

SECTION B

WINDSHIELD WIPER AND WASHER SYSTEM (Depressed Park)

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DIVISION I SPECIFICATIONS AND ADJUSTMENTS

10-11 SPECIFICATIONS

a. Tightening Specifications

Part	Location	Torque Lb. In.
Screw	Washer Pump Mounting.....	18
Screw	Relay (Park Switch).....	30
Bolt	Motor Tie	30
Nut	Crank Arm	65
Nut	Armature Adjusting Screw Jam.....	55

b. General Specifications

Operating Volts	12 VDC
Gear Ratio	
43-44000 Series	45:1
45-46-48-49000 Series	51:1
Crank Arm Rotation (Looking at Crank Arm)	CCW
Crank Arm Speed: (RPMs, No Load)	
Lo	35-50
Current Draw: (Amps)	
No Load (Lo Speed).....	5.0 Max.
Stall { 43-44000	19 Max.
45, 46, 48 and 49000	26 Max.
Shunt Field Resistor.....	20 OHMS
Lubricant	High Melting Point, Water Proof, Medium Grade

DIVISION II

DESCRIPTION AND OPERATION

10-12 DESCRIPTION AND OPERATION OF WIPER MOTOR

a. General Description

The two speed, tandem-articulating (left side only) wiper system is optional on 43000 Series and standard on 44-45-46-48-49000 Series. The wiper motor is a round shaped compound wound motor (series and shunt field). See Figure 10-31. Although the wiper motor for the 43-44000 Series appears to be the same as used on the 45-46-48-49000 Series, they are sufficiently different that they should not be interchanged. See Figure 10-31 for identification of wiper motors. See Figure 10-32 for wiring diagrams of the two circuits.

b. Operation

An explanation of "LO", "HI" and parking circuits follows:

1. Lo-Speed Circuit

When the wiper switch on the instrument panel is moved to the Low speed position (ignition switch on), the circuit through the coil in the relay switch assembly is completed to ground through the instrument panel switch. The shunt field ground connection through the instrument panel switch is maintained. See Figure 10-33.

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 relay switch slot.

Since the gear rotates independently during this stage of the "start up", and since the 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 shaft and related parts to the gear. The complete gear mechanism is now in its normal run position. The gear, drive pawl, lock pawl, drive plate and shaft assembly and crank arm now rotate as a unit.

2. Hi-Speed Circuit

Moving the instrument panel switch to the High speed position opens the shunt field circuit to ground through the instrument panel switch. However, the shunt field circuit is then completed to ground through the resistor located on the wiper terminal board. See Figure 10-34.

With the shunt field circuit completed to ground through the resistor, the wiper will run at high speed.

3. Parking Circuit

Moving the switch to the off position opens the relay switch coil circuit to ground through the instrument panel switch. With the relay switch coil circuit open, the spring loaded relay latch arm moves out into the path of the drive pawl. See Figure 10-35.

The relay switch contacts are still closed at this stage of operation, so

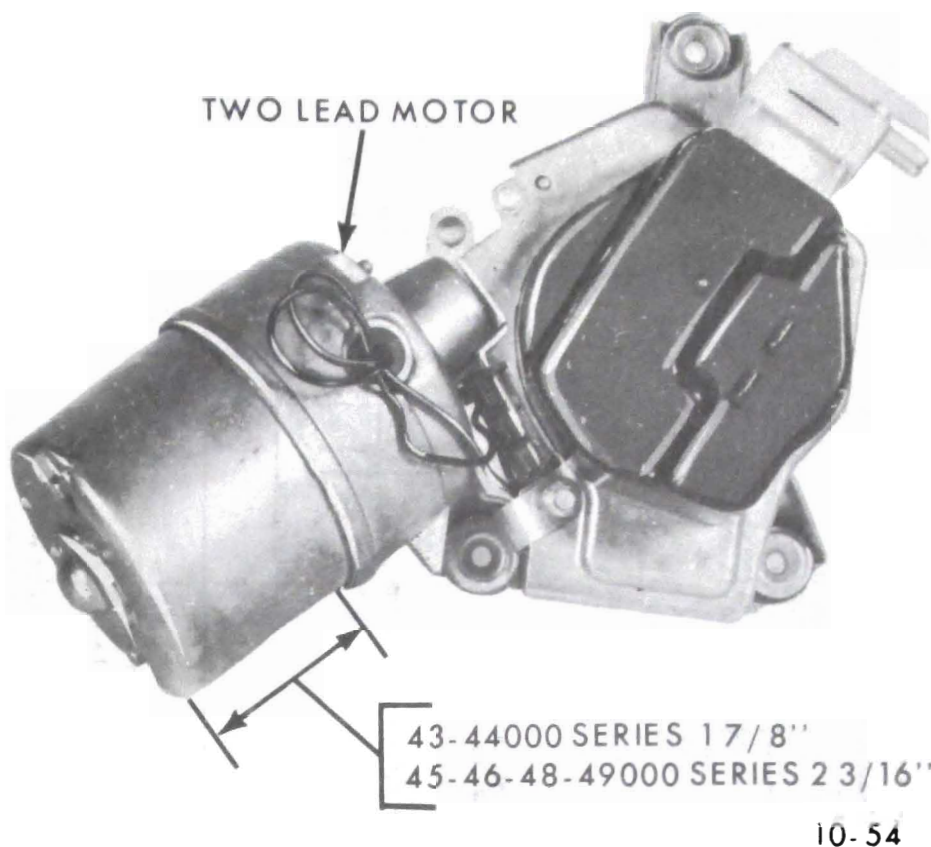
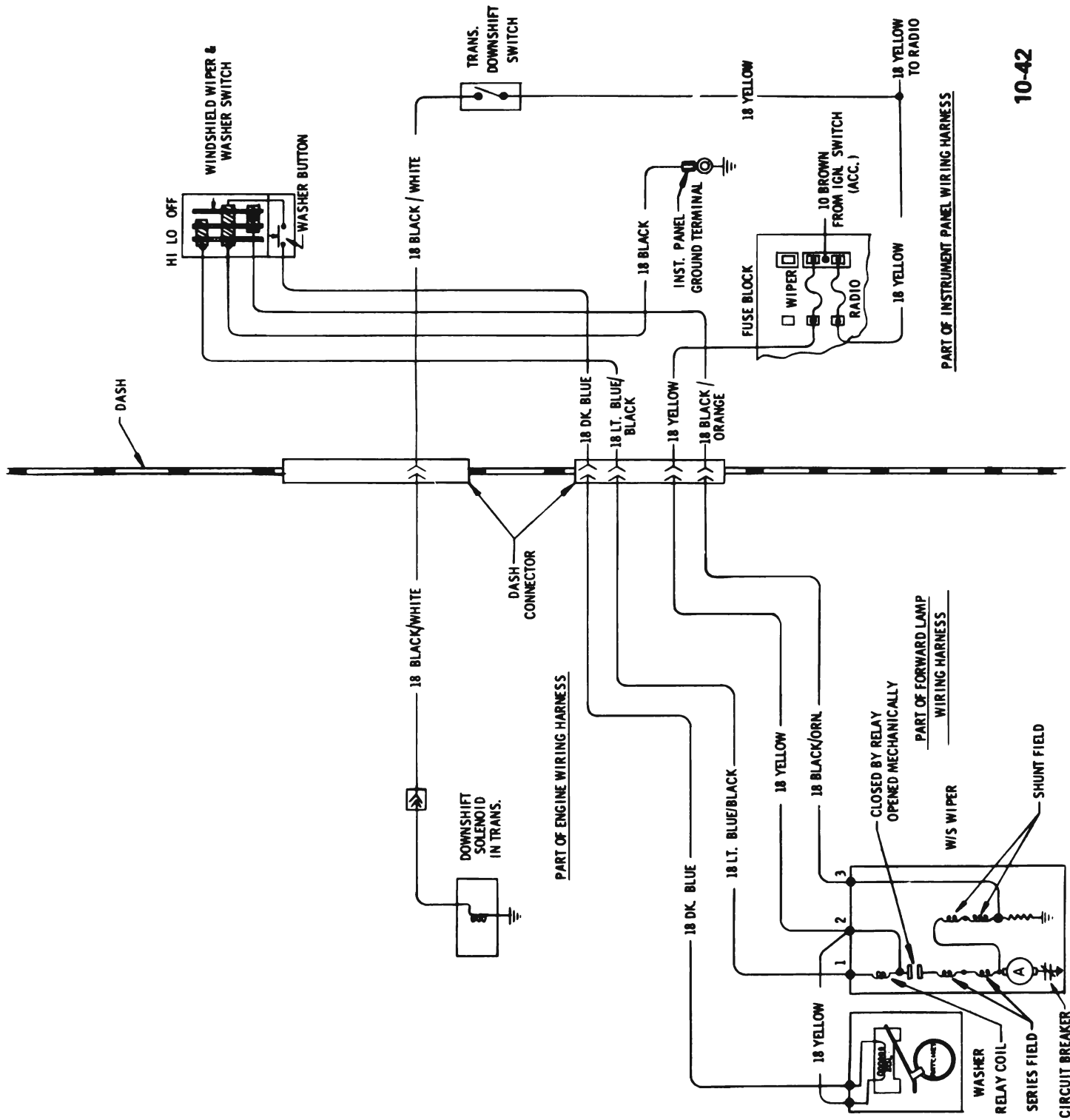


Figure 10-29 Wiper Motor and Washer Pump Assembly
Depressed Park

10-54



10-42

Figure 10-32 49000 Series Wiper Motor Wiring Diagrams

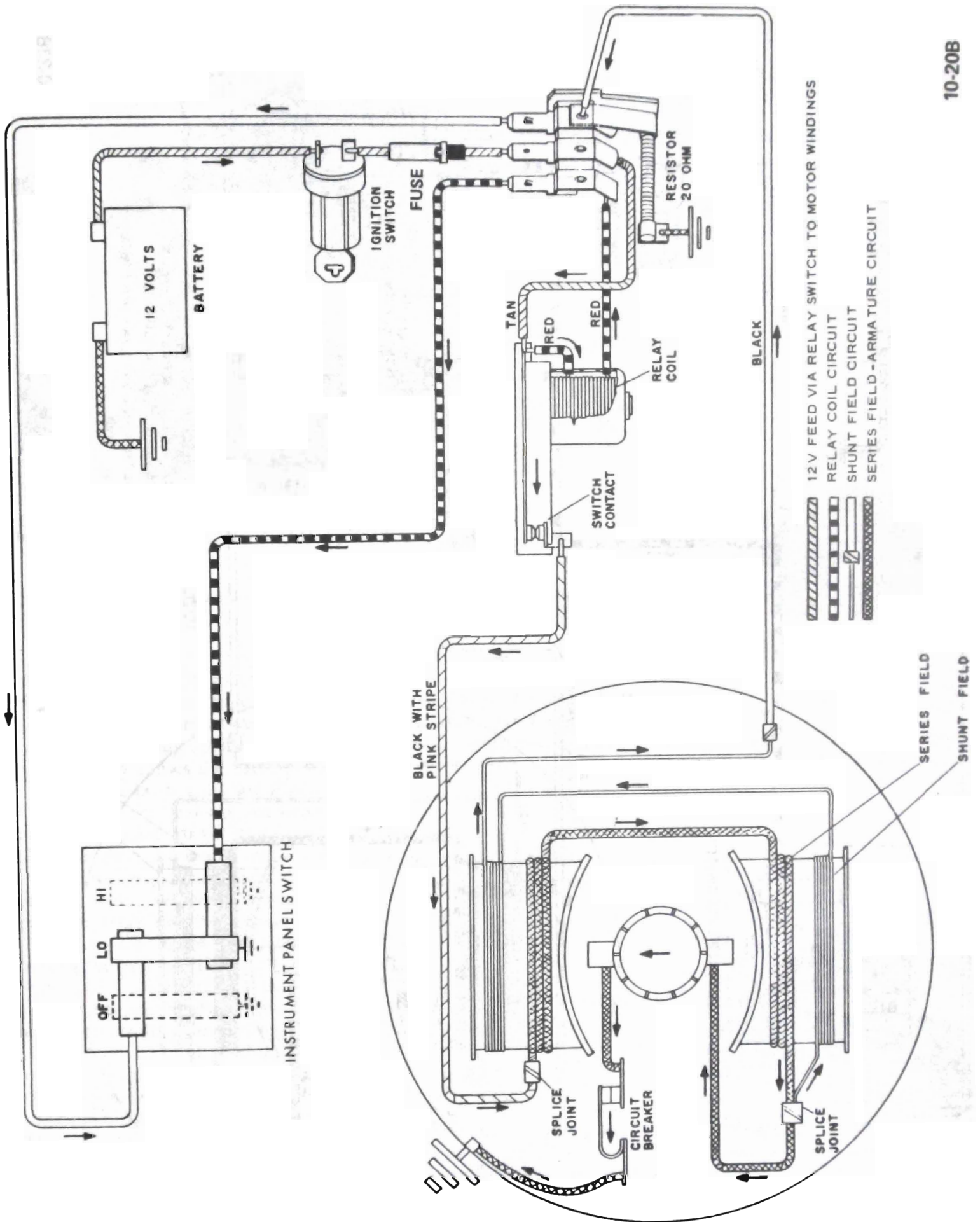
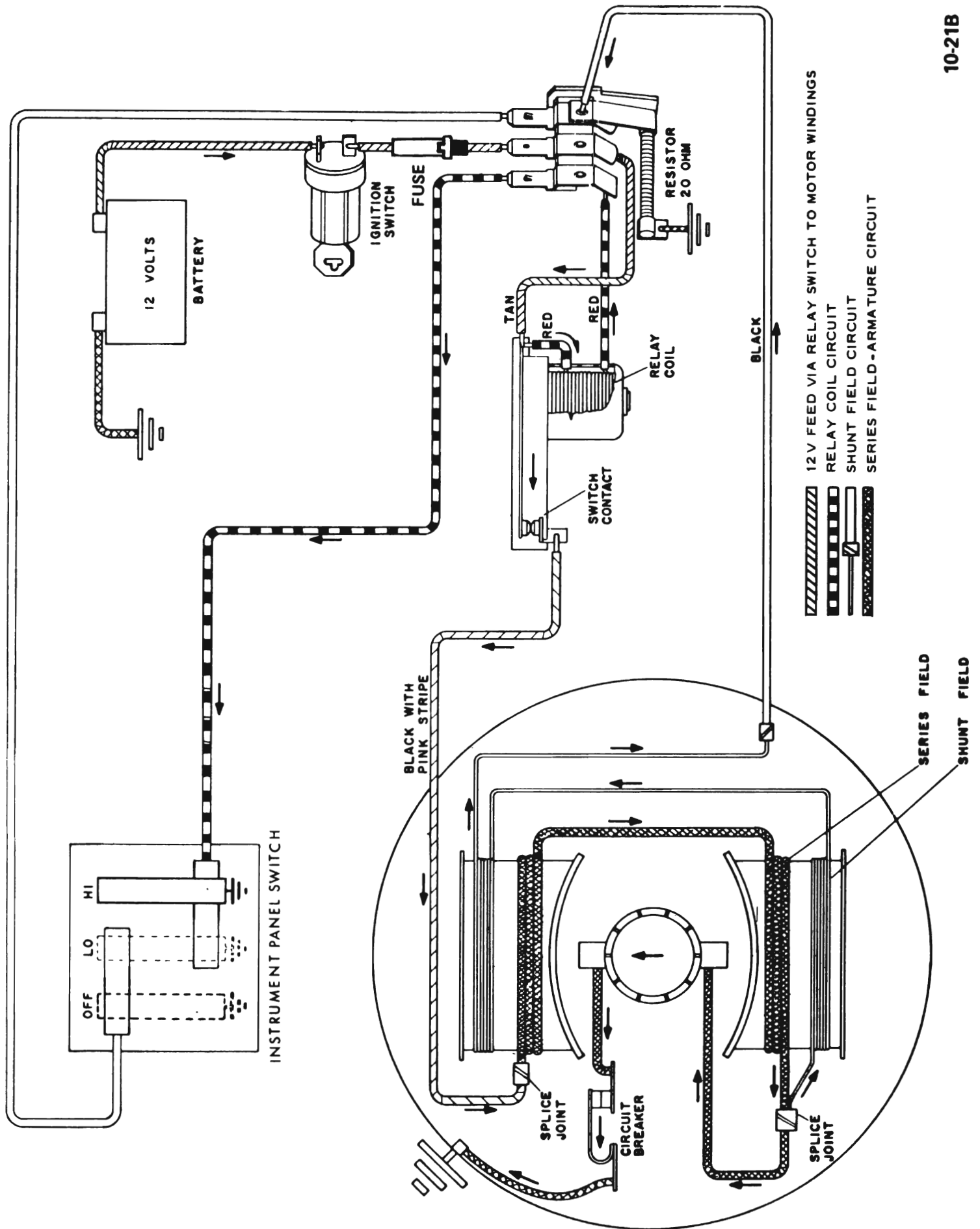


Figure 10-33 Wiring Diagram · Lo Speed Circuit



10-21B

Figure 10-34 Wiring Diagram · Hi Speed Circuit

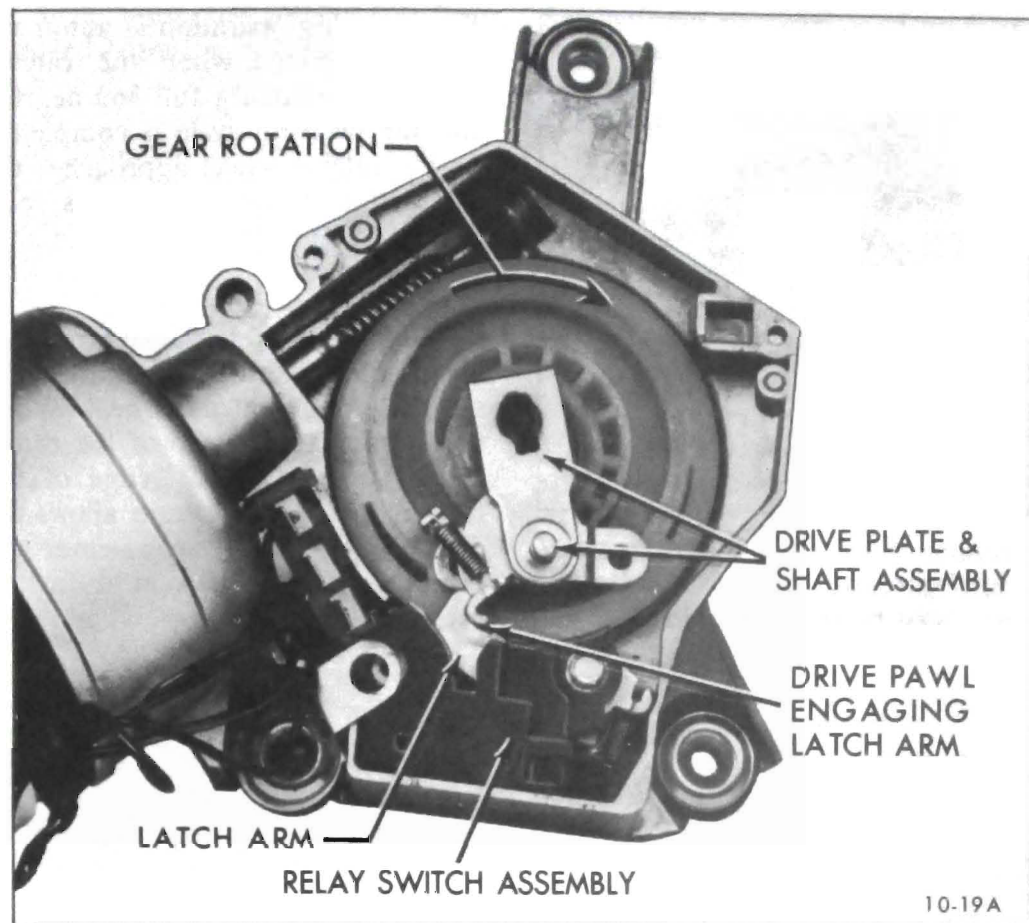


Figure 10-35 Wiper Mechanism Starting into Park Position

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 10-35. 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. 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 through the instrument panel switch with the instrument panel switch in the off position.

10-13 DESCRIPTION AND OPERATION OF WASHER PUMP

a. Description

The washer pump used on the depressed park wiper motor is a positive displacement type pump employing a small piston, piston spring and valve arrangement. The pumping mechanism is actuated by a 4-lobe cam driven by a pin on the wiper motor lock pawl. See Figure 10-36. The programming (starting and completion of a wash cycle) is accomplished electrically and mechanically by a relay assembly and ratchet wheel arrangement.

b. Operation

1. Idling

With the washer pump idling, a tang on the piston actuator plate is resting against a ramp on the lower surface of the ratchet wheel. See Figure 10-37. This holds the piston actuator plate in a lock-out position. With the actuator plate in this position and the wiper running, the cam follower merely moves back and forth in the elongated slot in the piston actuator plate and no pumping action can occur.

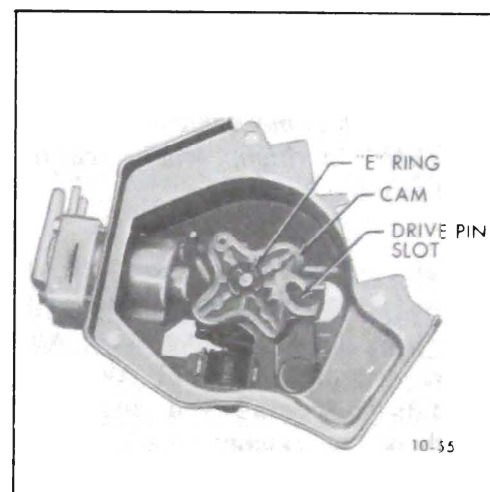


Figure 10-36 Washer Pump Actuator Cam

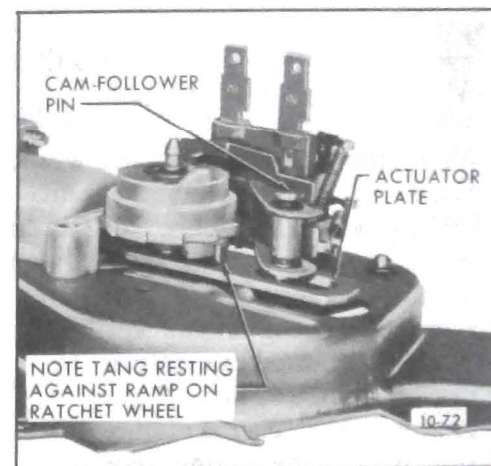


Figure 10-37 Washer Pump Idling

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The ratchet wheel, which, if rotated, would move the ramp away from the tang of the actuator plate releasing the pump action, is prevented from rotating as follows: The relay assembly, consisting of a coil and armature, is constructed in such a way that the ratchet wheel pawl extends through an opening in the relay armature, preventing it from engaging the ratchet wheel teeth. See Figure 10-38.

2. Pumping

Actuating the instrument panel switch to obtain washer pump operation closes the washer pump relay circuit to ground.

NOTE: *If the wiper was 'OFF' the wiper switch is mechanically turned to the 'ON' position, when selecting washer pump operation.*

When the relay is energized, the relay armature is pulled toward the coil pole allowing the ratchet wheel pawl to drop out of the relay armature opening and engage the teeth of the ratchet wheel.

The ratchet wheel pawl, which is actuated by the same cam follower pin that moves the piston actuating plate, begins to rotate the ratchet wheel. Rotating the ratchet wheel one tooth moves the ramp on which the tang of the piston actuating plate was resting. This permits the piston spring to expand, forcing the piston toward the valve assembly resulting in the first exhaust stroke.

When the instrument panel washer switch is released the circuit is broken and the relay coil is no longer energized. Since the relay coil is no longer energized the relay armature, being under spring tension, is allowed to return to the ratchet wheel. See Figure 10-41. However, the relay armature will not return to the same position it occupied with the pump idling because a leg on the relay armature is forced to ride on a shelf on the ratchet wheel until completion of the wash cycle.

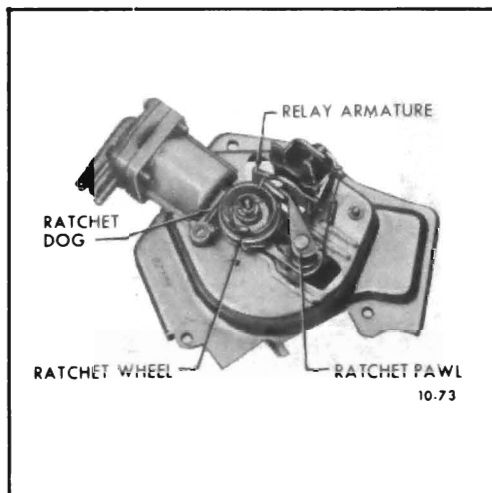


Figure 10-38 Ratchet Pawl Held by Relay Armature

The pumping operation is automatically terminated when the ratchet wheel has rotated a full 360 degrees and the twelfth cycle is completed. As the ratchet wheel approaches the completion of its 360 degrees rotation, two functions occur simultaneously:

1. A leg on the relay armature rides up a ramp located on the outer surface of the ratchet wheel. When the leg reaches the top of the ramp, it moves over the top edge of the ratchet wheel. This action allows the ratchet wheel pawl to re-enter the armature opening preventing further rotation of the ratchet wheel until

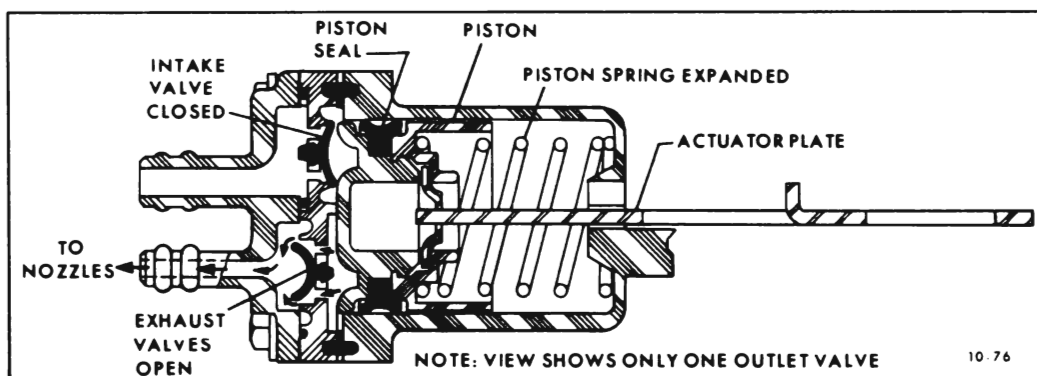


Figure 10-39 Pump Stroke (Exhaust)

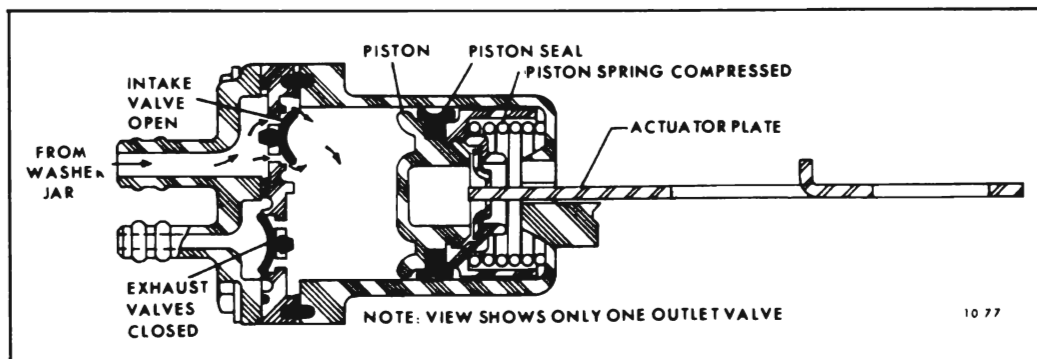


Figure 10-40 Pump Stroke (Intake)

the next time the relay coil is energized from the instrument panel switch.

2. The tang on the piston actuator plate is resting once more against the ramp on the lower side of the ratchet wheel.

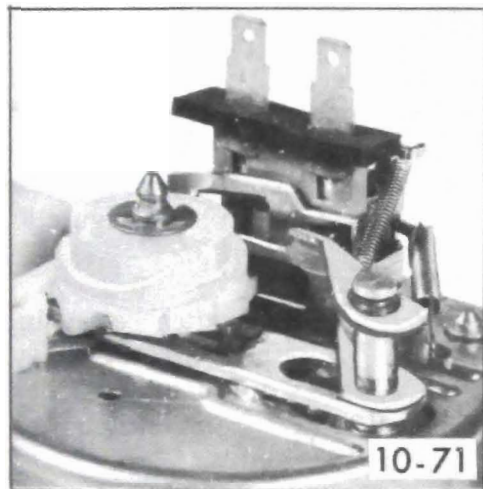


Figure 10-41 Washer Pump Operating

DIVISION III

SERVICE PROCEDURES

10-14 DISASSEMBLY AND ASSEMBLY OF WIPER MOTOR

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

a. 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 tie 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.

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 10-42.
5. Straighten out the 4 tabs that secure the brush plate to the field coil retainers.

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 10-42
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.

b. 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.

c. Case and Field Assembly 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 10-42.

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

d. 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 grease. Next, install thrust ball in end of shaft.

4. Assemble armature in the case and field assembly. See Figure 10-43.

5. Position the partially assembled brush plate, Figure 10-44, 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 10-42.

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

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

IMPORTANT: 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 10-42.

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

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alignment of the new case with the scribed line made on the housing (Disassembly, Step 1).

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.

NOTE: *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.

e. 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.

f. Disassembly of Drive Gear Mechanism

1. CLAMP CRANK ARM IN A VISE and remove crank arm retaining nut, crank arm, rubber seal cap, retaining ring, shim washers, shield and spacer washer in the order indicated.

2. Slide drive shaft and gear assembly out of housing. See Figure 10-45.

3. Remove inner spacer washer and slide drive plate and shaft out of gear and remove the drive pawl, lock

pawl and coil spring as required. See Figure 10-46.

g. Assembly of Drive Gear Mechanism

1. Position drive pawl on drive plate. See Figure 10-47.

2. Assemble lock pawl over drive pawl. See Figure 10-48.

3. Slide gear and tube over the drive shaft. See Figure 10-49.

NOTE: *Move drive and lock pawls as required to allow their respective pins to fit into the gear guide channel.*

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 10-45.

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" position and install crank arm in the approximate position shown in Figure 10-50.

9. CLAMP CRANK ARM IN A VISE and tighten retaining nut to 80 lb. in.

10. Rotate washer pump drive cam so that hole in cam and hole in washer pump mounting plate are aligned. Insert a length of 1/8" rod through pump mounting plate and cam to maintain alignment while installing

pump assembly on wiper motor. See Figure 10-53.

11. Install washer pump assembly on wiper motor being careful to properly install ground strap. Remove washer pump cam alignment pin.

h. Removal of Relay

1. Remove gear box cover - washer pump assembly.

2. If wiper gear drive pawl is in full park position, remove gear assembly. If wiper gear mechanism is away from the park position (drive pawl away from latch arm as in Figure 10-51), proceed to Step 3.

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

i. 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. See Figure 10-52.

NOTE: *With the relay-switch assembly placed in the housing and gear box cover - washer pump assembly installed, 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.

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

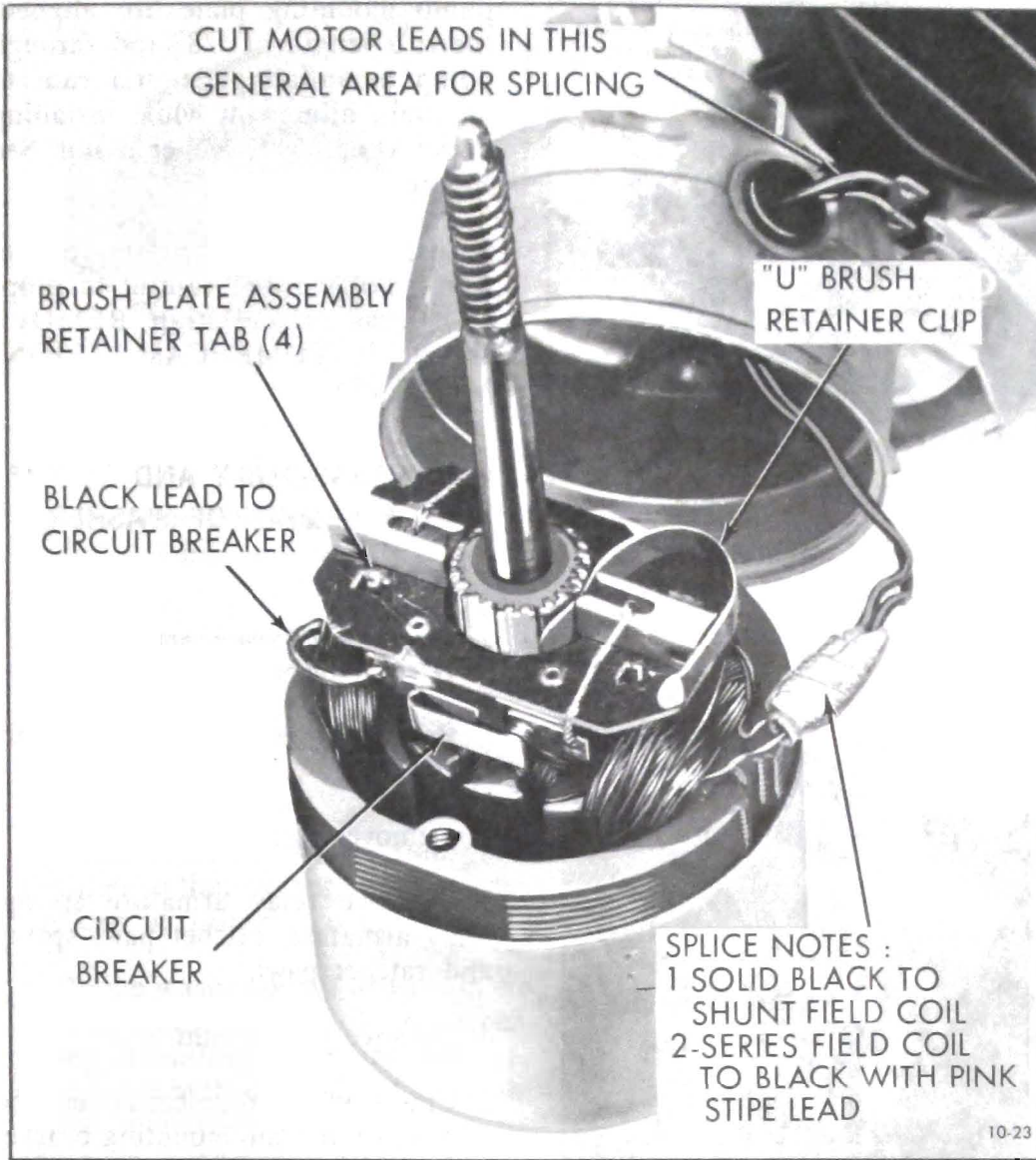


Figure 10-42 Motor Disassembly

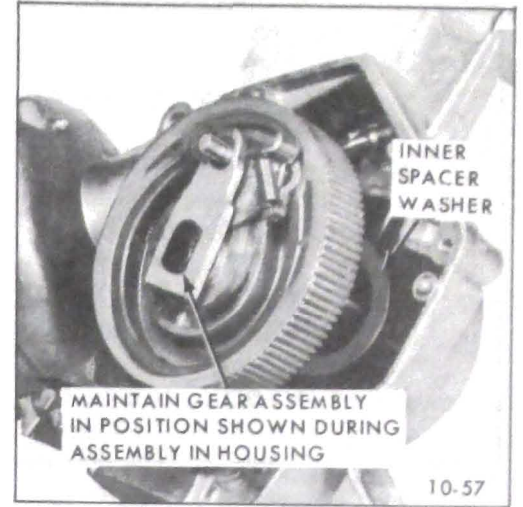


Figure 10-45 Removing or Installing Gear Assembly



Figure 10-46 Disassembling Gear assembly

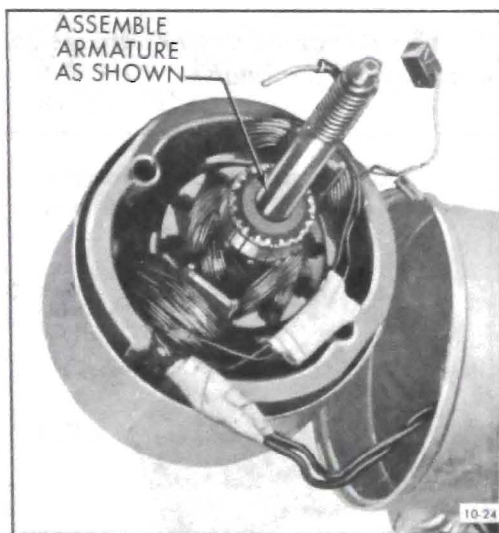


Figure 10-43 Assembling Armature

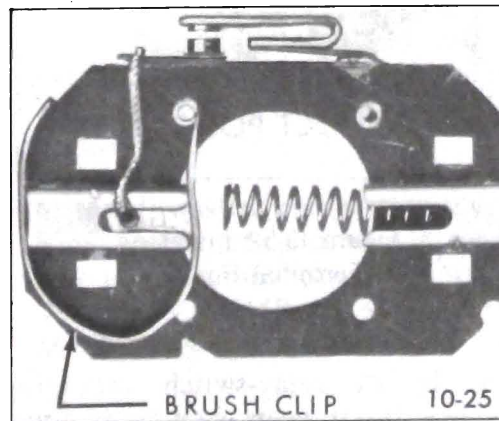


Figure 10-44 Partially Assembled Brush Plate

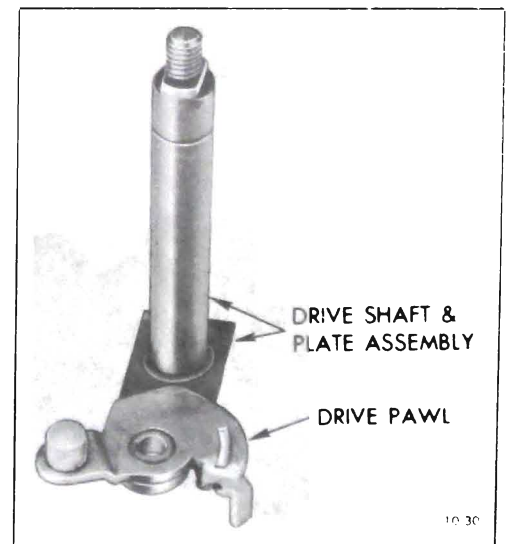


Figure 10-47 Assembling Drive pawl on drive plate

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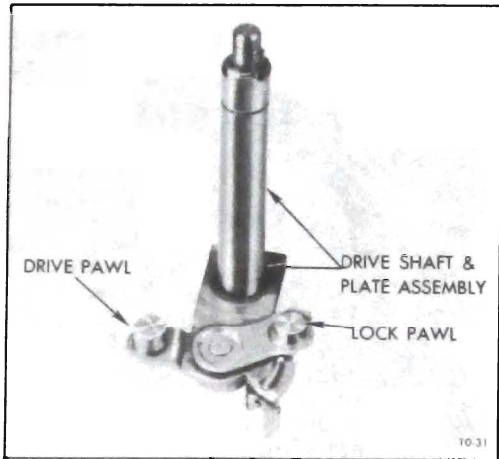


Figure 10-48 Assembling Lock Pawl over Drive Pawl



Figure 10-51 Removing Relay Switch Assembly

pump mounting plate are aligned. Insert a length of 1/8" rod through pump mounting plate and cam to maintain alignment while installing pump assembly on wiper motor. See Figure 10-53

8. Install washer pump assembly on wiper motor being careful to properly install ground strap. **REMOVE WASHER PUMP CAM ALIGNMENT PIN.**

10-15 DISASSEMBLY AND ASSEMBLY OF WASHER PUMP

a. Removal and Replacement of Relay and Terminal Board

1. Remove washer pump assembly from car.
2. Remove washer pump cover.
3. Remove relay armature spring, relay armature, ratchet pawl spring and ratchet pawl.
4. Remove 4-lobe cam.
5. Chisel off the four bent-over tabs that secure the coil mounting bracket to the base. See Figure 10-54.

6. Hold replacement relay assembly securely against the base mounting surface and bend locking tabs over.

NOTE: *Be careful not to damage coil windings or terminals.*

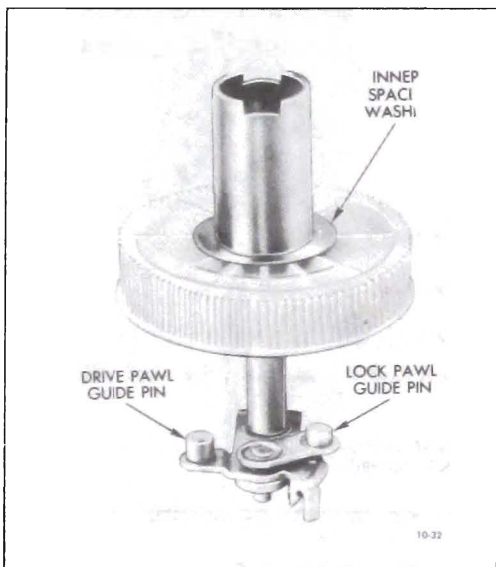


Figure 10-49 Assembling Gear over Drive Shaft

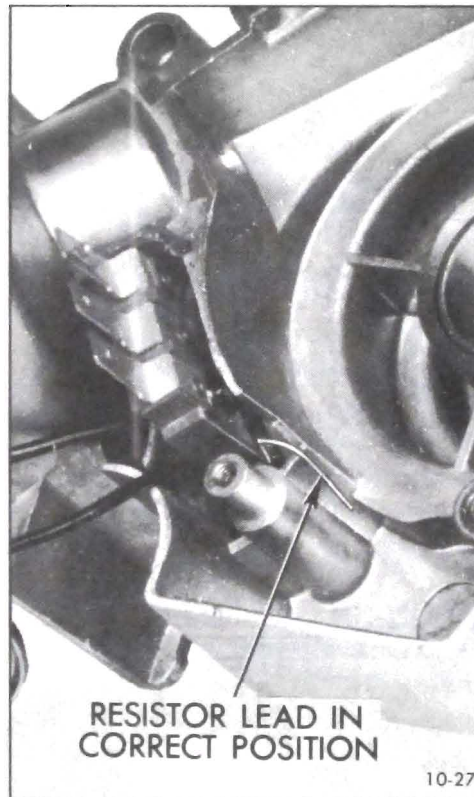


Figure 10-52 Installing Terminal Board

5. Install relay-switch mounting screw. Install gear assembly if it was removed.

6. Run wiper motor to full park position so that washer pump assembly can be installed.

7. Rotate washer pump drive cam so that hole in cam and hole in washer

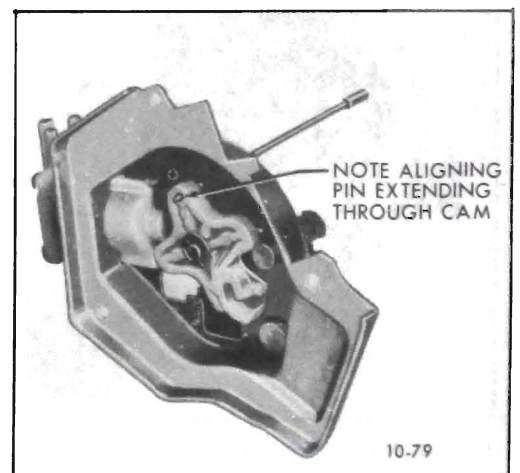


Figure 10-53 Pump Cam Alignment Pin in Place

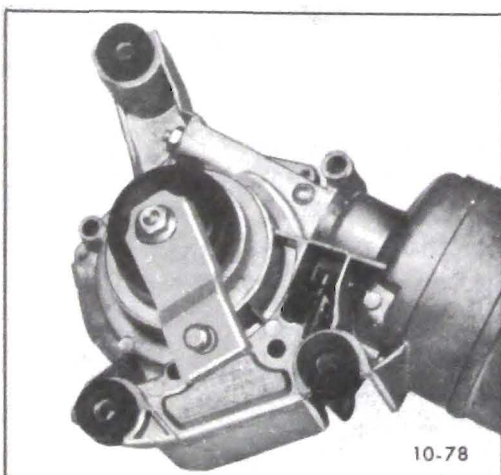


Figure 10-50 Install Crank Arm on Motor

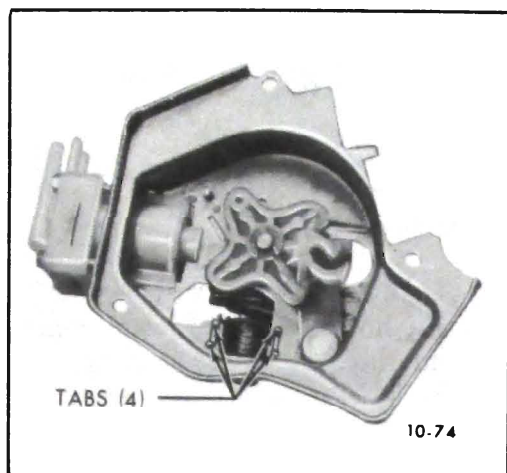


Figure 10-54 Removing Pump Relay Coil

7. Remainder of parts can now be installed by reversing removal procedure.

8. Run wiper motor to full park position so that washer pump assembly can be installed.

9. Rotate washer pump drive cam so that hole in cam and hole in washer pump mounting plate are aligned. Insert a length of 1/8" rod through pump mounting plate and cam to maintain alignment while installing pump assembly on wiper motor. See Figure 10-53.

10. Install washer pump assembly on wiper motor being careful to properly install ground strap. **REMOVE WASHER PUMP CAM ALIGNMENT PIN.**

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 valve plate seal is properly installed and that hose connections are pointed in the proper direction pointed in the proper direction when angle valve is used.*

c. Removal and Replacement of Piston Assembly

1. Remove washer pump assembly from car.

2. Remove washer pump cover.

3. Remove relay armature spring, relay armature, ratchet pawl spring and ratchet pawl.

4. Remove ratchet wheel dog screw and dog.

5. Remove ratchet wheel retaining "E" ring and ratchet wheel.

6. Slide valve and piston assembly out of retaining slot in washer pump frame.

7. Remove four screws that retain valve assembly to piston housing.

8. To install, reverse removal procedure.

NOTE: *Be certain valve plate seal is properly installed and that hose connections are pointed in the proper direction when angle valve is used.*

9. Run wiper motor to full park position so that washer pump assembly can be installed.

10. Rotate washer pump drive cam so that hole in cam and hole in washer pump mounting plate are aligned. Insert a length of 1/8" rod through pump mounting plate and cam to maintain alignment while installing pump assembly on wiper motor. See Figure 10-53.

11. Install washer pump assembly on wiper motor being careful to properly install ground strap. **REMOVE WASHER PUMP CAM ALIGNMENT PIN.**

DIVISION IV

TROUBLE DIAGNOSIS

10-16 WIPER MOTOR TROUBLE DIAGNOSIS

a. Wiper in Car

1. *Preliminary Inspection.* Check the following items:

(a) Wiring harness properly connected to wiper motor terminal board and instrument panel switch.

(b) Wiper motor to dash panel mounting screw tight.

(c) Instrument panel 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 switch, as shown in Figure 10-55. Check low and high speeds and if wiper shuts off correctly.

(a) If wiper operates correctly, see "Trouble Chart 1 - 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 for broken or binding linkage.

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

b. Wiper Out of Car

1. *Preliminary Test.* Try operating wiper as shown in Figure 10-56. 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 2 - Wiper Out of Car". Note possible causes listed, then turn to checking procedure for this trouble.

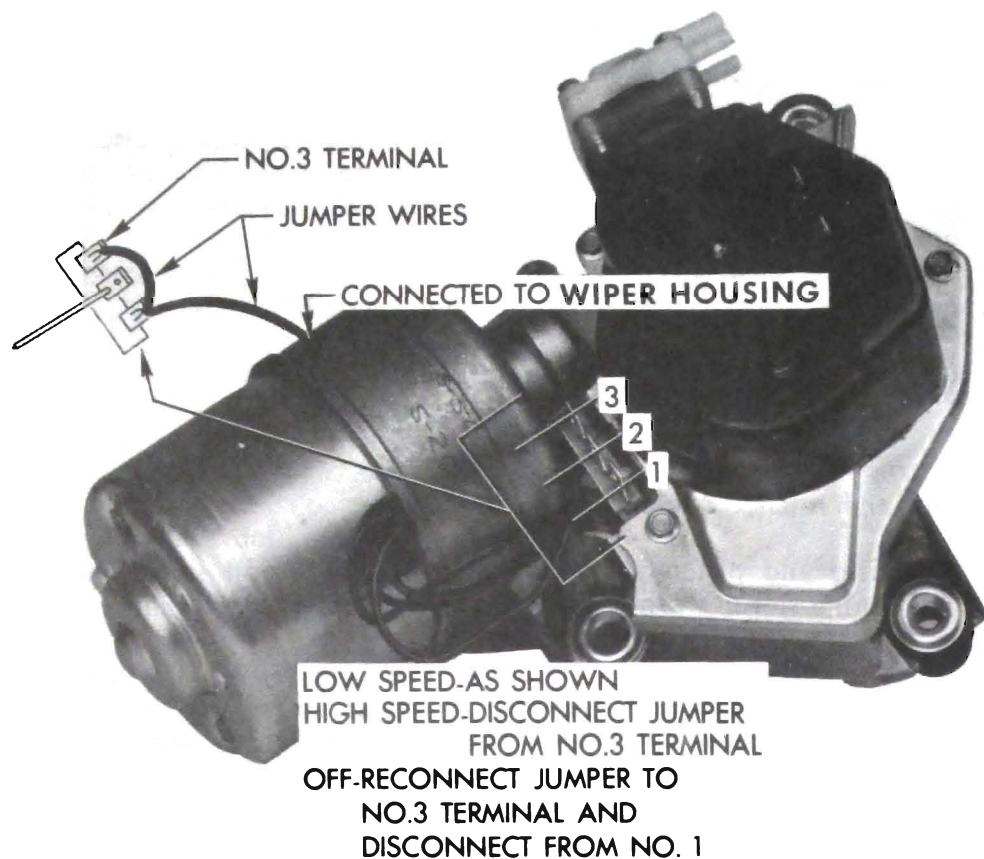


Figure 10-55 Connections to Operate Wiper Independent of Instrument Panel Switch

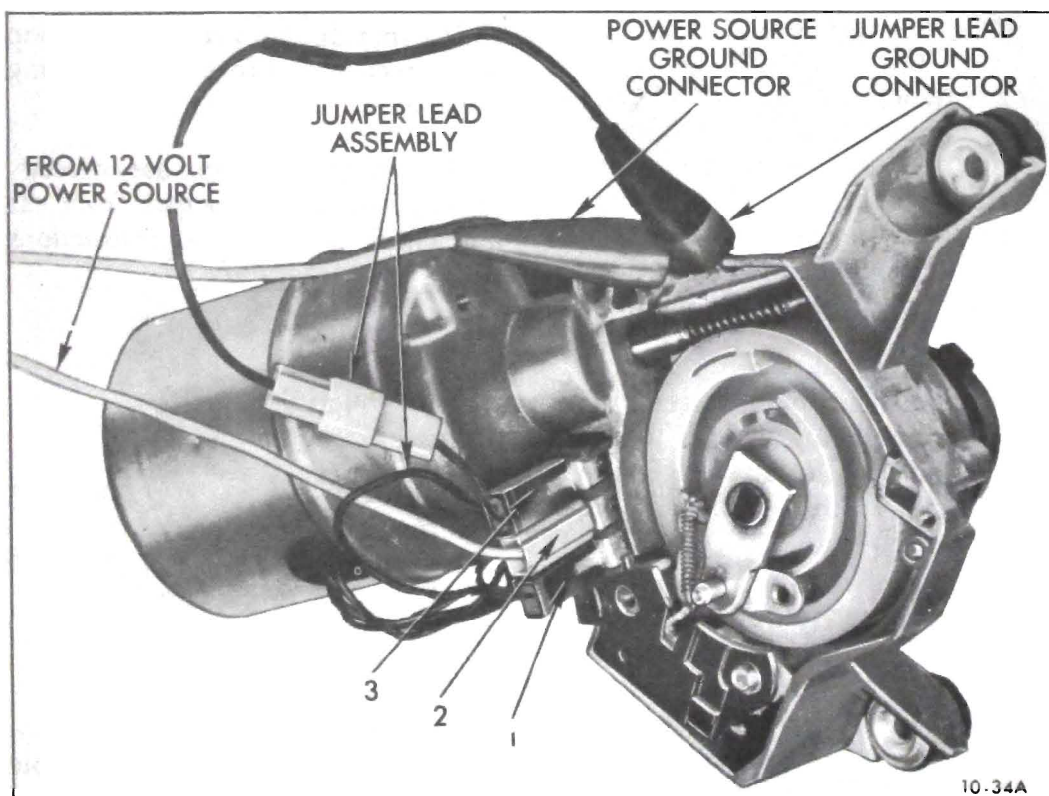


Figure 10-56 Connection to Operate Wiper Out of Car

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 10-57.

Do not connect jumper to Terminal 1 and 3.

(c) To determine if wiper circuit to relay switch is complete, connect test light to relay switch terminal as shown in Figure 10-57.

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

(2) *Test Lamp Doesn't Light.* Solder connections at terminal board or relay defective.

(d) To determine if relay coil is open, connect test lamp to wiper Terminal No. 1, Figure 10-57.

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 10-57. 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.

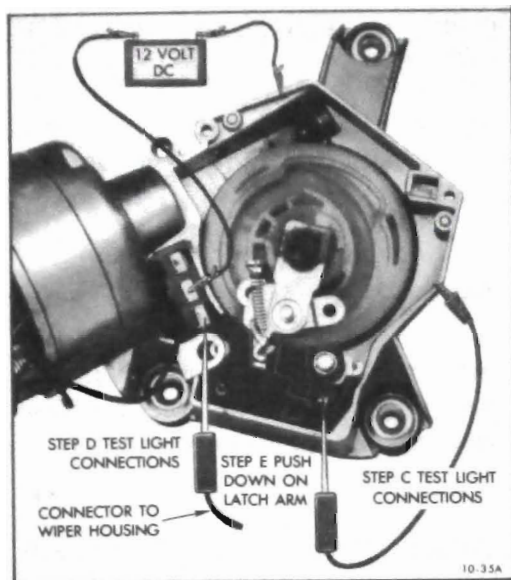


Figure 10-57 Test Light Checks

(2) Solder connections at brush holders.

(3) Splice joints at field coil connection 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 degrees).

(a) Observe if relay latch arm spring is connected properly. See Figure 10-57.

(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 10-57. Do not make any connection 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.

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 10-57.

(b) Check to see if "E" clip has slipped out of groove on drive shaft.

(c) 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 10-57 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 10-57 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 wiper to operate in "LO" speed (Figure 10-56). 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, disassembly motor section of wiper and check armature on growler for shorted or grounded condition.

10-17 WASHER PUMP TROUBLE DIAGNOSIS

a. Washer Pump Inoperative

1. Check the following items:

(a) Jar has adequate quantity of water solution.

(b) Hoses are not damaged and hose connections are tight.

(c) Screen on end of jar cover hose is not plugged.

(d) Electrical connections to washer pump and instrument panel switch.

(e) Nozzles are not plugged.

2. If all items in Step 1 check properly, start wiper motor only, then operate washer pump switch and listen for "click" as washer pump relay pulls in. If no "click" is heard, check for 12 volts at terminal without tab. No voltage indicates defective wiring. If "click" is heard, proceed to Step 4.

3. If correct voltage was found in Step no. 2, start wiper first, then connect 12V supply to one pump terminal and ground other terminal. If washer relay "click" is heard and pump functions correctly, a defective

instrument panel switch or an open circuit between washer pump and instrument panel switch is indicated -No "Click" indicates an open relay coil.

4. If relay "click" is heard in Step 2 or 3, listen for the "soft clicking" as the pump ratchet wheel is rotated.

If "soft clicking" is not heard, the pump mechanism is faulty and should be removed from the wiper motor and checked.

If "soft clicking" is heard, but no pumping action occurs, replace the valve assembly and recheck pump.

b. Washer Pump Does Not Shut Off at End of Cycle

1. Disconnect wiring from washer pump. If pump shuts off, trouble is

located in wiring or instrument panel switch.

2. If pump fails to shut off in Step 1, remove pump assembly from car for further checking.

c. Checking Valve Assembly

1. Attach a hose to large or intake pipe. You should be able to blow through it but not draw through it.

2. Attach a hose individually to each small or exhaust pipe. You should be able to draw through them but not blow through them.

If any of three valves allow air to pass in both directions, valve assembly is defective.

If wiper operated correctly independently of instrument panel switch and car wiring, but original trouble was:	Check the Following Items:
1. Wiper Inoperative	<ul style="list-style-type: none"> a. Open lead wire from wiper terminal #1 to instrument panel switch. b. Instrument panel switch connector loose. c. Instrument panel switch defective.
2. Will not Shut Off (Blades make full wipe stroke).	<ul style="list-style-type: none"> a. Ground condition in lead from wiper terminal #1 to instrument panel switch. b. Check for corroded wiper terminals. Clean terminals and spread a thin coat of waterproof grease over board. c. Defective instrument panel switch. d. Check "E" clip, to be sure it has not slipped out of groove on drive shaft.
3. Will not Shut Off (Blades move up and down about 15° from lower windshield molding)	<ul style="list-style-type: none"> a. Open in lead wire from wiper terminal #3 to instrument panel switch. b. Instrument panel switch connector loose. c. Instrument panel switch defective.
4. Has one Speed "Fast"	<ul style="list-style-type: none"> a. Lead wire from wiper terminal #3 to instrument panel switch open. b. Instrument panel switch defective.
5. Has one Speed "Slow"	<ul style="list-style-type: none"> a. Grounded condition in lead from wiper terminal #3 to instrument panel switch. b. Defective instrument panel switch.
6. Intermittent Operation	<ul style="list-style-type: none"> a. Check for loose instrument panel switch connector. b. Check for clearness of glass and concentration of washer solution to make sure there is no wiper drag. 10-81A

Figure 10-58 - Trouble Chart I - Wiper in Car

10-36 WINDSHIELD WIPER AND WASHER SYSTEM

TROUBLE	POSSIBLE CAUSES	USE CHECKING PROCEDURE
1. Wiper Inoperative (Motor doesn't run)	<ul style="list-style-type: none"> a. Open relay coil b. Circuit breaker open c. Open armature d. Motor series field open e. Brushes sticking f. Defective solder joints—relay switch g. Binding condition—relay latch arm 	A
2. Wiper will not shut off (Crank arm rotates thru 360°)	<ul style="list-style-type: none"> a. Relay coil—grounded b. Relay latch spring disconnected or broken c. Latch arm binding 	B
3. Wiper will not shut off (Crank arm moves back and forth in a horizontal plane accompanied by a loud "Klunk")	<ul style="list-style-type: none"> a. Relay coil—grounded b. Relay latch spring disconnected or broken c. Wiper has one speed fast caused by open shunt field d. Check "E" clip, to be sure it has not slipped out of groove on drive shaft. 	C
4. Wiper has one speed "Fast" (This usually results in typical trouble "3")	<ul style="list-style-type: none"> a. Shunt field open b. defective soldering at terminal No. 3 on wiper terminal board 	C
5. Wiper has one speed "Slow"	<ul style="list-style-type: none"> a. Shunt field internally grounded b. Shunt field lead to terminal board (black) grounded c. Shorted armature 	D
6. Wiper has excessive speed in "Hi"; "Lo" speed normal	<ul style="list-style-type: none"> a. Open speed resistor b. Poor resistor ground connection 	E
7. Wiper stops at random (Crank arm stops rotating immediately and does not return to full park position).	<ul style="list-style-type: none"> a. Relay switch contacts dirty or broken 	Replace Relay Switch Assembly.
8. Intermittent Operation	<ul style="list-style-type: none"> a. Defective circuit breaker (weak) b. Circuit breaker tripping because of shorted armature and/or fields causing motor to draw excessive current c. Check for clearness of glass and concentration of washer solution to make sure there is no wiper drag. 	F
9. No apparent trouble on bench test but fails occasionally on car	<ul style="list-style-type: none"> a. Armature end play tight b. Gear assembly end play tight c. Loose solder or weld joints 	See Paragraph 10-11, Sub-paragraph 2, Step B. 1, or Sub-paragraph 3, Step b. 7. 10-82A

Figure 10-59 - Trouble Chart 2 - Wiper Out of Car

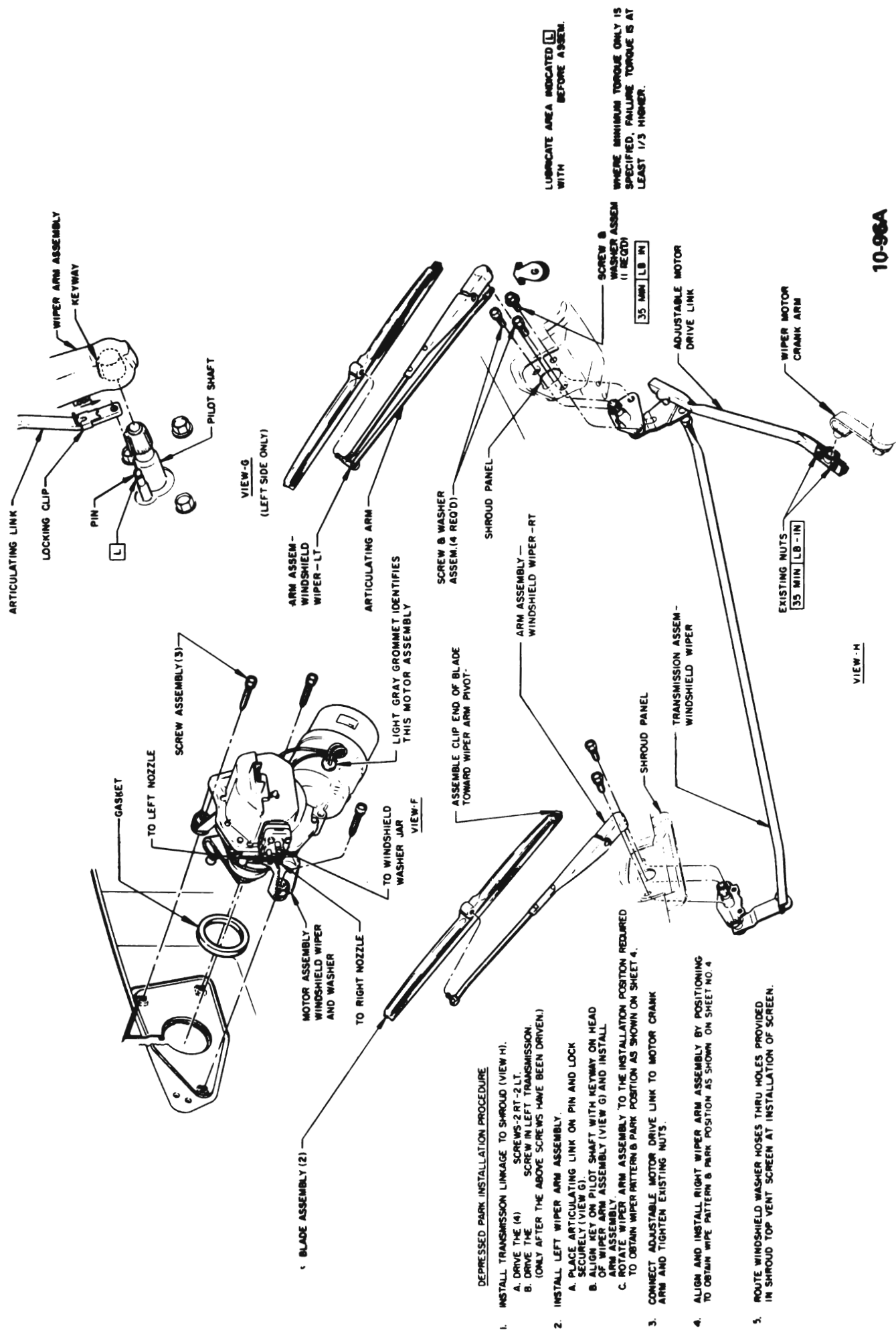


Figure 10-60 - Wiper Motor, Linkage and Arm Installation 43-44000

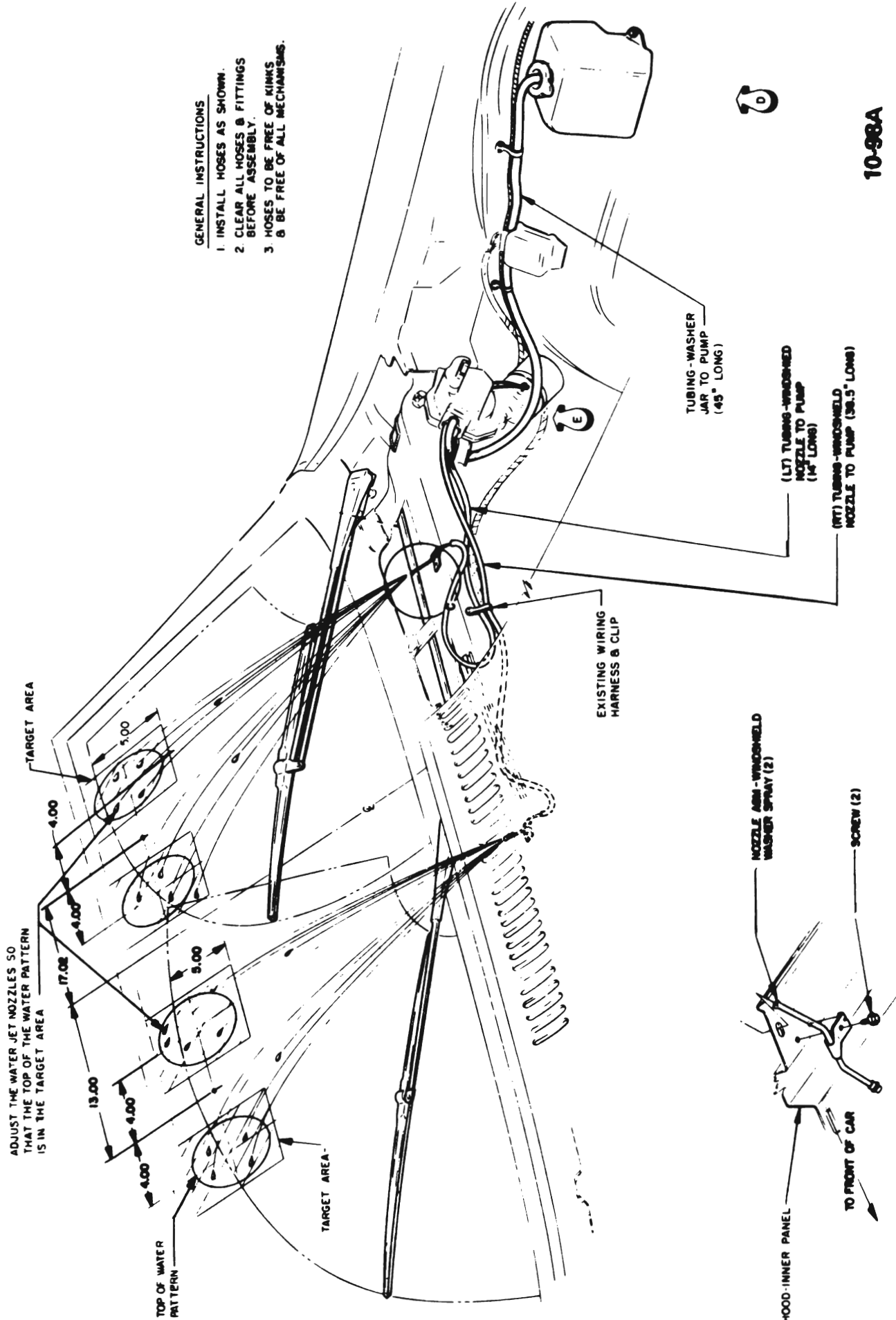
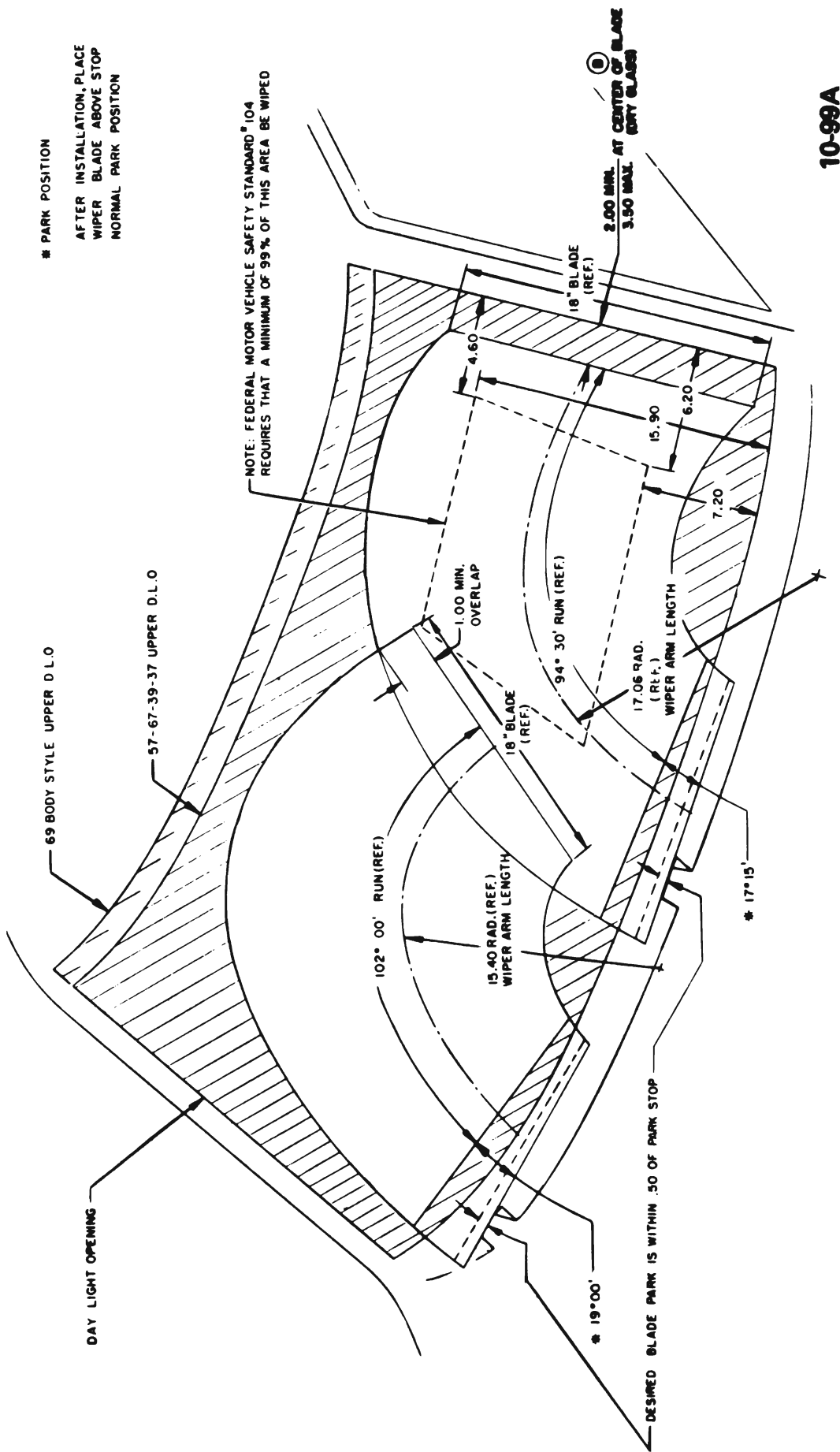


Figure 10-62 - Washer Jar and Hose Installation 45-46-48000

10-40 WINDSHIELD WIPER AND WASHER SYSTEM

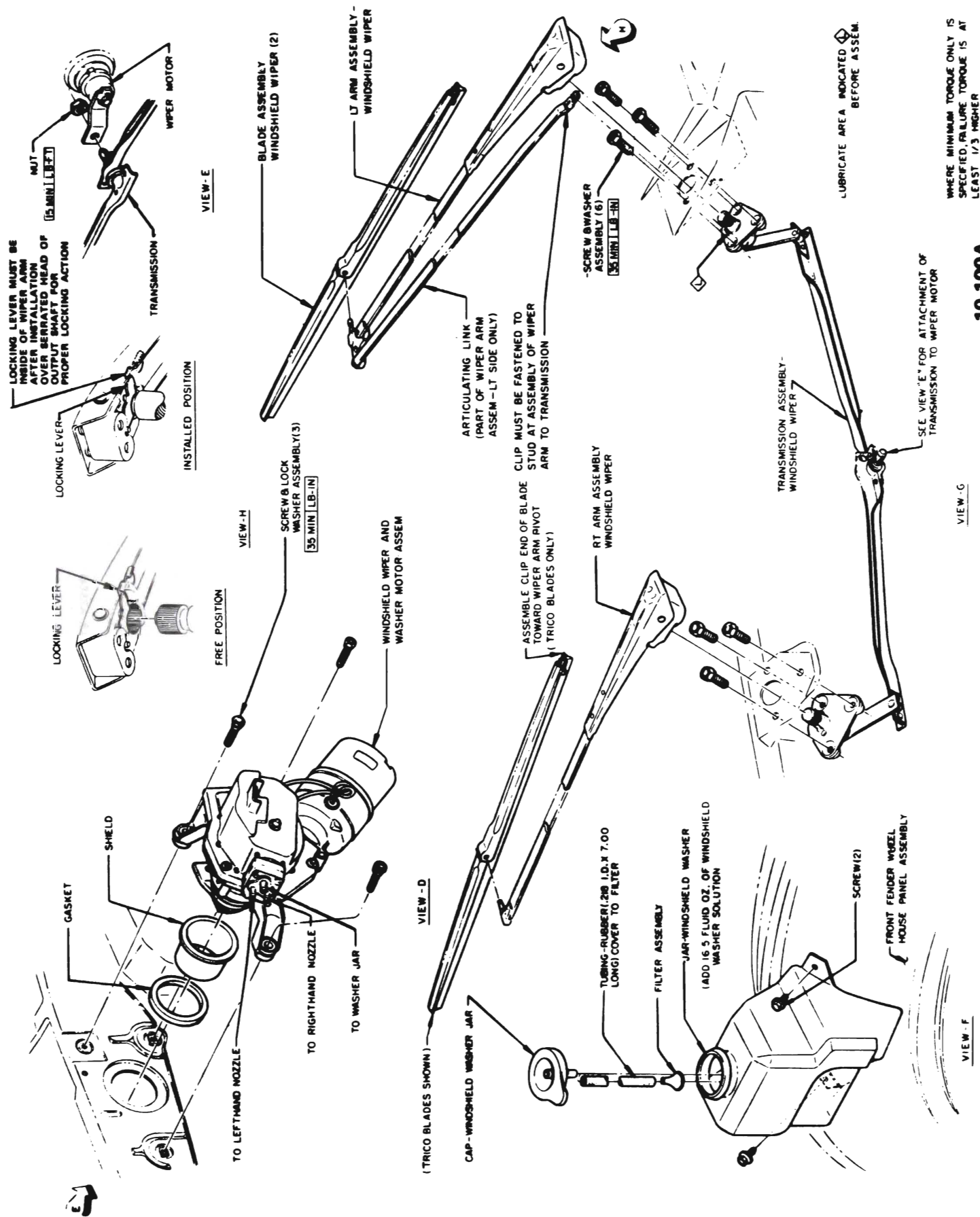


PARK POSITION
AFTER INSTALLATION, PLACE
WIPER BLADE ABOVE STOP
NORMAL PARK POSITION

NOTE: FEDERAL MOTOR VEHICLE SAFETY STANDARD #104
REQUIRES THAT A MINIMUM OF 99% OF THIS AREA BE WIPED

10-99A

Figure 10-63 - Windshield Wipe Pattern 45-46-48000



10-100A

Figure 10-64 - Wiper Motor, Linkage and Arm Installation 49000

10-42 WINDSHIELD WIPER AND WASHER SYSTEM

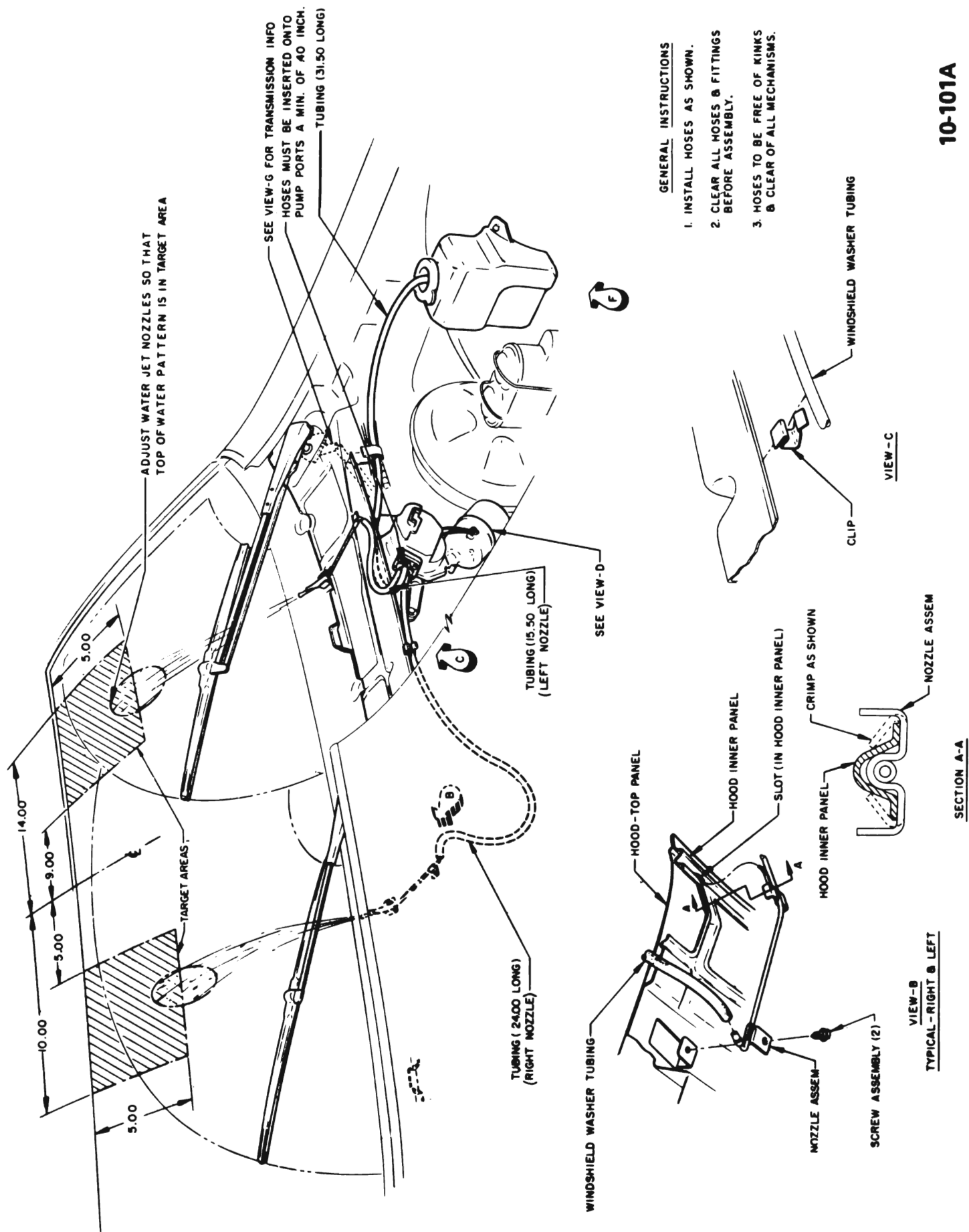
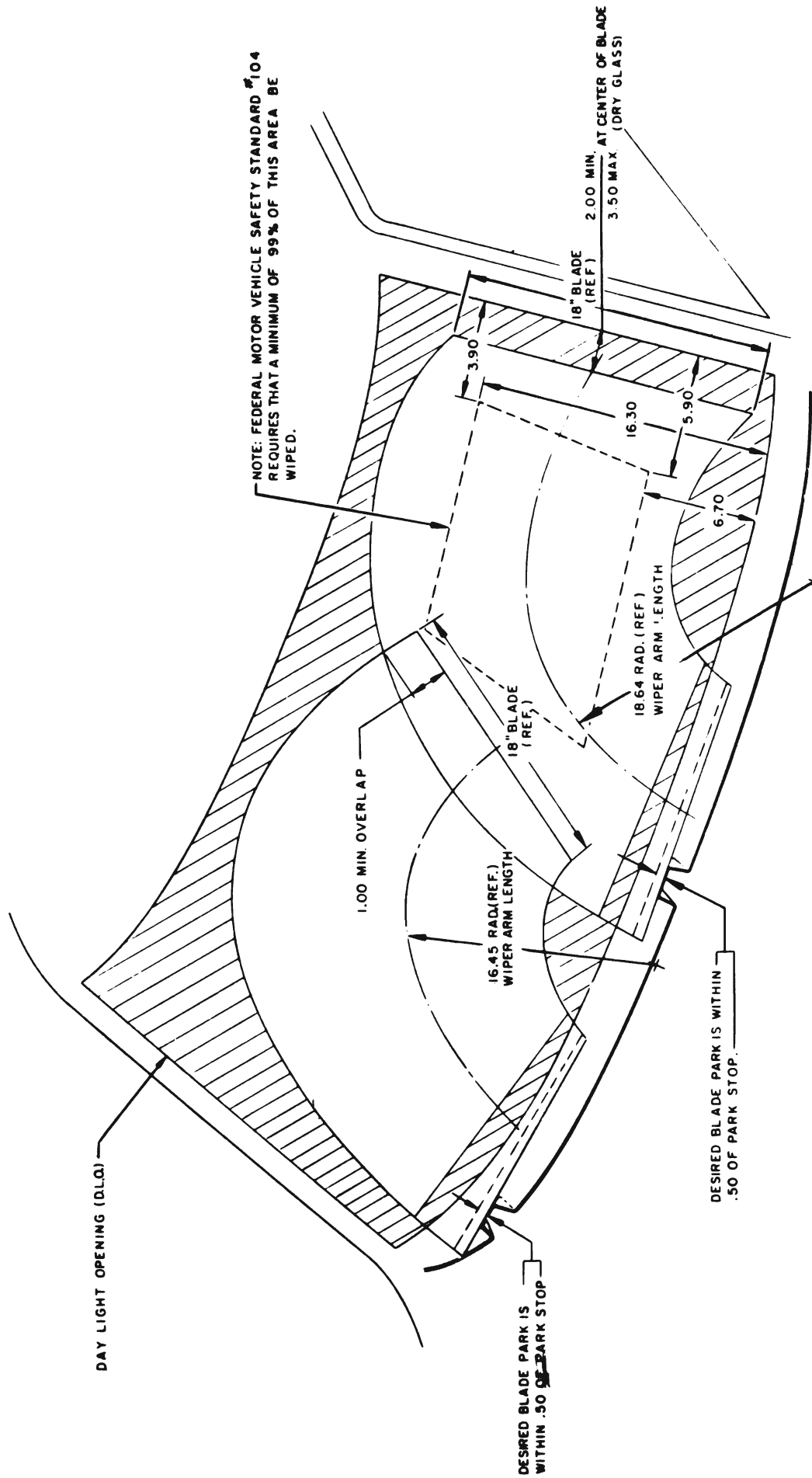


Figure 10-65 - Washer Jar and Hose Installation



10-102A

Figure 10-66 - Windshield Wipe Pattern 49000