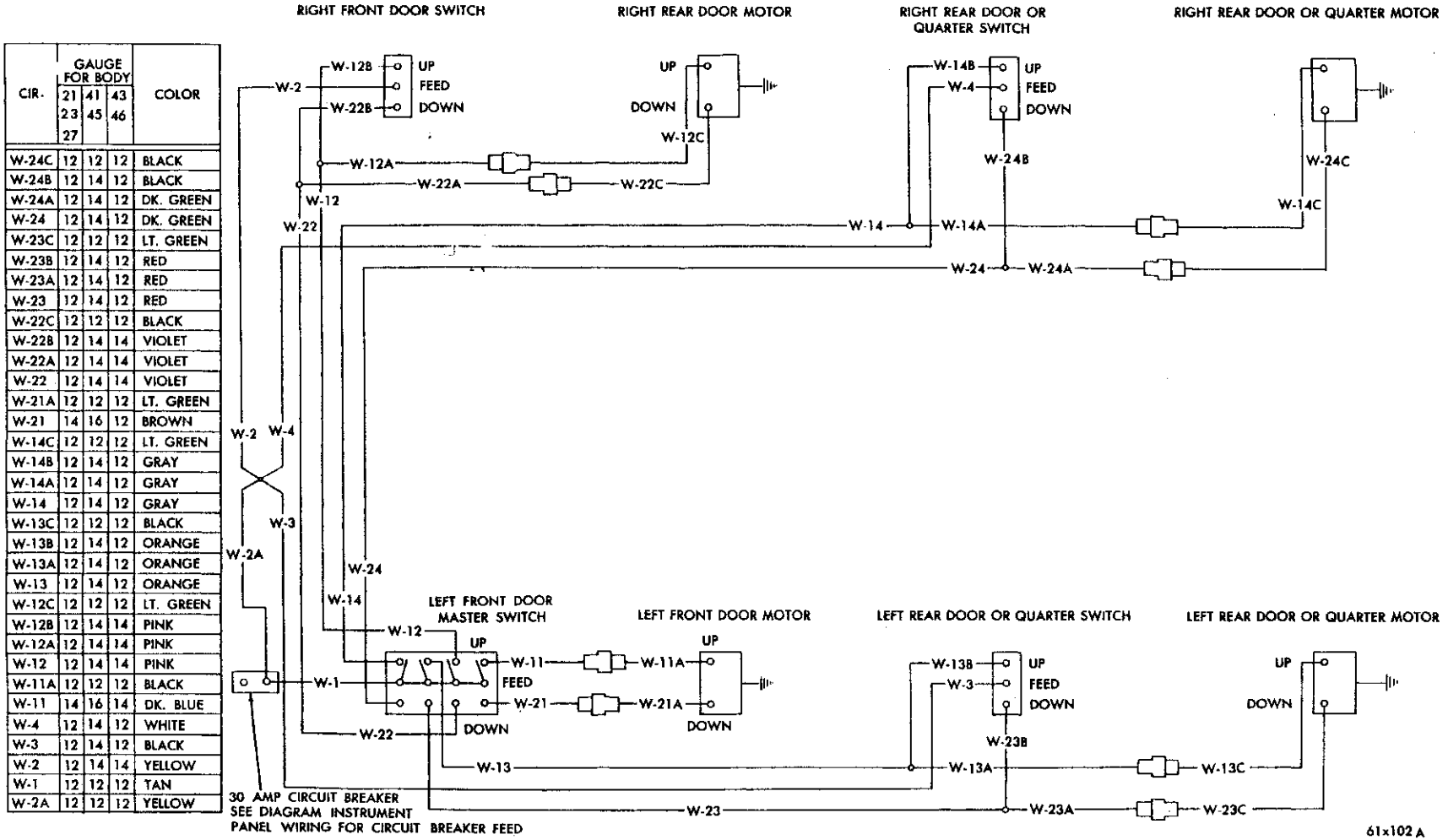


Fig. 142—Electric Window Lift Wiring Diagram (Chrysler)

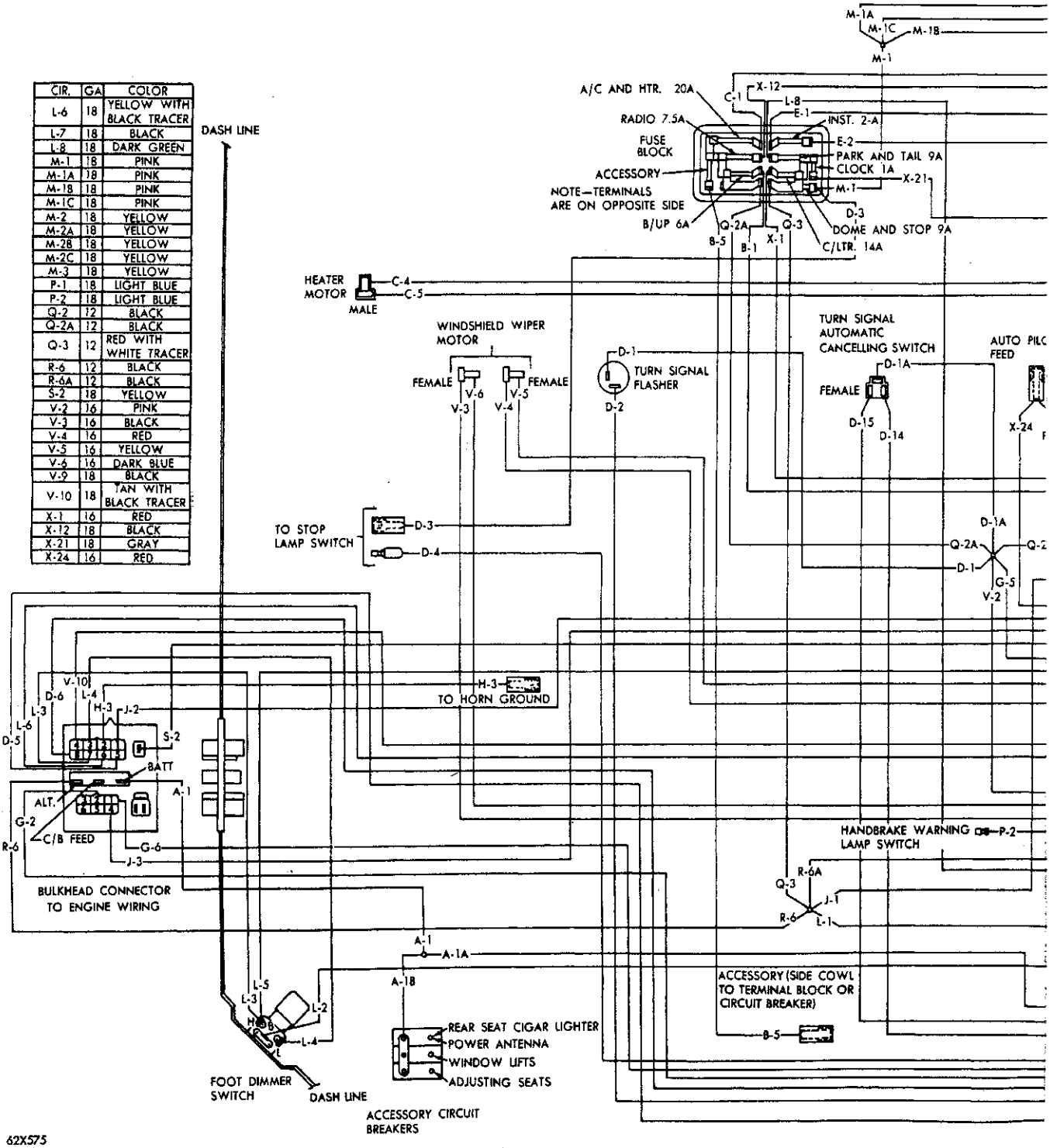
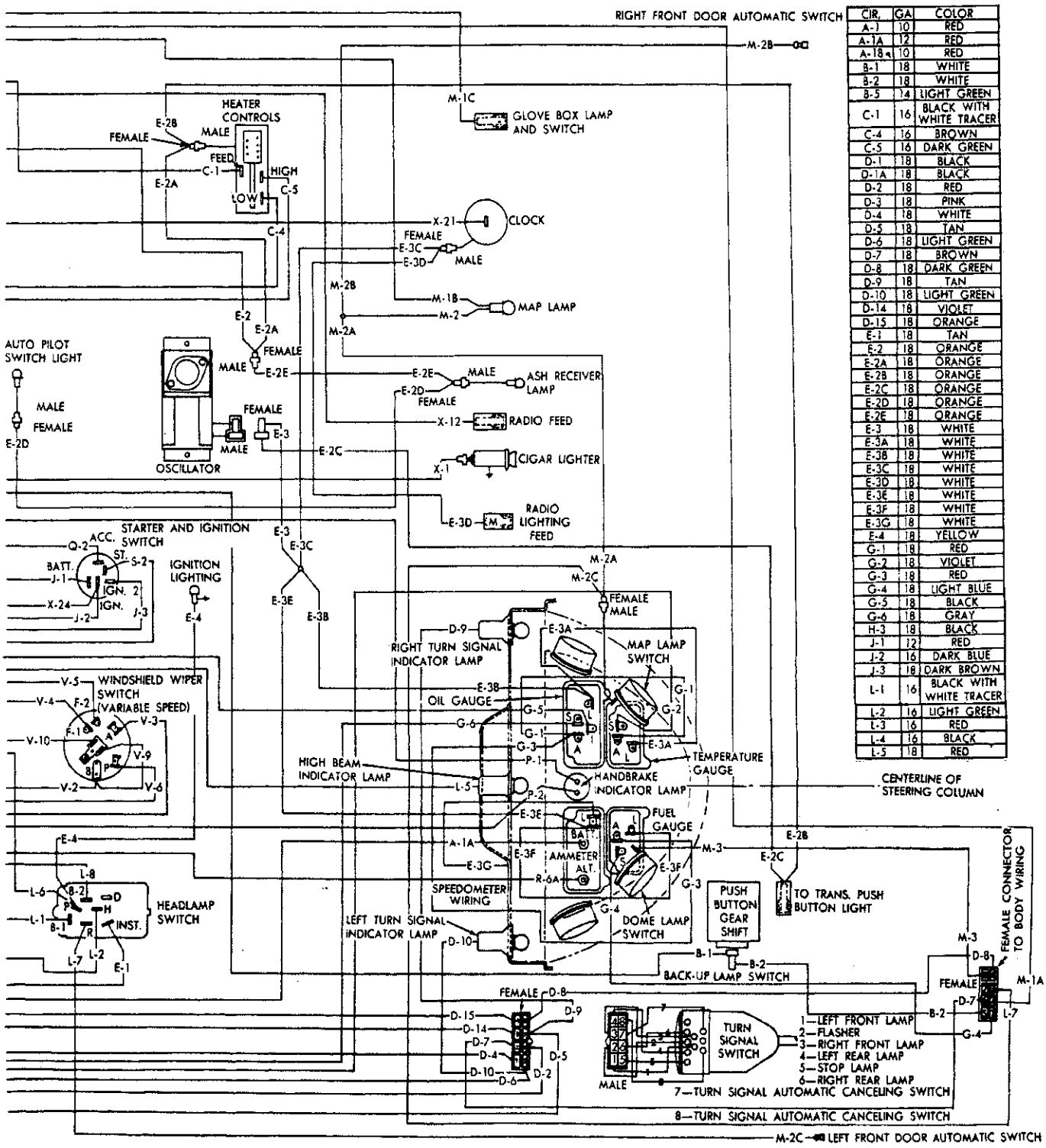


Fig. 143—Instrument Panel Wiring Diagram (Chrysler)



CIR.	GA.	COLOR
A-1	10	RED
A-1A	12	RED
A-1B	10	RED
B-1	18	WHITE
B-2	18	WHITE
B-5	14	LIGHT GREEN
C-1	16	BLACK WITH WHITE TRACER
C-4	16	BROWN
C-5	16	DARK GREEN
D-1	18	BLACK
D-1A	18	BLACK
D-2	18	RED
D-3	18	PINK
D-4	18	WHITE
D-5	18	TAN
D-6	18	LIGHT GREEN
D-7	18	BROWN
D-8	18	DARK GREEN
D-9	18	TAN
D-10	18	LIGHT GREEN
D-14	18	VIOLET
D-15	18	ORANGE
E-1	18	TAN
E-2	18	ORANGE
E-2A	18	ORANGE
E-2B	18	ORANGE
E-2C	18	ORANGE
E-2D	18	ORANGE
E-2E	18	ORANGE
E-3	18	WHITE
E-3A	18	WHITE
E-3B	18	WHITE
E-3C	18	WHITE
E-3D	18	WHITE
E-3E	18	WHITE
E-3F	18	WHITE
E-3G	18	WHITE
E-4	18	YELLOW
G-1	18	RED
G-2	18	VIOLET
G-3	18	RED
G-4	18	LIGHT BLUE
G-5	18	BLACK
G-6	18	GRAY
H-3	18	BLACK
J-1	12	RED
J-2	16	DARK BLUE
J-3	18	DARK BROWN
L-1	16	BLACK WITH WHITE TRACER
L-2	16	LIGHT GREEN
L-3	16	RED
L-4	16	BLACK
L-5	18	RED

62 x 575

Fig. 143—Instrument Panel Wiring Diagram (Chrysler)

CIR.	GA.	COLOR
A-1	10	RED
A-1A	12	RED
A-1B	10	RED
B-1	18	WHITE
B-2	18	WHITE
B-5	14	LT. GREEN
C-1	16	BLACK WITH WHITE TRACER
C-1A	16	BLACK
C-2	18	LT. BLUE
C-4	16	BROWN
C-4A	16	BROWN
C-4B	16	BROWN
C-4C	16	BROWN
C-5	16	DK. GREEN
C-5A	16	DK. GREEN
D-1	18	BLACK
D-2	18	RED
D-3	18	PINK
D-4	18	WHITE
D-5	18	TAN
D-6	18	LT. GREEN
D-7	18	BROWN
D-8	18	DK. GREEN
D-9	18	TAN
D-10	18	LT. GREEN
E-1	18	TAN
E-2	18	ORANGE
E-2A	18	ORANGE

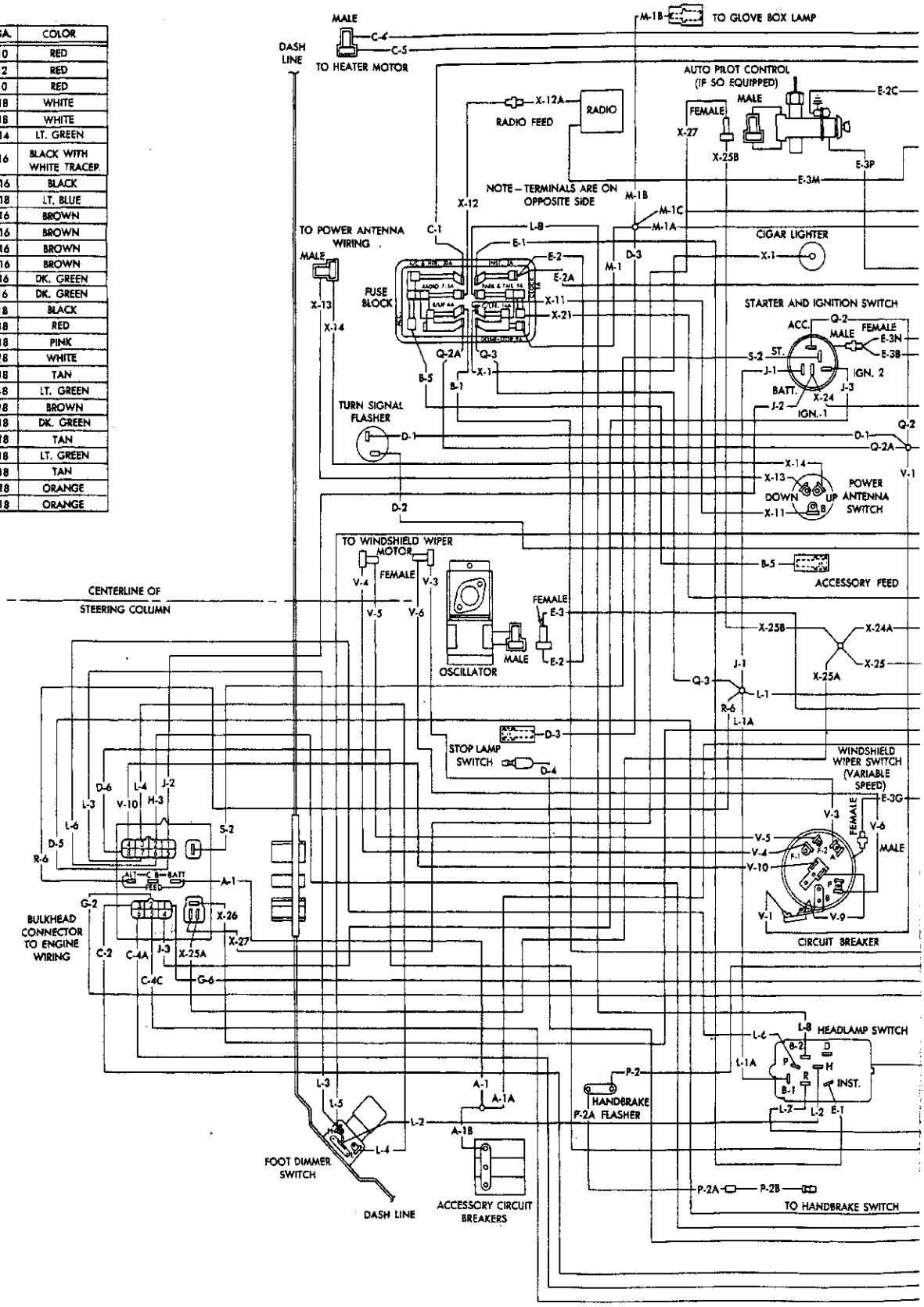
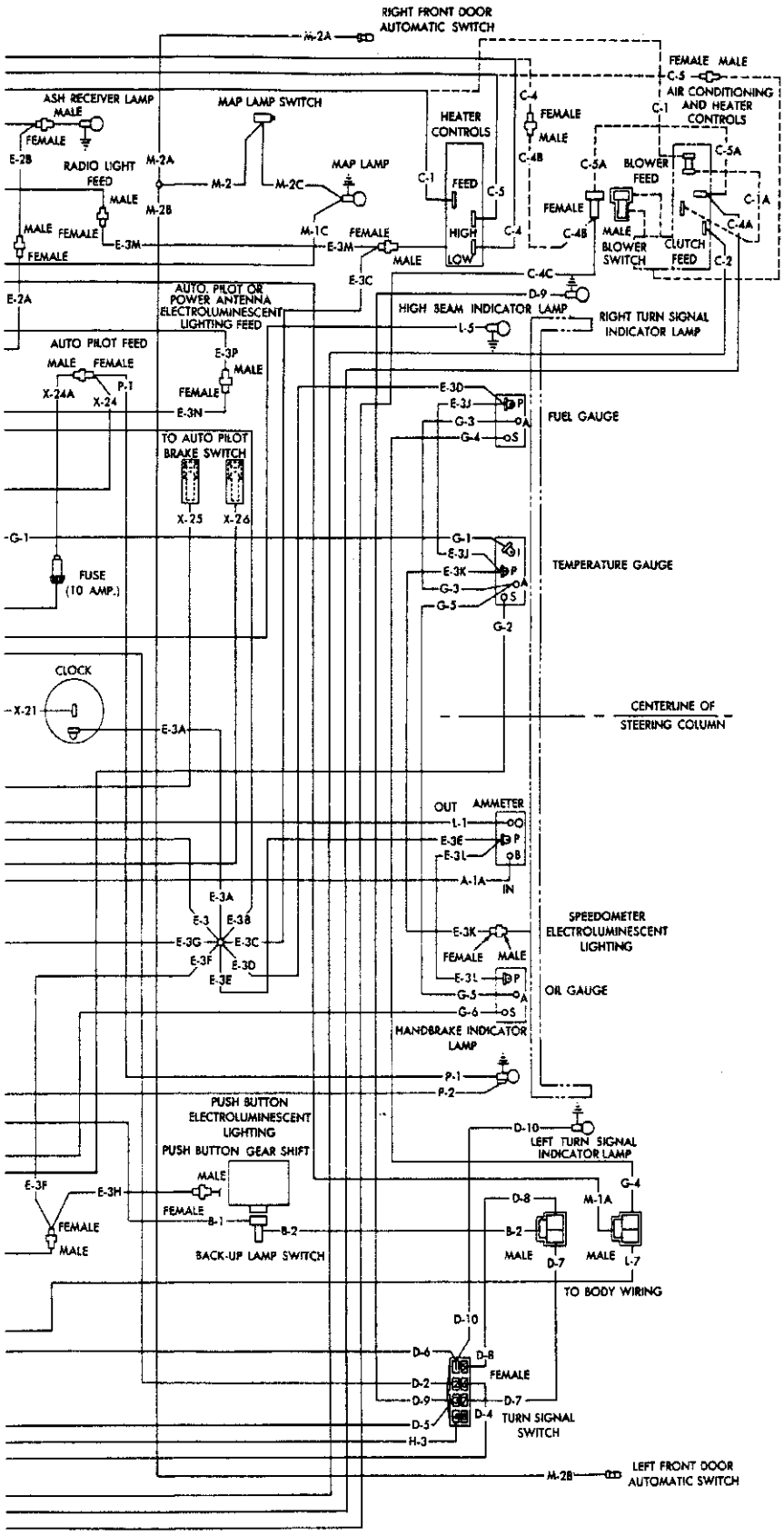


Fig. 144—Instrument Panel Wiring Diagram (Imperial)

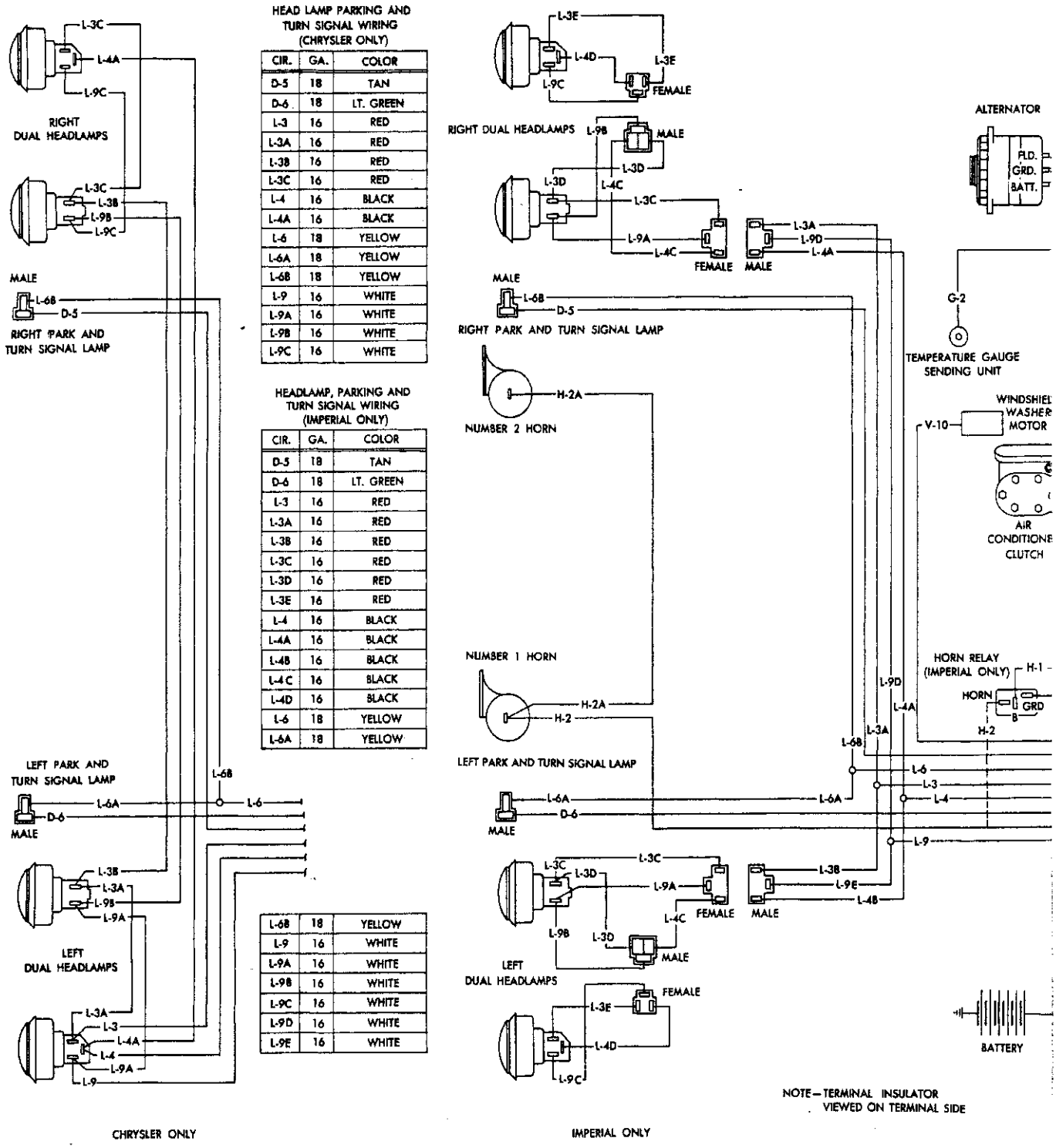


AUTO PILOT	CIR	GA	COLOR
	E-2B	18	ORANGE
	E-2C	18	ORANGE
	E-3	18	WHITE
	E-3A	18	WHITE
	E-3B	18	WHITE
	E-3C	18	WHITE
	E-3D	18	WHITE
	E-3E	18	WHITE
	E-3F	18	WHITE
	E-3G	18	WHITE
	E-3H	18	WHITE
	E-3J	18	WHITE
	E-3K	18	WHITE
	E-3L	18	WHITE
	E-3M	18	WHITE
	E-3N	18	WHITE
	E-3P	18	WHITE
	G-1	18	BLACK
	G-2	18	VIOLET
	G-3	18	RED
	G-4	18	LT. BLUE
	G-5	18	RED
	G-6	18	GRAY
	H-3	18	BLACK WITH WHITE TRACER
	J-1	12	RED
	J-2	16	DK. BLUE
	J-3	18	DK. BROWN
	L-1	12	BLACK
	L-1A	16	BLACK WITH WHITE TRACER
	L-2	16	LT. GREEN
	L-3	16	RED
	L-4	16	BLACK
	L-5	18	RED
	L-6	18	YELLOW WITH BLACK TRACER
	L-7	18	BLACK
	L-8	18	DK. GREEN
	M-1	18	PINK
	M-1A	18	PINK
	M-1B	18	PINK
	M-1C	18	PINK
	M-2	18	YELLOW
	M-2A	18	YELLOW
	M-2B	18	YELLOW
	M-2C	18	YELLOW
	P-1	18	LT. BLUE
	P-2	18	LT. BLUE
	P-2A	18	LT. BLUE
	P-2B	18	LT. BLUE
	Q-2	12	BLACK
	Q-2A	12	BLACK
	Q-3	12	RED WITH WHITE TRACER
	R-6	12	BLACK
	S-2	18	YELLOW
	V-1	16	BLACK
	V-3	16	BLACK WITH WHITE TRACER
	V-4	16	RED
	V-5	16	YELLOW
	V-6	16	DK. BLUE
	V-9	16	BLACK
	V-10	18	TAN WITH BLACK TRACER
	X-1	16	RED
	X-11	18	BLACK
	X-13	18	BROWN
	X-14	18	YELLOW
	X-21	18	GRAY
	X-24	16	RED
	X-24A	16	YELLOW
	X-25	16	RED
	X-25A	16	RED
	X-25B	16	RED
	X-26	16	LT. BLUE
	X-27	16	BLACK

62 x 579

579

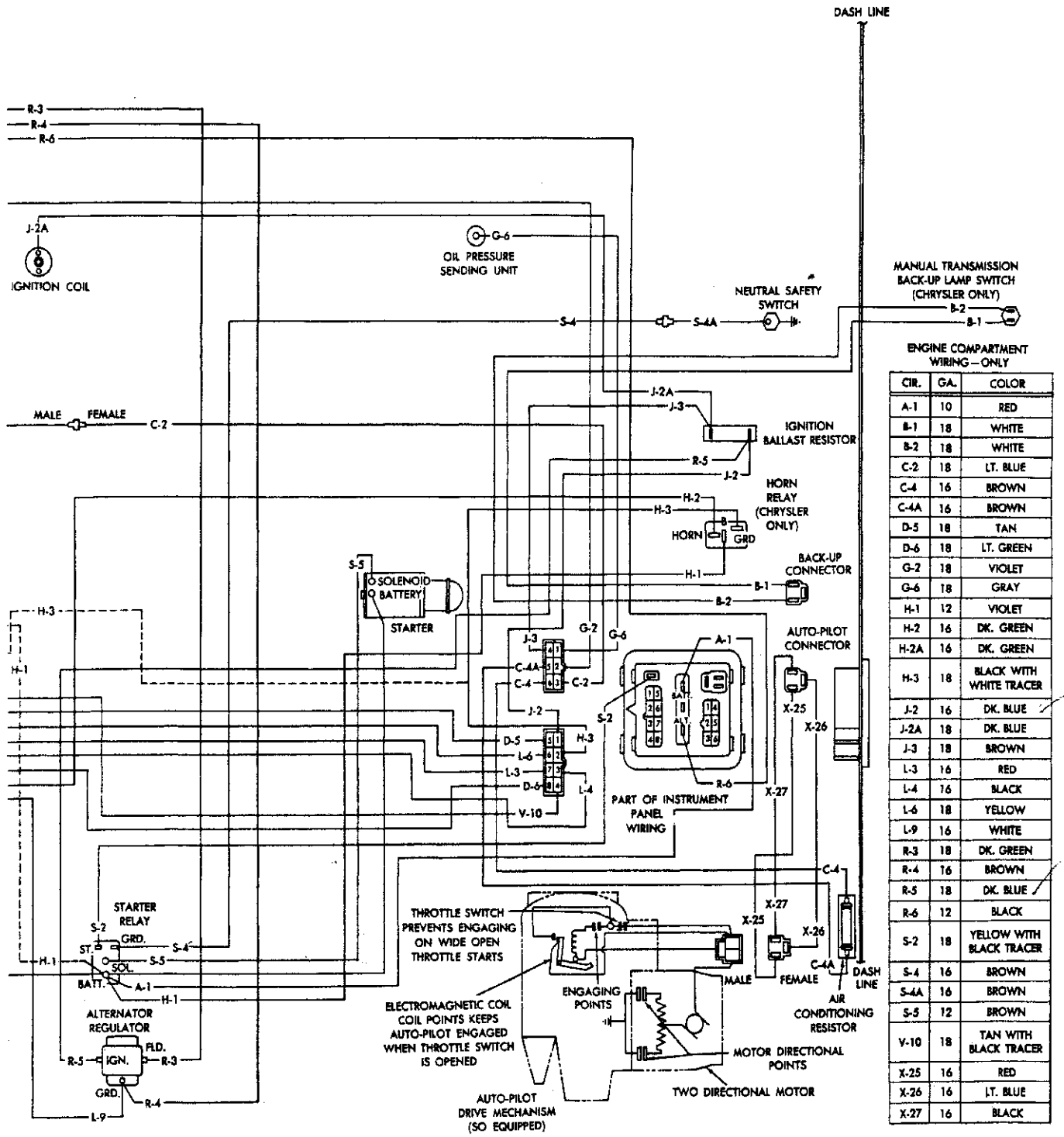
Fig. 144—Instrument Panel Wiring Diagram (Imperial)



CIR.	GA.	COLOR
D-5	18	TAN
D-6	18	LT. GREEN
L-3	16	RED
L-3A	16	RED
L-3B	16	RED
L-3C	16	RED
L-4	16	BLACK
L-4A	16	BLACK
L-6	18	YELLOW
L-6A	18	YELLOW
L-6B	18	YELLOW
L-9	16	WHITE
L-9A	16	WHITE
L-9B	16	WHITE
L-9C	16	WHITE

CIR.	GA.	COLOR
D-5	18	TAN
D-6	18	LT. GREEN
L-3	16	RED
L-3A	16	RED
L-3B	16	RED
L-3C	16	RED
L-3D	16	RED
L-3E	16	RED
L-4	16	BLACK
L-4A	16	BLACK
L-4B	16	BLACK
L-4C	16	BLACK
L-4D	16	BLACK
L-6	18	YELLOW
L-6A	18	YELLOW
L-6B	18	YELLOW
L-9	16	WHITE
L-9A	16	WHITE
L-9B	16	WHITE
L-9C	16	WHITE
L-9D	16	WHITE
L-9E	16	WHITE

Fig. 145—Engine Compartment Wiring Diagram (Chrysler and Imperial)

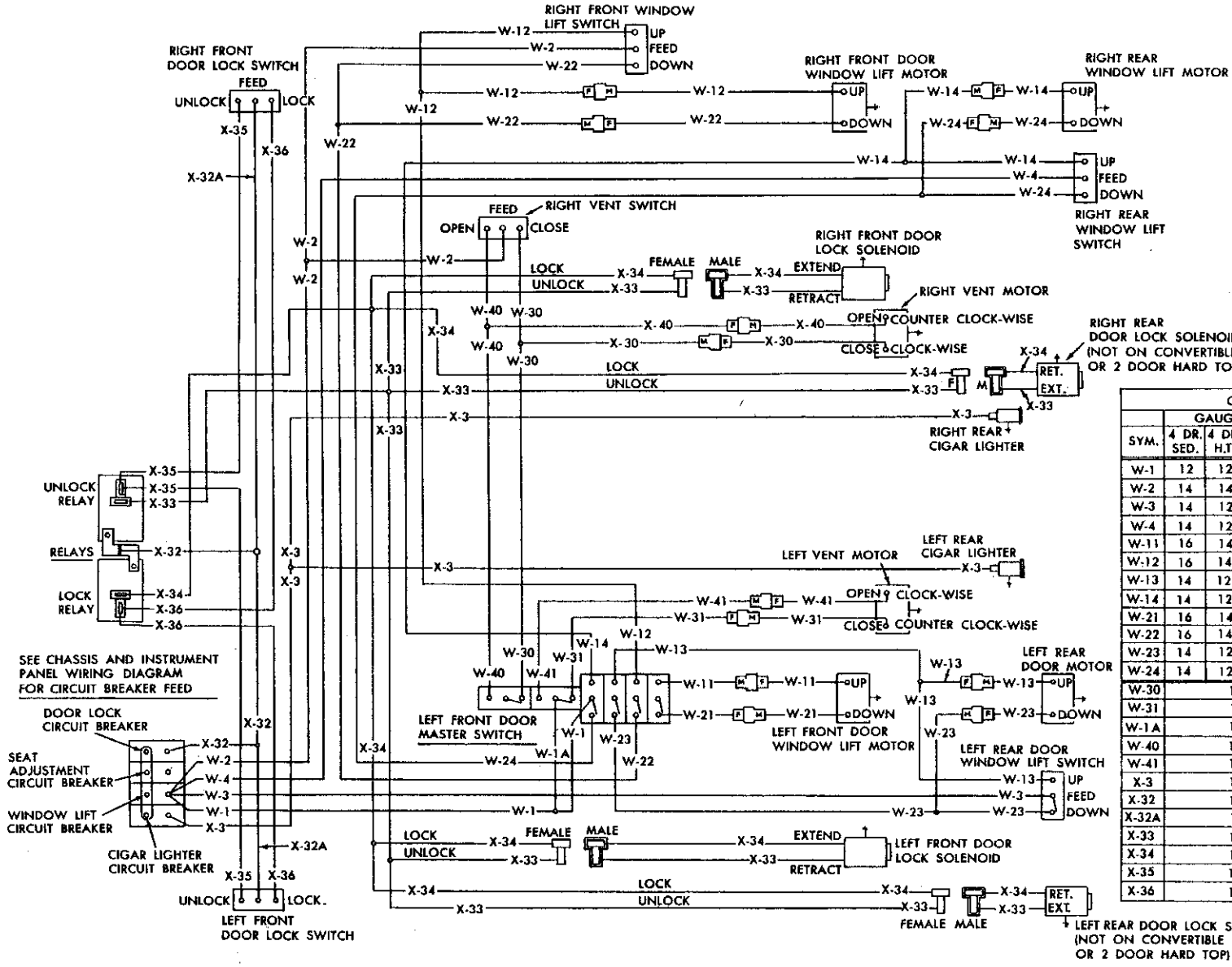


ENGINE COMPARTMENT WIRING—ONLY

CIR.	GA.	COLOR
A-1	10	RED
B-1	18	WHITE
B-2	18	WHITE
C-2	18	LT. BLUE
C-4	16	BROWN
C-4A	16	BROWN
D-5	18	TAN
D-6	18	LT. GREEN
G-2	18	VIOLET
G-6	18	GRAY
H-1	12	VIOLET
H-2	16	DK. GREEN
H-2A	16	DK. GREEN
H-3	18	BLACK WITH WHITE TRACER
J-2	16	DK. BLUE
J-2A	18	DK. BLUE
J-3	18	BROWN
L-3	16	RED
L-4	16	BLACK
L-6	18	YELLOW
L-9	16	WHITE
R-3	18	DK. GREEN
R-4	16	BROWN
R-5	18	DK. BLUE
R-6	12	BLACK
S-2	18	YELLOW WITH BLACK TRACER
S-4	16	BROWN
S-4A	16	BROWN
S-5	12	BROWN
V-10	18	TAN WITH BLACK TRACER
X-25	16	RED
X-26	16	LT. BLUE
X-27	16	BLACK

62 x 576

Fig. 145—Engine Compartment Wiring Diagram (Chrysler and Imperial)



SYM.	CIRCUITS GAUGES FOR 4 DR. SED.	4 DR. H.T.	2 DR. H.T. CV. CPE.	COLOR
W-1	12	12	12	TAN
W-2	14	14	12	YELLOW
W-3	14	12	12	BLACK
W-4	14	12	12	WHITE
W-11	16	14	14	DK. BLUE
W-12	16	14	14	PINK
W-13	14	12	12	ORANGE
W-14	14	12	12	GRAY
W-21	16	14	14	BROWN
W-22	16	14	14	VIOLET
W-23	14	12	12	RED
W-24	14	12	12	DK. GREEN
W-30	16			DK. BLUE
W-31	16			RED
W-1A	16			TAN
W-40	16			LT. GREEN
W-41	16			DK. GREEN
X-3	14			LT. GREEN
X-32	12			LT. BLUE
X-32A	16			LT. BLUE
X-33	12			ORANGE
X-34	12			PINK
X-35	16			ORANGE
X-36	16			PINK

61 x 175A

Fig. 146—Electric Window Lift Wiring Diagram (Imperial)

SERVICE DIAGNOSIS

BATTERY TESTING CHART

Hydrometer Test (Corrected to 80° F.)	State of Charge or Battery Condition	Correction
Less than 1.220 SP. GR.	Battery low.	Recharge the battery. Give high rate discharge test for capacity. If the cells test O.K., recharge and adjust the gravity of all cells uniformly. Test the voltage regulator setting. Thoroughly test the electrical system for short circuits, loose connections, corroded terminals, etc.
Cells show more than 25 points (.025 Specific Gravity) variation.	Short circuit in low cell. Loss of electrolyte by leakage or excessive overcharge. Improper addition of acid. Natural or premature failure. Cracked case.	Try to recharge the battery. See "Charging the Battery". Test battery for capacity. Install a new battery if necessary.

Open Circuit Voltage Test	State of Charge or Battery Condition	Correction
Cells showing more than 1.220 specific gravity.	Satisfactory.	No correction required if variation among cells is not over .05 volts. If variation is more than .05 volts, recharge. Give high rate discharge capacity test, if cells test O.K., adjust gravity of all cells uniformly.
Cells showing less than 1.220 specific gravity, but nor more than .05 volts variation.	Questionable	Recharge the battery. Give high rate discharge test for capacity. If the cells test O.K., recharge. Test the voltage regulator setting. Thoroughly test the electrical system for short circuits, loose connections, corroded terminals, etc.
Cells showing more than 05 volts variation.	Short circuit in low cell. Loss of electrolyte by leakage or excessive overcharge. Improper addition of acid. Natural or premature failure. Cracked case.	Recharge battery. See "Charging the Battery".

SERVICE DIAGNOSIS—CONT'D.

BATTERY TESTING CHART

Cranking Test	Possible Cause	Correction
If the voltage drop is more than 0.3 volts (3/10) between the starting motor cable and the vehicle frame while cranking look for:	Poor contact between the cable terminal and the vehicle frame or between the cable clamp terminal and the battery post or the starter switch contacts. Frayed, corroded or broken cable.	Locate the high resistance: repair or replace as necessary.
While operating the starting motor, ignition "OFF" check the voltage of all cells. If the voltage varies more than 0.15 volt between cells, look for:	Faulty cell or cells.	Compare the voltage readings with the hydrometer reading—low voltage is usually accompanied by low gravity. Try to recharge the battery. See "Charging the Battery".

STARTING MOTOR

Condition	Possible Cause	Correction
Starter Fails to Operate	(a) Weak battery or dead cell in the battery.	(a) Test for specific gravity and check for dead cell. Replace or recharge the battery, as required.
	(b) Ignition switch faulty.	(b) Replace the switch.
	(c) Loose or corroded battery cable terminals.	(c) Clean terminals and clamps, replace if necessary. Apply a light film of vaseline to terminals. Tighten clamps securely.
	(d) Open circuit, wire between the ignition—starter switch and ignition terminal on the starter relay.	(d) Inspect and test all the wiring.
	(e) Inoperative clutch unit.	(e) Replace the clutch unit.
	(f) Faulty starting motor.	(f) Test and repair.
	(g) Armature shaft sheared.	(g) Test and repair.
Starter Fails and Lights Dim	(a) Weak battery or dead cell in the battery.	(a) Test for specific gravity and inspect for dead cell. Replace or recharge the battery as required.
	(b) Loose or corroded battery cable terminals.	(b) Clean the terminals and clamps, replace if necessary. Apply a light film of vasoline to the terminals. Tighten the clamps securely.
	(c) Internal ground in winding.	(c) Test and repair the starter.
	(d) Grounded starter fields.	(d) Test and repair the starter.
	(e) Armature rubbing on pole shoes.	(e) Test and repair the starter.
Starter Turns, But Pinion Does Not Engage	(a) Starter clutch slipping.	(a) Replace the clutch unit.
	(b) Broken teeth on flywheel drive gear.	(b) Replace the flywheel ring gear. Also examine teeth on the starter clutch pinion gear.

SERVICE DIAGNOSIS—CONT'D.

STARTING MOTOR

Condition	Possible Cause	Correction
	(c) Pinion shaft rusted, dirty or dry, due to lack of lubrication.	(c) Clean, test and lubricate.
Starter Relay Does not Close	(a) Battery discharged.	(a) Recharge or replace the battery.
	(b) Faulty wiring.	(b) Test for open circuit, wire between the starter relay ground terminal post and neutral starter switch (automatic transmission only). Also test for open circuit, wire between ignition-starter switch and ignition terminal and starter relay.
	(c) Neutral starter switch on automatic transmission faulty.	(c) Replace the switch.
	(d) Test starter relay.	(d) Test and replace if necessary.
	(e) Test ignition-starter switch.	(e) Replace the ignition-starter switch.
Relay Operates but Solenoid Does Not	(a) Faulty wiring, open circuit wire between the starter-relay and solenoid terminal and solenoid terminal post.	(a) Test for open circuit wire between the starter-relay solenoid terminal and solenoid terminal post.
	(b) Faulty solenoid switch or connections.	(b) Test for loose terminal connections between solenoid and starter field.
	(c) Solenoid switch contacts corroded.	(c) Test and replace the solenoid.
	(d) Broken lead or loose soldered connection inside solenoid switch cover (brush holder plate).	(d) Replace the solenoid.
Solenoid Plunger Vibrates Back and Forth When Switch is Engaged	(a) Battery low.	(a) Test for specific gravity of the battery. Replace or recharge the battery.
	(b) Faulty wiring.	(b) Test for loose connections at relay, ignition-starter switch and solenoid. Repair as necessary.
	(c) Lead or connections broken inside solenoid switch cover (brush holder plate) or open hold-in winding.	(c) Replace the solenoid.
	(d) Check for corrosion on solenoid contacts.	(d) Test and clean the contacts.
Starter Operates But will Not Disengage When Ignition-Starter is Released	(a) Broken solenoid plunger spring or spring out of position.	(a) Test and repair.
	(b) Faulty ignition-starter switch.	(b) Replace the switch.
	(c) Solenoid contact switch plunger stuck in solenoid.	(c) Remove the contact switch plunger, wipe clean of all dirt, place a film of SAE 10 oil on the plunger, wipe off excess.

SERVICE DIAGNOSIS—CONT'D.

STARTING MOTOR

Condition	Possible Cause	Correction
	(d) Insufficient clearance between winding leads to solenoid terminal and main contactor in solenoid.	(d) Test and repair.
	(e) Faulty relay.	(e) Replace the relay.

ALTERNATOR

Condition	Possible Cause	Correction
Alternator Fails to Charge (No Output)	(a) Blown fusible wire in voltage regulator.	(a) Locate and correct the cause of the fuse blowing. Install a new fuse wire. Solder both ends of a new fusible wire securely.
	(b) Alternator drive belt loose.	(b) Adjust the drive belt according to Accessory Belt Drive Specifications Group 7A in this Service Manual.
	(c) Worn brushes and/or slip rings.	(c) Install new brushes and/or rotor.
	(d) Sticking brushes.	(d) Clean the slip rings and brush holders. Install new brushes.
	(e) Open field circuit.	(e) Test all the field circuit connections, and correct as required.
	(f) Open charging circuit.	(f) Inspect all connections in the charging circuit, and correct as required.
	(g) Open circuit in stator windings.	(g) Remove the alternator and disassemble. Test the stator windings. Install a new stator if necessary.
	(h) Open rectifiers.	(h) Remove the alternator and disassemble. Test the rectifiers. Install new rectifiers if necessary.
Low, Unsteady Charging Rate	(a) Alternator drive belt loose.	(a) Adjust the alternator drive belt. See "Accessory Belt Drives" Specifications, Group 7A.
	(b) High resistance at battery terminals.	(b) Clean and tighten the battery terminals.
	(c) High resistance in the charging circuit.	(c) Test the charging circuit resistance. Correct as required.
	(d) High resistance in the body to engine ground lead.	(d) Tighten the ground lead connections. Install a new ground lead if necessary.
	(e) Open stator winding.	(e) Remove and disassemble the alternator. Test the stator windings. Install a new stator if necessary.
Low Output and a Low Battery	(a) High resistance in the charging circuit.	(a) Test the charging circuit resistance and correct as required.
	(b) Low regulator setting.	(b) Adjust the voltage regulator.
	(c) Shorted rectifier. Open rectifier.	(c) Perform the current output test. Remove and disassemble the alternator. Test the rectifiers. Install new rectifiers as required.

SERVICE DIAGNOSIS—CONT'D.

ALTERNATOR

Condition	Possible Cause	Correction
	(d) Grounded Stator windings.	(d) Remove and disassemble the alternator. Test the stator windings. Install a new stator if necessary.
Excessive Charging Rate to a Fully Charged Battery	(a) Regulator set too high.	(a) Reset the voltage regulator according to Specifications.
	(b) Regulator contacts stuck.	(b) Install a new voltage regulator.
	(c) Regulator voltage winding open.	(c) Install a new voltage regulator.
	(d) Regulator base improperly grounded.	(d) Correct the regulator base to the ground connection.
Regulator Contacts Oxidized	(a) High regulator setting.	(a) Reset the voltage regulator according to specifications.
	(b) Regulator air gap improperly set.	(b) Reset the voltage regulator air gap and lower the contact gap.
	(c) Shorted rotor field coil windings.	(c) Test the rotor field coil current draw. If excessive, install a new rotor.
Regulator Contacts Burned	(a) High regulator setting.	(a) Reset the voltage regulator according to specifications.
	(b) Shorted rotor field coil windings.	(b) Test the rotor field coil current draw. If excessive install a new rotor.
Regulator Voltage Coil Windings Burned	(a) High regulator setting.	(a) Install a new voltage regulator. Test the regulator voltage setting and reset if necessary.
Regulator Contacts Points Stuck	(a) Poor ground connection between the alternator and the regulator.	(a) Correct the ground connection. Install a new regulator. Test the regulator setting, and reset if necessary.
Noisy Alternator	(a) Alternator mounting loose.	(a) Properly install and tighten the alternator mounting.
	(b) Worn or frayed drive belt.	(b) Install a new drive belt and adjust. See "Accessory Belt Drives," Group 7A.
	(c) Worn bearings.	(c) Remove and disassemble the alternator. Install new bearing as required.
	(d) Interference between the rotor fan and stator leads or rectifiers.	(d) Remove and disassemble the alternator. Correct the interference as required.
	(e) Rotor or rotor fan damaged.	(e) Remove and disassemble the alternator. Install a new rotor.
	(f) Open or shorted rectifier.	(f) Remove and disassemble the alternator. Test the rectifiers. Install new rectifiers as required.
	(g) Open or shorted winding in the stator.	(g) Remove and disassemble the alternator. Test the stator windings. Install a new stator if necessary.

SERVICE DIAGNOSIS—CONT'D.

ALTERNATOR

Condition	Possible Cause	Correction
Excessive Ammeter Fluctuation	(a) High resistance in the field circuit to the alternator or an improperly set voltage regulator.	(a) Clean all connections and tighten all connections as necessary. Adjust voltage regulator.

IGNITION SYSTEM

Burned or Pitted Distributor Points	(a) Dirt or oil on points.	(a) If the oil is on contact face, determine the cause and correct the condition. Clean the distributor cam of dirt and grease, apply a light film of distributor cam lubricant Number 1473595 to cam lobes; wipe off the excess. Replace the point set and adjust as necessary.
	(b) Alternator regulator setting too high.	(b) Test the alternator voltage regulator setting, adjust as necessary. Replace and adjust the distributor contact points.
	(c) Points misaligned or gap too small.	(c) Align and adjust points.
	(d) Faulty coil.	(d) Test and replace coil if necessary. Replace and adjust contact points.
	(e) Ballast resistor not in circuit.	(e) Inspect conditions, and correctly connect the coil.
	(f) Wrong condenser or faulty condenser.	(f) Test the condenser and replace if necessary. Replace and adjust points.
	(g) Faulty ignition switch.	(g) Replace the ignition switch.
	(h) Bushings or distributor shaft worn.	(h) Recondition the distributor.
	(i) Touching of points with hands during installation.	(i) Replace and adjust the contacts.
Ignition Coil Failure	(a) Alternator regulator setting too high.	(a) Test the alternator setting and adjust as necessary. Inspect the condition of the distributor contact points.
	(b) Coil damaged by excessive heat from engine.	(b) Replace coil. Inspect the condition of the distributor contact points.
	(c) Coil case or tower cracked.	(c) Replace the coil.
	(d) Oil leak at tower.	(d) Replace the coil.
	(e) Coil tower carbon-tracked.	(e) Wipe the tower clean. Test the coil, replace if necessary.
Condenser Failure	(a) Normal fatigue.	(a) Test and replace the condenser. Inspect distributor contact points for pitting.
	(b) Damaged by excessive engine heat or moisture.	(b) Test and replace the condenser. Inspect distributor contact points for pitting.
Fouled Spark Plugs	(a) Carburetor mixture overrich.	(a) Adjust the carburetor. Refer to Group 14 "Fuel System".
	(b) Improper gap adjustment.	(b) Set the spark plug gap to .035 inch.
	(c) Improper plug heat range.	(c) Install the correct plugs.

SERVICE DIAGNOSIS—CONT'D.

ALTERNATOR

Condition	Possible Cause	Correction
Burned Spark Plugs	(a) Plugs loose or too tight in the cylinder head.	(a) Replace the spark plugs: Install new gaskets. Tighten spark plugs to 30 foot-pounds torque.
	(b) Carburetor mixture too lean.	(b) Adjust the carburetor. Refer to Group 14 "Fuel System".
	(c) Improper plug heat range.	(c) Install the correct plugs.
	(d) Improper ignition timing.	(d) Adjust the ignition timing.

LIGHTING SYSTEM

Headlamps Dim (engine idling or shut off)	(a) Partly discharged battery.	(a) Charge battery.
	(b) Defective cells in battery.	(b) Replace battery.
	(c) High resistance in light circuit.	(c) Check headlight circuit including ground connection. Make necessary repairs.
	(d) Faulty sealed beam units.	(d) Replace sealed beam units.
Headlamps Dim (engine running above idle)	(a) High resistance in lighting circuit.	(a) Check lighting circuit including ground connection. Make necessary repairs.
	(b) Faulty sealed beam units.	(b) Replace sealed beam units.
	(c) Faulty voltage control unit.	(c) Test voltage control and alternator. Make necessary repairs.
Lamps Flicker	(a) Loose connections or damaged wires in lighting circuit.	(a) Tighten connections and check for damaged wiring.
	(b) Light wiring insulation damaged producing momentary short.	(b) Check light wiring and replace or tape damaged wires.
Lamps Burn Out Frequently	(a) High voltage regulator setting.	(a) Adjust voltage regulator.
	(b) Loose connections in light-circuit.	(b) Inspect circuit for loose connections.
Lamps Will Not Light	(a) Discharged battery.	(a) Recharge battery and correct cause.
	(b) Loose connections in lighting circuit.	(b) Tighten connections.
	(c) Burned out lamps.	(c) Replace bulbs or sealed beam unit.
	(d) Open or corroded contacts in lighting switch.	(d) Replace lighting switch.
	(e) Open or corroded contact in dimmer switch.	(e) Replace dimmer switch.

SERVICE DIAGNOSIS

HORN

Condition	Possible Cause	Correction
Horns Will Not Blow	(a) Improper adjustment.	(a) See "Adjusting Horns."
	(b) Broken or faulty wiring.	(b) See Testing Horns "A" and "B".
	(c) Faulty horn.	(c) See Testing Horns "A" and "B". Replace horn if necessary.
	(d) Faulty relay.	(d) See Testing Horns "A" and "B". Replace relay if necessary.
Horns Blow Continuously	(a) Shorted wiring.	(a) See Testing Horns "A" and "B".
	(b) Horn button sticking.	(b) Disconnect battery ground cable. Release horn button. After correction, reconnect battery ground cable.
	(c) Relay sticking.	(c) Replace relay.

ELECTRIC WINDOW LIFTS

A Window Will Not Operate from the Master Switch, but can be Operated from the Individual Door Switch	(a) Faulty switch in the master switch group.	(a) Replace the master switch.
	(b) Break in the wire at the door opening, or at the door holding the master switch group.	(b) Test for continuity see Wiring Diagram in this Section. Repair wiring. Avoid making a splice in the flexing sections of the wiring harness.
None of the Windows Will Operate from the Master Switch of from the Individual Door Switch	(a) Faulty circuit breaker—located above left cowl panel.	(a) Replace the circuit breaker and test the circuit breaker to determine if current is present at the terminal opposite the battery feed.
	(b) Open or ground in the battery feed wire from the circuit breaker to the bulk head disconnect.	(b) Test for continuity and repair as necessary.
A Window Cannot be Operated from Either the Master Switch or the Individual Door Switch	(a) Test for faulty circuit breaker—located above left cowl panel.	(a) Replace the circuit breaker.
	(b) Master switch and door switch inoperative.	(b) Check the master switch and door switch for continuity.
	(c) Open in wire between motor and gear box.	(c) Check for continuity between the motor and the gear box. Repair wiring as necessary.
	(d) Jammed gear box.	(d) Test and repair. Inspect the motor to gear box alignment.
	(e) Coupling broken between the motor and the gear box.	(e) Replace the coupling and test the motor and gear box alignment.
	(f) If the window can be moved up and down by rotating the coupling between the motor and the gear box:	(f) Remove the motor and test on bench with battery voltage. See "Wiring Diagram".

SERVICE DIAGNOSIS—CONT'D.

ELECTRIC WINDOW LIFTS

Condition	Possible Cause	Correction
	(g) Lift motor burned out.	(g) Repair or replace lift motor. Test for sticking switch.
	(h) Short in the wiring circuit.	(h) Inspect and test wiring. See "Wiring Diagrams".
A Window Will Operate in one Direction only When Controlled by Either the Master Switch or by the Individual Door Switch	(a) Faulty circuit between master switch and door switch.	(a) Check the master switch and door switch for continuity. Check for continuity between the motor leads and the switch.
	(b) Jammed gear box.	(b) Test and repair. Inspect the motor to gear box alignment.
	(c) If the window can be moved by rotating the coupling between the motor and the gear box:	(c) Remove the motor and test on bench with battery voltage. See "Wiring Diagram".
	(d) Lift motor burned out.	(d) Check for sticking switch.
	(e) Short in wiring circuit.	(e) Inspect and test all wiring. See "Wiring Diagram".
Circuit Breaker Clicks "On" and "Off" Continuously and Window Does Not Operate	(a) Short in the feed wire that feeds the right front and rear doors.	(a) Disconnect the cable at the battery negative post and remove the two window lift feed wires from the circuit breaker. **Do not** remove the battery feed wire. Reconnect the battery negative cable at battery and replace the feed wires one at a time as follows: 1. One feed wire feeds the left front door. 2. The other feed wire feeds the right front door and both rear doors. 3. Check the wiring to the doors one at a time to locate the short. **NOTE: When checking for faulty wiring, inspect the wiring harness control wires for a break behind the plate and sector or the regulator in each door.**
	(b) A faulty switch.	(b) Replace the switch.

POWER SEATS

Entire Unit Inoperative	(a) Broken wire or loose connections in any part of motor control circuit.	(a) Disconnect the 6-way terminal connector that connects the switch to the seat actuator. Using jumper wires, connect the jumpers, as shown in the following test chart for the six various control operations. If the operation is normal, by connecting the wires, as shown in the chart, replace the switch.

SERVICE DIAGNOSIS—CONT'D.

POWER SEATS

POWER SEAT ELECTRICAL TEST CHART

For Forward Horizontal	For Forward Tilt	For Straight Up
Red Connect—Blue Green	Red Connect—Blue Yellow	Red Connect—Blue Yellow Brown

For Rearward Horizontal	For Rearward Tilt	For Straight Down
Red Connect—White Green	Red Connect—Blue Brown	Red Connect—White Yellow Brown

Condition	Possible Cause	Correction
Motor Inoperative	(a) Short or open circuit between power source or faulty relay, switch or motor.	(a) Check the red wire at the relay with a test light. If the test light does not light, check for continuity in the number 10 red feed wire, a faulty circuit breaker or a poor connection between the circuit breaker and bulkhead disconnect. If the test light lights, connect number 10 red feed wire with the red and black or red and green wires from the motor. If the motor runs, the relay was faulty.
	(b) Faulty motor.	(b) Repair or replace the motor.
Seat Inoperative (Motor Runs)	(a) Short or open circuit between the switch and affected solenoid.	(a) Jump the wire from the number 10 feed wire to each solenoid terminal on the clutch assembly. Each solenoid should "click" as the jumper is connected. If solenoid does not click: Test the wire in the harness for an open circuit. Repair. Test for a possible seized solenoid armature in the coil. Replace the coil. Test for a possible burned-out solenoid. Replace the solenoid.
Seat Inoperative (Motor Runs and Solenoid Click)	(a) Possible stripped or broken gear in the drive unit.	(a) Inspect and replace the drive unit if necessary.
Slave Unit Inoperative (Motor, Solenoids and Drive Unit O.K.)	(a) Possible broken drive cable.	(a) Inspect and replace the parts as necessary.

SERVICE DIAGNOSIS—CONT'D.

POWER SEATS

Condition	Possible Cause	Correction
Excessive Free Play in the Unit (Seat has a Rocking Motion, Excessive Movement between the Slide and the Base of the Track Assembly)	(a) Possibly due to the roller (A), Fig. 106 being out of position.	(a) Repair as follows: (1) Remove the power seat assembly from the vehicle. (2) Remove the seat drive tubes from the slave unit. CAUTION: **Do not run the seat motor with the drive cables and tubes disassembled or the unit will be placed out of synchronization.** (3) Remove the seat support (B). (4) Remove the seat slave unit from the seat track slide (C). (5) Remove the horizontal stops located on the slide at (D). (6) Separate the seat slide (C) from the base (N) by pressing the slide rearward which will allow the rollers (A) to jump the retaining rivets (E, F, G, H), thereby separating the slide from the base. (7) Remove the rivet (F) and replace with 5/16—18 x 1/2" cap screw (1) as shown to retain in the proper position. To reassemble, reverse the above sequence. NOTE: **In reassembly, frayed drive cable may occur. Such a cable may be repaired by applying a light coating of solder and then grinding to cable size.**
Seat Track Excessively Loose (A Loose Rivet Joints)	(a) Loose rivet joints.	(a) Disassemble the upper track seat support (B) by removing the cotter keys and pins. Remove the seat support and tighten all the riveted joints (J) by peening with a ball peen hammer.
Loose Front Levers	(a) Movement between the two sections comprising the front lever assembly (Fig. 99).	(a) Arc weld the front levers (K) to prevent movement between the two sections.
Seat Chuck Fore and Aft	(a) Loose horizontal rack support arm to lower track base.	(a) Repair as follows: (1) Remove the seat track assembly from the vehicle and arc weld as shown (L). (2) Tighten the rack attaching pins (N) by arc welding.
	(b) Loose horizontal rack in slave unit gear train.	(b) Replace the slave unit.

SERVICE DIAGNOSIS

WINDSHIELD WIPERS

Condition	Possible Cause	Correction
Wiper Operates Slowly	(a) Binding linkage.	(a) Relieve the binding condition. Add lubriplate to moving parts.
	(b) High resistance in brush to commutator contact, or carbon deposits in slots.	(b) Test the armature commutator and brushes.
	(c) High resistance in ground connection.	(c) Test for high resistance in ground connection and/or wiring circuit.
	(d) Faulty control switch.	(d) Replace the switch.
Wiper Fails to Operate	(a) Binding linkage.	(a) Relieve the binding condition. Add light film of lubriplate to moving parts.
	(b) Faulty switch.	(b) See switch testing procedure under "Windshield Wiper Switch".
	(c) Faulty motor.	(c) Test and repair. See "Bench Testing Wiper Motor".
	(d) Open or grounded wiring.	(d) Test for continuity. Repair wiring as necessary.
Wiper Blades not Parking Properly	(a) Broken link spring.	(a) Replace the spring. See "Assembly of Wiper Link".
	(b) Link spring not releasing.	(b) Inspect "Assembly of Wiper Link".
	(c) Link spring not engaging stop on linkage.	(c) Inspect "Assembly of Wiper Link".
Blades Slap Windshield Mouldings	(a) Improperly installed link spring trip.	(a) Inspect "Assembly of Wiper Link".
	(b) Alignment of motor and pivots.	(b) See "Wiper Motor Installation".
Blades Chatter	(a) Twisted arm.	(a) Replace the wiper arm. **Do not attempt to straighten bent or twisted arm.**
	(b) Wrong type blades used.	(b) Install the correct wiper blades.
	(c) Wax on glass.	(c) Clean the glass.
Motor Will Not Park	(a) Parking spring in the parking switch plate is bent too low and is not breaking contact.	(a) Inspect and adjust the switch plate spring.
	(b) Contact spring leaf on the parking switch plate is distorted.	(b) Inspect, if spring leaf cannot be repaired, replace wiper motor and switch assembly.
	(c) Dirty or worn contact points.	(c) Clean the contacts, if excessively worn. Replace wiper motor and switch.

SERVICE DIAGNOSIS

(ELECTROLUMINESCENT LIGHTING), INSTRUMENTS, GAUGES AND DIRECTIONAL INDICATORS

Condition	Possible Cause	Correction
One Instrument Fails to Glow	(a) Disconnected lead or broken lead to the instrument dial.	(a) Connect or repair the lead, or replace the instrument if necessary.
Instrument Glows But Pointer Fails to Glow	(a) Broken lead to the pointer within the instrument.	(a) Repair the lead or replace the instrument if necessary.
All Instruments Fail to Glow	(a) A possible faulty panel lamp switch.	(a) Test the operation of the switch using a test lamp. Install new switch if necessary.
	(b) A possible faulty power unit.	(b) Test the power unit using Tester Number C-3764. Test the 12 volt input using the tester. Test the high voltage output using the other leads of the tester as follows: WARNING **Before connecting any test equipment, always turn the instrument panel switch "OFF". Failure to do this might result in your becoming startled by an electric shock from the high voltage in the instrument power unit. The terminals are the protective type and this should not occur unless you inadvertently touch the terminal of disconnected socket. However, due to the low wattage, it will not harm you.** (1) First turn on the instrument panel switch and observe the instrument lighting. If any portion of the instrument panel does not light, the unlighted lamps are open and the complete instrument should be replaced. (2) If the entire panel fails to light, turn off the instrument panel switch and install the tester tool at the power pack by disconnecting the connectors and plugging in the tool connectors. Ground the black wire to a good ground on the instrument panel. **NOTE: The caps on the end of the tester indicate the high and low voltage indicator lamps. Red indicates high voltage A/C. Black indicates low voltage D/C.** (3) Turn on the instrument panel light switch. If the D/C and A/C indicators both glow, it indicates the A/C power supply is operating satisfactorily.

SERVICE DIAGNOSIS—CONT'D.

ELECTROLUMINESCENT LIGHTING), INSTRUMENTS, GAUGES AND DIRECTIONAL INDICATORS—(CONT'D.)

Condition	Possible Cause	Correction
		(4) If the D/C indicator glows but the A/C does not, the power unit (Fig. 116) is not operating and should be replaced. (5) If neither the D/C or A/C indicator glows, it indicates the D/C circuit (orange lead) is incomplete. Test with D/C voltmeter to locate the failure on the D/C input side of the power unit. (6) If both the D/C and A/C indicators glow but the panel does not light up test for a short circuited lamp by disconnecting each lamp in succession and touch the test prod on the white test lead from the tester to the terminal of each of the lamp receptacles. A good lamp will light up when its terminal is contacted by the white lead test prod. A short circuited lamp will not light up and the instrument must be replaced. **NOTE: One shorted lamp will prevent the entire panel from lighting.** (7) There is always a possibility that more than one lamp might be shorted at the same time. In this case, the panel will stay dark after the new instrument is installed. Continue to test the balance of the lamps that were not tested before to find additional short circuited lamps.

THERMAL TYPE GAUGES

All Gauges Read High ("against the peg") After Ignition Switch is Turned "ON".	(a) Defective constant voltage regulator (stuck points or an open heater coil).	(1) Test voltage at output (A) terminal of constant voltage regulator. A steady voltage of approximately 12 volts indicates regulator is malfunctioning. A voltage regulator that is operating properly should normally have a voltage at the output terminal that is fluctuating between 0 and 7.0 volts. It is, of course, impossible to obtain an accurate voltage reading. The fluctuating voltage reading will, however, indicate that the constant voltage regulator is functioning.

SERVICE DIAGNOSIS—CONT'D.

THERMAL GAUGES

Condition	Possible Cause	Correction
Gauge Pointers do not Move when Ignition Switch is Turned "ON".	(a) Malfunctioning constant voltage regulator or an open circuit on battery side (input of regulator).	(1) Connect a voltmeter between the constant voltage regulator input terminal and ground. (2) Turn on the ignition switch. A reading of approximately 12 volts indicates a defective regulator. No reading indicates an open circuit in wiring to the regulator.
Temperature Gauge or Oil Pressure Gauge Indicates Normal Operation. But the Fuel Gauge Indicates a Higher or Lower Fuel Level than Actually Exists	(a) Fuel tank sending unit or instrument panel fuel gauge is defective.	(1) Disconnect the lead wire at tank sending unit. (2) Connect a jumper wire to the terminal of the test "Tank Sending Unit" and the disconnected lead wire. (3) Connect the remaining jumper wire to a good ground on the test sending unit and ground the opposite end of the jumper wire to a good ground on the car. (4) While observing the instrument panel fuel gauge, move the test sending unit to the "empty" position and turn on the ignition. The gauge should indicate empty. Move the float to the "full" position and the gauge should indicate full. A gauge that indicates correctly at both positions proves the instrument panel gauge to be operating properly. The tank sending unit in the car should be replaced. If the instrument panel gauge reads incorrectly at either or both positions, the instrument panel gauge should be replaced. **NOTE: Checking the system with the tank sending unit positioned for both "empty" and "full" is usually sufficient to determine the calibration in the range between these positions.**
Fuel Gauge and Oil Pressure Gauge Indicates Correctly But Temperature Gauge indicates Higher or Lower Temperature than Actual Engine Temperature	(a) Defective instrument panel temperature gauge, wiring or defective temperature sending unit in engine.	(1) Disconnect the lead wire from the engine sending unit and connect the test jumper lead to the disconnected lead wire. (2) Connect the opposite end of the test jumpers to the test fuel tank sending unit. (3) Connect the remaining jumper lead to a good ground on the base of the test sending unit and the opposite end of the jumper to a good engine ground.

SERVICE DIAGNOSIS—CONT'D.

THERMAL TYPE GAUGES

Condition	Possible Cause	Correction
		(4) While observing the instrument panel gauge, turn on the ignition switch and move the tank sending unit to the empty position. The gauge should indicate at the lowest "cold" end of the dial scale. Move the test sending unit to the "full" position and the gauge should indicate to the "hot" highest end of the dial scale. If the temperature gauge indicated correctly, replace the engine temperature sending unit.
Erratic Temperature Gauge Operation	(a) Loose or dirty electrical connections.	(a) Clean and tighten all electrical connections and recheck the gauge operation
Erratic Operation of Fuel Gauge	(a) Loose or dirty electrical connections or defective fuel tank sending unit.	(a) Check the fuel gauge sending unit, and proceed as follows: (1) Clean and tighten all electrical connections. (2) Make sure that the fuel tank sending unit is grounded to tank and that the tank is grounded to the frame.
No or Low Oil Pressure (SC-1, SC-2, SC-3)	(a) Defective gauge, sending unit, wiring or engine oiling system.	(a) Measure oil level with oil indicator stick, and proceed as follows: (1) Disconnect the lead wire from the engine oil pressure sending unit and connect a jumper lead to the disconnected wire. (2) Connect the opposite ends of the jumper wires to the test tank unit. (3) Connect the remaining jumper to a good ground and to the test tank unit ground. (4) Turn on the ignition switch and observe the oil pressure gauge pointer while moving the test tank float up and down. With the float at the low level, the gauge pointer should indicate no pressure. Moving the float towards the full position should cause the gauge pointer to move to the high pressure position. If the oil pressure gauge indicates that it is functioning properly, replace the oil pressure sending unit. **NOTE: If after replacing the sending unit the oil pressure still does not function properly, check the engine oiling system.**

SERVICE DIAGNOSIS—CONT'D.

THERMAL TYPE GAUGES

Condition	Possible Cause	Correction
		If the oil pressure gauge test indicates the instrument gauge is malfunctioning, replace the gauge. CAUTION **No attempt should be made in the field to repair or calibrate any instrument panel gauge or voltage regulator units. These units should be replaced only.** No unit should be removed from the car until tests indicate that it is faulty. **NOTE: Always disconnect the battery before attempting to remove a unit from the instrument panel.** CAUTION **Never ground the tank or engine sending unit terminal or wire. The panel gauge will be damaged if you do.**