SECTION B

WINDSHIELD WIPER AND WASHER SYSTEM (45-46-48-49000 SERIES)

CONTENTS

DIVISION I
SPECIFICATIONS AND ADJUSTMENTS

10-8 SPECIFICATIONS

Data provided in the table below is based on 12-14 Volts D.C.

Crank Arm Rotation (all) . . . . . CCW

	Current Draw (Amps)	Crank Arm Speed (RPM's)
Bench Check (No Load)		
— Lo Speed	5.0 Max.	35 - 50
— Hi Speed	4.0 Max.	70 - 85
Wiper Installed in Car Operating Complete Wiper System. (Wet Windshield)		
— Lo Speed	5.5 Max.	30 - 44
— Hi Speed	4.5 Max.	60 - 75

LUBRICATION

Gear Mechanism	Delco Remy
Gear Shaft	Lubricant
Seal Cap (Inside)	
Armature Shaft	

DIVISION II
DESCRIPTION AND OPERATION

10-9 DESCRIPTION AND OPERATION

a. General Description

The two speed overlapping wiper system is standard on Series 45, 46, 48 and 49000 series cars. The two speed overlap wiper motor is equipped with a washer pump. See Figure 10-18. As shown, the motor leads that extend between the motor and the gear box are routed externally. The pump is bolted to the bottom of the wiper motor assembly and is driven by the motor. The pump is relay actuated by a switch on the instrument panel.

To operate the windshield washer, the wiper-washer switch must be

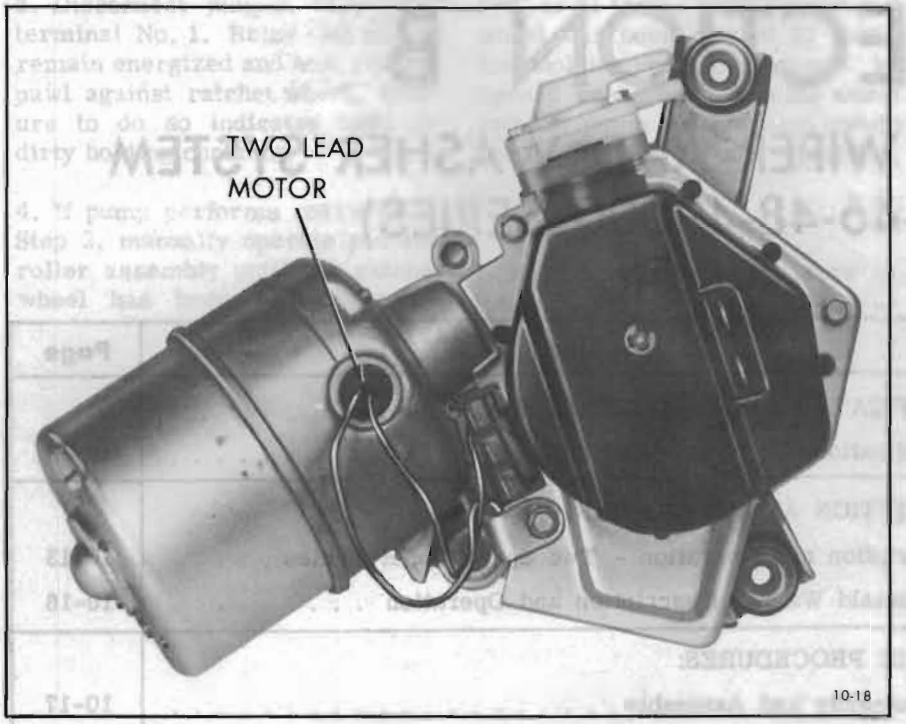

Figure 10-18—Windshield Wiper Motor - Two Speed

CAUTION: It is important that when the wiper arms of the overlap system are in the park position, the right arm must be positioned below the left arm. If the arms should be reversed the system will not operate because the left blade will lock into the right blade assembly. The reason for this is that the left wiper transmission has a mechanical advantage such that the speed of the wiper blade on the left arm is faster causing it to move away from the park position more rapidly. Should the blades become bound up for reasons mentioned above, the wiper should be turned off immediately. The blades can be freed only by removing the wiper arms from the wiper transmission or bending the blades to free them.

pushed in or forward. In so doing, the switch is mechanically moved to the slow speed position. After the washer has stopped, the switch must be manually moved to the off position to stop the wiper blades. The blades always return to the depressed park position when the switch is moved to off. If a faster wiper blade speed is desired, the knob should be down.

All motors are held to the upper cowl by three bolts. A water deflector is used on the motor shaft and is located under the motor drive crank and arm assembly.

Each wiper transmission is held to the upper cowl by three screws.

Although the transmission links may appear to be the same they are different, and right and left transmissions are not interchangeable.

The drive link and bell crank assembly which is located under the air intake grille attaches to the drive crank arm on the motor shaft on one end. The right and left housing and link assemblies attach to the bell crank.

b. Wiper Motor Operation

1. Wiper Off. In the off position,

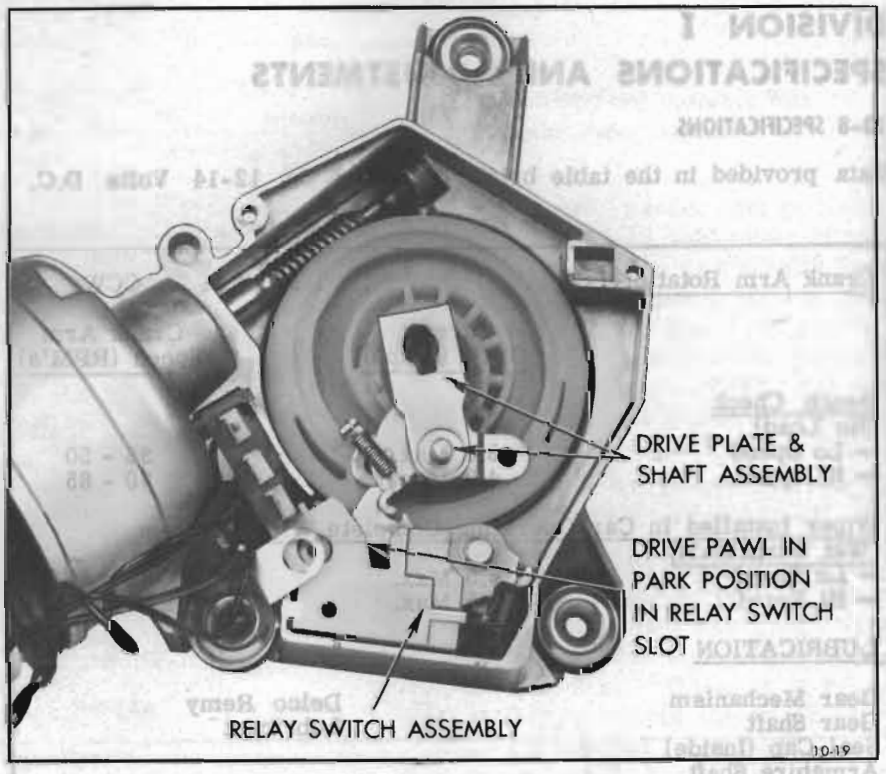

Figure 10-19—Wiper Mechanism Starting into Park

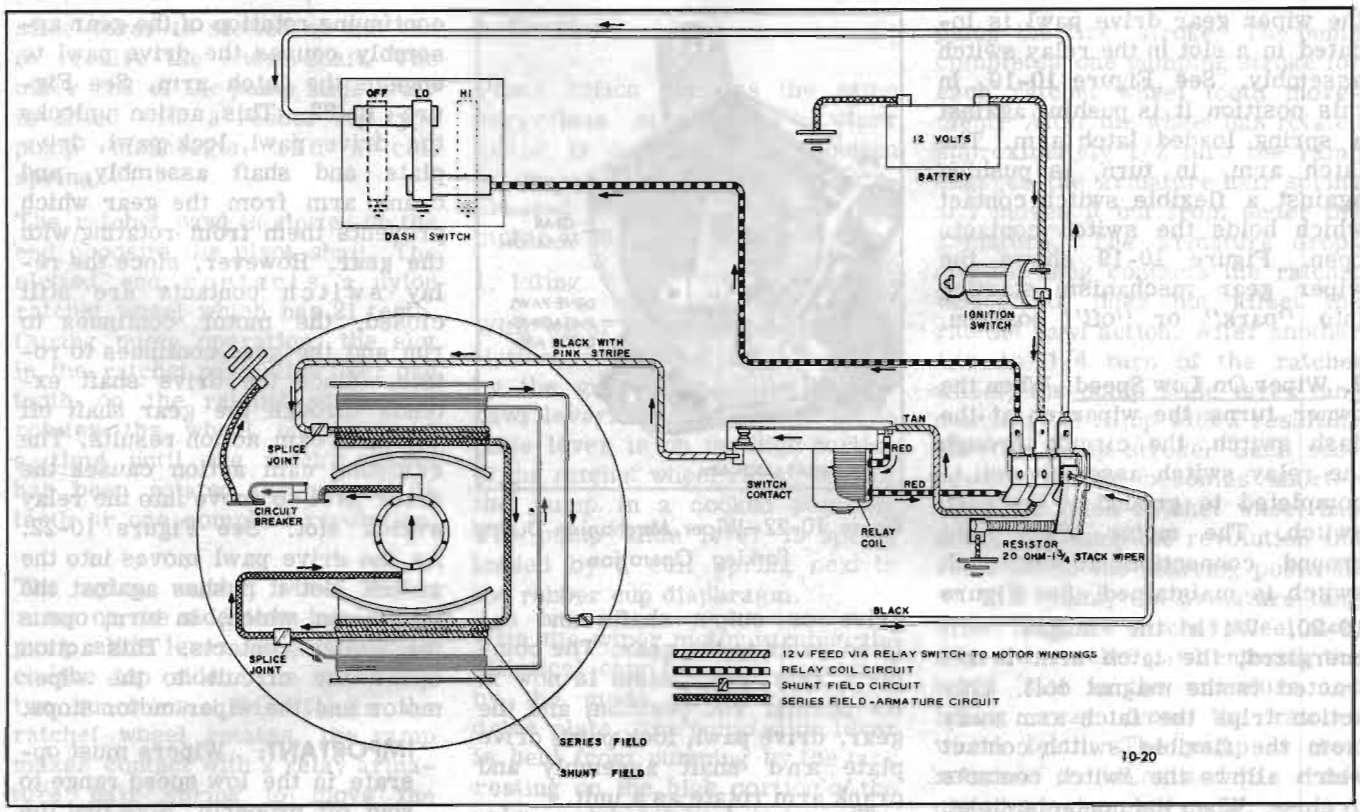

Figure 10-20—Wiring Diagram - Low Speed Operation

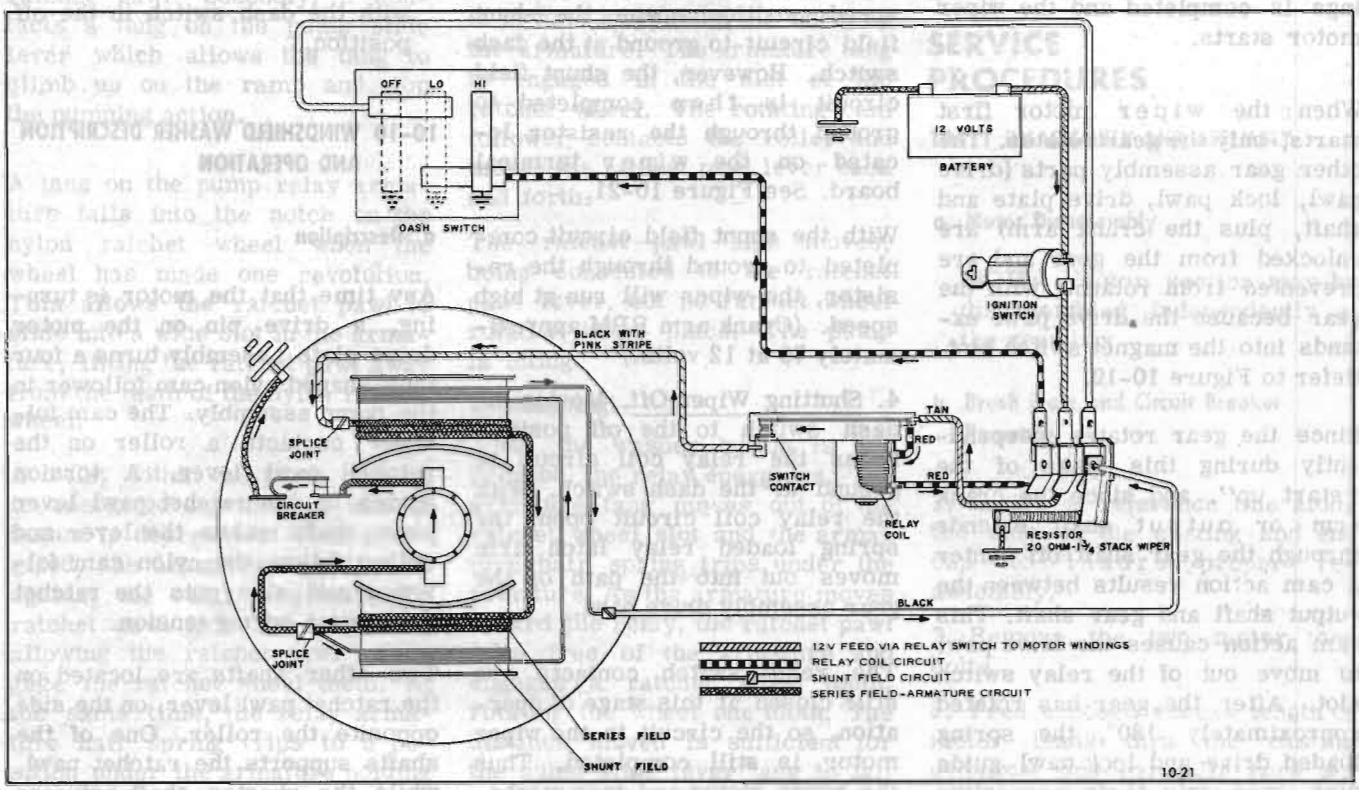

Figure 10-21—Wiring Diagram - High Speed Operation

the wiper gear drive pawl is located in a slot in the relay switch assembly. See Figure 10-19. In this position it is pushing against a spring loaded latch arm. The latch arm, in turn, is pushing against a flexible switch contact which holds the switch contacts open. Figure 10-19 shows the wiper gear mechanism starting into "park" or "off" position.

2. Wiper On Low Speed. When the owner turns the wiper on at the dash switch, the circuit through the relay switch assembly coil is completed to ground at the dash switch. The motor shunt field ground connection at the dash switch is maintained. See Figure 10-20. With the magnet coil energized, the latch arm is attracted to the magnet coil. This action trips the latch arm away from the flexible switch contact which allows the switch contacts to close. When the contacts close, the 12V feed (black with pink stripe) to the wiper motor windings is completed and the wiper motor starts.

When the wiper motor first starts, only the gear rotates. The other gear assembly parts (drive pawl, lock pawl, drive plate and shaft, plus the crank arm) are unlocked from the gear and are prevented from rotating with the gear because the drive pawl extends into the magnet switch slot. Refer to Figure 10-19.

Since the gear rotates independently during this stage of the "start up", and since the crank arm or output shaft extends through the gear shaft off center a cam action results between the output shaft and gear shaft. This cam action causes the drive pawl to move out of the relay switch slot. After the gear has rotated approximately 180°, the spring loaded drive and lock pawl guide pins snap into their respective pockets in the gear locking the drive or output shafts and related parts to the gear. The complete gear mechanism is now in its normal run position, and the gear, drive pawl, lock pawl, drive plate and shaft assembly and crank arm rotate as a unit.

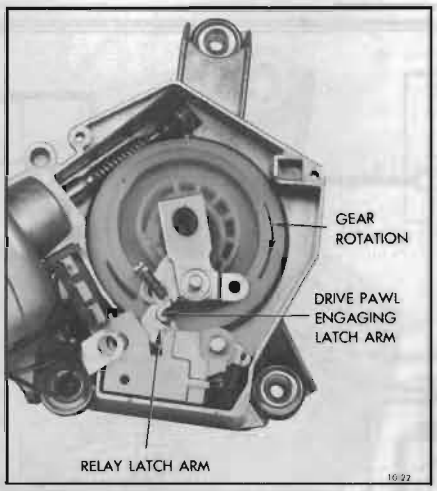

Figure 10-22—Wiper Mechanism During Parking Operation

3. Wiper On High Speed. Turning the wiper dash switch to the high speed position opens the shunt field circuit to ground at the dash switch. However, the shunt field circuit is then completed to ground through the resistor located on the wiper terminal board. See Figure 10-21.

With the shunt field circuit completed to ground through the resistor, the wiper will run at high speed. (Crank arm RPM approximately 70 at 12 volts.)

4. Shutting Wiper Off. Moving the dash switch to the off position opens the relay coil circuit to ground at the dash switch. With the relay coil circuit open, the spring loaded relay latch arm moves out into the path of the gear assembly drive pawl.

The relay switch contacts are still closed at this stage of operation, so the circuit to the wiper motor is still completed. Thus the wiper motor and gear mechanism continues to run. The continuing rotation of the gear assembly causes the drive pawl to engage the latch arm. See Figure 10-22. This action unlocks the drive pawl, lock pawl, drive plate and shaft assembly, and crank arm from the gear which prevents them from rotating with the gear. However, since the relay switch contacts are still closed, the motor continues to run and the gear continues to rotate. Since the drive shaft extends through the gear shaft off center a cam action results. The resulting cam action causes the drive pawl to move into the relay switch slot. See Figure 10-22. As the drive pawl moves into the switch slot it pushes against the latch arm which, in turn, opens the switch contacts. This action opens the circuit to the wiper motor and the wiper motor stops.

IMPORTANT: Wipers must operate in the low speed range to shut off properly. Note that the shunt field circuit is connected to ground at the dash switch with the dash switch in the off position.

10-10 WINDSHIELD WASHER DESCRIPTION AND OPERATION

a. Description

Any time that the motor is turning, a drive pin on the motor drive plate assembly turns a four lobe shaped nylon cam follower in the pump assembly. The cam follower contacts a roller on the ratchet pawl lever. A torsion spring on the ratchet pawl lever pivot shaft makes the lever and roller follow the nylon cam follower and also puts the ratchet pawl under spring tension.

Two other shafts are located on the ratchet pawl lever, on the side opposite the roller. One of the shafts supports the ratchet pawl, while the shorter shaft actuates the pump slide lever. The pump

slide lever is slotted at one end to receive the short shaft. The other end of the pump slide lever is fitted with a rubber cup type pump diaphragm and a coil spring.

The ratchet pawl is slotted on the end opposite the pivot shaft. The slotted end contacts a nylon ratchet wheel which has 21 teeth. During pump operation, the slot in the ratchet pawl slips over one tooth on the ratchet wheel and rotates the wheel one tooth at a time until the ratchet wheel has been rotated through all 21 teeth or one complete revolution.

The nylon ratchet wheel has a ramp on the side down toward the pump slide lever and also a notch on the top side. The ramp has two functions. First, as the ratchet wheel rotates, the ramp makes contact with a relay armature hair spring to move the spring from under the armature and allow it to drop toward the ratchet pawl. Secondly, it contacts a tang on the pump slide lever which allows the tang to climb up on the ramp and stop the pumping action.

A tang on the pump relay armature falls into the notch on the nylon ratchet wheel when the wheel has made one revolution. This allows the ratchet pawl to slide into a wide slot in the armature, lifting the ratchet pawl away from the teeth of the nylon ratchet wheel.

A relay within the pump housing is energized anytime the washer button is depressed. When energized, the armature is pulled up against the relay to release the ratchet pawl from the armature, allowing the ratchet pawl to engage the ratchet wheel teeth. At the same time, the relay armature hair spring trips to a position under the armature holding it away from the ratchet wheel and ratchet pawl.

b. Operation

Pump action remains the same regardless of whether wiper motor is on when washer button is depressed or if button is depressed to start washer and motor at the same time.

1. Idling.

With wiper motor turning, the elliptical cam follower is rotated by the guide pin on the ratchet pawl lever. The tang on the pump slide lever is on the high portion of the ratchet wheel ramp, leaving the pump in a cocked position. The pump slide lever is spring loaded by a coil spring next to the rubber cup diaphragm.

With the wiper motor turning, the elliptical cam follower is rotated by the guide pin of the motor drive plate. The pump slide lever is held from pumping by the tang resting on the high portion of the nylon ratchet wheel ramp. The ratchet pawl does not engage the teeth of the ratchet wheel because it is held away from the wheel by the armature. The armature tang is engaged in the slot of the ratchet wheel. The rotating cam follower contacts the roller and moves the ratchet pawl lever back and forth.

The ratchet pawl also moves, being connected to the ratchet pawl lever, but no ratchet wheel rotation takes place. The pump is idling.

2. Pumping.

When the washer button is depressed, the relay energizes. The armature tang moves out of the ratchet wheel slot and the armature hair spring trips under the armature. As the armature moves toward the relay, the ratchet pawl falls free of the armature and engages a ratchet wheel tooth, rotating the wheel one tooth. The distance moved is sufficient for the pump slide lever tang to fall off the ratchet wheel ramp and allow the spring loaded pump to pump the first stroke. The pump completes one pumping stroke for each ratchet wheel tooth movement. After the wheel has rotated approximately 1/2 turn the ramp engages the armature hair spring and moves it out from under the armature. The armature drops and the tang contacts the ratchet wheel but does not affect the ratchet pawl action. After another 1/8 to 1/4 turn of the ratchet wheel, the pump slide lever tang contacts the ramp with a resulting shorter pump stroke. Each succeeding stroke becomes shorter until the nylon ratchet wheel has made one complete revolution and returned to the starting position. At that point, the armature tang drops into the ratchet wheel slot, with the ratchet pawl entering the large slot in the armature and lifting away from the ratchet wheel teeth. The pump is then returned to idling and has completed one pumping cycle.

DIVISION III

SERVICE PROCEDURES

10-11 DISASSEMBLY AND ASSEMBLY

a. Motor Disassembly

NOTE: Motor section may be disassembled independently of the gear box.

b. Brush Plate and Circuit Breaker Removal

1. Scribe a reference line along the side of the casting and end cap to insure proper reassembly.

2. Remove the two motor thru bolts.

3. Feed exposed excess length of motor leads thru the casting grommet and carefully back the case and field assembly plus the armature away from the casting.

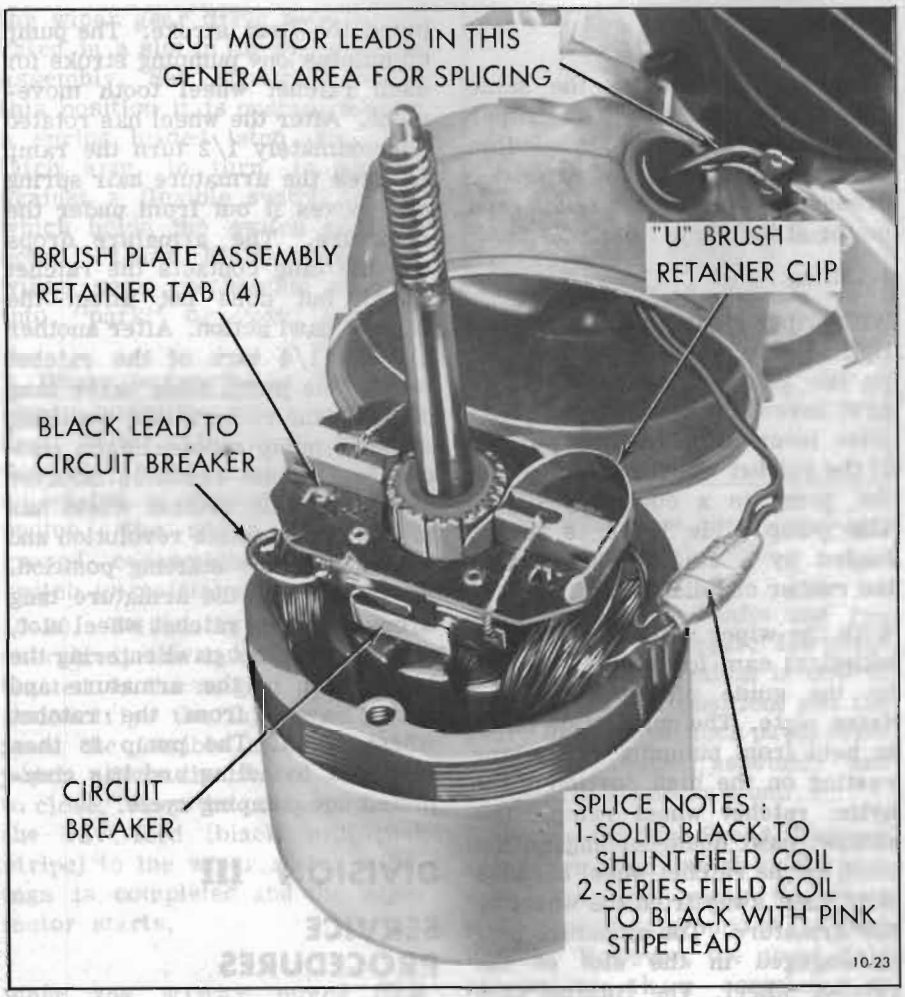

Figure 10-23—Motor Disassembly

NOTE: It may be necessary to remove the armature end play adjusting screw and insert a rod thru the opening in order to apply pressure against the end of the armature.

4. Unsolder the black lead from circuit breaker. See Figure 10-23.

5. Straighten out the 4 tabs that secure the brush plate to the field coil retainers (see Figure 10-23).

CAUTION: Be careful not to break any of the retainer tabs.

6. Install "U" shaped brush retainer clip over brush holder that has brush lead attached to circuit breaker. See Figure 10-23.

7. Holding the opposite brush from that retained in Step 6, carefully lift the brush holder off the mounting tabs far enough to clear the armature commutator.

8. Allow the brush, held in Step 7, to move out of its holder. Remove the brush spring and lift the brush holder off the armature shaft.

c. Armature Removal

1. Follow Steps 1 thru 8 under brush plate removal.

2. Lift armature out of case and field assembly.

3. Remove thrust ball from end of armature shaft as required and save for reassembly.

NOTE: Thrust ball may be easily removed with a magnet.

d. Case and Field Assy. Removal

1. Remove brush plate and armature.

2. The end case and field assembly is serviced as a unit. To free the field and case assembly, cut the solid black and black with pink stripe leads in a location convenient for splicing - preferably near the wiper terminal board. Refer to Figure 10-23.

3. Remove steel thrust plate and rubber disc from case bearing as required.

e. Motor Re-Assembly

1. If new field and case assembly is being installed, splice the black and black with pink stripe leads of the new field with the corresponding leads of the wiper.

2. Install the rubber thrust disc, steel thrust disc and felt lubricating washer in the case assembly bearing in the order indicated.

3. Lubricate end of armature shaft that fits in case bearing with recommended type grease. Next, install thrust ball in end of shaft.

Figure 10-24—Assembling Armature

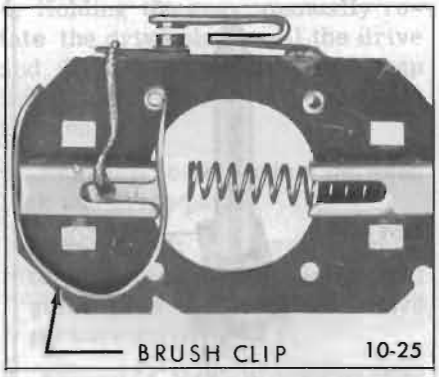

Figure 10-25—Partially Assembled Brush Plate

4. Assemble armature in the case and field assembly. See Figure 10-24.

5. Position the partially assembled brush plate, Figure 10-25, over the armature shaft far enough to allow re-assembly of the remaining brush in its brush holder; then position the brush plate assembly on the mounting tabs in the position shown in Figure 10-25.

NOTE: Circuit breaker ground lead will not reach circuit breaker terminal if brush plate is positioned wrong.

6. Center the brush plate mounting holes over the mounting tabs and bend the tabs toward the brush holders as required to secure the brush plate in position.

CAUTION: Be sure tabs are centered in brush plate mounting holes.

7. Remove brush retainer clips and resolder circuit breaker ground lead to circuit breaker. Refer to Figure 10-23.

8. If new case and field assembly is used, scribe a line on it in the same location as the one scribed on the old case. This will insure proper alignment of the new case with the scribed line made on the housing (Step 1 under Brush Plate Removal).

9. Position armature worm shaft inside the housing and, using the scribed reference marks, line up as near as possible the case and field assembly with the housing.

10. 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. At the same time carefully pull the excess black and black with pink stripe leads thru the housing grommet.

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

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

12. Secure the case to the housing with the two tie bolts.

f. Assembly of Washer Pump to Wiper

1. Disregard position of 4 lobe cam and secure washer pump to wiper housing.

CAUTION: Be sure ground strap is connected to wiper housing.

2. To engage washer pump cam slot with gear assembly drive pin, operate wiper in "LO" speed, then turn wiper off.

NOTE: It may be necessary to repeat this step if pump cam doesn't engage the first time. When pump cam is properly engaged, the loud pump noise disappears.

g. Removal of Relay Switch and Terminal Board

1. Remove gear box cover and/or washer pump.

2. If wiper gear drive pawl is in full park position remove gear assembly.

Figure 10-26—Removing Relay Switch Assembly

If wiper gear mechanism is away from park position (drive pawl away from latch arm (Figure 10-26), proceed to Step 3.

3. Remove relay-switch attaching screw and carefully lift the relay-switch assembly out of the

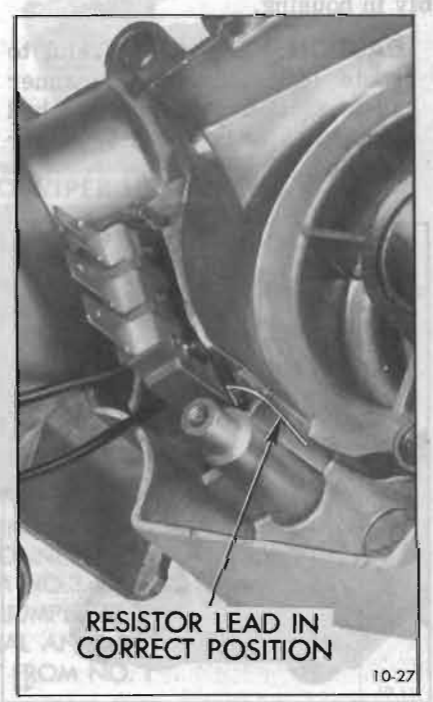

Figure 10-27—Installing Terminal Board

gear box. Unsolder leads from switch terminals as required.

4. To remove terminal board assembly simply slide it out of housing and unsolder leads as required.

h. Installation of Relay Switch and Terminal Board

1. Resolder red coil lead to wiper terminal board as required.

2. Slide terminal board into wiper housing being careful to position the terminal board resistor lead as shown in Figure 10-27.

NOTE: With the relay-switch assembly replaced in the housing and washer pump or gear box cover reinstalled, the relay-switch plastic housing applies pressure against the resistor lead to form a positive ground connection to the wiper housing.

3. Resolder leads to relay-switch assembly as required.

4. Position relay-switch assembly in housing.

CAUTION: Be very careful to route leads in such a manner as to avoid having them pinched between relay and wiper housing.

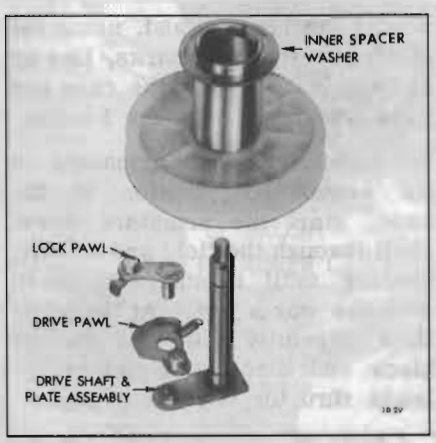

Figure 10-29—Disassembling Gear Assembly

5. Install relay-switch mounting screw. See Figure 10-26.

6. Assemble gear box cover and/or washer pump to wiper being careful that the ground strap is properly connected.

i. Disassembly of Drive Gear Mechanism

1. Remove crank arm retaining nut, crank arm, rubber seal cap, retaining ring, shim washers, shield and spacer washer in the order indicated.

2. Slide gear assembly out of housing. See Figure 10-28.

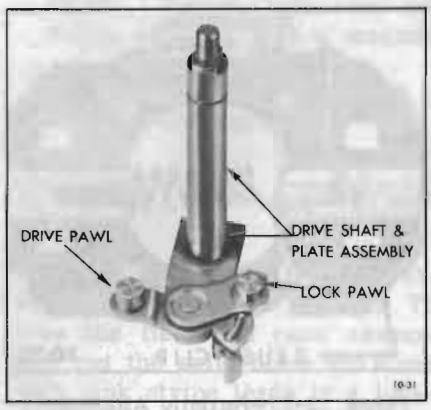

Figure 10-31—Assembling Lock Pawl Over Drive Pawl

3. Slide drive plate and shaft out of gear and remove the drive pawl, lock pawl and coil spring as required. See Figure 10-29.

j. Assembly of Drive Gear Mechanism

1. Position drive pawl on drive plate as shown in Figure 10-30.

2. Assemble lock pawl over pawl as shown in Figure 10-31.

3. Slide gear and tube over the drive shaft. See Figure 10-32. (Move drive and lock pawls as required to allow their respective pins to fit in the gear guide channel.)

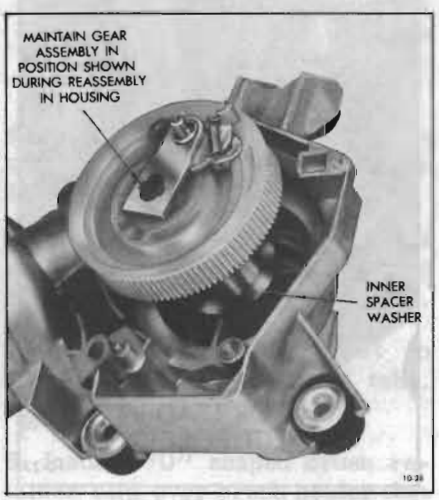

Figure 10-28—Removing or Installing Gear Assembly

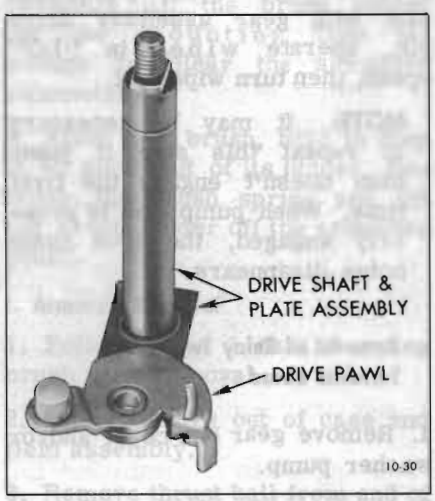

Figure 10-30—Assembling Drive Pawl on Drive Plate

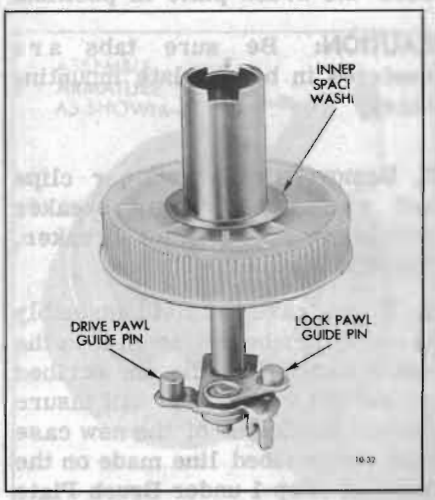

Figure 10-32—Assembling Gear Over Drive Shaft

4. Holding the gear, manually rotate the drive plate until the drive and lock pawl guide pins snap into their respective pockets in the gear.

5. Reinstall coil spring between lock and drive pawls.

IMPORTANT: Be very careful to maintain lock and drive pawl guide pins in their respective pockets during Step 6.

6. Assemble inner spacer washer over gear shaft and assemble gear mechanism in housing so that it is positioned with respect to the housing in the approximate location shown in Figure 10-28.

7. Reassemble the outer spacer washer, shield, shim washers as required to obtain .005" maximum end-play, snap ring and rubber seal cap in the order indicated.

8. Operate wiper to "park" or "off" position and install crank arm in the approximate position shown in Figure 10-28.

9. Reassemble washer pump to wiper.

k. Adjusting Armature End-Play

1. Loosen adjusting screw locknut and tighten or loosen the adjusting screw as required until end of screw barely touches end of armature.

2. Back off set screw 1/4 turn and tighten locknut.

l. Adjusting Gear Assembly End-Play

1. Add or remove end-play washers as required to obtain .006" minimum end-play.

10-12 WINDSHIELD WASHER DISASSEMBLY AND ASSEMBLY

a. Removal and Replacement of Relay and Terminal Board

1. Remove washer pump cover.

2. Rotate nylon rotor cam to free ratchet arm from relay armature and lift out relay coil assembly.

CAUTION: Whenever it is necessary to solder connection on either the wiper or the pump, rosin core solder should be used. Do not use acid core solder.

3. To reinstall, hold relay armature in against the coil pole and position the relay mounting stud in the slot provided in the pump body casting.

4. Install spring clip on relay mounting stud.

5. Assemble terminal insulator over terminals and position terminal board.

6. Manually rotate washer pump through a complete cycle to check if pump is operating properly.

b. Removal and Replacement of Valve Assembly

1. Remove four screws attaching valve to pump body.

2. Carefully remove valve assembly.

3. To install reverse removal procedure.

NOTE: Be certain that bellows is positioned properly when valve assembly is installed.

c. Removal and Replacement of Bellows

1. Remove valve assembly.

2. To release bellows unit from pump plunger, hold end of pump slide lever, push in against bottom of bellows and turn bellows approximately 1/4 turn.

3. To install, reverse removal procedure.

DIVISION IV TROUBLE DIAGNOSIS

10-13 TROUBLE-SHOOTING AND TESTING

Trouble-shooting and testing is divided into two sections. The

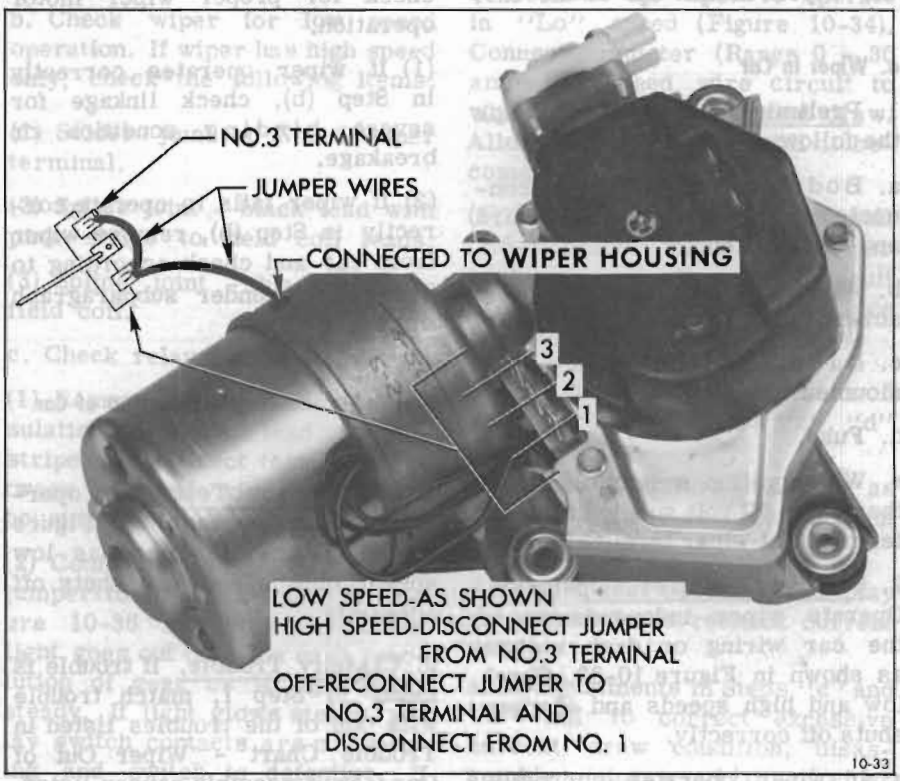

Figure 10-33—Connections to Operate Wiper Independently of Dash Switch

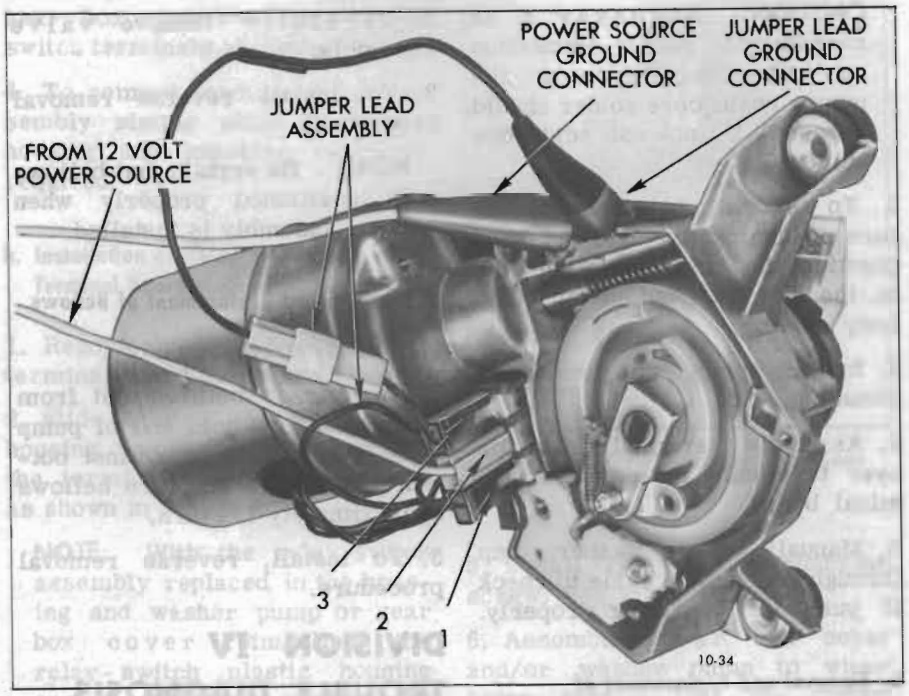

Figure 10-34—Connections to Operate Wiper Out of Car

first section covers testing with the wiper motor in the car; the second section covers testing with the wiper motor out of the car.

a. Wiper in Car

1. Preliminary Inspection. Check the following items:

a. Body wiring properly connected to wiper terminal board and dash switch.

b. Wiper to fire wall mounting screw tight.

c. Dash switch securely mounted.

d. Fuse.

e. With ignition switch turned on there is a 12 volt supply at center terminal of wiper terminal board.

2. Checking Wiper Operation. Operate wiper independently of the car wiring or dash switch, as shown in Figure 10-33. Check low and high speeds and if wiper shuts off correctly.

a. If wiper operates correctly, see "Trouble Chart - Wiper in Car".

b. If wiper still fails to operate correctly, disconnect wiper linkage from wiper motor and recheck for proper wiper motor operation.

(1) If wiper operates correctly in Step (b), check linkage for severe binding condition or breakage.

(2) If wiper fails to operate correctly in Step (b), remove wiper from car and check according to instructions under subparagraph "b".

b. Trouble Shooting—Wiper Out of Car

1. Preliminary Test. Try operating wiper as shown in Figure 10-34. Check if wiper has low speed, high speed, and shuts off correctly.

2. Classify Trouble. If trouble is found in Step 1, match trouble with one of the troubles listed in Trouble Chart - Wiper Out of Car. Note possible causes listed, then turn to checking procedure for this trouble.

3. Procedure A
(Wiper Inoperative)

a. Remove wiper gear box cover or washer pump to gain access to relay-switch assembly.

b. Connect 12V power source to wiper - hot side to center terminal, ground side to gear housing. See Figure 10-35. Do not connect jumper to Terminal 1 and 3.

c. To determine if wiper circuit breaker is operating properly, connect test light to relay switch terminal as shown in Figure 10-35.

(1) Test Lamp Lights. Circuit from Terminal No. 2 through circuit breaker to relay - switch O.K.

(2) Test Lamp Doesn't Light. Circuit breaker or solder connections at circuit breakers defective.

d. To determine if relay coil is open connect test lamp to wiper Terminal No. 1, Figure 10-35.

If lamp doesn't light, coil is open or solder connection to No. 1 Terminal is defective.

e. Test relay switch as follows: If gear mechanism is in full park position, use a small screwdriver in the switch slot and push latch arm down toward relay coil. See

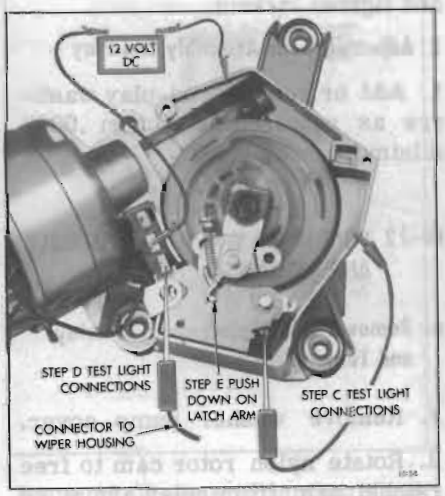

Figure 10-35—Test Light Checks

Figure 10-35. Next, remove a small amount of insulation from black lead with pink tracer and touch test lamp to exposed wire.

(1) Test lamp lights but motor doesn't run - proceed to Step (f).

(2) Test lamp doesn't light - relay-switch defective

NOTE: Cover exposed wire with tape after the test.

f. Disassemble motor section and check the following:

(1) Hung brush.

(2) Solder connections at brush holders.

(3) Splice joints at field coil connections to leads.

(4) Open armature.

(5) Series field ground connection on field lamina.

4. Procedure B (Wiper will not shut off - Crank arm rotates thru 360°)

a. Observe if relay latch arm spring is connected properly. See Figure 10-36.

b. Manually operate latch arm to check it for possible binding condition.

c. If items in "a" and "b" check out, connect power source to wiper and connect jumper wire from Terminal No. 3 to wiper housing, Figure 10-36. Do not make any connections from Terminal No. 1. Manually actuate latch arm in direction of arrow and observe if it remains in energized position (inside plastic switch housing out of patch of gear drive pawl). If it remains in energized position, check for grounded red leads from coil to Terminal No. 1. If red lead is not grounded, coil is probably grounded internally and relay switch should be replaced.

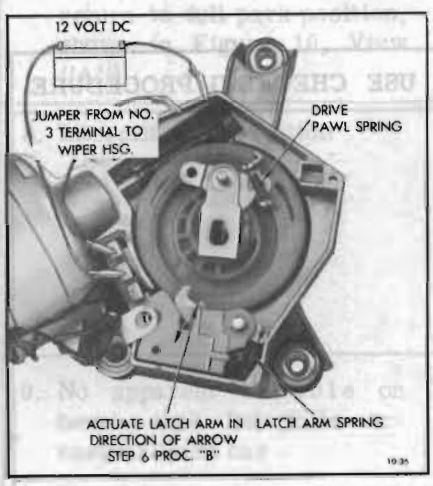

Figure 10-36—Checking Operation of Relay and Latch Arm

5. Procedure C (Wiper will not shut off - Recycles)

NOTE: Crank arm oscillates in a somewhat horizontal plane and is accompanied by a loud knock with each revolution of the gear.

a. Check that drive pawl and relay latch arm springs are properly connected as shown in Figure 10-36.

b. Check wiper for low speed operation. If wiper has high speed only, check the following items:

(1) Solder joint at No. 3 wiper terminal.

(2) Splice joint - black lead with pink stripe to field coil leads.

(3) Splice joint - black lead to field coil.

c. Check relay switch as follows:

(1) Remove small amount of insulation from black lead with pink stripe and connect test light between exposed wire and wiper housing.

(2) Connect power source and jumper to wiper as shown in Figure 10-36 and observe if test light goes out once for each revolution of gear or if light glows steady. If light glows steady, relay switch contacts are not opening and switch is defective. If light goes out each time drive pawl moves into relay switch slot relay switch is functioning correctly.

6. Procedure D (Wiper has one speed-"slow")

a. Check for grounded condition in the internal black lead that connects to wiper terminal No. 3. Refer to Figure 10-36 for Terminal No. 3 location.

b. Disassemble motor section of wiper and check for grounded field coil.

7. Procedure E (Wiper has excessive speed in "HI" but "LO" is normal)

(Crank Arm RPM exceeds 70 at 12 Volts.)

a. Check for open resistor and the resistor ground connection. (Motor uses 20 ohm resistor.)

8. Procedure F (Intermittent Operation)

a. Check solder connections at wiper terminal board.

b. Connect up wiper to operate in "Lo" speed (Figure 10-34). Connect ammeter (Range 0 - 30 amps.) in feed wire circuit to wiper and observe current draw. Allow motor to run until it becomes hot.

(1) If current draw is normal (3.5-5 amps. max.) and wiper cycles on and off, a weak circuit breaker is indicated. Replace case and brush assembly.

(2) If current draw exceeds 5 amps. proceed to Steps "c", "d" and "e".

c. Adjust armature end-play as required and recheck current draw.

d. Adjust gear assembly end-play as required and recheck current draw.

e. If adjustments in Steps "c" and "d" fail to correct excessive current draw condition, disassemble motor section of wiper and check armature on growler for shorted or grounded condition.

TROUBLE CHART—WIPER IN CAR

If wiper operated correctly independently of dash switch and car wiring, but original trouble was:	Check the Following Items:
1. Wiper Inoperative	a. Open lead wire from wiper terminal #1 to dash switch. b. Dash switch not securely mounted. c. Dash switch defective.
2. Will not Shut Off (Blades make full wipe stroke.	a. Ground condition in lead from wiper terminal #1 to dash switch. b. Check for corroded wiper terminals. Clean terminals and spread a thin coat of waterproof grease over board. c. Defective dash switch.
3. Will not Shut Off (Blades move up and down about 15° from lower windshield molding)	a. Open in lead wire from wiper terminal #3 to dash switch. b. Dash switch mounting loose. c. Dash switch defective.
4. Has one Speed "Fast"	a. Lead wire from wiper terminal #3 to dash switch open. b. Dash switch defective.
5. Has one Speed "Slow"	a. Grounded condition in lead from wiper terminal #3 to dash switch. b. Defective dash switch.
6. Intermittent Operation	a. Check for loose dash switch mounting.

TROUBLE CHART—WIPER OUT OF CAR

TROUBLE	POSSIBLE CAUSES	USE CHECKING PROCEDURE
1. Wiper Inoperative (Motor doesn't run)	1. Open relay coil 2. Circuit breaker open 3. Open armature 4. Motor series field open 5. Brushes sticking 6. Defective solder joints-relay switch 7. Binding condition - relay latch arm	A

TROUBLE CHART—WIPER OUT OF CAR

TROUBLE	POSSIBLE CAUSES	USE CHECKING PROCEDURE
2. Wiper will not shut off (Crank arm rotates thru 360°)	1. Relay coil-grounded 2. Relay latch spring disconnected or broken 3. Latch arm binding	B
3. Wiper will not shut off (Crank arm moves back-forth in a horizontal plane accompanied by a loud "Klunk"	1. Relay switch contacts shorting together 2. Drive pawl spring disconnected 3. Wiper has one speed fast caused by open shunt field	C
4. Wiper has one speed "Fast" (This usually results in typical trouble "3")	1. Shunt field open 2. Defective soldering at terminal No. 3 on wiper terminal board.	C
5. Wiper has one speed "Slow"	1. Shunt field internally grounded 2. Shunt field lead to terminal board (black) grounded 3. Shorted armature	D
6. Wiper has excessive speed in "Hi"; "Lo" speed normal	1. Open speed resistor 2. Poor resistor ground connection	E
7. Wiper stops at random (Crank arm stops rotating immediately and does not return to full park position, shown in Figure 19, View "A")	1. Relay switch contacts dirty or broken	Replace Relay Switch Assembly
8. Intermittent Operation	1. Defective circuit breaker (weak) 2. Circuit breaker tripping because of shorted armature and/or fields causing motor to draw excessive current	F
9. No apparent trouble on bench test but fails occasionally on car	1. Armature end play tight 2. Gear assembly end play tight 3. Loose solder or weld joints	See adjustments Section

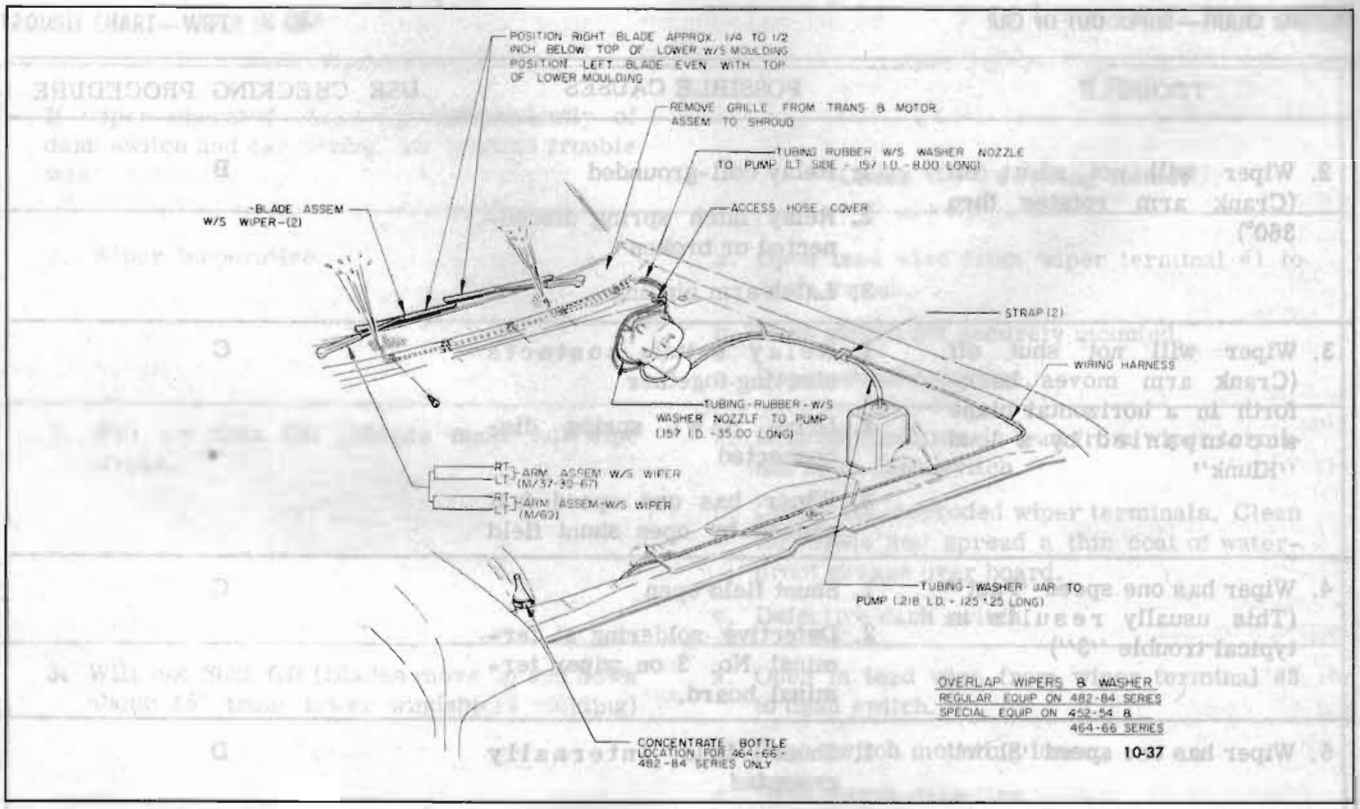

Figure 10-37—Wiper Arm Installation - 45-46-48000 Series

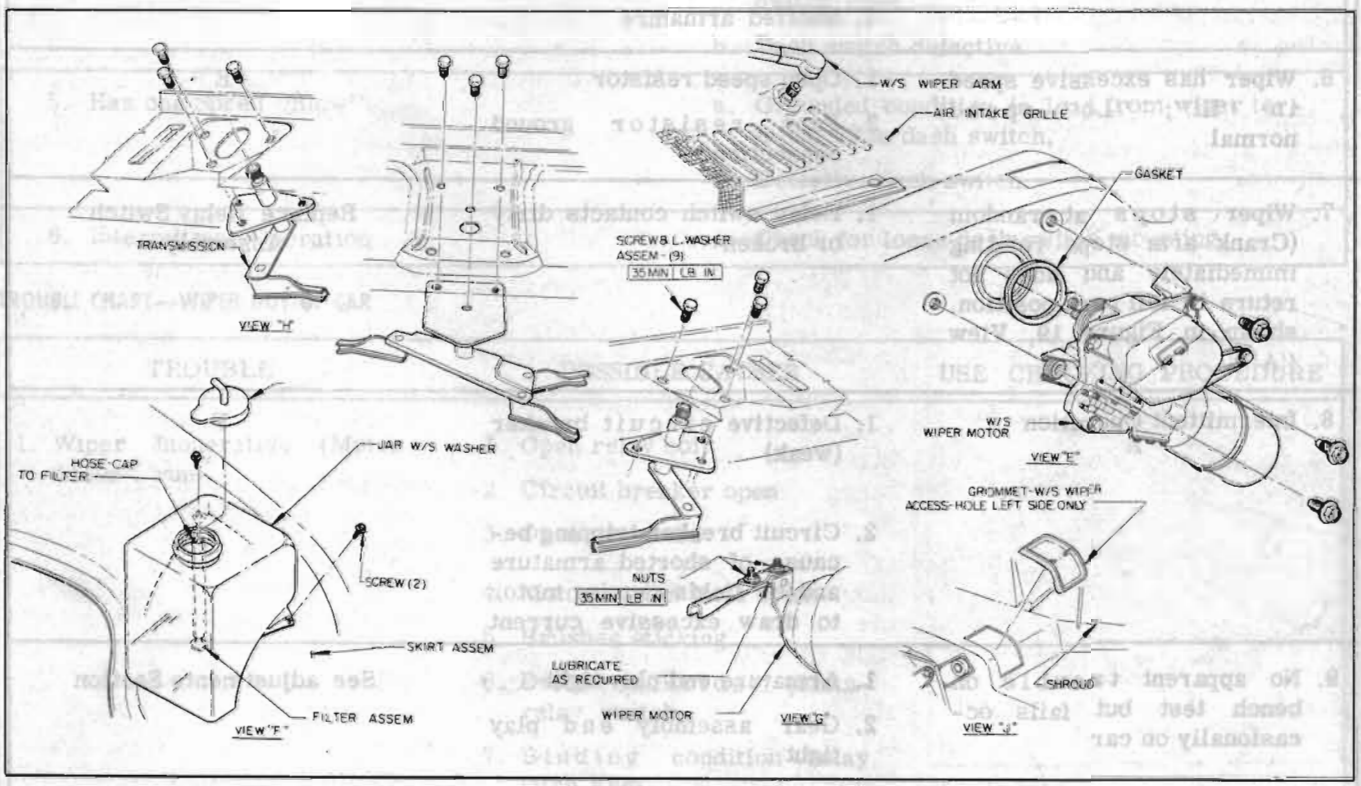

Figure 10-38—Wiper Motor and Washer Jar Installation - 45-46-48000 Series

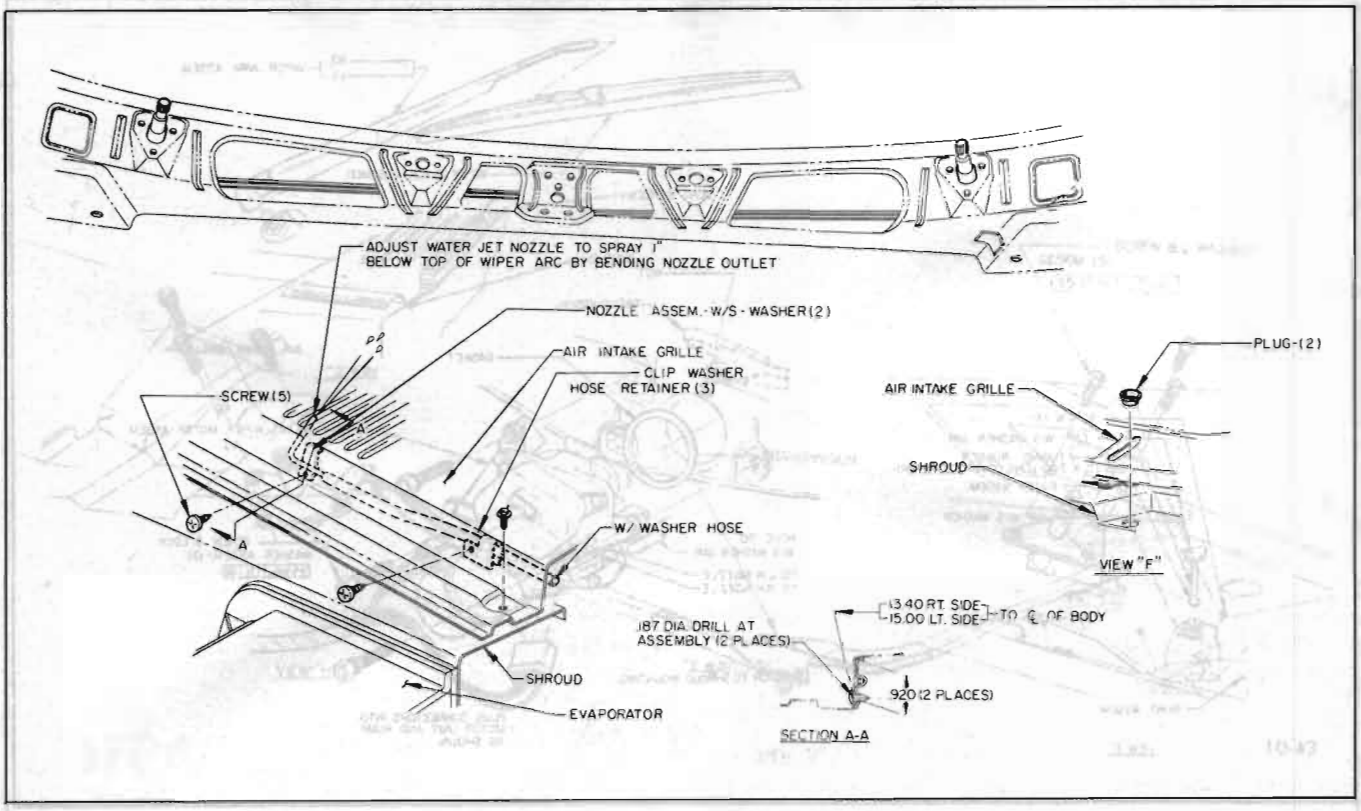

Figure 10-39—Washer Nozzle Aiming - 45-46-48000 Series

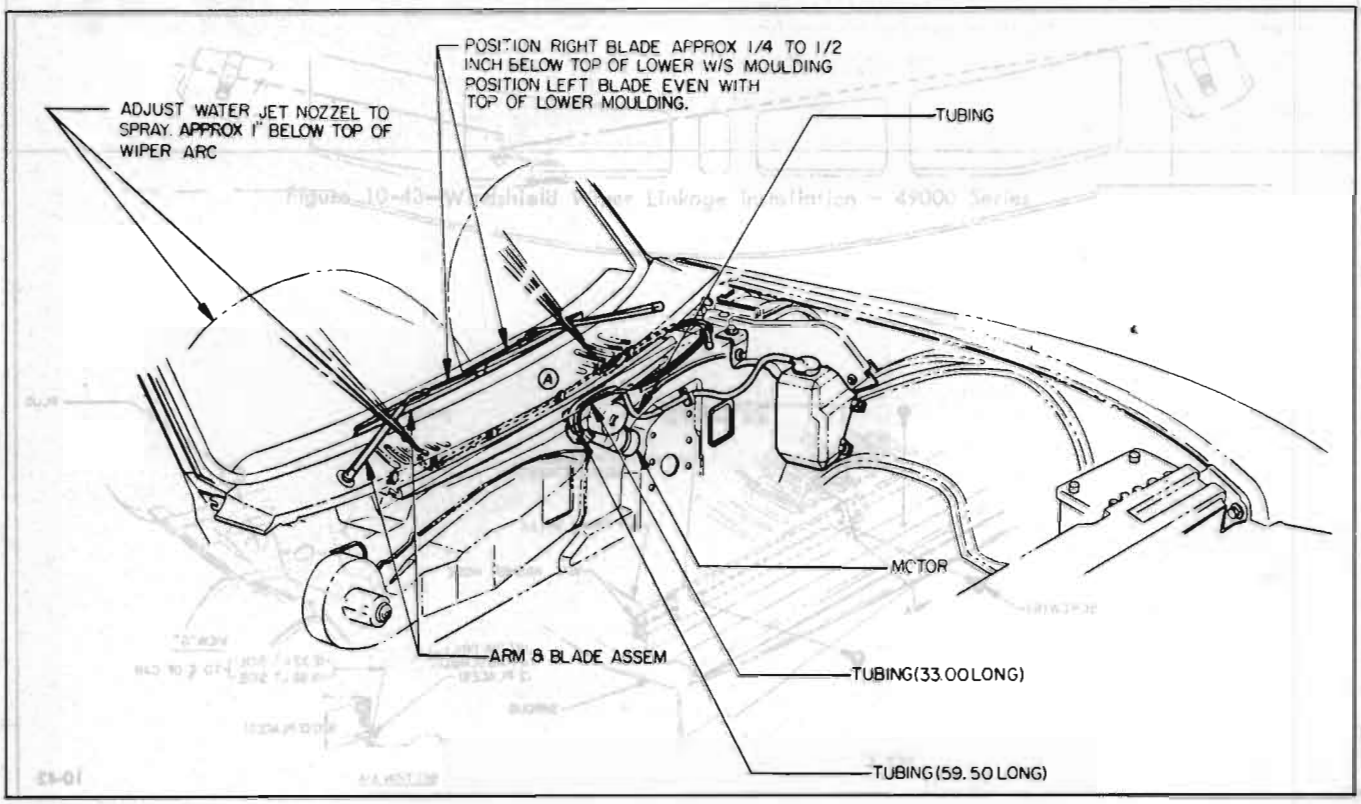

Figure 10-40—Windshield Wiper and Washer Installation - 49000 Series

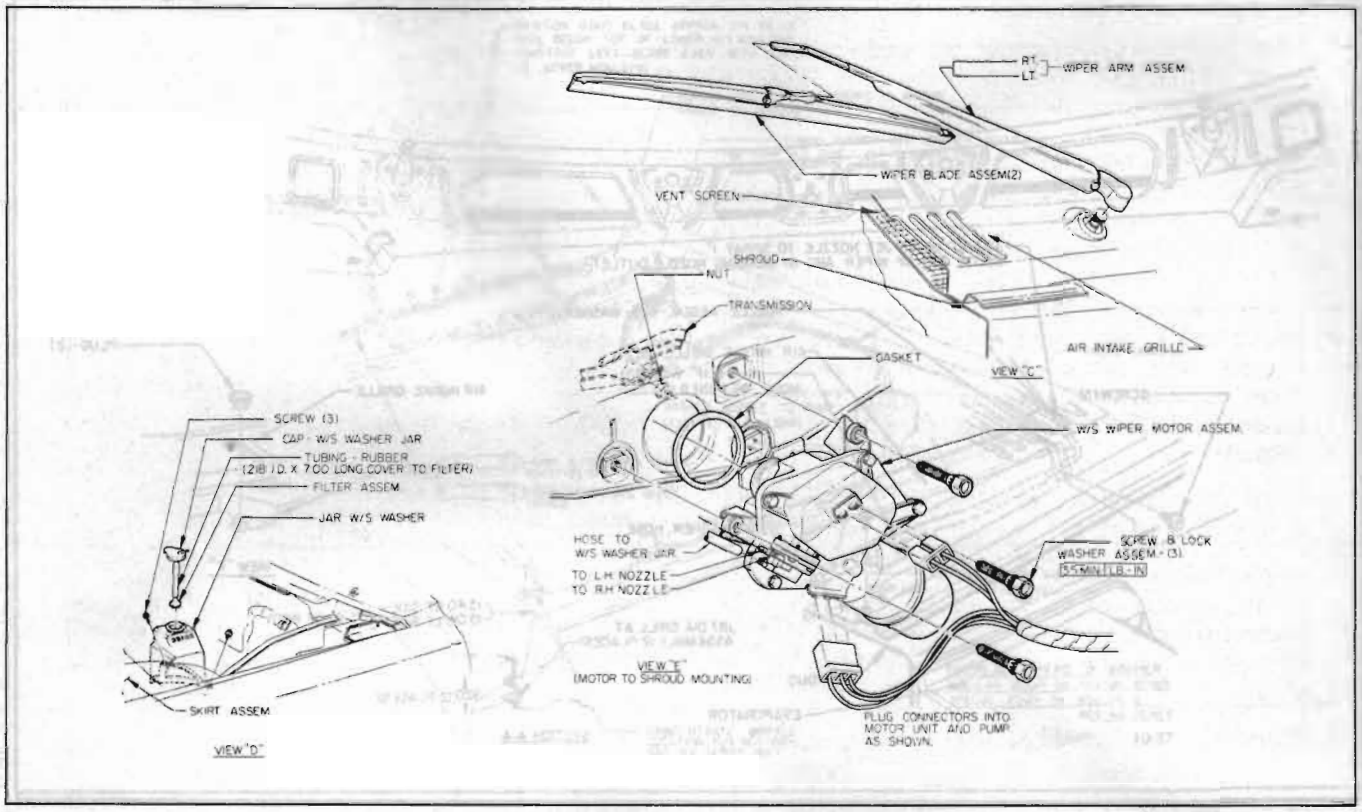

Figure 10-41—Windshield Wiper Motor Installation - 49000 Series

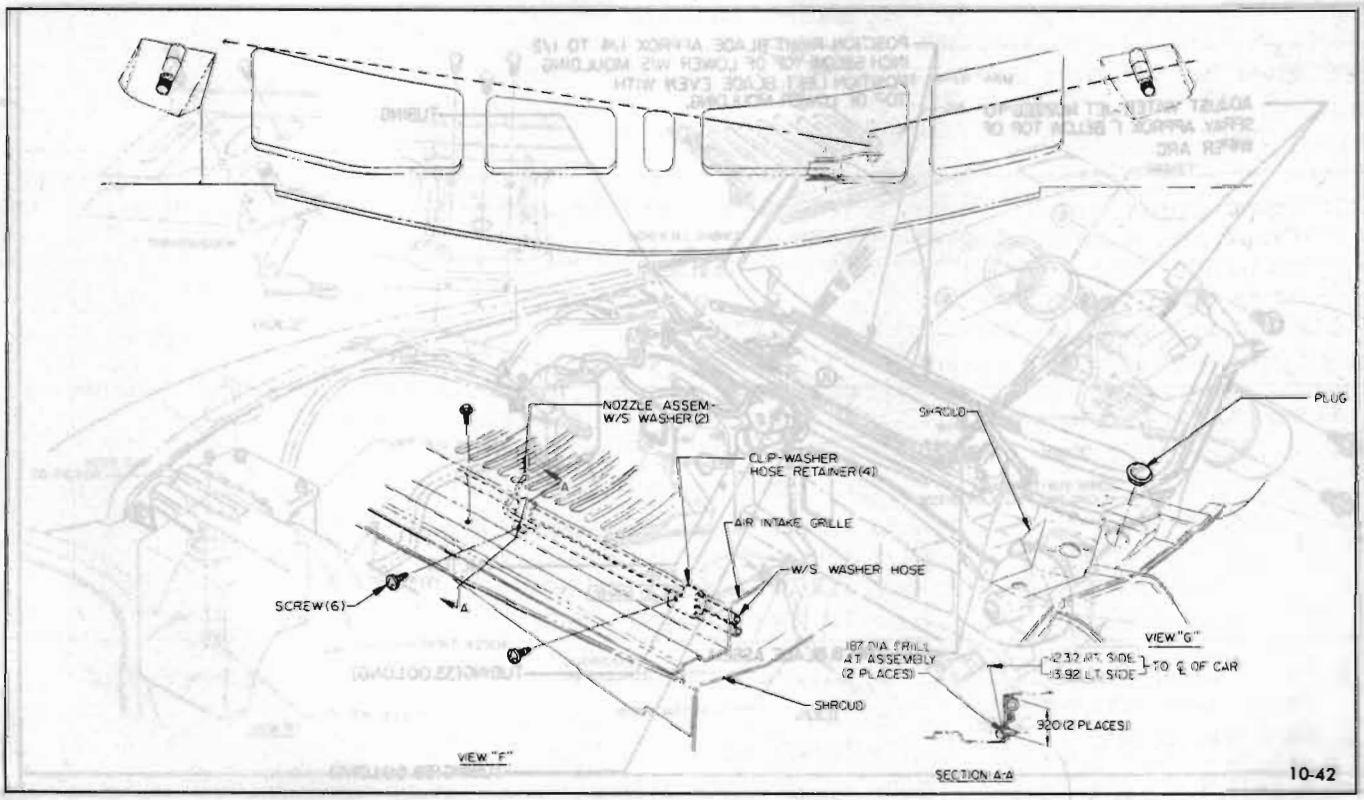

Figure 10-42—Windshield Wiper Linkage and Washer Nozzle Mounting - 49000 Series

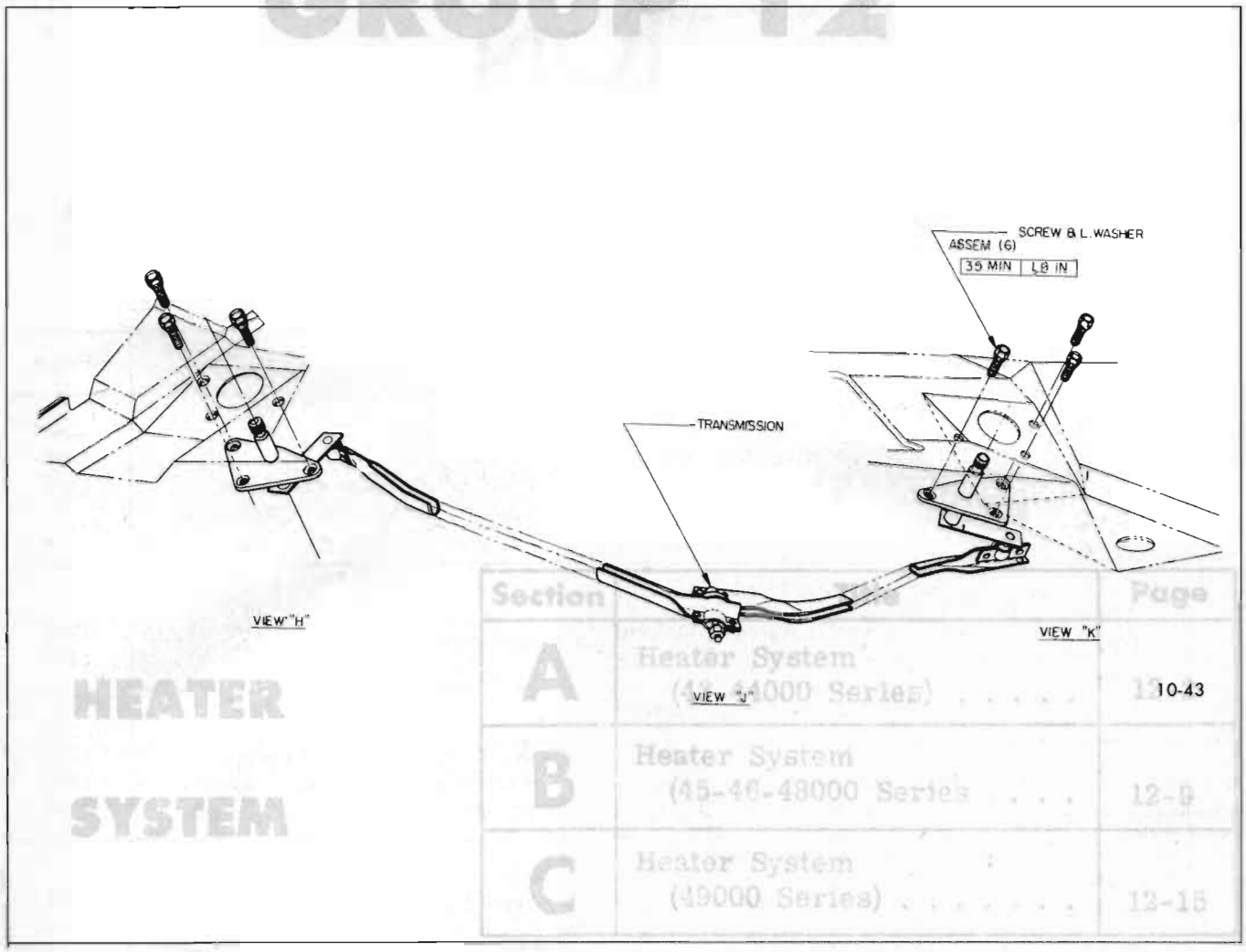

Figure 10-43—Windshield Wiper Linkage Installation - 49000 Series