SECTION 01-16 Wiper and Washer Systems

VEHICLE APPLICATION

Taurus/Sable.

DESCRIPTION AND OPERATION

Windshield Wiper System, Front

The two-speed, permanent magnet, three brush electric windshield wiper motor has a brush rigging that permits selection of low or high speed. When the control selector is in LO position, the common brush and the blue/orange wire brush are used, and the motor operates at low speed. When the control selector is in HI position, the grounded brush and the white wire brush are used. Current bypasses a portion of the armature winding, causing the motor to run faster. When the control selector is moved to the OFF position, the motor will continue at low speed until the park switch contacts open, signaling the motor to PARK and activating the depressed PARK mechanism which is part of the motor output arm.

Wiper/Washer Switch, Front

The wiper system features a rotary actuated switch which is part of the turn signal lever of the multi-function switch. The washer switch is a push-type and also is part of the multi-function switch.

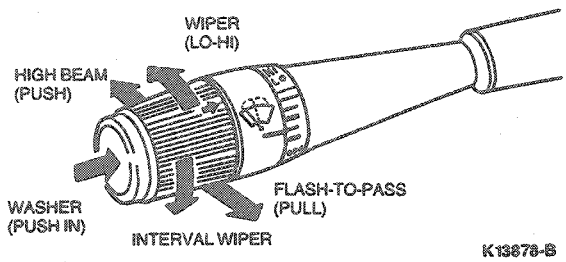
Interval System

When the wiper control switch is in the interval position, the wipers make single wipes which are separated by a pause. The control knob on the end of the turn signal lever sets the length of the pause (from about 1 second to about 12 seconds). The length of pause decreases as the knob is rotated away from OFF and increases as the knob is rotated toward OFF.

DESCRIPTION AND OPERATION (Continued)

While in the interval wiper mode it is normal to hear a slight ticking sound. This sound is due to the interval wiper module.

NOTE: When using interval wipers, the first wipe may not occur until after a pause of up to 12 seconds.



To operate the washer, push the knob of the lever toward center of steering column.

If wiper control switch is in OFF or INT position, wipers will run as long as knob is pushed in. When knob is released, the washers will stop immediately, but the wipers will run for three to four cycles, then return to previously set operation.

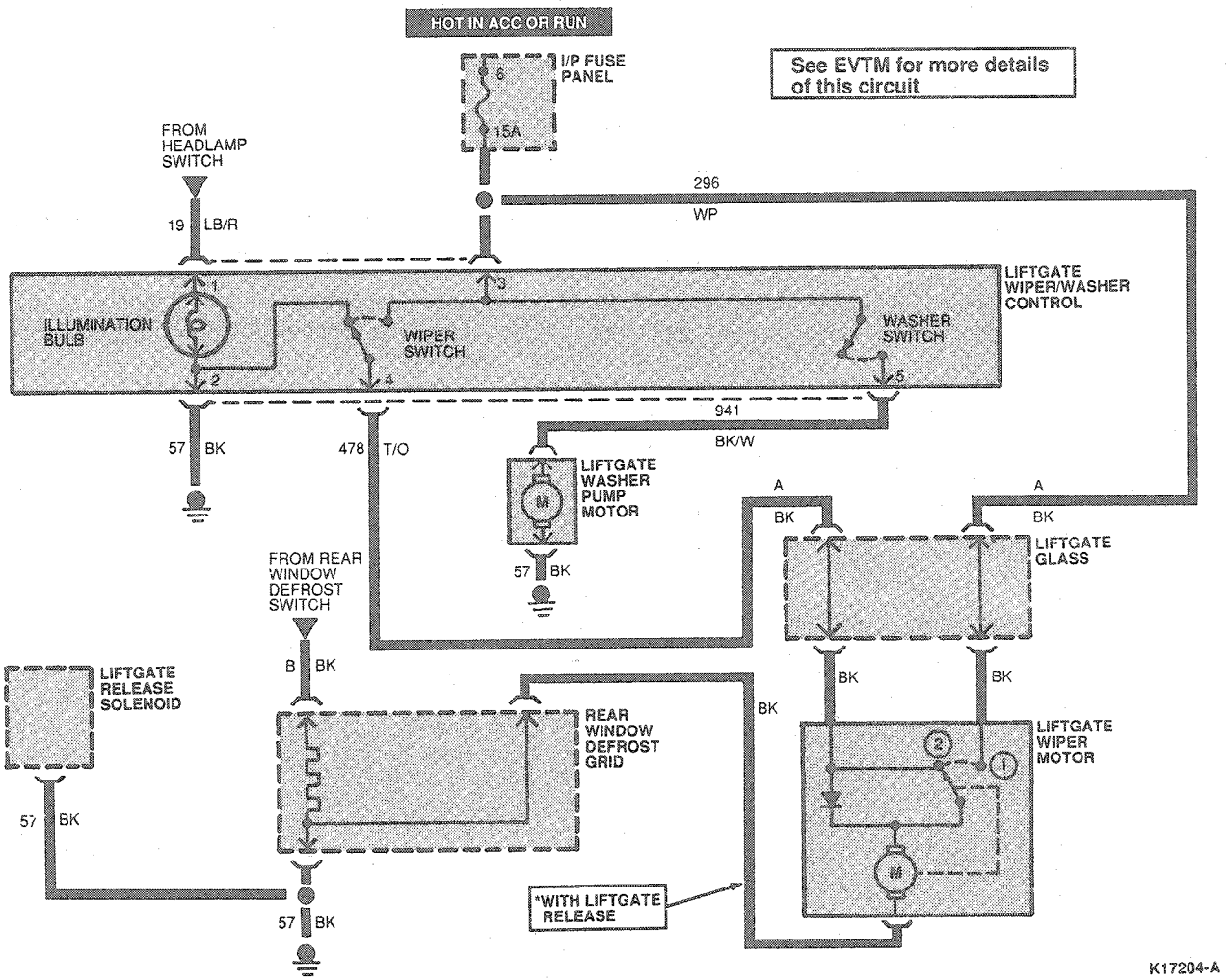
If the wiper control switch is in LO or HI position, washers operate with no change in wiper operation.

Wiper System and Switch, Rear

Main components of the system are a single motor assembly mounted on the liftgate, and an instrument panel-mounted control switch powered through an in-line circuit breaker.

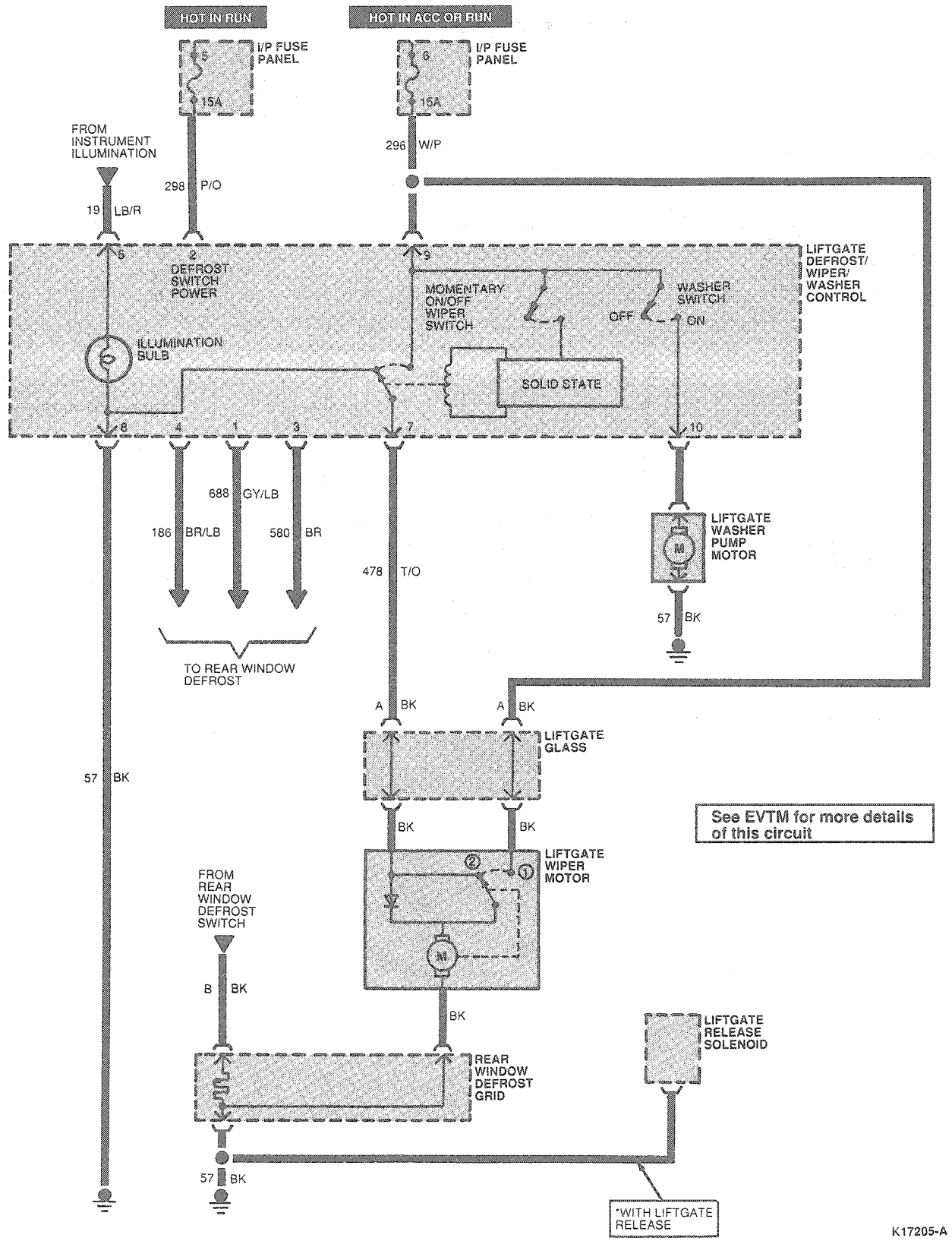
DESCRIPTION AND OPERATION (Continued)

Taurus



DESCRIPTION AND OPERATION (Continued)

Sable



DESCRIPTION AND OPERATION (Continued)

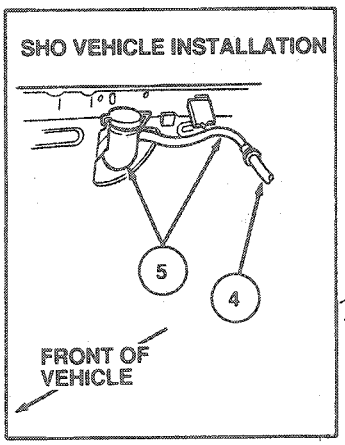
Washer System

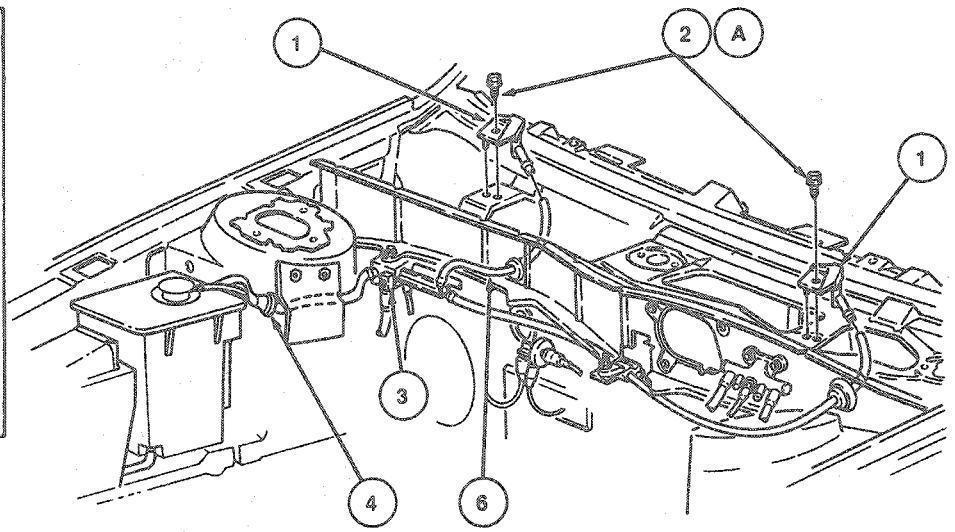
The washer system uses two nozzles located on the cowl top panel. The control switch is part of the multi-function switch and is steering column-mounted. Refer to Section 11-05 for multi-function switch. When activated, it energizes a washer pump mounted inside a cavity in the washer reservoir. The reservoir is mounted at the RH fender apron.

Windshield Washer Low Fluid Warning Indicator (Front Washer System)

Vehicles equipped with a windshield washer low fluid warning indicator system have a red WASH FLUID indicator.

If the washer fluid level is low, the warning indicator will illuminate when the washer switch is activated. The sending unit for the system is mounted in the washer reservoir and consists of a float and a magnet assembly that opens and closes a reed-type switch. When the fluid reaches approximately one-quarter full, the switch contacts will close. Current will flow through the switch and directly to the warning indicator when the washer motor is energized.





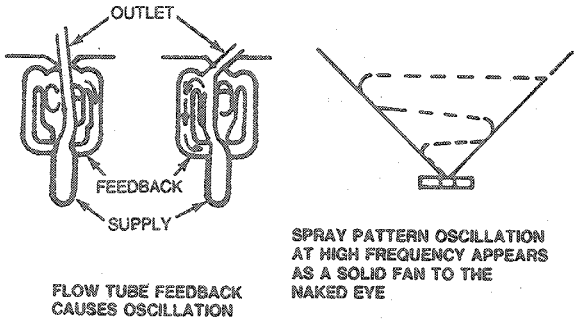
REGULAR PRODUCTION VEHICLE INSTALLATION K8507-E

Item	Part Number	Description
1	17603	Windshield Washer Jet Assy
2A	N610959-S2	Screw (2 Req'd)
3	9S431	Vacuum and Water Distribution Manifold
4	17K608	Filter
5	17618	Washer Reservoir Assy
6	17A605	Hose
A		Tighten to 1.8-2.6 N·m (16-23 Lb-In)

DESCRIPTION AND OPERATION (Continued)

Fluidic Washer System

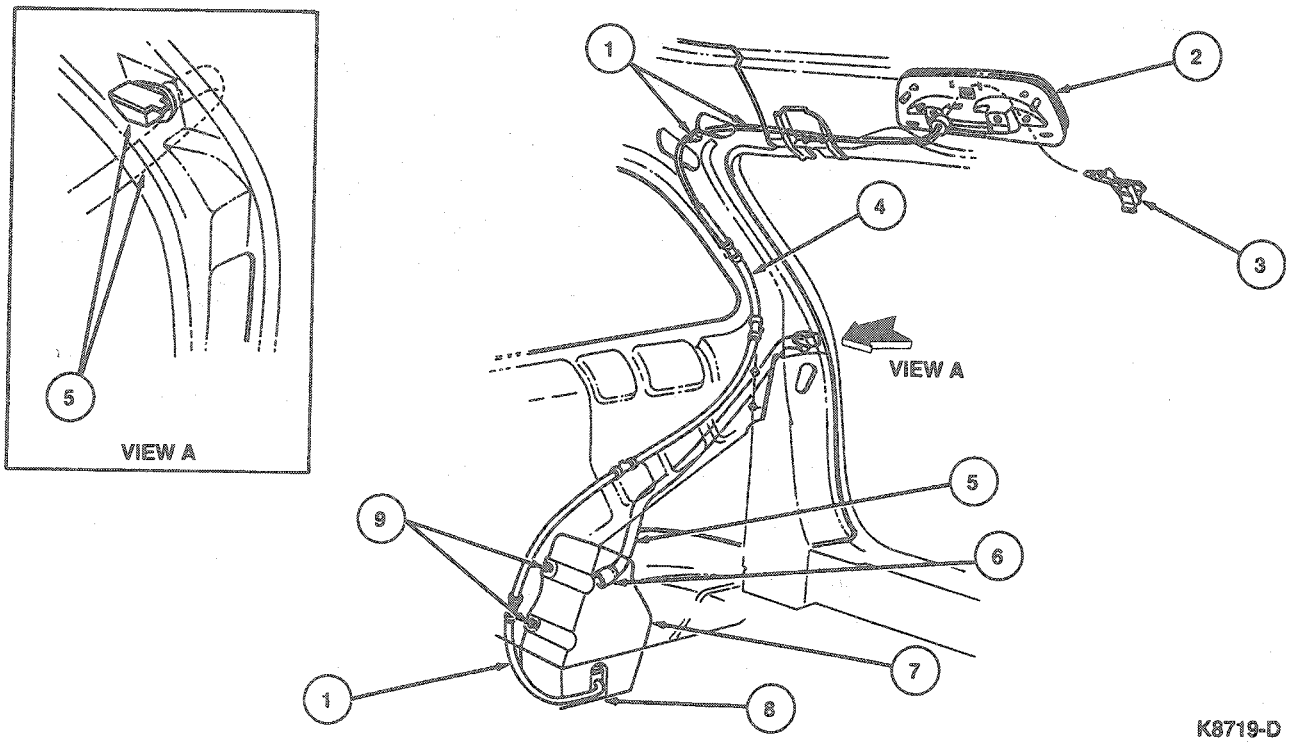
The front fluidic system nozzle expels what appears to be a wide fan-like spray pattern of large droplets of fluid on the windshield. However, it is actually a single oscillating jet stream. Care should be taken to only actuate the system momentarily because of the greater volume of fluid that is dispersed with this system.



Washer System, Rear

The rear system uses a single nozzle mounted inside the rear high-mount stoplamp assembly.

The control switch is on the instrument panel. When activated, the switch energizes an external washer pump on the washer reservoir. The reservoir on the station wagon model is mounted behind the RH trim panel. The reservoir fill cap is located outside near the liftgate opening. Fill the reservoir slowly, otherwise air will become trapped and the reservoir will overflow.



Item	Part Number	Description
1	17408	Hose Assy
2	13A613	High-Mount Stoplamp
3	17603	Washer Jet Assy
4	17408	Hose Assy

(Continued)

Item	Part Number	Description
5	17632	Reservoir Fill Hose Assy
6	8287	Clamp
7	17618	Washer Reservoir
8	17664	Pump
9	N800369-S2	Screw (3 Req'd)

DIAGNOSIS AND TESTING

Parking Test

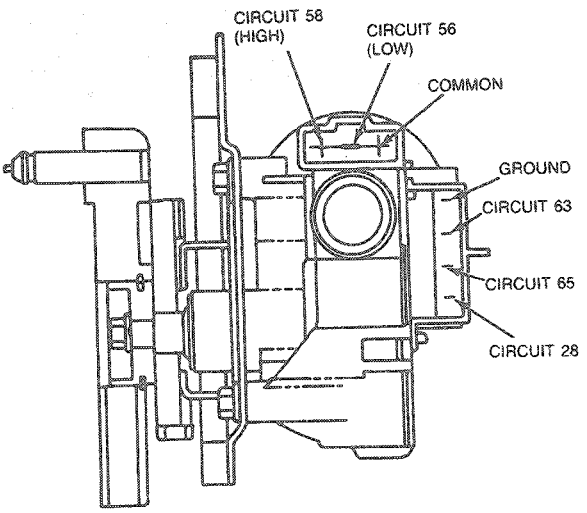
Tools Required:

- Rotunda Digital Volt Ohmmeter 014-00407

The ignition switch must be in RUN for all tests. Verify proper operation of wiper system in LO. With system operating in LO, turn wiper system switch to OFF when wiper blades are in vertical (straight-up) position. Wipers should complete cycle and depress park (to bottom of windshield). If the wiper blades do not park, refer to appropriate condition of system below and test and service as indicated.

- Motor stops when wiper switch is turned to OFF. (Does not complete cycle).

1. Remove motor park switch connector and check for battery voltage, using Rotunda Digital Volt-Ohmmeter 014-00407 or equivalent on Circuit 65 (DG). If battery voltage is not present, service circuit as required. If voltage is present, go to Step 2.
2. Check motor ground wiring at switch connector.
3. With both wiper motor connectors disconnected, use an ohmmeter, such as Rotunda Digital Volt-Ohmmeter 014-00407, or equivalent, to verify continuity (less than one ohm) between Circuits 28 (BK/PK) and 58 (W) in the wiring harness. If continuity is not present, trace and service as required. If continuity is OK, leave connectors disconnected and go to Step 4.
4. Check for continuity to ground terminal on gear cover at circuit terminal 28 (BK/PK) on wiper motor. If open, replace motor. If ground is present, leave connectors disconnected and go to Step 5.
5. Verify continuity (less than one ohm resistance) between Circuits 61 (Y/R) and 63 (R) in the wiring harness. If continuity is not present, trace and service as required. If lack of continuity is traced to wiper control module (WCM), check wiper switch for continuity. Refer to Section 11-05. Replace switch if continuity is not present. If continuity is present in switch, and lack of continuity has been traced to WCM, replace module. If continuity between Circuits 61 (Y/R) and 63 (R) is OK, leave connectors disconnected and go to Step 6.
6. Check for continuity between circuit 63 (R) and 65 (DG) on wiper motor. If open, replace motor.
   - Wiper blades go into depressed park (below windshield), but wiper motor keeps running. Replace motor.
   - Wiper blades stall or jam (motor starts running in reverse direction) while going from park to depressed park (below windshield).
7. Check linkage and service as required. If OK, go to Step 8.
8. Check wiper motor arm and windlatch assembly. If bent or cracked replace motor.
   - Wiper blades complete cycle, but continue to wipe for part of another cycle and park on windshield, or
   - Wiper blades run continuously in OFF or INTERVAL, or
   - Wiper blades run to bottom of windshield and stop, but will not depress park below windshield.
9. Perform wiper switch continuity test. Refer to Section 11-05. If continuity test fails, replace motor. If continuity test is OK on standard wiper system, replace motor. If continuity test is OK on interval wiper system, go to Step 10.
10. Check wash Circuit 941 (BK/W) for no voltage. If any voltage is present, service as required. If no voltage is present, go to Step 11.
11. Disconnect connectors at wiper motor and check for continuity between Circuits 61 (Y/R) and 63 (R) going to interval governor. If open, replace governor. If continuity is present, replace motor.



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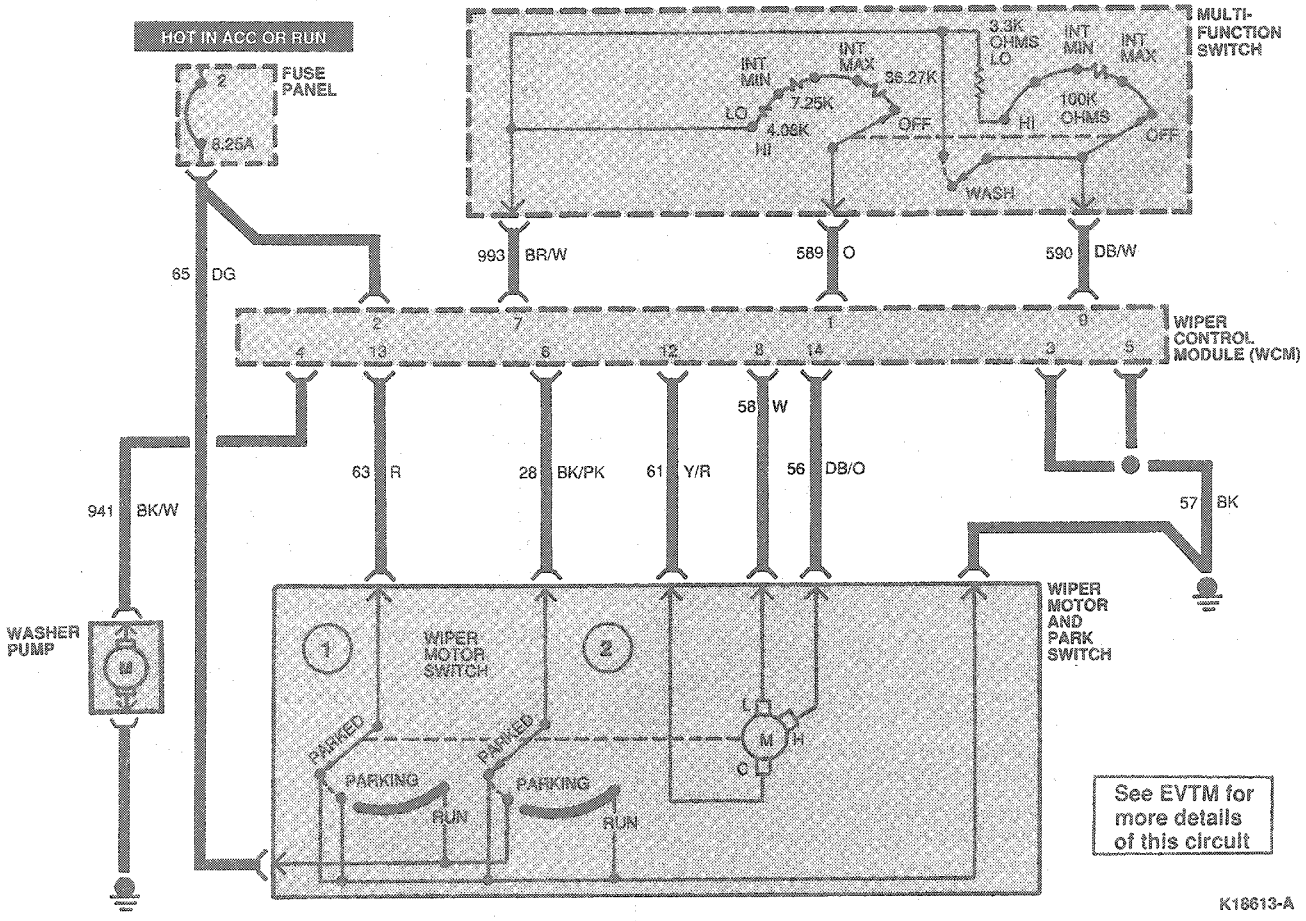
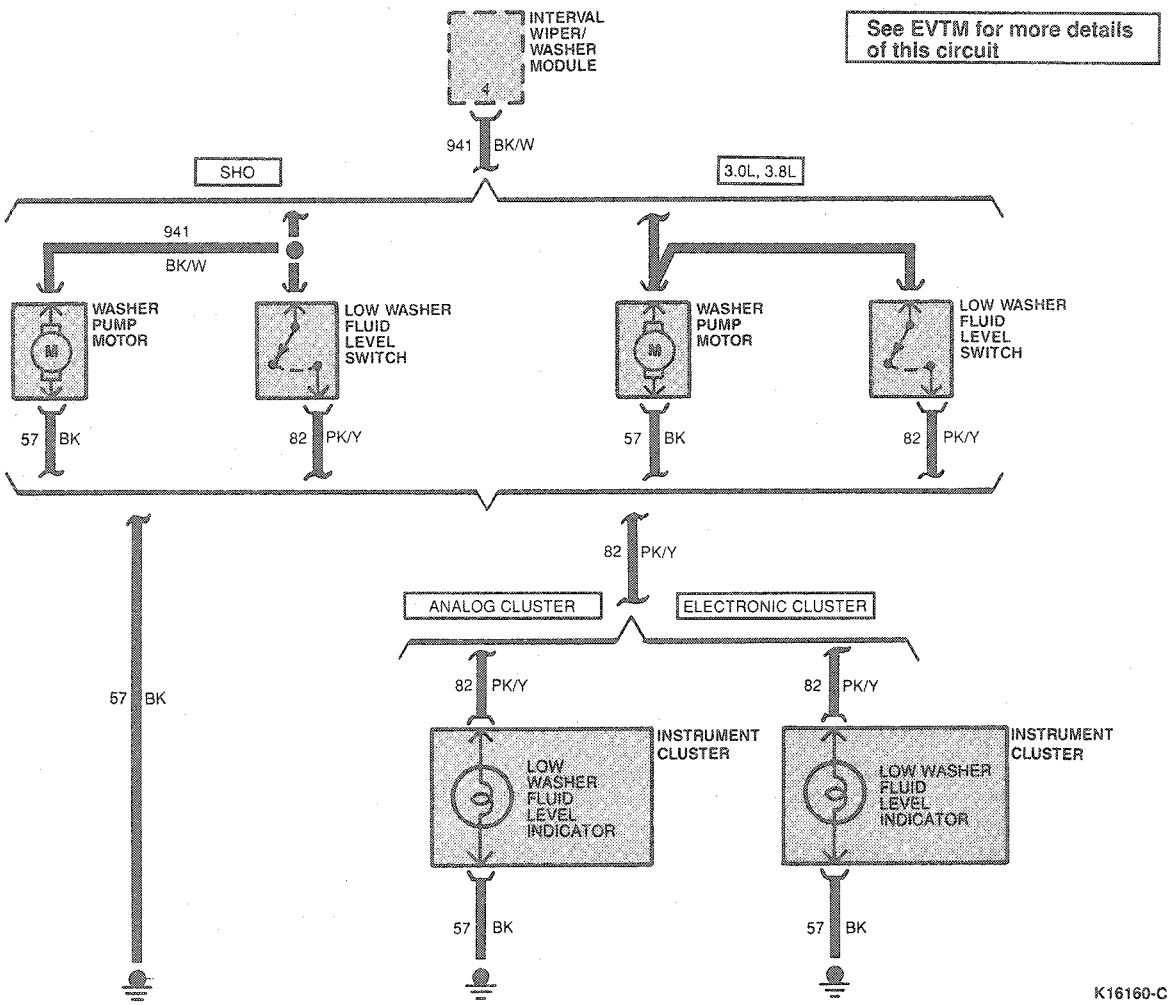
DIAGNOSIS AND TESTING (Continued)

Wiper Circuit



DIAGNOSIS AND TESTING (Continued)

Washer Circuit



Wiper Motor Current Draw, Front

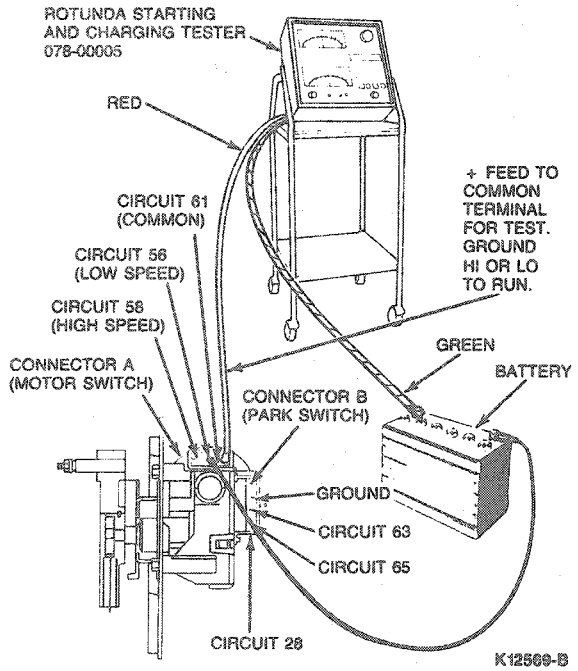
Tools Required:

- Rotunda Starting and Charging Tester 078-00005

CAUTION: Do not handle any windshield wiper motor abusively when diagnosing wiper operations, because it will damage the magnets and make the motor inoperative. Rough handling of new replacement motors may also damage the magnets.

DIAGNOSIS AND TESTING (Continued)

Disconnect the linkage from the motor and disconnect the electrical plug to test the motor on the vehicle. Connect the green lead from the test equipment, such as Rotunda Starting and Charging Tester 078-00005 or equivalent, to the battery positive (plus) post. Connect the positive (red) lead from the tester to the common brush terminal. Attach a ground first to the low-speed connection and then to the high-speed connection at the connector plug as shown. In either case, the current draw should not exceed 3.5 amperes.



Circuit Breaker

The 8.25 amp circuit breaker is located in the fuse panel. Two separate tests are necessary to check for correct circuit breaker operation. Remove the circuit breaker from the fuse panel. Connect the tester leads to the circuit breaker.

Test 1

1. Before connecting the circuit breaker to the volt-amp tester, touch the tester leads together and adjust the current draw, until it equals the circuit breaker rating.
2. Connect the breaker to the tester. Leave the breaker connected to the tester for 10 minutes. Hold the current reading on the ammeter at the rated current. If the circuit breaker opens during the 10 minutes, replace the circuit breaker.

Test 2

1. Touch the tester leads together and adjust the current draw until it is twice the rated current.
2. Connect the breaker. Hold the current reading on the ammeter at twice the rated current. The current reading on the ammeter should drop to zero within 30 seconds. If it takes longer than 30 seconds for the circuit breaker to open (current reading drops to zero), replace the circuit breaker.

Wiper Switch Continuity Test, Front

Refer to Section 11-05.

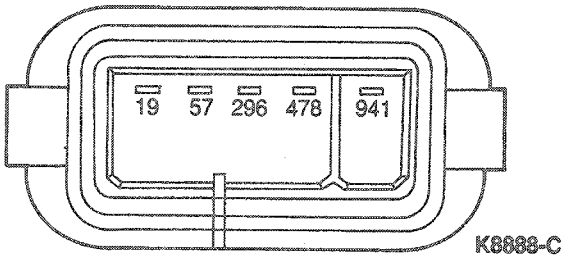
Wiper Switch Continuity Test, Rear

Check the continuity between the switch terminals. Either a self-powered test lamp or an ohmmeter can be used to test rear switch.

To detect marginal operation of the switch, move the switch button while each reading is being taken.

If the switch does not exhibit continuity or if poor continuity exists in any switch position, replace the switch.

Taurus



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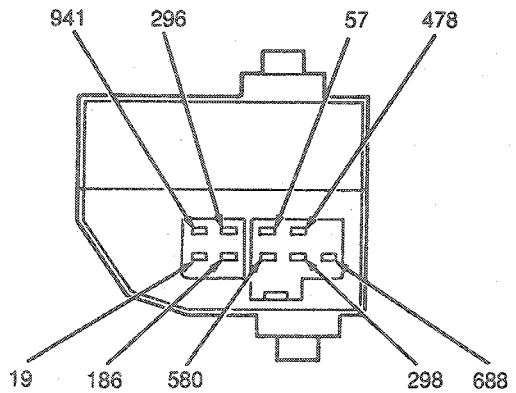


SWITCH POSITION	SWITCH TERMINALS
OFF	57 AND 478
ON	296 AND 478
WASH(ON)	296, 478 AND 941

DIAGNOSIS AND TESTING (Continued)

Windshield Wiper Control Module Test

If interval operation is unsatisfactory, first check the motor current draw and the control switch and all connecting wires for continuity. If the motor, switch and connecting wires are OK, replace the WCM.

Refer to the following diagnosis chart to diagnose concerns in the windshield wiper / washer system.

ELECTRICAL—WIPERS AND WASHERS

CONDITION	POSSIBLE SOURCE	ACTION
• Windshield Wipers Inoperative in ALL Switch Positions	**NOTE:** Check in sequence. • Open circuit breaker. • Poor ground at wiper motor. • Switch. • Bent or damaged motor linkage. • Motor. • Open wire or connector. • Wiper control module.	• Check and replace if required. • Jumper motor ground terminal to vehicle body. If motor now works service ground. • Test switch. • Serviced as required. • Perform motor current draw test. • Service as required. • Check and replace if required.
• Windshield Wipers Inoperative or Erratic in LO or INTERVAL (HI OK)	• Switch. • Motor. • Open wiring. • Inoperative wiper control module.	• Test switch. • Perform motor current draw test for low speed. • Check Circuit 58 (W). • Check Circuit 61 (Y / R). • Check Circuit 57 (BL). • Replace wiper control module.
• Wipers Will Not Stop in OFF or INTERVAL	• Motor switch, wiring or governor assembly.	• Perform parking test.
• Internal Systems Only: No Wipe(s) After Wash	• Circuit 941 (BK / W) open. • Wiper control module inoperative.	• Service as required. • Replace wiper control module.
• Windshield Washer Does Not Operate	• Low fluid level. • Split, loose, pinched or kinked hose. • Open in wiring or switch. • Washer pump. • Wiper control module.	• Fill as required. • Inspect, service as required. • Service as required. • Replace pump. • Replace wiper control module.

ELECTRICAL—REAR WIPER AND WASHER

CONDITION	POSSIBLE SOURCE	ACTION
• Liftgate Wiper / Washer is Inoperative	• No voltage to rear wiper / washer switch • Inoperative wiper / washer switch.	• Check continuity of rear wiper / washer circuit breaker. If good, check for voltage to rear wiper / washer switch on 296 (W / P) wire. If no voltage is present, service wire for an open. • Check continuity to ground G100 from 57 (BK) wire of rear wiper / washer switch. • For Taurus check continuity of rear wiper / washer switch between 296 (W / P) and 478 (T / O) on connector C204 with switch on. If no continuity, replace switch. • For Sable check continuity of rear wiper / washer switch between 478 and ground then between 441 and ground with switch on. If no continuity, replace switch.

DIAGNOSIS AND TESTING (Continued)

ELECTRICAL—REAR WIPER AND WASHER (Continued)

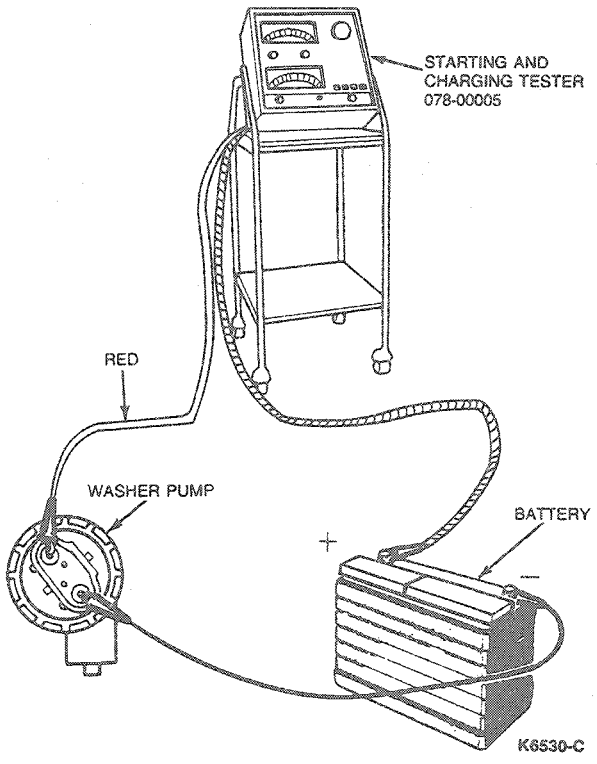
CONDITION	POSSIBLE SOURCE	ACTION
• Liftgate Wiper Does Not Park	• No voltage to liftgate wiper motor and switch. • Inoperative liftgate switch. • Inoperative rear wiper switch.	• Check for voltage at connector C408, A (BK) wire. • Check Liftgate Switch for continuity while wiper is in park position. • Check continuity of rear wiper switch between Pin 2 (circuit 57, BK) and Pin 4 (circuit 478, T/O) with switch in the OFF position.
• Liftgate Washer Pump is Inoperative	• No voltage to liftgate washer pump • Rear washer switch inoperative.	• Check for voltage at liftgate washer pump on 941 (BK/W) wire while rear wiper/washer switch is on. If voltage is present, check continuity to ground G400 from liftgate washer pump. • Check rear wiper/washer switch for continuity between 296 (W/P) wire and 941 (BK/W) wire while washer switch is on.
• Illumination Bulb Does Not Operate	• Open bulb. • No voltage to bulb.	• Check illumination bulb continuity. • With main light switch in PARK or HEAD, check for voltage on 19 (LB/R) wire. If no voltage is present, check 19 (LB/R) wire for an open. • Check 57 (BK) wire for continuity to ground G100 from rear wiper/washer switch.

Washer Pump Current Draw

Tools Required:

- Rotunda Digital Volt Ohmmeter 014-00407
- Rotunda Starting and Charging Tester 078-00005

Attach leads of the volt-amp tester, such as Rotunda Starting and Charging Tester 078-00005 or Rotunda Digital Volt-Ohmmeter 014-00407 or equivalent. Current draw should not exceed four amps, or indicate less than two amps while the washer pump motor is pumping fluid.



DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: WINDSHIELD WASHER DOES NOT OPERATE

TEST STEP		RESULT	ACTION TO TAKE
A1	CHECK FLUID LEVEL		
	• Check fluid level in reservoir. • **Is fluid level good?**	Yes No	GO to A2. Fill Reservoir.
A2	CHECK WASHER OPERATION		
	• Activate washer switch. • Check pump for operation.	Motor inoperative Motor operates, but will not squirt fluid Pump squirts fluid but wipers do not wipe	GO to A3. GO to A8. GO to A10.
A3	CHECK WCM OUTPUT		
	• Turn ignition on. • Depress washer switch. • Check for battery voltage at circuit 941 (BK/W) at washer pump. • **Is battery voltage present?**	Yes No	GO to A7. GO to A4.
A4	CHECK FOR POWER TO WCM		
	• Check for battery voltage at circuit 65 (DG) of the WCM Pin J1-2. • **Is battery voltage present?**	Yes No	GO to A5. CHECK for • Open circuit breaker. • Open connector. • Open wire circuit 65 (DG). SERVICE as required.
A5	CHECK CONTINUITY OF SWITCH		
	• Disconnect connector from WCM. • Depress washer switch. • Measure resistance between circuit 993 (BR/W) and circuit 590 (DB/W). • **Is there continuity?**	Yes No	GO to A6. CHECK for: • Open wire between wiper switch and WCM. • Damaged wiper/washer switch. SERVICE or REPLACE as required.
A6	CHECK FOR VOLTAGE TO MOTOR		
	• Reconnect connector to WCM. • Turn ignition switch to run position. • Depress washer switch. • Measure voltage at circuit 58 (W) at WCM connector. • **Is battery voltage present?**	Yes No	CHECK for: • Open circuit 58 (W) between WCM and wiper motor. REPLACE damaged WCM.
A7	CHECK GROUND AT WASHER PUMP		
	• Using an ohmmeter, check ground at the pump. • **Is the ground functional?**	Yes No	REPLACE washer pump. SERVICE ground.
A8	INSPECT HOSE AND NOZZLE		
	• visually inspect washer hose and nozzle for blockage or hose kinks. • **Is hose blocked or kinked?**	Yes No	CLEAN, REPLACE, or SERVICE nozzle or hoses. GO to A9.
A9	CHECK FOR BLOCKAGE AT WASHER PUMP OUTLET		
	• Disconnect hose at reservoir and check for blockage at washer pump outlet. • **Is hose blocked at washer pump outlet?**	Yes No	REMOVE washer pump from reservoir and clean. REPLACE washer pump.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: WINDSHIELD WASHER DOES NOT OPERATE (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
A10	TEST FOR POWER TO WIPER MOTOR		
	• Disconnect connector from wiper motor. • Turn ignition to run position. • Depress and release washer switch. • Check for battery voltage between circuit 58 (W) and 61 (Y/R). • **Is battery voltage present?**	Yes ▶ No ▶	PERFORM wiper motor current draw test. SERVICE as required. GO to A11.
A11	TEST FOR BATTERY VOLTAGE AT WCM OUTPUT PIN		
	• Turn ignition to RUN position. • Depress and release washer switch. • Check for battery voltage between circuits 58 (W) and 61 (Y/R) at WCM connector. • **Is battery voltage present?**	Yes ▶ No ▶	CHECK for: • Unseated connector. • Open circuit 58 (W) between WCM and wiper motor. REPLACE WCM.

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PINPOINT TEST B: WIPERS INOPERATIVE AT HIGH SPEED

TEST STEP		RESULT ▶	ACTION TO TAKE
B1	CHECK OPERATION		
	• **Does low speed work?**	Yes ▶ No ▶	GO to B4. GO to B2.
B2	CHECK FOR SUPPLY VOLTAGE AT MOTOR		
	• Turn ignition on. • Turn wiper switch to HI. • Unplug wiper motor. • Check for battery voltage at circuit 65 (DG). • **Is battery voltage present?**	Yes ▶ No ▶	GO to B3. CHECK for: • Open circuit breaker in fuse panel. • Open connector. • Open wire circuit 65 (DG). • Poor ground connection. SERVICE as required.
B3	CHECK FOR BATTERY VOLTAGE AT THE WCM		
	• Check for battery voltage at circuit 65 (DG) pin 2 of connector. • **Is battery voltage present?**	Yes ▶ No ▶	GO to B4. SERVICE open in power feed to module. CHECK for: • Open wire in circuit 65 (DG). • Open unseated connector.
B4	CHECK FOR BATTERY VOLTAGE TO MOTOR WINDINGS		
	• Turn ignition switch to RUN. • Turn wiper switch to HI. • Disconnect connector from wiper motor. • Check for battery voltage between circuits 61 (Y/R) and 56 (DB/O). • **Is battery voltage present?**	Yes ▶ No ▶	GO to B7. GO to B5.
B5	CHECK FOR BATTERY VOLTAGE AT WCM CONNECTOR		
	• Check for battery voltage between pins 12 and 14 (circuits 61 (Y/R) and 56 (DB/O)) of WCM connector. • **Is battery voltage present?**	Yes ▶ No ▶	CHECK for: • Open wire circuits 56 (DB/O) or 61 (Y/R). • Open connector. • Unseated connector. GO to B6.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: WIPERS INOPERATIVE AT HIGH SPEED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
B6	CHECK WIRING BETWEEN (WCM) AND SWITCH		
	• Disconnect connector from wiper control module (WCM) • Measure resistance between circuits 993 (BR/W) and 589 (O). • **Is there continuity?**	Yes ▶ No ▶	REPLACE WCM. CHECK for: • Open wire between wiper switch and WCM. • Damaged wiper switch. SERVICE as required.
B7	CHECK WIPER SWITCH CONTINUITY		
	• Disconnect harness from the wiper switch. • Check continuity between terminals for circuits 993 (BR/W) and 589 (O). • **Is there continuity?**	Yes ▶ No ▶	CHECK for open wire between switch and WCM. SERVICE as required. CHECK for damaged switch. SERVICE as required.
B8	PERFORM WIPER MOTOR CURRENT DRAW TEST		
	• **Is current draw OK?**	Yes ▶ No ▶	CHECK linkage. SERVICE as required. SERVICE wiper motor as required.

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PINPOINT TEST C: WIPERS INOPERATIVE AT LOW SPEED

TEST STEP		RESULT	ACTION TO TAKE
C1	CHECK OPERATION		
	• **Does high speed work?**	Yes ▶ No ▶	GO to C4. GO to C2.
C2	CHECK FOR SUPPLY VOLTAGE		
	• Turn ignition on. • Turn wiper switch to HI. • Unplug wiper motor. • Check for battery voltage at circuit 65 (DG). • **Is voltage present?**	Yes ▶ No ▶	GO to C3. CHECK for: • Open circuit breaker in fuse panel. • Open connector. • Open wire circuit 65 (DG). • Poor ground connection. SERVICE as required.
C3	CHECK FOR BATTERY VOLTAGE AT THE WCM		
	• Check for battery voltage at circuit 65 (DG) pin 2 of connector. • **Is voltage present?**	Yes ▶ No ▶	GO to C4. SERVICE open in power feed to module. CHECK for: • Open wire in circuit 65 (DG). • Open unseated connector.
C4	CHECK FOR BATTERY VOLTAGE TO MOTOR WINDINGS		
	• Turn ignition switch to RUN. • Turn wiper switch to LO. • Disconnect connector from wiper motor. • Check for battery voltage between circuits 61 (Y/R) and 58 (W). • **Is voltage present?**	Yes ▶ No ▶	GO to C7. GO to C5.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C: WIPERS INOPERATIVE AT LOW SPEED (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
C5	CHECK FOR BATTERY VOLTAGE AT WCM CONNECTOR		
	• Check for battery voltage between pins 12 and 8 (circuits 61 (Y/R) and 58 (W)) of WCM connector. • Is voltage present?	Yes ▶	CHECK for: • Open wire circuits 58 (W) or 61 (Y/R). • Open connector. • Unseated connector.
		No ▶	GO to C6.
C6	CHECK WIRING BETWEEN (WCM) AND SWITCH		
	• Disconnect connector from wiper control module (WCM). • Measure resistance between circuit 993 (BR/W) and 589 (O). • Is resistance 4.08k ohms?	Yes ▶	REPLACE WCM.
		No ▶	CHECK for: • Open wire between wiper switch and WCM. • Damaged wiper switch. SERVICE as required.
C7	CHECK CONTROL LINE SIGNAL AT WIPER SWITCH		
	• Disconnect harness from the wiper switch. • Check continuity between terminals for circuits 993 (BR/W) and 589 (O). • Is resistance 4.08k ohms?	Yes ▶	SERVICE open wire between switch and WCM.
		No ▶	SERVICE damaged switch.
C8	PERFORM WIPER MOTOR CURRENT DRAW TEST		
	• Is current draw OK?	Yes ▶	CHECK linkage. SERVICE wiper motor as required.
		No ▶	SERVICE as required.

TK18609A

PINPOINT TEST D: WIPERS INOPERATIVE AT LOW SPEED INTERVAL

TEST STEP		RESULT ▶	ACTION TO TAKE
D1	CHECK OPERATION		
	• Does low speed work?	Yes ▶	GO to D2.
		No ▶	GO to C1.
D2	CHECK MODE SELECT INPUT SIGNAL		
	• Disconnect connector from wiper control module (WCM). • Measure resistance between circuits 993 (BR/W) and 589 (O). • Is resistance 11.3k ohms?	Yes ▶	GO to D4.
		No ▶	GO to D3.
D3	CHECK MODE SELECT SIGNAL AT WIPER SWITCH		
	• Disconnect harness from the wiper switch. • Resistance between terminals for circuits 993 (BR/W) and 589 (O). • Is resistance 11.3k ohms?	Yes ▶	CHECK for open wire between switch and WCM. SERVICE as required.
		No ▶	CHECK for damaged switch. SERVICE as required.
D4	CHECK INTERVAL SELECT INPUT SIGNAL		
	• Rotate interval control on the wiper switch from min to max. • Measure resistance between circuits 590 (DB/W) and 993 (BR/W). • Is resistance 3.3k-100k ohms?	Yes ▶	REPLACE WCM.
		No ▶	GO to D5.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST D: WIPERS INOPERATIVE AT LOW SPEED INTERVAL (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
D5	CHECK INTERVAL SELECT INPUT SIGNAL AT WIPER SWITCH		
	• Disconnect harness from wiper switch. • Rotate interval control on the wiper switch from min to max. • Measure resistance between terminals of wiper switch for circuits 590 (DB/W) and 993 (BR/W). • **Is resistance 3.3k-100k ohms?**	Yes ▶ No ▶	CHECK for open wires between the wiper switch and the WCM. SERVICE as required. CHECK for damaged wiper switch. SERVICE as required.

TK18610A

PINPOINT TEST E: WIPERS WILL NOT PARK BELOW WINDSHIELD

TEST STEP		RESULT ▶	ACTION TO TAKE
E1	CHECK FOR WIRE CONTINUITY		
	• Turn wiper switch to OFF position. • Disconnect connector from wiper motor. • Check for continuity between circuits 28 (BK/PK) and 58 (W). • **Is there continuity?**	Yes ▶ No ▶	PERFORM motor parking test. GO to E2.
E2	CHECK FOR WCM CONTINUITY		
	• Turn ignition to OFF. • Disconnect connector from wiper control module. • Measure continuity between pins J1-6 and J1-8 of WCM. • **Is there continuity?**	Yes ▶ No ▶	CHECK for: • Unseated connectors. • Open circuit between WCM and wiper motor. SERVICE as required. GO to E3.
E3	CHECK WIPER SWITCH FUNCTIONALITY		
	• Turn wiper switch to OFF position. • Measure resistance between circuits 589 (O) and 993 (BR/W). • **Is resistance approximately 47.6k ohms?**	Yes ▶ No ▶	REPLACE WCM. CHECK for: • Unseated wiper switch connector. • Open circuit (589 (O) or 993 (BR/W)). • Damaged wiper switch. SERVICE as required.

TK18611A

PINPOINT TEST F: WIPERS WILL NOT TURN OFF

TEST STEP		RESULT ▶	ACTION TO TAKE
F1	CHECK FOR SHORTED WCM		
	• Disconnect connector from wiper motor. • Turn ignition to RUN position. • Turn wiper switch to OFF position. • Measure continuity between circuits 28 (BK/PK) and between circuits 61 (Y/R) and 63 (R). • **Is there continuity?**	Yes ▶ No ▶	CHECK for: • Unseated component. • Damaged wiper motor. SERVICE as required. GO to F2.
F2	CHECK WIRING BETWEEN WCM AND MOTOR		
	• Measure continuity of circuits 28 (BK/PK) and 58 (W) and between circuits 61 (Y/R) and 63 (R) at WCM connector? • **Is there continuity?**	Yes ▶ No ▶	SERVICE open circuit between WCM and wiper motor. GO to F3.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST F: WIPERS WILL NOT TURN OFF (Continued)

TEST STEP		RESULT	ACTION TO TAKE
F3	CHECK WIPER SWITCH		
	• Measure resistance between circuits 589 (O) and 993 (BR/W). • **Is resistance approximately 47.6k ohms?**	Yes ▶	REPLACE WCM.
		No ▶	CHECK for: • Open circuit (993 (BR/W) or 589 (O)) between wiper switch and WCM. • Damaged wiper switch. SERVICE as required.

TK18612A

REMOVAL AND INSTALLATION

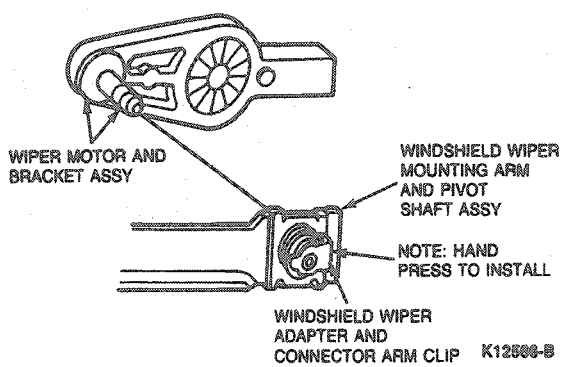
Wiper Motor, Front

When installing the drive arm to a new motor, follow the instructions included in the new motor kit.

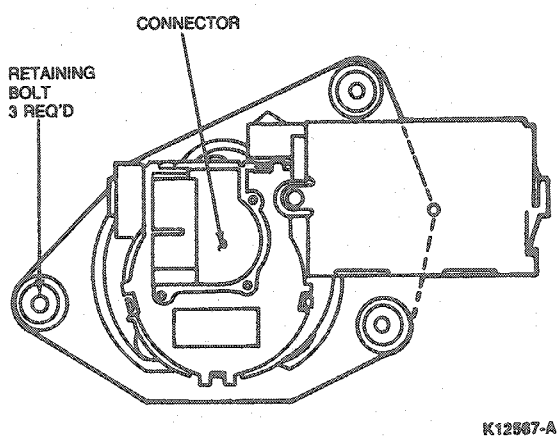
CAUTION: The internal permanent magnets used in the wiper motor are a ceramic (glass-like) material. Care must be exercised in handling the motor to avoid damaging the magnets. The motor must not be struck or tapped with a hammer or other object.

Removal

1. Open hood and disconnect battery cables.
2. Disconnect power lead from motor.
3. Remove LH wiper arm.
4. Lift watershield cover from cowl on passenger side.
5. Remove linkage retaining clip from operating arm on motor by lifting locking tab up and pulling clip away from pin.



6. Remove three retaining bolts from motor and bracket assembly and remove.



Installation

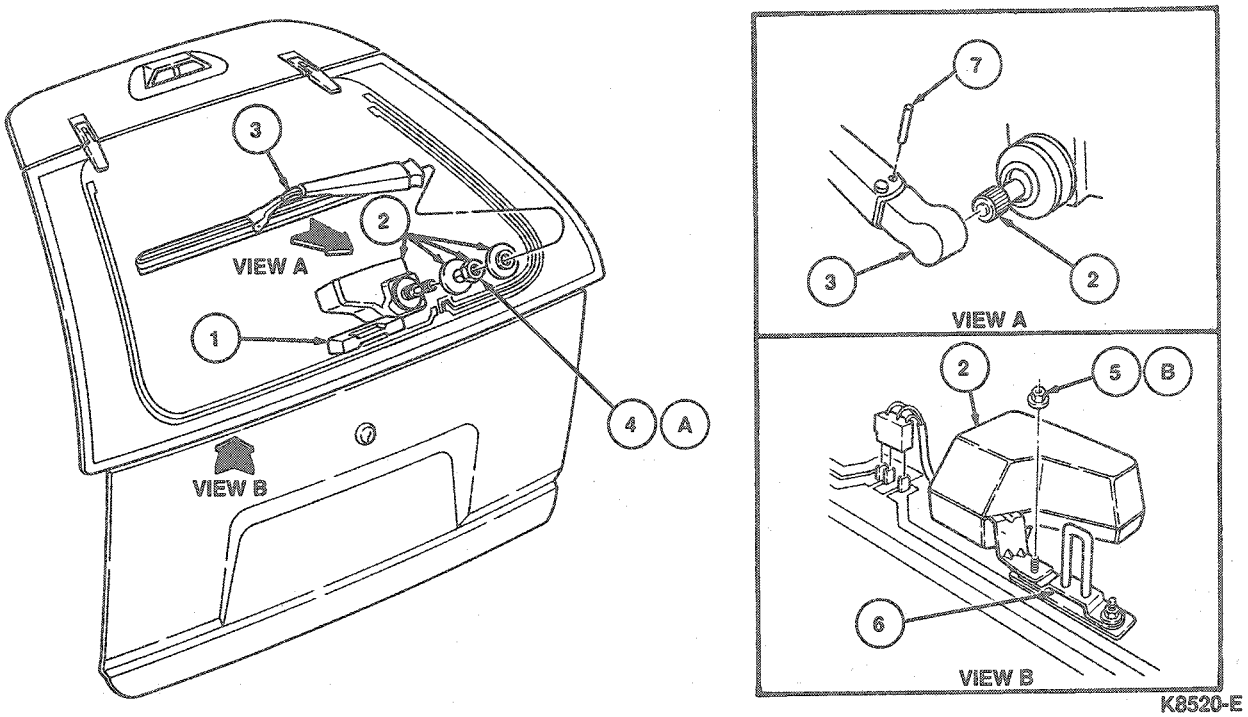
1. Position wiper motor assembly and install retaining bolts. Tighten to 7-9.6 N·m (60-85 lb-in).
2. Install retaining clip on linkage arm.
3. Install linkage on motor output arm. Ensure arm is securely attached to motor. Install linkage by pulling until clip snaps in place.
4. Install LH watershield.
5. Connect battery ground cable. Check wiper motor operation through all modes.
6. Install LH wiper blade to Dimension X shown in illustration under Adjustments.

Station Wagon — Rear

Removal and Installation

1. Remove wiper arm and blade.
2. Remove pivot shaft retaining nut and spacers.
3. Disconnect electrical connector to wiper motor. Pull on connector only, not wires.
4. Remove nut retaining motor to handle and remove motor.
5. To install, reverse Steps 1 through 4.

REMOVAL AND INSTALLATION (Continued)



Item	Part Number	Description
1	44409	Back Window Handle
2	17C541	Rear Window Wiper Motor Assy
3	17C403	Rear Arm and Blade Assy
4A	17A475	Nut

(Continued)

Item	Part Number	Description
5B	—	Nut and Washer Assy
6	42148	Back Window Latch Striker Assy
7	—	1/16 Inch Diameter Roll Pin
A		Tighten to 15-20 N·m (11-14 lb-ft)
B		Tighten to 5-8 N·m (4-6 lb-ft)

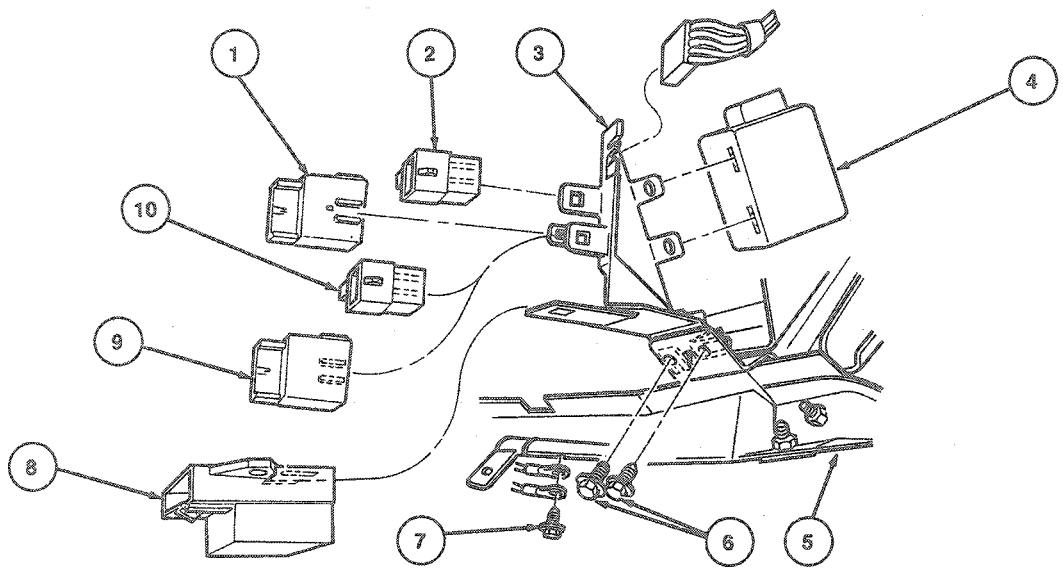
Wiper Control Module (WCM)

The WCM is mounted on a bracket to the right of the steering column support bracket.

Removal and Installation

1. Disconnect battery ground cable.
2. Disconnect harness connector.
3. Remove two retaining screws.
4. To install, reverse Removal procedure. Check wiper system operation.

REMOVAL AND INSTALLATION (Continued)



K16854-A

Item	Part Number	Description
1	6C625AA	Indicator Assy
2	14B193A	Relay Assy Horn
3	14A323A	Bracket Assy Relay Panel
4	17D539AB	Wiper Control Module
5	5404304	Panel Assy Instrument

(Continued)

Item	Part Number	Description
6	N803876	Screw (2 Req'd)
7	N803875-S36	Screw OK
8	10D840A	Chime Assy
9	18C641A	Rear Window Defroster Timer (Sable)
10	14B193A	Relay Assy Fog Lamps (SHO)

Wiper Switch, Front

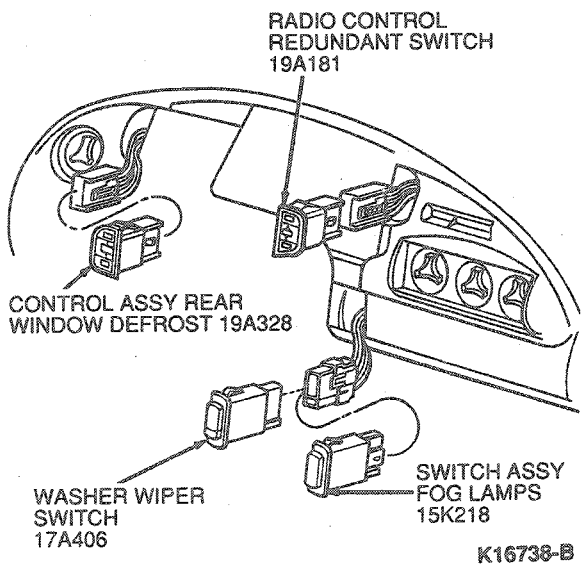
Refer to Section 11-05.

Wiper / Washer Switch, Rear

Removal and Installation

1. Remove cluster opening finish panel. Refer to Section 01-12.
2. Disconnect wiring connector from rear washer switch.
3. Remove washer switch from cluster opening finish panel.
4. To install, reverse Removal procedure.

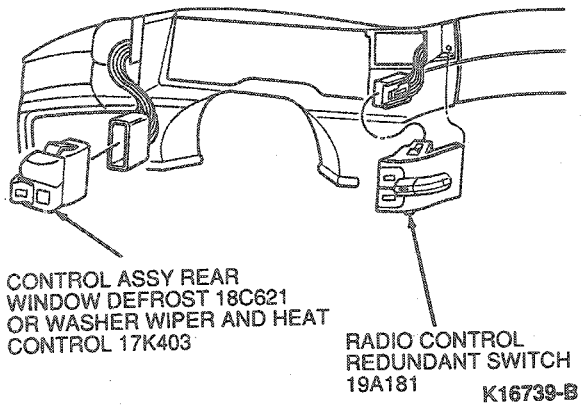
Taurus



K16738-B

REMOVAL AND INSTALLATION (Continued)

Sable



Arm Assembly, Front

Removal

NOTE: To prevent glass and / or paint damage, do not pry arm from pivot with metal or sharp tool.

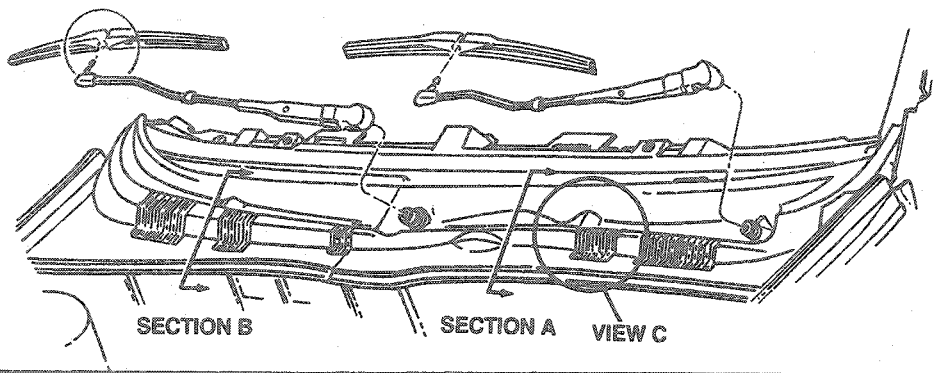
1. Turn ignition switch to the ACC position. Turn wiper switch ON. Allow motor to move the pivot shafts three or four cycles, then turn off the switch. This will place the pivot shafts in the park position. Turn ignition switch to the OFF position.
2. Remove the wiper arm and blade assembly by first applying downward pressure on the wiper arm head, while holding the wiper arm. Then, lift the arm to the highest position and using finger pressure only, grasp slide latch tab and slide latch out from under the arm head. Remove arm and blade assembly.
3. To remove the blade assembly, insert a screwdriver into the slot provided at top of the blade frame, push down on spring lock and pull the blade assembly from the wiper arm pin.
4. Install the blade assembly onto the new replacement wiper arm assembly.

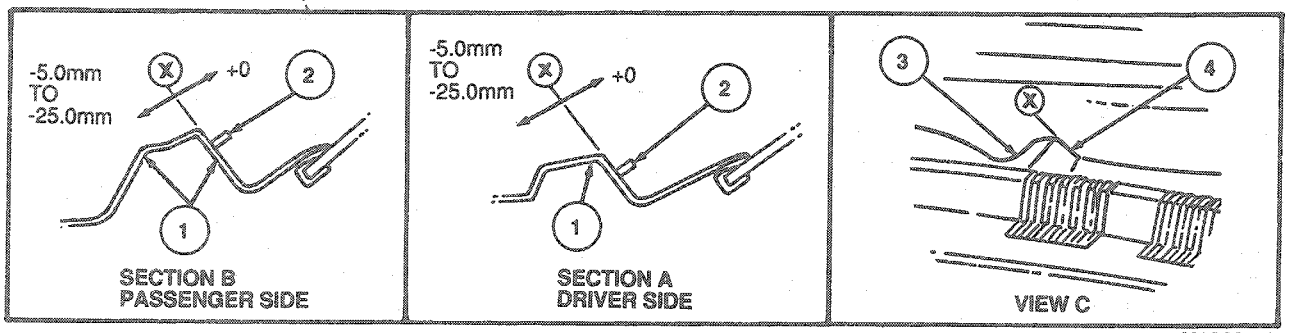
Installation

1. Position the bottom surface of the wiper arm parallel with the top surface of the cowl screen louvers, ensuring the arm rests against the top surface of the cowl screen. Install the arm onto the pivot shaft with the latch slide in the unlatched (outward) position. Refer to Installation Specifications.
2. While applying downward pressure on the arm head, to ensure full seating, raise the other end of the arm sufficiently to allow the latch to slide under the pivot assembly to the latched position.
3. Lift the (latched) wiper arm and blade assembly away from the top surface of the cowl screen louvers and position the arm only on the rearward surface of the wiper arm stop.
4. Ensure the blade is fully seated on the arm and the arm is against (rearward of) the wiper stop, before operating the wipers to verify the correction.

REMOVAL AND INSTALLATION (Continued)

Installation Specifications



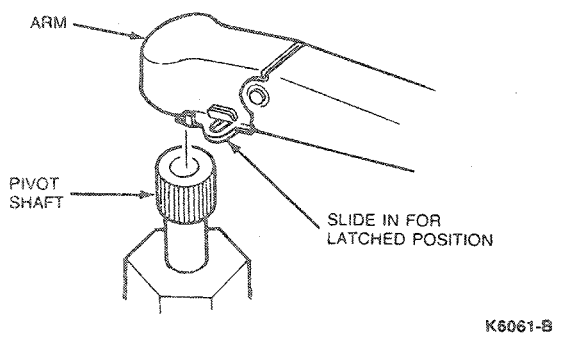


K18624-A

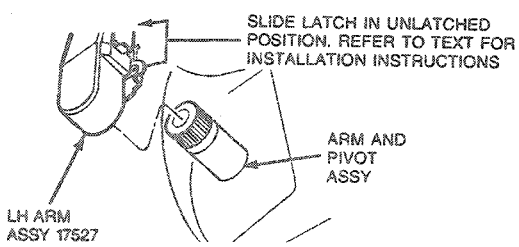
Item	Part Number	Description
1	018A14	Cowl Vent Screen Assy
2	17526	Arm Assy

Item	Part Number	Description
3	—	Top Surface
4	—	Park Surface

(Continued)



K6061-B



K6692-B

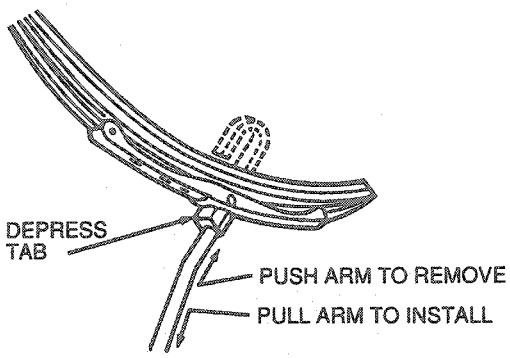
Wiper Blades

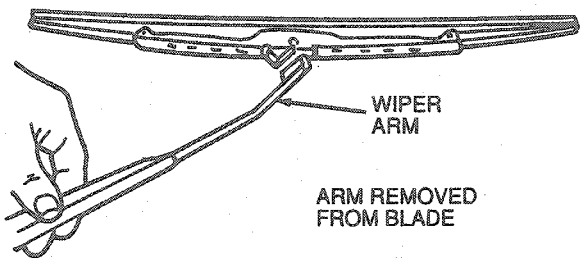
Trico Wiper Blade/Element

To remove and install blade assembly, refer to the following illustration.

REMOVAL AND INSTALLATION (Continued)

Trico





BLADE REPLACEMENT

1. CYCLE ARM AND BLADE ASSEMBLY TO WHERE REMOVAL OF BLADE ASSEMBLY CAN BE PERFORMED WITHOUT DIFFICULTY. TURN IGNITION KEY OFF AT DESIRED POSITION.
2. TO REMOVE BLADE ASSEMBLY FROM ARM, DEPRESS LOCK TAB AND PUSH ARM AWAY FROM BLADE.
3. TO INSTALL BLADE, PULL ARM DOWN ON BLADE UNTIL LOCK TAB IS ENGAGED.

K16855-A

Pivot Shafts and Wiper Linkage, Front

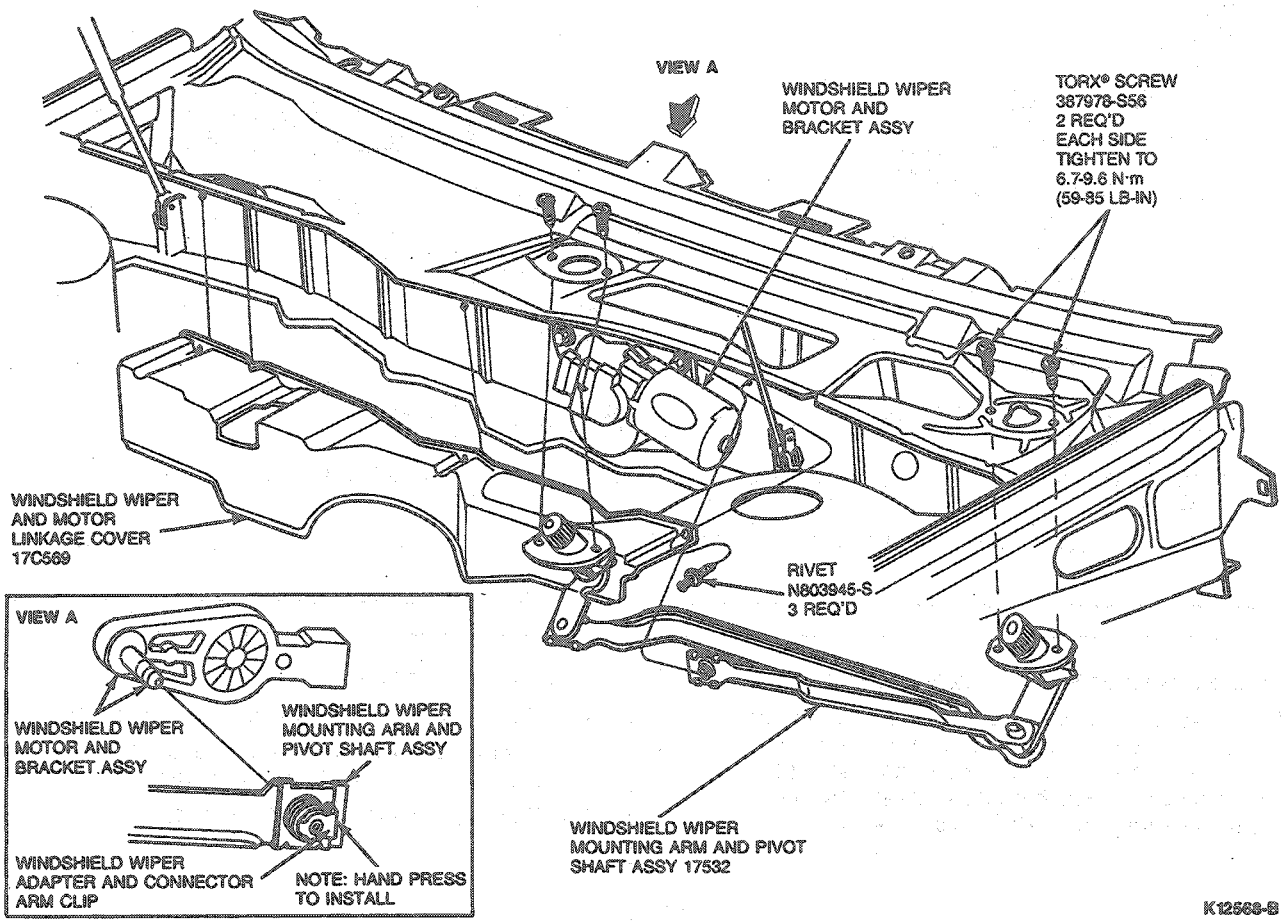
Wiper linkage is mounted below cowl top panel and can be reached by raising hood. Pivot shafts and linkage assemblies are connected together with non-removable plastic ball joints. LH and RH pivot shafts and linkage are serviced as one unit.

Removal and Installation

1. Raise hood. Disconnect battery ground cable.
2. Remove windshield wiper arm and blade assembly from pivot shafts as outlined.
3. Remove RH and LH cowl screens.

REMOVAL AND INSTALLATION (Continued)

4. Disconnect linkage drive arm from motor crank pin after removing clip.



5. Remove screws retaining pivot assemblies to cowl. Remove linkage and pivots from cowl chamber.
6. To install, reverse Removal procedure. Tighten screws to 6.7-9.6 N·m (59-85 lb-in)

Wiper Arm and Blade Assembly, Rear

Removal and Installation

NOTE: To prevent glass and/or paint damage, do not pry arm from pivot with metal or sharp tool.

Raise arm away from glass and insert a 1.6mm (0.062-inch) pin in holes in retainer arm. Allow arm to move toward glass to relieve arm spring tension and lift arm off pivot shaft.

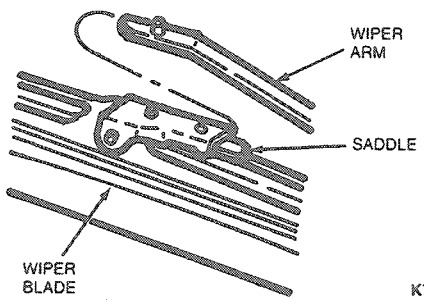
To install, push main arm head over pivot shaft. Ensure pivot shaft is in park, and that blade assembly dimension is positioned correctly. Hold main arm head on pivot shaft while raising blade end of wiper arm and remove 1.6mm (0.062-inch) pin. Then, lower blade to glass.

Wiper Blade, Rear

Removal and Installation

To remove blade, press down on arm to unlatch top stud and pull blade from arm.

To install blade, slide blade assembly onto arm. Ensure that top stud and bottom saddle are securely latched.



REMOVAL AND INSTALLATION (Continued)

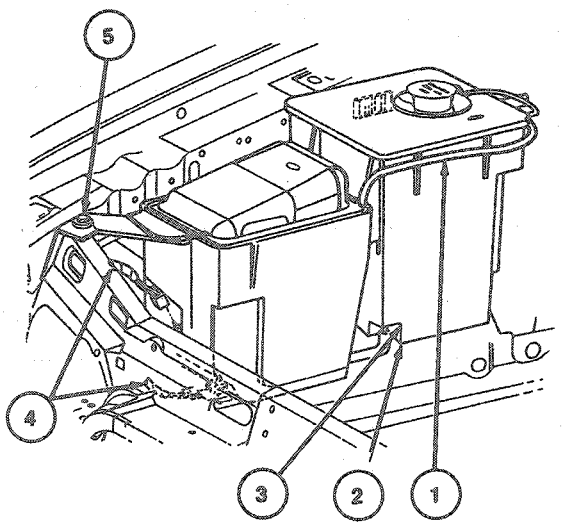
Washer Pump and Reservoir Assembly, Front

Taurus / Sable

Removal and Installation

1. Remove retaining screw.
2. Disconnect electrical connectors.
3. Disconnect hoses and remove reservoir from vehicle.

   NOTE: Reservoir will drain with hose disconnected.
4. To install, reverse Removal procedure. Fill reservoir with fluid.



K14987-C

Item	Part Number	Description
1	17A605	Windshield Washer Hose
2	17618	Washer Reservoir and Motor
3	—	To Pump
4	14290	Wiring Assy
5	N800369-S2	Screw

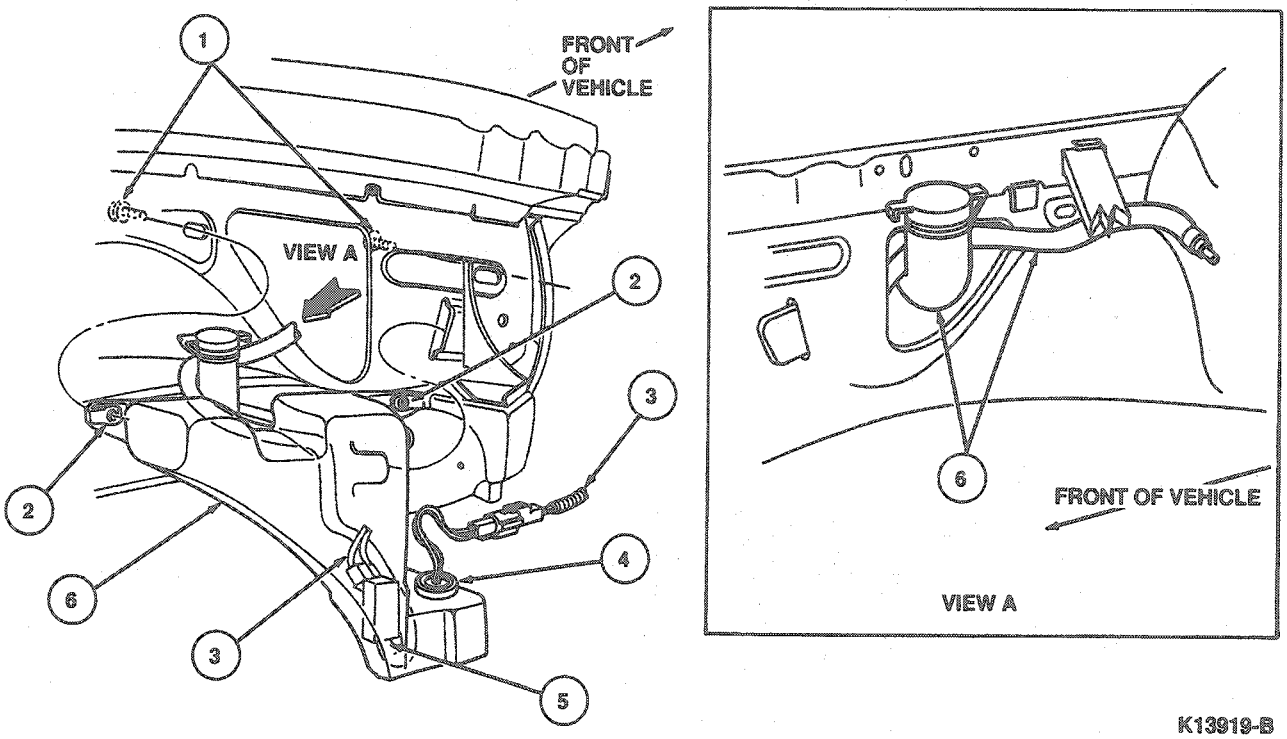
Taurus SHO

Removal and Installation

1. Remove two retaining screws.
2. Remove RH inner splash shield.
3. Disconnect electrical connectors.
4. Disconnect hose and remove reservoir from vehicle.

   NOTE: Reservoir will drain with hose disconnected.
5. To install, reverse Removal procedure. Fill reservoir with fluid.

REMOVAL AND INSTALLATION (Continued)



Item	Part Number	Description
1	N605892-S2	Screw (2 Req'd)
2	N623332-S2	J-Nut (2 Req'd)
3	14290	Wiring Assy
4	17B613	Low Fluid Sensor
5	17664	Pump
6	17618	Reservoir and Washer Motor Assy

Pump Assembly

Removal

1. Remove reservoir assembly from vehicle. Disconnect electrical connector and hoses.
2. Using a small-blade screwdriver, pry out pump being careful not to damage plastic housing.
3. Remove one-piece seal / filter and inspect for damage or debris.

Installation

1. Insert seal.
2. Lubricate inside diameter of seal with soapy solution and insert pump into bottle pump cavity until it is firmly seated in seal.
3. Connect electrical plugs and hoses and replace reservoir assembly in vehicle.
4. Fill reservoir slowly (otherwise air will be trapped in reservoir causing it to overflow) and operate washer system.
5. Check for leaks.

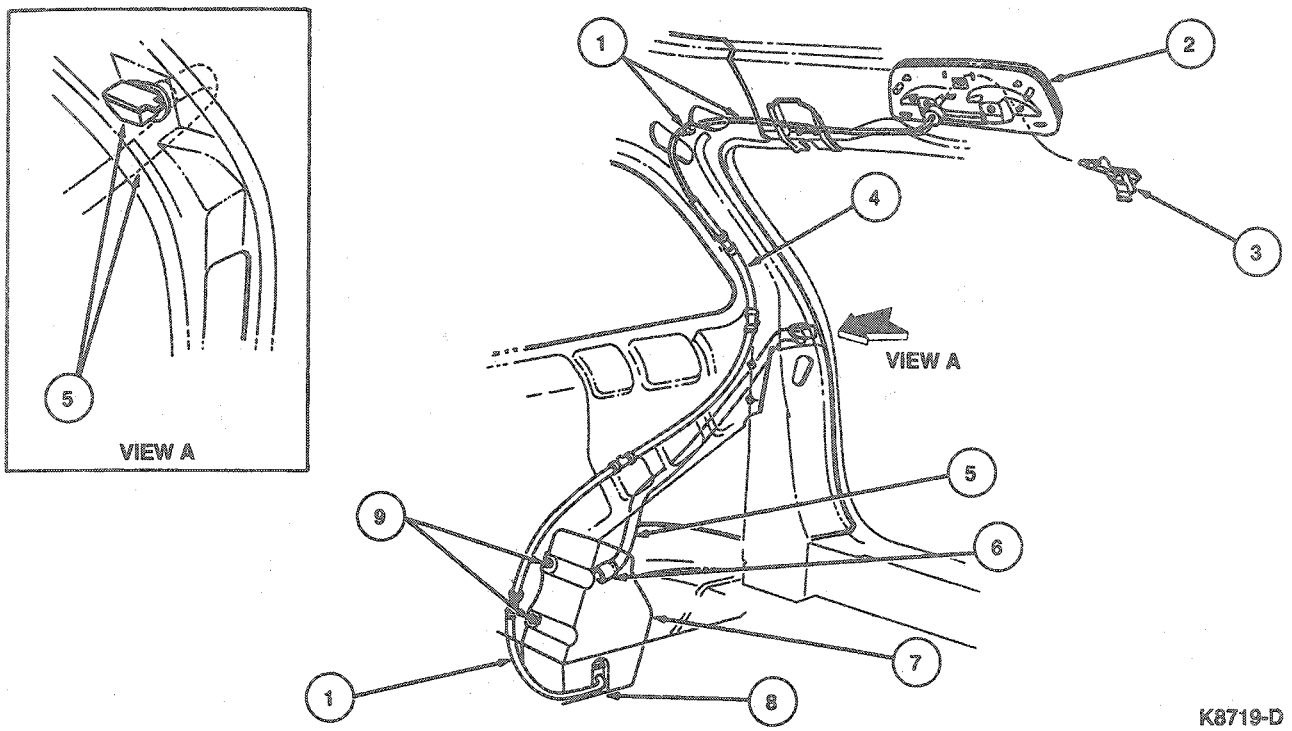
CAUTION: Do not operate pump until fluid is added to reservoir.

Washer Hose, Rear

Removal and Installation

1. Remove D-pillar trim panel and remove washer hose.
2. Pull hose from nozzle.
3. Pull grommet from door and roof.
4. To install, reverse Removal procedure.

REMOVAL AND INSTALLATION (Continued)



Item	Part Number	Description
1	17408	Hose Assy
2	13A613	High-Mount Stoplamp
3	17603	Washer Jet Assy
4	17408	Hose Assy

(Continued)

Item	Part Number	Description
5	17632	Reservoir Fill and Cap Assy
6	8287	Clamp
7	17618	Washer Reservoir
8	17664	Pump
9	N800369-S2	Screw (3 Req'd)

Washer Pump and Reservoir Assembly, Rear

Removal

1. Remove RH quarter trim panel. Refer to Section 01-05.
2. Disconnect electrical connector reservoir supply hose, and washer nozzle hose as outlined.
3. Remove reservoir retaining screws and remove reservoir from vehicle.
4. Using a small-blade screwdriver, pry out pump carefully, so as not to damage the plastic housing. Remove one piece seal / filter and inspect for damage or foreign material.
5. Flush reservoir and clean any foreign material from motor cavity or the reservoir.

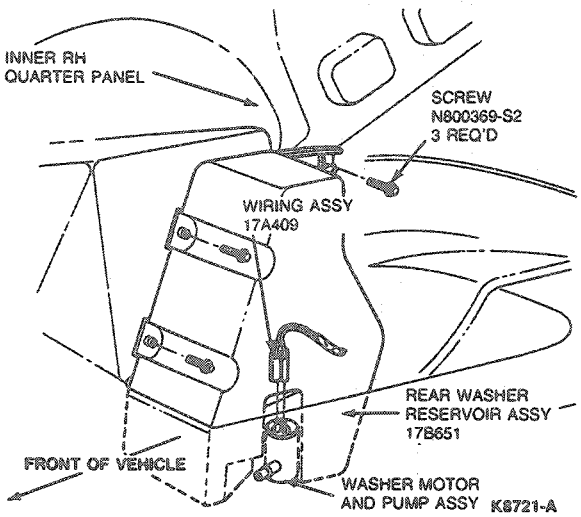
Installation

1. Insert seal.
2. Lubricate inside of seal with soapy solution and insert pump into bottle pump cavity until it is firmly seated in the seal.
3. Connect electrical connector and supply hose.
4. Install reservoir. Install retaining screws.
5. Fill reservoir slowly, otherwise air will become trapped in reservoir causing it to overflow.

REMOVAL AND INSTALLATION (Continued)

6. Replace quarter trim panel.

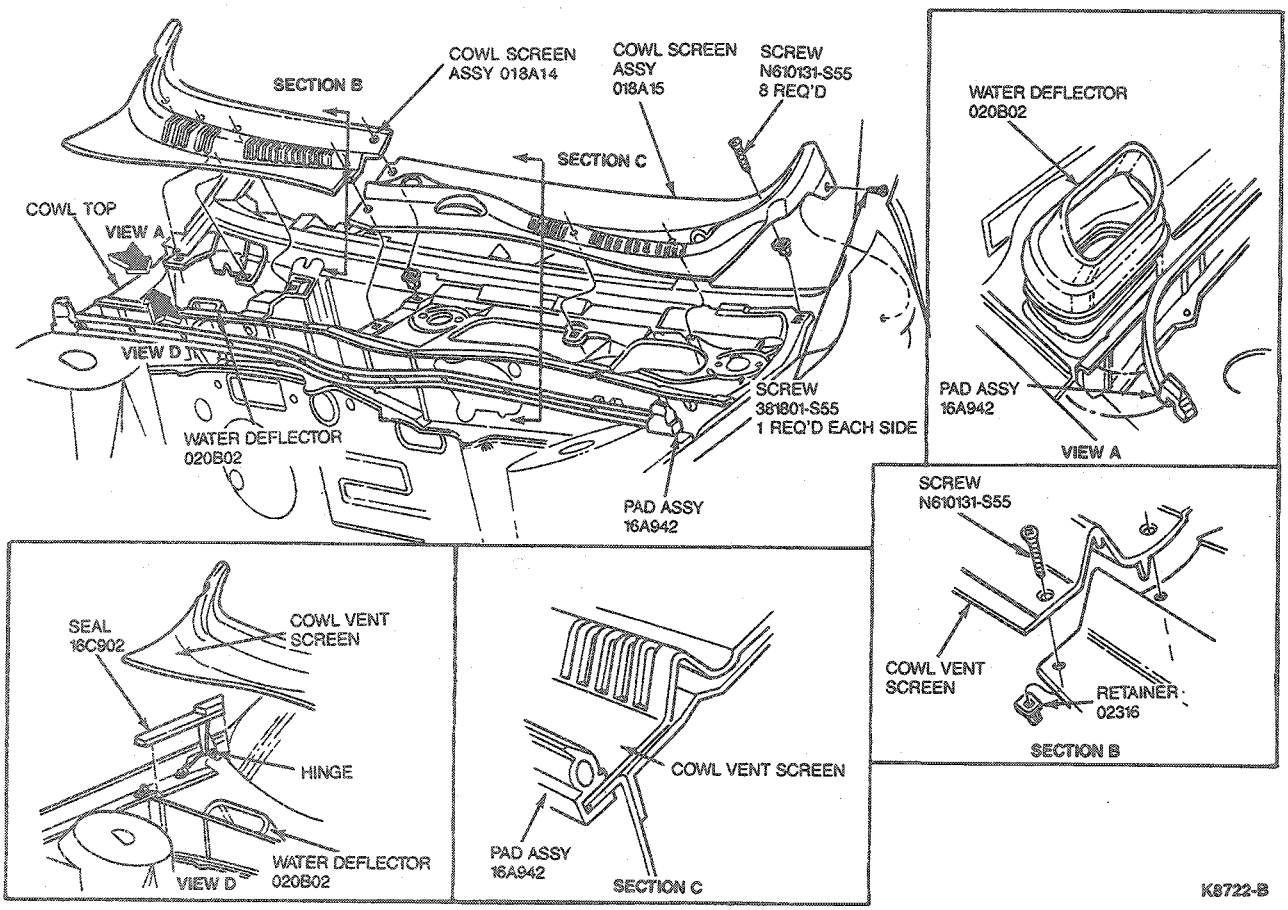
CAUTION: Do not operate pump until reservoir is filled.



Fluidic Washer Nozzle, Front

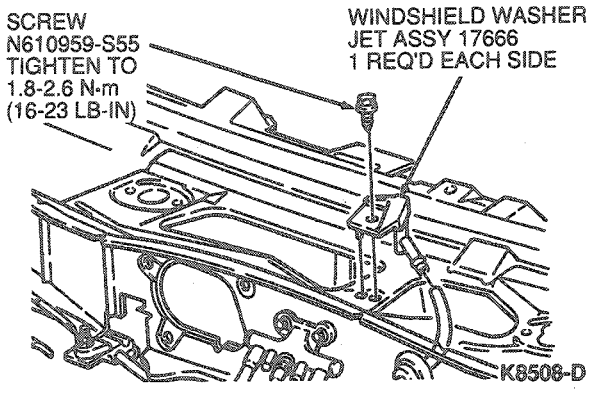
Removal

1. Raise hood.
2. Remove wiper arms.
3. Remove cowl top screen.



REMOVAL AND INSTALLATION (Continued)

4. Disconnect washer hose and remove screws retaining washer nozzle to dash panel.
5. To install, reverse Steps 1 through 4. Tighten retainer screw to 2.8-5.0 N·m (25-44 lb-in).



Fluidic Washer Nozzle, Rear

Removal

1. The liftgate nozzle is attached inside the high-mount stoplamp by two snap-in tabs.
2. Remove liftgate trim panel. Refer to Section 01-05.
3. Remove four nuts retaining high-mount stoplamp. Refer to Section 17-01.
4. Disconnect grommet hose from nozzle by pulling away from inside of liftgate.
5. From bottom side of high-mount stoplamp assembly, squeeze the two snap-in tabs and push out to remove washer nozzle.

Installation

1. Snap washer nozzle into body of rear high-mount stoplamp assembly.

   NOTE: Ensure grommet is fully seated into hole on inner panel of liftgate.

   CAUTION: Ensure hose is not kinked or twisted.
2. Push hose and grommet onto nozzle.
3. Position high-mount stoplamp to liftgate. Install four retaining screws.
4. Install liftgate trim panel. Refer to Section 01-05.

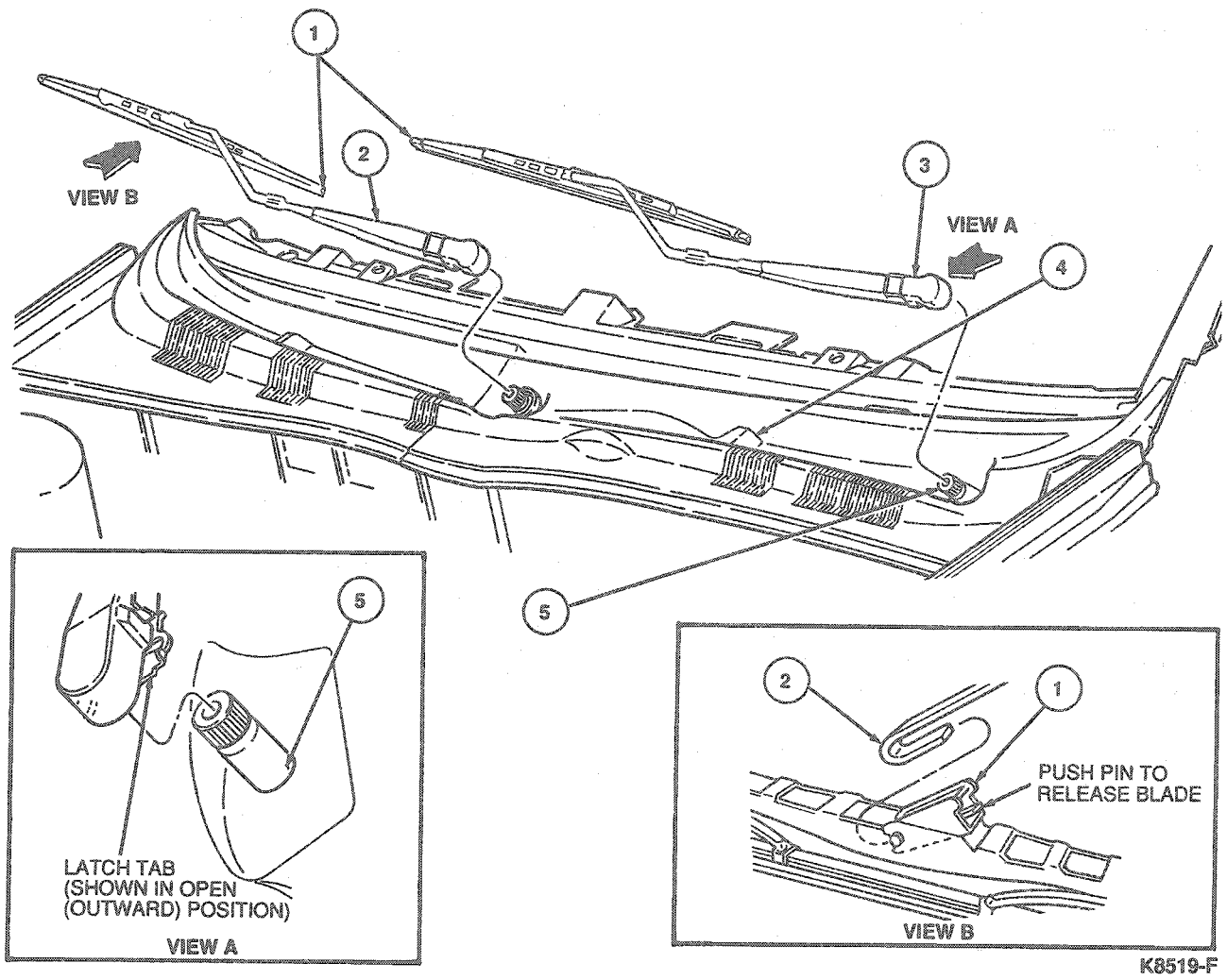
ADJUSTMENTS

Arm and Blade Assembly

Remove the arm and blade assembly from the pivot shafts. Turn on the wiper switch, allow the motor to move the pivot shafts three or four cycles, and then turn off the wiper switch. This will place the pivot shafts in PARK position.

ADJUSTMENTS (Continued)

Arm and Blade Assembly, Front

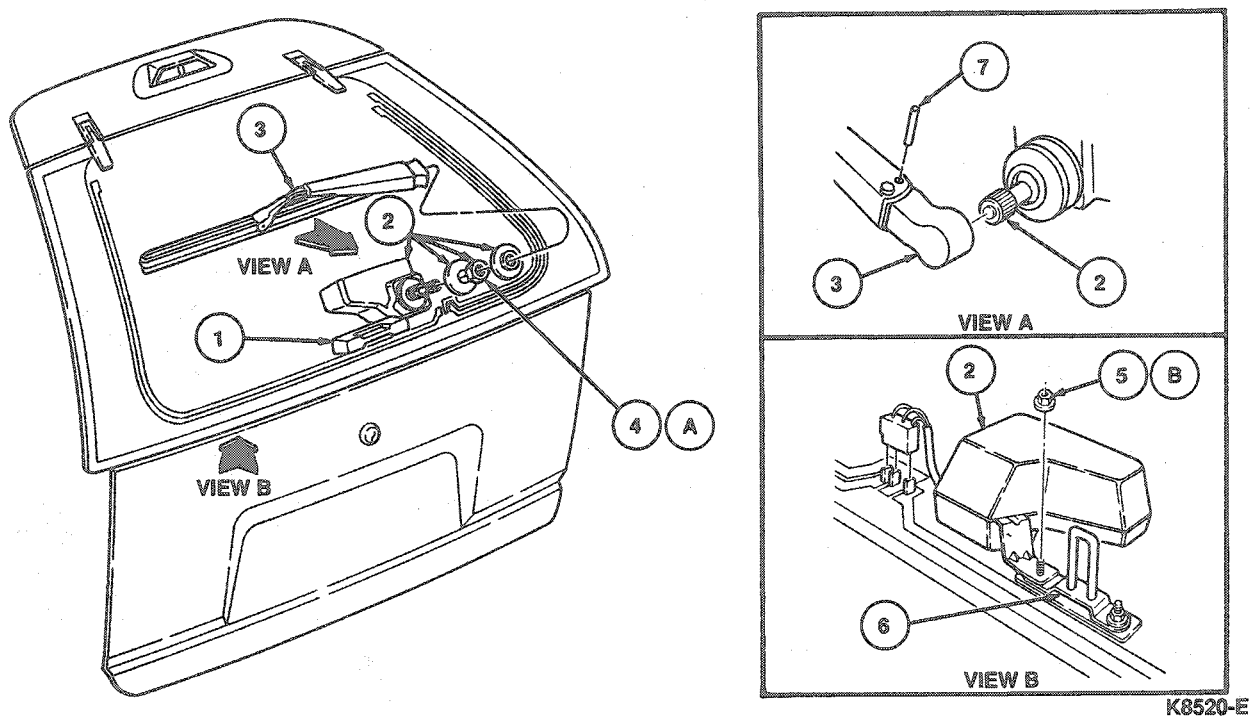


K8519-F

Item	Part Number	Description
1	17528	Blade Assy Windshield Wiper (2 Req'd)
2	17526 (RH)	Arm Assy
3	17527 (LH)	Arm Assy
4	17C549	Wiper Arm Stop
5	17566	Arm and Pivot Shaft Assy

ADJUSTMENTS (Continued)

Arm and Blade Assembly, Rear



Item	Part Number	Description
1	44409	Back Window Handle
2	17C541	Rear Window Wiper Motor Assy
3	17C403	Rear Arm and Blade Assy
4A	17A475	Nut, Grommet and Washer Assy

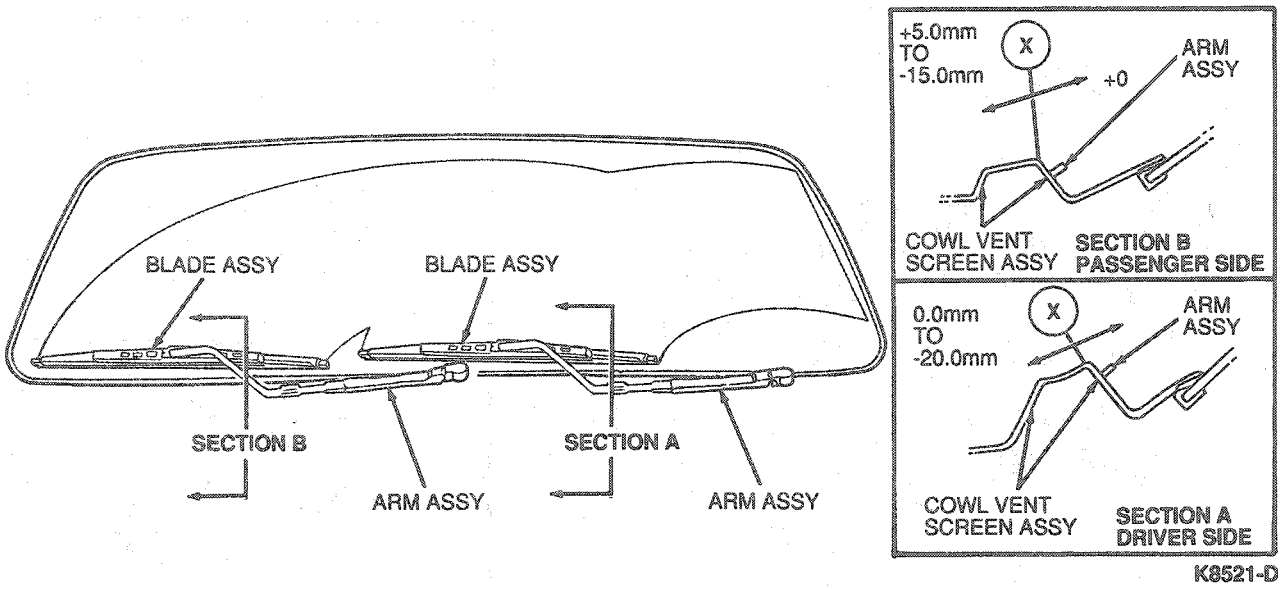
(Continued)

Item	Part Number	Description
5B	—	Nut and Washer Assy
6	42148	Back Window Latch Striker Assy
7	—	1/16 Inch Diameter Roll Pin
A		Tighten to 15-20 N·m (11-14 Lb-Ft)
B		Tighten to 5-8 N·m (4-6 Lb-Ft)

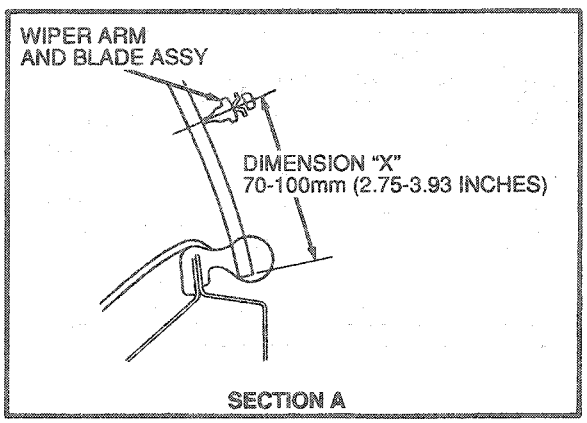
Install the arm blade assemblies on the pivot shafts to Dimension X.

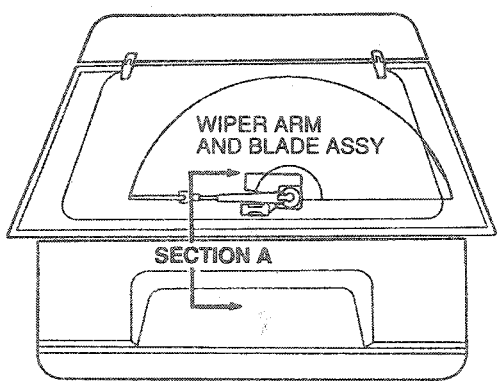
ADJUSTMENTS (Continued)

Front



Rear





SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	N-m	Lb-in
Motor Retaining Bolts	7-9	60-80
Pivot Retaining Screws	6.7-9.6	59-85
Windshield Washer Jet Screws	1.8-2.6	16-23
Rear Wiper Nut	15-20	11-14
Rear Wiper Motor Nut	5-8	4-6

SPECIFICATIONS (Continued)

ELECTRIC WINDSHIELD WIPER MOTOR AND SWITCH TEST CURRENT LIMITS

Motor Type	Motor Current Draw Test	Circuit Breaker / Switch Test	
		Low Current	High Current
Front Wiper Motor	*3.5 amperes	Must Hold One Hour Minimum 8.25 amperes	Must Trip Within 30 Seconds 16.5 amperes
Rear Wiper Motor	*1.5 amperes	Must Hold One Hour Minimum 4.5 amperes	Must Trip Within 30 Seconds 9.0 amperes

* Motor maximum current when operated without linkage attached.

SPECIAL SERVICE TOOLS

ROTUNDA EQUIPMENT

Model	Description
014-00407	Digital Volt-Ohmmeter
078-00005	Starting and Charging Tester

SECTION 01-17 Moon Roof, Electric

VEHICLE APPLICATION

Taurus / Sable.

DESCRIPTION AND OPERATION

The moon roof, available as an option, is electrically operated. The moon roof can be closed manually in case of electrical power failure.

Electric Operation

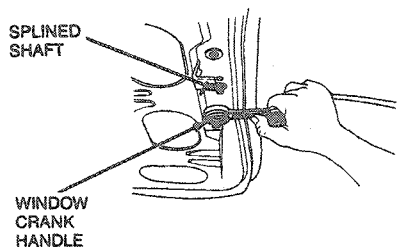
When the control switch is rocked rearward, the glass slides into the storage space between the roof trim panel and the roof, exposing an opening over the front seats.

When the control switch is rocked forward, with the glass fully back in the storage space, the glass moves forward from the storage position. Near the end of the forward travel, the rear portion of the sliding panel moves upward on two lifter arms. This allows a weather-tight seal when the roof is closed.

When the control switch is rocked forward, with the glass fully forward, the rear of the glass "pops up" to the VENT position. With the glass in the VENT position, rocking the control switch rearward closes the glass.

Manual Operation

To close the sliding panel manually, remove the roof console located at the front of the roof trim panel. Refer to Section 01-12. Remove the motor and bracket assembly, as outlined to expose the splined shaft of the moon roof drive gear box. Using a typical corporate door window regulator crank handle properly set on the splined shaft, crank the moon roof panel closed.



R6301-A

After performing these operations, remove the crank handle and install the motor and bracket assembly and the roof console.

NOTE: The motor and module must be synchronized after servicing. Synchronize as outlined.

TESTING

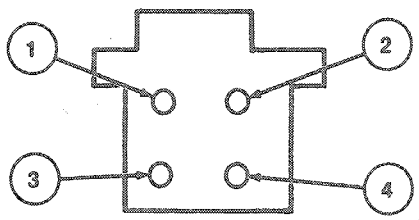
Tools Required:

- Rotunda Digital Volt-Ohmmeter 014-00407

Switch Test

1. Use a self-powered test lamp or an ohmmeter such as Rotunda Digital Volt-Ohmmeter 014-00407 or equivalent, to test moon roof switch.

   NOTE: Check all terminals at switch connector.
2. With switch in NEUTRAL position, there should be continuity between Terminals 1, 2 and 4.
3. With rocker switch pushed rearward, there should be continuity between Terminals 2 and 3.
4. With rocker switch pushed forward, continuity should break between Terminals 1 and 4.
5. If switch does not test as outlined, replace switch.



R7987-A

DIAGNOSIS

Refer to the following charts for diagnosis of the moon roof.

CONDITION	POSSIBLE SOURCE	ACTION
• Water Leaks	• Glass panel not properly aligned or fitted to roof. • Glass panel not fully closing. • Drain tubes not properly connected and / or blocked. • Cracks in housing. • Glass assembly seal not properly in place and / or attached securely.	• Align to specifications. • Adjust to specifications. • Connect properly and / or service or replace drain tubes as required. • Service as required. • Install seal properly and / or attach correctly.
• Wind Noise	• Glass panel not properly fitted or aligned. • Glass panel not fully closing. • Glass assembly seal not properly in place and / or not attached securely.	• Align to specifications. • Adjust to specifications. • Install seal properly and / or attach correctly.
• Moon Roof Does Not Function and / or Perform Properly	• Glass panel not properly aligned or fitted to roof. • Glass assembly seal not properly in place and / or not attached securely. • Obstructions or foreign objects in tracks or troughs. • Rear guide pin not properly engaged in cam slot of lifter assembly. • Rear lifter assemblies not properly connected to glass module. • Front guides not properly installed and / or secured. • Adequate voltage not being supplied to the motor (12.6 V). • Tracks not securely attached to housing. • Rear guide cables not properly synchronized. • Rear drive cable or guide broken. • Sunshade not properly installed. • Amperage range for glass running not adequate (3.5A).	• Align to specifications. • Install seal properly and / or attach correctly. • Remove obstructions or foreign objects as required. • Engage rear guide pin properly. • Properly connect lifter assemblies to glass module. • Install and.or secure front guides as required. • Check voltage and correct if voltage not adequate. • Attach track securely to housing. • Synchronize cables and motor. • Replace or service as required. • Check and install sunshade properly as required. • Check for proper amperage and correct if required.

DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• Noisy Operation	• Glass panel not fitted properly to housing. • Glass assembly seal not properly in place and / or secured. • Rear guide pins not properly engaged in cam slot of lifter assembly. • Rear lifter assemblies not properly attached to glass module. • Front guides not properly installed and / or secured. • Track assembly not properly secured to housing. • Rear drive cables not properly synchronized. • Sunshade not installed properly. • Amperage range for glass running not adequate (3.5A).	• Align to specification. • Properly fit and / or secure glass assembly seal. • Engage rear guide pins properly. • Properly attach lifter assembly to glass module. • Properly install or service as required. • Secure track assembly to housing. • Synchronize cables and motor. • Check and install sunshade properly as required. • Check for proper amperage and correct if required.
• Rattles	• Glass panel not properly aligned or fitted to roof. • Glass panel not fully closing. • Drain tubes not properly connected and / or blocked. • Glass assembly seals not properly in place and / or not attached securely. • Obstructions or foreign objects in tracks or troughs. • Rear guide pin not properly engaged in cam slot of lifter assembly. • Rear lifter assemblies not properly connected to glass module. • Front guides not properly installed and / or secured. • Tracks not attached to housing securely. • Sunshade not installed properly.	• Align glass panel to specification. Bend glass attaching tabs inboard 1.5mm (0.059 inch). • Adjust to specification. • Connect properly and / or fix to replace drain tubes as required. • Install seals properly and / or attach correctly. • Remove obstructions or foreign objects as required. • Engage rear guide pin properly. Add retaining clip as required. • Properly connect lifter assemblies to glass module. • Install and / or secure front guides. • Attach tracks securely to housing. • Check and install sunshade properly as required.
• Glass Broken or Scratched	• Glass panel not fitted or aligned properly. • Obstructions or foreign objects in tracks or troughs. • Clearance to underside of roof panel and reinforcement ring not adequate.	• Align to specification. • Remove foreign objects and / or obstructions as required. • Adjust clearance as required to obtain adequate clearance.

TR4028F

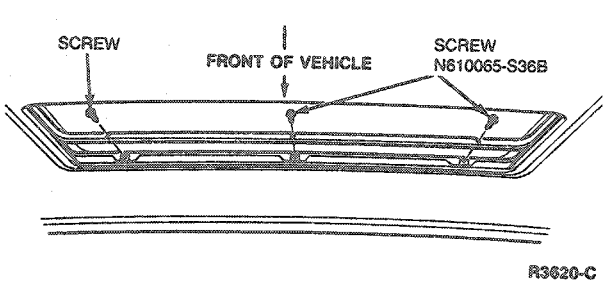
REMOVAL AND INSTALLATION

CAUTION: It is recommended that the battery ground cable be disconnected.

Glass and Sunshade

Removal

1. To remove glass panel, remove three halo front retaining screws.

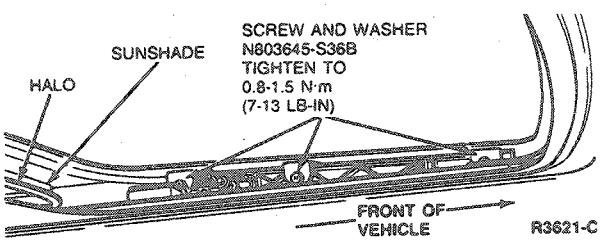


R3620-C

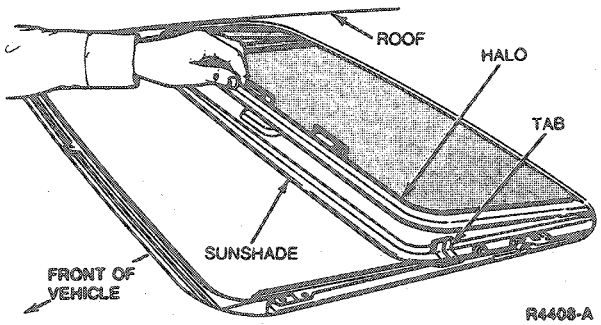
2. Slide halo and sunshade fully rearward to expose six glass retaining screws (three each side).

REMOVAL AND INSTALLATION (Continued)

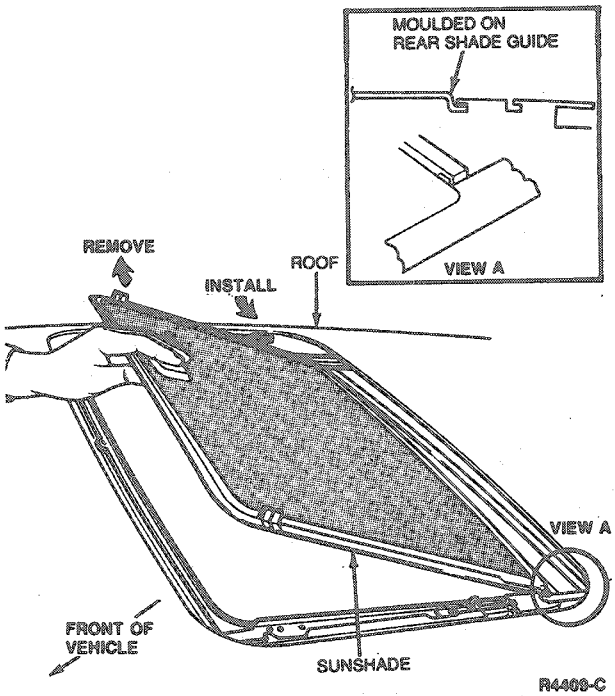
3. To remove sunshade, remove glass retaining screws and washers.



4. Push glass up from inside vehicle and remove. Take care not to scratch glass or roof paint.
5. Slide halo and sunshade forward halfway across moon roof opening.
6. Lift halo to clear sunshade.

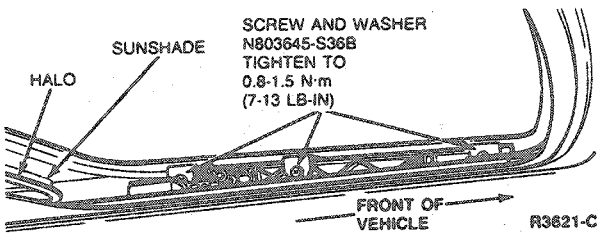


7. Push halo fully rearward.
8. Slide sunshade fully forward.
9. Lift front on sunshade, slide forward and rotate 90 degrees to remove.



Installation

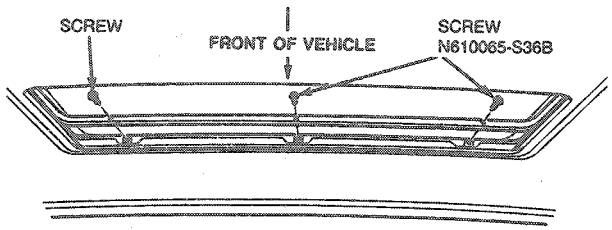
1. With sunshade at an angle, insert one sunshade rear tab into channel at rear of moon roof opening.
2. Insert other rear tab and place sunshade in position.
3. Slide halo forward, lifting it to clear sunshade.
4. Lower halo onto sunshade. Halo must be outside of rail or moon roof will not function properly.
5. Slide sunshade and halo fully rearward.
6. Install glass. Align with holes for screws. Take care not to push lifter arm slide out of track.



7. Install six glass retaining screws and washers. Tighten to 0.8-1.5 N·m (7-13 lb-in).
8. Adjust glass as outlined.
9. Slide halo fully forward and install three screws.

REMOVAL AND INSTALLATION (Continued)

10. Close sunshade if desired.



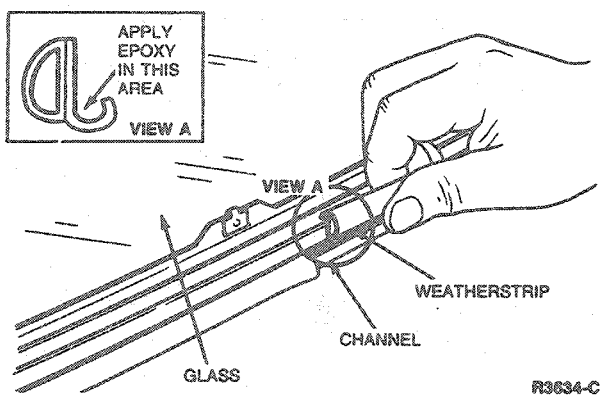
Glass Weatherstrip

Removal and Installation

1. Remove glass as outlined.
2. Peel off weatherstrip.
3. Clean off excess epoxy from bright glass moulding.
4. Apply epoxy to new seal before installing.

   NOTE: Seal has an internal bumper which must be centered on front of glass panel. The bumper may be located by pressing on the seal with a finger.
5. Snap new seal onto bright moulding as shown.

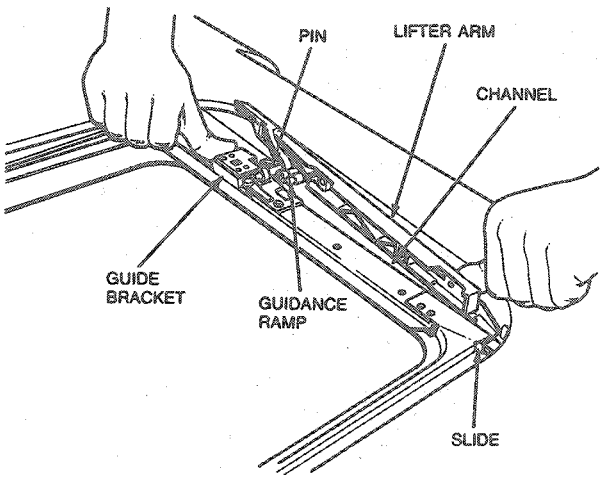
   NOTE: Apply Super Weatherstrip Adhesive 3M® 08008 or equivalent to new weatherstrip before pressing weatherstrip onto glass channel.
6. To install, reverse Removal procedure.
7. Adjust glass after installation as outlined.



Lifter Arm

Removal and Installation

1. Remove glass as outlined.
2. Using the motor switch, move guide bracket rearward until lifter pin is at the top of curved slot in lifter arm.
3. Pull lifter arm off guidance ramp retaining pin. Slide out of track.
4. To install, reverse Removal procedure.
5. Check motor for synchronization and adjust as outlined. Install motor and glass as outlined.

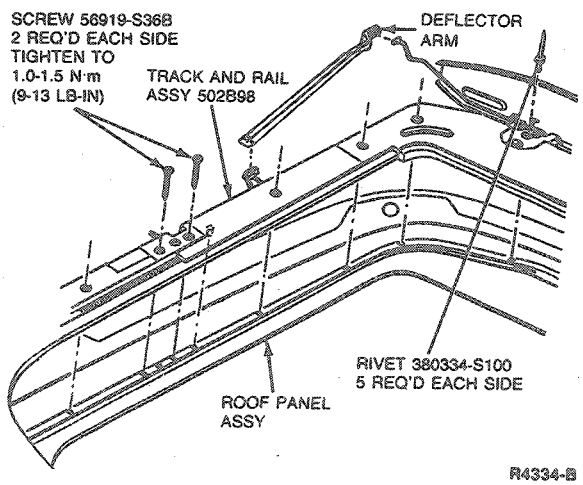


Moon Roof Assembly

Removal

1. Open glass panel and sunshade fully.
2. Disconnect air deflector arms by pulling up on rear of arm to disengage from track retainer and rotating arm to remove from air deflector.

   CAUTION: Use an appropriate shield so that the headlining is not damaged while the rivets are drilled out.
3. Drill out 10 rivets using 3/8-inch drill stop.
4. Connect air deflector arms by engaging rear of arm to track retainer.

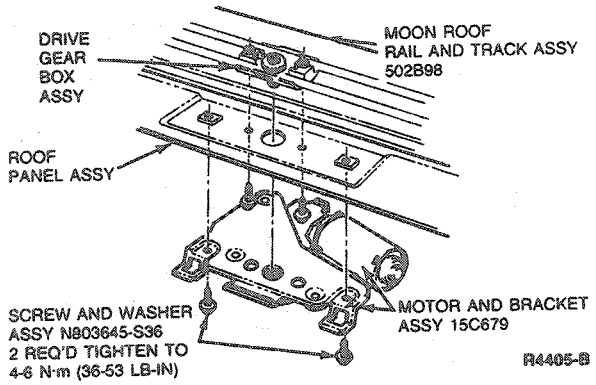


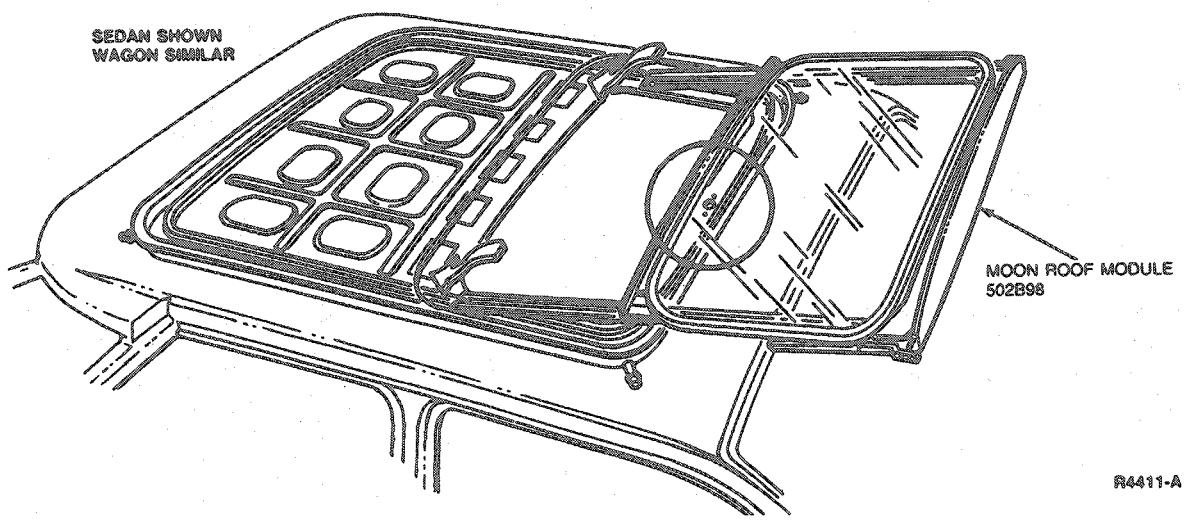
REMOVAL AND INSTALLATION (Continued)

5. Remove four pivot screws (two forward, two rearward). Do not remove center bolt.
6. Close glass panel.
7. Remove roof console. Refer to Section 01-12. Disconnect motor electrical connections.
8. Remove two retaining screws while holding motor in place. Remove motor.
9. Remove two screws retaining moon roof front rail to roof panel.
10. Lift and slide entire moon roof module out of vehicle. Protect roof's painted surface. Make certain halo trough clears roof edge.

Installation

1. Slide moon roof into vehicle, taking care not to damage roof finish.

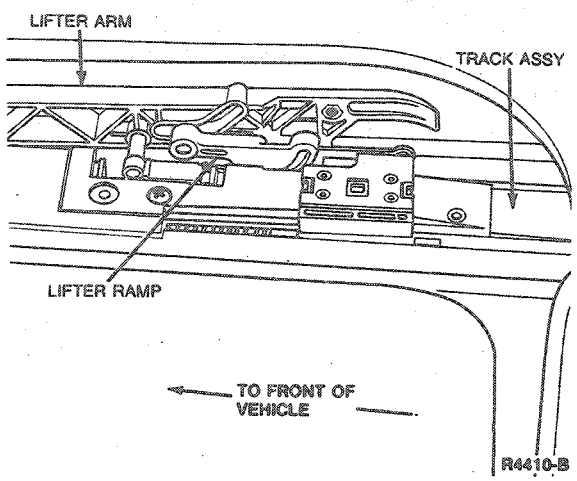




2. Install two screws retaining moon roof front rail to roof panel.
3. Check motor for synchronization. If not synchronized, adjust as outlined.
4. Install motor and retaining screws. Connect electrical connectors.
5. Ensure lifter arm and guidance ramp are aligned as shown.
6. Open glass and sunshade fully.
7. Install 10 pop rivets.
8. Adjust glass as outlined.
9. Install four pivot bracket retaining screws after glass is adjusted.

REMOVAL AND INSTALLATION (Continued)

10. Install roof console.



Halo

Removal

1. Remove glass, sunshade and entire unit as outlined. Remove lifter arms as outlined.
2. If only halo is to be removed, carefully bend one track inward and pull halo tab out of channel. Pull other tab out of channel on other side.

Installation

1. Install halo.
2. Slightly crimp cable track tabs to hold flanged tube ends in place.
3. Install lifter arms as outlined.
4. Install moon roof, glass and sunshade as outlined.
5. Adjust glass panel as outlined.

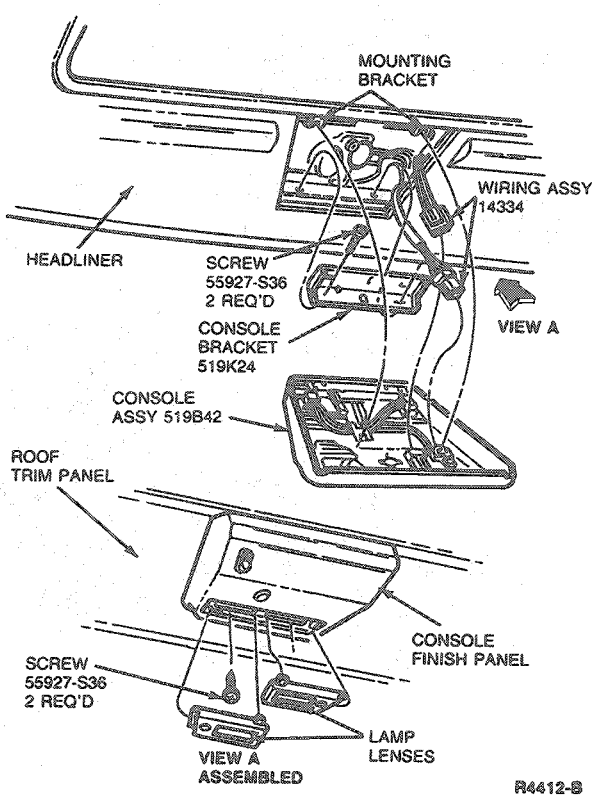
Switch

Removal

1. Remove two map lens assemblies by holding lens in switch depressed position, and using a flat, thin tool (such as a putty knife), pop out lens assembly at center gap between two lens assemblies.
2. Remove two roof console retaining screws and remove roof console by lowering forward edge of console and slide console rearward, disengaging console rear retaining tabs.
3. Disconnect two wiring connectors.
4. Test switch assembly, if necessary.
5. Using a small screwdriver, pry apart two switch retaining tabs and connector retaining tab. Remove switch.

Installation

1. Snap switch into its housing (ribbed portion of switch knob is rearward), slide wiring under metal clip and attach connector to metal retaining tab.
2. Connect two wiring connectors.
3. Install roof console by engaging two latch tabs, pushing console forward, swinging upward and installing two retaining screws.
4. Install two map lamp lens assemblies by engaging lens retaining tab at outboard edge of opening and snapping center edge of lens into console.



Motor

Removal and Installation

1. Remove switch as outlined.
2. Disconnect motor electrical connectors.
3. Remove motor and retaining screws.

   NOTE: Once motor is removed, it must be synchronized (timed) as outlined under Adjustments.
4. To install, reverse Removal procedure.

ADJUSTMENTS

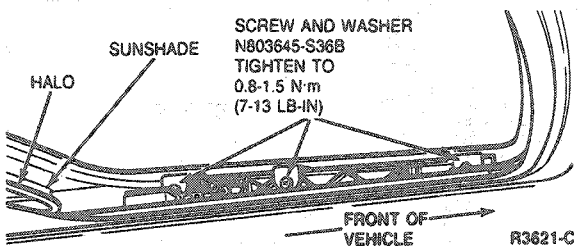
Glass Height

The correct position of the glass to the roof is as follows:

Front Corners: Flush to 1mm below roof.

Rear Corners: Flush to 1mm above roof.

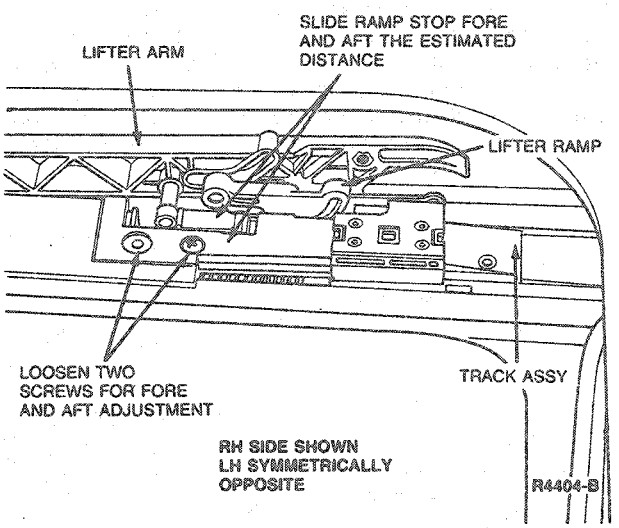
1. Cycle glass from full open to full closed position.
2. Remove three halo retaining screws along front of the opening inside of vehicle and slide halo and sunshade fully rearward to expose six glass retaining screws (three each side).
3. Loosen six glass retaining screws. Then, tighten them so that they are snug but not tightened to specification.
4. To adjust only the front of glass, loosen the center and front screws. If it is desired to adjust only the back of the glass, only loosen the center and rear screws.
5. To check height setting, open the glass about four inches, then return to the closed position.
6. Tighten the glass retaining screws to 2-4 N·m (18-35 lb-in).
7. Slide halo forward and replace three retaining screws.
8. Close sunshade if desired.



Glass—Fore-and-Aft

Fore-and-aft adjustment of the glass panel can be accomplished by first estimating the amount of fore or aft adjustment necessary for proper glass panel fit, then:

1. Run glass panel fully rearward. Use emergency crank if necessary.
2. Loosen five screws on pivot brackets, noting position of ramp stop.
3. Move ramp stops equally fore or aft the estimated distance necessary for proper glass panel fit.
4. Install six pivot bracket screws and cycle moon roof, checking for proper fit. Repeat procedure until desired fit is obtained.



Water Drainage System and Water Leak Corrections

Drain Hoses

The roof panel module contains the track assemblies, cable and drive mechanisms, and a drain trough that encircles the sliding panel. Attached to the module are four drain hoses. One drain hose is attached at each corner of the module. The two front drain hoses are routed down the windshield pillars and into the cowl sides exiting at rocker panel drain holes; ends of hose are not reusable. The two rear drain hoses are routed down the rear pillars, forward of the rear wheelbase, exiting at rocker panel drain holes on station wagons.

On sedan vehicles, the rear hoses are routed aft of wheelhouse and through the quarter panel behind the bumper facia. A rubber valve is used at the end of the tube to prevent noise from entering the passenger compartment.

NOTE: Prior to performing any services, first verify that the drainage system is not plugged or restricted.

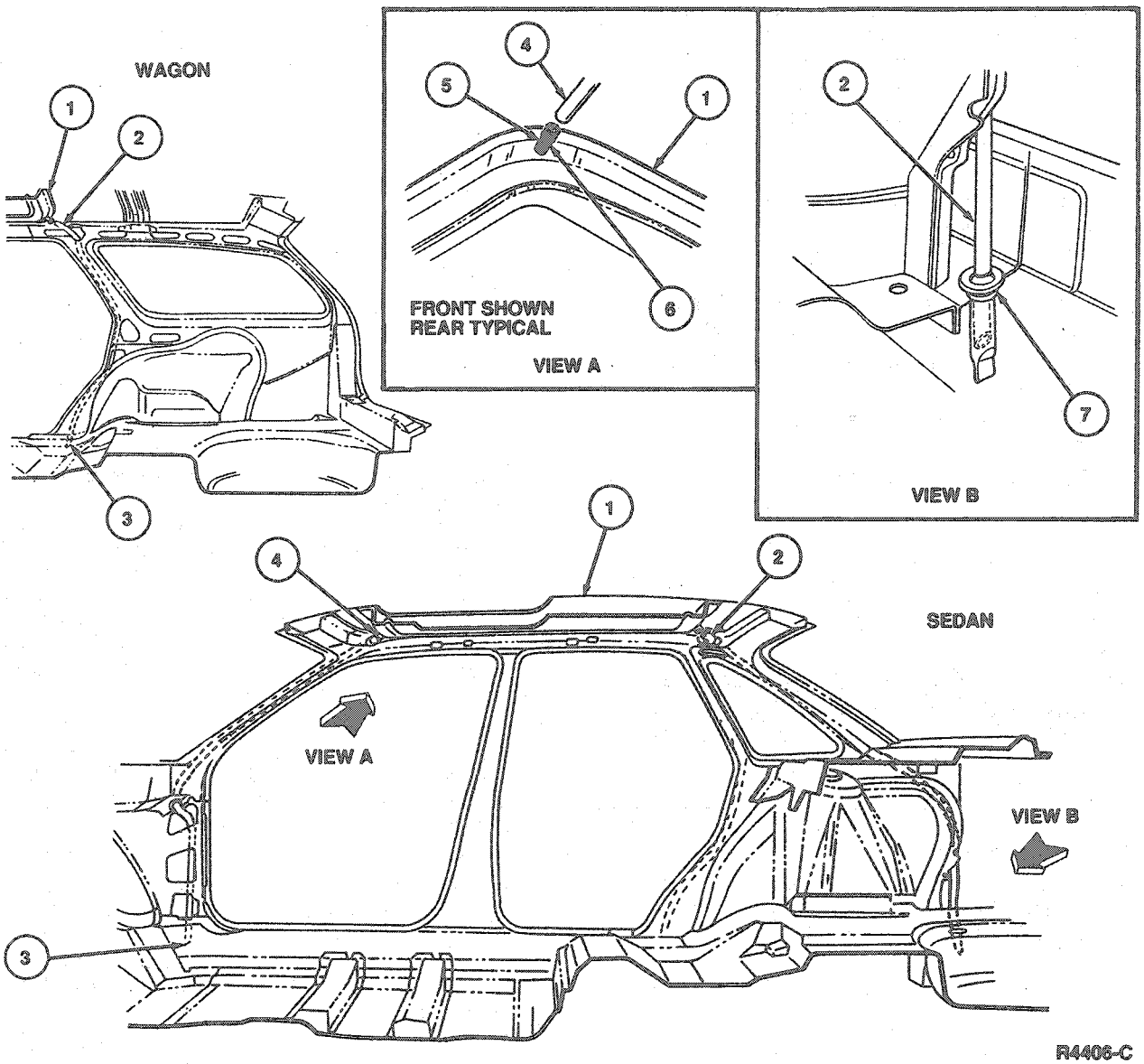
Use a 473ml (16 oz) container and pour water into the drain trough. Look at the rear of the vehicle to ensure that the water drains from the rocker panels forward of the rear wheelhouse for station wagons, and aft of wheelhouse on sedans.

If the water flow is restricted, use compressed air to blow out any material in the drain hose system. Test by pouring water slowly into the system again.

After ensuring that the drainage system is not restricted, verify that gaps do not exist between the glass seal and the roof panel. If a gap exists, the gap must be brought to specification before any further action is taken. Adjust sliding panel as outlined.

ADJUSTMENTS (Continued)

With clearances within specification and panel closed, have an assistant spray water on the sliding panel while you are on the inside, visually inspecting the area to see if an excessive amount of water is entering the drain trough. A large volume of water indicates that an excessive clearance exists between the sliding panel seal and the roof.



Item	Part Number	Description
1	—	Roof Body Panel
2	502C53	Rear Roof Drain Hose
3	—	Drain Hose Inserted into Hole in Rocker Panel

(Continued)

Item	Part Number	Description
4	502C52	Front Roof Drain Hose
5	—	Nipple, Part of 502A82 Moon Roof Assy
6	ESA-M2G161-A	Adhesive, Apply to Nipple Prior to Hose Installation
7	03A20	Moon Roof Drain Valve

ADJUSTMENTS (Continued)

Sliding Panel

The sliding panel has controlled water leak at the seals. A properly adjusted glass panel should result in snug fit between the seal and the roof skin around the entire opening. The fit can be checked by using a feeler gauge set at 0.25mm (0.01 inch) between the seal and roof. **If these specifications are not maintained, water will overflow the drain troughs and enter the module, running down into the passenger compartment when the vehicle is stopped abruptly. Also, increased wind noise could result if glass clearances are not kept to these specifications.**

Wet Headlining—Sides

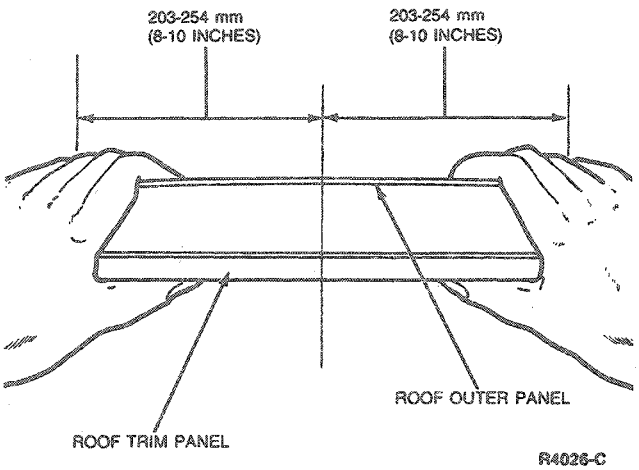
If water drips from the headlining above the door or quarter window, check to see if the drain tube(s) are disconnected from the module. Apply Weatherstrip Adhesive E8AZ-19552-A (ESB-M2G14-A) or equivalent, on drain tube nipple and insert drain hose.

Overcrowned Rear Roof Panel

If the roof panel is overcrowned to the contour of the sliding panel (at rear of sliding panel), this can cause wind noise or water leak conditions.

CAUTION: Excessive overbending could distort the roof panel, requiring costly metal finishing service. This procedure should be used only as a last resort.

Remove sliding panel from vehicle and carefully overbend the center of the roof panel by applying downward pressure.



Undercrowned Rear Roof Panel

A glass panel scratch can be caused by the rear of the roof panel being slightly undercrowned.

CAUTION: Excessive overbending could distort the roof panel, requiring costly metal finishing service. This procedure should be used only as a last resort.

Open the sliding panel assembly slightly and compare the contour of roof panel and glass panel. If the roof panel appears flattened in the center, and the glass scuffs on the underside of the roof panel, remove the sliding panel from the vehicle and arch the roof panel by pushing up on underside of roof panel to increase the roof panel arch.

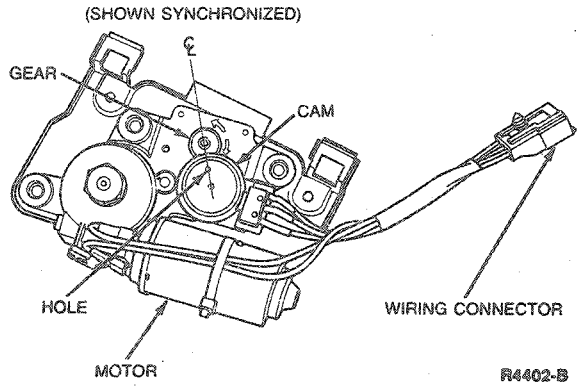
Motor Synchronization (Timing)

If the moon roof motor is removed from the vehicle, it must always be checked for synchronization before it is installed. The motor is synchronized when the centerline of the gear, the centerline of the cam, and the hole in the cam are aligned. If the motor is not synchronized, remove the motor as outlined and adjust it as follows:

NOTE: The glass panel should be in the CLOSED position for synchronization.

1. Connect motor wiring connector to moon roof wiring connector.
2. Operate control switch to advance motor drive gear until the centerline of the gear, the centerline of the cam and the hole in the cam are aligned as shown.
3. Disconnect motor wiring connector from moon roof wiring connector.

   NOTE: It may be necessary to rotate motor assembly slightly to engage drive splines when installing.
4. Ensure that the lifter arms and guidance ramps are aligned as shown. Connect the motor and install to roof panel.



SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	N·m	Lb-in
Sunshade Retaining Screws	0.8-1.5	7-13
Track Retaining Screws	1.0-1.5	9-13
Motor and Bracket Screws	4-6	36-53

SPECIAL SERVICE TOOLS

ROTUNDA EQUIPMENT

Model	Description
014-00407	Digital Volt-Ohmmeter