Section VI

ELECTRICAL SYSTEM

SERVICE BULLETIN REFERENCE

NUMBER	DATE	SUBJECT	CHANGES

ELECTRICAL SYSTEM
DATA AND SPECIFICATIONS
STARTING MOTOR
(ALL MODELS)

	C-67	C-68, C-69	C-70
STARTING MOTOR			
		Up to MC1-6121 After	
Model	MCL-6304	MCL-6304	MDC-6301
Voltage	6	6	12
ARMATURE			
End Play	.005 to .030"	.005 to .030"	.005 to .030"
Adjustment	Thrust Washer	Thrust Washer	Thrust Washer
Runout (Maximum)	.003"	.003"	.003"
BRUSHES			
Number Used	4	4	4
Spring Tension	42 to 53 ounces	42 to 53 ounces	42 to 53 ounces
Fluid Coils	4	4	4

	C-67, C-68, C-69	C-70
DRIVE		
Type	Clutch	Clutch
Pinion to Drive Stop Collar Clearance	.080 to .109"	.080 to .109"
Adjustment	Solenoid Plunger	Solenoid Plunger
Pinion Teeth	9	9
Ring Gear Teeth	146	146
FREE RUNNING TEST		
Model	MCL	
Voltage	6	12
Amperage Draw	50 to 65	50 to 55
Minimum Speed RPM	5300	4000
STALL TORQUE TEST		
Model	MCL	
Torque (Foot-Pounds)	8.0	8.5
Voltage	2.0	4.0
Amperage Draw	410	250

GENERATOR

	C-67		C-68		C-67, C-68	C-69, C-70	
	(Without Power Steering)	(With Power Steering)	(Without Power Steering)	(With Power Steering)	*(With Car Cooling)	(With and Without Power Steering, Car Cooling	
Model	GGW-6001	GGW-6016	GGW-6001	GGW-6008	GGW-6017	GGU-6013	GHM-6003
Type	6-Volt Shunt Wound	6-Volt Shunt Wound	6-Volt Shunt Wound	6-Volt Shunt Wound	6-Volt Shunt Wound	6-Volt Shunt Wound	12-Volt Shunt Wound
Rotation	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise
Bearing—Drive End	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing
Commutator End	Absorbent Bronze Bushing	Ball Bearing	Absorbent Bronze Bushing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing
Armature End Play	.003 to .010"	.003 to .010"	.003 to .010"	.003 to .010"	.003 to .010"	.003 to .010"	.003 to .010"
Commutator Runout	.0005"	.0005"	.0005"	.0005"	.0005"	.0005"	.0005"
Ground Polarity	Positive	Positive	Positive	Positive	Positive	Positive	Positive
No. of Brushes	2	2	2	2	2	2	2
Brush Spring Tension	35 to 53 ozs.	35 to 53 ozs.	35 to 53 ozs.	35 to 53 ozs.	35 to 53 ozs.	35 to 53 ozs.	35 to 53 ozs.
Field Coil Draw	1.7 to 1.8 amps. at 6-Volts	1.7 to 1.8 amps. at 6-Volts	1.7 to 1.8 amps. at 6-Volts	1.7 to 1.8 amps. at 6-Volts	1.7 to 1.8 amps. at 6-Volts	1.7 to 1.8 amps. at 6-Volts	.8 to .93 amps. at 12-Volts
Motoring Draw	5.0 to 5.5 amps. at 6-Volts	5.0 to 5.5 amps. at 6-Volts	5.0 to 5.5 amps. at 6-Volts	5.0 to 5.5 amps. at 6-Volts	5.0 to 5.5 amps. at 6-Volts	5.5 to 6.5 amps. at 6-Volts	3.0 to 3.5 amps. at 12-Volts
Hot Output—Volts	8.0	8.0	8.0	8.0	8.0	8.0	15
Maximum Amps.	45	45	45	45	45	50	30
Max. R.P.M.	2450	2450	2450	2450	2450	1840	1550

*Without Power Steering

CURRENT AND VOLTAGE REGULATOR

	C-67, C-68	C-69	C-70
**Model	VBE-6001A	VAV-6001B	VRX-6003B
Rated Capacity			
Volts	6	6	12
Amps.	45 to 57	50 to 62	25 to 38
Ground Polarity	Positive	Positive	Positive
Value of Resistors (Ohms)			
Number 38	34.5 to 42	....	34.5 to 42
Number 7	6.5 to 8.0	....	....
Number 60	....	57 to 70	....
Number 15	....	14 to 17.1	....
Number 135	....	....	122 to 149

CURRENT AND VOLTAGE REGULATOR (Contd.)

	C-67, C-68	C-69	C-70
Circuit Breaker			
Resistance of Windings	29.8 to 33	29.8 to 33	102-126
Armature Air Gap	.031 to .034"	.031 to .034"	.031 to .034"
No. of Coils in Armature Spring	10¾	10¾	10¾
Contact Point Gap Minimum	.015"	.015"	.015"
Points Close at (Volts)	6.3 to 6.8	6.3 to 6.8	13 to 13.75
Points Open at (Volts)	4.1 to 4.8	4.1 to 4.8	8.2 to 9.3
Voltage Regulator			
Resistance of Winding (Ohms)	10.8 to 12	10.8 to 12	43.7 to 49.3
Armature Air Gap	.048 to .052"	.048 to .052"	.048 to .052"
No. of Coils in Armature Spring	14½	14½	14½
Contact Point Gap	.012"	.012"	.012"
Operating Voltage (At 70° F.)*	7.1 to 7.4	7.1 to 7.4	14.2 to 14.8
Current Regulator			
Armature Air Gap	.048 to .052"	.048 to .052"	.048 to .052"
No. of Coils in Armature Spring	14½	14½	14½
Contact Point Gap	.012"	.012"	.012"
Operating Amperage (At 70° F.)	43 to 47	48 to 52	23 to 27

*Test at 10 amp. output for 15 minutes and after 15 minutes operation at full output.

**Regulator VBF-6001A used with Gen. GGJ-6004 as special equipment—refer to D-15085 Shop Manual for specifications.

IGNITION DISTRIBUTOR

	C-67	C-68, C-69, C-70
Model	IAZ 4001D (Up to) IAZ 4001E (After)	IAZ 4001E (Up to) IAZ 4001F (After)
Cam Angle (Dwell)	26° to 28° (One Set of Points) 32° to 36° (Total Dwell)	26° to 28° (One Set of Points) 32° to 36° (Total Dwell)
Gap	.015 to .018"	.015 to .018"
Breaker Arm Tension	17 to 20 ozs.	17 to 20 ozs.
Ignition Timing	B.T.D.C.	B.T.D.C.
Degrees of Crankshaft Travel	6°	6°
Timing Mark Location	Vibration Damper	Vibration Damper
Condenser Capacity	.25 to .28 mfd.	.25 to .28 mfd.
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Rotation	Clockwise	Clockwise
Drive	Camshaft	Camshaft
Bushings	2—Absorbent Bronze	2—Absorbent Bronze

IGNITION DISTRIBUTOR (Contd.)

	C-67	C-68, C-69, C-70
Automatic Advance Curve		
Distributor Speed (RPM and Degrees)	IAZ 4001D (Up to) 300-400 RPM—0° 400 RPM—0° to 7° 550 RPM—5.5° to 7.5° 2100 RPM—16° to 18° IAZ 4001E (After) 300-400 RPM—0° 400 RPM—0° to 4° 550 RPM—3.7° to 5.5° 2550 RPM—13° to 15°	IAZ 4001E (Up to) 300-400 RPM—0° 400 RPM—0° to 7° 550 RPM—3.7° to 5.5° 2000 RPM—13° to 15° IAZ 4001F (After) 300-400 RPM—0° 400 RPM—0° to 4° 550 RPM—3.7° to 5.5° 1725 RPM—11° to 13°
Vacuum Advance Curve		
Distributor Vacuum in Inches of Mercury		
—5½" to 6½"	1°	1°
10"	5° to 6.75°	5° to 6.75°
17"	10½° to 12½° Max.	10½° to 12½° Max.

SPARK PLUGS AND COIL

	C-67	C-68, C-69	C-70
Spark Plugs			
Type	Resistor 4S-165	Resistor 4GS-175	Resistor 4GS-175
Size	14 mm.	14 mm.	14 mm.
Gap	.035"	.035"	.035"
Coil			
Model	CAC-4001	CAC-4001	CAE-4001
Amperage Draw—			
Engine Idling	2.25 amps.	2.25 amps.	1.8 amps.
Engine Stopped	5.0 amps.	5.0 amps.	3.0 amps.

HORNS

	C-67, C-68	C-69	C-70
Style (Sea Shell, Airtone, Trumpet)	Air Tone	Air Tone	Air Tone
Type	Electric	Electric	Electric
Number Used	2—Air Tone	3 (1 Trumpet, 2 Air Tone)	3 (1 Trumpet, 2 Air Tone)
Individual Amp. Draw	15 Amps. per Horn at 6 to 6.2 Volts	15 Amps. per Horn at 6 to 6.2 Volts	9 Amps. per Horn at 12.0 Volts
Tone Pitch	Adjustable	Adjustable	Adjustable
Location	Behind Radiator Grille	Behind Radiator Grille	Behind Radiator Grille

LIGHTING SYSTEM

	Number Required	C.P. or Watts 6-Volts	C.P. or Watts 12-Volts	Mazda No. 6-Volts	Mazda No. 12-Volts	Chrysler Part No. 6-Volts	Chrysler Part No. 12-Volts
Headlights (Seal Beams)	2	45-35	50-40	4030	4430	854750	1567159
Headlights Upper Beam Indicator Light	1	2		55	57	125588	127934
*Tail Light	2	21-3	32-4	1154	1034	145416	151567
*Rear Turn Signal Light	2	21-3	32-4	1154	1034	145416	151567
Glove Box Light	1	2	1.5	55	57	125588	127934
Instrument Lights	3	2	1.5	55	57	125588	127934
Rear License Plate Light	1	3	3	63	67	142303	142450
Map Light—Center	1	15	15	210	1004		
Ignition Switch Light	1	1	1	51	53	115273	131282
Parking Light and Front Turn Signal	2	21-3	32-4	1154	1034	145416	151567
*Stop Light	2	21-3	32-4	1154	1034	145416	151567
Turn Signal Indicator Light	2	2	1.5	55	57	125588	127934
Back-up Light	2	21	21	1129	1141	142308	142456
Dome Light	1	15	15	210	1004	151559	151578
Dome Light	2	15	15	210	1004	151559	151578

*One bulb serves all three functions.

CIRCUIT PROTECTORS

Circuit	Type	Rated Capacity 6-Volts	Rated Capacity 12-Volts	Location
Lighting System	Circuit Breaker	1-27 Amps.	1-27 Amps.	
		1-10 Amps.	1-10 Amps.	In Switch
Clock	Fuse	3 Amps.	3 Amps.	Clock Lead Wire
Windshield Wiper	Circuit Breaker	10 Amps.	6 Amps.	On Switch
Radio	Fuse	14 Amps.	9 Amps.	Behind Inst. Panel
Rear Seat Cigar Lighter	C-B	15	15	Left Front Kick Pad
Top and Lift Motor	C-B	50	25	On Switch
Accessory Circuits (Dome Lamp, Stop Lamp, Map Lamp, Glove Box Lamp)	C-B	10 Amps.	10 Amps.	Inc. H. L. Sw.
Air Cond. Blower Motor	C-B	1-30	1-15	On Switch
Window Lift Motor	C-B	2-30	2-15	Left Front Kick Pad
Seat Adj. Motor	C-B	1-30	1-15	Under Seat

ELECTRIC WINDSHIELD WIPER

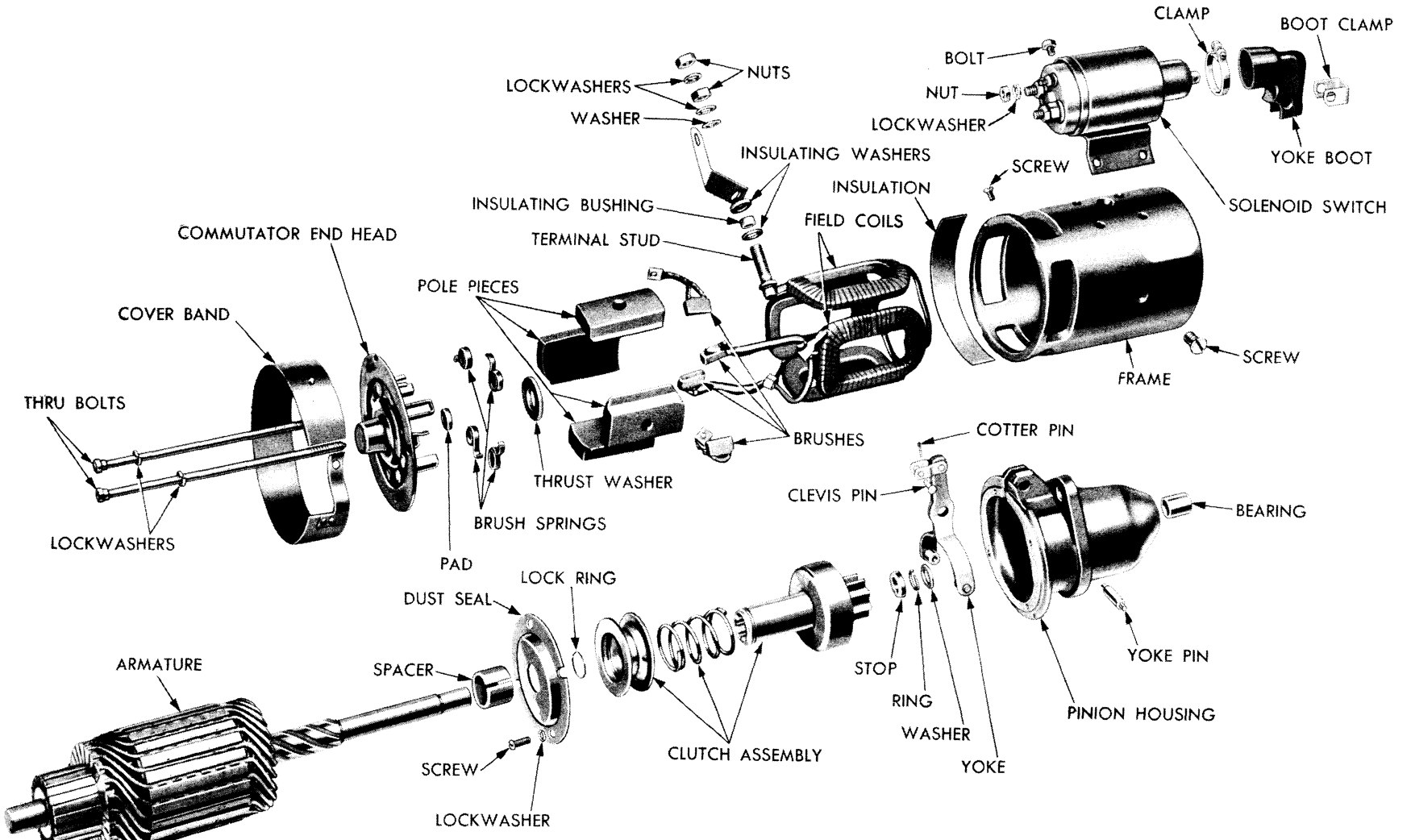
	6-Volts	12-Volts
Part No.	1605599	1627382
Rated Volts	6	12
Resistor (Ohms)	0-4.25	0-17
Field Draw		
Volts	6.0	12
No Load Test		
Volts	6.0	12.0
Amperage Draw At—High Speed	3.5 at 76 R.P.M.	1.8 at 76 R.P.M.
—Low Speed	5.5 at 32 R.P.M.	2.8 at 32 R.P.M.

BATTERY

	C-67	C-68	C-69	C-70
Model	HW-2-120	2H-135	2H-135	12-H65R
Location	Under Hood in Left Fender Shield			
Voltage	6	6	6	12
Number of Plates	17	19	19	13
Capacity (Amp-Hours)	120	135	135	65
Terminal Ground	Positive	Positive	Positive	Negative

TIGHTENING REFERENCE

Battery Hold Down Bolts	3 Foot-Pounds (Max.)



52x627 A

Fig. 1—Starting Motor (Typical for C-67, C-68, C-69, C-70)

Section VI
ELECTRICAL SYSTEM
STARTING MOTOR

The starting motor is of the conventional four-pole, four-brush, magnetic shift type (Fig. 1) with a sliding gear and over-running clutch. It is operated through a solenoid, as described below.

1. STARTING MOTOR SOLENOID

The starting motor solenoid (Fig. 2) is controlled by turning the ignition key to the extreme right. As the key is turned, current flows from the ignition and starter switch through the neutralizer safety switch (cars equipped with PowerFlite), the solenoid relay coil and generator armature to ground.

This causes the relay armature to close the contact points. Current then flows from the battery connections at the solenoid through the relay points and coils of the solenoid. The solenoid winding is made up of two coils. One coil is connected from the relay points to the starter side of the solenoid starter switch. The other coil is connected from the same side of the relay points to ground. When the relay points are first closed, current flows through both coils, which immediately pull in the solenoid plunger and shift lever, engaging the pinion of the starting motor with the flywheel. At the end of plunger travel, the starter switch disc is closed and the motor cranks the engine.

As the starter switch disc is closed, one coil of the solenoid is shorted out (coil from battery lead post to starter side of the solenoid switch). The second coil remains in the circuit with sufficient current to hold the pinion in engagement with the flywheel, while the engine is being cranked. As soon as pressure on the switch key is released, the relay contacts open, breaking the solenoid circuit and allowing the return spring in the solenoid to disengage the pinion. The solenoid circuit is also interrupted when the generator speed increases on starting of the engine, due to voltage build-up which opposes the flow of current from the ignition and starter switch.

2. REMOVAL OF STARTING MOTOR

To remove starting motor, disconnect terminals from binding post and battery terminal, or disconnect it at battery. Remove bolts from starter to flywheel housing and draw out starting motor assembly.

3. DISASSEMBLY AND ASSEMBLY OF STARTING MOTOR (REMOVED) (FIG. 1)

a. Disassembly

The armature may be removed after lifting the brushes out of their holders and removing the assembly bolts from the frame and pinion housing.

b. Removal and Installation of Clutch Assembly

To remove the clutch assembly from armature shaft, first remove the washer and then the snap ring and stop. Slide the clutch assembly from armature shaft. To install the clutch assembly, slide the assembly into position on the armature shaft and install the stop, the snap ring and the washer.

c. Assembly

The armature shaft end-play should be .005 to .030 inch. This end-play is controlled by spacers on the shaft between the leather washer and the commutator end head.

4. ADJUSTING PINION CLEARANCE

It is essential that the relationship between the over-running clutch drive (or pinion) and the solenoid switch be maintained within proper limits. This pinion clearance adjustment can be accurately set only after the starting motor is removed from the car. Checking the pinion clearance should be included in the bench test. This operation can best be accomplished by using the battery current to hold the plunger in the engaged position, while adjusting the plunger stud

linkage. The strap connecting the solenoid to the starter terminal should be removed so that the pinion will not spin. Remove the connector from the solenoid to the motor. Connect a jumper wire from the solenoid motor terminal to ground. Connect a jumper wire from the solenoid relay terminal to the negative terminal post of a battery. Connect a jumper wire from the positive battery post to the starter frame.

NOTE

Due to removing the connector it will be necessary to assist the solenoid by pushing on the plunger by hand to shift the pinion. Then, remove the hand pressure while measuring clearance.

The shift lever adjusting link screw can now be adjusted so that there will be .080 to .109 inch clearance between the end of the pinion and the stop collar.

Do not hold the pinion in the engaged position by pushing on the shift lever while making this adjustment. The play, between the pin in the adjusting stud link and the slotted hole in the lever, is correct only when the solenoid is pulling on the adjusting stud link.

With the contact points closed, the air gap between the armature and core should be .012 to .020 inch. This can be adjusted by raising or lowering the stationary contact. Contact points close at 1.5 to 3.0 volts and open at 0.5 volts min.

The contact point opening of the solenoid relay should be .020 to .040 inch and is adjusted by bending the armature stop.

5. REPLACING BRUSHES AND REDUCING SPRING TENSION

Replace brushes if they are worn more than half their original length, scored or oil soaked. To remove, unsolder and unclinch the brush leads from the field coil connector loops and remove leads and brushes. When inserting the lead or pigtail of the new brush, it will be necessary to open up the field coil connector loop slightly. Be sure the pigtail is inserted the full depth of the loop. Then, it should be clinched to hold the pig-

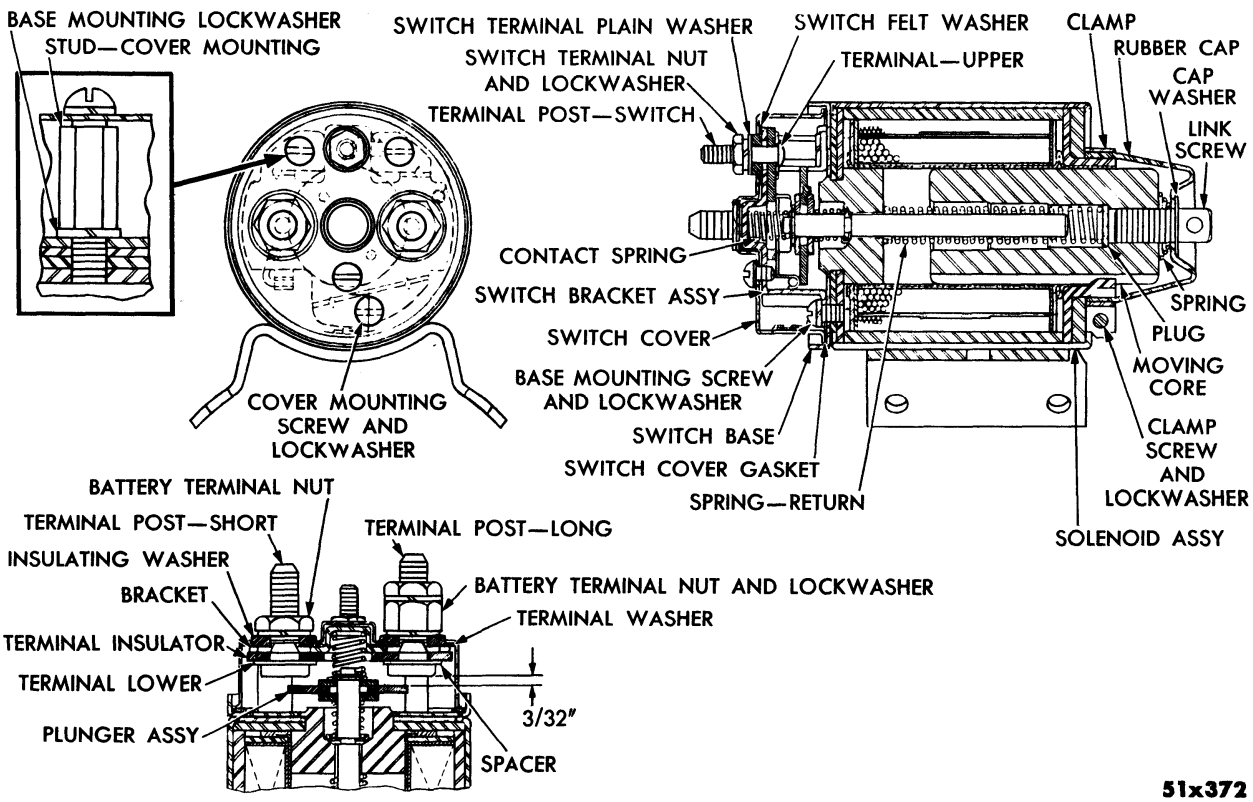


Fig. 2—Starting Motor Solenoid

tail securely before resoldering with resin core solder. **A good soldering job must be done to ensure full efficiency.**

To test brush spring tension, insert a piece of medium weight paper between brush and commutator and attach a spring scale to brush arm. Pull on the scale (at right angles to the arm) and note the scale reading at the instant the paper is free. If the reading is not within specified limits, replace spring.

6. TESTING STARTING MOTOR (ASSEMBLED)

The starting motor should first be checked to see that the free running voltage and current are within the limits shown in the Data and Specifications Chart.

a. Testing for Free Running (6-Volt)

Remove starting motor, place on test bench and connect the starter to a fully-charged 6-volt battery, with a resistor in parallel. Adjust the resistor to 5.5 volts across the battery, running the motor (if new brushes were installed) for approximately two minutes to allow the brushes to seat. Cool motor before testing.

The ammeter should show a current draw of 65 amps., while the starter is running free. If the amperage is too high, check the bushing alignment and end play to make sure there is no binding or interference.

If a test bench is not available, connect the starter to a 6-volt battery. If the armature revolves smoothly at a satisfactory speed, the motor should crank the engine.

NOTE

The V12 volt starters are tested in the same manner except for the voltage and current values. Refer to Data and Specifications.

b. Testing for Stall Torque

Connect the starter to the test bench and mount torque arm and spring scale on the starting motor. Close the test bench switch and adjust the resistor so that the specified voltage is shown on the voltmeter. At 8 foot-pounds torque, the ammeter reading should be 410 amps., and the voltmeter reading should be 2.0 volts.

If the test results are not as specified above, recondition or replace the unit as necessary.

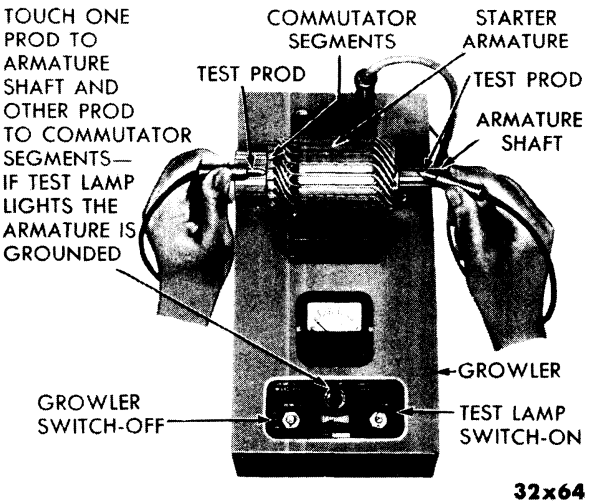


Fig. 3—Testing Starting Motor Armature for Ground

7. TESTING STARTING MOTOR (DISASSEMBLED)

a. Testing Armature for Short Circuit

Place the armature in a growler and hold a strip of steel, or piece of hack saw blade, on the core, parallel to the grooves. Turn on the growler and revolve the armature slowly. If the metal strip becomes magnetized or vibrates, the armature is shorted. If it is shorted at an accessible point, it should be repaired. Otherwise, a new armature should be installed.

b. Testing Armature for Ground

With a 110 volt test light, touch one test prod to a commutator segment and the other test prod to the armature shaft, as shown in Figure 3.

CAUTION

Do not touch the brush surfaces of the commutator or the bearing surface of the shaft. An arc from the circuit would damage the contacting surfaces.

If the test lamp lights, the armature is grounded. Replace the armature.

c. Reconditioning Armature

The armature commutator should be turned down in a lathe (if the mica is high or the commutator out-of-round) or cleaned (if covered with an oil film or dirt). Only sufficient material should be removed to correct the difficulty. Use

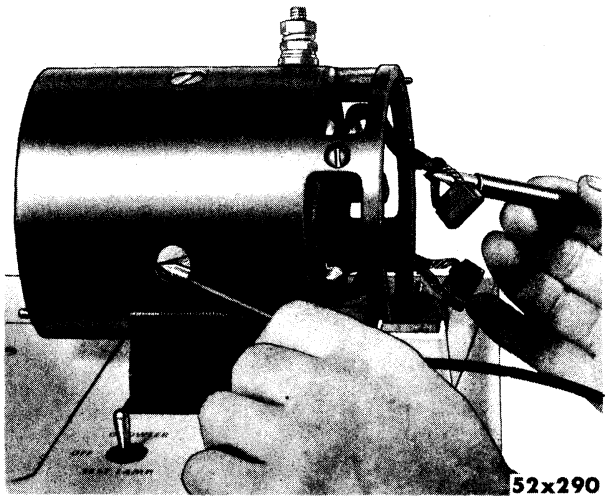


Fig. 4—Testing for Ground

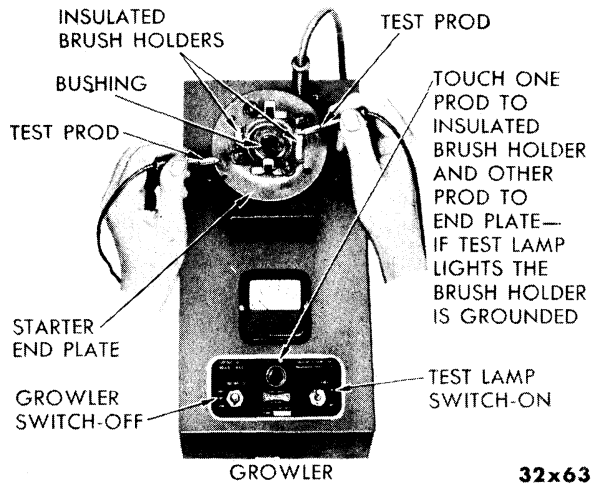


Fig. 5—Testing Brush Holder for Ground

00 sandpaper to finish the commutator smoothly. Undercut the mica to a depth of $\frac{1}{32}$ inch and the full width of the groove.

If the armature shaft bearing surfaces are scored or worn, replace the armature. Make sure the armature windings are tight in the armature slots and soldered properly to the commutator segments. If soldering is necessary, be sure the solder does not short circuit the segments.

d. Testing Field Coils for Open Circuit

To determine if one of the four coils is faulty, disconnect one end of the equalizer jumper between the field coils. Test between the starting motor terminal and each field coil with test light. If light does not light, the coil being tested is open and should be replaced.

e. Testing Field Coils for Ground

Test between the insulated brushes and the frame, as shown in Figure 4. If the test lamp lights, the coils are grounded. If the ground is accessible, repair coil. Otherwise, replace coil.

f. Testing Brush Holders for Ground

Inspect the brush holders for wear or damage. Test insulated holders with a test lamp to see if they are grounded (Fig. 5). Replace the commutator end plate assembly, if brush holders are grounded. Check grounded brush holders to see if they are tight.

Install head on armature and install a brush in one of the holders. Inspect to see that brush slides freely and that it is parallel with the commutator segments. Repeat this inspection on all brush holders.

SERVICE DIAGNOSIS

8. STARTER FAILS TO OPERATE

Possible Causes:

a. Weak battery.
b. Loose battery cables.
c. Dead battery cell.
d. Defective solenoid or solenoid switch.
e. Defective starter windings.
f. Corrosion at battery posts.
g. Faulty relay.
h. Faulty wiring.

Remedies:

a. Test specific gravity of battery and check for dead cell. Replace or recharge battery as necessary.

b. Clean battery posts and cable clamps. For good contact, tighten securely.

c. Replace defective battery. Check voltage regulator and generator output.

d. Replace starter and ignition switch and check starting motor solenoid for operation. Check soldered connections of solenoid windings.

e. Remove and test starting motor. Replace parts, or the complete unit, as required.

f. Remove battery cables and clean terminals and clamps. Check clamps for corrosion and replace as necessary. Coat clamps with vaseline or cup grease to retard corrosion, replace and tighten securely.

g. Inspect all wiring. Check control wiring by touching a jumper lead from relay "Bat" to "Ign" terminals.

h. Check relay by touching heavy jumper lead from relay "Bat" to "Sol" terminals.

9. STARTER FAILS AND LIGHTS DIM

Possible Causes:

a. Weak battery.

b. Dead battery cell.

c. Corroded battery terminals.

d. Internal ground in windings.

Remedies:

a. Test specific gravity of battery and check for dead cell. Replace or recharge battery as necessary.

b. Replace defective battery. Check voltage regulator and generator output to determine cause of battery failure.

c. Remove battery terminals and clean terminals and clamps. Check clamps for corrosion and replace as necessary. Coat with vaseline or cup grease to retard corrosion, install and tighten securely.

d. Remove starting motor and test. Replace parts, or complete unit as required to correct condition.

10. STARTER TURNS BUT DOES NOT ENGAGE

Possible Causes:

a. Defective starter clutch (slipping).

b. Broken teeth on flywheel ring gear.

c. Defective switch on yoke linkage.

Remedies:

a. Remove starting motor and install new pinion and clutch assembly. Check shaft for excessive wear or burring and replace if necessary.

b. Replace flywheel ring gear. Check teeth on mating pinion for wear and replace as necessary.

c. Install new linkage.

11. STARTER LOCKS

Possible Causes:

a. Broken or chipped teeth on flywheel ring gear.

b. Loose starter mounting bolts.

Remedies:

a. Replace flywheel ring gear. Check teeth on mating pinion for wear and replace as necessary.

b. Remove starting motor and check for possible damage to pinion teeth. Remount starting motor and tighten bolts securely.

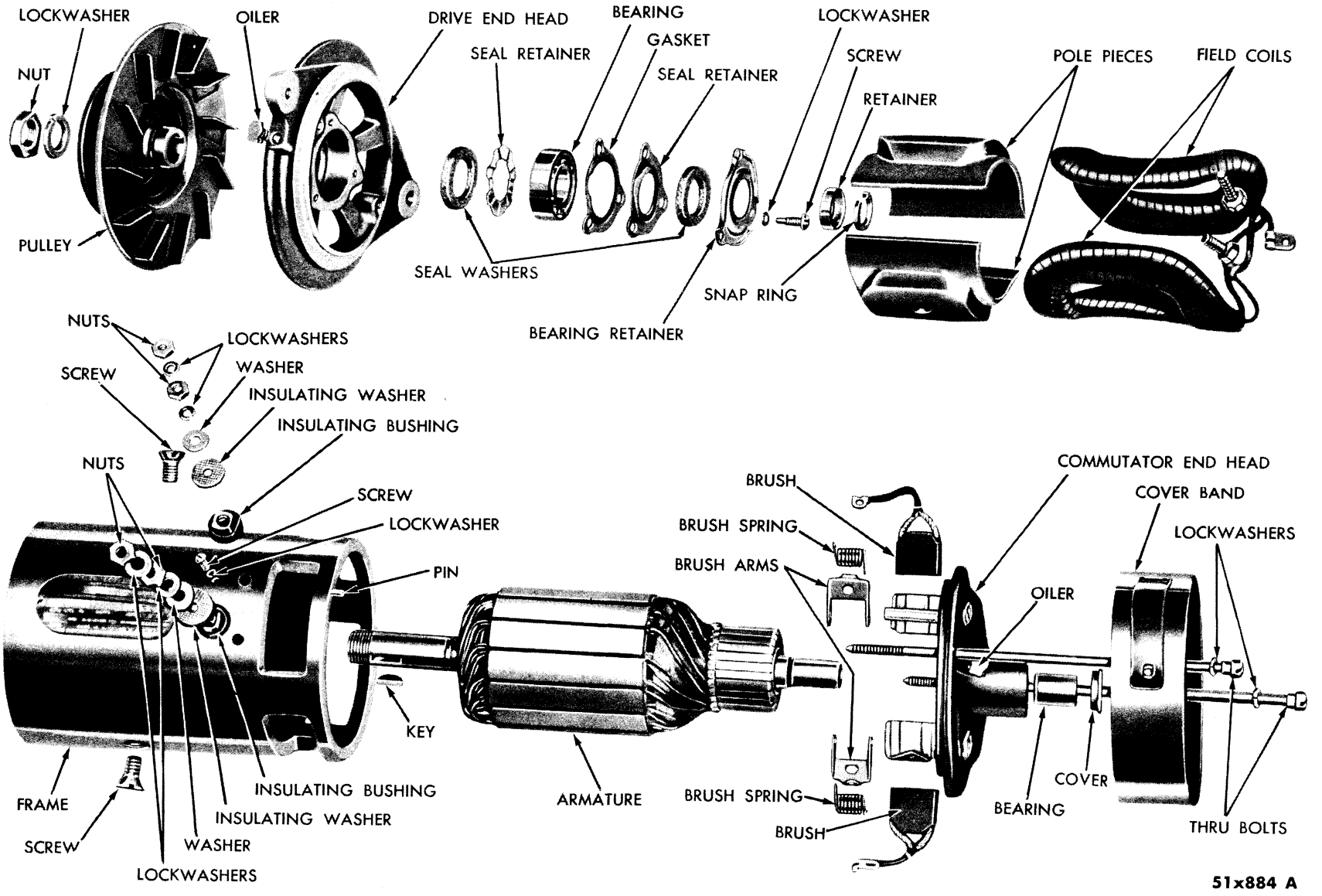


Fig. 6—Generator Type GGW (C-67, C-68) (Without Power Steering)

GENERATOR

A heavy-duty, air-cooled, shunt-type generator, with automatic cut-out, current and voltage regulation, is used. The output of the generator is controlled (in relation to the voltage requirements), keeping the battery fully charged and maintaining proper voltage under normal driving conditions. This means that the ammeter hand may gradually approach zero, indicating that the battery requires less current, at that time. Thus, the voltage control feature of the generator prevents over-charging of the battery.

12. REMOVAL AND INSTALLATION OF GENERATOR

To remove generator, disconnect lead wires, and remove adjusting strap bolt and support bracket bolts.

When installing generator, adjust fan belt by pulling outward on generator, until belt shows approximately ¼ inch slack (when pushed from a straight line) midway between the fan and generator pulley.

After installation of the generator, it may be necessary to flash the generator field to restore its residual magnetism and insure its correct polarity as follows:

First, disconnect the field lead at the "F" field terminal of the generator. Then connect a jumper wire from the field terminal post of generator to ground. Use a second jumper (with one end connected to the negative battery post) and touch the other end momentarily, but firmly, to the armature terminal post at the generator (with the engine not running). Start engine and check for charge.

CAUTION

No connection, ground, battery or otherwise, should be made on the terminals of the regulator. Such a connection could damage the regulator by causing a dead short through its contacts. When flashing the field, be sure that the lead between the field terminals of the generator and regulator is removed at the generator field terminal post, during flashing operation.

13. DISASSEMBLY OF GENERATOR (REFER TO FIGS. 6, 7, 8 AND 9)

a. Removal and Disassembly of Commutator End Head

(1) Remove generator cover band.

(2) Remove terminal screws (which attach brush pigtails to brush holders), lift brush arms away from brushes and remove brushes.

(3) Remove the bearing retaining screws from the end of the armature end head. (All Power Steering).

(4) Remove the two long frame screws and remove the commutator end head. Inspect commutator end head bushing. If worn or damaged, replace it.

A worn bushing (generators so equipped) may allow the armature core to rub against the pole shoes and cause damage. Remove the felt wick from the end head (generators so equipped). Press out the worn bushing and install a new one, using a suitable tool or mandrel.

Never ream an oil impregnated bushing. Be sure to soak the bushing before installation. Replace the felt wick if the **generator is so equipped.**

If the generator is equipped with a ball bearing, clean the ball bearing in suitable solvent and dry with compressed air. DO NOT SPIN BEARING WITH COMPRESSED AIR. If bearing is satisfactory for further service, pack half full with high temperature, non-fiber grease and install in head.

Inspect all other parts of commutator end head for wear or distortion and replace parts as required. If brush holders are loose, do not attempt to tighten, but replace head.

Place head on armature and install brushes, check alignment and movement of brushes.

(Continued on page 151)

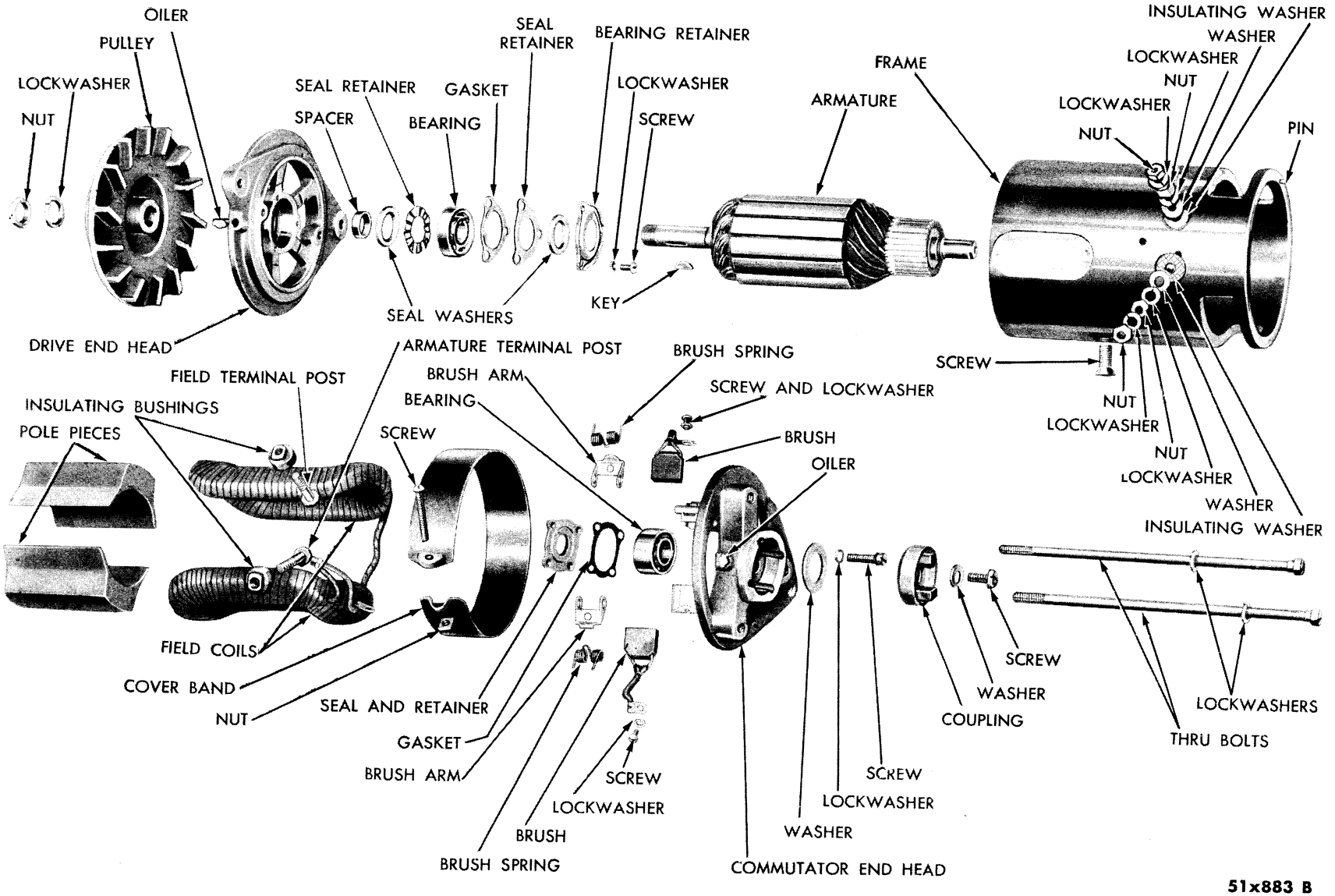


Fig. 7—Generator Type GGU (C-69, C-70) (With Power Steering)

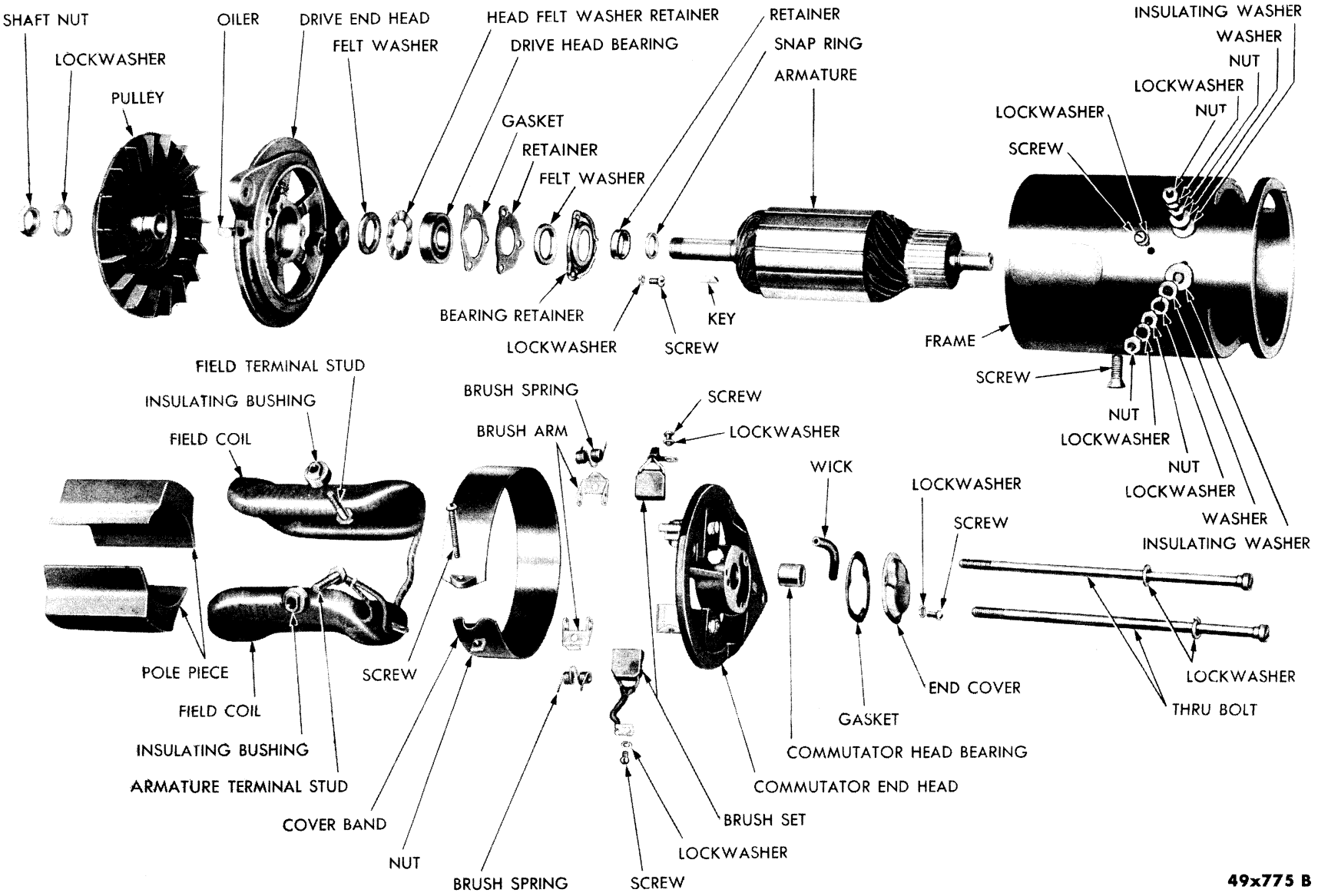


Fig. 8—Generator Type GGU (C-69, C-70) (Without Power Steering)

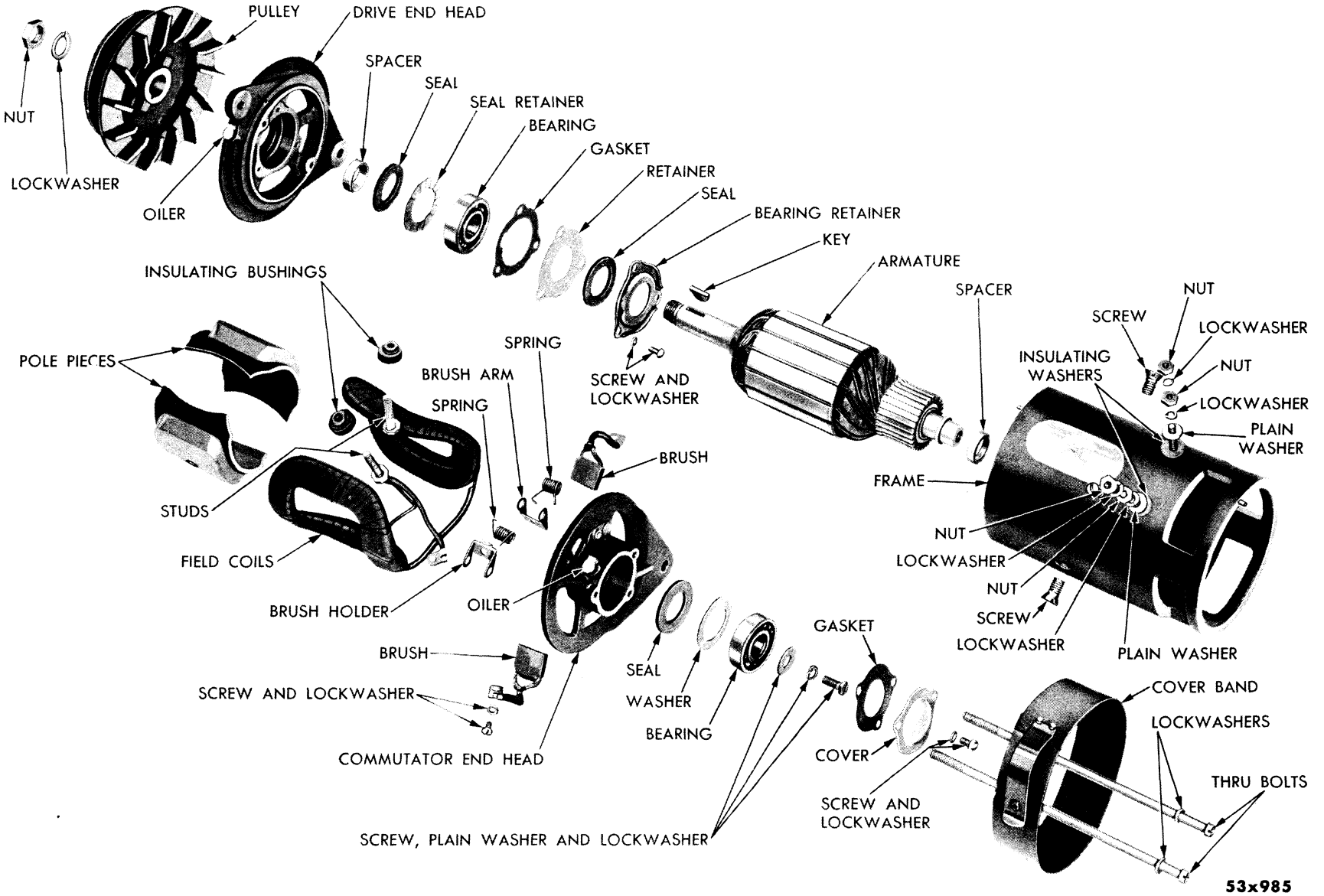


Fig. 9—Generator Type GGU (With Car Cooling) (Without Power Steering) (Exploded View) (C-69, C-70)

(Continued from page 147)

b. Removal and Disassembly of Drive End Head

(1) Pull the drive end head and armature from generator frame. Remove armature shaft nut, pulley and key.

(2) Remove the bearing cover screws and retainer and pull drive end head from bearing.

(3) Inspect bearing. Replace if worn or rough.

c. Removal of Field Coils

(1) Remove nuts from field and armature terminal posts and push posts to the inside of generator frame.

(2) Remove large screws which hold the field pieces to generator frame and remove field shoes and coils.

14. ASSEMBLY OF GENERATOR (REFER TO FIGS. 6, 7, 8 AND 9)

a. Installation of Field Coils

(1) Slide the field coils and field shoes into the generator frame with the brush lead wire and terminal post adjacent to the armature terminal post hole.

(2) Insert the terminal posts through the frame.

(3) Install the insulating washers and binding nuts on the terminal posts. Dip screws in linseed oil and install the screws which hold the field pieces to the frame.

(4) Tighten screws securely and stake.

b. Installation of Drive End Head and Armature

Be sure the ball bearing is in good condition and fits snugly into the recess. Before assembly, pack ball bearings about ½ full with a high temperature non-fiber grease. Soak felts in clean engine oil and compress slightly to remove excess oil before installation.

Install generator parts on the drive end of the armature shaft and slide the drive end head over the bearing. Align the retainers with the head and install the lockwashers and retaining screws. Install woodruff key, drive pulley, lockwasher and nut.

CAUTION

Soft jaws should be installed on the vise before gripping the armature core to tighten the nut.

c. Installation of Armature in Field Frame

Slide armature and drive end head assembly into the field frame and align the dowel hole in the end head with the dowel pin in field frame and tap head in place.

d. Installation of Commutator End Head (Without Power Steering)

(1) Place the brush arms and springs over the pins in the end head.

(2) Slide the commutator end head over the armature shaft, mating the dowel hole and dowel pin.

(3) Install the thru bolts.

(4) Install a new felt wick. Align the gasket, end cover and holes in the end head and install retaining screws and lockwashers.

(5) Hold the brush arms out against the spring tension and slide the brushes into the brush holders (with the angle on the brushes conforming with the contour of the commutator).

(6) Connect the brush pigtails, field lead and armature lead to the brush holders, being sure terminals do not touch end frame and do not interfere with motion of brushes.

(7) Install cover band and lubricate bearings with 8 to 10 drops of oil in each oil cup.

e. Installation of Commutator End Head (With Power Steering)

(1) Place the brush arms and springs over the pins in the end head.

(2) Install bearing, gasket and seal retainer on inner side of commutator end head and align screw holes with head. Install the retaining screws and lockwashers.

(3) Slide the assembly over the armature and on the generator field frame, mating the dowel pin hole over the dowel pin.

(4) Install the thru bolts and lockwashers.

(5) Install flat washer, coupling and coupling retaining screw and lockwasher. Tighten screw to 15 foot-pounds torque.

(6) Hold the brush arms out against the spring tension and slide the brushes into the brush holders (with the angle on the brushes con-

forming with the contour of the commutator).

(7) Connect the brush pigtails, field lead and armature lead to the brush holders, being sure terminals do not touch end frame and do not interfere with motion of brushes.

(8) Install cover band and lubricate bearings with 8 to 10 drops of oil in each oil cup.

15. TESTING GENERATOR

a. Generator Motoring Test

A motoring test is often made to determine if the generator is in good condition. To perform the test, loosen and remove fan belt from generator pulley. Connect a jumper between the negative battery post and the armature terminal.

CAUTION

Do not touch field terminal of generator with jumper as voltage regulator will be damaged beyond repair.

If the generator "motors" over slowly, it should be able to generate. However, if the generator does not "motor" and a flash is obtained as jumper is connected, connect another jumper between the field terminal and a good ground. If the generator now "motors," check the regulator for trouble in the field to ground circuit. If generator does not function after above test is made, remove, disassemble and test parts as outlined in the following paragraphs:

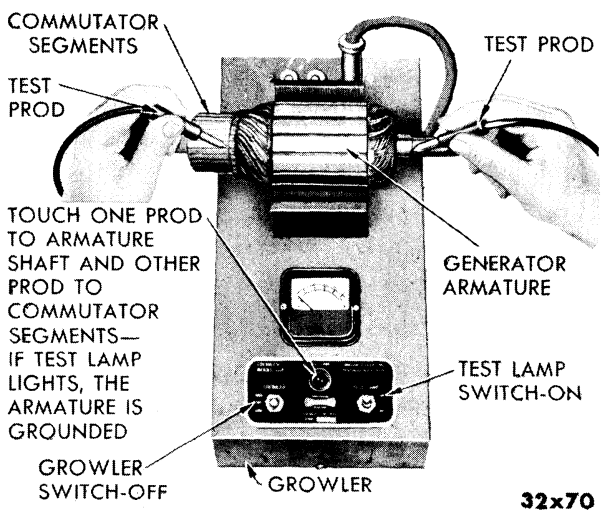


Fig. 10—Testing Generator Armature for Ground

b. Testing Armature

(1) GROUND—Touch one lead from a test lamp to the armature shaft and the other lead from the lamp to the commutator segments, as shown in Figure 10. If the test lamp lights, the armature is grounded.

(2) SHORT CIRCUIT—Place the armature in a growler and turn growler switch to the low position (Fig. 11). Hold a steel strip (parallel with and against the armature segments) and rotate the armature slowly. If the steel strip vibrates, the armature is short circuited.

(3) INSULATED BRUSH HOLDER — Test for ground, as shown in Figure 12.

c. Testing Field Coils

(1) OPEN CIRCUIT — Connect one lead from a test lamp to the field terminal and the other lead from the lamp to the lead wire, as shown in Figure 13. If the lamp does not light, there is a break in the coil wiring.

(2) GROUND — Touch one lead from a test lamp to the generator frame and the other lead from the lamp to the field terminal post, as shown in Figure 14. If the lamp lights, the field coils are grounded.

(3) RESISTANCE — If during test (1) the lamp lights, even though test (2) shows no apparent ground, there may be an internal short or a small current leak and the test lamp may light despite the presence of such

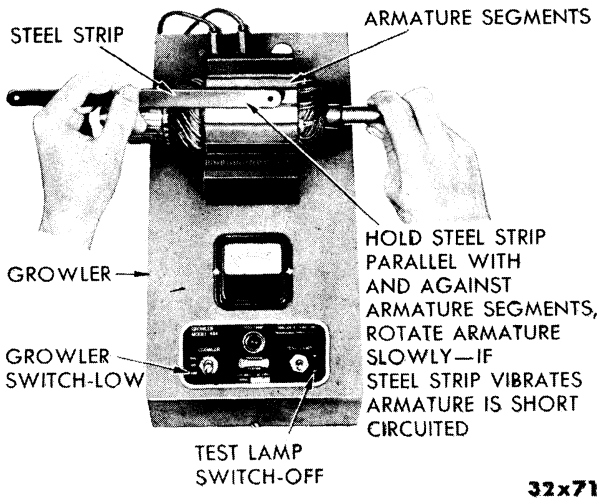


Fig. 11—Testing Generator Armature for Short Circuit

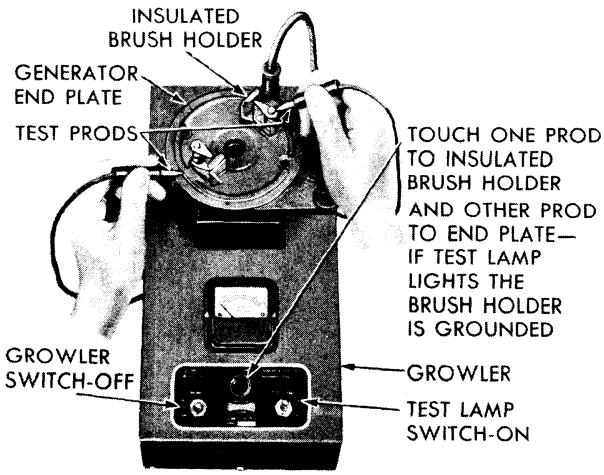


Fig. 12—Testing Insulated Brush Holder

conditions. If such occurs, check the resistance in the field windings by connecting an ammeter and variable resistance in series between a 6-volt battery and the two leads of the complete set of field coils. Connect a voltmeter to the coil leads. Perform this test carefully because a shorted field may cause an excessively high current. Adjust voltage to 6 volts and read ammeter. If ammeter shows field coil draw over the specified number of amperes, replace field coil.

16. GENERATOR MAINTENANCE

a. Inspection of Brushes

Check generator brushes to make certain that they are free in holders, are seating properly and are not worn excessively. Brushes should

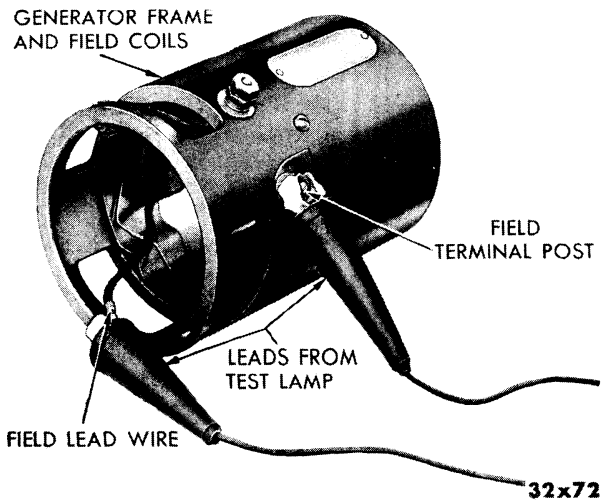


Fig. 13—Testing Field Coils for Open Circuit

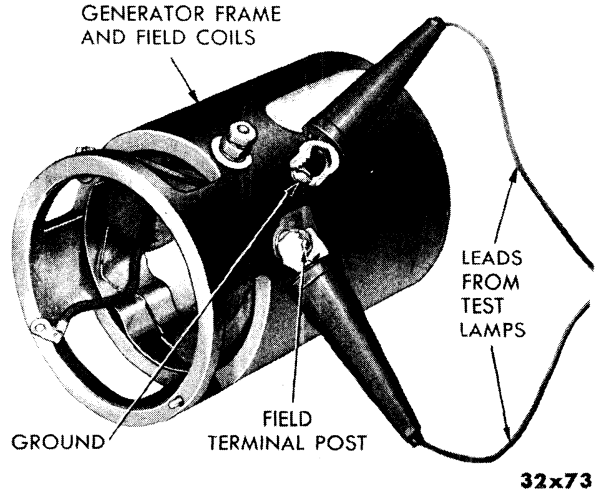


Fig. 14—Testing Field Coils for Ground

be examined at 10,000 miles, again at 20,000 miles and at 5,000 mile intervals thereafter. Brushes that are worn short or are covered with oil should be replaced to prevent damage to armature, commutator and windings.

If the brushes are badly worn, or the commutator is rough or worn so that the mica is even with the bars, proceed as follows:

Remove generator, disassemble, clean the parts, turn the commutator and undercut the mica. Assemble, fit new brushes and bench test the generator before installing on engine.

b. Fitting New Brushes

To fit new brushes after assembling generator, take a strip of No. 00 sandpaper, cut the width of commutator and slide it, sand side up, around commutator and under brushes.

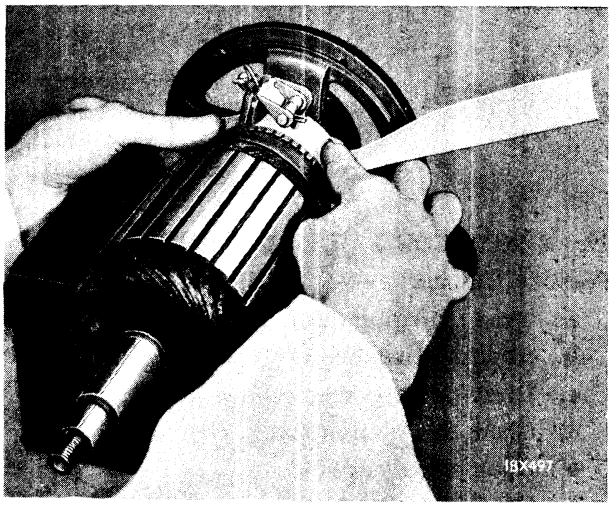


Fig. 15—Seating Brushes

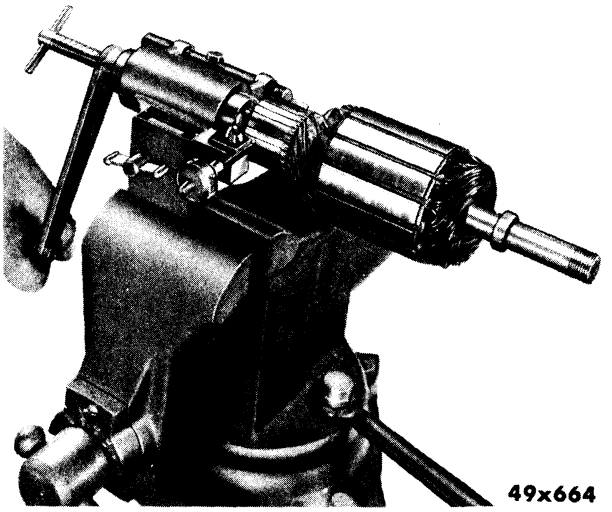


Fig. 16—Turning Commutator
(Using Tool C-770)

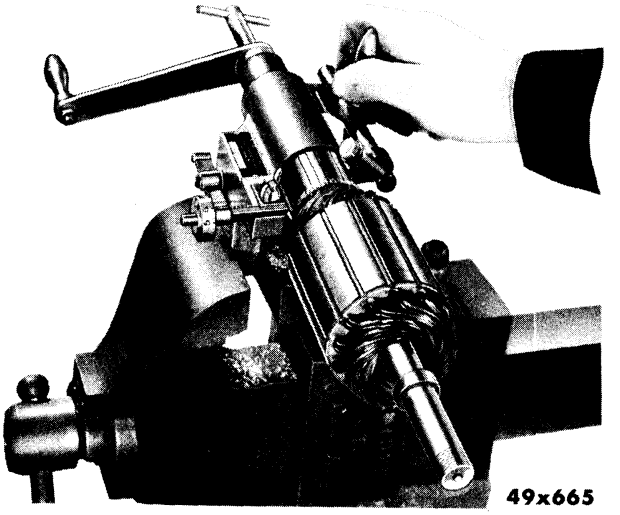


Fig. 17—Undercutting Mica
(Using Tool C-770)

Rotate armature and sandpaper slowly, being sure to keep sandpaper tight, until brushes show at least a 75 per cent fit over the entire contact face (Fig. 15). After obtaining a proper seat for all brushes, carefully remove sandpaper so as not to cut the edge of a brush. Excessive use of sandpaper shortens brush life and should be avoided. Blow out all sand and carbon dust from generator. Run generator on test stand long enough to obtain a highly polished fit over entire contact face of brush, before checking or adjusting generator output.

c. Reconditioning Armature (Armature Removed)

If the commutator is rough, out-of-round, burned, or if the mica is even with, or extends above the surface, the commutator should be turned down, using turning and undercutting Tool C-770, as shown in Figure 16, or a lathe.

Care must be taken, when turning commutator, because when finished, it should not have over .0005 inch eccentricity when tested with a dial test indicator (with armature shaft bearing seats resting on V blocks).

To undercut commutator, a special undercutting tool can be used. Or, a tool can be made by taking a short piece of fine tooth hack saw blade and grinding offset of teeth to just fit width of mica slot. Be sure to undercut mica square, the full width of slot, and $\frac{1}{32}$ inch deep. After undercutting, polish commutator with No. 00 sandpaper to remove burred edges of commutator bars. (See Fig. 17).

SERVICE DIAGNOSIS

17. GENERATOR FAILS TO CHARGE

Possible Causes:

a. Open charging circuit.
b. Sticking brushes.
c. Dirty or burned commutator.
d. Grounded commutator. Grounded wiring.
e. Open circuit in field.
f. Poor soldering on armature and field studs.
g. Faulty regulator.

Remedies:

a. Test generator for open charging circuit.

b. Free or replace generator brushes.

c. Check commutator and brushes. If brushes are badly worn, or the commutator is dirty, rough, or worn so that the mica is even with the bars, recondition armature. At reassembly, install new brushes.

d. Check armature for grounded commutator. Check wiring for a ground.

e. Check generator for open circuit in field.

f. Check armature and field stud connections for poor contacts. Resolder to form good contact surface to correct this condition.

g. Check regulator.

18. LOW, UNSTEADY CHARGING RATE

Possible Causes:

a. Slipping fan belt.

b. Defective ammeter.

c. Improperly seating brushes.

d. Weak brush spring tension.

e. Poor bond between brush and pigtail.

f. Out-of-round commutator.

g. Resistance in charging circuit.

h. High mica between commutator bars.

i. Open armature winding.

j. High resistance at battery terminal posts.

k. Loose connections.

Remedies:

a. Check driving surfaces of fan belt and tighten. If the sides or bottom of belt are frayed, cracked or greasy, replace belt and adjust it for approximately ½ inch slack (when pushed from a straight line, midway between the fan and generator pulley).

b. Replace defective ammeter after checking to determine cause of failure.

c. Replace generator brushes and seat properly. Check armature commutator for roughness or high mica. Recondition commutator if necessary.

d. Check brush spring tension with tension specified in Data and Specifications. Discard springs that do not meet minimum requirements.

e. Check pigtails for discoloration which indicates a burned condition. Replace brushes as necessary. Tighten pigtails securely to form a good contact.

f. Recondition armature commutator. Install new brushes and check spring tension.

g. Check charging circuit.

h. Undercut mica.

i. Test armature for open winding. If unable to correct condition, replace armature and install new brushes.

j. Remove battery cables and clean terminals and clamps. Check clamps for corrosion and replace if necessary. Coat clamps with vaseline or grease to retard corrosion, install and tighten securely.

k. Clean and tighten connections in the charging circuit.

19. EXCESSIVE CHARGING RATE

Possible Causes:

a. Defective regulator.

b. Overheated battery.

c. Grounded field or ground in generator to regulator wiring.

d. Shorted cell in battery.

Remedies:

a. Replace defective regulator. Check to determine cause of failure.

b. Test battery. Test regulator for high voltage setting. Adjust or replace regulator to correct this condition.

c. Check generator for internal ground, check generator to regulator wire for ground and repair as necessary.

d. Test specific gravity of battery. Replace battery if necessary.

20. GENERATOR NOISY

Possible Causes:

a. Misaligned fan belt or pulley.

b. Improperly seating brushes.

c. Worn bushing or bearing.

d. Loose generator drive pulley.

e. Loose field poles.

f. Excessive voltage output.

g. High wedges in armature slots.

h. Bent flange on pulley.

i. Generator fan blades striking.

j. Loose generator mounting.

Remedies:

a. Check fan belt and pulley for true running. Replace parts as necessary to correct this condition.

b. Check brushes for excessive wear and for looseness in holders. Replace brushes if necessary.

c. Replace bearing, and/or bushing. Check armature assembly for possible damage and replace if necessary.

d. Tighten drive pulley and check for true running.

e. Tighten pole shoes and check armature for possible damage.

f. Refer to Paragraph 19 for Possible Causes.

g. Replace, or sand down armature slot wedges.

h. Check fan belt for possible damage. Replace pulley as required.

i. Test generator fan pulley for true running.

j. Tighten generator mounting bolts.

21. NOISE AND ARCING AT GENERATOR BRUSHES

Possible Causes:

a. High mica between commutator bars.

b. Out-of-round commutator.

c. Sprung armature shaft.

d. Dirty, glazed commutator.

e. Hard spots on brushes.

f. Weak brush springs.

g. Worn or loose brushes.

h. Loose wiring at brush pigtails.

i. Excessive voltage output.

Remedies:

a. Undercut mica. Inspect and replace brushes if necessary.

b. Recondition commutator. Check brushes and replace if necessary.

c. Replace armature assembly and install new brushes. Seat brushes properly.

d. Recondition armature. Check brushes for excessive wear and replace as required.

e. Replace brushes.

f. Check brush spring tension with tension specified in Data and Specifications. Discard springs that do not meet minimum requirements.

g. Replace brushes.

h. Refer to Paragraph 18, remedy **e**, for correction of this condition.

i. Refer to Paragraph 19 for remedies of this condition.

22. ARMATURE FAILURE (PREMATURE)

Possible Causes:

a. Excessive charging rate.

b. Failure of voltage regulator.

c. Improper type brushes used.

d. Worn shaft bearing (pole rub).

e. Short between armature coils.

f. Shorted battery cell.

g. Insufficient ventilation.

Remedies:

a. Check regulator setting and replace armature assembly. Check and adjust regulator as necessary.

b. Replace armature assembly. Check voltage regulator for proper adjustment. If unable to adjust, replace voltage regulator.

c. Replace armature assembly and install new brushes.

d. Replace armature assembly and install new bearing and bushing.

e. Replace armature assembly and install new brushes.

f. Replace battery and check voltage regulator for improper adjustment.

g. Inspect fan and vent holes for dirt or obstruction.

CURRENT AND VOLTAGE REGULATOR

The current and voltage regulator assembly (Fig. 18) contains three units, namely: the cut out relay, the current regulator and the voltage regulator. Each unit has its own function to perform.

The cut out relay acts as an automatic switch between the generator and the battery. The cut out relay closes the charging circuit when the generator is charging and opens the circuit when the generator is not charging. This action prevents the battery discharging back through the generator.

The current regulator limits the maximum current output of the generator in amperes. When the generator output reaches a predetermined maximum, the regulator points are opened, cutting in a resistance in the generator field circuit —thus reducing the output. Immediately upon the dropping of the output, the points close (cutting out the resistance) and the output rises. These cycles occur so rapidly that the points vibrate at a high frequency, thus holding the output constant at a predetermined maximum.

The voltage regulator is used for holding the voltage of the electrical system constant within close limits. When the voltage rises to a predetermined value, the regulator contact points vibrate, thus cutting a resistance in and out of the generator field circuit.

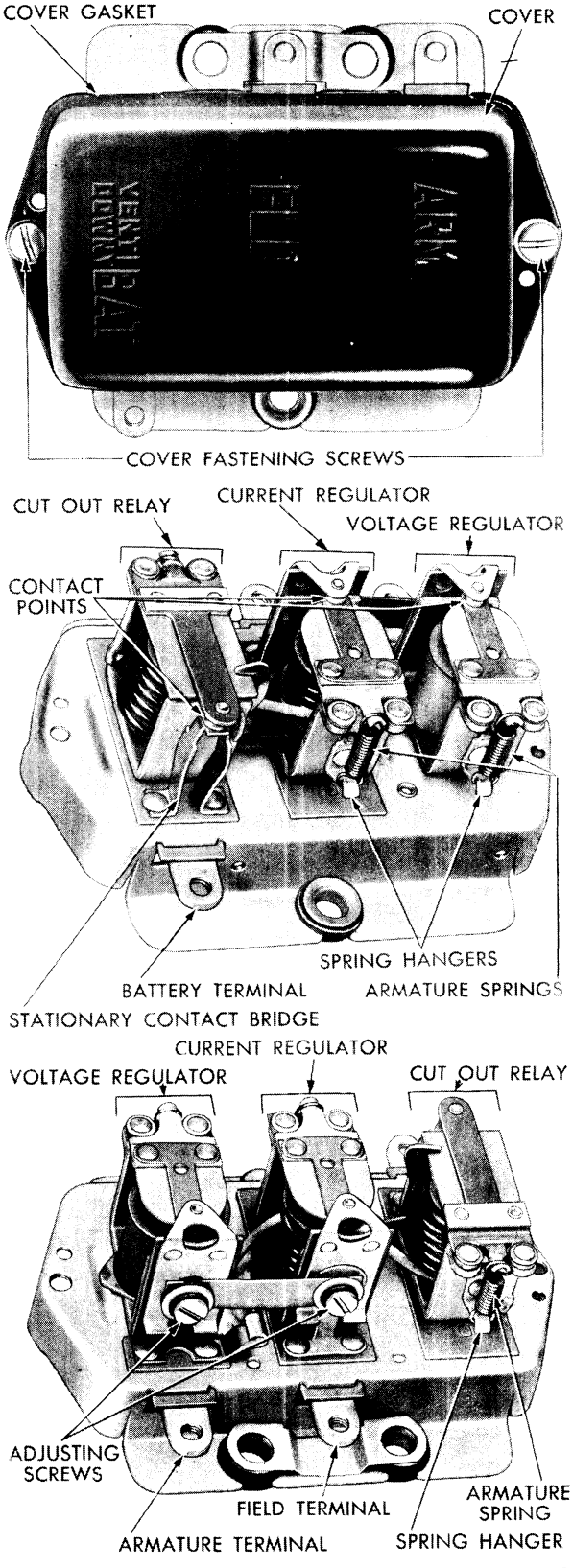
CAUTION

Do not attempt to adjust the regulator assembly, unless its operation is thoroughly understood and accurate meters are available. Even a slight error in the setting of the unit may cause improper functioning, resulting in a rundown or overcharged battery.

23. REGULATOR INSPECTION

Remove regulator cover, after checking to determine if seal has been broken, which may indicate previous adjustment or repair has been made. A close visual inspection should be made to determine if any of the following conditions exist:

(1) Loose or broken connections resulting from poor soldering or rough handling.



51x618

Fig. 18—Current and Voltage Regulator

(2) Evidence of burning or abnormal high temperatures at the coils, contact points, insulation or flexible arm to which regulator contacts are mounted.

(3) Broken or altered resistors.

(4) Improperly installed armature springs, distorted spring hangers, bent armatures, yokes or hinges.

(5) Evidence of moisture or corrosion in regulator.

If any of the above conditions are apparent, or if regulator is in a generally poor condition, it should be replaced.

Before testing or adjusting regulator, the following tests should be made:

(1) Test and check the wiring in the charging circuit. Be sure all connections are clean, tight and in good condition.

(2) Test the specific gravity and check the ground polarity and voltage of the battery. If not fully charged and in good condition, substitute (temporarily for test purposes) a fully charged battery of the same type and capacity.

(3) Check generator for operation without the regulator in the circuit.

(4) Check the part numbers stamped on the name plates of the generator and regulator to make sure the correct regulator has been installed. Each regulator is designed for use with a generator having a specified field draw, output, internal connections and speed range and may not work properly, if an incorrect substitution has been made.

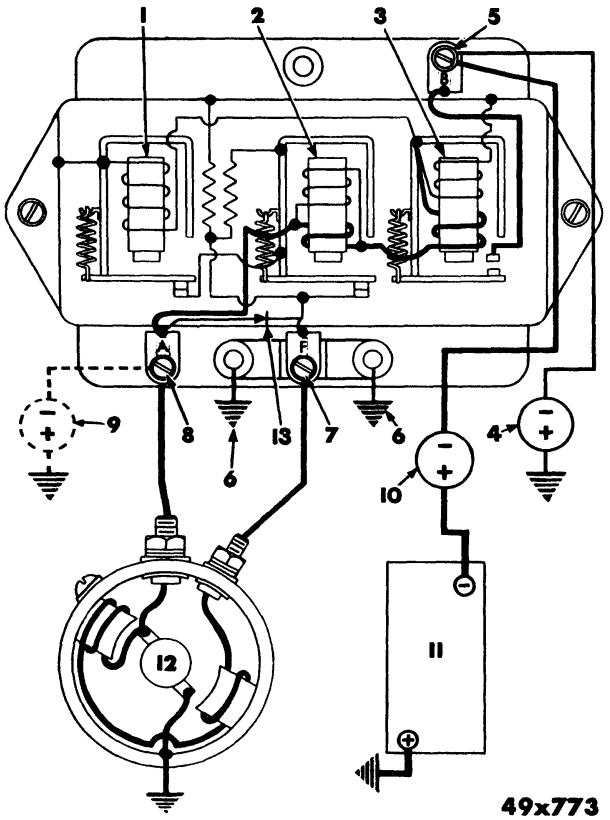


Fig. 19—Generator Regulator Wiring Diagram and Test Connections

1—Voltage regulator coil
2—Current regulator coil
3—Cut out relay
4—Voltmeter connection for current and voltage regulator tests
5—Regulator battery terminal
6—Regulator ground screws
7—Regulator field terminal
8—Regulator armature terminal
9—Voltmeter connection for circuit breaker test
10—Test ammeter
11—Battery
12—Generator
13—Resistor

24. TESTING CUT OUT RELAY

Disconnect wire from "B" terminal of the regulator; connect the positive (+) lead of a test ammeter to the wire removed and the negative (—) lead to the regulator "B" terminal, as shown in 10, Figure 19.

Connect the negative (—) lead of a test voltmeter to the "A" terminal of the regulator and positive (+) lead to the regulator housing ground, as shown in 9, Figure 19.

Start engine and be sure that it idles smoothly. Then, increase engine speed slowly to determine when the cut out relay points close. When the hand of the voltmeter kicks back slightly, it indicates points have closed. This should occur at 6.3 to 6.8 volts.

If an adjustment is necessary, remove regulator cover and inspect the contacts of all three units. In normal use, the contacts will become grayed. If the contacts are burned, dirty or pitted, service the regulator contact points, as outlined in Paragraph 27.

Adjust closing by bending lower spring hanger on cut out relay unit.

25. TESTING VOLTAGE REGULATOR

Change voltmeter connection from armature to battery terminal of regulator, as shown in 4,

Figure 19. Connect a variable resistance across the battery posts.

Run engine at a speed equivalent to 30 miles per hour for 15 minutes, adjust load to give 10 amp. output. Cover must be on regulator during this warm-up period and when taking test readings. The voltage regulator must control the voltage from 7.1 to 7.4 volts at 70° F.

If an adjustment is necessary, remove regulator cover and service the contact points, as outlined in Paragraph 27, of this Section.

Adjust regulated voltage by bending lower spring hanger. Replace cover, operate for 5 minutes and check voltage.

26. TESTING CURRENT REGULATOR

Leave the voltmeter and ammeter connected as when testing the voltage regulator.

Run engine at a speed equivalent to 30 miles per hour for 15 additional minutes, applying enough resistance load across the battery to maintain the voltmeter registering between 6.9 and 7.1 volts. At 70 degrees F., the current regulator should operate at the lower figure indicated on the regulator name plate (plus or minus 2 amps.) at the conclusion of the warm-up period.

If an adjustment is necessary, remove regulator cover and service the points, as outlined in Paragraph 27, of this Section.

Adjust by bending spring hanger.

NOTE

When removing or replacing the regulator cover, do not touch the relay armature. This would cause a short circuit and damage the regulator assembly.

27. SERVICING REGULATOR CONTACT POINTS

Remove regulator cover and inspect the contact points of all three units. In normal use, the contacts will become grayed. If the contact points are burned, dirty or pitted, reface with a clean fine file.

CAUTION

Never use sandpaper, emery cloth or a rough file.

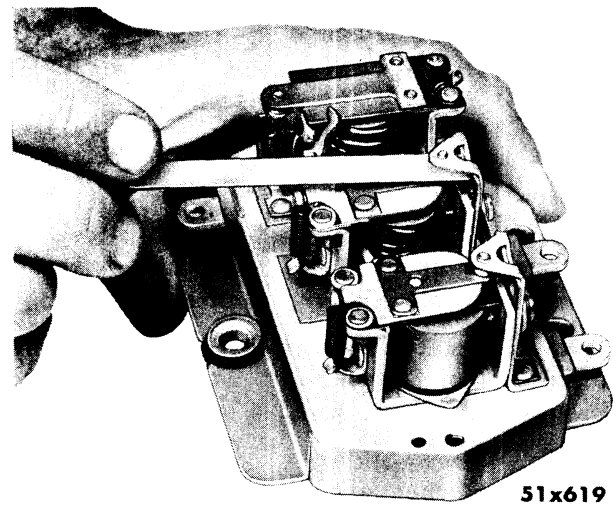

51x619

Fig. 20—Refacing Contact Points

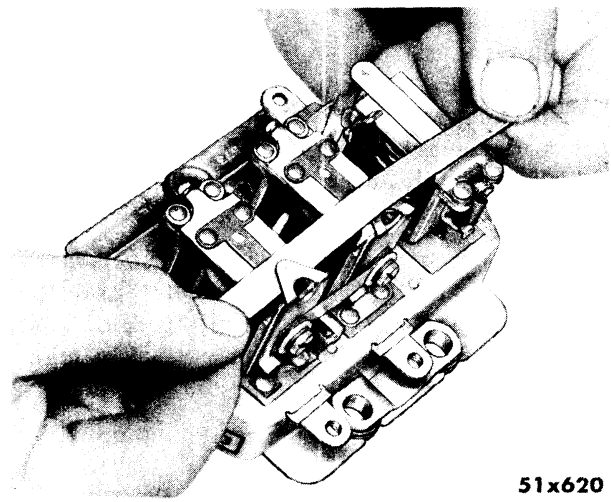
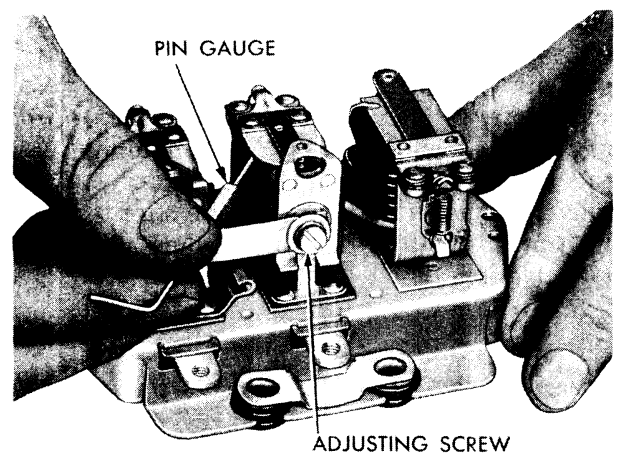

51x620

Fig. 21—Cleaning Contact Points with Lintless Tape



51x624

Fig. 22—Checking Air Gaps (With Wire Gauge from Tool Kit C-828)

To reface contact points file lengthwise and parallel to the armature, as shown in Figure 20, until the contact points present a smooth flat surface toward each other. It will not be necessary to remove all traces of pitting.

NOTE

Crossways filing may form grooves which would tend to cause sticking and erratic operation.

Clean the contact points after filing with a strip of lintless bond tape, as shown in Figure 21. Be sure that no lint remains between contacts after cleaning.

After refacing and cleaning the contact points, it will be necessary to readjust the armature air gaps in order to compensate for metal removed from contacts.

To check the current and voltage regulator air gaps, use pin type gap gauge Tool from Kit C-828, which measures from .048 to .052 inch. Insert gauge on the point side of the air gap and next to the armature stop pin (Fig. 22) and with the contact points just separating.

To adjust air gap, loosen the bracket screws and raise or lower the contact point brackets until the desired clearance is obtained. Be sure that these screws are tightened securely after adjustments are made. Keep contacts aligned.

To check the relay air gap, use flat gauge Tool from Kit C-828, which measures .031 to .034 inch. Insert gauge between armature and magnet core, as shown in Figure 23. Be sure gauge is placed as near to the hinge as possible.

To adjust the relay air gap, bend the armature stop so the space between the core and armature is within the limits specified. Be sure stop does not interfere with the armature movement. Adjust the contact gap to .015 inch minimum by expanding or contracting the stationary contact bridge, as shown in Figure 24. Be sure to keep the contact points in alignment when adjusting contact gap.

NOTE

Increasing the contact gap lowers the opening voltage and raises the opening reverse current.

To adjust armature for proper opening and closing voltages, use bending Tool from Kit C-828. With slot in the end of tool place over the lower spring hanger (Fig. 25), bend hanger to in-

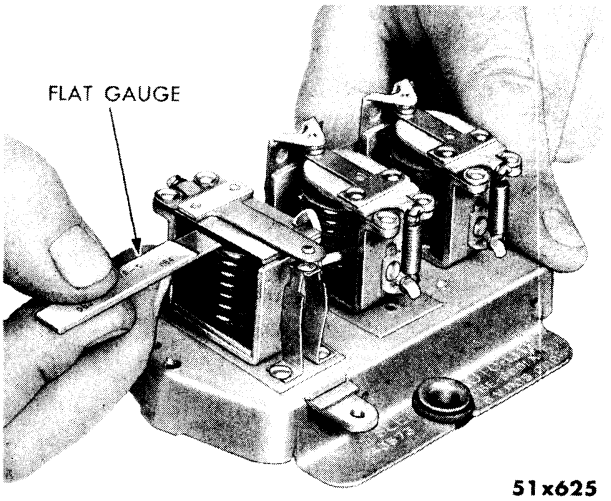


Fig. 23—Checking Relay Air Gap
(Using Flat Gauge from Tool Kit C-828)

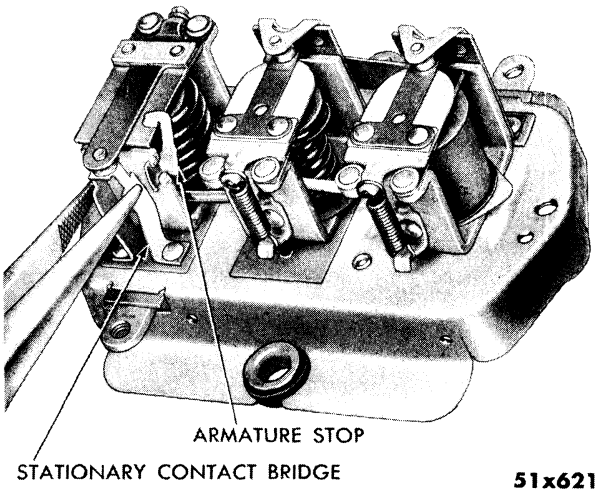


Fig. 24—Adjusting Relay Contact Gap

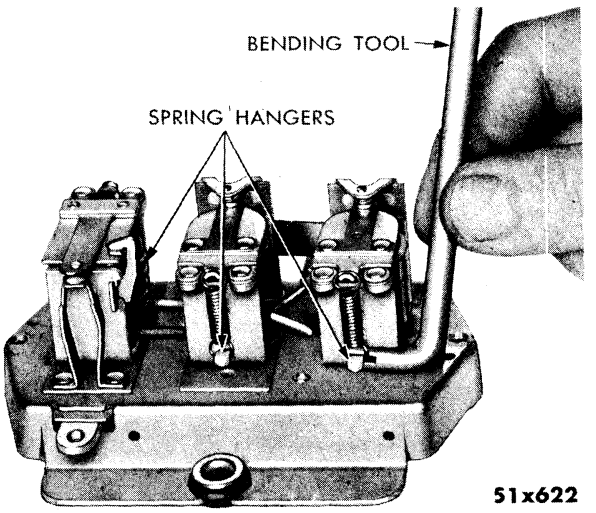


Fig. 25—Adjusting Spring Tension

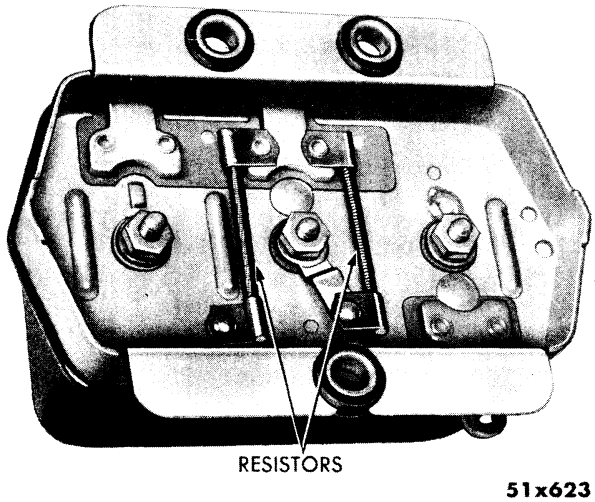


Fig. 26—Resistor Assemblies on Regulator

crease or decrease the spring tension until the desired opening or closing voltage is obtained.

Checking Resistors—Refer to Figure 26. Check with an ohmmeter. The resistor marked 38 should test from 34.5 to 42 ohms, while the resistor marked 7 should test from 6.5 to 8.0 ohms resistance.

Marked 60 57-70

Marked 15 14-17.1

Marked 80 75-91

SERVICE DIAGNOSIS

28. REGULATOR POINTS OXIDIZED

Possible Causes:

a. Poor ground connections.

b. Misaligned contact points.

c. Improper air gap setting.

d. Shorted field in generator.

Remedies:

a. File down contact points, after checking for poor connections on ground side of circuit.

b. File down contact points, align and adjust.

c. File down contact points. Set air gap from .031 to .034 inch for circuit breaker and from .048 to .052 inch for current and voltage regulator.

d. File down contact points, after checking for shorted field in generator.

29. REGULATOR POINTS PITTED

Possible Causes:

a. Long usage, normal wear.

b. High current output of generator.

c. Insufficient point spring tension.

d. Reversed polarity in generator.

e. Radio condenser connected to field terminal instead of armature terminal of generator.

Remedies:

a. File down contact points. Reset air gaps to required specifications.

b. Check regulator for burned coil windings or contact arms. If conditions exist, replace regulator. Otherwise, file down contact points, check air gap and contact point setting. Check generator for grounded or shorted field, or high resistance in ground circuit.

c. File down contact points. With special Tool from Kit C-828 placed over the lower spring hanger, bend slightly to increase tension. Increasing the spring tension raises the closing voltage. Refer to Servicing Regulator Contact Points Paragraph 27.

d. File down contact points, reset air gaps and adjust contact points. Check generator polarity and correct as necessary.

e. Connect radio condenser to armature terminal.

30. BURNED COIL WINDINGS

Possible Causes:

a. High voltage regulator setting.

b. High current regulator setting.

c. Grounded generator field.

Remedies:

a. Replace regulator assembly.

b. Replace regulator assembly.

c. Replace regulator assembly, after checking and correcting the grounded condition in the generator field.

31. BURNED CONTACT ARM

Possible Causes:

a. Regulator connected incorrectly.

b. Accidental, momentary short between battery terminal and field terminal of regulator.

c. Wrong procedure followed in connecting generator, causing a build-up.

Remedies:

a. Check wiring diagram and replace regulator assembly.

b. Replace regulator assembly. To avoid dead shorts, be careful when working on regulator.

c. Replace regulator assembly. Polarize generator (after making all connections) by causing a momentary connection from the starting switch or the regulator battery terminal to the generator armature terminal.

32. STUCK CURRENT REGULATOR POINTS

Possible Causes:

a. Reversed polarity.

b. Long usage.

c. Foreign material present.

Remedies:

a. File down contact points. Polarize generator.

b. File down contact points. If condition still exists, replace regulator assembly.

c. Clean interior of regulator, inspect contact points, clean and align. Check cover gasket. If it does not seal properly, replace it.

33. STICKING VOLTAGE REGULATOR CONTACT POINTS

Possible Causes:

a. Misaligned points.

b. Poor ground connections between generator and regulator.

c. Wrong polarity on regulator.

d. Pitted or oxidized points.

e. Defective winding in regulator.

f. Radio condenser connected to field terminal instead of armature terminal of generator.

Remedies:

a. Free up points, reset air gaps and adjust contact points.

b. Free up points, reset air gaps, clean and adjust contact points. Check connections between generator and regulator for indication of poor ground. Clean or tighten faulty connections to correct this condition.

c. Negative polarity regulators have "NEG" stamped in red on cover and should be used on negative ground systems only. Replace with proper positive ground regulator.

d. Refer to Paragraph 28 for Remedies of this condition.

e. Replace regulator assembly after checking to determine cause of failure.

f. Connect radio condenser to armature terminal of generator.

BATTERY

Electrolyte in the battery should be maintained at proper level by adding pure distilled water to each cell. Batteries with "star" level indicators should be filled until the solution reaches star level.

Batteries with special vent plugs should be filled after removing filler plugs and attaching them to the vents. Fill each cell to the top of the filler plug opening. Then, remove plugs from vents and electrolyte will drop to proper level which is $\frac{3}{8}$ inch above top of plates. There is no danger of overfilling battery unless it is filled too often.

Battery cell fluid level should be checked at least once a month in winter, every two weeks in summer, or every 1,000 miles.

Do not overfill or fill too frequently.

Water which is colorless, odorless, tasteless and suitable for drinking, is satisfactory for storage batteries.

WARNING: Explosive Gases!

Never allow a flame or spark near the battery vent openings. Hydrogen gas, which forms in normal battery operation, may be present and explode.

34. BATTERY MAINTENANCE

In order to obtain long life and efficient service from a battery, two important servicings must be done periodically:

(1) The electrolyte must, at all times, be kept above the plates and separators. Only pure distilled water, or water that is suitable for drinking purposes, should be used. NEVER ADD ELECTROLYTE except when it is definitely known that it has been lost by spillage.

(2) Be sure the battery is kept nearly charged at all times. Test the specific gravity at frequent intervals in order to determine the state of charge. Should the specific gravity fall below 1.250, remove the battery and have it charged.

a. Overcharging Battery

Overcharging a battery can be harmful in various ways, as follows:

(1) Overcharging causes high internal heat, which speeds corrosion of the positive plate grids and results in damage to the separators and negative plates. The case may become softened or distorted and the sealing compound displaced.

(2) Overcharging results in the separation of water and electrolyte, leaving the acid in a concentrated form, which can harm the separators and negative plate material at high temperatures over a period of time. This may cause charring of the separators and rapid corrosion of the positive grids.

(3) Overcharging may cause corrosion of the cables, battery support and other vital electrical or engine parts by forcing liquid from the cells.

(4) Overcharging vaporizes the water from the electrolyte, forming bubbles of hydrogen and oxygen gases. These gas bubbles tend to wash active material from the plates, liberating moisture and acid from the cells in a fine mist.

(5) Overcharging alone (or in conjunction with a previous intercharging) results in severe warping or buckling of the positive plates and performation of the separators, thus allowing an internal "short."

b. Tightening Hold Down Bolts

Battery hold down bolts, if not properly tightened, are apt to allow the battery to "bounce" or "jiggle" in the support, causing case and plate failure. Also, hold down bolts that are drawn too tight will result in a cracked or distorted case. Either of these conditions will result in premature failure of the battery and should be avoided. Tighten battery hold down bolts with a torque wrench to the recommended maximum torque of 3 foot-pounds.

c. Cold Weather Care

A battery that is operated in an undercharged condition is liable to freeze during severe winter weather. The freezing point of electrolyte varies with specific gravity variations. A fully charged battery with 1.280 specific gravity corrected to 80° F. will freeze at —90° F. The following chart indicates the freezing points at various specific gravity readings:

Specific Gravity (Corrected to 80° F.)	Freezing Point of Battery
1.280	—90° F.
1.250	—62° F.
1.200	—16° F.
1.150	+ 5° F.
1.100	+19° F.

CAUTION

Keep battery charged in cold weather.

35. TESTING BATTERY

The battery should be checked periodically with a hydrometer. The following readings show charge condition.

Fully Charged .....1.275 to 1.300
Half Charged 1.225
Dangerously Low 1.150

When reading a hydrometer, hold the barrel in a vertical position with sufficient amount of acid to lift the float freely. Take reading at eye level, and disregard the curvature of the liquid at the edges.

The reading of a hydrometer will vary with temperature variations of the electrolyte. (An ordinary dairy thermometer may be used to take electrolyte temperature readings. Always take these readings from the center cell.) A hydrometer reading of a cell which has an electrolyte temperature above 80° F. will indicate less than the reading of a cell with the electrolyte at 80° F. The opposite holds true when the electrolyte temperature is below 80° F. Hydrometer floats are calibrated to indicate a correct reading only at one temperature, 80° F.

a. The Open Circuit Voltage Tester

The Open Circuit Voltage Tester is an electrical instrument used to indicate the specific gravity of the electrolyte within the plates of the battery. Take the reading at a time when the circuit is open (when current is not being delivered to, or taken from, the battery).

The following can be determined with this voltage tester:

(1) State-of-charge of battery.

(2) Condition of battery.

To test battery with Open Circuit Voltage Tester, turn on the headlights for two minutes to eliminate surface charge. **THIS IS IMPORTANT!**

Hold Tool MT-310 in a vertical position and press it FIRMLY into the battery post and intercell connector, as shown in Figure 27.

Be sure that the red prod contacts a positive (+) battery post or intercell connector and the black prod contacts a negative (—) post or connector.

After reading No. 1 cell (starting at negative post of battery), reverse prods for No. 2 cell and reverse again for No. 3. Take reading from gauge which will show either a serviceable or a rundown condition. If cell volts vary more than 6 divisions (as indicated by gauge), replacement of battery is recommended.

If readings indicate that the battery is less than ½ charged, remove and recharge the battery.

A battery in which cell voltages vary more than .05 volt should be charged and checked

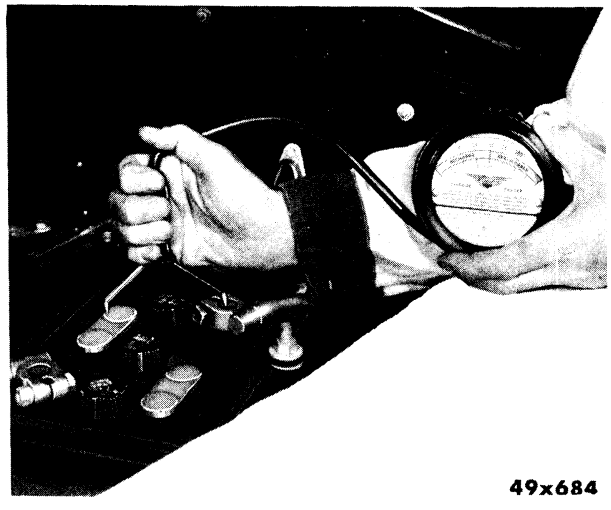
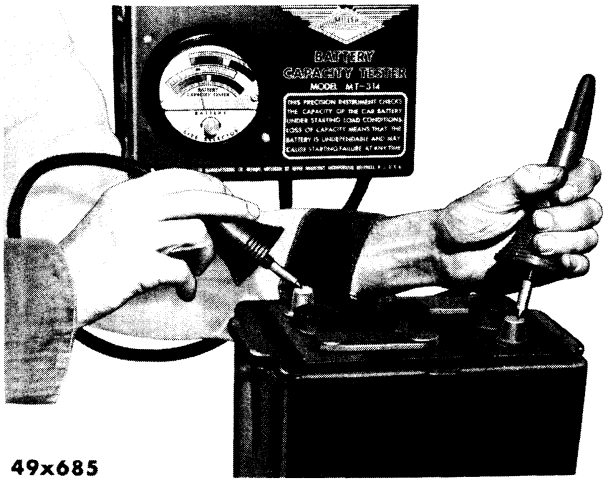
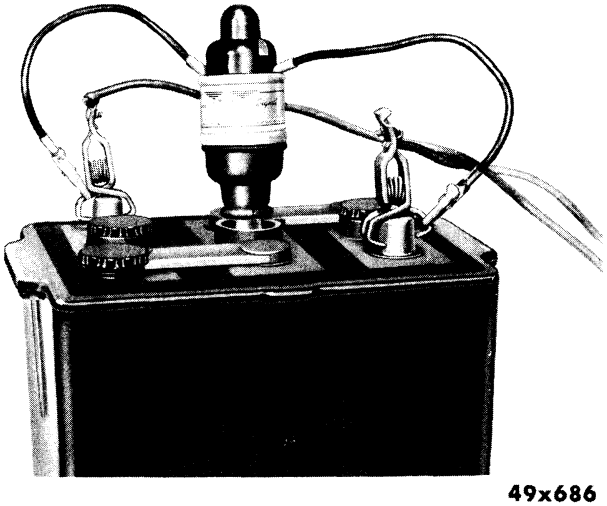


Fig. 27—Checking Battery with Tool MT-310 Open Circuit Voltage Tester



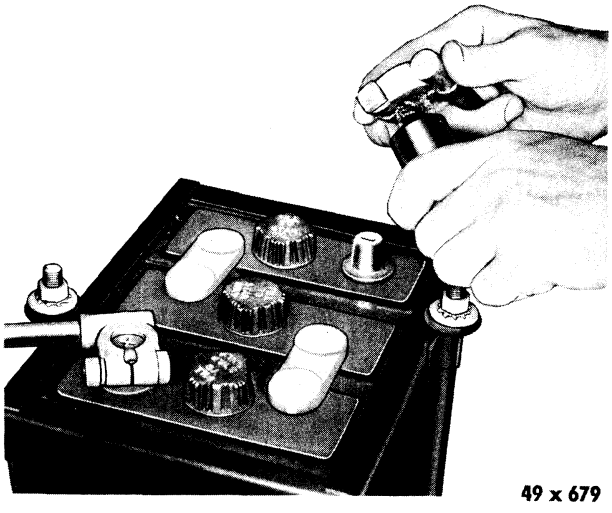
49x685

Fig. 28—Testing Battery Capacity
(Using Capacity Tester Tool MT-314)



49x686

Fig. 29—Guarding Battery Temperature on Charge
(With Thermal Signal Tool MT-315)



49 x 679

Fig. 30—Cleaning Inside of Cable Clamp
(With Wire Brush Tool MX-75)

with a high rate discharge tester, or other suitable method before discarding the battery as unsuitable for use.

b. The Portable Battery Capacity Tester

Tool MT-314 (Fig. 28), the Portable Battery Capacity Tester is used to determine whether or not the battery is worn out. Such a condition can not be determined before charge because of even cell wear that does not show up on the Open Circuit Voltage Tester. Tool MT-314 is accurately calibrated for testing at 125° F., the shutoff temperature after a fast charge, or for 80° F., after a slow charge. The instrument can be adjusted for the capacity of the battery—from 80 to 140 amp. hours. It should be used in testing a battery before condemning the unit.

c. The Thermo Signal

Tool MT-315, as shown in Figure 29, is available for converting a fast charger to thermostatic control. The tool, placed in the battery at the start of charge, will automatically signal (by buzzer) when the battery has received its maximum safe fast charge (125° F.). This tool provides a "safety" control to time clock chargers and makes possible after-charge capacity testing, as the temperature is the same for either slow or fast charging.

36. CORRODED BATTERY TERMINALS

Before diagnosing trouble at the generator or the regulator, check battery terminals for corrosion. Trouble resulting from corroded battery terminals is sometimes diagnosed as a defective generator or regulator.

The oxidation, which occurs between the post and the cable clamp, is a thin, black coating that may be overlooked. Frequently, this corrosion results in either high resistance or complete open circuit. The circuit can be open one minute and entirely closed the next.

The use of battery terminal cleaning Tool MX-75 greatly facilitates the cleaning operation. This tool incorporates a male brush for cleaning the inside of the cable clamps, as shown in Figure 30, and a female brush for cleaning the outside of the battery post, as shown in Figure 31.

To clean cable clamps, remove cover and insert male brush in the cable clamp. Exerting

pressure, turn the tool until a clean, bright surface is obtained.

To clean battery terminal post, replace cover over male brush and place female brush over battery post. Exerting pressure, force brush down over post and turn tool until a clean, bright surface is obtained.

Connect cable clamps to battery posts and tighten securely. A loose battery connection will cause excessively high generator voltages, which are likely to burn out light bulbs, pit and burn ignition breaker points and cause damage to generator and other electrical equipment. Coat connections with vaseline or grease to retard corrosion.

The cleaning operation should be done at least once a year, or at 10,000 mile intervals.

NOTE

If positive battery post is equipped with a felt washer, soak the washer in medium engine oil and insert over post before attaching ground cable clamp.

37. RESEALING THE BATTERY

Sealing compounds are used to form an acid tight joint between the covers and containers. To reseal battery, proceed as follows:

(1) Remove the old sealing compound from case and covers to approximately one inch beyond leak, or until sealing compound is forming a tight seal.

(2) Thoroughly dry the covers and all portions of the container where the sealing compound will make contact. **Since the sealing compound will not stick to a wet or dirty surface, special care should be taken in cleaning to assure a clean, dry surface.**

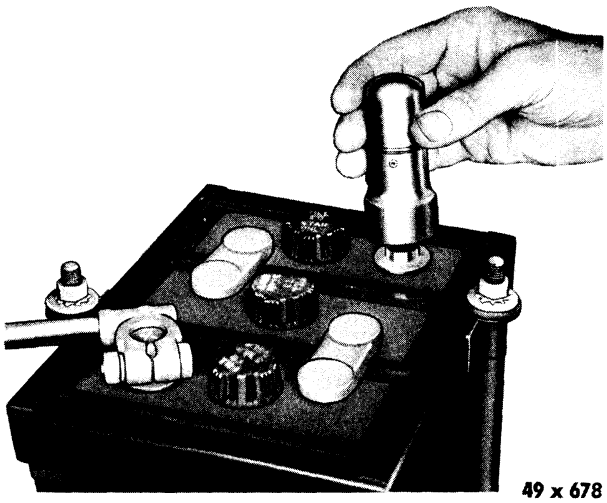


Fig. 31—Cleaning Outside of Battery Post (With Wire Brush Tool MX-75)

The sealing compound should be quite hot (about 325° F.), but must not be heated until it smokes. Inspect the covers and the groove where the hot compound will be poured, so that the hot seal will not run into the cell.

Pour the hot seal into the groove until the proper level is obtained, if the seal should sink slightly, let the first pour cool. Then, level up with more hot seal.

NOTE

Always use new sealing compound when resealing a battery.

SERVICE DIAGNOSIS

38. BATTERY RUN DOWN

Possible Causes:

a. Low regulator setting.

b. Loose fan belt.

c. Corroded battery terminals.

d. Short in charging circuit.

e. Stuck cutout in regulator.

f. Excessive use of electrical units.

g. Faulty stop light switch.

h. Faulty door switch.

i. Insufficient driving.

Remedies:

a. Recharge battery. Then, test current regulator for proper amperage setting, as outlined

in Paragraph 26, of this Section. Adjust as necessary to correct this condition.

b. Recharge battery. Readjust fan belt and check driving surfaces, as described in Paragraph 18, Remedy **a**, of this Section.

c. Recharge battery and clean terminals and clamps, as outlined in Paragraph 36, of this Section. Check clamps for corrosion and replace as necessary.

d. Recharge battery. Then, test generator, voltage regulator and charging circuit wiring for shorts. Replace parts as necessary to correct this condition.

e. Recharge battery. Refer to Possible Causes listed in Paragraphs 32 and 33. Service as indicated to correct this condition.

f. Recharge battery. Avoid excessive use of electrical units whenever possible.

g. Recharge battery. Then, replace faulty stop light switch and bleed lines. Refer to Brake Section.

h. Recharge battery. Then, replace faulty door switch with a new one to correct this condition. In most cases, shimming the switch to make it project out farther will cure the condition.

i. Recharge battery. Then, either drive car more often or use a trickle charger.

39. BATTERY WILL NOT RETAIN WATER

Possible Causes:

a. Too high charging rate.

b. Cracked battery case.

c. Leaking battery cell.

d. Defective sealing compound.

Remedies:

a. Fill battery to correct level. Then, check voltage regulator, as outlined in Paragraph 26, of this Section. Adjust or replace regulator to correct this condition.

b. Replace battery after checking to determine cause of case failure.

c. Replace battery after checking to determine cause of cell failure.

d. Replace battery, or if possible, reseal old one, as outlined in Paragraph 37, of this Section.

40. BATTERY WILL NOT TAKE CHARGE

Possible Causes:

a. Low water level.

b. Worn out battery.

c. Spilled electrolyte.

d. Internal short circuit.

e. Impure electrolyte.

Remedies:

a. Fill battery to correct level of $\frac{3}{8}$ inch above plates and charge. The plates are unable to take full part in the battery action unless completely covered by electrolyte.

b. Replace worn out battery with a new one of the same type and capacity. Test generator and voltage regulator for correct operation.

c. Recharge battery at 15 amp. hour maximum rate until specific gravity of all cells remains constant for two successive readings taken at least one hour apart. Remove a quantity of electrolyte from each cell and mix with new, adding water or electrolyte until 1.280 specific gravity is reached.

d. Replace shorted battery with a new one of the same type and capacity. Test generator and regulator for correct operation.

e. Pour impure electrolyte from battery and fill with fresh water. Repeat this operation several times. Then, fill with 1.350 specific gravity sulphuric acid electrolyte only, recharge battery and adjust fully charged specific gravity to the desired value.

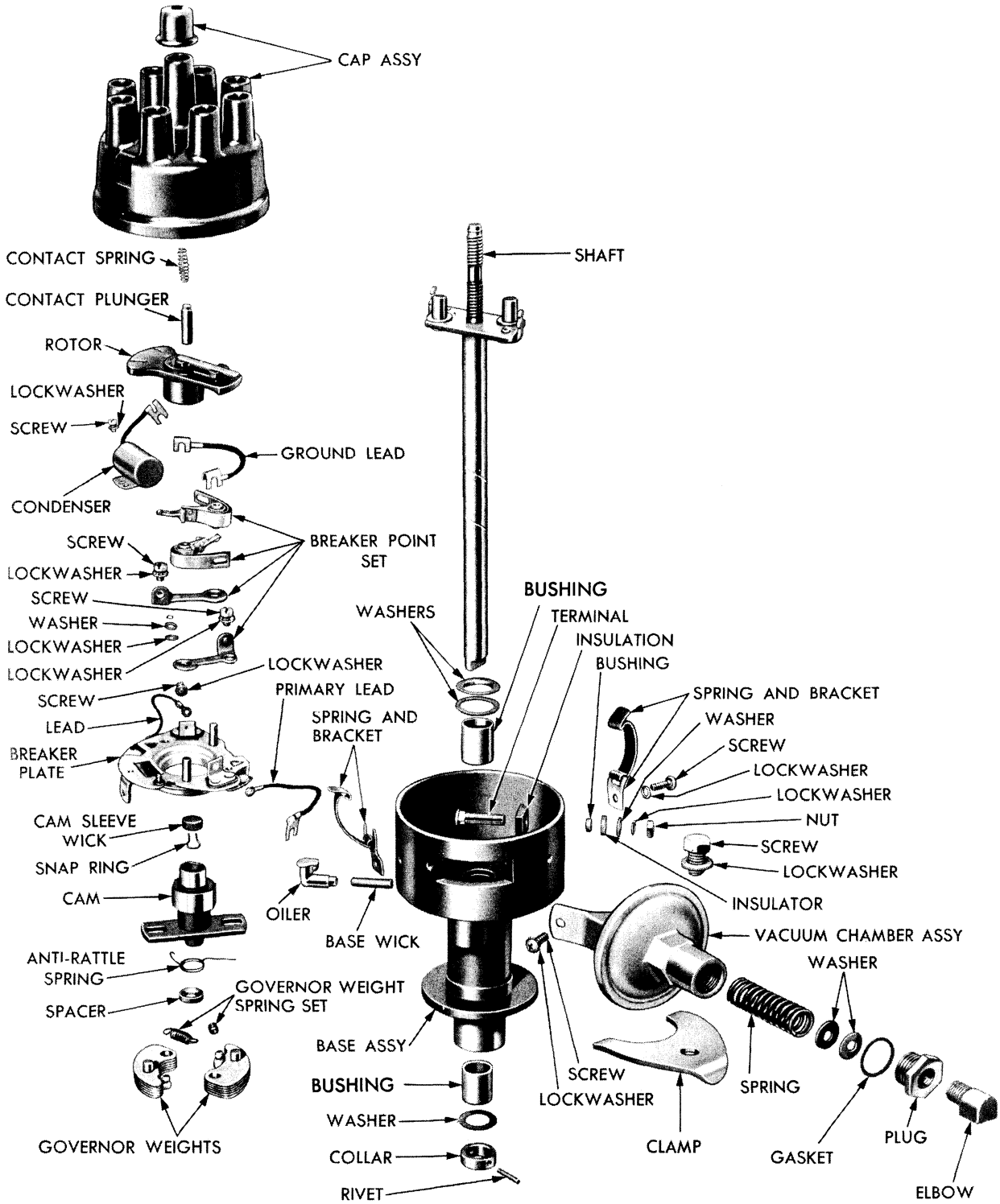


Fig. 32—Distributor (Exploded View)

AMMETER

41. AMMETER

The ammeter shows only the current flowing to or from battery, as the case may be, and does not indicate entire generator output. The current supplied for ignition, lights and accessories, is automatically deducted from generator output reading.

Because of this, the ammeter should never be used as an accurate check for generator current output.

Ammeter should not indicate more than 10 ampere charge above 30 M.P.H., after first 30 minutes of continuous driving. If more than a 10 ampere charge is indicated with a battery gravity of 1.275 or higher, check the voltage control regulator.

IGNITION SYSTEM
DISTRIBUTOR

42. DESCRIPTION (FIG. 32)

The ignition distributor is driven by a drive shaft which engages the camshaft. The distributor accurately times and distributes the ignition current. Two sets of breaker points (V-8 engine distributor), located in the base of the distributor, time the ignition by opening and closing the primary circuit between the battery and the ignition coil at the correct time. A rotor in the distributor cap distributes the high tension current (built up by the ignition coil) to the spark plugs as the pistons reach the top of their compression strokes.

Two devices are built into the distributor to provide automatic advance of ignition timing, according to engine speed and load. One of these, a centrifugal governor in the distributor body, regulates the spark timing according to speed. The other is a vacuum operated unit that is attached to the side of the distributor body. The vacuum for operating this unit is obtained through a drilled passage above the throttle valve in the carburetor. The vacuum unit regulates the spark timing according to load.

43. PRINCIPLES OF OPERATION (FIG. 33)

a. Distributor Points

When distributor points open, the primary current through the coil is interrupted. This causes the magnetic field to collapse suddenly and induces a high voltage in the secondary winding. This high voltage fires the spark plug. The value of this voltage depends on how much primary current is present at the instant of point opening. This primary current starts building up as soon as the points close after firing the spark plug. The longer the points remain closed, the greater will be the primary current build up (to the point of saturation) and the higher the voltage induced when the points again open to fire the next spark plug. On an 8-cylinder distributor with only one set of points, the length of time the points are closed (when operating at high speed) is so short that the primary current does not build up enough for efficient operation.

This build-up time for the primary current is increased by using two sets of points which are connected in parallel between coil and ground and are staggered in relation to the 8-lobe cam. The over-lapped contacts result in longer coil saturation and, as they are in a parallel circuit, no ignition occurs until both contacts are open. See Figure 33. As the cam rotates in a clockwise direction (as viewed from above), the first set of points closes the primary circuit. As it rotates a little further, the second set of points closes. But, since they are connected in parallel, the circuit is not changed. Further rotation of the cam causes the first or "circuit maker" points to open. But, the circuit is not interrupted because the second or "circuit breaker" points are still closed. Later, the second set of points open and

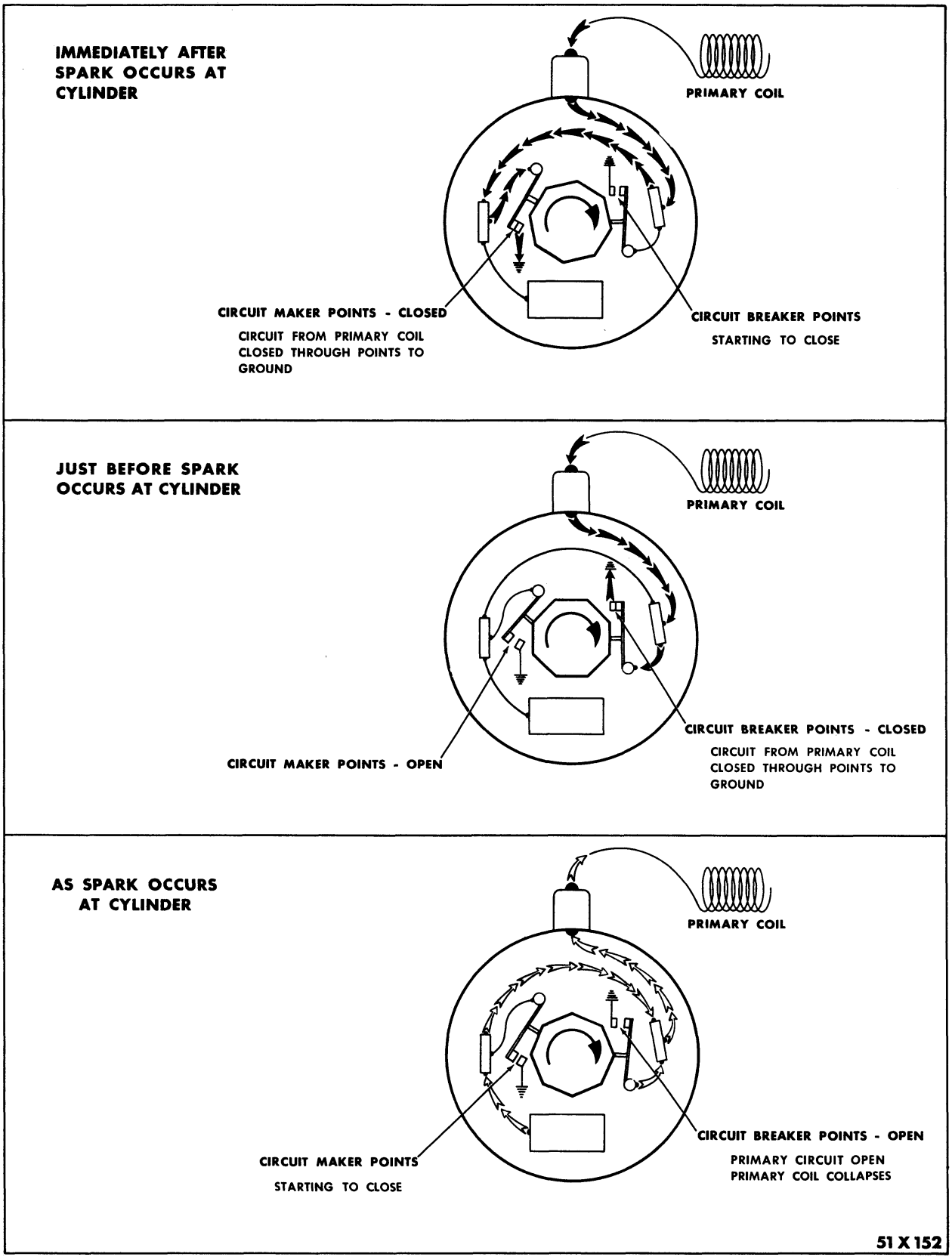


Fig. 33—Distributor (Operational Schematic) (V-8 Engine)

break the primary circuit, causing a spark at the plug. Thus, on the two-breaker distributor used on the V-8 engine, one set of points closes the primary circuit and the other set opens the circuit, therefore, the primary current has more time to build up for efficient high speed operation.

b. Spark Advance

When engine is idling with throttle closed, there is no vacuum present at the vacuum unit and the spark occurs at the timed position. With wide open throttle operation, such as on acceleration, the vacuum is insufficient to operate the vacuum unit, but the spark is advanced to correct position by means of the centrifugal governor.

Under normal road load or part throttle operation, the spark is advanced by the governor in proportion to speed. In addition, sufficient vacuum is created at the vacuum control unit to move the diaphragm and compress the spring in the unit. The arm of the vacuum unit is connected to the breaker point plate which rotates, causing additional spark advance for efficient fuel economy.

44. REMOVAL AND INSTALLATION OF DISTRIBUTOR

To remove distributor, disconnect vacuum control line and low tension wire and remove cap and lock plate hold down screw.

When installing distributor assembly on engine, make sure that number one piston is at top dead center on compression stroke and that the distributor rotor is in the number one firing position.

45. SERVICING THE DISTRIBUTOR

The distributor should be tested and recalibrated approximately every 10,000 miles, in order to insure efficient engine operation.

NOTE

Before attempting to calibrate the distributor, check drive shaft bushings with dial indicator, Tool C-707, and spring scale, Tool C-690. If play in shaft is more than .005 inch, replace and burnish bushings with Tool C-3041.

To check the mechanical advance mechanism, place the distributor on tester and connect leads to the primary connection on the distributor. Connect the vacuum control tube to vacuum chamber on distributor.

Start the tester and check the advance curve number of rpm against the degree of advance. Compare with specifications. If the degree of advance is more than limits shown in specifications, at the same rpm, the governor weight spring is too weak, making the advance too rapid.

If the degree of advance is less than the limits shown in the specifications, at the same rpm, the spring tension is too stiff, making the advance too slow.

In most cases, the tension of the spring may be increased or decreased by bending the bracket on the weight plate to which the springs are attached, in order to make the springs conform with specifications.

It is advisable to replace old springs with new ones **only** after failure to make original spring come within specifications.

The vacuum chamber on the distributor compensates for load conditions of the engine. Upon sudden acceleration, or wide open throttle operation, the manifold vacuum drops, causing the spring in the chamber to **retard** the ignition timing. As engine load, or throttle opening, **decreases,** the vacuum **increases** and overcomes spring pressure and advances the ignition timing.

A weak or broken spring in the chamber will not retard the timing properly and detonation will result.

NOTE

Before testing, be sure the diaphragm in the vacuum chamber will hold vacuum.

To check the vacuum advance mechanism, slow the tester down to about 800 rpm, where gauge will show a steady reading. Check the vacuum control specifications for the inches of vacuum at which the advance starts.

Without changing distributor speed, turn the control knob on the tester to get the amount of vacuum required for full specified advance. If the advance does not fall within specifications,

remove the retaining nut and take out or add washers to make the necessary adjustment. Check washer thickness and substitute a thinner washer, if the advance requires more than the specified vacuum. If too much advance is obtained, substitute a thicker washer.

When the right combination of washers is obtained to permit full advance to start, check the amount of vacuum necessary to produce 1 degree of advance. Usually, if the advance is correct at full position and at the proper vacuum, it will be correct throughout the entire range.

In some cases, it may be necessary to change the spring and then readjust its tension by means of various combinations of washers.

46. TESTING BREAKER SPRING TENSION

Hook a spring scale on the arm at the point end and pull at right angles to the point surfaces. Take a reading as the points start to separate. The spring tension should be 17 to 20 ounces. If spring tension is not within these specifications, loosen the screw which holds the end of the point spring and slide the end of the spring in and out as necessary. **Do not pull the conductor ribbon tight against the spring, as this will cause the ribbon to fatigue and break.** Tighten the screw and check the tension. Test the tension of the remaining breaker arm spring in like manner.

47. CHECKING DISTRIBUTOR GOVERNOR ADVANCE

Mount the distributor assembly in a test stand and check the distributor rpm and degrees of advance as follows:

(1) Operate the distributor in the correct rotation, at low speeds, gradually increasing speed, until the distributor spark advances. Reduce the speed and set the indicator at zero.

(2) Now, increase the distributor speed from 300 to 400 rpms. The degree reading should be zero.

(3) Again advance the speed to 550 rpm. The reading should read as indicated in the specifications (plus or minus 1 degree). If the advance is not as specified, stop the distributor, remove the breaker plate and bend the outer spring lug on the light-weight spring to change its tension.

(4) Check this adjustment again and operate the distributor at the specified high speed. If this advance is not as specified in Data and Specifications—plus or minus 1 degree—stop the distributor. Bend the outer spring lug on the heavy-weight spring to change its tension.

(5) Now, recheck the zero point and the above two settings and make the changes required. Then, check the advance at all points specified.

NOTE

When making this last check, operate the distributor both up and down the speed range. If variations exist between the readings for increasing and decreasing speeds, the governor action is sluggish and an overhaul is required.

48. CHECKING THE VACUUM ADVANCE

After checking the distributor governor action, check the vacuum advance as follows:

(1) Connect the vacuum line, being careful not to distort the vacuum chamber housing. Turn on the vacuum pump to give a reading of 10 to 20 inches of vacuum. Then, shut off the pump. If the gauge reading falls, it indicates leakage in the vacuum chamber, gauge, or connections. The source of the leakage should be located and the condition corrected before check is made.

(2) Remove the vacuum line from the distributor and operate at a speed above the maximum governor advance speed (see Data and Specifications) to eliminate all spark advance variations due to the governor.

(3) Set the indicator at zero and apply vacuum to give one of the advance figures specified. If the advance reading is incorrect, change the spacer washers between the vacuum chamber spring and nut.

NOTE

If the reading is below specifications, remove necessary washers to give correct reading. If the reading is above specifications, add necessary thickness washers to give a correct reading.

When changing washers, tighten the nut securely and make sure the nut gasket is in place.

When one point of the curve is adjusted, the others should be checked. If they are not correct, it indicates either incorrect spring characteristics or leakage in the vacuum chamber or tubes.

49. ADJUSTMENT OF DISTRIBUTOR BREAKER POINTS

a. Setting Points

Since the breaker points are timed to close and open at the exact instant necessary for efficient engine operation, adjustment of points is an important factor in correct distributor operation.

New points can be adjusted with a feeler gauge. If points are used but are still clean and make flat contact with each other, a dial indicator Tool C-707 can be used satisfactorily. If points are pitted or badly worn, they should be replaced because metal may be burned, causing a resistance that would result in poor point operation.

Feeler gauge or dial indicator method—Rotate the distributor shaft until rubbing block of one set of points is on high spot of cam (Fig. 34). With screwdriver blade inserted in the triangular opening, close or open points to a clearance of .015 to .018 inch by turning screwdriver blade against stationary point plate. Check clearance with a clean feeler gauge or dial indicator.

NOTE

The lock screw should be loosened just enough so that the stationary point plate can be moved with a slight drag. Otherwise, it will be difficult to set the points accurately.

After setting points to correct clearance, tighten lock screw. Turn distributor shaft until rubbing block of second set of points is on high spot of cam. Adjust the second set of points in the same manner.

b. Checking Condition of Distributor With Dwell Meter

When adjusting distributor contact points with a dwell meter, first set the point gap to the specified clearance with a feeler gauge, or dial indicator, as outlined in **a.** above. Find the degrees of dwell on the dwell meter and check the dwell reading with the gap of the points.

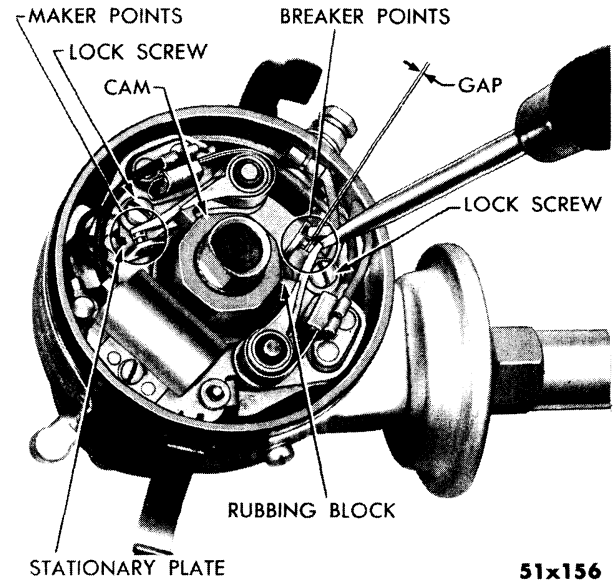


Fig. 34—Adjusting Distributor Breaker Point Gap

If the dwell meter shows 27 degrees for one set of points (with the specified gap of .015 inch to .018 inch), or a total dwell of 34 degrees, the distributor is in good condition. If the dwell angle is not within specifications with the specified point gap, or if the dwell meter needle is erratic, the distributor should be carefully checked for the following conditions:

(1) Worn rubbing block.

(2) Rubbing block bent or worn over to form a sort of shoe at the end. (This condition usually results when non-standard parts are used.)

(3) Rubbing block not square with cam.

(4) Badly worn cam (only on very old distributor).

(5) Drive shaft bushing wear.

50. ADJUSTING IGNITION TIMING

Make certain that points have been properly adjusted and that distributor has been properly installed in engine. Timing can be most satisfactorily adjusted with the use of timing light Tool C-693, as follows:

NOTE

When timing C-70 use combination 6-12 volt light Tool C-863.

a. Setting to Specified Firing Position (Engine Running)

(1) Place chalk mark on vibration damper indicating specified number of degrees.

(2) Insert male end of adapter Tool C-3066 into No. 1 distributor tower and insert No. 1 spark plug wire into female end of adapter, as shown in Figure 35.

(3) Attach timing light, Tool C-693 (Fig. 35), as follows:

(a) Connect blue wire to metal female end of adapter Tool C-3066.

(b) Connect wire with black insulator to negative battery terminal.

(c) Connect wire with red insulator to positive battery terminal.

(4) Start the engine and allow it to idle.

CAUTION

For acurate reading, make sure that the carburetor is not set at the fast warm-up, idle speed. Wait until it is at slow idle after warm-up.

(5) The timing light flash should occur when the chalk mark on vibration damper is opposite the pointer on the engine block. If it does not, loosen the distributor clamp bolt and move the distributor either clockwise or counter-clockwise until the specified setting is obtained. Tighten the clamp bolt. As the engine speed is increased, the timing light should indicate a gradual spark advance.

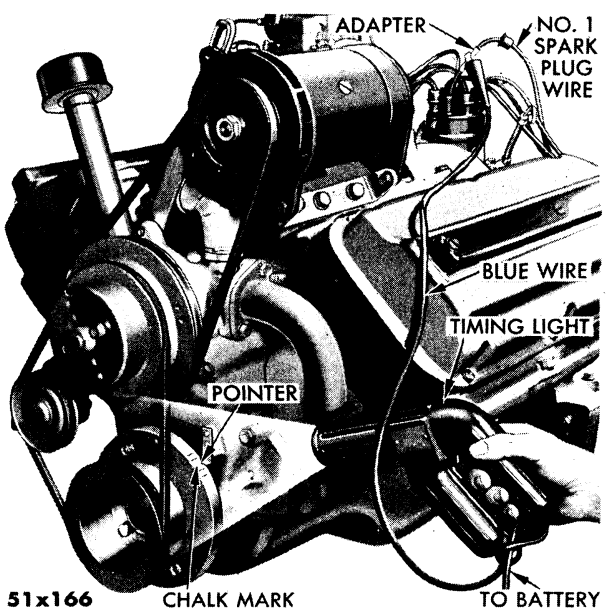


Fig. 35—Timing Light Tool C-693 with Adapter C-3066

b. Setting to Specified Firing Position (Engine Not Running)

If timing light is not available, a fairly accurate adjustment can be made as follows:

(1) Turn engine over in operation direction until specified reading in degrees of crankshaft rotation on vibration damper appears at pointer.

(2) Connect test lamp in series between distributor primary lead and negative battery post.

(3) Loosen distributor adjustment clamp bolt and back off distributor by turning it clockwise until lamp lights. If lamp lights immediately, this back-off is unnecessary.

(4) Turn distributor slowly counter-clockwise (against direction of rotor travel) until instant lamp goes out.

(5) Tighten clamp bolt.

c. Setting to Advance or Retard Position

To advance or retard the timing to conform with special conditions, leave timing light Tool C-693 hooked up as outlined in b., above and proceed according to the following instructions:

In low altitudes, the engine will give its best performance if timed according to the Specifications chart.

With this timing, there will be a trace of spark ping from 15 to 30 miles an hour when accelerating with wide open throttle in high gear from 15 miles per hour.

When using lower grade fuels, or after carbon has accumulated, spark ping may be excessive with the specified timing. In such cases, ignition should be retarded not to exceed 4 degrees of crankshaft rotation later than specified timing.

In high altitudes, there is less tendency for spark ping with either standard or premium fuels, and the same thing is true in low alti-

tudes, when using premium gasolines. Improved performance may be obtained by advancing the spark not to exceed 4 degrees ahead of specified setting.

Within the foregoing limits, namely: from 4 degrees earlier to 4 degrees later than specified timing, a good rule to follow is to advance the spark until a slight ping is audible when accelerating from 15 miles per hour in high speed with wide open throttle.

The distributor should be moved clockwise to retard ignition and counter-clockwise to advance ignition.

d. Checking Distributor Advance

The operation of the advance mechanism in the distributor can be checked on a testing machine. Refer to Data and Specifications for distributor advance specifications. Also, see Paragraph 47.

51. CHECKING DISTRIBUTOR DRIVE SHAFT BUSHINGS

To service distributor drive shaft bushings, remove the breaker plate assembly and cam and stop plate. Check the bushing wear as follows:

Attach a dial indicator to the distributor base and adjust the plunger of the indicator against the top of the drive shaft. Move the shaft to and from the indicator with just enough force to indicate the clearance. (Too much pressure will cause the shaft to spring and show a false reading.) If the clearance is more than .008 inch, replace the bushings.

52. IGNITION COIL

The ignition coil transforms battery voltage into high voltage for the spark plugs. If there are indications that the coil is not delivering a satisfactory spark, first check all connections at ammeter, ignition switch, coil and distributor to make sure that they are clean and tight.

A quick coil check may be made by removing coil high tension wire at distributor cap and holding it near cylinder head. With ignition switch turned on and starting motor cranking the engine, a spark should jump from the end of the high tension wire to the cylinder head. If spark is more than ¼ inch long, the coil is in good condition and the trouble is elsewhere in the electrical system. Check the electrical system to determine the cause and correct as necessary.

The ignition coil has been carefully designed to give maximum power and performance. No improvements can be obtained by use of other than the original equipment type of unit. If there is a clear indication that coil is defective, it should be replaced with a unit of same make and model.

To remove coil, disconnect high and low tension wires. Remove retaining screws or nuts and dismount coil.

53. SPARK PLUGS

The resistor type spark plug incorporates a resistor which, with the resistor in the distributor, eliminates radio static noises.

By using a high voltage, high output coil and 10,000 ohm resistor in the distributor cap, the spark plug gap has been increased to .035 inch. This improves idle and low speed operating performance.

The spark plugs for the C-68, C-69 and C-70 may be distinguished from the C-67 plugs by the longer thread on the base. **The longer base spark plugs must not be used in the 188 hp engines,** likewise the shorter base spark plugs should not be used in the 250 hp engines. The engines may be damaged if the correct length plugs are not used (Fig. 36).

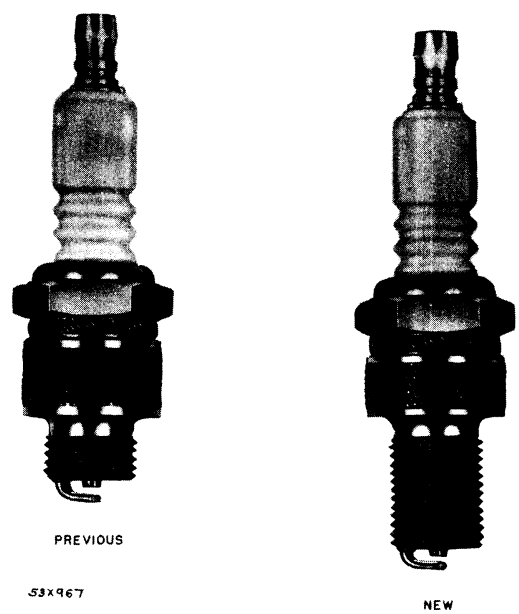


Fig. 36—Spark Plugs
Short Reach C-67; Long Reach C-68, C-69, C-70

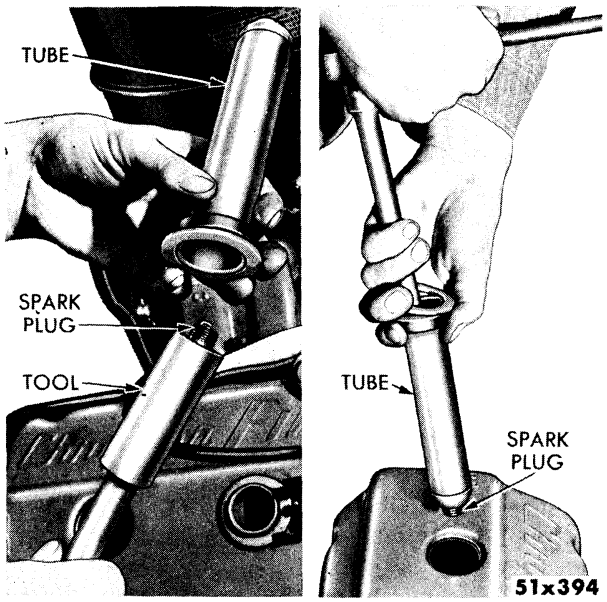


Fig. 37—Removing or Installing Spark Plugs C-68, C-69, C-70

For best engine performance and economical operation, spark plugs should be kept clean. They should be cleaned in a blast type cleaner which will remove deposit formed by use of chemically treated fuels for high compression engines. If this deposit is not removed, the engine may "miss" under heavy load or high speed driving.

NOTE

Spark plug gaskets should not be used on the Chrysler 250 hp engines.

It is advisable to clean the spark plug seats each time the plugs are removed for cleaning, inspection or replacement. Maintenance of the temperature of the plugs depends largely upon the proper installation and tightening of the plugs in the cylinder head to insure the proper heat transfer from the nose of each plug through the shell and seat to the engine's cooling system. Examine the seats of the spark plug tubes for burrs.

After cleaning the spark plugs, adjust the gap to .035 inch, using a round feeler gauge. Make all adjustments on the side electrode of the spark plug. If the center electrode is bent, the porcelain may crack, resulting in plug failure.

When cleaning the longer reach spark plugs care should be taken to see that plugs are positioned properly in cleaner to allow for complete sandblasting of the areas required for proper plug cleaning. Refer to Data and Specifications for type, gap and other information pertaining to new spark plugs.

CAUTION

On the C-68, C-69, C-70 engine, do not drop spark plugs into the tubes as this may cause the gaps to close up. When installing, place a spark plug in the socket wrench (Fig. 37) and bring the tube down over the plug. Hold the plug down in the tube and insert the assembly into the cylinder head.

SERVICE DIAGNOSIS

54. BURNED OR PITTED POINTS

Possible Causes:

a. Dirt or oil on points.

b. Improperly adjusted points.

c. Defective condenser.

d. Defective coil.

e. Worn bushings on distributor shaft.

f. Regulator setting high.

g. Extremely high voltage.

Remedies:

a. Clean breaker points and check for pitting. If the contact surfaces are badly burned, replace points and condenser.

b. Adjust points to .015 to .018 inch on 8 cyl. Excessive flashing or burning may be caused

by a chattering or rebound of the contact points. Test breaker arm spring tension, as described in Paragraph 46, of this Section.

c. Replace condenser and check contacts for pitting or burning. Replace parts as required.

d. Replace defective coil. Check points for burned or pitted contact surface. Replace parts as required.

e. Replace bushings on distributor drive shaft.

f. Check regulator setting, as outlined in Paragraph 25, of this Section. Check points for excessive burning. Replace parts as required.

g. Damage to the coil by extreme high voltages may be caused by failure of the voltage regulator to operate properly. This will be indicated by an overcharged condition of the battery. Refer to Paragraph 34, of this Section. Check voltage regulator, as outlined in Paragraph 25 of this Section. Replace defective coil and points, if the contacts are burned or pitted.

The new spark plug has a "colder" rating than the conventional plug of the same tip length, thereby providing improved high-load performance.

55. IGNITION COIL FAILURE

Possible Causes:

a. Extremely high voltages.

b. Moisture formation.

c. Excessive heat from engine.

d. Open circuit at soldered connection on primary studs.

Remedies:

a. Damage to the coil by extreme high voltages may be caused by failure of the voltage regulator to operate properly. This will be indicated by an overcharged condition of the battery. Refer to Paragraph 34, of this Section. Check voltage regulator, as outlined in Paragraph 25, of this Section. Replace defective coil and points, if the contacts are burned or pitted.

b. Replace defective coil and points, if the contact surfaces are burned or pitted. (The failure of the ignition coil may be caused by the entrance of moisture through a break in the soldered joints of the can—due to rough handling.)

c. Replace defective coil and points, if the contact surfaces are burned or pitted. Refer to Cooling System, Section V, for correction of excessive engine heat.

d. Resolder connections in primary studs, allowing solder to flow into stud cavity. Be very careful not to overheat the bakelite tower. If unable to make satisfactory connection, replace coil and points if necessary.

56. CONDENSER FAILURE

Possible Causes:

a. Normal fatigue.

b. Excessive heat.

c. Moisture.

Remedies:

a. Replace condenser and check points foi burning or pitting, replace if necessary.

b. Replace condenser and check points for burning or pitting. Refer to Cooling System Section to correct excessive heat.

c. Replace condenser and check points for burning or pitting. Replace parts as required.

57. FOULED OR BURNED SPARK PLUGS

Possible Causes:

a. Incorrect type of plug.

b. Plugs not sufficiently tight in head.

c. Improperly seating valves.

d. Excessive lean air-fuel mixture.

e. Ignition timing improperly adjusted.

f. Water leaking into combustion chamber.

Remedies:

a. Remove incorrect plugs and replace. Make sure gap is .035 inch.

b. Tighten plugs to 32 foot-pounds torque.

NOTE

Spark plug gaskets are not used on the C-68 C-69, C-70 engine. Tighten the plugs to 32 foot-pounds torque.

c. Refer to Engine Section for correction of this condition.

d. Refer to Fuel System Section for adjustment of the carburetor.

e. Refer to paragraph 50, of this Section, for correct ignition timing.

f. Replace cylinder head or gasket, as outlined in Engine Section.

SWITCHES (Figs. 38, 39 and 40)

58. IGNITION STARTER SWITCH (FIG. 38)

The following precautions must be followed when installing accessories such as heaters, radio, spotlight, etc. Use the accessory terminal **only** on the ignition starter switch and **not** the ammeter terminal post.

59. REMOVAL AND INSTALLATION OF IGNITION LOCK CYLINDER

To remove ignition lock cylinder, proceed as follows:

(1) Loosen set screw holding switch in instrument panel.

(2) Pull switch assembly out from panel towards firewall enough to allow lock cylinder locking pin to clear instrument panel.

(3) With ignition key in the **"on"** position, use pointed punch to push in on cylinder locking pin, while pulling on cylinder.

(4) Remove ignition lock cylinder.

(5) To install the lock cylinder in switch insert key in lock cylinder and turn key to approximately **"on"** position to line up locking pin with slot in switch housing. Press in on cylinder lock assembly.

(6) Install switch in instrument panel and tighten locking screw.

60. WINDSHIELD WIPER SWITCH

The windshield wiper switch has a 10 ampere circuit breaker on the 6 volt system and a 6 ampere circuit breaker on the 12 volt system. The armature, field, parking and battery terminals and the circuit breaker are located on the outside of switch, as shown in Figure 39.

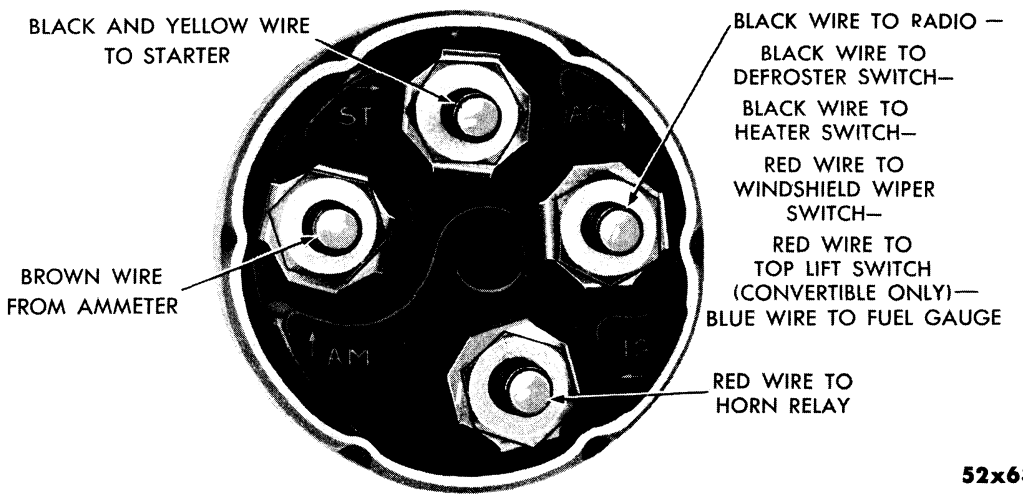


Fig. 38—Ignition and Starter Switch

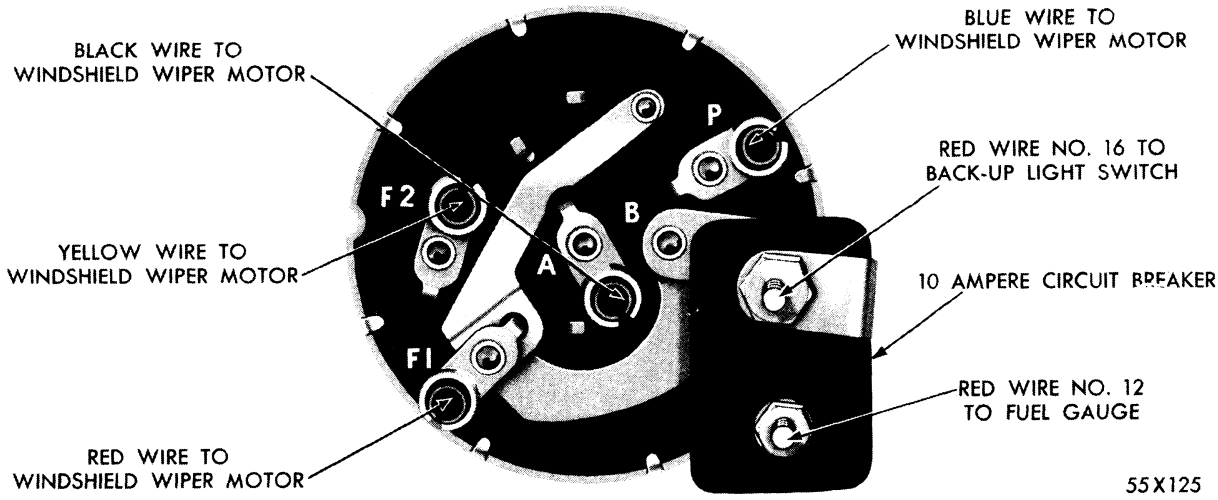


Fig. 39—Windshield Wiper Switch

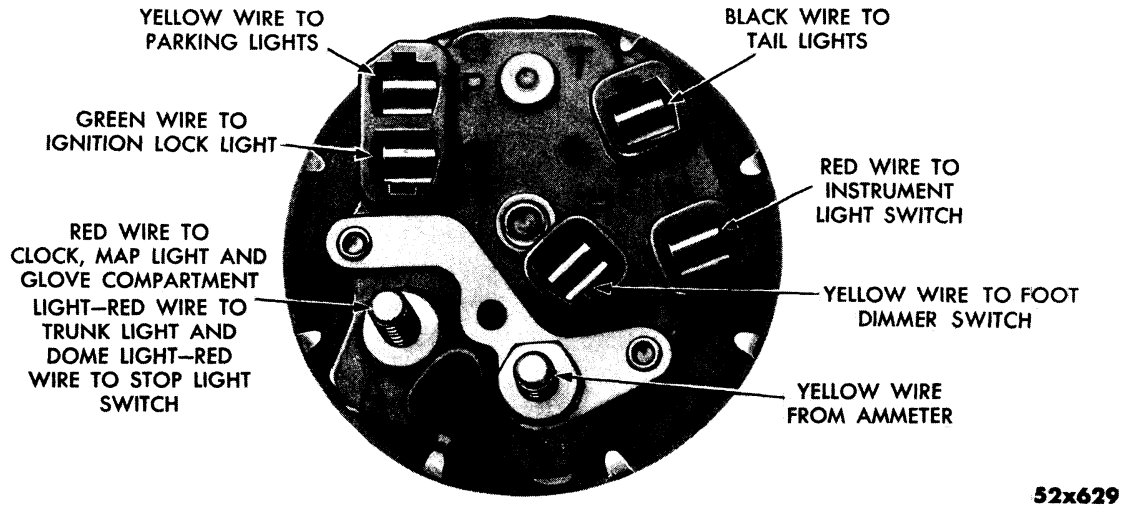


Fig. 40—Head Light Switch

HORNS

The horns should be inspected periodically for dirt and foreign material that may accumulate in the horn projector. If horns are inoperative or do not have a clear steady tone, they should be removed from their location on the radiator support, the covers taken off, cleaned, and inspected for faulty insulation or soldering, the windings for grounds or open circuits and the diaphragm, armature and contact springs for cracks or distortion before attempting to adjust horns. If contacts are rough or burned, they should be dressed with a fine file or hone.

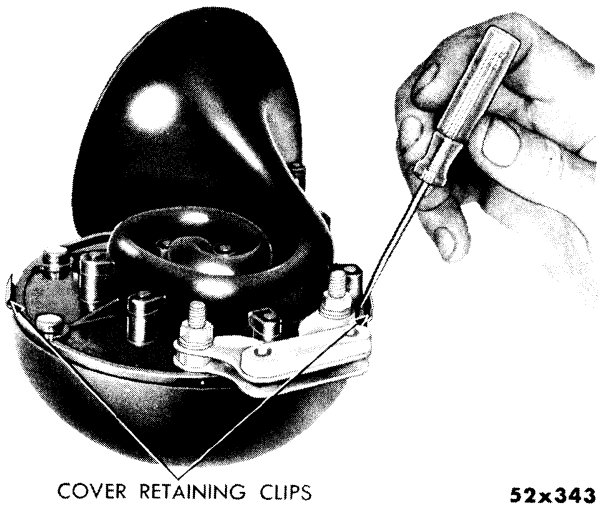


Fig. 41—Removing Horn Cover

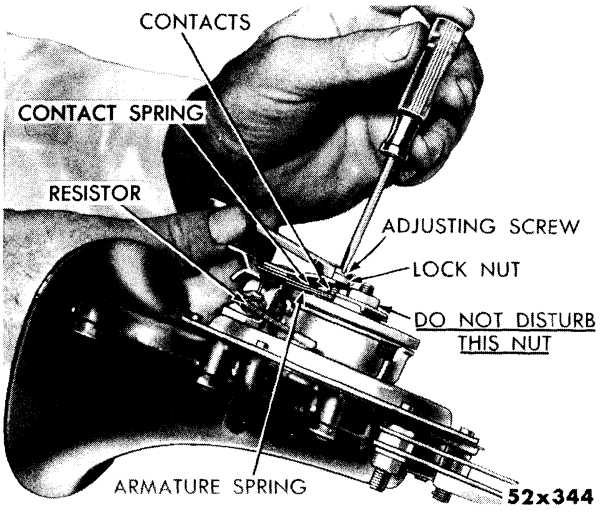


Fig. 42—Adjusting Horn

CAUTION

Do not force the contact points apart as this action may bend or distort the contact springs and change the contact pressure. When tuning a set of horns, each horn must be connected and adjusted separately, then check for tone together.

To Adjust the Horns remove the horns from car, pry the cover retaining clips away from the body of horn, as shown in Figure 41. Loosen the lock nut and turn the adjusting screw clockwise, as shown in Figure 42, until there is no oscillation between the contact points. Turn the adjusting screw approximately ¼ turn counterclockwise or until a clear mellow tone is obtained, then tighten locknut. Adjust each horn alike, and test both horns for combined tone.

The high note should draw 14.5 to 15 amperes. The low note 15 to 15.5 amperes.

CAUTION

Use care when handling the horn as damage to resistor core may result. The locknut in the center of horn motor should not be loosened as the diaphragm may be damaged in so doing.

Reinstall horn cover, crimp retaining clips to horn body and mount horn (or horns) to radiator support.

Testing Horn Relay. (See Fig. 43.) Ground the horn "SW" terminal at relay. If the horns operate, it indicates that the horns and relay are in good operating condition, but the horn button or wiring is "open." Connect a jumper lead from the starting switch battery terminal to the relay "B" terminal, then operate horn button. If the horns blow, it indicates faulty wiring from relay to battery.

Connect a jumper wire from the battery terminal to the horn terminal. If the horns blow it inidcates that the relay wiring to the button or horn button is defective.

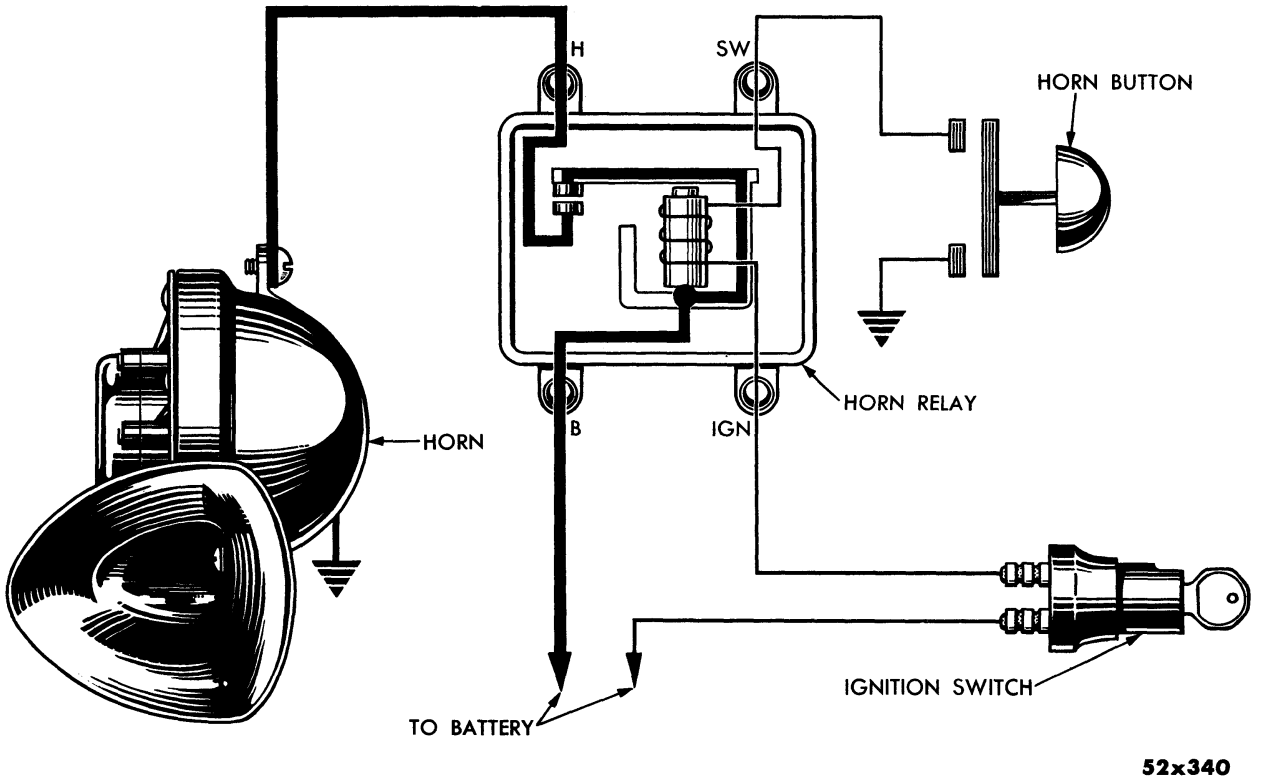


Fig. 43—Horn Circuit Relay

SERVICE DIAGNOSIS

61. HORNS WILL NOT BLOW

Possible Causes:

a. Improper adjustment.

b. Defective relay.

c. Faulty button contact.

d. Broken or defective wiring.

e. Defective horn.

Remedies:

a. Adjust horns, as outlined on page 180 of this Section.

b. Replace horn relay after inspection of the old one to determine cause of failure. For testing, refer to page 180 of this Section.

c. Check horn button for operation by grounding the relay control terminal. If horns blow, check button and wiring. Replace parts as required to correct this condition.

d. Inspect wiring for breaks, high resistance or grounds. Repair or replace wiring as necessary.

e. Replace horn assembly, after checking to determine cause of failure.

62. HORNS BLOW CONTINUOUSLY

Possible Causes:

a. Shorted horn relay.

b. Shorted wiring.

c. Grounded horn button.

d. Stuck contact points in relay.

Remedies:

a. Remove horn button lead from relay ("SW" terminal). If horns still blow, replace relay.

b. Remove horn button lead ("SW" terminal).

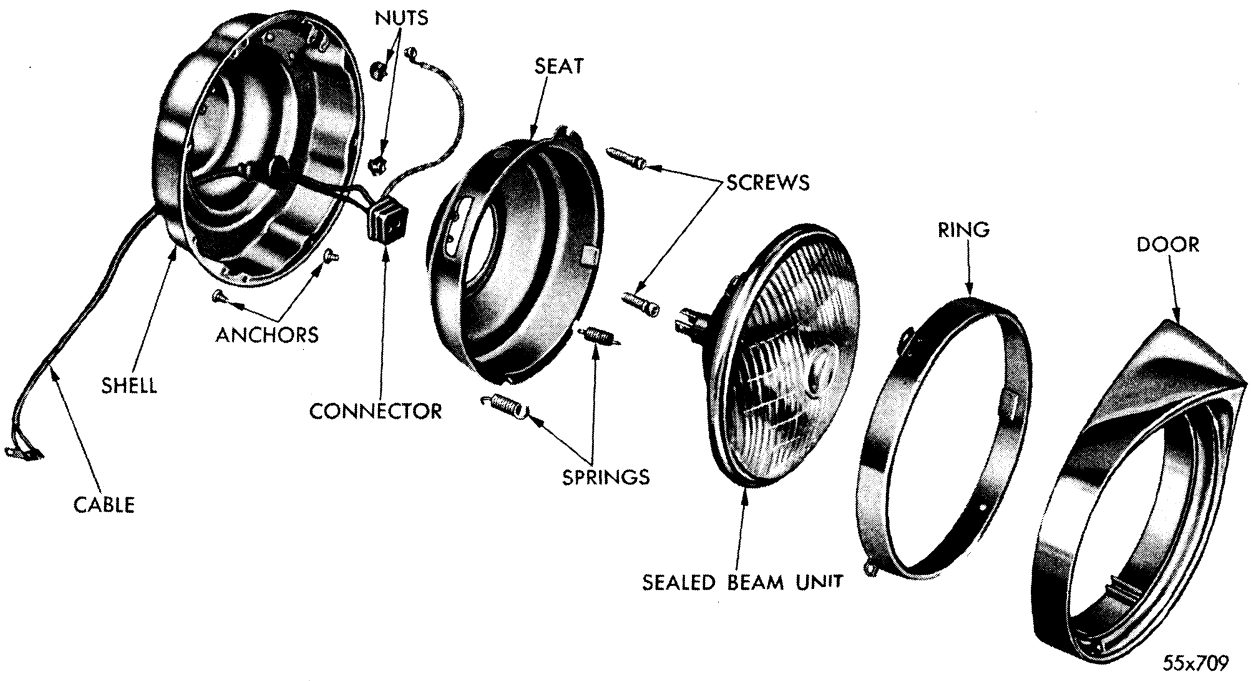


Fig. 44—Headlight Assembly (Exploded View)

LIGHTING SYSTEM

63. DESCRIPTION

"Sealed Beam" units, Figure 44, and light bulbs in the external and internal lighting system of the new Chrysler are easy to replace. The turn signal system is combined with the tail lights and parking lights by using double filament bulbs.

The main lighting circuit is protected by three automatic reset circuit breakers. In the event of a "short circuit" or "ground," the circuit breaker will open before damage occurs and will continue to open and close until the trouble clears or is corrected. The circuit breaker will then return and stay in its normal closed position.

64. REPLACING LIGHT BULBS

a. **Headlight.** Take out the screw from the front lower edge of the headlight door and remove the door. Remove the three retaining screws and remove the ring by pulling it outward. Pull the sealed light unit out and pull the wire connector straight off.

b. **Front Parking Light Bulb.** Remove the screws, retainer and lens. To remove the bulb, push it in slightly, twist to the left and pull it out of the socket.

c. **Remove Stop Light, Tail Light and Turn Signal Bulb.** The change of bulb is made from under the rear compartment lid. Pull the socket and bulb out of rear of lamp. The bulb is then removed by pressing in and turning to left.

d. **Back-up Light.** Remove the screws that hold down the lens retainer. Lift out the lens and retainer and remove the bulb from the top side of bulb retaining plate. Remove the two screws and lift out the bulb retaining plate to remove the back-up light bulb. Both these bulbs are removed in the same manner as the front parking light bulb.

e. **Turn Signal Bulb.** Front turn signal bulbs are combined with the parking lights. The rear turn signals are combined with the tail lights —double filament bulbs, being used. For replacement of these bulbs, see step "c."

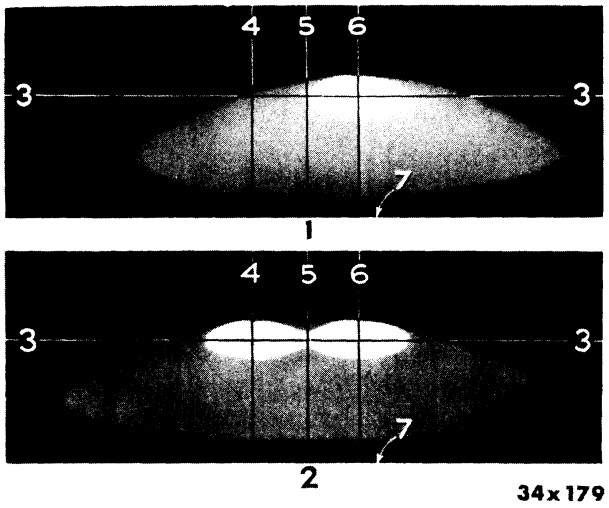


Fig. 45—Pattern of Properly Aimed Headlights

1—Upper beam of right headlight
2—Upper beam of both headlights
3—Horizontal line 3 inches below headlight centers
4—Vertical line, in line with center of left headlight
5—Vertical line, in line with windshield center strip and radiator cap
6—Vertical line, in line with center of right headlight
7—Floor level

65. HEADLIGHT AIMING (FIG. 45)

While the sealed beam light unit is prefocused, the unit requires occasional aiming to obtain maximum lighting efficiency. Properly aimed sealed beam headlights insure the maximum of night driving pleasure and safety.

A great many attempts at aiming fail completely because the sensitive aiming adjustment is not fully appreciated. The most important factor in aiming is **accuracy.** Slight errors in height of headlight beam on a screen 25 feet ahead of car will very noticeably affect road illumination. If beam is aimed 3 inches below a horizontal line on a screen 25 feet ahead of car, it will strike the roadway 250 feet ahead of car. If aimed 5 inches below horizontal line, it will strike roadway 150 feet ahead of car, resulting in very poor visibility. When aimed 1 inch below horizontal line, beam will strike roadway 750 feet ahead of car, increasing glare in eyes of approaching drivers with a definite loss of visibility, especially when car is loaded.

There are many different types of aiming devices which simplify headlight aiming and proper use of equipment will produce a satisfactory aiming job. Most manufacturers of such equipment furnish complete instructions covering its use. The instructions contained in this Shop Manual are based on use of a light colored wall or screen.

The most likely source of error in aiming headlights is the floor of the garage. The floor area used for this operation should be perfectly level, if possible. This means that the area where the screen or other headlight aiming equipment is located should be on exactly the same level as that where the car is placed.

The car should be located so headlights are 25 feet from a light colored wall or aiming screen. A horizontal line should be placed on this surface at a height 3 inches below headlight centers. A center point should be located on this line by sighting through windshield of vehicle in line with ornament at front of hood and windshield center strip. From this center point, draw two vertical lines at equal distances right and left. The distance between these vertical lines should be the same as the distance between centers of headlights. These two vertical lines should be immediately ahead of and in line with headlights.

If a perfectly level floor is not available, headlights can be satisfactorily aimed by practicing one simple rule:

The height of the horizontal line on aiming screen or wall should be measured from the part of the floor on which the car is standing.

If such a condition exists, a line can be located where it should be by placing a mark on two sticks, or rods, exactly the same distance from one end of each stick as from the floor up to center of headlight. Then, stand both sticks against fenders (one front and one rear) on one side of the car. Stand back of rear stick and sight forward at marks on each stick in a manner similar to sighting a gun. Have someone mark the point on the aiming screen where line of vision strikes wall (25 feet ahead of car). Repeat operation on other side of car, marking point on wall. Measure down from these marks 3 inches, and connect these two low marks with a straight line which will be exactly the right height and parallel to the plane of the headlight filaments, regardless of whether the car is standing up-grade, down-grade or slanting sidewise.

The intersections of horizontal line and two vertical lines which are directly ahead of light filaments should be the center of the bright

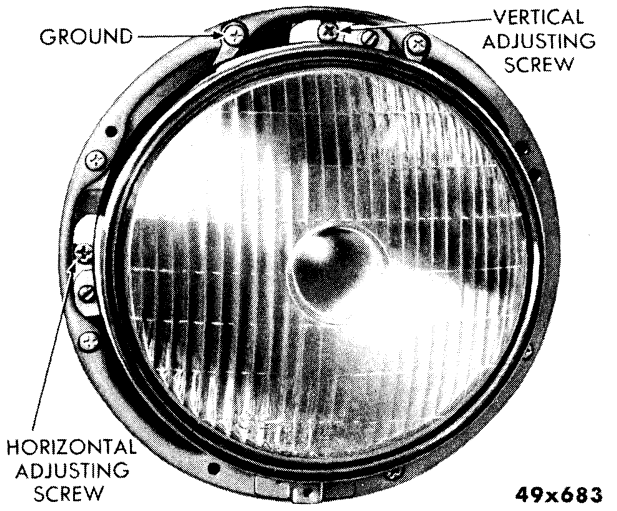


Fig. 46—Headlight Adjustments

spot of each light. Adjust one headlight at a time with other one covered. Adjustment should be made with country (high) beam turned "on." The traffic (low) beam also will be aimed properly. Do not use traffic beam for aiming lights.

NOTE

In most cases, headlights should be aimed as specified herein. Where state or local laws differ from these specifications, the headlights should be aimed to conform with such laws.

To adjust headlight beams, see Figure 46 and proceed as follows:

(1) Remove screw at bottom of headlight rim and unhook rim at top by pulling it outward.

(2) To raise or lower beam, turn adjusting screw on center at top (or bottom, as the case may be) of headlight frame.

(3) To move beam to right or left, turn adjusting screw at right side of headlight frame.

66. TESTING VOLTAGE AT HEADLIGHTS

One of the factors affecting headlight efficiency is voltage. Headlight voltage must be measured with the lights burning.

Remove headlight rim and, with sealed beam unit partially removed from its mounting seat, attach leads of a reliable voltmeter to prongs of sealed beam unit, while it is still inserted in connector socket.

With sealed beam unit in its correct position, top prong supplies current for traffic beam. One of side prongs supplies current for country beam and other is the ground connection.

After engine has been stopped and lights have burned for five minutes, voltage at headlights **(with country beam filament burning)** should not be less than 5.25 volts. With lights burning and engine warmed up and running at a speed equivalent to a car speed of about 20 M.P.H., voltage at headlights should be not less than 6.3 volts, nor more than 6.9 volts (with battery and generator at room temperature, approximately 70° F.).

If voltage is low at either headlight socket (with only standard equipment in the circuit), proceed as follows:

Test voltage output of battery—it should be 6 to 6.5 volts. Clean and tighten battery terminals and ground cable. Check wires and connections to all lights, main headlight switch, and dimmer switch for high resistance. When a voltmeter is placed between ground and input side of a switch and then between ground and output side of switch (with lights burning) the difference in readings will represent voltage drop in switch. The same method may be used in checking voltage drop in wires by taking a reading at each end of wire. A switch showing a voltage drop of more than one-tenth of a volt, or a wire showing a voltage drop of one-tenth of a volt, should be replaced. If any wire in the lighting circuit has been replaced with other than standard equipment wire, it may lack capacity and cause voltage drop. The most important wire in entire primary circuit is the wire that is connected from starter switch to ammeter because it must carry full load of all branching circuits.

67. ENTRANCE LIGHTS

Two lamps are provided in the front compartment. The right lamp is controlled by a door switch, or by a switch located under left side of instrument panel for map reading, etc. With ignition key turned on, the left light serves as a flasher warning signal indicating that the parking brake has not been released.

68. INSPECTING LIGHTING CIRCUIT WIRING

The wiring in the lighting circuit should be periodically inspected for loose connections, chafed or worn insulation and for corroded con-

nections or terminals. Special examination should be made at all terminal junction blocks. Inspect the switches, bulb sockets and lamp shells for loose mountings and corrosion. Clean and tighten where necessary to make a good contact and to eliminate the loss of efficiency due to poor or dirty connections.

NOTE

When replacing wires in the lighting system, be sure to use wires of the same size. Refer to the wiring diagram (Fig. 47) for wire sizes.

69. TURN SIGNAL (FIG. 47)

The turn signal is simple to operate because of its automatic switch which returns to the "off" position while the turn is being completed.

To signal for a right turn, the switch lever under the left side of the steering wheel is moved up in the direction of steering wheel rotation. With the switch lever in this position, the circuit for the right front and right rear signal lights is connected, flashing a warning signal to other drivers. Signalling for a left turn is accomplished by moving the switch lever down.

The switch, mounted on the steering column under the steering wheel hub, contains two specially shaped pawls which are actuated by the prongs of a ring pressed in the hub of the steering column. When the switch lever is in the "off" position, a small amount of clearance exists between the switch pawls and the prongs of the ring, so that the steering wheel can be turned in either direction without actuating the switch. When the switch lever is moved manually for a right or left turn signal, one of the switch pawls moves in position to engage the prongs of the ring. The prong then ratchets over the switch pawl and when the steering wheel is returned to the straight-ahead position, the prong engages the switch pawl and returns it and the switch lever to the "off" position.

70. POWER WINDOW LIFT

For service information concerning the Power Window Lift refer to Paragraph 93 of this Section.

71. BODY WIRING (FIGS. 48 AND 49)

a. Directional Signal Wires

The front directional signal lights, head and parking light wires are assembled in the chassis harness wiring and strung along the dash from switches to left cowl through firewall to terminal block on radiator yoke and from there to lamps. The rear signal light, trunk, back-up, parking dome and rear courtesy lights (if so equipped) are assembled in the body wiring harness and strung up through the left A post of the windshield along the left side of body roof rail and out to rear compartment to lights on the early production cars and along the floor to the rear compartment on the later production cars.

b. Dome Light Wires

The dome light wires are assembled in body harness wires, and strung up the front A post along roof rail, and branches off at B post to dome light or along the floor to B post then up B post to dome light. On cars equipped with two dome lights the other wires branch off the body harness at rear quarter panel to switch.

c. Windshield Wiper Switch Wires

There are four wires feeding into the wiper switch. One from the accessories terminal on ignition switch and three from the wiper motor.

d. Horn Wire

The horn wire from steering column tube goes to the relay on left fender side shield. **NOTE: Horn wires do not go to terminal block.**

e. Ignition Switch Wires

The number of accessories with which a car is equipped determine the number of wires on the ignition switch terminals. Because a feed wire is needed for each accessory. The permanent wires are as follows: One from starter relay to ignition switch and another from switch to ignition coil. The wires are grouped in the chassis wiring harness and strung through firewall into engine compartment.

f. Flasher Wires

There are two wires connected to the flasher, one from the horn relay located on thhe left fender side shield in engine compartment, and the other to turn signal switch.

g. Map Light Wires

Map light wires are strung along the instrument panel from wire connector to switches to both front A posts. On cars equipped with courtesy lights, feed wires branch from the main harness

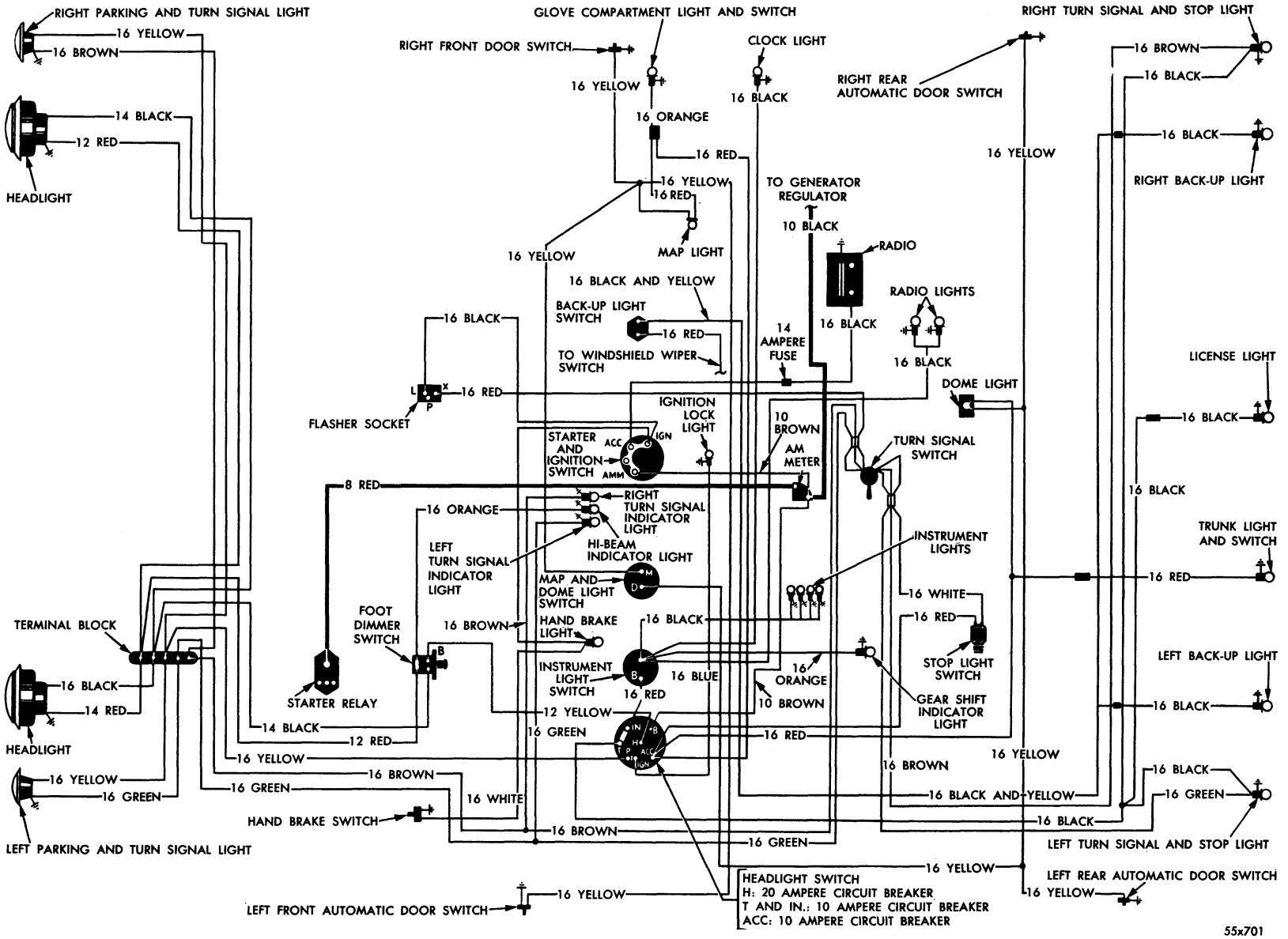


Fig. 47—Lighting and Turn Signal System (Models C-67, C-68 and C-69 Only)

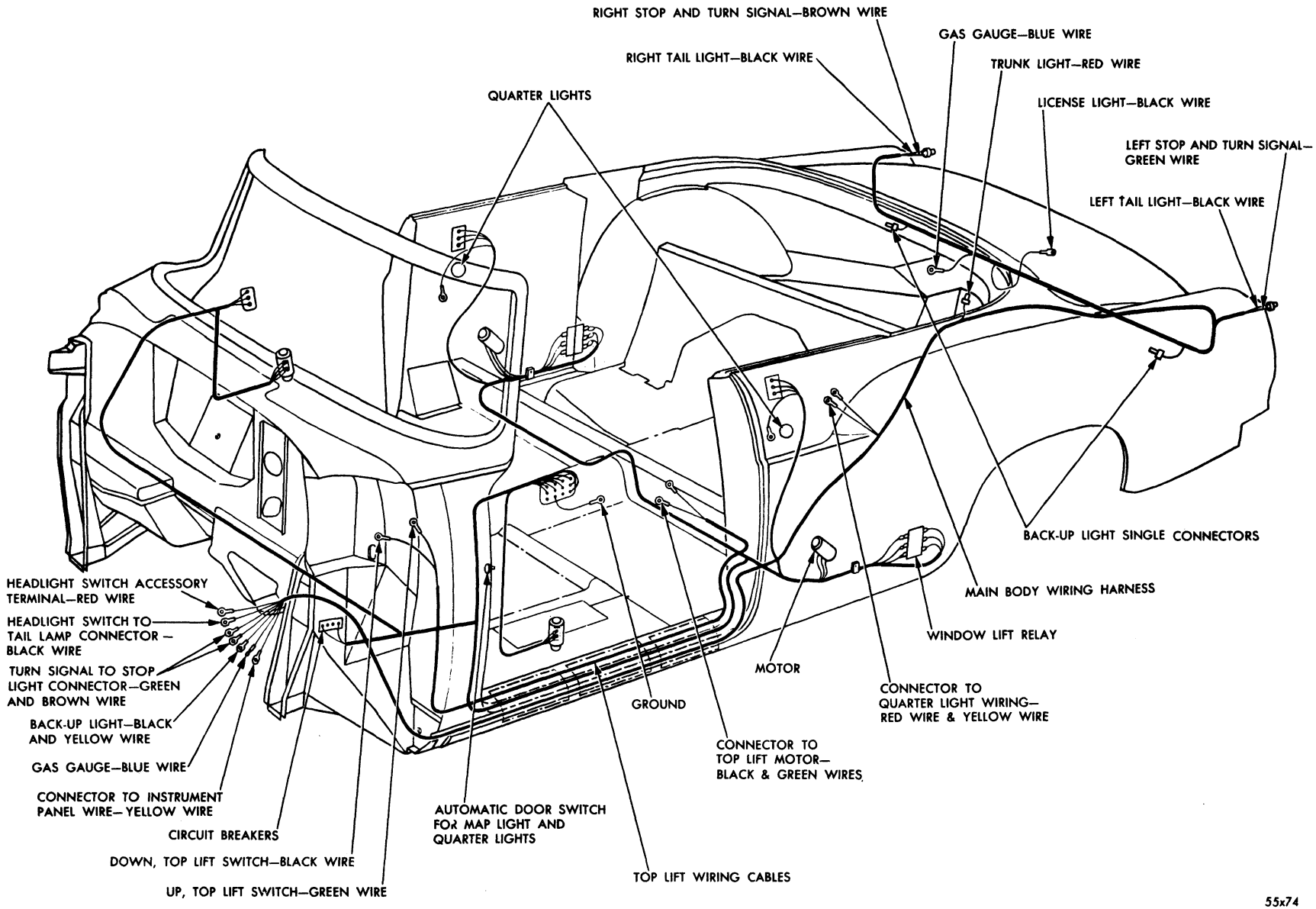


Fig. 48—Body Wiring (Including Convertibles)

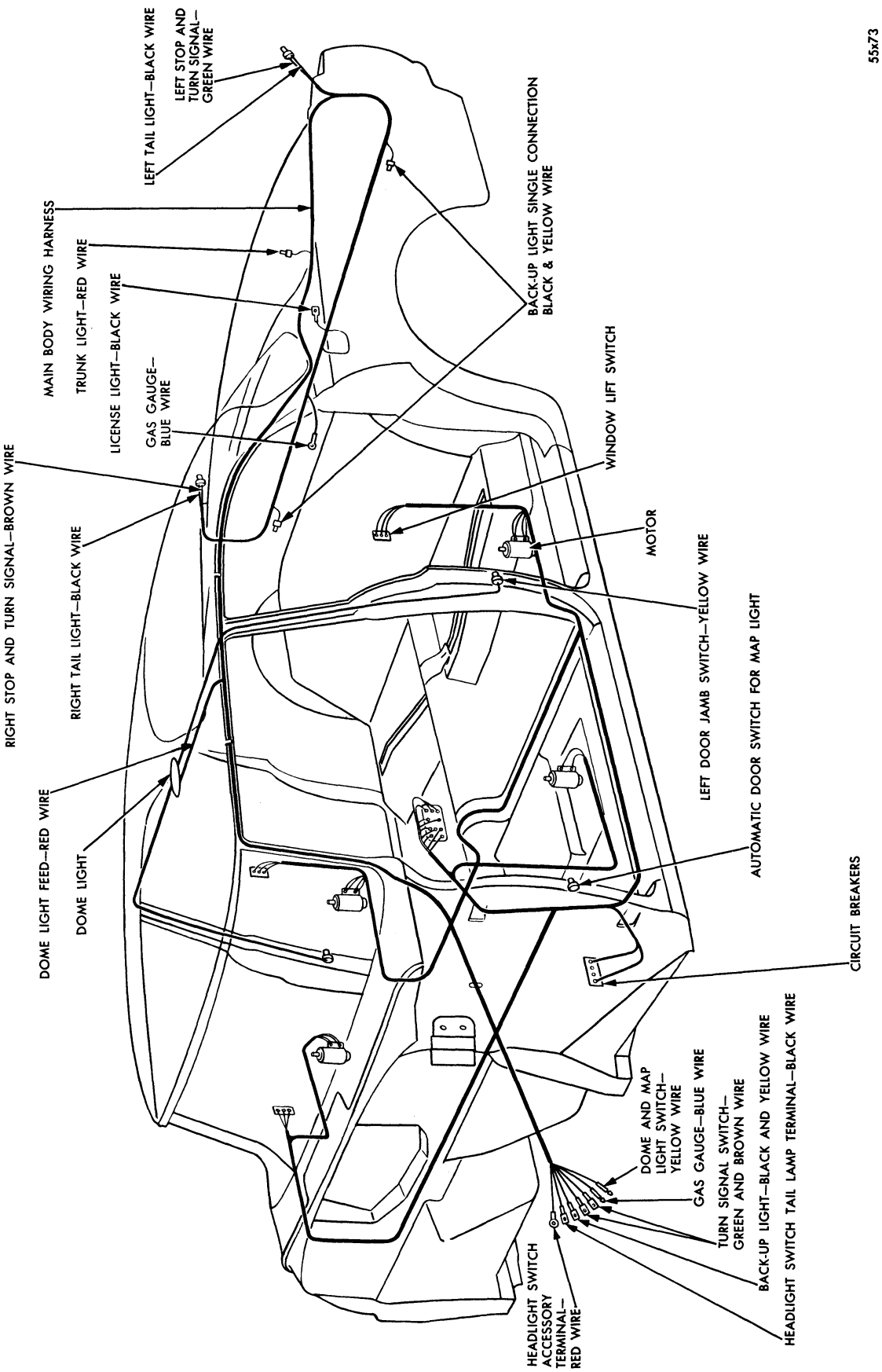


Fig. 49—Body Wiring (Except Convertibles)

at rear quarter panel to lamp and rear door switches.

h. Back-up Light Wires

Back-up light wires are strung along the instrument panel to left cowl panel through firewall from accessories terminal on ignition switch to back-up light switch on transmission and from transmission to rear lamps.

i. Trunk Light Wires

The trunk compartment light wiring is also included in the above harness, but branches off at the rear of deck lid.

j. Circuit Breakers

There is one 10 and one 27 ampere circuit breaker located in the head lamp switch.

k. Windshield Wiper

Windshield wiper circuit contains one 10 ampere circuit breaker in 6 volt system and 6 ampere in 12 volt system located on wiper switch.

SERVICE DIAGNOSIS

72. LIGHTS DO NOT BURN

Possible Causes:

a. Burned out bulb or unit.
b. Defective wiring.
c. Defective light switch.
d. Loose connections.
e. Run down battery.

Remedies:

a. Replace burned out bulbs or sealed beam units, after checking voltage at socket. Refer to specifications for correct replacement part and to Paragraph 66, of this Section for testing voltage at headlights.

b. Check for defective wiring, as outlined in Paragraph 71, of this Section. Replace as required.

c. Replace defective light switch after inspection and testing to determine cause of failure.

d. Clean and tighten connections (note especially the connections at the various junction blocks) as necessary to correct this condition.

e. Test specific gravity of battery, recharge and test voltage regulator for output. Adjust, as outlined in Paragraph 25, of this Section.

73. LIGHTS FLICKER

Possible Causes:

a. Loose connections.
b. Poor ground at light socket.

Remedies:

a. Clean and tighten connections, as necessary, to correct this condition.

b. Inspect bulb sockets for dirt or corrosion, check ground connections, clean and tighten, as required. Test ground connections for voltage drop, as outlined in Paragraph 66, of this Section.

74. BULBS BURN OUT FREQUENTLY

Possible Causes:

a. Excessive battery voltage.
b. High charging rate.
c. Poor ground at light socket.
d. Incorrect type of bulb.

Remedies:

a. Replace burned out bulbs, and test battery, as outlined in Paragraph 35, of this Section.

b. Replace burned out bulbs if required. Then, test voltage regulator, as outlined in paragraph 25, of this Section. Adjust as necessary to correct this condition.

c. Inspect bulb sockets for dirt or corrosion, check ground connection, clean and tighten, as required. Test ground connection for voltage drop, as outlined in Paragraph 73, of this Section.

NOTE

Whenever replacing a wire in the lighting circuit, use only standard equipment wire.

d. When replacing burned out bulbs, use only those recommended in Data and Specifications.

WINDSHIELD WIPERS

75. DESCRIPTION (FIG. 50)

The variable speed motor is a split field, compound wound, reversible motor which makes possible the off-glass parking feature. The wiper also contains a newly designed cam spring in the gear box for actuating the off-glass parking switch, and an eccentric in the connecting link, at the wiper crank pivot, which automatically lengthens the links making the off-glass parking position possible.

NOTE

Parking of the individual blades, in relation to each other, is accomplished by loosening up the nut attaching the wiper arm to the pivot and then moving the wiper arm to the desired position, then tightening the nut.

76. OPERATION

a. Operation of Link Cam

(1) As the wiper crank arm pivot or pin is rotated, the coil spring (which is installed on the pin and is undersize in relation to the pin) is forced to rotate, causing the spring release and parking cam to be rotated by the end of the spring until the parking cam butts up against the stop provided in the link.

(2) When the parking cam reaches the stop, the spring release is also held stationary.

(3) Pressure now applied by the spring against the spring release causes it to tend to uncoil the spring, thus releasing the braking action on the crank arm pivot, permitting

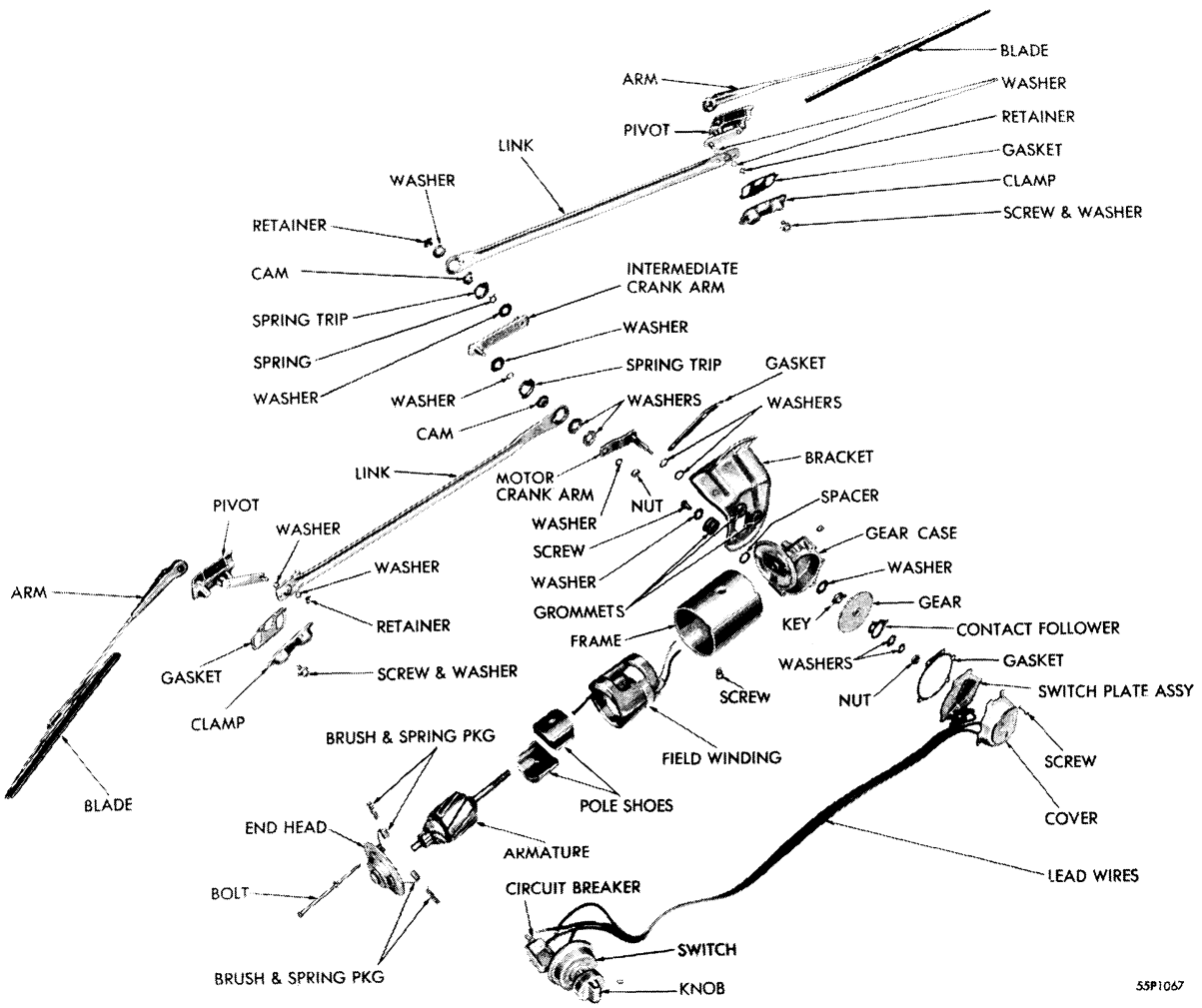


Fig. 50—Windshield Wipers (Exploded View)

the pivot to turn freely in its complete cycle of operation.

NOTE

When parking cam has been rotated into position for normal operation of the windshield wiper, the crank pin retaining hole in the cam will be facing the far end of the connecting link and in direct line with it. When in this position, the effective travel of the link has been shortened so that it will permit windshield wiping without striking the windshield moulding.

(4) When the off-glass parking switch is actuated and the motor reverses, the pressure on the end of the coil spring is released, causing it to wind and tighten itself against the crank arm pivot.

(5) As the pivot is rotated in the opposite direction, the other end of the coil spring applies pressure against the spring release, causing it to rotate with the parking cam until the parking cam contacts the link stop. **When this has occurred, the parking cam will have rotated 180 degrees so that the cam pivot retaining hole is now toward the short end and in line with the link, resulting in automatically lengthening the link to permit off-glass parking.**

(6) As the parking cam reaches the stop, the same action as previously described occurs. The spring release causes the coil spring to expand and allows the crank pivot to turn freely within the coil spring.

b. Operation of the Parking Switch

(1) When the wiper is operating normally, the cam spring rotates beneath the projection on the switch plate and does not come in contact with the nylon cut-off switch plunger.

(2) When the wiper is shut off the motor will reverse, causing the cam spring to go under the projection at the bottom of the switch plate, forcing the spring up until the end of its travel is reached, at which time the cam spring pushes against the switch plunger opening the contact points and shutting off the wiper.

(3) During this process of reversing the motor, the parking link cams are rotated to lengthen the connecting links so that they will be of sufficient length to provide off-glass parking by the time the cam spring has caused the contact points to open shutting off the wiper.

NOTE

Due to the design which requires the motor switch cam spring to reverse and slide under the switch plate projection before turning off the switch, the wiper blades will have a natural tendency (when turning off the wiper switch) to start to park, then reverse their direction to the full extent of their far travel to park.

77. WIPER ASSEMBLY REMOVAL (REFER TO FIG. 50)

Due to restricted room to properly assemble the eccentrics at the crank arm link ends, it will be necessary to remove the windshield wiper assembly as a unit whenever the wiper or links are to be serviced.

CAUTION

Before attempting to remove the wiper motor for complete disassembly, the wiper should be operated and then shut off by disconnecting at the circuit breaker behind the dash panel control switch or by turning off the ignition kay. Failure to observe this precaution will result in irreparable damage to the motor switch and spring parking cam when the switch cover is removed.

(1) Disconnect wiper motor.

(2) Remove left-hand fresh air door.

(3) Remove the clips that hold the links to the **pivot cranks. Clips are removed by lifting top tab and sliding sideways out of engagement with the groove in the pivot crank pin.**

(4) Remove brass spacing washer.

(5) Slip end of link containing nylon ball bushing off **pivot crank pin.**

(6) Remove the three windshield wiper bracket to dash panel retaining nuts and remove wiper motor bracket and links as an assembly. **A thick rubber gasket is assembled between the motor bracket and the dash panel to reduce noise.**

78. DISASSEMBLY of WINDSHIELD WIPER LINKS

(1) With the motor and link assembly lying

on a clean bench, remove the clip that holds the left-hand link to the crank arm.

(2) Remove the bevel washers.

(3) Carefully remove the link. **The pivot end of the link is provided with a stop to prevent the wipers from going over the center and locking.**

(4) Remove the parking cam.

(5) Remove the spring release.

(6) Remove the coil spring around the pin by spreading the spring ends apart. **Spreading the spring ends will cause the spring to expand, allowing it to be removed from the shaft.**

(7) Remove the spring washer.

NOTE

The right-hand link is disassembled in the same manner after removing the crank arm to crank lever retaining nut and removing the brass spacing washers between the link and the crank arm and crank lever.

Having removed the links to clean the switch contacts, should it be required, or to replace the wiper switch or spring cam, disassembly of the wiper motor can be accomplished as follows:

(1) Remove the switch cover.

(2) Remove the switch plate.

NOTE

Should an attempt be made to disassemble the switch while the wiper is in the park position, the cam spring would be under the projection at the bottom of the switch plate, and extreme force would be required to disassemble it, resulting in damage to the switch and cam spring.

(3) Observe the position of the cam spring, then remove it.

79. REASSEMBLY OF MOTOR SWITCH

(1) Make sure the gear box contains lubricant, then install the parking switch cam spring so that it will engage with the nylon drive gear and the top end of the spring points in the same direction as the crank arm.

(2) Install motor switch plate.

(3) Install switch cover.

80. REASSEMBLY OF WINDSHIELD WIPER LINK

(1) Install spring washer, concave surface towards the crank arm.

(2) Compress ends of crank pivot coil spring to expand, then install on the pivot. **Springs are interchangeable.**

(3) Install spring release. **Spring releases are interchangeable.**

(4) Install parking cam so that it will index with the spring release and engage the ends of the spring between the spring release and parking cam in the openings at the point of index.

CAUTION

While the parking cam is interchangeable, the face of the cam marked "L" must be away from the link when installed on the left link, while the face of the cam marked "R" must be away from the link when installed on the right link. Or when assembling to the left link, both the "L" on the left crank and on the parking cam should be seen. This is also true for the right link; both the "R" on the crank and on the parking cam should be seen.

(5) Install spring washer, convex surface towards the cam assembly.

(6) Install link arm with the stop projection on the link arms towards the cam assembly.

(7) Install retaining bolt and nut.

Reassemble left link and cam assembly to crank lever pivot in the same manner, locking in place with a slip instead of the retaining bolt.

NOTE

Should windshield pivot replacement be necessary, it should be accomplished in the following manner while the windshield wiper assembly is removed:

(1) Remove the wiper blade.

(2) From under the dash, remove the two pivot retaining bolts and bellville washers. **Retaining plate should drop off when bolts are removed.**

(3) Remove the pivot from the outside and remove the gasket.

81. INSTALLING NEW PIVOT

(1) Install new gasket.

(2) Install pivot.

(3) Install pivot retaining plate under dash.

(4) Install bellville washers on cap screws so that the convex surface is against the head of the bolt. **The use of, and proper installation of, the bellville washers is important as these washers can take up to .015 inch slack, as the bolt torque is reduced by the gasket taking a permanent set.**

(5) Install retaining bolts and washers and tighten to 75 inch-pounds torque. This is important to assure proper tension on the bellville washers and to reduce the possibility of a water leak occurring at that point.

(6) Reinstall wiper blade.

82. REINSTALLATION OF WINDSHIELD WIPER MOTOR BRACKET AND LINK ASSEMBLY

(1) Work links up behind the dash panel and attach to the pivot crank pins.

(2) Install the brass spacing washer.

(3) Install lock clips on the pivot crank pins.

(4) Make sure the wiper bracket to the dash panel rubber gasket is in place, then install windshield wiper motor and bracket assembly.

(5) Tighten retaining nuts to 25 inch-pounds torque.

CAUTION

Do not overtighten, causing rubber gasket to be excessively compressed as it will permit transmission of wiper noise.

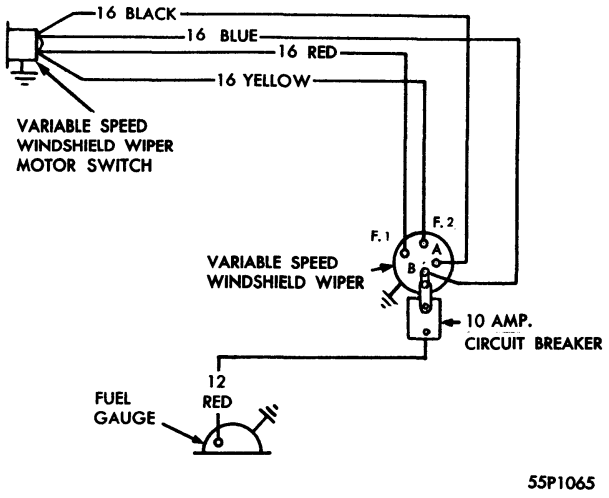


Fig. 51—Wiring Diagram of Wiper Circuit

(6) Reinstall fresh air door and adjust.

(7) Adjust wiper parking position, if necessary, by moving the cam adjustment lever which sticks out of the switch cover.

(8) Connect up the four lead wires from the wiper motor to the wiper control switch, as shown in Figure 51.

Blue wire to the "P" terminal on the control switch.

Black wire to the "A" terminal on the control switch.

Red wire to the "F1" terminal on the control switch.

Yellow wire to the "F2" terminal on the control switch.

The hot lead wire is attached to the circuit breaker.

SERVICE PROCEDURES

Before disassembling wiper motor, note the relationship between the parking switch, cam and crank arms.

WARNING

Use care when handling the worm follower gears, as the fine teeth are easily damaged.

83. SERVICING MOTOR

a. Inspection

Thoroughly inspect motor parts for wear, corrosion or damage. Clean the armature commutator with 00 to 000 sandpaper, or if necessary, turn down the commutator and undercut the bakelite as described below. Worn or oil soaked brushes **must** be replaced. Check the play of the armature and crank arm shafts in their respective bushings and replace worn parts, if any looseness can be detected. Inspect the worm follower gears for broken or chipped teeth, replacing those showing damage or excessive wear.

b. Refacing Commutator

If the armature commutator is rough, out-of-

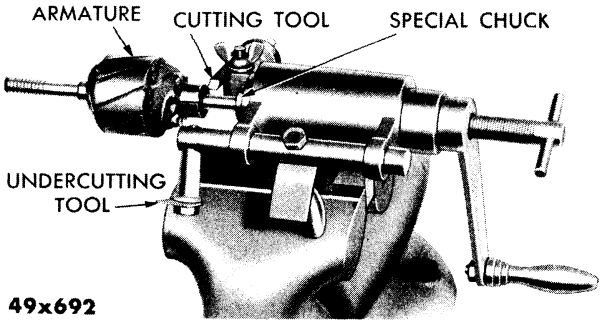


Fig. 52—Turning Down Commutator

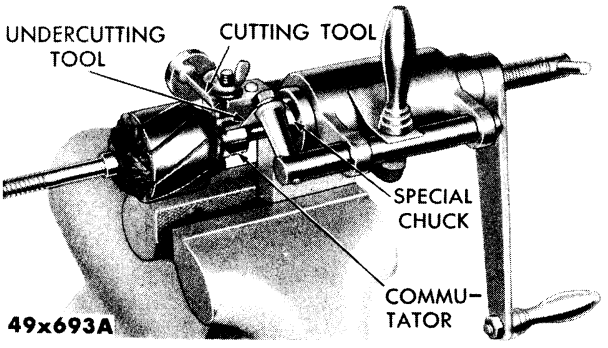


Fig. 53—Undercutting Bakelite

round, burned or the bakelite is even with, or extends above the surface of the commutator, turn the commutator down, using turning and undercutting Tool C-770, with special chuck SP-837, cutting Tool SP-838 and blade, as shown in Figure 52, or a lathe. **Remove only sufficient metal to give a smooth clean surface.**

c. Undercutting Bakelite

Undercut the bakelite segments to a depth of $\frac{1}{32}$ inch, using Tool C-770, with special blade SP-839, as shown in Figure 53, or a fine tooth hacksaw blade. Be sure to undercut the bakelite square. After undercutting, polish the commutator with 00 or 000 sandpaper to remove possible burred edges.

d. Assembly

Assemble the frame, armature and heads, being careful to raise brushes to allow entrance of commutator. Check armature end play, then adjust by expanding or contracting the bridge, carrying the end thrust bushing by use of adjusting screw provided to correct end play until the desired clearance of .005 to .010 inch is obtained. Rap motor frame several sharp blows with a rubber hammer to align the bushings and then make sure the armature turns easily without binding.

NOTE

Be sure 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.

SERVICE DIAGNOSIS
CONDITIONS — POSSIBLE CAUSES

84. WIPER OPERATES SLOWLY

Possible Causes:

a. High resistance in brush to commutator contact, or carbon deposits in slots.

b. High resistance in ground connection.

c. Pivot shaft binding.

d. Defective control switch.

e. Worn or damaged motor.

85. WIPER FAILS TO OPERATE

Possible Causes:

a. Binding linkage.

b. Defective switch.

c. Defective motor.

d. Open or grounded wiring.

86. SHORT SERVICE LIFE OF BLADES

Possible Causes:

a. Bent wiper blade arms.

b. Local climatic conditions.

c. Road splash containing deteriorating materials.

87. NOISY WIPER MOTOR

Possible Causes:

a. Motor to bracket or bracket to dash panel retaining screws torqued too tight.

b. Excessive armature shaft end play.

CAUTION

If adjustment of the armature end play is made, the free running amperage draw of the wiper motor should be checked. Under no circumstances should the amperage draw exceed 5 to 7 amperes.

88. BLADES STRIKE MOULDING AND PARK HIGH

Possible Causes:

a. Parking cam in link installed 180 degrees out of place (off-glass parking wiper only).

b. Spring release in link parking cam improperly installed (off-glass parking wiper only).

c. Motor field leads at dash control switch reversed (off-glass parking wiper only).

89. WIPER WILL NOT START

Possible Causes:

a. Field leads loose on control switch.

b. Switch housing not grounded to dash panel.

90. WIPER WILL NOT PARK IN OFF-GLASS POSITION (OFF-GLASS PARKING WIPER ONLY)

Possible Causes:

a. Broken link coil spring that operates parking cam.

b. Link coil spring release missing.

c. Broken or bent spring release finger on link.

91. WIPER BLADES PARK EARLY OR LATE

Possible Cause:

a. Adjust plate on motor switch, clockwise to park later and counter-clockwise to park earlier.

92. BLADE CHATTERS IN ONE DIRECTION, SCRAPES GLASS IN OTHER

Possible Causes:

a. Wiper arm has a torsional bend.

NOTE

Turn wipers on, and stop in vertical position by turning off key. Remove blades, allow seats to rest against glass. If both sides of saddle do not contact glass within thickness of a piece of note paper, use two pairs of pliers to bend the arm until they do.

b. Incorrect wiper blades.

CAUTION

Due to specially designed blades for use on our curved windshields, only the blades available through MOPAR should be used.

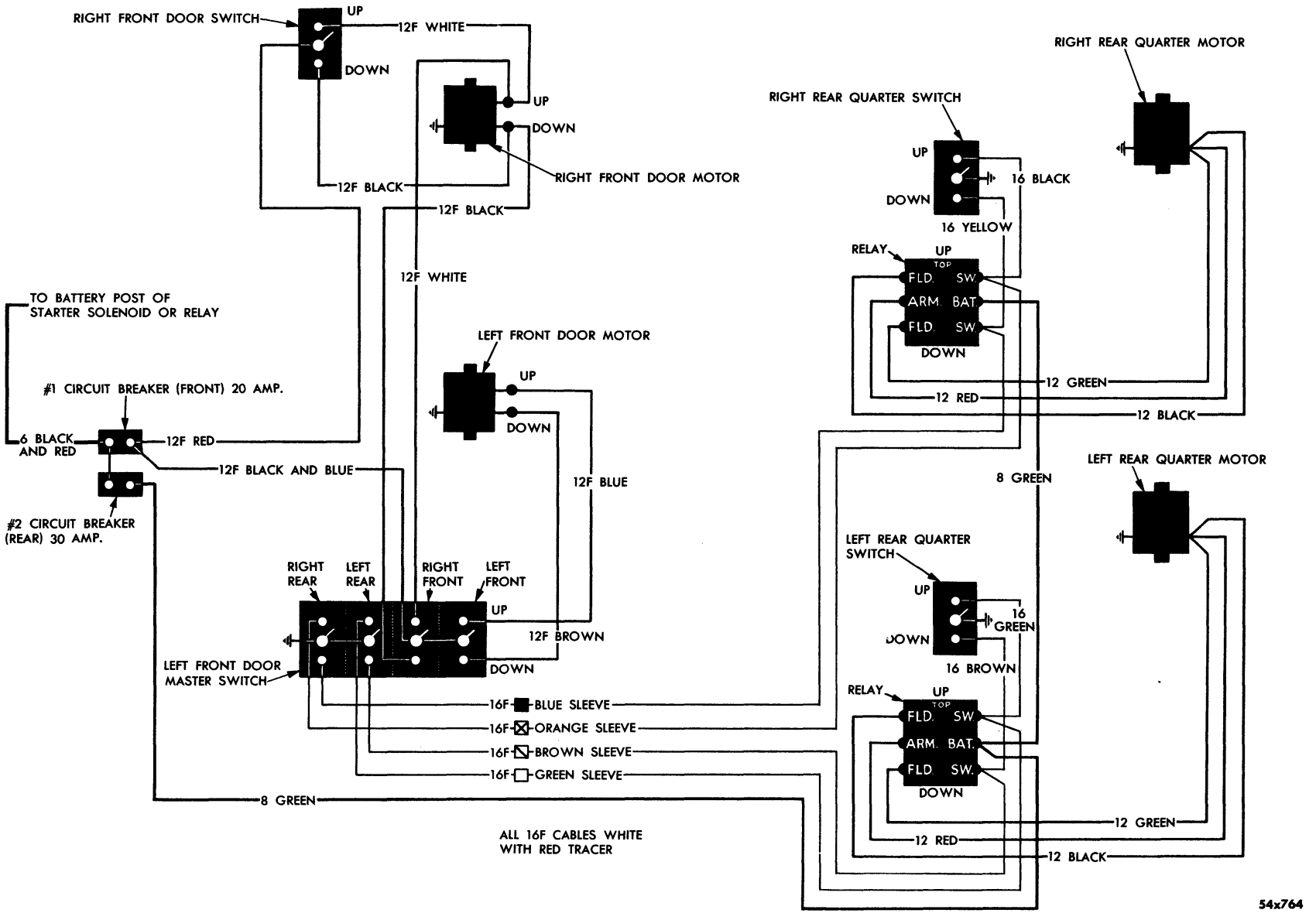


Fig. 54—Power Window Lift (Convertible and Special Club Coupe)

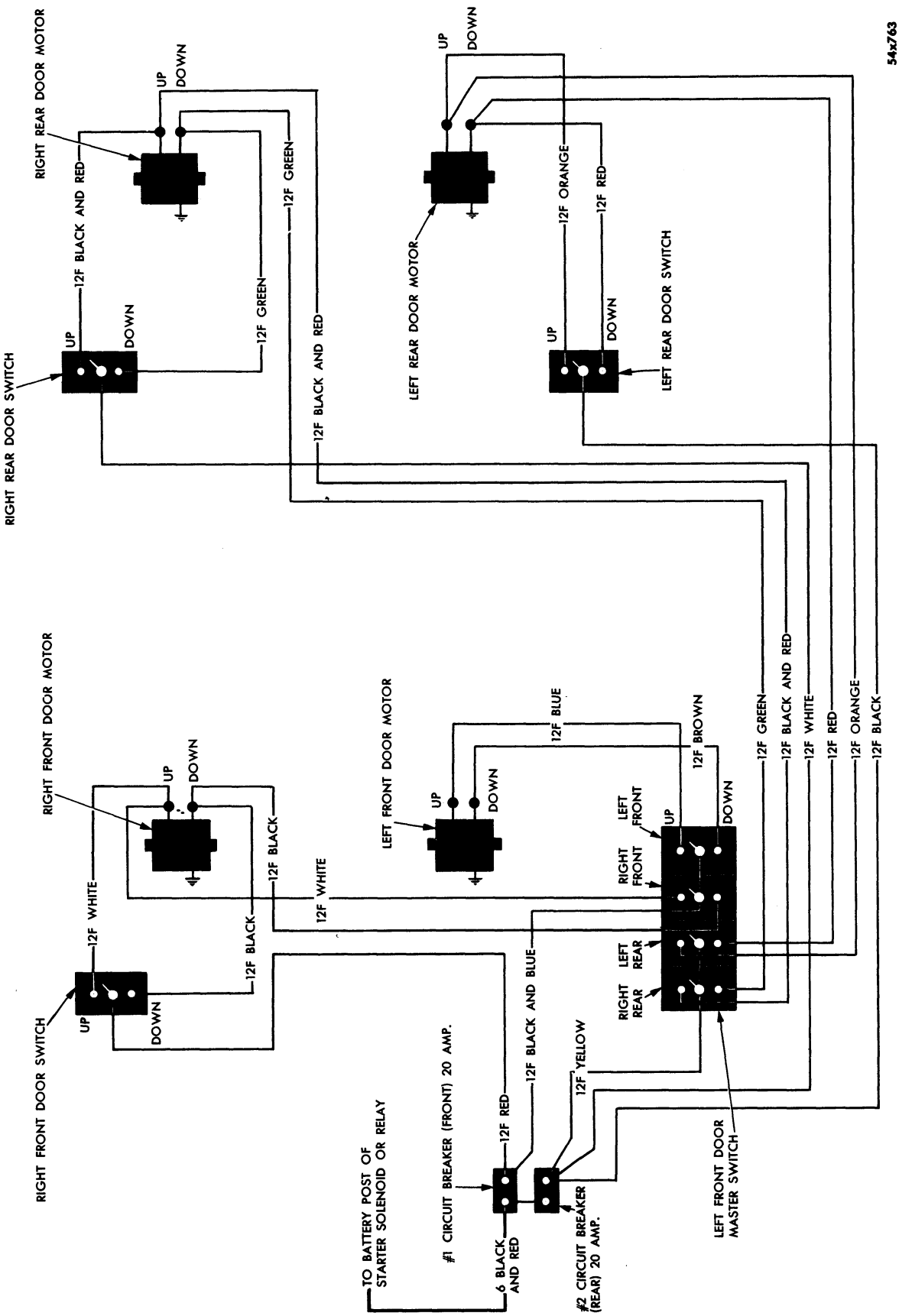


Fig. 55—Power Window Lift (All Models Except Convertible and Club Coupe)

POWER WINDOW LIFTS

93. DESCRIPTION

There are three component parts in the basic Power Window Lift circuit: a circuit breaker, a motor, and a switch. The relay has been eliminated and the switch now carries the full amperage load of the motor, except on Convertible and Club Coupe rear quarter windows which still have a relay.

Power window lift circuits are protected by circuit breakers which are located behind the left front kick panel. One circuit breaker controls the front window circuit, while the other controls the rear window circuit.

NOTE

30 ampere circuit breakers are used with relay circuits and 20 ampere circuit breakers are used in circuits without relays.

94. WIRING (FIGS. 54 AND 55)

In wiring, the circuit breakers are fed from the battery solenoid by a No. 6 cable and paralleled with a brass jumper. From the circuit breakers to door switches and motors a No. 12 harness (super-flex) is used. The wiring harness is clipped to the door hinges and is looped sufficiently to accommodate opening and closing of doors. Should harness be removed for any reason it should be looped sufficiently upon reinstalling to permit opening and closing of doors.

CAUTION

Do not allow an excessive loop as this will cause harness to take a permanent set which in turn will cause wires to bend at this point and eventually break.

There are 4 switches used to control the window lifts, a master switch which is located on the left front door and one individual switch for each of the windows. The master switch on the left front door is actually a group of switches of the same type as those used on each door. Each switch of the master switch group is hooked in parallel with the window switch it controls.

Each window switch is connected so that when the switch lever is pushed up, the window is raised, and, when the switch lever is pushed down, the window is lowered. The window can be stopped in any position by releasing the switch lever.

The wiring connections on all switches are set screws. There is one wire from the circuit breaker to the master switch and 8 wires (2 each) leaving the master switch to the doors. The wires leaving the master switch are connected directly to the motors. The individual switches on the right side are connected directly to the circuit breaker. The individual switch on the left side is connected to the circuit breaker through the master switch.

The harness for the right rear door is carried along back of the front seat on the floor pan. The harness for the right front door is carried across the firewall. The motors require no lubrication. In the motor wiring, the top lead (one nearest coupling) is used to raise the window and the bottom lead to lower the window. The normal 6 volt amperage draw when operating window is 20-25 amperes, this will vary with voltage.

95. REMOVAL OF WINDOW LIFT

(1) Disconnect battery.

(2) Remove garnish moulding. Remove door handle control and escutcheon plate. Remove arm rest and window lift control switch. Remove door trim panel.

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

(4) Raise glass manually and prop the glass. Raise glass before loosening cap screws so that it is out of the working area. Remove the four regulator to door attaching cap screws. Remove the pivot guide retaining pin. Lower motor and regulator assembly out through opening in the door.

CAUTION

If gear box is to be replaced, remove regulator counter balance spring before removing. The counter balance spring has approximately 220 degrees of wrap, use large pair of pliers when removing. Failure to remove spring before disassembly of gear box can result in personal injury.

The gear box which is replaced as an assembly, consists of a worm and worm gear. The worm gear drives a pinion which is meshed with the regulator sector gear. The gear box is lubricated at the time of assembly and should not require any further lubrication. Use Lubriplate 105 light weight on all other movable parts.

96. INSTALLATION OF WINDOW LIFT

(1) Place motor and regulator assembly through opening in door. Insert intermediate pivot arm pin into guide inside of door shell—THERE IS NO CLIP. Install the four regulator attaching screws finger tight.

NOTE

After installing the regulator retaining screws check to see that the intermediate pivot arm did not slip out of the guide during installation. This can happen very easily.

(2) Remove window prop, lower glass and insert control arms into glass channel, using a leather washer on each side of channel, secure with clip.

NOTE

Control arms can be inserted into glass channel only when glass is in lowered position.

(3) Connect wires to motor and connect battery.

(4) Operate window up and down several times to help align glass in the channel, then stop window halfway and tighten the four regulator attaching screws.

(5) Check glass for alignment. Connect an ammeter into electrical circuit and operate window. The ammeter reading should be constant without fluctuation. (Coupes and Sedans 22 amperes.) (Hardtops and Convertible rear quarter 28 amperes.) If reading fluctuates, it is an indication there is a bind either in glass or linkage. Down stop should be adjusted so window is flush with garnish molding.

(6) Replace trim panel, garnish molding and other parts in reverse order as done during removal.

POWER SEAT LIFTS

97. DESCRIPTION

The power seat may be moved four ways, fore, aft, up and down.

The power seat is driven by two motors which are located under the front seat. One motor is used for vertical movement and the other for horizontal movement. (See Figs. 56 and 57.)

The motors operate a worm shaft and sleeve through a worm head. The control switch assembly is located on the left side of the front seat and wired through a 30 ampere circuit breaker which is located adjacent to the window lift circuit breakers behind the left front kick panel. The wire from the starter solenoid supplies the power to the circuit breaker. (The circuit breaker has sufficient capacity to permit operation of both motors at one time.) If vehicle is also equipped with electric windows, then power is supplied by a brass jumper paralleled with the window lift circuit breakers. A wire supplies the power from the circuit breaker to the relays on the motors. From each relay there are two wires to the control switch. The switch grounds one or the other of the control wires which closes the circuit. The left motor adjusts the seat vertically. The wiring harness to the right motor is looped to permit up and down movement. The horizontal control unit motor being stationary requires no loop but harness is installed in back of seat track on floor pan to prevent cutting of wires.

CAUTION

Be sure to clip wire harness securely so that wires will not be pinched when track is in extreme lower back position. The tracks are replaceable only as an assembly and are not interchangeable from right to left, also they are not adjustable.

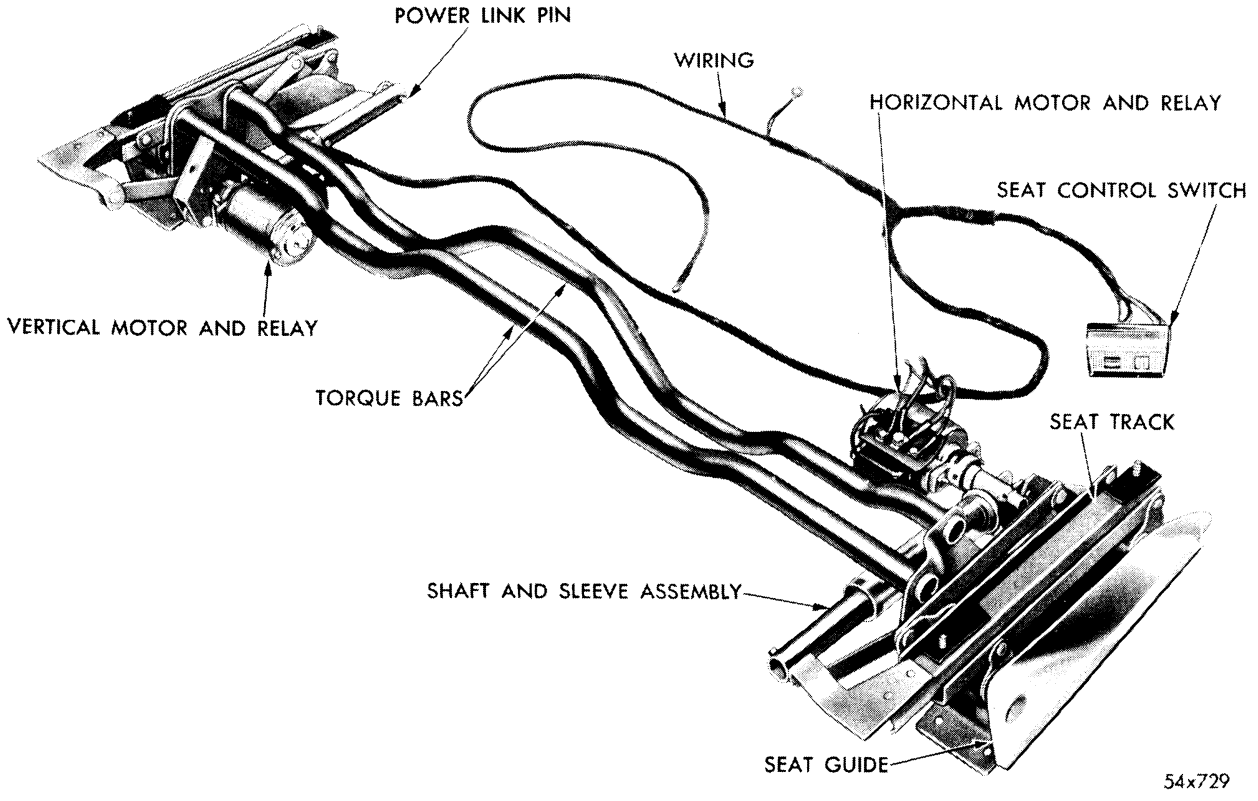


Fig. 56—Power Unit of Power Seat Assembly

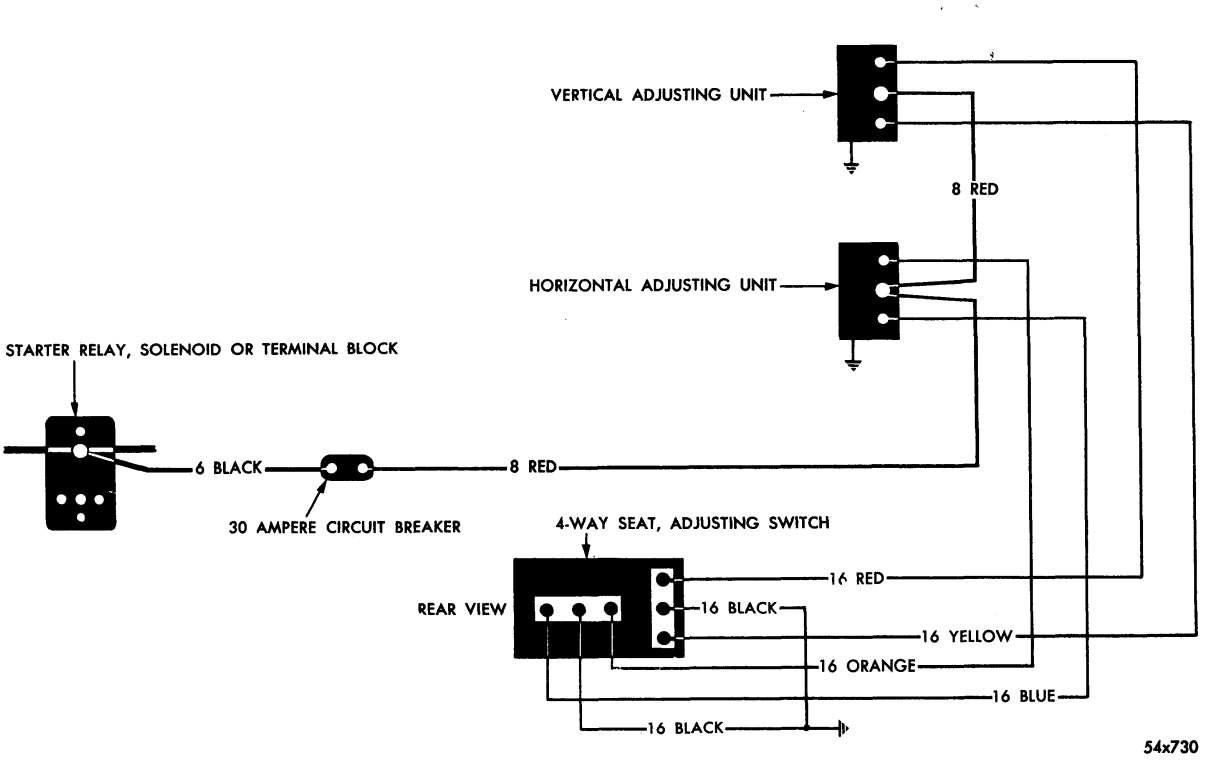


Fig. 57—Wiring Diagram (Power Seat)

The horizontal travel is 5 inches, the vertical travel is 1⅝ inches at front and 2 inches at the rear. The horizontal plane of the seat track is inclined 11 degrees.

98. REMOVAL AND INSTALLATION OF FRONT SEAT ASSEMBLY

(1) Remove front cushion. Disconnect battery. Disconnect seat adjuster control wires to relays.

(2) Remove floor pan to seat guide attaching cap screws and remove guide from seat assembly.

To install, repeat procedure followed during removal, only in reverse order.

99. REPLACING LEFT SEAT GUIDE AND VERTICAL POWER UNIT (Without Removal of Front Seat Assembly From Car)

a. Removal

Remove front seat cushion. Disconnect battery and seat adjuster control wires to relays.

CAUTION

To facilitate the removal of vertical bar clevis pin the front seat assembly should be elevated to the highest position of travel and blocked before attempting removal of pin.

(1) Remove vertical bar pins attaching the vertical power unit shaft and sleeve to front seat frame.

(2) Remove power link pin. Disconnect the motor to relay lead wires.

(3) Remove floor pan to seat guide attaching cap screws and remove guide from seat assembly.

b. Installation

(1) When replacing the vertical power unit, adjust the power unit to the two pins (adjustment made by turning unit coupling). Then the rear of the unit on the rear pin and secure.

(2) Raise seat manually by turning front torque bar. Install front end of unit into torque bar bracket, attach clevis pin and secure.

NOTE

The length of the unit may be varied by turning the coupling manually.

(3) Replace wires to terminals on relay. Connect battery and check seat operation. Replace seat cushion.

100. REPLACING HORIZONTAL POWER UNIT AND SHAFT ASSEMBLY

(1) Remove front seat cushion. Disconnect battery and seat adjuster control wires to relays. Remove horizontal power unit retaining snap rings.

CAUTION

To facilitate the removal of horizontal bar clevis pins the seat assembly should be lowered to the lowest point before attempting removal of unit.

(2) Disconnect relay lead wires to motor and remove the horizontal power unit assembly.

101. REMOVAL OF SEAT TRACKS

NOTE

Seat tracks will be serviced only as an assembly, as are the individual torque rods. Either the right or left seat tracks can be replaced independently.

Remove jack assemblies. Remove the two rear and front retaining bolts that hold the seat track to the floor pan. Slide seat track outward causing it to disengage from the two horizontal torque rods.

NOTE

When removing the right seat track it will be necessary to disengage one connecting link from a pivot pin.

102. INSTALLATION OF SEAT TRACKS

(1) Engage the seat torque rods in the seat track assembly. Install rear seat track retaining screws but do not tighten. Install jacks and operate in all directions to obtain proper alignment between the seat tracks and the horizontal torque rods.

(2) Tighten front seat track retaining screws. Raise seat and tighten rear seat track retaining screws.

NOTE

The vertical power unit shaft is equipped with a ball nut and should not be lubricated. The horizontal power unit shaft is equipped with a friction nut that is packed with life-time grease requiring no further lubrication.

When the seat tracks are properly aligned the normal running current with no load is as follows: 28 amperes on the vertical unit and 24 amperes on the horizontal unit.