WINDSHIELD WIPER AND WASHER

GENERAL DESCRIPTION

The 2-speed windshield wiper (fig. 28) consists of a compound wound 12 volt dc motor and a gear box section containing the gear mechanism and relay control. The motor armature is fitted with a worm gear which drives the main gear assembly and crank arm.

The relay control, consisting of a relay coil, relay armature and switch assembly, is located in the gear box section and controls the starting and stopping of the wiper through a latching mechanism (fig. 29).

An electric washer pump is mounted on the gear box section of the wiper and is driven by the wiper unit gear assembly (fig. 30).

SERVICE OPERATIONS

REMOVAL AND INSTALLATION

WIPER MOTOR AND WASHER PUMP ASSEMBLY

1. Raise vehicle hood and disconnect positive lead at battery.
2. Remove engine distributor shielding and left bank spark plug wire vertical shield.
3. Disconnect left bank spark plug wire bracket-to-manifold and position assembly to one side.
4. Disconnect ignition resistor at firewall, then remove washer pump inlet and outlet hose at pump valve assembly.
5. Remove engine distributor cap and position to one side; then disconnect washer pump and motor assembly lead wires.

6. Remove glove box door and compartment. Refer to Section 1 for removal procedures.

7. Make sure wiper arms and wiper motor are both in the parked position; then remove the wiper transmission retaining clip and disconnect both transmission and spacer from crank arm (fig. 31).

8. Remove four wiper motor-to-dash wall mounting bolts and remove wiper motor from vehicle.

9. With the aid of an assistant position the wiper motor to the dash wall and install the four motor mounting bolts, making sure motor assembly is in parked position.

10. Position left transmission assembly, spacer and right transmission assembly on crank arm then install the retaining clip in the groove in the crank arm.

11. Install glove compartment and door assembly. Refer to Section 2 for installation procedure.

12. Install washer pump and motor assembly lead wires; then install engine distributor cap.

13. Install washer pump inlet and outlet hose to pump valve assembly then install ignition resistor to firewall.


15. Connect positive lead to battery terminal, lower hood and test wiper and washer assembly for proper operation.

WIPER TRANSMISSION

1. Remove wiper block and arm assembly from transmission.

2. Remove glove box door and compartment assembly. Refer to Section 1 for removal procedures.

3. Remove three transmission-to-cowl retaining screws.

4. Remove wiper transmission retaining clip and remove transmission from crank arm. Then remove transmission through the glove box opening.

5. Reverse removal procedure to install wiper transmission.

WIPER ASSEMBLY REPAIRS

The overhaul procedures for the wiper are broken down into three major areas: The motor section, gear box section and washer pump section. Each section may be serviced independently of the other.

MOTOR SECTION

Disassembly

1. Remove the two motor tie bolts.

2. Remove the armature end-play adjusting screw (fig. 28).

3. Strike the steel case lightly with a mallet to partially loosen it from the die cast housing and motor field.

4. Insert a tool through the armature adjusting screw opening and push against the end of the armature shaft to back off the case. This will retain the armature commutator in position between the brushes until ready to separate the armature from the case.

THERMO CIRCUIT BREAKER

Fig. 32—Retaining Armature Brushes
5. To separate armature from case while still retaining the brush springs and brushes in place fashion as that shown in Figure 32 and insert behind the brush leads as shown.
6. Pull the armature out of the case and remove the felt washer, thrust plate, and rubber thrust disc from the case assembly bearing as required.
7. The field windings are pressed into the gear housing and further disassembly is not recommended; however, the field leads may be unsoldered from the brush holders to remove the case.
8. Clean and inspect all parts.

Inspect both the field and armature for damage due to overheating such as unsoldered electrical connections.

Check that brush leads are firmly attached both to the brushes and their connections at the brush holders.

Check brushes for wear. If brushes are worn to within 3/4" of brush lead, or pigtails, they should be replaced.

Check contacts of circuit breaker shown at top of Figure 32. Clean as required or file lightly to remove irregularities.

Inspect all leads from the brush and circuit breaker plate for worn insulation or breaks.

If it was determined by inspection that brush replacement was required, proceed as follows:

a. Remove retainer installed during disassembly and remove brush springs.
b. Place a hot soldering iron against brush lead connection on brush holders, remove old brushes, and install new brushes.

c. To reinstall brushes in holders, compress spring within holder and hold fully compressed with a thin instrument inserted through the slot in the brush holder. Then push brush into holder with lead upward to project through slot in holder, hold brush tightly, and remove instrument retaining spring. Hold brush installed with improvised separator as shown in Figure 32.

Reassembly
1. Assemble rubber thrust disc, steel thrust plate and felt washer in order indicated (fig. 33).
2. Be sure steel thrust ball is located in commutator end of armature shaft, lubricate armature shafts and thrust ball with a high melting point grease and install armature shaft in case assembly bearing.
3. Remove the brush retainer spring.
4. Maintaining the armature in its assembled position in the case, start the armature worm shaft through the field and housing bearing until it starts to mesh with the worm gear.

NOTE: It may be necessary at this point to rotate the armature slightly before the worm will engage with the worm gear.

5. Rotate the case as required to align the holes in the case with those in the housing.

6. Being very careful not to pinch any of the motor leads between the case and edge of the field, push the case onto the field until it butts against the housing.

7. Secure case to housing with two tie bolts.

8. Install end-play adjusting screws and locknut and adjust end-play by tightening adjusting screw finger tight, then back off screw 1/4 turn and tighten locknut.

GEAR BOX SECTION

The gear box section is subdivided into two areas, (A) the relay control and latching mechanism and (B) the drive gear mechanism.

A—Relay Control and Latching Mechanism:

Disassembly

1. Remove four screws which secure the washer pump assembly to gear box.

2. Refer to Figure 34. Disconnect coil spring, remove “E” ring and lift the latch and follower assembly off the pivot pin and relay armature.

3. Remove the stop assembly retaining screw. This will permit the stop assembly to be moved as necessary to allow clearance for removing the relay control assembly.

Fig. 35—Drive Gear Mechanism

1. Nut
2. Crank Arm
3. Snap Ring
4. Seal Cap
5. Retaining Ring
6. End Play Washers
7. Shield
8. Spacer Washer
9. Spacer Washer
10. Gear and Eccentric Shaft
11. Drive Plate and Shaft Assembly
12. Lock Pawl
13. Drive Pawl
14. Spring
15. Washer
16. Spring
17. Latch and Follower
18. Stop Retaining Screw
19. “E” Ring
4. Remove the two screws that secure the relay control assembly.
5. Lift the relay control assembly out of the gear box and unsolder leads as required.

Reassembly
1. Solder existing green and yellow wiper leads to relay control switch and solder the relay coil lead to the wiper unit terminal board as shown in Figure 35.

8—Drive Gear Mechanism:
Disassembly
Refer to Figure 36 unless otherwise specified.
1. Remove the crank arm retaining nut (No. 1).
2. Remove crank arm (No. 2), snap ring (No. 3) and rubber seal (No. 4).
3. Remove the retaining ring (No. 5), end play washers (No. 6), shield (No. 7) and spacer washer (No. 8).
4. Follow steps 1 through 3 under relay control and latch mechanism disassembly.
5. Remove gear mechanism from the gear box and slide spacer washer (No. 9) off the gear assembly eccentric shaft.
6. Slide the drive plate and shaft assembly (No 11) out of the gear assembly, remove the lock and drive pawls (Nos. 12 and 13) and remove the coil spring (No. 14).

Reassembly
1. Assemble lock and drive pawls to the shaft and drive plate assembly as shown in Figure 37.
2. Install the assembled parts from step 1 in the gear and eccentric shaft as shown in Figure 38.
3. Connect the coil tension spring between the lock and drive pawls (fig. 39).
4. Reinstall spacer washer on the eccentric shaft of the gear.
5. Reinstall gear mechanism in the housing as shown in Figure 39.
6. Reassemble the parts removed in steps 1 through 4 under drive gear disassembly.

WASHER PUMP SECTION
The washer pump and/or valve assembly (fig. 40) may be removed from the wiper assembly as a unit:
Body Wiring

1. Make sure body wiring is properly connected to the wiper unit and dash switch.
2. Check that wiper unit ground strap is securely connected under wiper unit cover screw and to harness connector.
3. With ignition switch turned on check for 12 Volts at center (No. 2) terminal of wiper unit terminal board. (See Figure 40.) Check also for 12 Volts at the Brown lead terminal which connects to washer pump.

Dash Switch

1. Check dash switch mounting. Loose mounting can cause an intermittent operating condition when using the wiper.
2. To determine if dash switch or wiper is defective try operating wiper independently of dash switch as follows:
   - Connect 12 Volt supply to center (No. 2) terminal of wiper terminal board and connect a jumper wire from terminal No. 1 (Figure 40) to ground.
   - Wiper should operate in "Hi" speed.
   - To check "Lo" speed operation connect an additional jumper wire from terminal No. 3 to ground.
3. To determine if washer pump unit or the washer button switch is defective operate washer pump independently of washer switch as follows:
   - Operate wiper unit as explained in Step 2 above and connect 12 Volts to either of the washer pump terminals. Connect a jumper wire from the other terminal to ground.

B. WIPER REMOVED FROM CAR (BENCH CHECKS)

This section of the checking procedure is divided into two areas:

1. Relay Control—Latch Mechanism.

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Remove washer pump assembly to gain access to relay control and latching mechanism. To prevent motor from running disconnect yellow lead from relay control switch.

Latch Mechanism

Manually operate the relay armature (fig. 35) to check that latch arm and attaching parts move freely.

Relay Control Assembly

a. Circuit to Relay Coil—Connect 12 Volt supply to wiper as follows: (+) to center or No. 2 terminal (fig. 40) and (—) to housing. Check for 12 Volts at switch terminal to which the green lead is attached (fig. 35). No voltage indicates an open circuit breaker or a broken brown or green lead.

CHECKING PROCEDURE

This section is divided into two checking procedures; (A) wiper installed in car and (B) with wiper removed.

A. WIPER INSTALLED IN CAR:

Testing the wiper while installed in the car consists of checking out the body wiring, dash control and wiper linkage.

therefore it is not necessary to remove the wiper assembly from the vehicle if only the washer pump and/or valve assembly requires service.

Replacement

To replace the washer pump assembly proceed as follows:

1. Raise vehicle hood and remove engine distributor shielding and distributor cap.
2. Remove lead wires from washer pump and disconnect ground wire from screw retained connector; disconnect hoses from valve unit.
3. Remove four screws which secure the washer pump assembly to the gear box.
   a. The water inlet and outlet valve assembly is serviced as a unit if required; also the rotor cam is serviced separately.
4. Install washer pump and cover assembly so that the slot in the washer pump cam fits over the pin on the wiper unit drive plate.
5. Install the four washer pump to gear box retaining screws, position ground lug under lower screw.
6. Connect valve inlet and outlet hoses, attach ground lead and water pump lead wires.
7. Install engine distributor cap and shielding.
8. Lower hood and check operation of wiper unit.
b. Relay Coil—If circuit to relay coil checks out leave 12 Volt supply connected as explained in Step (a) above and connect a jumper wire from terminal No. 1 (fig. 40) to housing. Failure of relay armature to pull in indicates a weak or open relay coil. (Re-check for a binding condition in the latching mechanism.)

Re-check Switch—If steps (a) and (b) above check out correctly proceed as follows:

(1) Leave battery and jumper wire connected as described in steps (a) and (b) and check for 12 Volts at switch terminal to which the yellow lead attaches (fig. 35). If relay pulls in properly and no voltage reading is obtained a defective switch is indicated.

(2) Disconnect jumper wire between terminal No. 1 to ground and check that relay armature moves away from coil pole. Check for 12 Volts at switch terminal to which yellow lead attaches. No voltage reading indicates a defective relay switch.

NOTE: If wiper gear mechanism is in full park position. Disconnect the coil spring that connects between the gear assembly drive and lock pawls to release the pressure of the drive pawl switch actuator against the switch tab.

(3) Leave voltmeter connected as described in Step No. 2 above and manually push the switch stop tab (fig. 35) toward the relay coil. If voltage reading is still obtained a defective switch is indicated.

2—Motor Checks—Armature, Field, Case and Brush Assembly

For the Motor Checks disassemble the motor but leave the field assembly in the housing.

Armature

a. Open or Shorted—A growler check should locate either of these conditions.

b. Ground Check—Check between armature lamina and commutator with 250 Volts, AC for one second. A high arcing condition when test prod is removed from lamina indicates a grounded armature.

Field Assembly

a. Open Test—Disconnect yellow lead from relay control switch and connect an ohmmeter between the yellow lead and the brush holder to which the internal field lead connects. No reading indicates an open series field.

b. Ground Test—Disconnect yellow lead from relay control switch (fig. 35). Be sure steel case is not touching the housing. Then check between the yellow lead and field lamina with 250 Volts AC for one second. A high arcing condition when test prod is removed from field lamina indicates a grounded field.

Operating Wiper—Bench

CAUTION: Be sure to ground motor while performing following tests.

"Lo" Speed—Connect 12 Volt supply to center or No. 2 terminal (fig. 40) and ground housing. Connect jumper wires from terminals 1 and 3 to ground.

"Hi" Speed—Disconnect jumper wire from terminal No. 3 (fig. 40).

Stop—Disconnect jumper wires from terminals 1 and 3.
## WINDSHIELD WIPER

### Wiper Inoperative
- No power supply (12 V) at wiper
- Wiper ground strap loose or disconnected
- Defective dash switch
- Wiper unit latching mechanism **binding**
- Defective relay control
- Defective wiper motor

Check circuit from power source to wiper
Connect ground strap to washer retaining screw and check harness ground lead
See dash switch checking procedure
See wiper latching mechanism checking procedure
See relay control checking procedure
See wiper motor checking procedure

### Wiper Will Not Shut Off
- Wiper unit latching mechanism binding
- Relay control switch defective

Free up latching mechanism and lubricate as required
See relay control checking procedure

### Excessive Speed in "Hi" Speed Range But Operates Normal in "Lo" Speed
- Loose solder connection between motor black field lead and wiper terminal board
- Resistor on wiper terminal board open
- Motor shunt field open

Repair as required
Replace terminal board assembly
Check shunt field per motor checking procedure and replace as required

### Wiper Operates in "Lo" Speed Only
- Defective dash switch
- Red lead between dash switch and wiper terminal board grounded
- Wiper motor black lead internally grounded

See dash switch checking procedure
Check body wiring to locate grounded condition and repair as required
Disassemble wiper as required to locate and repair grounded condition

### Wiper operates in "Hi" speed only
- Dash switch defective.
- Red lead between dash switch and wiper unit open.

See dash switch checking procedure
Repair red lead as required