LIGHTING SYSTEMS 3R

SECTION INDEX

EXTERIOR LIGHTING SYSTEMS

GENERAL

The wiring of the lighting systems is shown in the wiring diagrams which indicate the various units in relation to their positions in the vehicle. The wires in the various circuits are different colors or are marked by tracers.

All models have a 24-amp circuit breaker built into the switch for light system protection.

The upper and lower headlamp beams are controlled by a foot switch located on the toeboard.

HEADLAMPS

All models are equipped with a single headlamp system.

The round headlamp used with the CJ system is identified by the number 2D1 embossed on the sealed beam face. The large rectangular headlamp system is used on all Cherokee, Wagoneer and Truck models. All lamps contain two elements: one low beam and one high beam.

Replacement

Each sealed beam headlamp can be replaced only as a complete unit.

CJ Models

NOTE: *CJ headlamps have a number 2D1 molded into the glass at the top of the lens.*

(1) Remove attaching screw and pull door out slightly at bottom and push up to disengage upper retaining tab.

(2) Loosen screws in retaining ring, rotate ring to disengage from screws.

(3) Pull headlamp out and disconnect wire harness.

(4) Install replacement headlamp with number 2D1 at TOP of lamp.

(5) Install retaining ring and tighten screws.

(6) Install headlamp door and attaching screw.

(7) Check headlamp aim following procedure outlined below.

Cherokee-Wagoneer-Truck Models

(1) Remove headlamp door, if equipped.

(2) Remove screws attaching retaining ring and remove ring.

(3) Pull headlamp out and disconnect wire harness.

(4) Install replacement headlamp and connect to wire harness.

(5) Install retaining ring and attaching screws.

(5) Check headlamp aim following procedure outlined below.

(6) Install headlamp door and attaching screw, if equipped.

Headlamp Aiming Procedure

Lamps must be aimed on the **low beam.** They may be aimed either with mechanical aimers or by using a screen. Use HeadLight Aimer J-25300-10 which has the proper adapters for use with the large rectangular headlamps used on the Cherokee, Wagoneer and Truck models, follow instructions supplied with the equipment for proper headlamp aiming. If a screen is to be used, preparation for aiming is as follows:

(1) Locate vehicle in darkened area with level floor and with screen (wall) having nonreflecting white surface.

(2) Mark reference line on floor 25 feet away from and parallel to screen (fig. 3R-1).

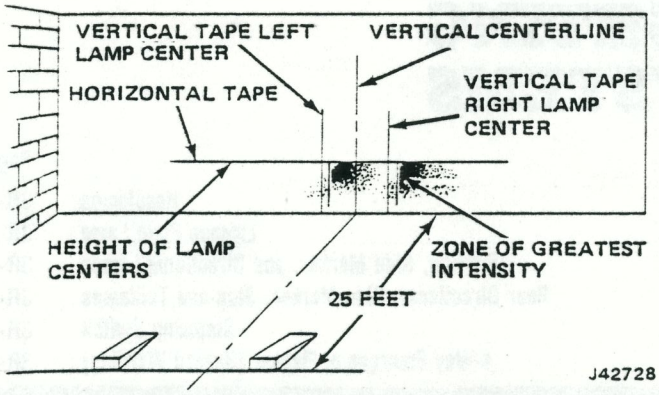


Fig. 3R-1 Headlamp Aiming

(3) Position vehicle perpendicular to screen and with headlamps directly over reference line.

(4) Locate middle tape on screen so it is aligned with centerline of vehicle.

(5) Equalize all tire pressures.

(6) Rock vehicle from side to side to equalize springs and shock absorbers.

(7) Measure distance between vehicle headlamp centers.

(8) Position marker tapes vertically on screen to right and left of middle tape at half this distance.

(9) Measure distance from center of each lamp to surface on which vehicle rests.

(10) Position marker tape horizontally on screen to cross vertical tapes at measured height of each lamp center respectively.

(11) Remove headlamp doors, if equipped.

(12) Clean headlamps.

(13) Turn headlamps on LOW beam.

NOTE: *Cover the lamp not being aimed.*

(14) Turn vertical aiming screw counterclockwise until lamp beam is considerably lower than horizontal reference line on screen (fig. 3R-2).

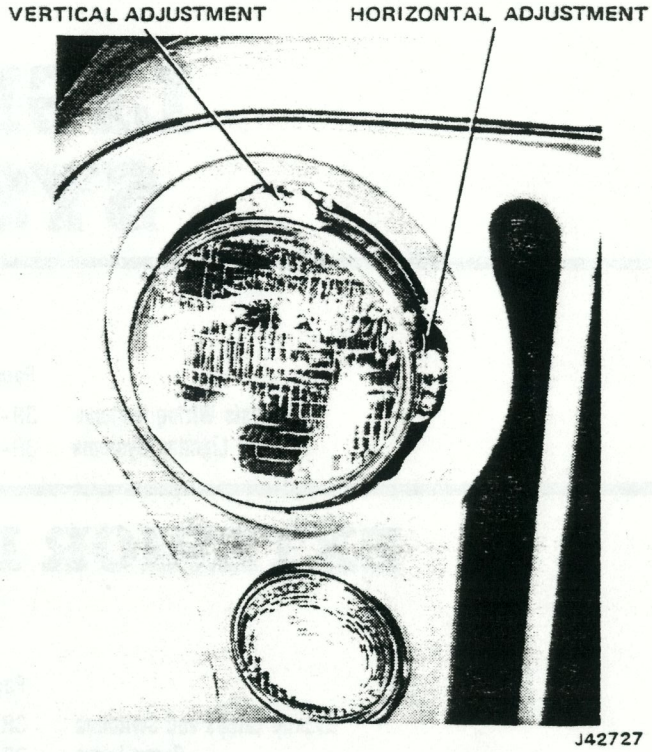


Fig. 3R-2 Headlamp Adjustment—Typical

(15) Turn screw clockwise until top edge of high intensity area is even with horizontal line.

(16) Turn horizontal aiming screw counterclockwise until beam is off centering tape.

(17) Turn same screw clockwise until left edge of high intensity area is 2 inches to right of lamp centerline (fig. 3R-1).

(18) Cover lamp that has been aimed and aim other lamp using same procedure.

Headlamp Switch

The switch is a two-position switch containing a rheostat for controlling instrument panel light brightness (fig. 3R-3). Rotating the knob clockwise dims the panel lights. Rotating the knob fully counterclockwise turns on the dome and courtesy lamps.

Headlamp Switch Replacement

(1) Disconnect harness connector plug from switch.

(2) Pull control knob out to second position.

(3) From behind instrument panel, depress knob release button (as shown in figure 3R-3, inset) and pull knob out of switch.

(4) Remove retaining nut and bezel.

(5) Remove switch through rear of instrument panel.

(6) When installing switch, make sure harness connector plug on switch is secure.

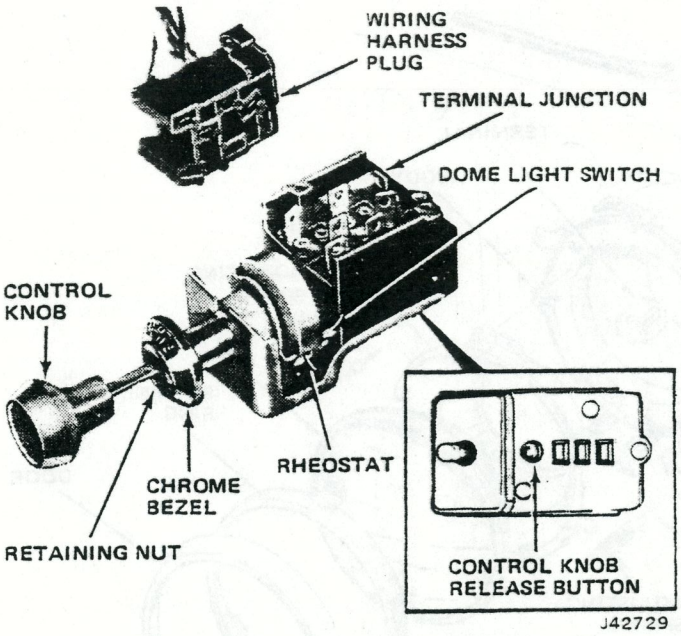


Fig. 3R-3 Headlamp Switch

Dimmer Switch Replacement

Refer to figure 3R-4.

(1) Remove harness plug from switch.

(2) Remove screws attaching dimmer switch to floorboard.

(3) Remove switch.

(4) Check operation of dimmer switch with Continuity Lamp J-21008. Connect one continuity lamp lead to switch input terminal (fig. 3R-4). Probe each output terminal with other continuity lamp lead. Current flow should alternate from one output terminal to the other as the switch is operated.

PARKING, SIDE MARKER AND DIRECTIONAL LAMPS

CJ Models

The parking lamps are mounted in the radiator guard panel just below the headlamps (fig. 3R-5). The lamps are on when headlamp switch knob is pulled out.

Parking and Directional Bulb

(1) Remove lens attaching screws.

(2) Remove lens.

(3) Replace bulb.

Parking Lamp Assembly

(1) Remove lens attaching screws.

(2) Remove lens and gasket.

(3) Remove housing from front panel.

(4) Disconnect wire connector from harness.

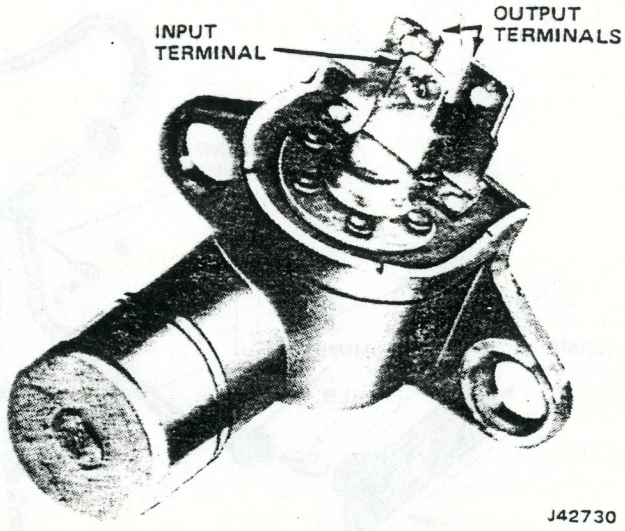


Fig. 3R-4 Headlamp Dimmer Switch

Side Marker Bulbs

(1) Reach under fender and twist socket a quarter turn counterclockwise to remove from housing.

(2) Replace bulb.

Cherokee-Wagoneer-Truck Models

The parking lamps are mounted in the panel just above the bumper (fig. 3R-6).

The front side marker lamps flash in unison with the front directional indicator bulb when the headlamps are not on. When the headlamps are on, the side markers flash alternately with the front directional signal lamps. Side markers and parking lamps come on when the headlamp switch is pulled out to any position.

To replace parking lamp bulbs on Cherokee, Wagoneer and Truck models, remove the lens and gasket to gain access to the bulb.

To replace side marker lamps, remove the lamp assembly. Twist the socket 1/4-turn counterclockwise to remove. Remove the bulb by pulling it straight out from the socket.

REAR DIRECTIONAL, SIDE MARKER, STOP AND TAILLAMPS

CJ and Sport Truck Models

Refer to figure 3R-7 for parts identification.

Taillamp Bulb Replacement

Remove lens attaching screws, lens and gasket. Clean lens and reflector before installing.

Taillamp Housing Replacement

Disconnect wiring, remove taillamp lens, and remove screws attaching taillamp assembly body and remove.

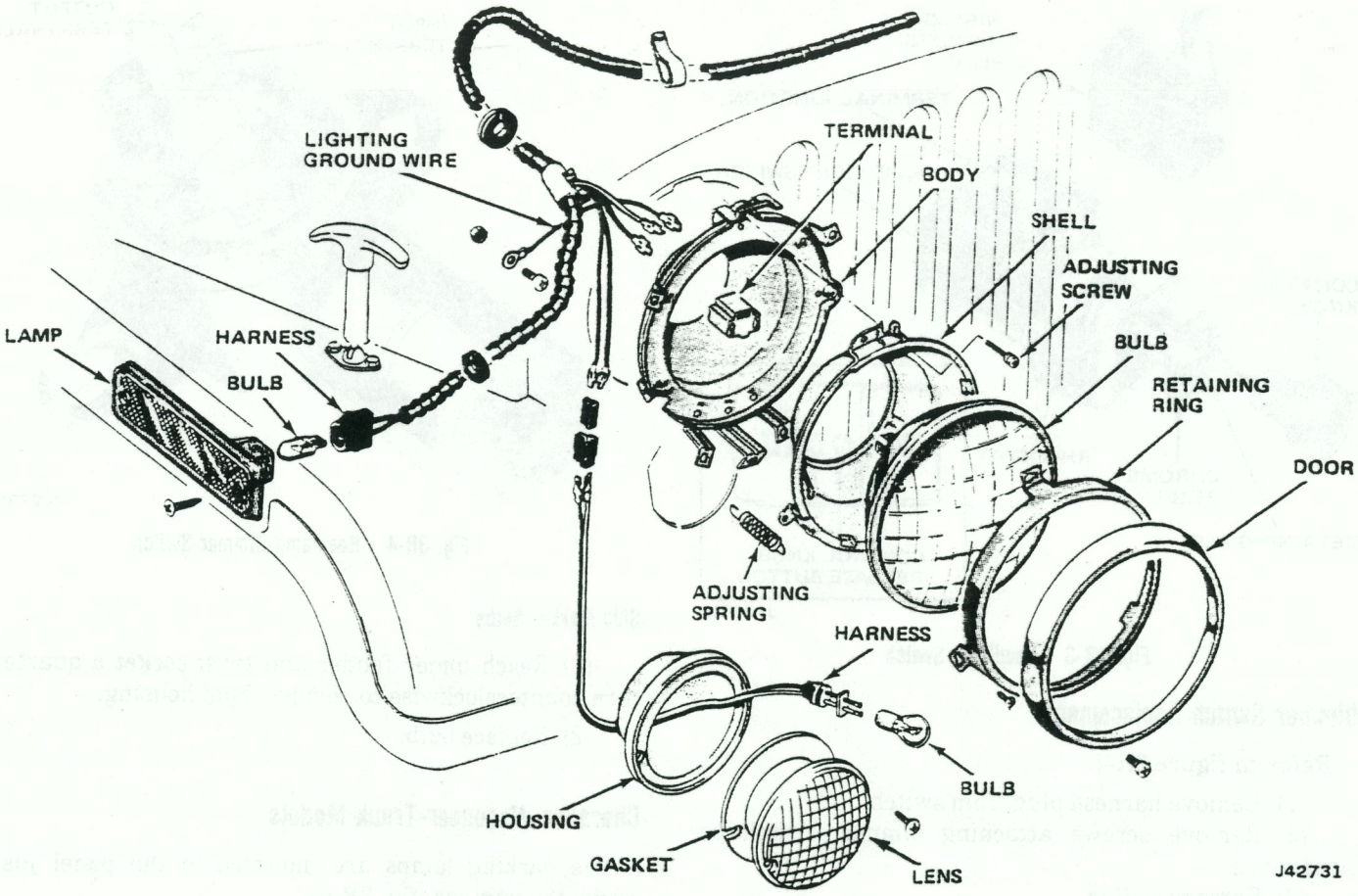


Fig. 3R-5 Headlamp, Parking, Directional and Side Marker Lamps—CJ Models

Side Marker Bulb Replacement

(1) Remove lens attaching screws, lens and gasket. Clean lens and reflector before installing.
(2) Pull side marker bulb straight out of socket.
(3) To install new bulb, push straight into socket.
(4) Position lens gasket and lens and install screws.

Cherokee

Refer to figure 3R-8 for parts identification.

Taillamp Bulb Replacement

Remove taillamp lens and remove bulb. Clean lens and housing before installing.

Taillamp Housing Replacement

(1) Remove interior rear quarter trim panel. On right side, pull panel out at top to remove. On left side, trim panel is attached with expandable clips. Use care in prying these clips out of their recesses so panel is not bent or damaged.
(2) Disconnect taillamp harness.
(3) Remove four attaching nuts and push housing out from corner posts.

Wagoneer

Refer to figure 3R-9 for parts identification.

Taillamp Bulb Replacement

Remove four lens attaching screws and lens. Replace bulb. Clean lens and reflector before installing.

Taillamp Housing Replacement

Refer to figure 3R-9 and follow housing replacement procedure as outlined for Cherokee models.

Truck with Townside Pickup Box

The lamp assemblies are mounted in the pickup box end caps (fig. 3R-10).

Taillamp Bulb Replacement

Remove lens attaching screws, lens and bulb. Clean lens and reflector before installing.

Taillamp Housing

(1) Remove lens attaching screws and lens.
(2) Remove housing attaching screws.
(3) Remove housing and disconnect lamp harness.

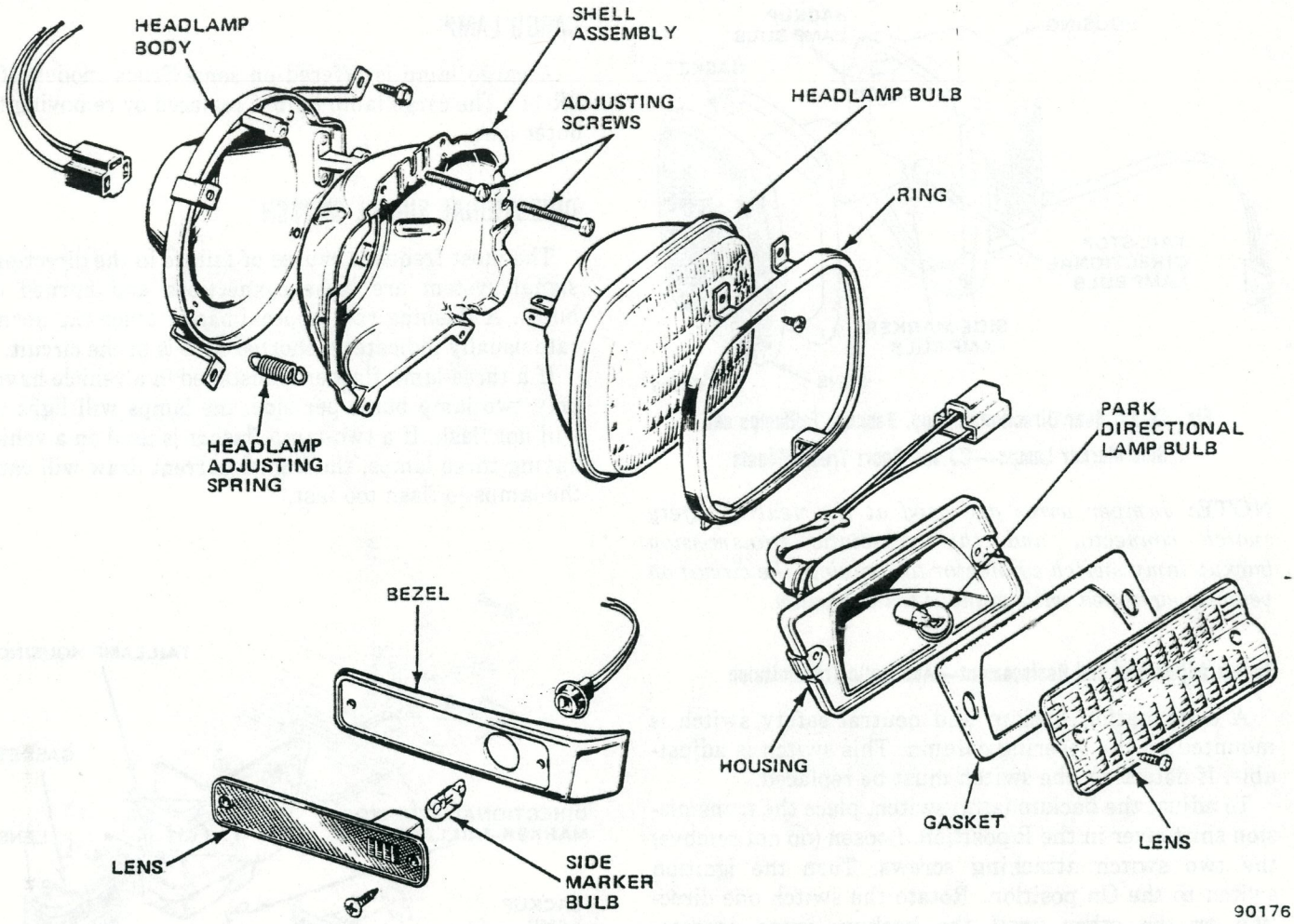


Fig. 3R-6 Headlamp, Parking, Directional and Side Marker Lamps—Cherokee-Wagoneer-Truck Models

LICENSE PLATE LAMP

CJ Models

The left taillamp illuminates the license plate. Refer to figure 3R-7.

Truck with Sport Truck Pickup Box

The lamp assemblies are the same as those used on CJ models. Refer to figure 3R-7 for parts identification and to procedural steps for CJ model for service procedures.

Cherokee and Wagoneer

The license plate lamp is attached to the tailgate and is a sealed unit. The lamp is removed by removing the lamp attaching screws and disconnecting the wire harness.

Truck with Townside Pickup Box

The license plate lamp is attached to the rear frame crossmember. Bulb replacement is accomplished by removing the bulb lens. The ground circuit for the license plate bulb is completed through metal-to-metal contact between the bulb bracket, license plate bracket, and the frame (fig. 3R-10).

When equipped with step bumper, the lamp wiring must be disconnected from the original lamp and connected to the step bumper license lamp extension wire.

BACKUP LAMPS AND SWITCHES

To replace a bulb, remove the backup lamp or taillamps lens, as required.

Switch Adjustment and Replacement—Manual Transmission

The backup lamp switch is threaded into the right rear corner of the transmission cover housing. The backup lamp switch is actuated by the reverse shift rail.

The backup lamp switch is not serviceable or adjustable and must be replaced as a unit.

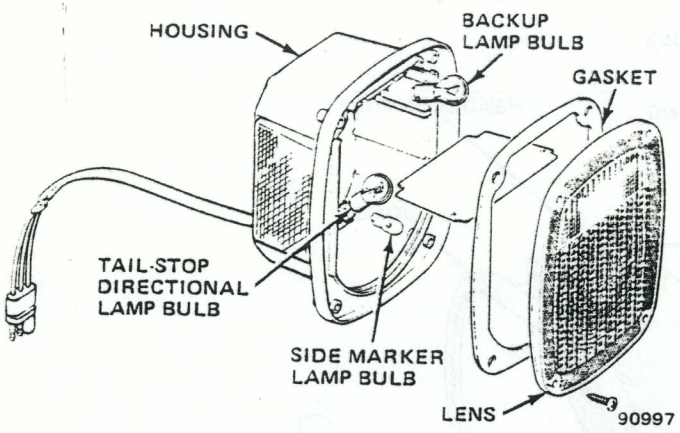


Fig. 3R-7 Rear Directional, Stop, Backup, Taillamps and Side Marker Lamps—CJ and Sport Truck Models

NOTE: *Jumper wires are used at the neutral safety switch connector and the automatic transmission backup lamp switch connector to complete the circuit on vehicles equipped with manual transmission.*

Switch Adjustment and Replacement—Automatic Transmission

A combination backup and neutral safety switch is mounted on the steering column. This switch is adjustable. If defective, the switch must be replaced.

To adjust the backup lamp switch, place the transmission shift lever in the R position. Loosen (do not remove) the two switch attaching screws. Turn the ignition switch to the On position. Rotate the switch one direction or the other until the backup lamps operate. Tighten the attaching screws. Check the switch for an engine start in the N and P positions. The engine must not start in R, D, 2 or 1 position.

As an aid to adjusting the backup lamp switch, install a test lamp to the lamp side of the switch and ground one side of a test lamp. When the test lamp lights, the backup lamps are operating.

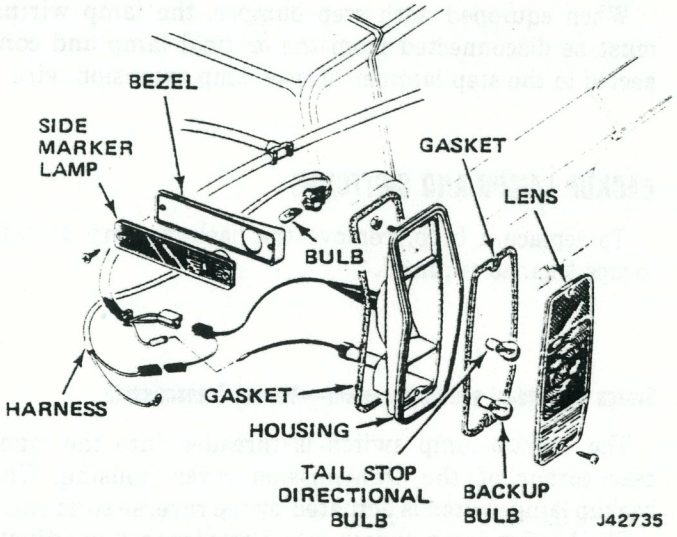


Fig. 3R-8 Rear Directional, Stop, Backup and Taillamps—Cherokee

CARGO LAMP

A cargo lamp is offered on some Truck models (fig. 3R-11). The cargo lamp bulb is replaced by removing the outer lens.

DIRECTIONAL SIGNAL SWITCH

The most frequent causes of failure in the directional signal system are loose connections and burned out bulbs. A flashing rate approximately twice the normal rate usually indicates a shorted bulb is in the circuit.

If a three-lamp flasher is installed in a vehicle having only two lamp bulbs per side, the lamps will light but will not flash. If a two-lamp flasher is used on a vehicle having three lamps, the higher current draw will cause the lamps to flash too fast.

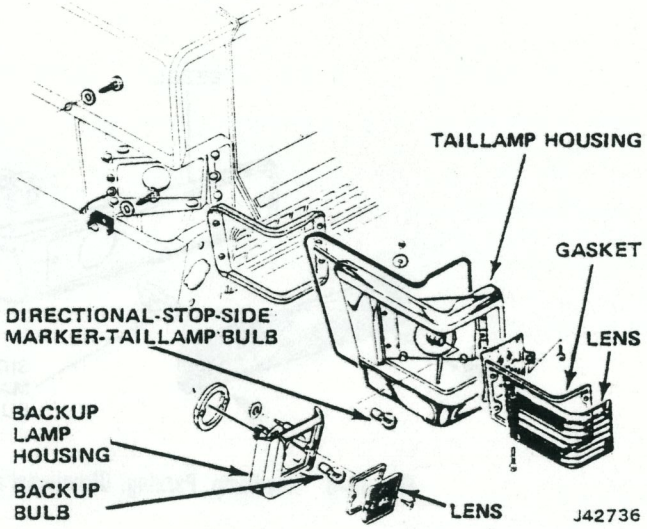


Fig. 3R-9 Rear Directional, Stop, Backup and Taillamps—Wagoneer

If there is no signal at any front, rear or indicator lamp, check the fuse.

If fuse checks okay, substitute a known good flasher. If a new flasher does not cure the problem, check the signal system wiring connections at the fuse and at the steering column connector.

NOTE: *If the brake stoplamps function properly, the rear signal lamp bulbs are okay.*

The directional flasher is mounted directly to the fuse panel. Refer to the wiring diagram at the rear of the manual for circuitry.

Switch Removal

(1) Disconnect battery negative cable.

(2) Remove horn center button by pulling straight out.

(3) Remove screws, bushing, receiver and spring.

(4) Remove steering wheel nut. Note alignment of steering wheel to steering shaft index marks for later installation.

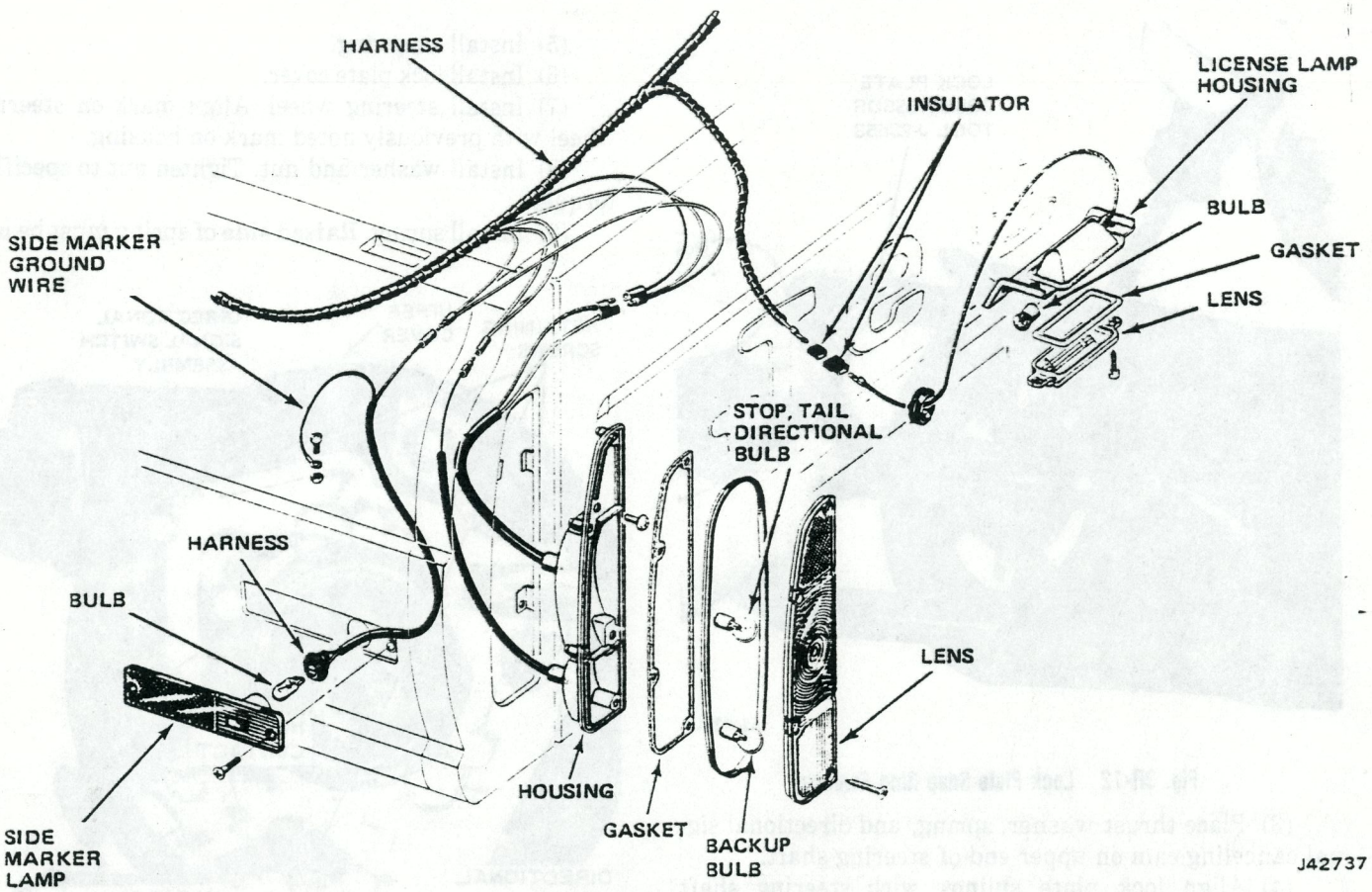


Fig. 3R-10 Rear Directional, Stop, Backup, Taillamps and Side Marker—Townside Truck

(5) Remove steering wheel with Steering Wheel Puller J-21232-01.

(6) Lift lock plate cover.

(7) Use Lock Plate Compressor Tool J-23653 to depress lock plate (fig. 3R-12).

(8) Pry round wire snap ring from steering shaft groove.

(9) Remove Lock Plate Compressor Tool, snap ring, lock plate, directional signal canceling cam, upper bearing preload spring and thrust washer from steering shaft.

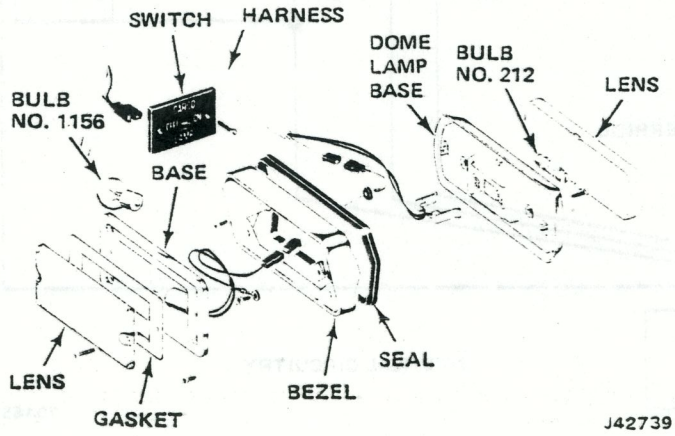


Fig. 3R-11 Cargo Lamp—Truck

(10) Place directional signal actuating lever in right turn position and remove lever.

(11) Depress hazard warning light switch, located on right side of column adjacent to the key lock, and remove button by turning in a counterclockwise direction.

(12) Remove directional signal wire harness connector block from its mounting bracket on right side of lower column.

NOTE: *On vehicles equipped with automatic transmission, use a stiff wire, such as a paper clip, to depress the lock tab which retains the shift quadrant lamp wire in the connector block.*

(13) Remove directional signal switch retaining screws and pull directional signal switch and wire harness from column (fig. 3R-13).

Switch Installation

(1) Guide wire harness into position and carefully align switch assembly.

NOTE: *Assure that actuating lever pivot is correctly aligned and seated in the upper housing pivot boss prior to installing the retaining screws.*

(2) Install directional signal lever and actuate directional signal switch to assure correct operation.

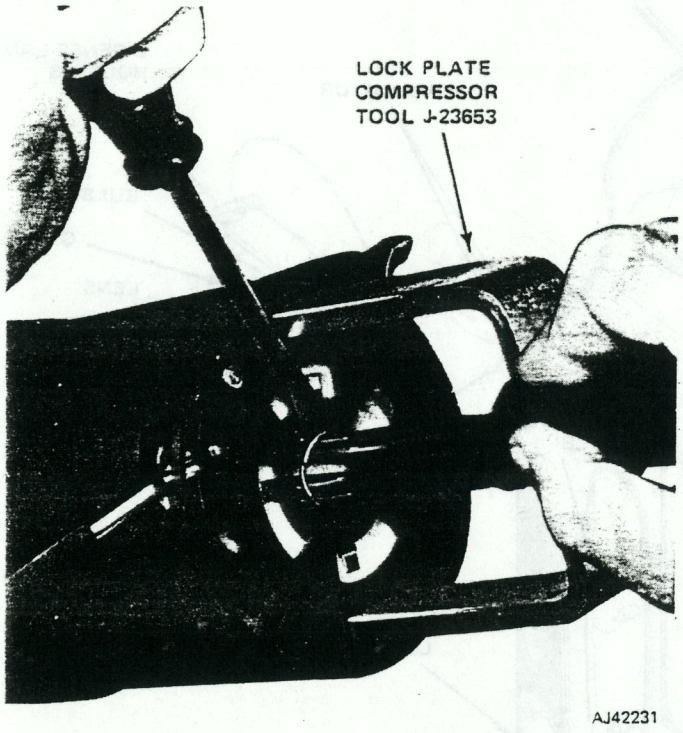


Fig. 3R-12 Lock Plate Snap Ring Removal

(3) Place thrust washer, spring, and directional signal canceling cam on upper end of steering shaft.

(4) Align lock plate splines with steering shaft splines and place lock plate in position with directional signal canceling cam shaft protruding through dogleg opening in lock plate.

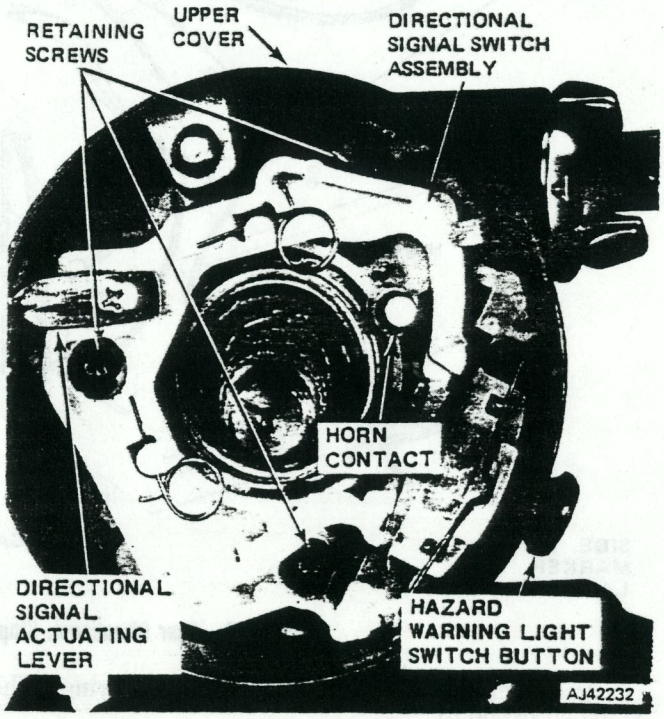
(5) Install snap ring.

(6) Install lock plate cover.

(7) Install steering wheel. Align mark on steering wheel with previously noted mark on housing.

(8) Install washer and nut. Tighten nut to specified torque.

(9) Install spring. **Raised side** of spring must be **up**.



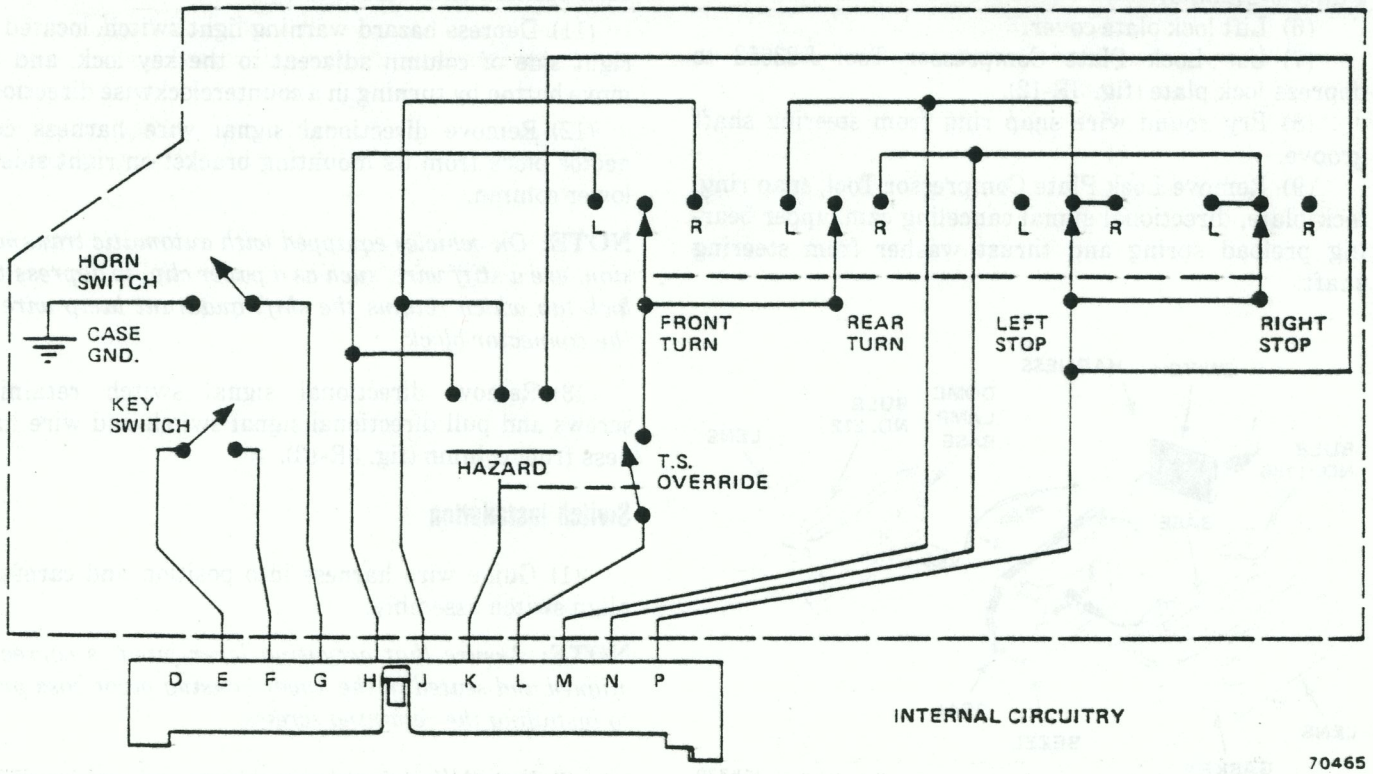


Fig. 3R-13 Directional Signal Switch

(10) Install receiver and bushing. Receiver must be free to move after bushing screws are tightened.

(11) Line up notch on receiver with nib on horn button. Push button until in snaps into place.

4-WAY EMERGENCY FLASHER (HAZARD WARNING)

All models are equipped with a four-way emergency flasher system. With the switch activated, the two front and two rear directional signal lamps flash on and off simultaneously with both directional signal indicator lamps on the instrument clusters.

This system makes use of the conventional directional signal wiring and bulbs, but has a separate battery feed wire, flasher unit and switch. It is possible to leave a vehicle with the 4-way flasher operating, with the ignition switch and vehicle doors locked. When the 4-way flasher is turned on, the normal directional signal supply is disconnected at the directional signal switch and a separate battery feed circuit is connected into the switch from the fuse panel. The 4-way flasher circuit uses a special heavy-duty flasher. Since the 4-way warning flasher is of the heavy-duty type, it will flash from one to six bulbs at a constant rate. Flashing indicator lights do not necessarily mean that *all* signal bulbs are flashing.

The 4-way emergency flasher switch is a part of the directional signal switch.

To operate the system, push in on the switch button.

The 4-way flasher can only be canceled by pulling out on the flasher switch knob.

Refer to Directional Signal Switch for 4-way flasher switch removal or replacement procedure.

The battery feed for the 4-way flasher system is in the fuse panel.

STOPLAMP SWITCH

The stoplamp switch is self-adjusting and is the same for all models. The switch is retained in its mounting bracket by a spring clip which engages the threaded portion of the switch housing (fig. 3R-14). The switch may be removed by pulling straight out of the mounting bracket and retainer.

Adjustment

(1) Depress brake pedal and hold in depressed position.

(2) Push stoplamp switch completely into mounting bracket until switch bottoms.

(3) Release brake pedal and allow it to return to undepressed position. Brake pedal will push switch to properly adjusted position.

(4) Check switch operation. Stoplamps should operate after 3/8 inch to 5/8 inch of pedal travel.

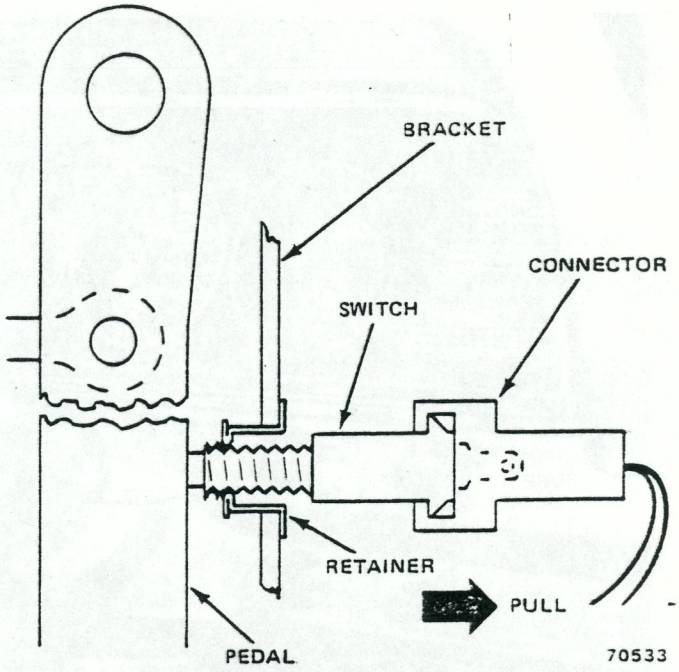


Fig. 3R-14 Stoplamp Switch

Stoplamp Switch Electrical Test

This test requires a voltmeter.

(1) Ground one lead of voltmeter.

(2) Probe each connection of stoplamp switch with other lead of voltmeter.

(a) With switch plunger depressed (brake not applied), one switch connector should indicate voltage and the other should not.

(b) With switch plunger released (brake applied), both switch leads should show voltage.

FOG LAMPS

The fog lamps are available on all models. Mounting locations vary depending on vehicle model and optional equipment. The switch is located on the far left side of the instrument panel (fig. 3R-15).

NOTE: *Fog lamps are turned off by the circuit relay when the high beam driving lamps are turned on. The circuit relay is located on the right front wheelhouse panel near the blower motor. Refer to Wiring Diagrams at the end of this manual for details.*

Aiming Fog Lamps

(1) Position vehicle on a flat surface, facing and approximately 25 feet from wall.

(2) Remove lamp stone shields (fig. 3R-16).

(3) Loosen lamp attaching hardware. Turn headlamp and fog lamp switches ON (fig. 3R-15), adjust lamp beams as follows:

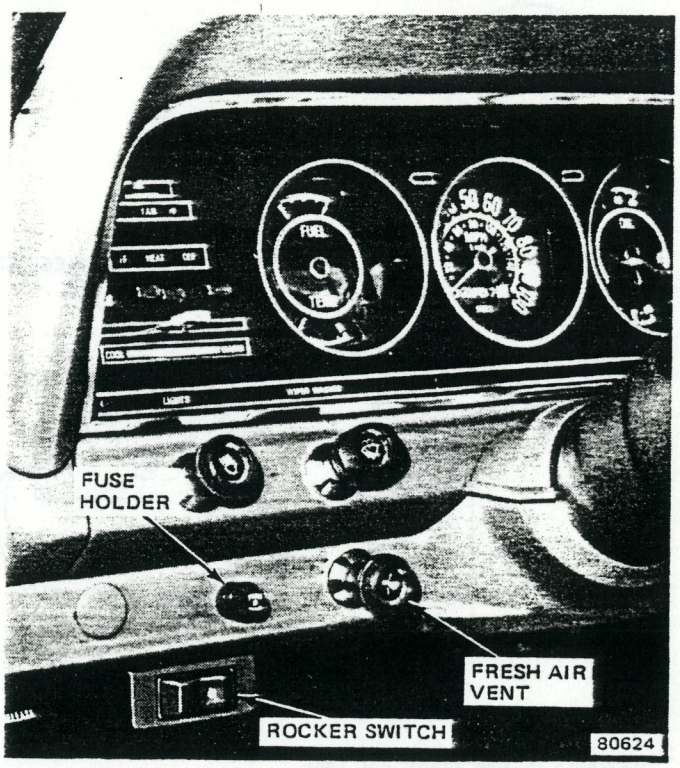


Fig. 3R-15 Fuse Holder and Switch Location—Typical

(a) Horizontal distance between light beams on wall should be same size as distance between lamps on front bumper.

(b) Vertical height of light beams on wall should be 4 inches less than height of lamps on front bumper.

(4) Tighten lamp attaching hardware.

(5) Turn off headlamp and fog lamp switches.

(6) Install lamp stone shields.

Lamp Element Replacement

(1) Remove lamp stone shields (fig. 3R-16).

(2) Remove screws attaching bezel to lamp body. Remove bezel from lamp body.

(3) Remove lens and reflector assembly from lamp body.

(4) Remove bulb holder from lens and reflector assembly.

(5) Remove lamp element from bulb holder and install replacement lamp element.

(6) Install bulb holder in lens and reflector assembly.

(7) Position lens and reflector assembly in lamp body with TOP of lens at top of lamp body.

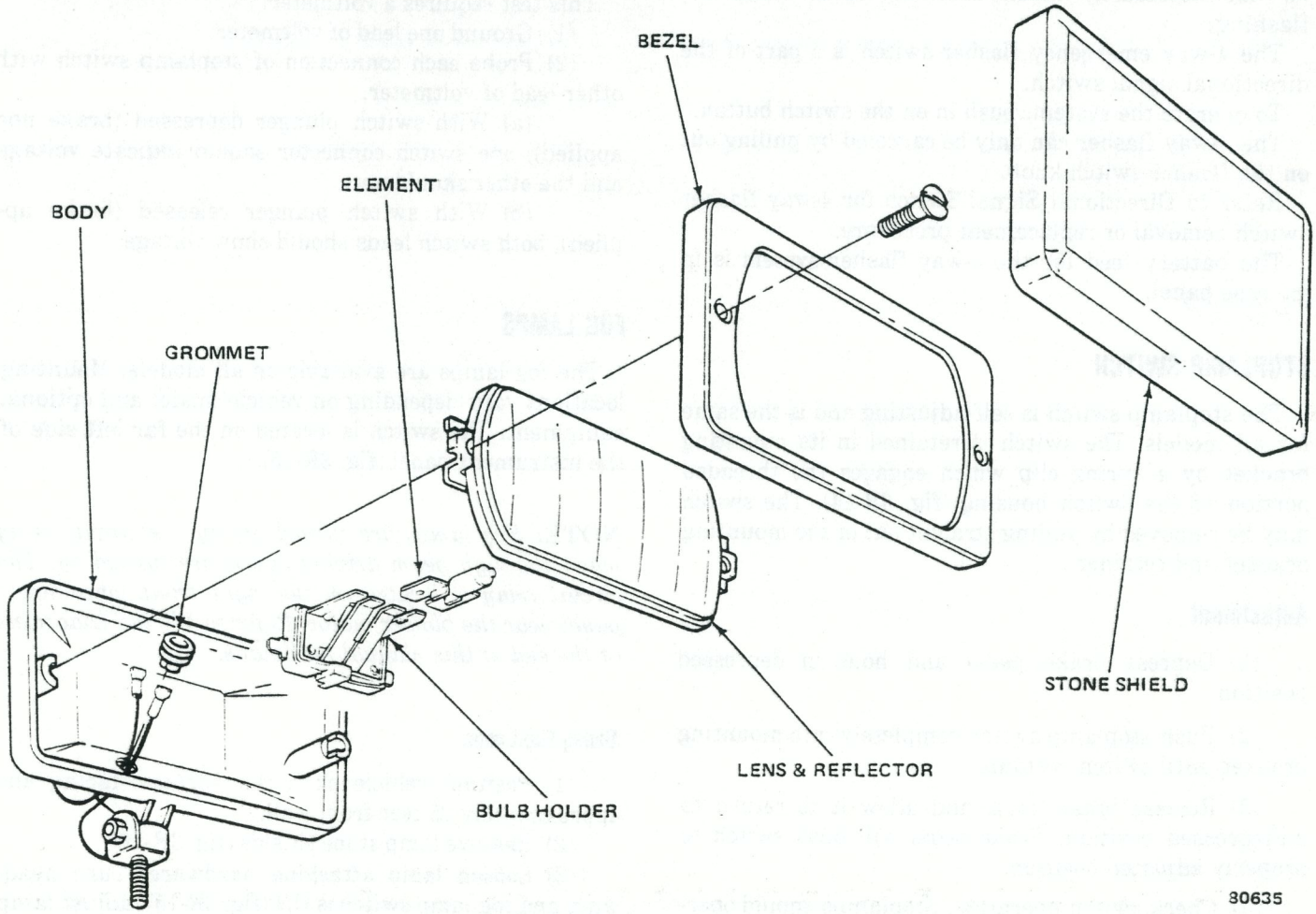


Fig. 3R-16 Fog Lamp Components

(8) Position bezel on lamp body and install attaching screws.

(9) Install stone shield on lamp.

Switch Replacement

(1) Remove switch from instrument panel and disconnect electrical harness (fig. 3R-17).

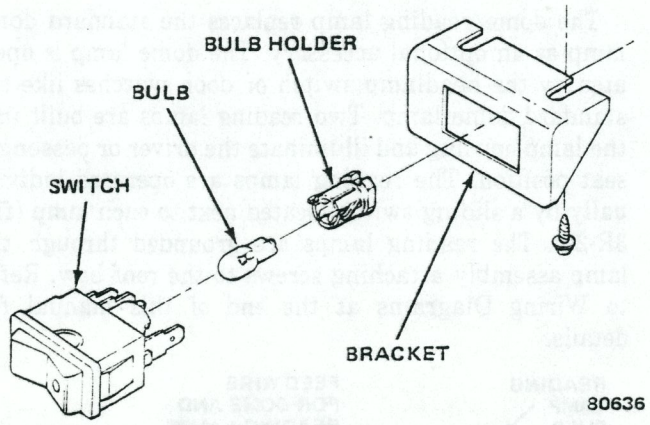


Fig. 3R-17 Fog Lamp Switch Components

(2) Connect harness to replacement switch and install switch in instrument panel.

ENGINE COMPARTMENT LAMP

This optional lamp obtains current at the battery terminal of the starter solenoid. A single wire incorporating a fusible link for protection passes current to the lamp assembly. The lamp assembly has a mercury switch which completes the circuit through the hood assembly when the hood is open. When the hood is closed, the mercury within the lamp assembly opens the circuit and the lamp does not light (fig. 3R-18).

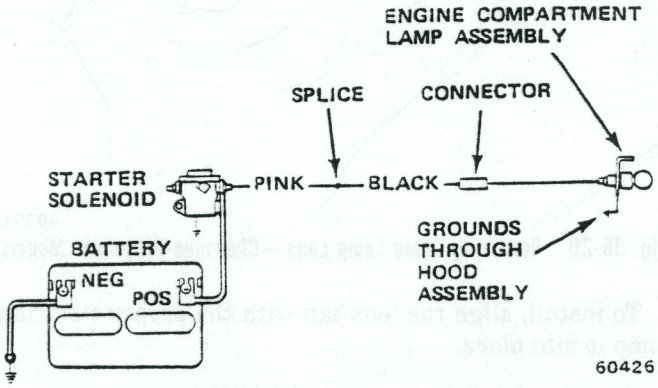


Fig. 3R-18 Engine Compartment Lamp Wiring

INTERIOR LIGHTING SYSTEM

COURTESY LAMPS/DOME LAMPS

CJ Models

CJ models equipped with the hardtop have a dome lamp located above the liftgate. When removing the hardtop, disconnect the wire connector located on the left C-pillar. The lamp is operated by turning the headlamp switch knob counterclockwise to the stop.

The dome lamp lens can be removed by squeezing the lens together to disengage the retaining tabs (fig. 3R-19). The dome lamp assembly can be removed after removing the attaching screws.

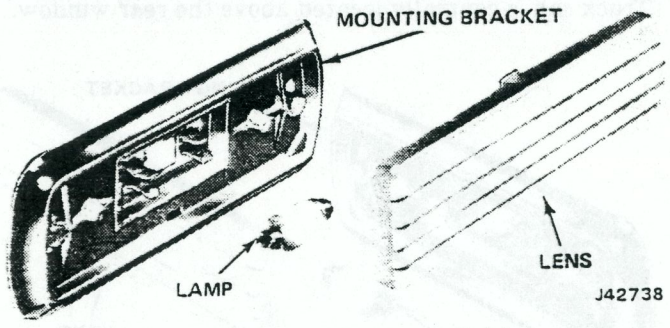


Fig. 3R-19 Dome Lamp—CJ Models

Cherokee-Wagoneer Models

The courtesy and dome lamps operate when the doors are opened. The door pillar switch provides a ground for the circuit.

Battery feed is from the headlamp switch. When the doors are closed, the dome and courtesy lamps are operated by rotating the headlamp switch knob counterclockwise to the stop. The ground for the lamps is then through the headlamp switch. The standard round dome lamp lens has three irregularly spaced barbed tabs that are inserted into slots in the dome lamp base to retain it. The lens is removed by pulling it downward or by prying it down with a small screwdriver (fig. 3R-20).

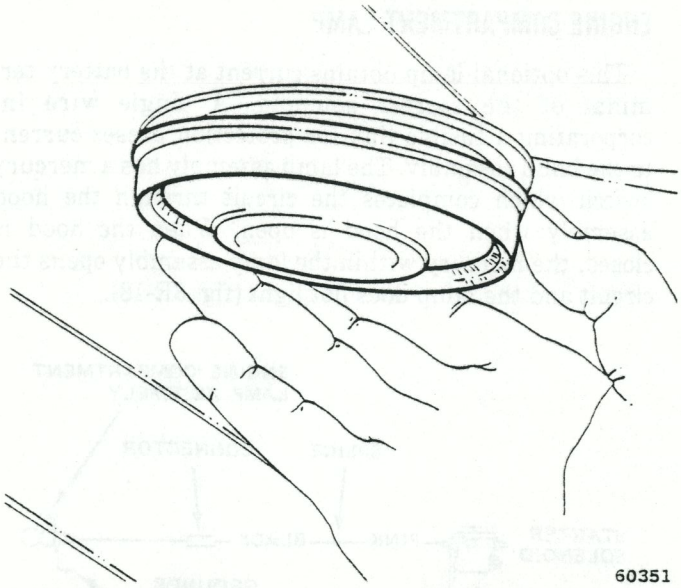


Fig. 3R-20 Removing Dome Lamp Lens—Cherokee-Wagoneer Models

To install, align the lens tab with the proper slots and snap it into place.

Truck Models

The courtesy and dome lamps operate when the doors are opened. The door pillar switch provides a ground for the circuit.

Battery feed is from the headlamp switch. When the doors are closed, the dome and courtesy lamps are operated by rotating the headlamp switch knob counterclockwise to the stop. The ground for the lamps then is made through the headlamp switch.

The dome lamp lens can be removed by squeezing the lens together to disengage the retaining tabs (fig. 3R-21). The dome lamp assembly can be removed after removing two attaching screws. The dome lamp bracket in the Truck cab is centrally located above the rear window.

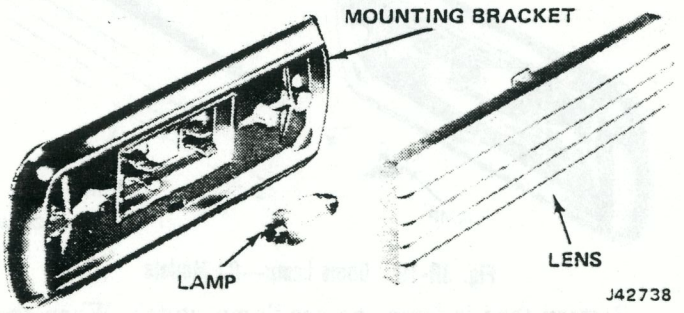


Fig. 3R-21 Dome Lamp—Truck Models

LIGHTED VANITY MIRROR

Cherokee-Wagoneer Models

The lighted vanity mirror (fig. 3R-23) is attached to the passenger sun visor. It has one lamp assembly mounted at each end of the vanity mirror. The lamp switch is located on the right side of the mirror assembly.

DOME/READING LAMP

Cherokee-Wagoneer Models

The dome/reading lamp replaces the standard dome lamp as an optional accessory. The dome lamp is operated by the headlamp switch or door switches like the standard dome lamp. Two reading lamps are built into the lamp housing and illuminate the driver or passenger seat position. The reading lamps are operated individually by a sliding switch located next to each lamp (fig. 3R-22). The reading lamps are grounded through the lamp assembly attaching screws to the roof bow. Refer to Wiring Diagrams at the end of this manual for details.

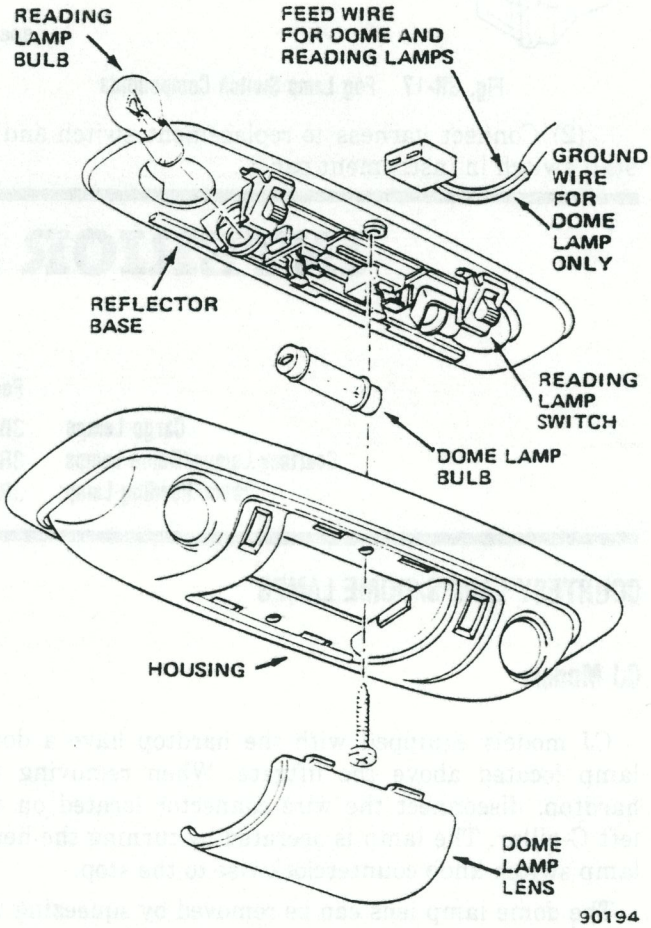


Fig. 3R-22 Dome/Reading Lamp—Cherokee-Wagoneer Models

The lighted vanity mirror assembly is equipped with a short harness and connector to allow removal without dropping the headliner. The short harness is connected to the dome/reading lamp harness. The circuit is grounded at the front roof rail and obtains current from the dome/reading lamp circuit. Refer to Wiring Diagrams at the end of this manual for details.

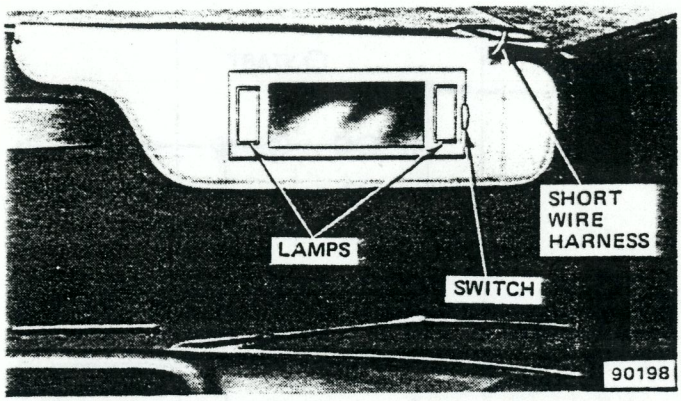


Fig. 3R-23 Lighted Vanity Mirror—Cherokee-Wagoneer Models

CARGO LAMP

Cherokee-Wagoneer Models

The cargo lamp is located in the rear headlining and controlled by the headlamp switch, door switches, and cargo lamp switch. The cargo lamp switch may be operated from the rear of the vehicle after lowering the tailgate glass. The cargo lamp switch provides an additional ground switch for the cargo lamp.

NOTE: *The cargo lamp on the Truck models is addressed in the exterior lighting system section of this chapter.*

GLOVE BOX LAMP

Current passes from the stoplight switch feed to the glove box lamp socket. The glove box lamp switch is grounded to the instrument panel and thus has no ground wire. When the glove box is open, the switch completes the ground circuit through the instrument panel. Refer to Wiring Diagrams at the end of this manual for details.

INSTRUMENT CLUSTER LAMPS

The instrument cluster lamps are covered in detail in Chapter 3C.

CHASSIS WIRING HARNESS

WIRING HARNESS COMPONENTS

Main Harness Connector

All models have a main wiring harness connector located at the left upper corner of the dash panel. This connector is made up of the engine and forward lamp harness at the engine compartment and the fuse and instrument panel harness at the passenger compartment side.

The connector can be removed from the dash panel by removing the center bolt from the engine compartment side and the two attaching screws from the driver's side. Be careful not to bend the male spade terminals when removing or installing the connector. The center of the connector is filled with a non-conductive grease to prevent corrosion of the terminals. If any wires are replaced on the engine compartment side, the terminal opening must be resealed with a durable waterproof sealer. **Do not use string-type body caulk as a sealer.**

Fusible Links

Fusible links are harness wires covered with a special non-flammable insulation. The links protect circuits which are not normally fused due to carrying high amperage loads or because of their location in the chassis.

They are used to prevent major harness damage in the event a short circuit, short to ground or overload condition occurs.

All Jeep models are equipped with fusible links, located in the engine compartment, which protect the circuits shown in the Wiring Diagrams.

Each link is of a fixed value for the specific load. Replacement links are listed in the parts catalog.

NOTE: *Failure of a fusible link is often caused by a grounded circuit; therefore, the cause of the failure must be determined prior to installing a new link.*

Fusible Link Replacement

(1) Disconnect battery negative cable.

(2) Follow one end of the link to the terminal end. Follow the remaining end to wire harness.

(3) Remove harness tape approximately 2 inches from where link enters harness; the soldered splice will be visible.

(4) Following the wiring diagram, determine which circuit(s) may have caused the failure. Test the circuit(s)

using an ohmmeter or test light until ground condition is located and corrected.

(5) Unsolder link from harness, solder replacement link to harness wire(s).

NOTE: *Solder joint MUST be made with rosin core solder only. DO NOT use acid or acid core solder. Protect harness wires from damage when soldering.*

(6) Tape harness using plastic electrical tape.

(7) Route wire as originally installed and make connection.

(8) Connect battery negative cable and check operation of the circuit(s) involved.

IGNITION SWITCH

The ignition switch is mounted on the lower section of the steering column and is connected to the key lock assembly by a remote lock rod.

Removal

(1) Place key lock in Off—LOCK position and remove two switch attaching screws.

(2) Disconnect switch from remote rod.

(3) Disconnect harness connector and remove switch from steering column.

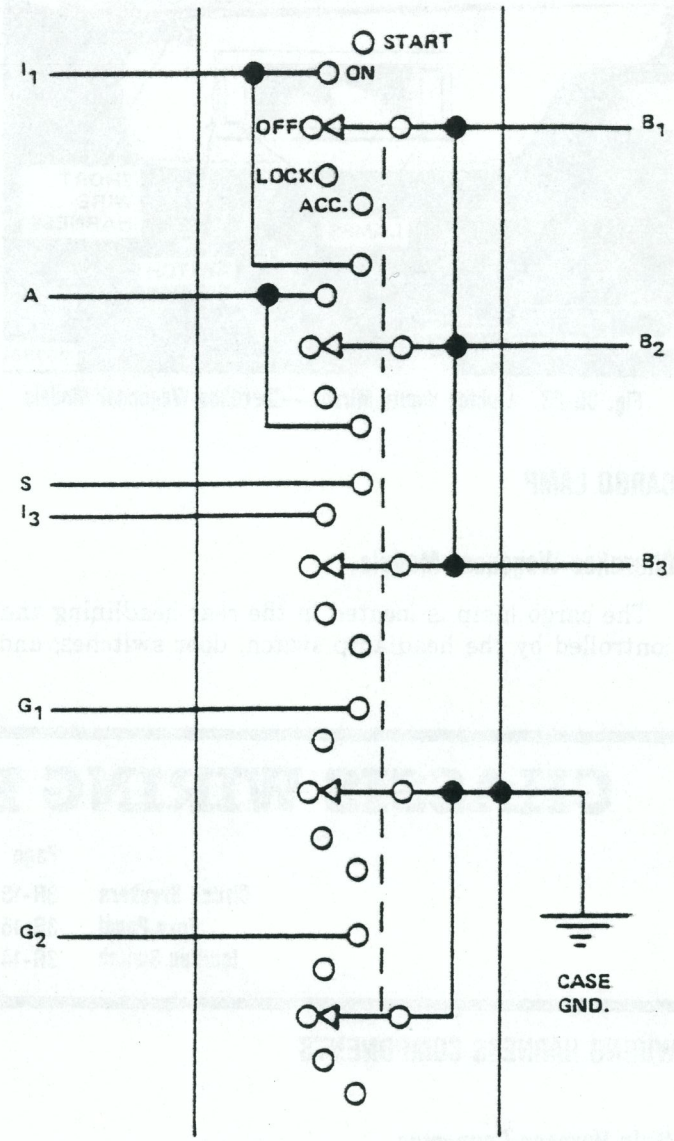
Testing

The ignition switch terminals are shown in figure 3R-24.

To test the ignition switch circuitry and continuity, place the slide bar in the position to be tested and use either an ohmmeter or Continuity Light J-21008.

Ignition switch slide bar positions can be easily identified by first locating the alignment hole located in the flat portion of the switch adjacent to the terminals. Starting from the alignment hole end of the switch, the switch positions are: Accessory, Off—LOCK, Off, On, and Start. Each position has a detent stop except START which is spring loaded to release when the key is released.

No electrical resistance should be indicated (test lamp on) between two connected terminals. The maximum voltage drop between any two connected terminals, as shown in the Ignition Switch Chart, should not exceed 12.5 millivolts per amp. For example: If a 10-amp load is drawn through the switch, maximum voltage drop should be 10 x 0.0125 or 0.125 volt.



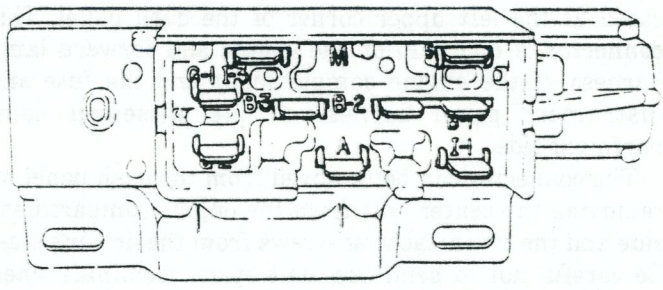


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Fig. 3R-24 Ignition Switch Terminals

Installation

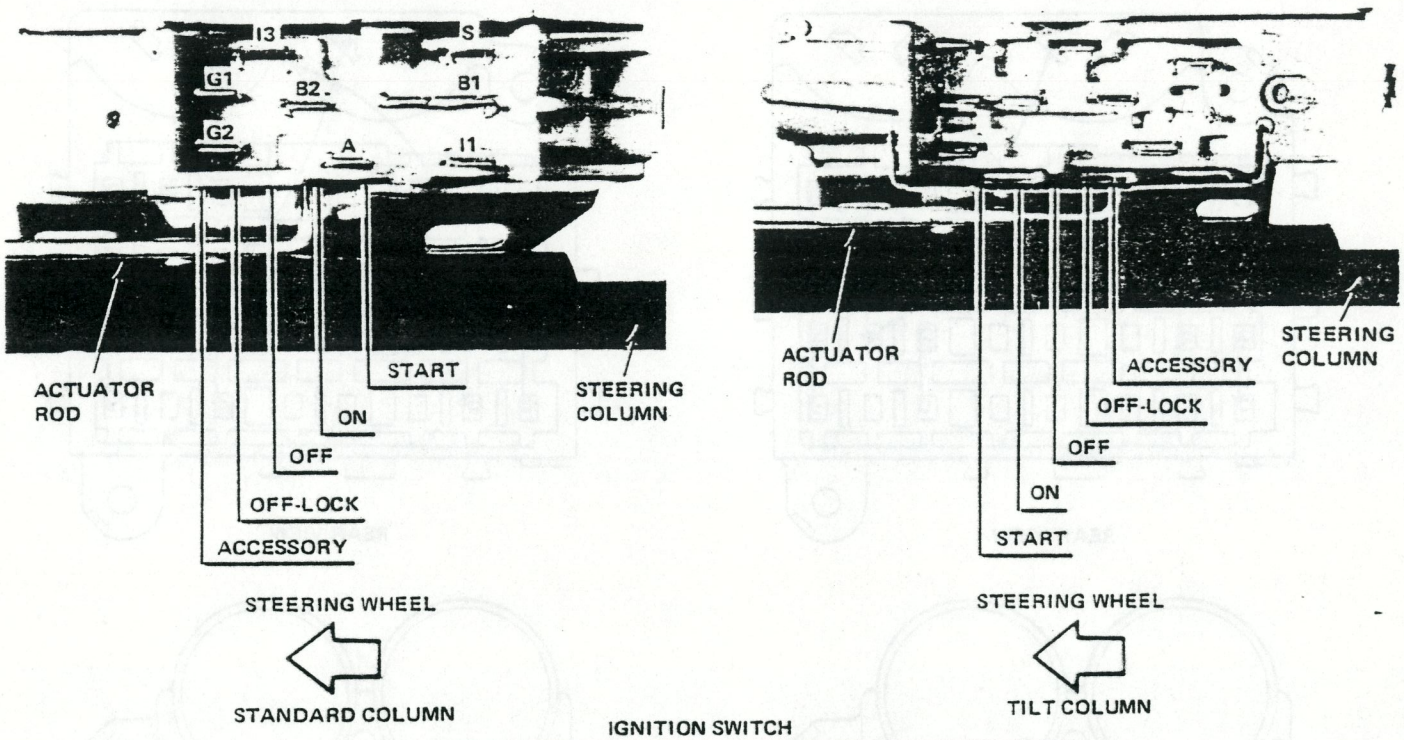
Standard Column

(1) With actuator rod disconnected, position switch as shown in figure 3R-25.

(2) Move slider to extreme left (Accessory position).

NOTE: *The left side of the ignition switch is toward the steering wheel.*

(3) Position actuator rod in the slider hole and install switch to steering column being careful not to move the slider out of the detent.



IGNITION SWITCH

POSITION	CIRCUIT	
START	I-1, B-1 & S G-1, G-2	CONNECTED GROUNDED
ON	I-1 & B-1 A & B-2 1-3 & B-3	CONNECTED CONNECTED CONNECTED
OFF	OPEN	
OFF-LOCK	OPEN	
ACCESSORY	A & B-2	CONNECTED

B-1, B-2 & B-3 (COMMON CONNECTION)

A42215

Fig. 3R-25 Ignition Switch Positions

(4) Hold key in Accessory position and push switch down column slightly to remove slack in actuator rod.

(5) Tighten attaching screws securely.

(6) Connect white connector and then black connector to switch.

(7) Install steering tube cover.

Tilt Column

(1) With actuator rod disconnected, position switch as shown in figure 3R-25.

(2) Move slider to extreme right (Accessory position).

NOTE: *The right side of the ignition switch is downward from the steering wheel.*

(3) Position actuator rod in slider hole.

(4) Install switch to steering column but do not tighten attaching screws.

(5) Lightly push switch down column (away from steering wheel) to remove lash in actuator rod, while holding key in Accessory position. Be careful not to move slider out of detent.

(6) Tighten attaching screws securely.

(7) Connect white connector and then black connector to ignition switch.

(8) Install steering tube cover, if removed.

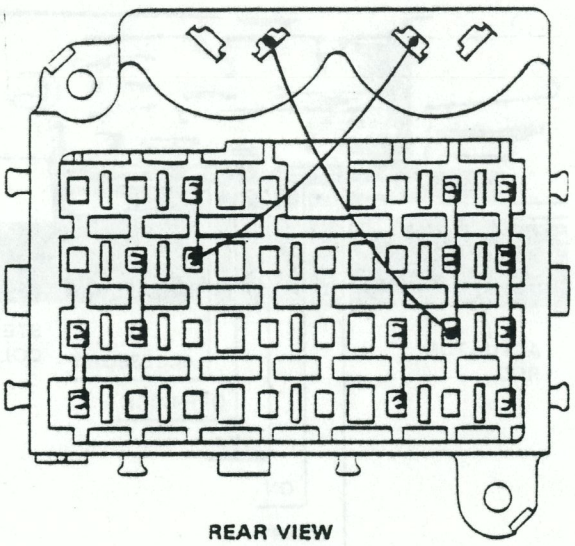
FUSE PANEL

The fuse panel is located on the passenger compartment side of the dash panel, attached to the main harness connector (figs. 3R-26 and 27).

CIRCUIT BREAKERS

CJ Models

Headlamps are protected by a 24-amp circuit breaker located in the headlamp switch.



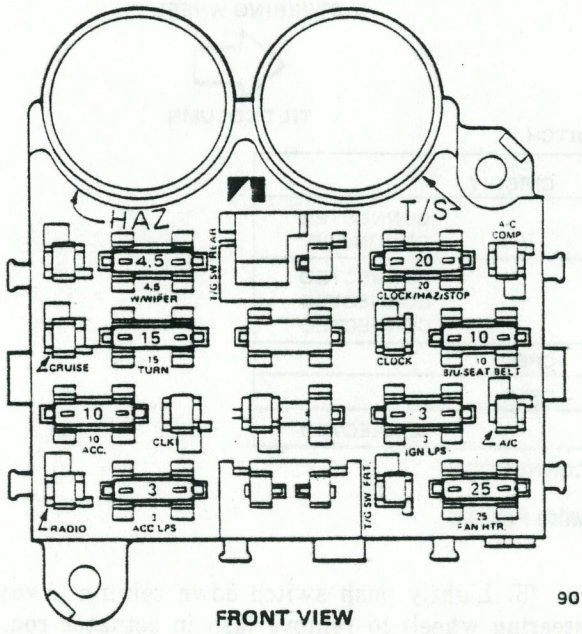
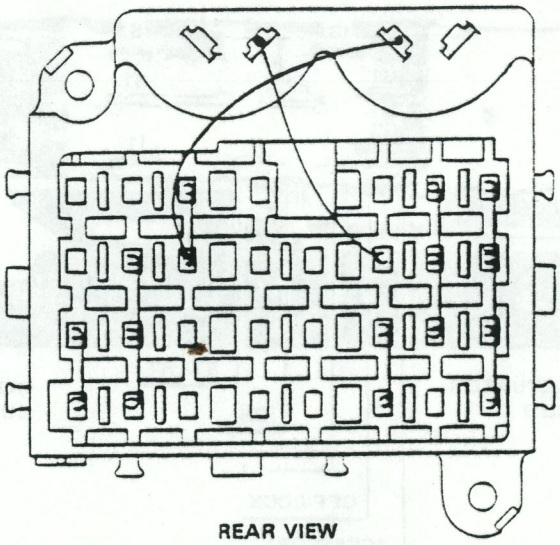


Fig. 3R-26 Fuse Panel Circuitry and Fuse Application—CJ Models



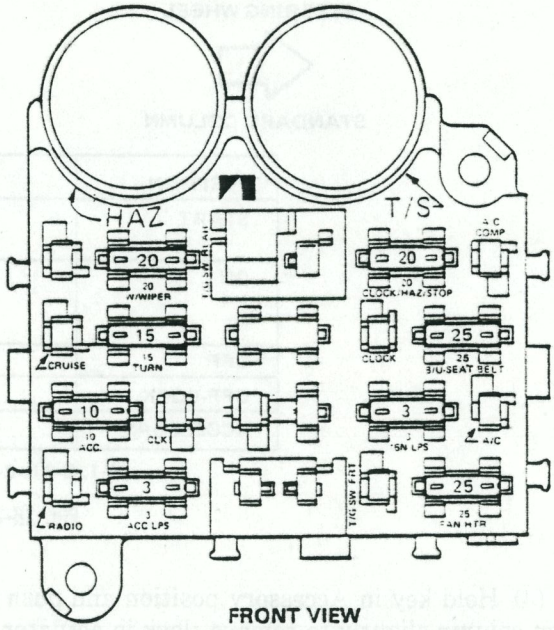


Fig. 3R-27 Fuse Panel Circuitry and Fuse Application—Cherokee-Wagoneer-Truck Models

Cherokee-Wagoneer-Truck Models

Headlamps are protected by a 24-amp circuit breaker located in the headlamp switch.

The tailgate window circuits are protected by two 30-ampere circuit breakers located in the fuse panel.

One circuit breaker is used in the instrument panel switch circuit and the other is used in the tailgate key operated switch circuit.

Torque Specifications

Service Set-To Torques should be used when assembling components.

Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Service Set-To Torque		Service In-Use Recheck Torque	
	USA (in-lbs)	Metric (N·m)	USA (in-lbs)	Metric (N·m)
Steering Wheel Nut	35 ft-lbs	48	30-40 ft-lbs	41-54
Directional Signal Switch Handle	25	3	15-30	2-3
Hazard Warning Knob Mounting Screws	5	0.5	2-5	0.2-0.5

All Torque values given in inch-pounds and newton-meters with dry fits unless otherwise specified.

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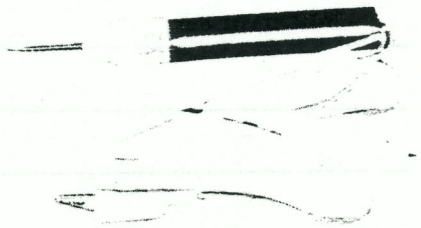
Tools

J-23653 LOCK
PLATE COMPRESSOR



J-21008
CONTINUITY LAMP

J-21232-01 FRONT PUMP
OIL SEAL REMOVER
(STEERING WHEEL PULLER)

J-25300-10
HEADLIGHT AIMER

42271B

NOTES

HORN SYSTEMS 3S

INDEX

GENERAL

The horn circuit includes horn(s), horn relay, battery, steering column wiring harness, horn ring, and the body sheet metal.

Wagoneer, Cherokee and Truck model horns are located on the radiator grille face panel behind the plastic grille. The grille must be removed to gain access to the horns.

CJ model horns are located on the inner left wheelhouse.

A cadmium-plated ground screw is used to attach the horn(s) to the body. **Do not** substitute other types of ground screws as they may become corroded and cause a loss of ground.

To reduce the current flow through the horn ring contacts, a relay is used between the battery and horn. The horn relay consists of an electromagnet and a set of contacts arranged so that when the magnet is energized an armature is attracted and the contacts close. A spring keeps the contacts open when the unit is at rest. The horn-ring contacts carry only relay current, while the relay opens and closes the circuit between the horn and battery (fig. 3S-1).

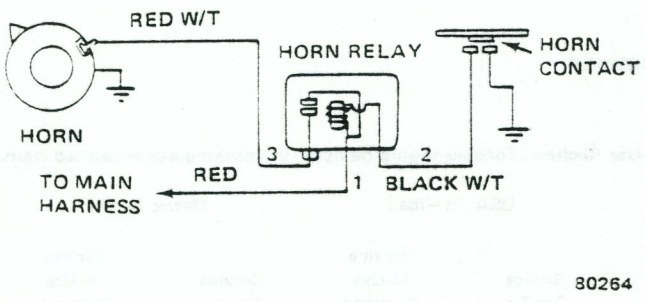


Fig. 3S-1 Horn Circuit Schematic

A fusible link is incorporated in the main wiring harness to furnish protection against major harness damage.

When a grounded circuit or overload occurs in the horn circuit, damage will be limited to the fusible link.

HORN SYSTEM DIAGNOSIS AND REPAIR

In case of horn system failure, proceed as follows:

(1) Using a test light or voltmeter, check for battery voltage in the red lead to relay before individual components are tested or replaced.

(2) A lack of voltage indicates fusible link or harness is open and cause of failure must be determined and repaired prior to installing a replacement fusible link or other components.

(3) The replacement fusible link is supplied in the proper length with a terminal connector on one end.

(4) Inspect wiring between horn, relay and battery for loose connections, faulty insulation, corroded terminals, or improper ground connection at horn base.

NOTE: *Be sure the clip on the horn mounting bracket cuts through the inner wheelhouse to ensure a good ground.*

(5) If horn does not operate when ring or button is depressed, ground number 2 terminal (fig. 3S-1) of horn relay with a jumper lead. If horn operates, this indicates proper operation of horn and relay.

(6) Inspect horn ring switch and wire from switch to relay carefully for source of trouble.

CAUTION: *Do not ground red lead.*

(7) If horn does not operate, ground number 2 terminal and connect a jumper lead from horn relay terminals 1 to 3.

(8) If horn now operates, a faulty horn relay is indicated.

(9) If it does not operate, check wiring and connections between the horn relay terminal number 3 and horn for continuity.

(10) Connect a jumper lead from horn base to the vehicle chassis or engine and repeat the above tests.

(11) If horn now operates, remove attaching screw, horn and mounting bracket, clean mating surfaces.

(12) Install horn, mounting bracket and attaching screw, tightened screw to 15 foot-pounds (20 N•m) torque.

(13) If horn still does not operate, horn is inoperative and must be replaced.

(14) To check for bad component ground, place a voltmeter between component and ground. If a sizable voltage is shown on the meter, repair the poor ground connection.

(15) Continuous horn operation is usually caused by improper ground in horn ring or button wiring.

HORN ADJUSTMENT

Adjust current by turning the adjusting screw counterclockwise to decrease the current until the specified current is reached. Current adjustment is very sensitive. Therefore, care must be taken not to turn the horn adjustment screw too far. Turn only 1/10 of a turn at one time.

(1) Check for normal battery voltage (about 12.6 volts).

(2) Connect ammeter in series between horn and battery and read current as shown in figure 3S-2.

(3) Adjust current to 4.5 amps.

NOTE: *Do not stuff rags or other materials in the horn protector to muffle the sound while adjusting, as this changes the vibration frequency and would give a raise in current setting. When adjusting a set of horns, each horn should be connected and adjusted separately, then check for tone by operating as a pair.*

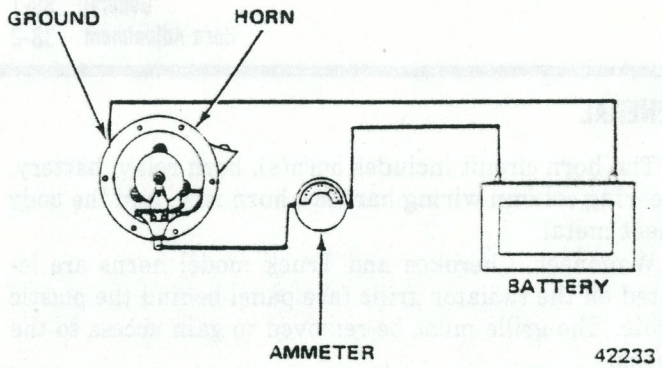


Fig. 3S-2 Connection for Horn Adjustment

SPECIFICATIONS

Electrical Specifications

Item	Current Flow
Horn	4-5 Amps

70446

Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	USA (ft – lbs)		Metric (N·m)	
	Service Set-To Torque	Service In-Use Recheck Torque	Service Set-To Torque	Service In-Use Recheck Torque
Horn Bracket Screw	15	8-17	20	11-23

All Torque values given in foot-pounds and newton-meters with dry fits unless otherwise specified.

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WINDSHIELD WIPERS 3T

SECTION INDEX

CJ WINDSHIELD WIPER

GENERAL

All CJ models are equipped with a two-speed, electric wiper motor.

The motor is mounted on the lower left corner of the windshield (fig. 3T-1).

WIPER BLADE REPLACEMENT

The wiper blade assembly is removed from the wiper arm by holding the blade away from the windshield, and pushing it firmly against the tip of the arm to compress the locking spring and disengage the retaining pin. At

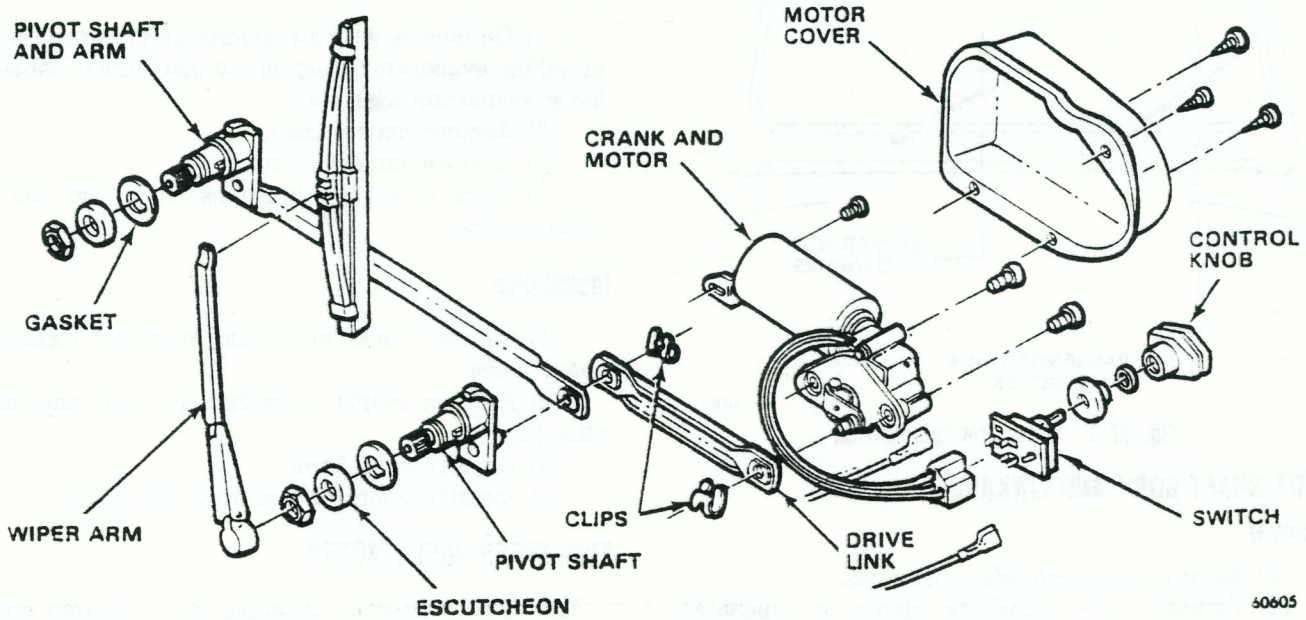


Fig. 3T-1 Windshield Wiper Components

the same time, pivot the blade clockwise to unhook it from the end of the arm.

To install, place blade assembly on wiper arm and snap blade assembly into position.

WIPER ARM REPLACEMENT

(1) Remove windshield wiper arm from pivot shaft body with Remover Tool J-22128 as shown in figure 3T-2.

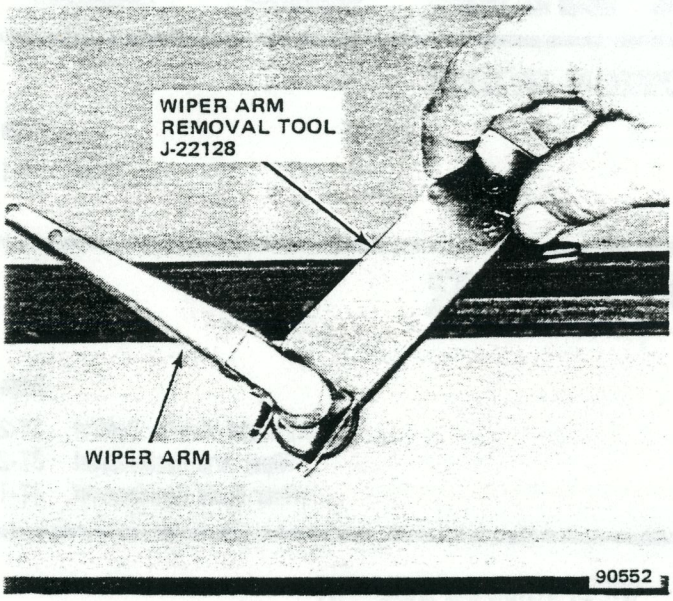


Fig. 3T-2 Wiper Arm Removal

(2) To install, push wiper arm over pivot shaft. Be sure pivot shaft is in Park position and wiper arm is positioned as shown in figure 3T-3.

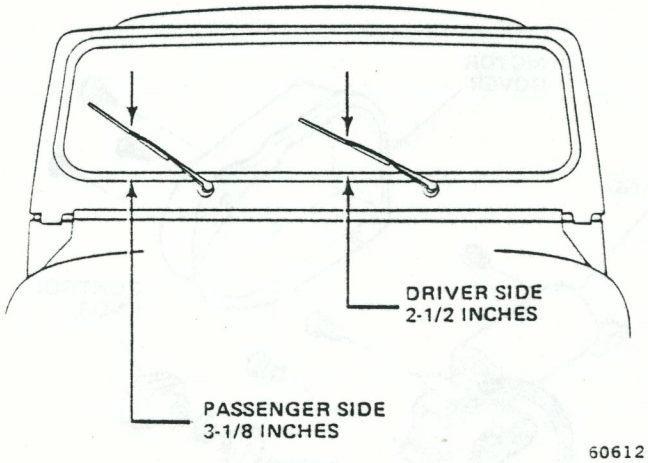


Fig. 3T-3 Wiper Arm Park Position

PIVOT SHAFT BODY AND LINKAGE

Removal

(1) Remove right and left wiper arms.

(2) Remove nuts attaching pivots to windshield frame.

(3) Remove necessary top components from windshield frame.

(4) Remove right and left windshield holddown knobs and fold windshield down.

(5) Remove right and left access hole covers.

(6) Disconnect wiper motor drive link from left wiper pivot.

(7) Remove pivot shaft body and linkage from access hole.

Installation

(1) Install pivot shaft body and linkage in windshield frame.

(2) Connect wiper motor drive link to left wiper pivot.

(3) Install right and left access hole covers.

(4) Raise windshield to upright position and install right and left windshield holddown knobs.

(5) Install nuts attaching pivots to windshield frame.

(6) Install right and left wiper arms.

(7) Install necessary top components on windshield frame.

WIPER AND WASHER CONTROL

The control switch is mounted on the instrument panel. The switch is a through-type multi-position switch which does not require grounding for proper operation.

The two-speed wiper motor is energized for continuous wiping action by turning the control knob in a clockwise direction.

The electric washer pump is operated by depressing the wiper control knob.

Removal

(1) On models with air conditioning, remove screws attaching evaporator assembly to instrument panel and lower evaporator assembly.

(2) Remove control knob.

(3) Remove nut and switch.

(4) Mark wire color locations on switch and disconnect wires.

Installation

(1) Connect wires to switch, in proper location as noted above.

(2) Position switch in instrument panel and install attaching nut.

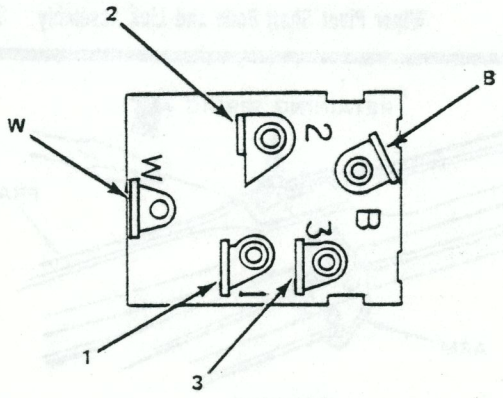
(3) Install control knob.

(4) Install evaporator assembly, if removed.

TWO-SPEED WIPER MOTOR

The wiper motor is protected by a 4.5-amp circuit breaker in the fuse panel.

When the wiper switch is moved to the low speed position, current flows from the fuse panel to terminal B (fig. 3T-4) of the wiper switch, through the wiper switch to terminal 2, then through the green wire to the motor low speed brush and through the armature to ground.



Selector Position	
Off or Park	B-1
Low Speed	B-2
High Speed.	B-3
Wash	B-W

80343

Fig. 3T-4 Continuity Test for Wiper Switch

With the wiper switch in the high speed position, current flows from the fuse panel to terminal B of the wiper switch, through the wiper switch to terminal 3, then through the red wire to the motor high speed brush and through the armature to ground.

When the wiper switch is turned off, current flows from the fuse panel to terminal B of the wiper switch, through the wiper switch to terminal 1, then through the black wire to the park contact points to the motor low speed brush and through the armature to ground. When the cam on the wiper drive gear opens the park contact points, the feed circuit to the motor low speed brush is interrupted and the motor is in park.

Troubleshooting Procedures

The wiper motor may be operated independently of the switch to aid in determining defective components.

NOTE: *The wiper motor must be grounded for proper operation and during all wiper tests.*

With ignition switch on, check for 12-volts at switch terminal B. If 12-volt test lamp lights but wiper motor does not operate, connect a jumper wire from ground strap on motor to a good body ground. If motor still does not operate, disconnect wiring from switch. Using a jumper wire, connect switch terminals 2 and B. This connection should give low speed operation. If wiper motor does not operate in low speed, there is an open in the green wire, a defective internal motor connection or a stuck low speed brush.

To obtain high speed, connect a jumper wire between terminals 3 and B. If wiper motor fails to operate, there is an open in the red wire, a defective internal motor connection, or a stuck high speed brush.

With the wiper blades in a position other than park, connect a jumper wire between terminals 1 and B. The wiper blades should run on low speed and stop in the park position. If the motor does not run after making the jumper connection, there is an open in the black wire, a defective internal motor connection, a misaligned or damaged set of contact points or a bad connection through the park point set to the low speed brush. If the wiper motor runs but does not park, the cam on the drive gear is not sufficiently breaking the contact points.

If wiper motor operation is intermittent, a defective solder joint, wiring connection, body ground or worn brush may cause the condition.

Removal with Crash Pad

NOTE: *Without crash pad, remove wiper motor cover.*

(1) Remove necessary top components from windshield frame.

(2) Remove right and left windshield holddown knobs and fold windshield down.

(3) Remove left access hole cover.

(4) Disconnect drive link from left wiper pivot.

(5) Disconnect wiper motor wire harness from switch.

(6) Remove attaching screws and remove wiper motor.

Installation with Crash Pad

(1) Position wiper motor on windshield frame and install attaching screws.

(2) Connect wiper motor wire harness to switch.

(3) Connect drive link to left wiper pivot.

(4) Install left access hole cover.

(5) Raise windshield to upright position and install right and left windshield holddown knobs.

(6) Install necessary top components on windshield frame.

WASHER PUMP

The electric washer pump assembly is mounted in the water reservoir. The impeller motor case is grounded to the body sheet metal by a black ground wire. It is energized by a yellow feed wire from the single blade terminal on the control switch.

CHEROKEE - WAGONEER - TRUCK WINDSHIELD WIPER

GENERAL

The two-speed electric windshield wipers and electric washers are standard equipment. An optional intermittent wiper system provides a pause between wipe cycles for use during conditions of very light precipitation.

The controls for the windshield wipers are mounted on the instrument panel to the left of the steering column.

The electric wipers are operated by turning the control knob to the right. For intermittent operation, turn knob to the left. Electric washers are actuated by depressing the wiper control knob.

The wiper arms are actuated by a link and pivot assembly attached to the wiper motor.

The wiper motor is mounted to an adapter plate mounted to dash panel.

The wiper arms move in a tandem-like action and park to the right side of the car.

CAUTION: *The wiper arms and blades must not be moved manually from side to side or damage could result.*

WIPER BLADE REPLACEMENT

(1) To remove wiper blade from mounting pin on wiper arm, pull up on retainer spring and remove wiper blade (fig. 3T-5).

(2) To install, push blade frame onto mounting pin so that retainer spring engages pin. Be sure blade is securely attached to arm.

WIPER BLADE ELEMENT REPLACEMENT

(1) Place frame of wiper blade on a firm surface with notched end of blade element backing strip as shown in figure 3T-6.

(2) Pull up and twist counterclockwise plastic backing strip, unlocking backing strip from retaining tab.

(3) Slide backing strip down and align with next retaining tab, twist slightly and unlock backing strip from retaining tab.

(4) Repeat procedure for remaining tabs until blade element is detached from frame.

(5) To install, engage notched end of blade element backing strip with first wiper blade frame retaining tab.

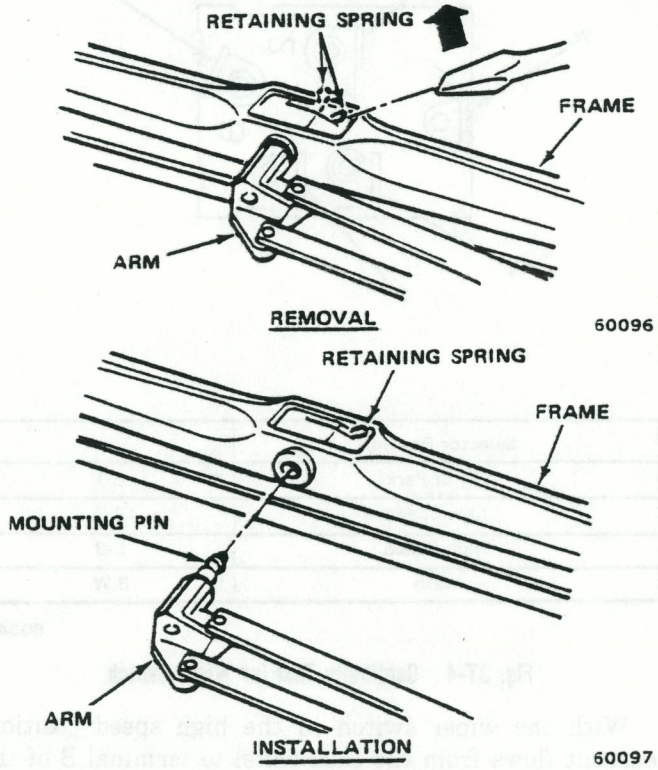


Fig. 3T-5 Wiper Blade Replacement

(6) Slide backing strip up and align with next backing strip.

(7) Repeat procedure for next three retaining tabs.

(8) For last retaining tab, place frame on firm surface, pull up and twist backing strip clockwise, locking strip into retaining tab.

WIPER ARM REPLACEMENT

(1) Raise blade end of arm from windshield and move spring tab away from pivot shaft. Disengage auxiliary arm retainer clip (driver's side only) from pivot pin and pull wiper arm from pivot shaft.

(2) To install, start wiper on pivot shaft, position auxiliary arm on pivot and slide retaining clip down to lock arm in position. Push wiper arm down on pivot shaft until it bottoms. Be sure that pivot shaft is in Park position and wiper arm is positioned as shown in figure 3T-7.

(3) Wet windshield and recheck Park position by operating wiper motor several times—ON and OFF.

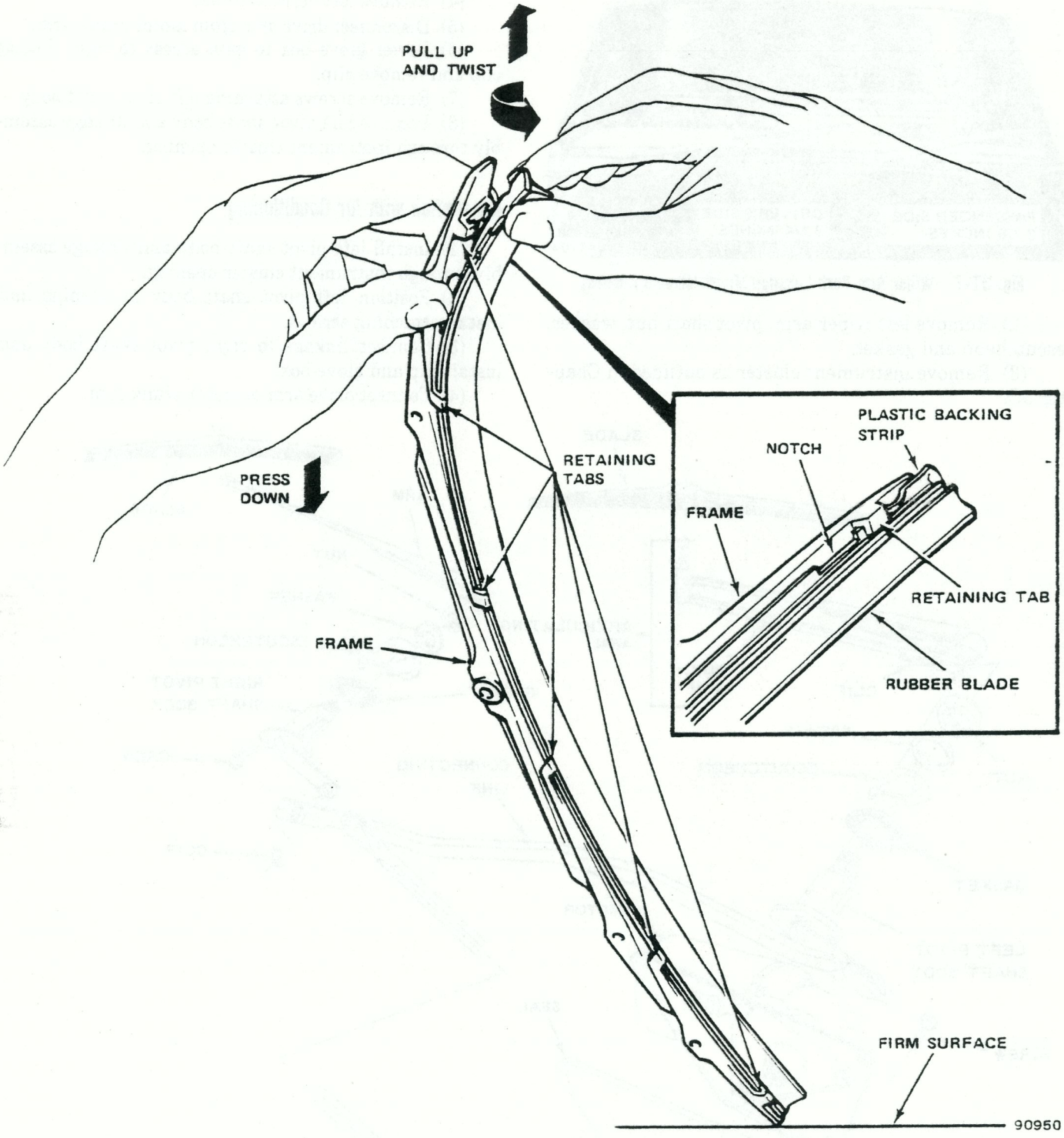


Fig. 3T-6 Wiper Blade Element Replacement

WIPER PIVOT SHAFT BODY AND LINKAGE

Removal without Air Conditioning

(1) Remove wiper arms, pivot shaft nuts, washers, escutcheons, and gaskets (fig. 3T-8).

(2) Disconnect drive arm from motor crank.

(3) Remove individual links where necessary to remove pivot shaft bodies without excessive interference.

Installation without Air Conditioning

(1) Install wiper pivot shafts and linkage.

(2) Connect drive arm to motor crank.

(3) Install gaskets, escutcheons, washers, pivot shaft nuts, and wiper arms.

Removal with Air Conditioning

(1) Disconnect battery negative cable.

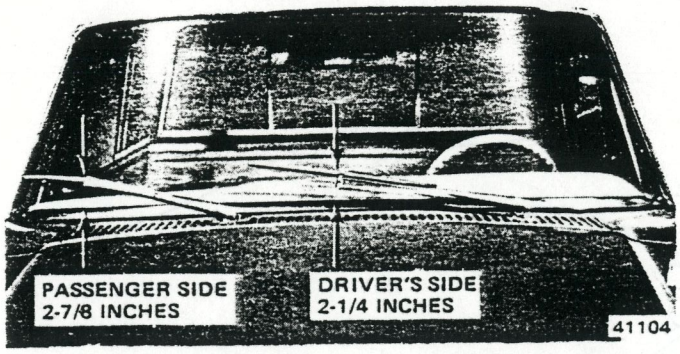


Fig. 3T-7 Wiper Arm Park Location Measurements (Inches)

(2) Remove left wiper arm, pivot shaft nut, washer, escutcheon and gasket.

(3) Remove instrument cluster as outlined in Chapter 3C.

(4) Remove left defroster duct.

(5) Disconnect drive arm from motor crank arm.

(6) Lower glove box to gain access to right linkage clip and remove clip.

(7) Remove screws attaching left pivot shaft body.

(8) Remove left pivot shaft body and linkage assembly through instrument cluster opening.

Installation with Air Conditioning

(1) Install left pivot shaft body and linkage assembly through instrument cluster opening.

(2) Position left pivot shaft body in opening and install attaching screws.

(3) Connect linkage to right pivot shaft body and install clip and glove box.

(4) Connect drive arm to motor crank arm.

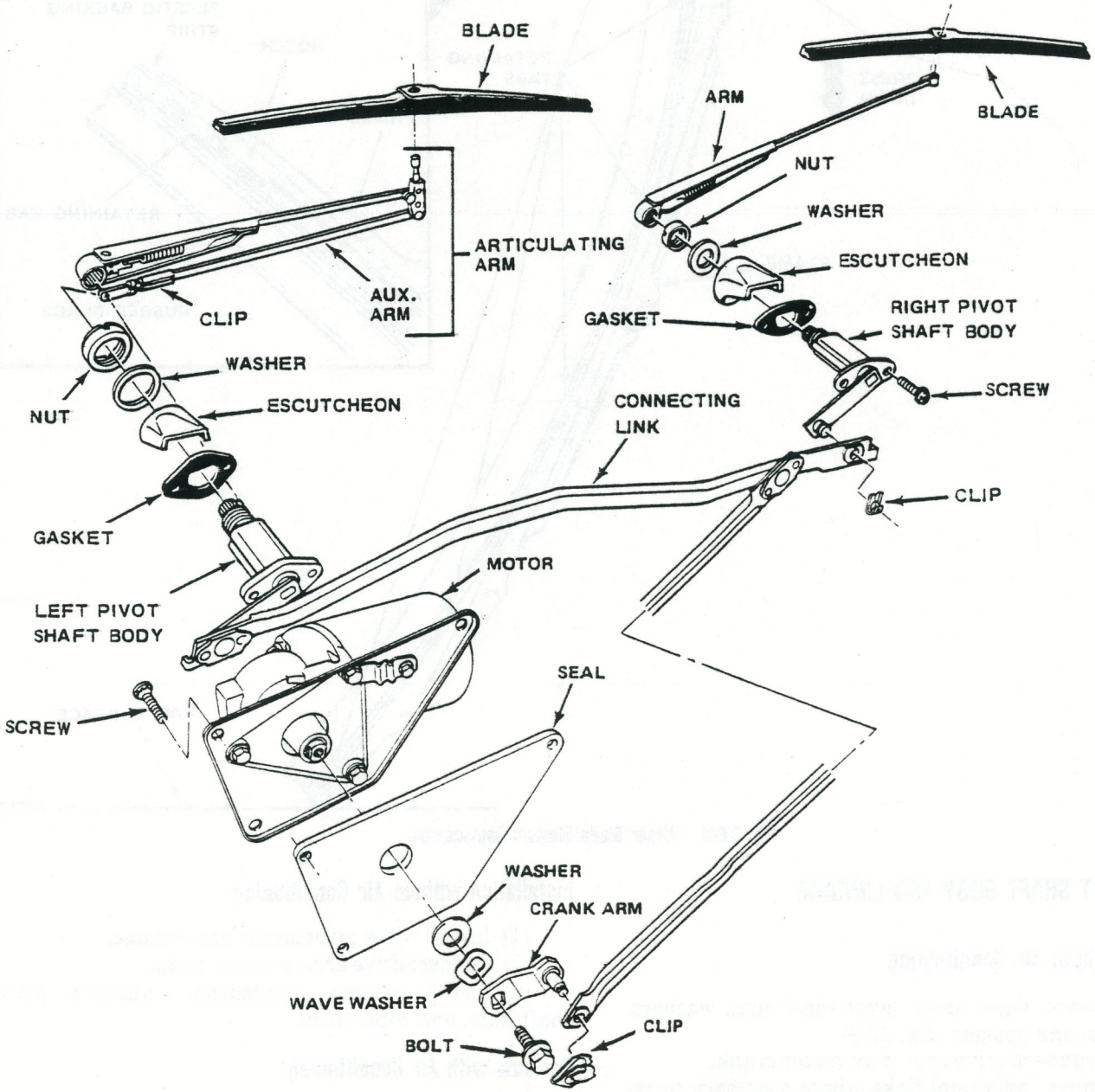


Fig. 3T-8 Windshield Wiper Components

(5) Install left defroster duct.

(6) Install instrument cluster as outlined in Chapter 3C.

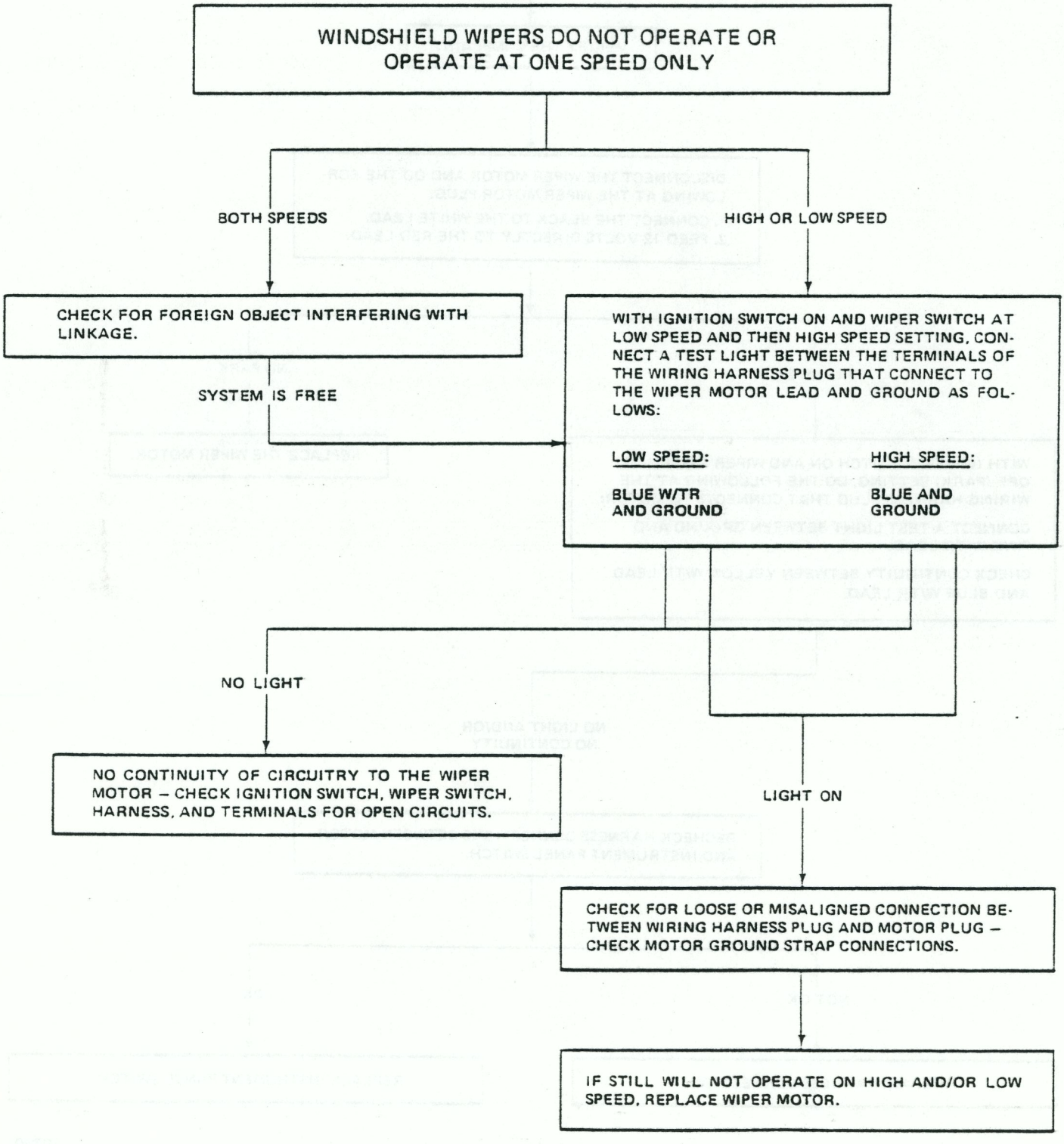
(7) Install gasket, escutcheon, washer, pivot shaft nut and left wiper arm.

(8) Connect battery negative cable.

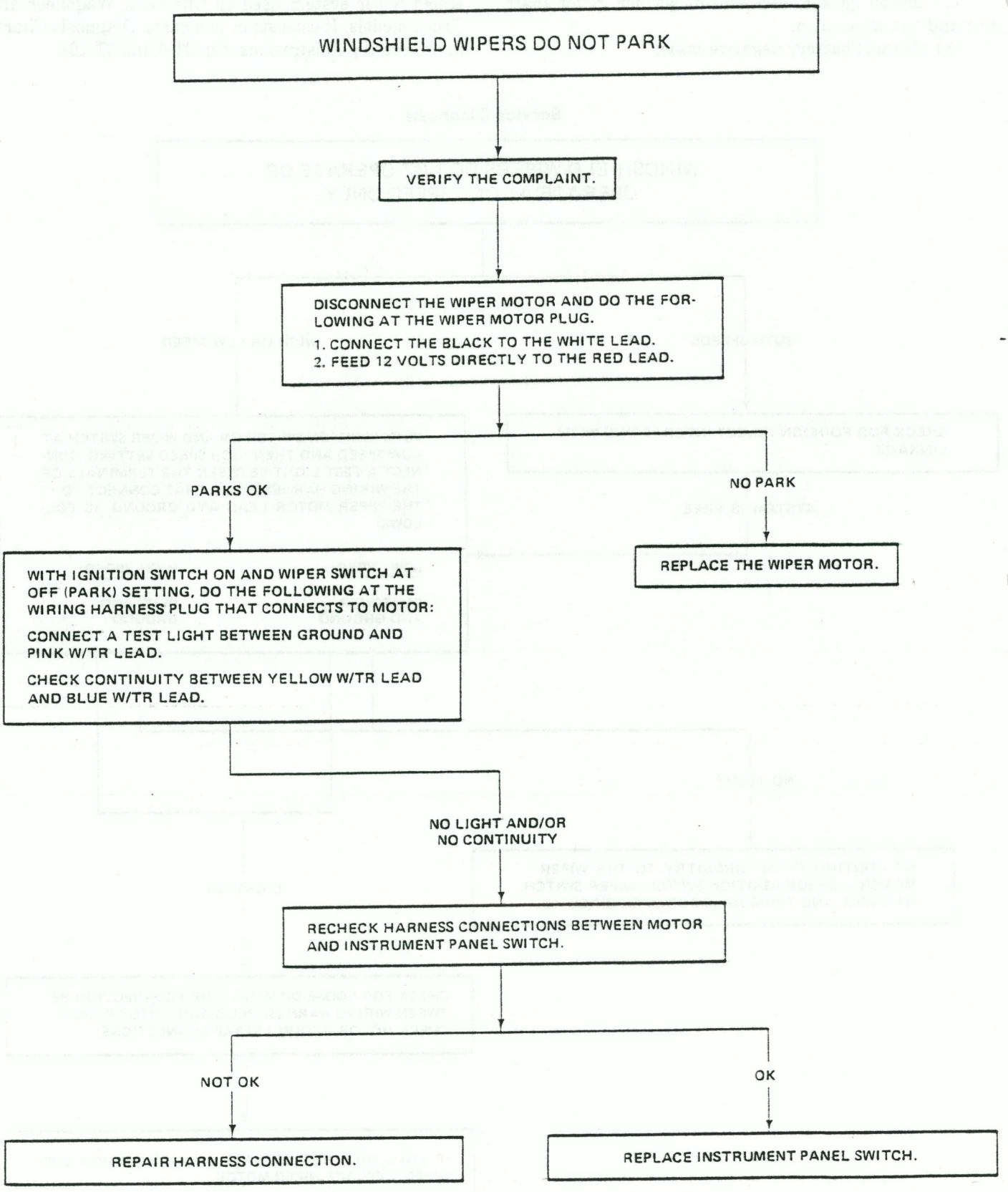
DIAGNOSIS AND CIRCUITRY

This section is a guide to troubleshooting the windshield wiper system used on Cherokee, Wagoneer and Truck models. It consists of two parts: Diagnosis Charts and Circuitry Illustrations (fig. 3T-9 and 3T-10).

Service Diagnosis



Service Diagnosis (Continued)



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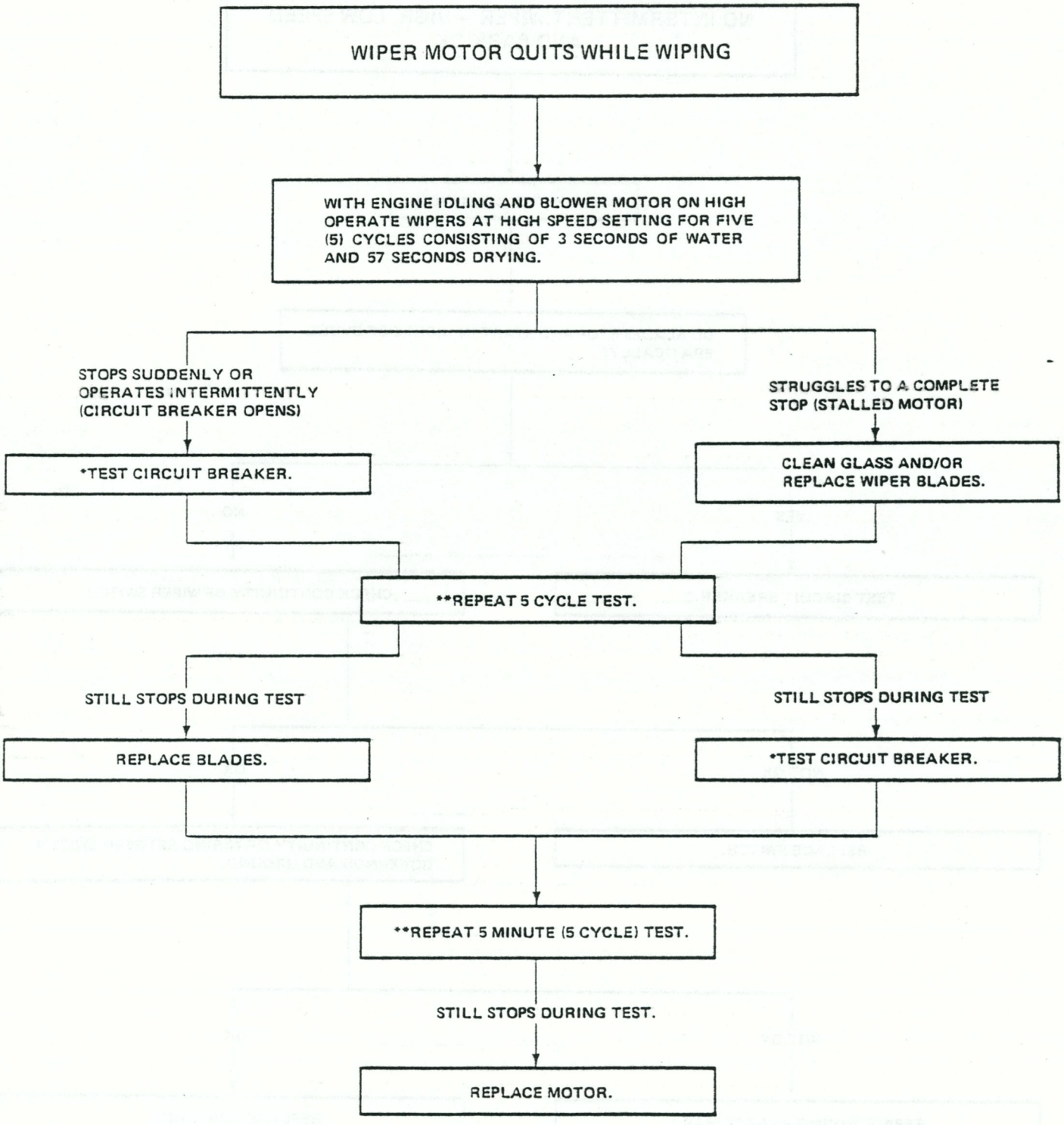
Service Diagnosis (Continued)



* CIRCUIT BREAKER IS INTEGRAL WITH INSTRUMENT PANEL SWITCH.

** ALLOW MOTOR TO COOL TO 140° F OR LOWER BEFORE STARTING REPEAT TESTS. IF MOTOR IS 140° F OR LOWER, THE HAND CAN BE HELD AGAINST MOTOR WITHOUT DISCOMFORT.

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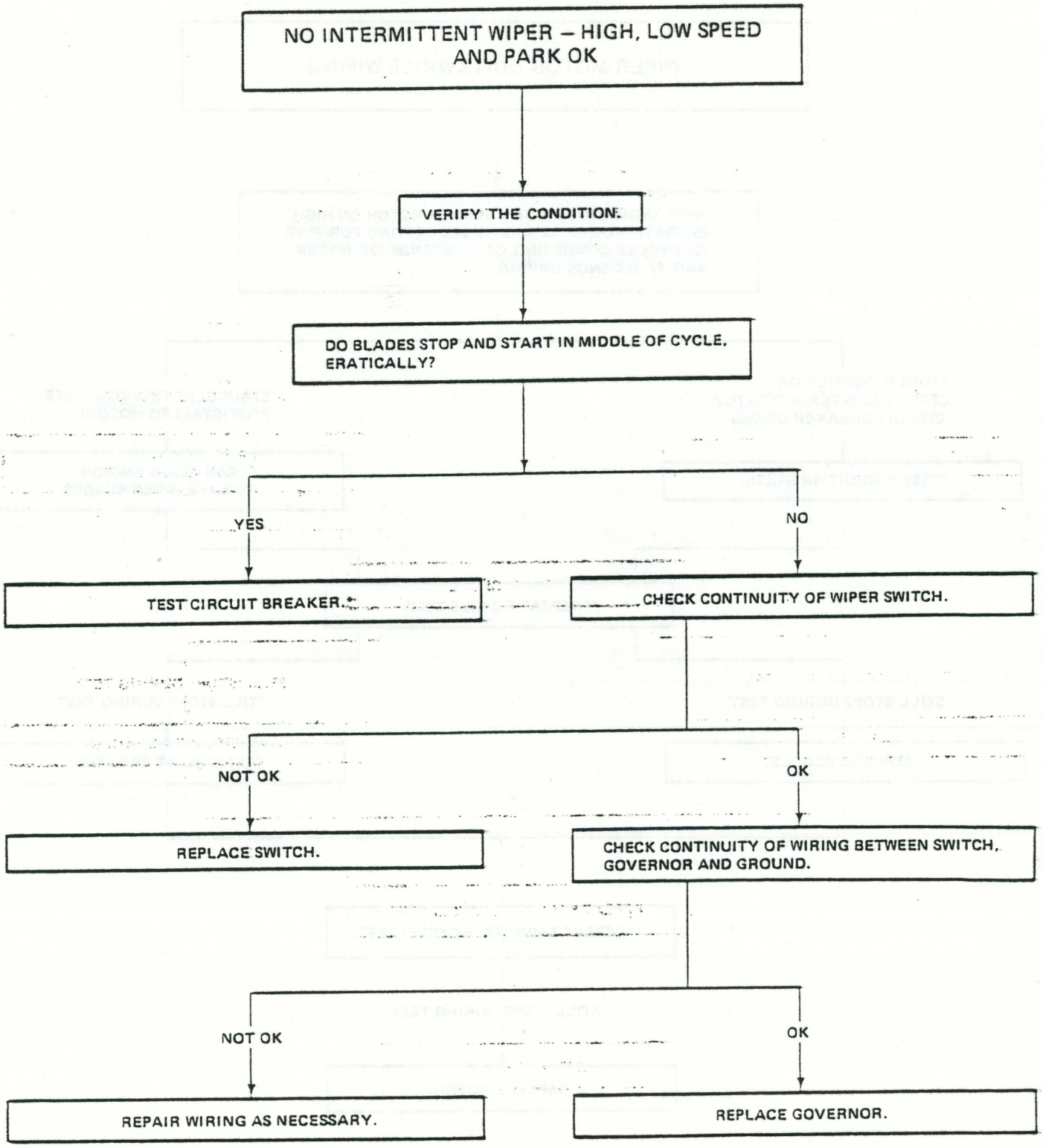
Service Diagnosis (Continued)



*WIPER SWITCHES HAVE INTERNAL CIRCUIT BREAKERS WHICH REQUIRE REPLACEMENT OF ENTIRE SWITCH.

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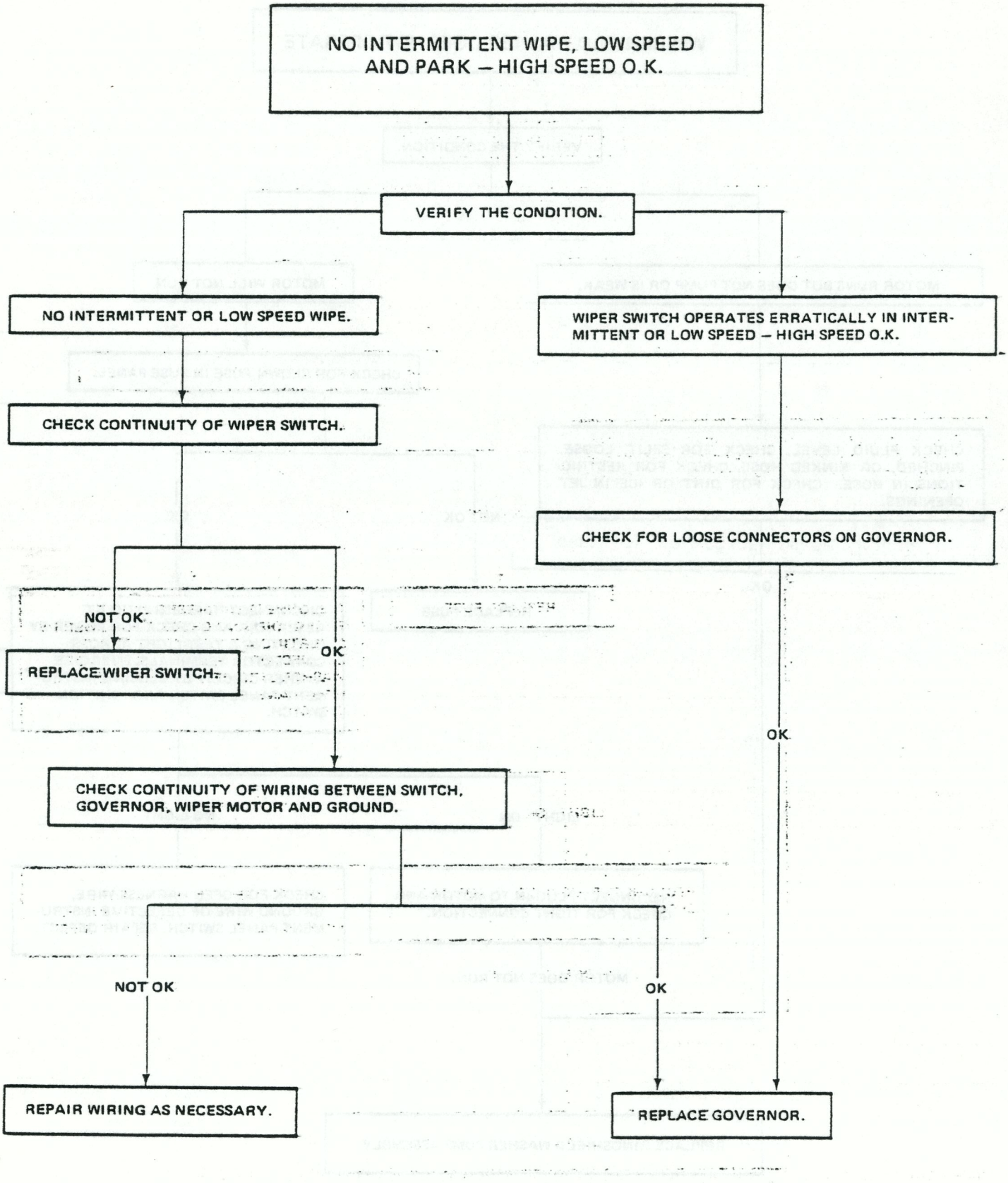
Service Diagnosis (Continued)



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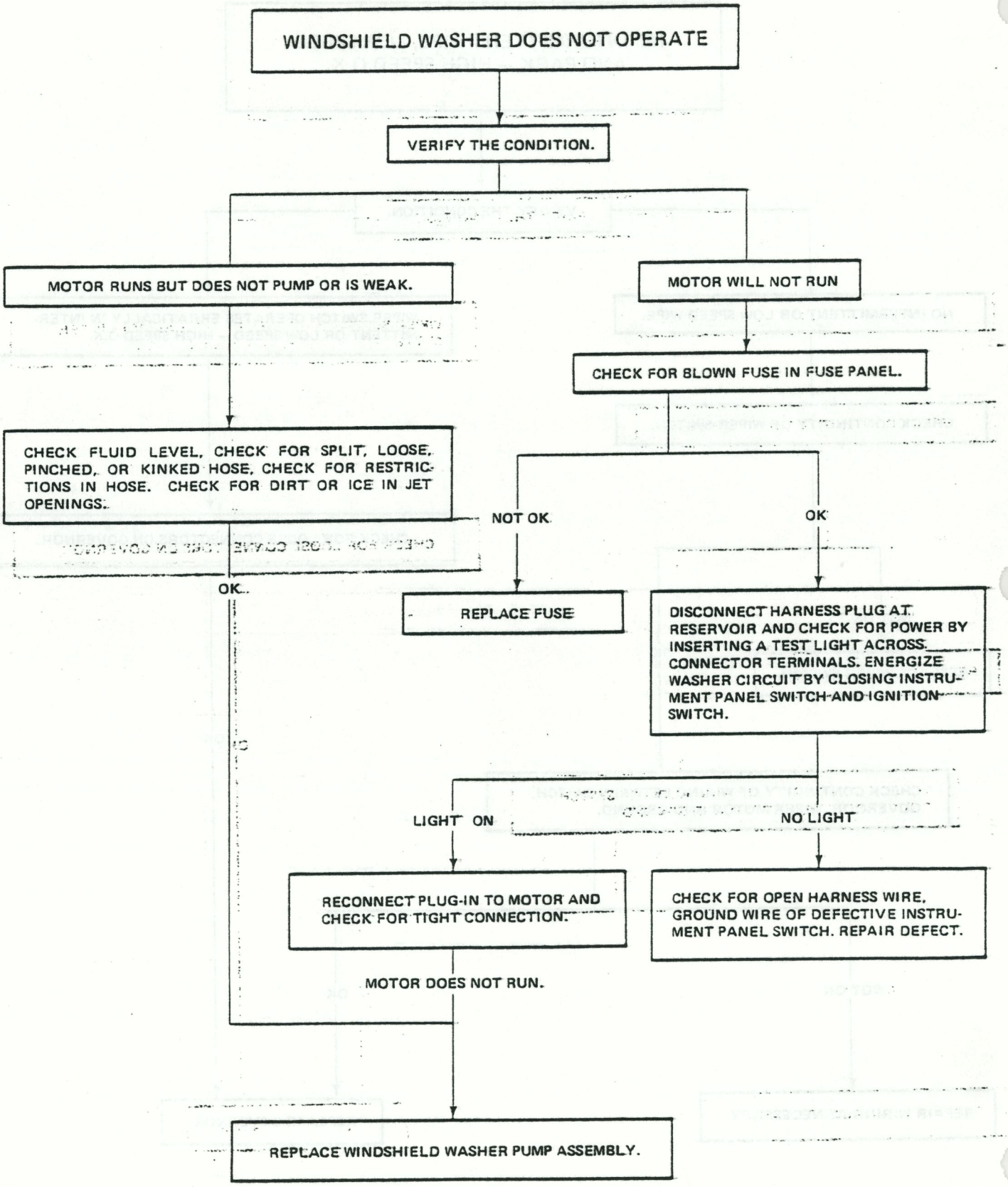
Service Diagnosis (Continued)



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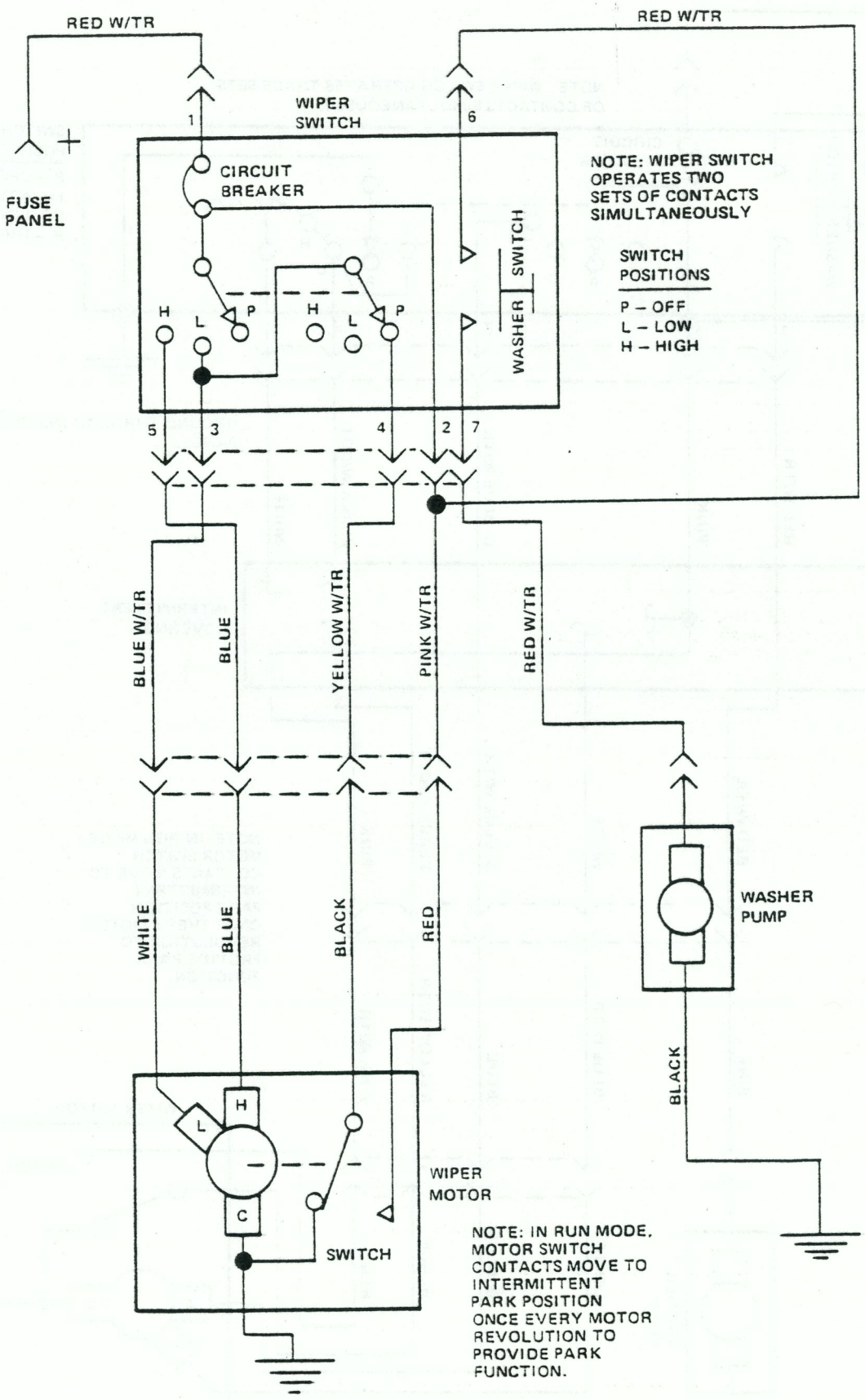

Fig. 3T-9 Windshield Wiper Circuitry

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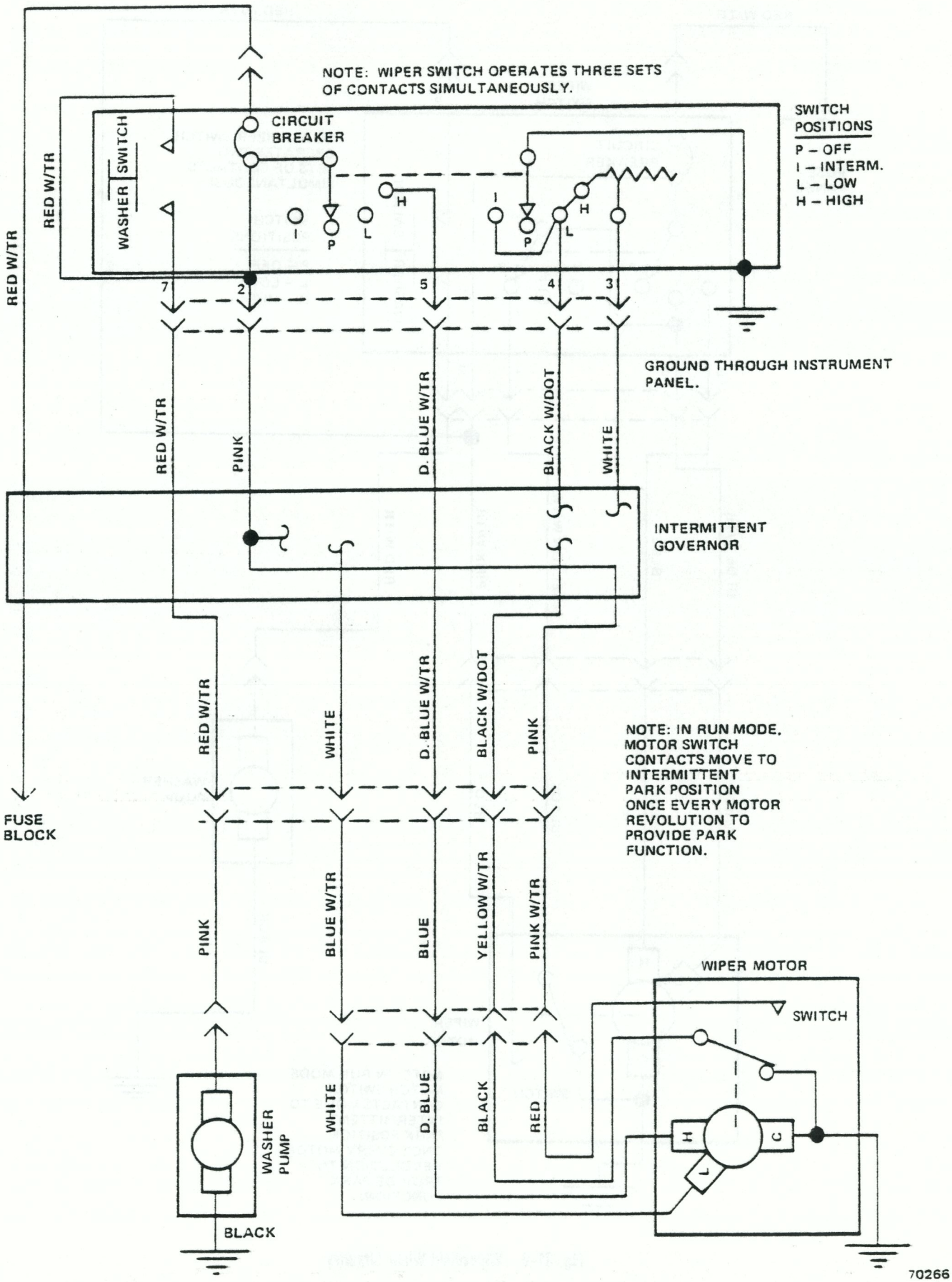


Fig. 3T-10 Windshield Wiper with Intermittent Governor Circuitry

CONTROL SWITCH

Removal

A one-way friction spring in the control knob retains it to control switch shaft. This one-way spring allows knob to be installed but prevents its removal unless spring tension is released.

(1) Disconnect battery negative cable.

(2) To remove, locate small notch at base of knob and insert a small screwdriver at that point. Apply pressure to release spring and pull knob from shaft.

(3) Remove slotted trim nut from front of switch.

(4) Push switch through instrument panel, disconnect from harness and remove.

Installation

(1) Connect switch to harness and push through instrument panel.

(2) Install slotted trim nut on front of switch and tighten.

(3) Align control knob and push on shaft.

(4) Connect battery negative cable.

Switch Test

(1) Check wiper switch continuity using Continuity Light J-21008 or an ohmmeter. Continuity should exist between terminals at various switch positions as shown in figure 3T-11.

(2) Variable resistance between number 4 and 5 terminals of an intermittent wiper system must be checked with an ohmmeter. This resistance controls governor operation for intermittent wiping. If intermittent wipe cycle is not operating, but system does operate at both low and high speed, resistance between number 4 and 5 terminals should be checked. With switch control knob rotated to full counterclockwise position, ohmmeter should indicate 5600 to 8400 ohms. As control knob is rotated in a clockwise direction, resistance should decrease to a minimum of 100 to 900 ohms.

(3) If continuity and resistance do not check out as specified, switch must be replaced. Check wiring for proper continuity if switch tests indicate proper operation.

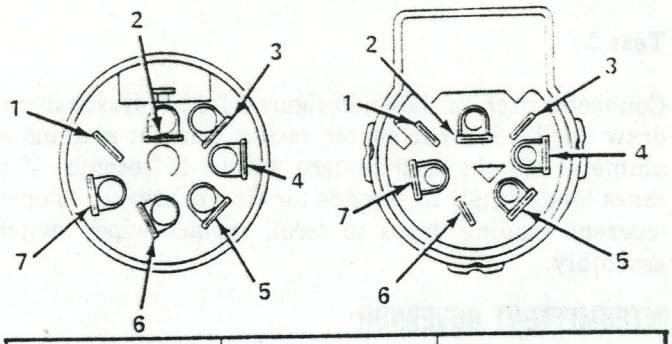
Circuit Breaker Test

The circuit breaker is located in the wiper control switch and has a rating of 7 amps.

Two separate tests are necessary to check for correct circuit breaker operation.

Test 1

Connect switch to tester as shown in figure 3T-12. Adjust current draw until it equals circuit breaker rating. Leave switch connected to tester for ten minutes. Current reading on ammeter should remain at rated current. If circuit breaker opens during ten minute period, replace wiper switch assembly.



	Standard	Intermittent
Off or Park	1-2 3-4	1-2 4-5
Low Speed	1-2-3	1-2 4-5 to Case 4-5
High Speed	1-2-5	1-2-3 4-5 to Case 4-5
Intermittent		1-2 4-5 to Case 4-5 Variable Resist. 1-9K to 7 K
Wash	1-2 6-7	1-2 6-7

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Fig. 3T-11 Continuity Test for Wiper Switches

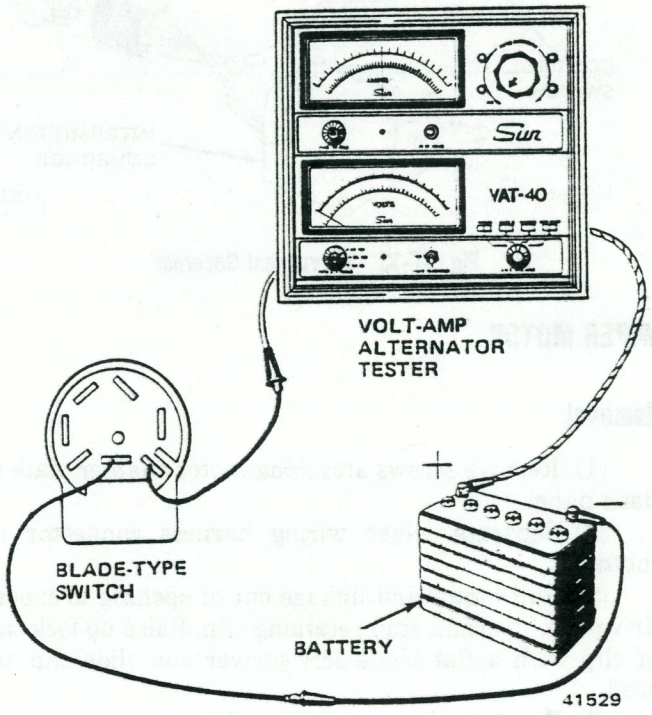


Fig. 3T-12 Circuit Breaker Test

Test 2

Connect switch as shown in figure 3T-12. Adjust current draw until it is twice switch rating. Current reading on ammeter should drop to zero within 15 seconds. If it takes longer than 15 seconds for circuit breaker to open (current reading drops to zero), replace wiper switch assembly.

INTERMITTENT GOVERNOR

To check the intermittent governor accurately requires electronic testing equipment. However, if the intermittent wipe cycle is not satisfactory, check related components such as the motor, control switch, and connecting wires. If all components function properly, install a new governor.

The electronic governor assembly is contained in a two-inch cube which is attached to an instrument panel bracket adjacent to the wiper control switch. The 6-inch governor lead plugs into the wiper control switch and the shorter, 4-inch lead plugs into the instrument panel harness (fig. 3T-13).

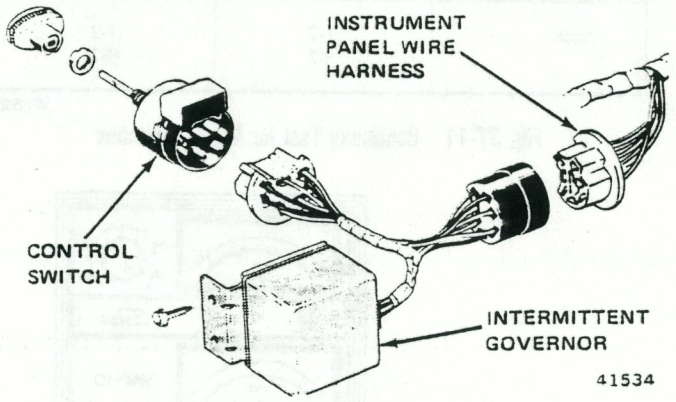


Fig. 3T-13 Intermittent Governor

WIPER MOTOR

Removal

(1) Remove screws attaching motor adapter plate to dash panel.

(2) Separate wiper wiring harness connector at motor.

(3) Pull motor and linkage out of opening to expose drive link-to-crank stud retaining clip. Raise up lock tab of clip with a flat blade screwdriver and slide clip off stud.

(4) Remove wiper motor assembly.

Installation

(1) Position wiper motor assembly and insert crank stud into drive link bushing.

(2) Press retaining clip onto stud and slide it in place in stud groove (fig. 3T-14). Check for positive retention.

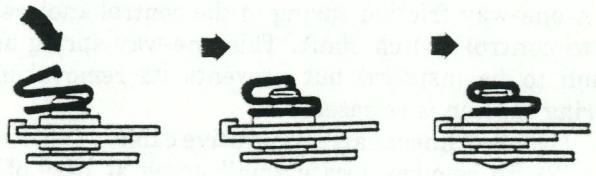


Fig. 3T-14 Linkage Retainer Clip Installation Sequence

(3) Install wiper motor attaching screws. Tighten attaching screws to 25 inch-pounds (3 N•m) torque.

Current Draw Test—On Vehicle

(1) Remove wiper arms and blades and disconnect motor lead.

(2) Connect negative lead of ammeter to positive battery post (fig. 3T-15).

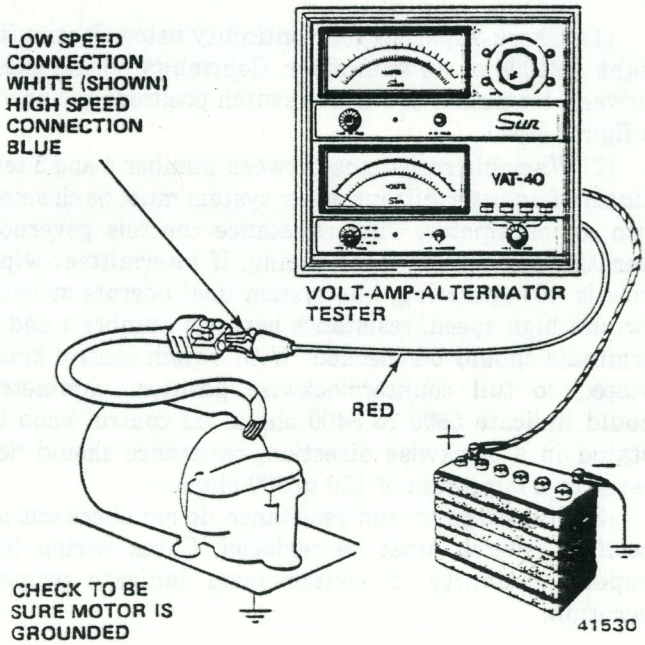


Fig. 3T-15 Wiper Motor Current Draw Test Connections

(3) Connect other ammeter test lead to blue wire w/tracer terminal (low speed) of motor harness. Current draw should be approximately one amp but not more than three amps.

(4) Connect blue wire terminal (high speed). Current draw should remain about the same. In either case, current draw should not exceed three amps.

Park Test

(1) Disconnect motor from harness connection. Temporarily contact a battery feed to either blue or blue w/tracer wire to move wiper arms and blades away from normal park position.

(2) Insert jumper wire from white to black wire terminals (fig. 3T-16).

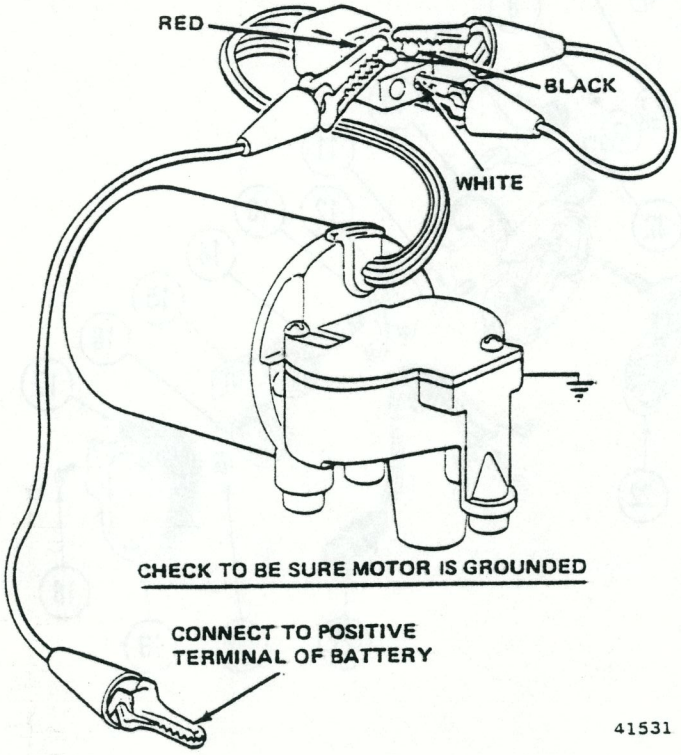


Fig. 3T-16 Park Test

(3) Contact a battery feed to red wire terminal of motor harness. Motor should operate until wipers have reached normal park position.

(4) If wiper motor does not park correctly, replace or repair wiper motor.

Disassembly

CAUTION: *The motor field consists of two permanent ceramic-type magnets which can be damaged by pounding on the motor housing or the magnets.*

NOTE: *Mark position of drive crank with respect to output shaft for correct assembly.*

(1) Remove drive crank attaching nut, drive crank, spring washer, and plain washer (fig. 3T-17).

(2) Remove screws attaching mounting bracket to motor. Separate bracket from motor and remove screw attaching ground strap to bracket.

(3) Remove screws attaching gear housing cover to housing. Remove cover and gasket.

(4) Remove idler gear and pinion by pressing shaft (with push nut) out of gear housing.

(5) Remove motor through-bolts and motor housing.

NOTE: *The field magnets will hold the armature in the motor housing as it is removed from the gear housing.*

(6) Remove end play spring, output gear and shaft, switch lever, switch washer, and seal from gear housing.

(7) Remove brushes, harness, and springs from end head.

(8) Remove end head assembly.

(9) Remove parking lever pin from gear housing.

(10) Remove all old lubricant from gear housing and components.

(11) Inspect gear housing and all components for damage or excessive wear. Replace damaged or excessively worn components.

(12) Apply a coating of American Motors All Purpose Lubricant, or equivalent, to all bearing surfaces and gears.

Assembly

(1) Position gear housing on a flat surface with inside of housing facing up.

(2) Position switch washer and switch lever in gear housing with cam rider pointing toward output shaft hole.

(3) Install seal and output gear and shaft in gear housing. Make certain switch lever is clear of cam and gear assembly.

(4) Position idler gear and pinion on shaft, and insert shaft through switch lever and switch washer into gear housing. Use a drift and hammer to lightly tap shaft to proper depth. **A 0.001 to 0.007-inch clearance between push nut and gear must be maintained to prevent preloading the idler gear.**

(5) Install end play spring in gear housing.

(6) Install parking lever pin in gear housing.

(7) Attach brush terminals and switch terminals to end head.

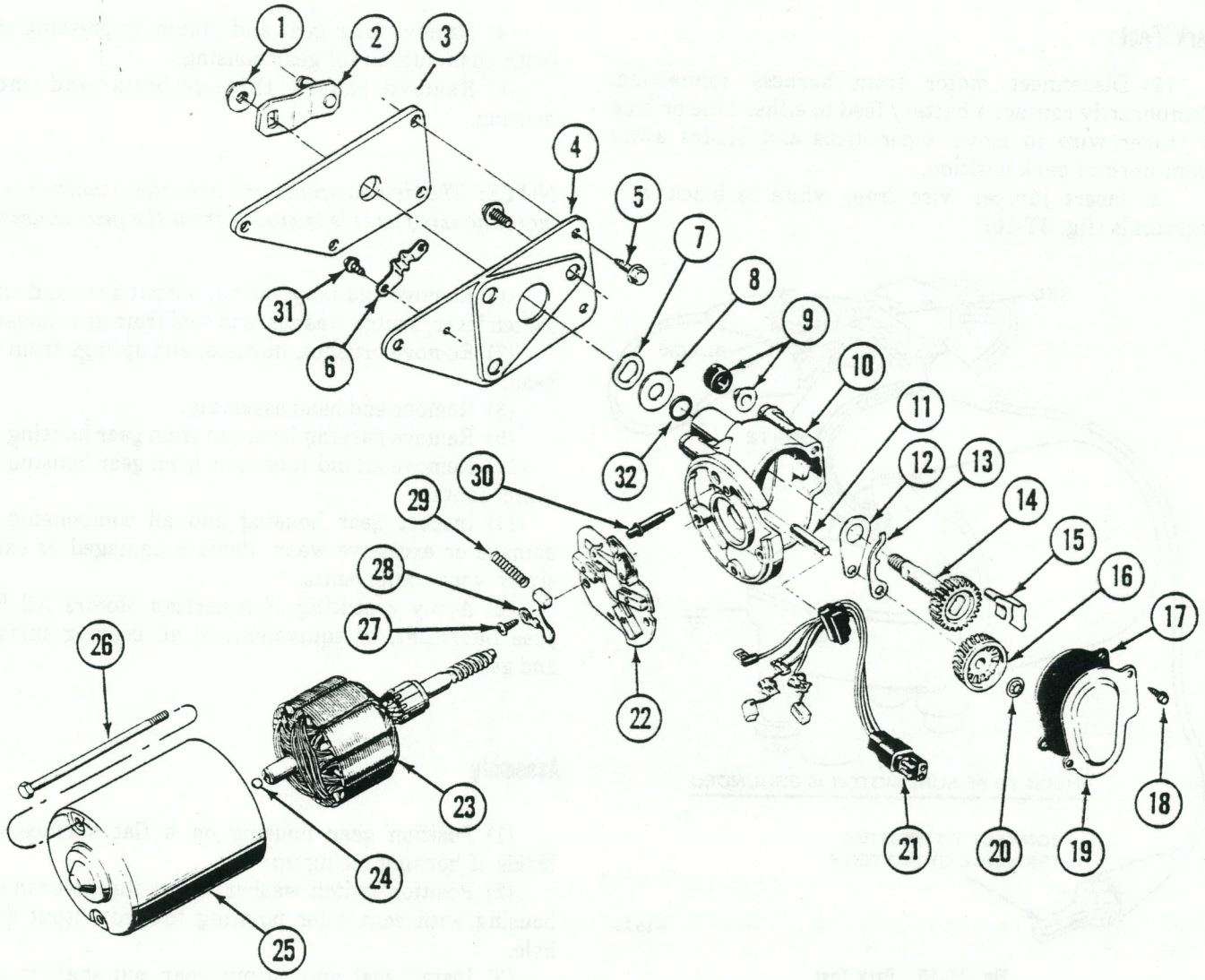
(8) Position end head on gear housing and secure with attaching screws.

(9) Install springs and brushes in end head. Hold each brush in the fully retracted position with tag wire as shown in figure 3T-18.

(10) Apply a small amount of lubricant to armature end shaft and ball.

(11) Install armature in gear housing and remove tag wire brush retainers.

NOTE: *Make certain plastic thrust button in end play spring is bearing against end of armature shaft.*



1.	NUT	11.	SHAFT	22.	END HEAD
2.	DRIVE CRANK	12.	SWITCH WASHER	23.	ARMATURE
3.	SEAL	13.	SWITCH LEVER	24.	BALL
4.	BRACKET	14.	OUTPUT GEAR AND SHAFT	25.	MOTOR HOUSING
5.	SCREW	15.	END PLAY SPRING	26.	BOLT
6.	GROUND STRAP	16.	IDLER GEAR AND PINION	27.	SCREW
7.	SPRING WASHER	17.	GASKET	28.	BRUSH
8.	PLAIN WASHER	18.	SCREW	29.	SPRING
9.	GROMMET	19.	COVER	30.	PARKING LEVER PIN
10.	GEAR HOUSING	20.	PUSH NUT	31.	SCREW
		21.	BRUSHES AND HARNESS	32.	SEAL

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Fig. 3T-17 Wiper Motor and Transmission Components

(12) Install motor housing on armature, holding armature worm gear to prevent magnetic field from pulling armature out of position in gear housing.

(13) Align indicator marks on motor housing and gear housing before inserting through-bolts.

(14) Install through-bolts securing motor housing to gear housing.

(15) Apply generous amount of lubricant to gear housing cavity.

(16) Position gasket and cover on gear housing and install two attaching screws.

(17) Position motor assembly and ground strap on mounting bracket and install ground strap attaching screw.

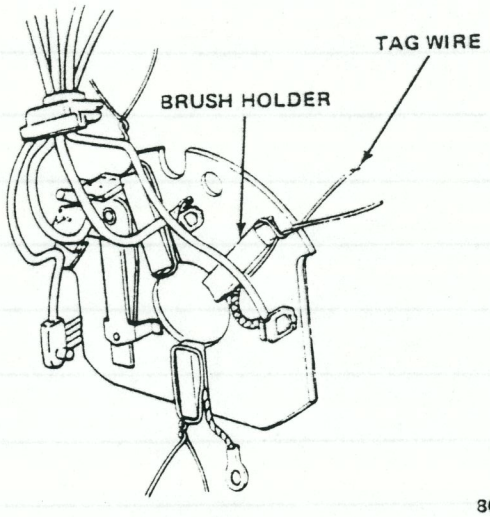

Fig. 3T-18 Tag Wire Brush Retainers

(18) Install grommets in mounting bracket and secure motor assembly to bracket with attaching screws. Tighten attaching screws to 23 inch-pounds (3 N•m) torque.

(19) Install plain washer and spring washer on output shaft, position drive crank on output shaft in the marked position from which it was removed, and install nut. Tighten nut to 120 inch-pounds (14 N•m) torque.

WINDSHIELD WASHERS

The electric pump assembly is mounted in the bottom of the water reservoir. The impeller motor case is grounded to the car body by a ground wire. It is energized by a feed wire from the number 6 and 7 terminals on the control switch.

SPECIFICATIONS

Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	USA (in-lbs)		Metric (N-m)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Wiper Motor MTG. Plate to Cowl	23	15-35	3	2-4
Windshield Wiper Pivot to Cowl	118	100-135	13	11-15

All Torque values given in newton-meters and inch-pounds with dry fits unless otherwise specified.

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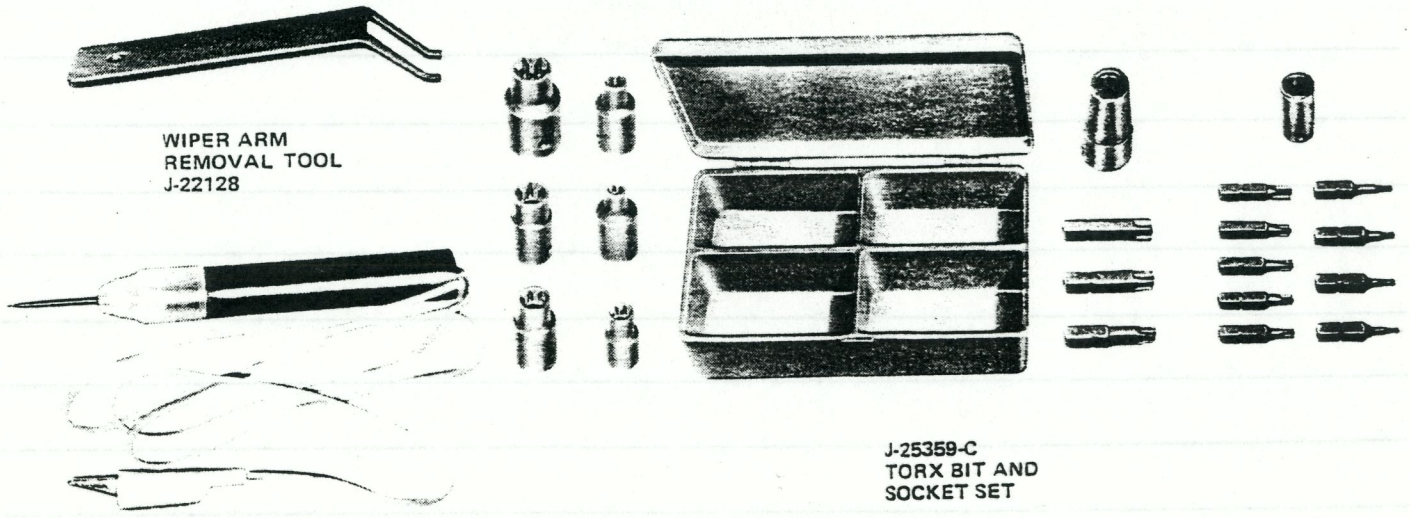
Tools



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NOTES

TAILGATE WINDOW DEFOGGER 3U

INDEX

GENERAL

The electrically-heated tailgate window grid consists of two vertical bus bars and horizontal rows of heating elements of silver-bearing, ceramic enamel compound that is fused to the inside surface of the tailgate glass. A control switch, pilot lamp, timer-relay and wire harness complete the circuit.

Braided wire, soldered to each bus bar at 2-1/2-inch intervals, serves as the electrical feed and ground for the grid. The grid feed wire is attached to the timer-relay, mounted inside the tailgate. The feed to the relay is supplied by a wire attached to the fuse panel power tailgate terminal (fig. 3U-1).

A separate control circuit, connected to the heater control switch, operates the relay and timer in the relay.

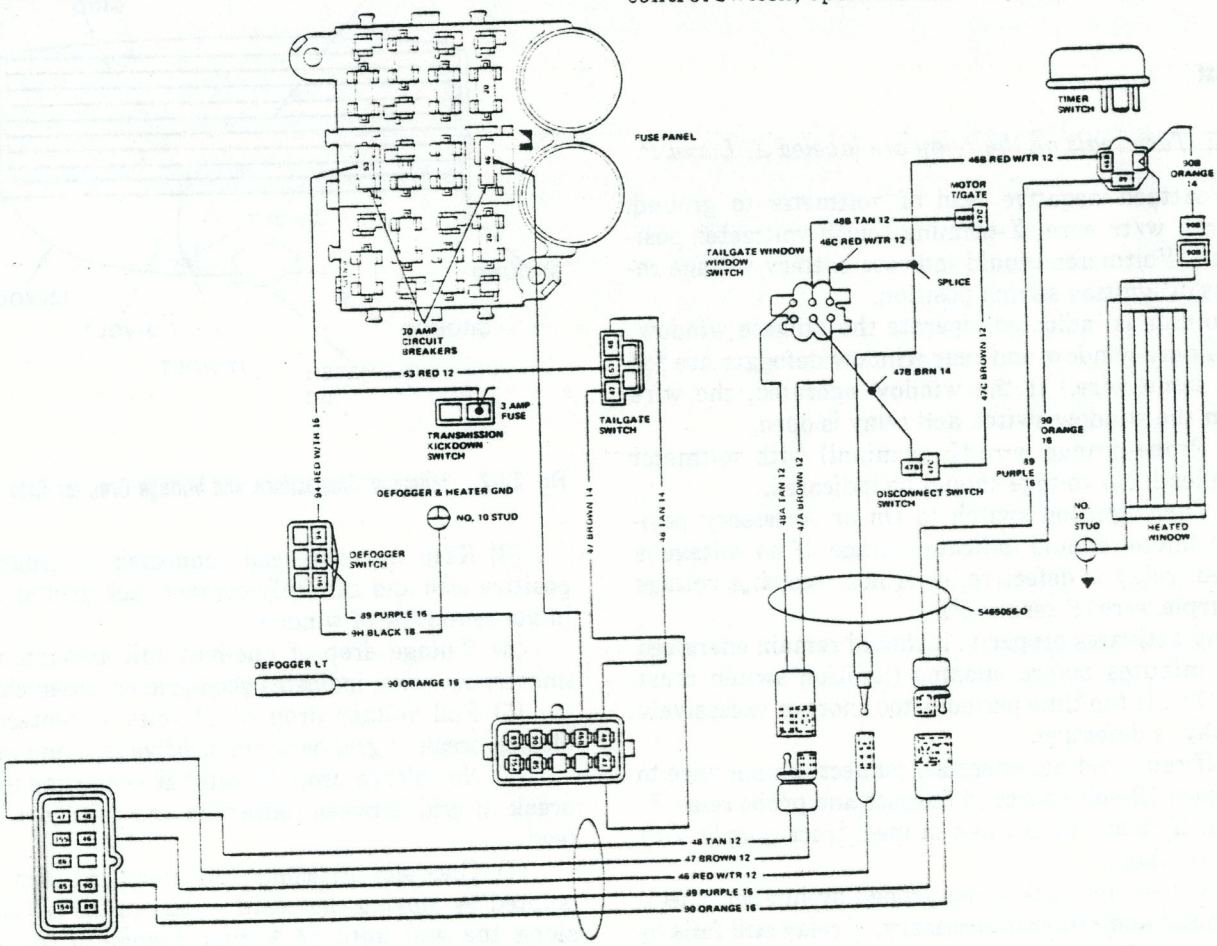

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Fig. 3U-1 Heated Rear Window Wiring Diagram

With the control switch on the instrument panel activated and ignition switch On, the relay contacts close. The timer in the relay operates the defogger for 8 to 12 minutes, depending on the ambient temperature, or until the control switch or ignition switch is turned Off. The pilot lamp indicates system operation.

NOTE: *The defogger switch and the electric tailgate window switch are serviced as an assembly.*

TESTING

Switch Test

(1) Turn ignition switch On and press defogger switch.

(2) Disconnect optional equipment wiring harness at connector under dash. Connect a 12-volt test lamp from purple wire (89) to a good ground (fig. 3U-1). Test lamp should light.

(3) Shut off defogger switch and test lamp should not light.

(4) To test indicator light, disconnect orange wire from lamp. Connect jumper wire from accessory terminal of new fuse panel to orange wire. With ignition switch turned to Accessory position, the lamp should light.

Relay Test

NOTE: *Terminals on the relay are labeled X, L and P.*

(1) Attach negative lead of voltmeter to ground. Probe red w/tr wire (X-terminal) with voltmeter positive lead. Voltmeter should indicate battery voltage regardless of ignition switch position.
If no voltage is indicated, operate the tailgate window. (The tailgate window and rear window defogger are fed by the same wire.) If the window operated, the wire between the window switch and relay is open.

(2) Probe orange wire (L-terminal) with voltmeter positive lead. No voltage should be indicated.

(3) Turn ignition switch to On or Accessory position. Voltmeter should indicate voltage. If no voltage is indicated, relay is defective, or is not receiving voltage from purple wire (P-terminal).

If relay activates properly, it should remain energized 8 to 12 minutes before opening (ignition switch must remain On). If the time period is too short or excessively long, relay is defective.

(4) If relay did not energize, connect jumper wire to known good 12-volt source in tailgate and probe relay P-terminal. If relay clicks when probed, trace purple wire for open or short.

If relay does not click when probed by jumper, check relay ground and repair if necessary. If relay still fails to operate, it is defective.

Grid Test

When a grid is inoperable due to an open circuit, the area of glass normally cleared by that grid will remain fogged or iced until adequately warmed by the adjacent grids. Use the following procedure to locate a broken grid.

(1) With engine running at idle, press tailgate window defogger switch. Defogger lamp should light, indicating defogger operation.

NOTE: *The feed wire is connected to the right side (passenger side) of the window and the ground connection is on the left side of the window.*

(2) Use 12vdc voltmeter and contact positive lead of voltmeter to right side (feed) vertical bus element on inside surface of glass. Contact negative lead to left side (ground) bus element (fig. 3U-2). Voltage drop indicated on meter should be 11 to 13 volts. Connect negative lead of voltmeter to good ground—meter reading should not change.

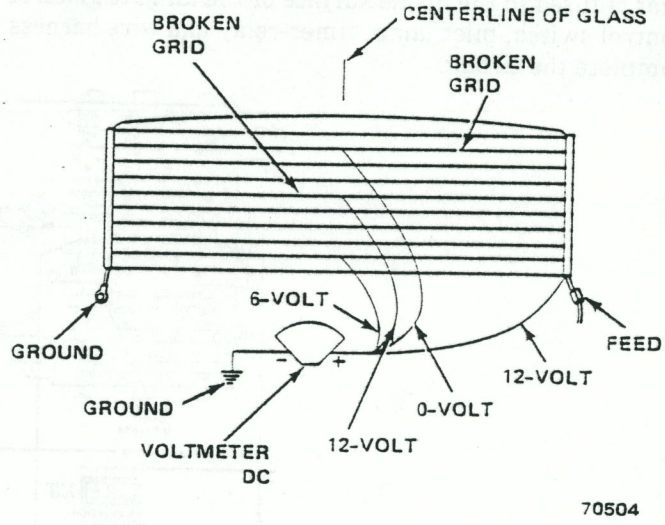

Fig. 3U-2 Voltmeter Connections and Voltage Drop for Grid Continuity

(3) Keep negative lead connected to ground. Use positive lead and carefully contact each grid at approximate centerline of window.

(4) Voltage drop of one-half full amount, approximately six volts, indicates good grid or closed circuit.

(5) Full voltage drop of 12 volts at centerline indicates break in grid between positive lead and ground.

(6) No voltage drop (0 volts) at centerline indicates break in grid between centerline and voltage source or feed.

(7) The exact location of the break can then be pinpointed by moving the positive lead to the left or right along the grid until an abrupt change in the voltage reading is noticed.

Grid Repair

Once a broken or open grid is located, repairs can be accomplished using the grid repair kit in accordance with the following procedure.

(1) Using suitable marking pencil, mark location of broken or open grid on exterior surface of glass.

(2) Using fine steel wool, lightly rub area to be repaired (inside of tailgate window). Clean area with isopropyl alcohol (rubbing alcohol).

(3) Attach two strips of cellulose tape (inside of tailgate window) above and below break in grid as shown in figure 3U-3.

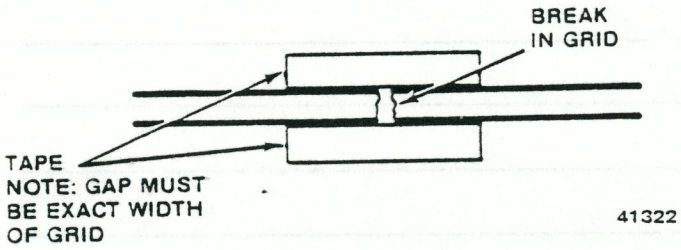

Fig. 3U-3 Tailgate Window Defogger Grid Repair

(4) Mix repair coating until uniform in consistency, with silver particles mixed throughout fluid. Apply coating to break in grid with small brush furnished in kit. Apply heavy coat of mixture, extending approximately 1/4 inch on either side of break.

(5) Start engine and press defogger switch. Run engine for one minute. Turn ignition switch off.

(6) Apply second heavy coat of mixture to break in grid, extending about 1/4 inch on either side of break.

(7) Start engine and press defogger switch. Run engine until defogger completes cycle (pilot light goes off). Turn ignition switch off.

(8) Remove cellulose tape from inside of tailgate window.

(9) Check repaired area for continuity. **Do not touch repaired area.**

CAUTION: *Do not clean repaired area for 24 hours. Then clean inside of tailgate window with liquid window cleaner.*

(10) Clean pencil markings from exterior surface of glass.

NOTE: *If a more finished appearance is desired, repaired area may be stained with tincture of iodine.*

NOTES

RADIO SOUND SYSTEMS 3V

SECTION INDEX

GENERAL

All Jeep radios are transistorized and have an output impedance of 3.2 ohms. They operate with the ignition switch in the On or Accessory positions. All models use non-adjustable, whip-style antennas. Antennas used with CB radios are slighly longer than those used with other radios.

On radios with pushbutton tuning the AM or FM stations may be preselected, using the five pushbuttons, or manually tuned. On all radios, the left-hand knob controls power (on and off) and volume. The right-hand knob controls station selection. All radios also have adjustment for the bass and treble tone quality.

AM/FM radios have a slide switch to select AM or FM reception and controls for left-right, front-rear speaker balance. During stereo reception, a small indicator light glows. The light is off during FM monaural reception. Cherokee and Wagoneer models use four speakers with the stereo radio. A speaker is mounted in each front door and rear quarter trim panel. A front-to-rear speaker fader control is used with the four-speaker system. It is located behind the manual station tuning knob. CJ and truck models use a two-speaker system with the stereo radio. On truck models a speaker is mounted in each front door. On CJ models a speaker is mounted on each side of the instrument panel.

In addition to the above features, all Citizen Band (CB) radios have a switch to change from broadcast band radio listening into the CB receive or transmit mode.

CAUTION: *Do not operate the CB radio with the antenna disconnected. Radio damage can result.*

The radio manufactured date, model and serial number are stamped on the radio case.

Setting the Pushbuttons

To set each pushbutton for automatic tuning, proceed as follows:

(1) Move vehicle outside building and away from high tension lines.

(2) Permit radio to warm up for several seconds.

(3) Pull pushbutton out about 1/2 inch to unlock tuner.

(4) Select station with manual tuning knob.

(5) Push pushbutton in as far as it goes (to lock the tuner) and then release it. This station is now set for automatic tuning.

(6) Follow the same procedure for the remaining pushbuttons.

Radio Polarity

When servicing the radio, the A (power) lead must be connected to the positive side of the power source. If connected to the negative side, the radio will not operate and damage to components will result.

The radio is grounded internally. The ground return circuit is completed by grounding the radio chassis to the instrument panel. When testing on the bench, a ground jumper wire must be attached between the radio chassis and the negative terminal of a 12-volt battery or power supply to complete the power circuit.

ANTENNA TRIMMER

Antenna trimmer adjustment is necessary to match the vehicle radio circuit to the vehicle antenna. The adjustment should be made after installation of a radio or antenna, or after repair to a radio. The adjustment also should be checked whenever radio reception is unsatisfactory.

Adjuster Location

- AM and AM/FM radio: just above the tuning control.
- AM/FM stereo with tape player: in the tape cartridge slot.
- AM/FM/CB: just left of pushbuttons on face plate.

Trimmer Adjustment

The trimmer adjustment should be made when the radio is tuned to a very weak station. It is not necessary to be able to receive an understandable station. The object is to obtain the greatest volume while the volume control is at a medium setting.

(1) Switch radio to the AM broadcast band.

(2) Turn on radio and allow to warmup for several seconds.

(3) Turn station control knob to 1400 KC range and obtain radio station signal. Turn to medium volume.

(4) On AM and AM/FM radios, remove inner and outer station tuning control knobs (radios without tape player). On AM/FM/Tape radios, open tape door. On AM/FM/CB radio the AM adjustment is on the face of the radio. The CB adjustment procedure is found in the Tuning Antenna Splitter section.

(5) Engage small slotted screw head with standard screwdriver.

(6) Turn screw left or right until the greatest vol ume can be obtained **without touching the volume control.**

(7) Install inner and outer tuning control knobs, if removed.

CONTROLS

AM Radio

The AM radio (fig. 3V-1) has one dash-mounted speaker as standard equipment. The dial bulb is controlled by the on-off switch; therefore, the bulb has no brilliance control.

AM/FM Multiplex Radio

An optional AM/FM two-speaker stereo radio is available on CJ and truck models. Both speakers are mounted in the instrument panel on CJ models and in the doors on truck models (fig. 3V-2).

All Cherokee and Wagoneer models have optional four-speaker systems, one speaker in each front door with rear speakers mounted in the rear trim panels.

The radio has external fader and balance controls (fig. 3V-2). An indicator light will come on whenever the radio is receiving a stereo signal.

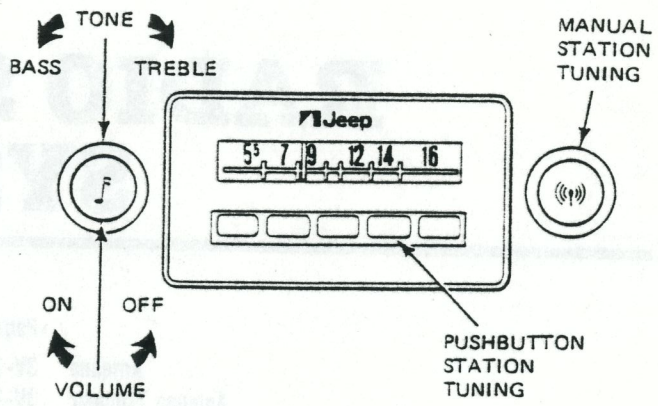

Fig. 3V-1 AM Radio Controls

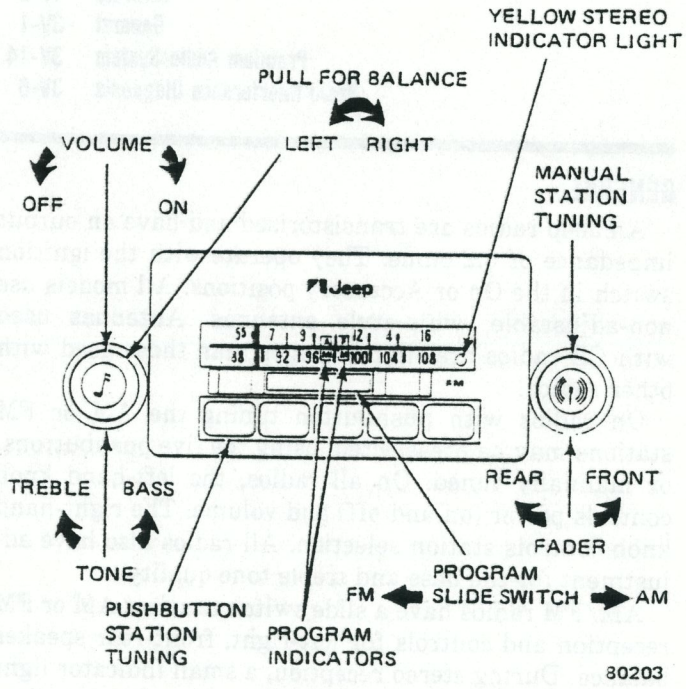

Fig. 3V-2 AM/FM/ Stereo Radio Controls

AM/FM Multiplex Tape Radio

The AM/FM multiplex radio has a built-in, 8-track stereo tape player (fig. 3V-3). AM or FM program selection is made by moving the slide switch (located on the right of the dial face) up or down for the desired programming. Left to right balance has been preset for equal balance and should not require any adjustment. However, should it become necessary to adjust for left-to-right balance, the balance control is located in the tape cartridge slot and is adjustable with a small standard screwdriver (fig. 3V-4).

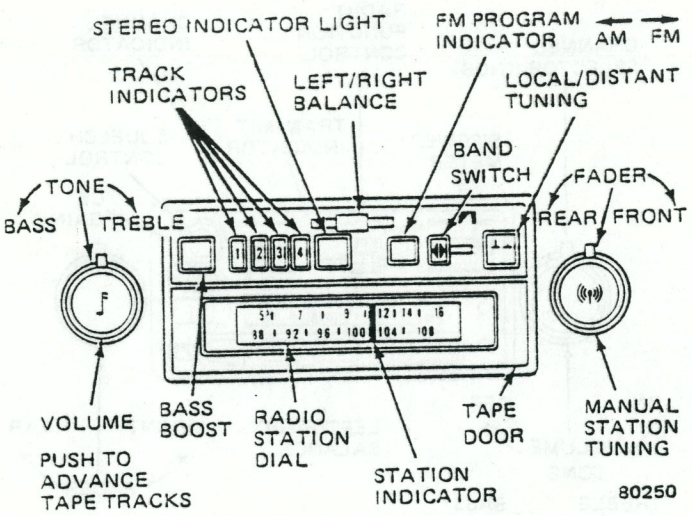

Fig. 3V-3 AM/FM Multiplex Tape Radio

Tape Player Operation

To operate the tape player, place the tape cartridge, open tape end first and labeled side up, in the slot and push in until it is firmly seated. The unit will play the selection on the inserted tape.

To manually change selections, push in and release the left-hand volume control. Each program track will automatically change and play in succession without pushing control.

To turn the tape player off, pull the tape cartridge out approximately one inch.

Stereo Test Tape

A Stereo Test Tape Cartridge, J-22683-01, is available for checking the operation of the tape player. This tape provides a means of checking the player for proper tape speed, crosstalk and sound. Follow the instructions on the tape cartridge.

Tape Head and Capstan Cleaning

One major cause of improper tape player operation is oxide buildup on the head. During normal operation, iron oxide particles are loosened from the tape and built up on the head. This accumulation of oxide can cause poor playback and some up and down tape travel. The head and drive capstan should be cleaned whenever the unit is serviced, or when poor playback or tape travel is noted.

Cleaning may be done either in the vehicle or on a service bench. To clean the head, use a cotton swab moistened with commercially available tape head cleaner or isopropyl alcohol. Wipe capstan and tape head dry (fig. 3V-4). If a commercial tape head cleaner is used, follow the manufacturer's recommended cleaning procedure.

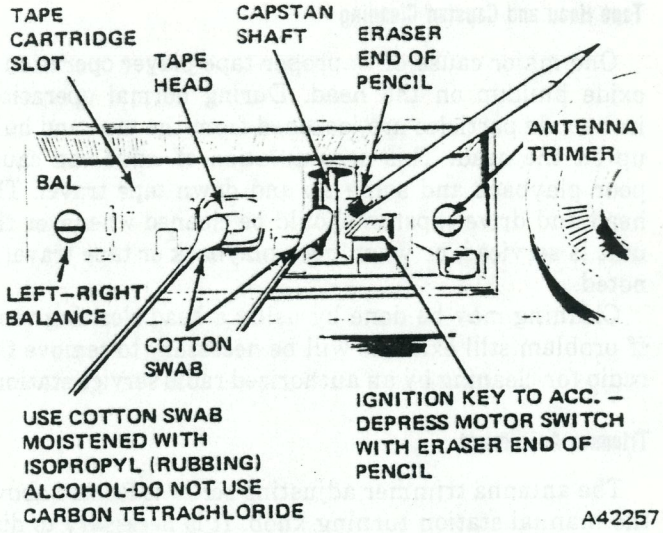

Fig. 3V-4 Tape Head and Capstan Cleaning Procedure

AM/FM/Cassette Stereo Radio

The stereo cassette player (fig. 3V-5) uses cassette cartridges. To operate, insert cartridge into cartridge door. With power on, the cassette will begin playing in the direction of the arrow located on either side of the fast-forward/rewind control. To play the other side of the tape, push the left-hand control knob. The auto-reverse mechanism will automatically begin playing the opposite side of the tape when the first side is completed. To advance or rewind the tape, slide the fast-forward/rewind knob to the desired position. The knob will remain in either position until it is moved back to the center position. To eject a cartridge, push the right-hand control knob. The cartridge will automatically eject when the radio is turned off or the ignition switch is turned off.

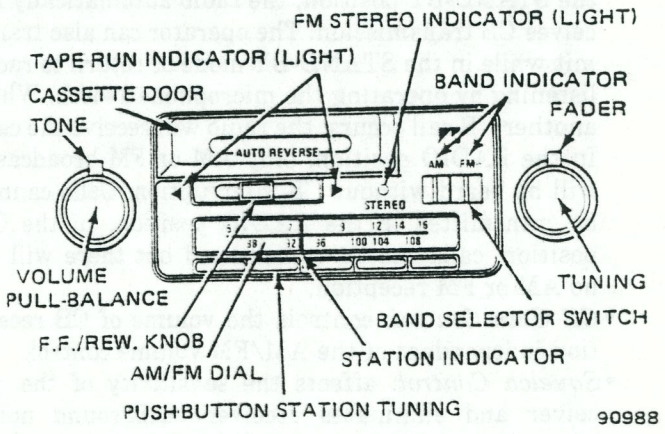

Fig. 3V-5 AM/FM/Cassette Stereo Radio

Bulb Replacement

The radio bulb can be replaced by an authorized radio service station.

Tape Head and Capstan Cleaning

One major cause of improper tape player operation is oxide buildup on the head. During normal operation, iron oxide particles are loosened from the tape and built up on the head. This accumulation of oxide can cause poor playback and some up and down tape travel. The head and drive capstan should be cleaned whenever the unit is serviced, or when poor playback or tape travel is noted.

Cleaning may be done by using a head cleaning tape. If problem still exists it will be necessary to remove the radio for cleaning by an authorized radio service station.

Trimmer Adjustment

The antenna trimmer adjusting screw is located above the manual station turning knob. It is necessary to disconnect the front of the radio and push the radio forward to gain access to the trimmer adjusting screw.

Cassette Test Tape

A cassette test tape J-23724 is available for checking the operation of the cassette player. This tape provides a means of checking the player for proper tape speed. Follow the instructions on the cassette test tape.

CB Radios

CB Radio Controls

Refer to figures 3V-6 and 3V-7.

- *S-RF Meter*: indicates output power when transmitting and the input signal strength when receiving.
- *Stand-By Mode Switch*: permits listening to the AM or FM broadcast band until receiving a CB call. In the STAND-BY position, the radio automatically receives CB transmission. The operator can also transmit while in the STAND-BY mode or return to radio listening by operating the microphone switch. When another CB call occurs, the radio will receive the call. In the RADIO position, only AM or FM broadcasts will be heard without CB interruption. Calls cannot be transmitted in the RADIO position. In the CB position, calls can be transmitted but there will be no AM or FM reception.
- *CB Gain Control*: controls the volume of CB reception independent of the AM/FM volume control.
- *Squelch Control*: affects the sensitivity of the receiver and eliminates receiver background noise when no signal or a weak signal is being received.

CB Operation—To Receive

(1) Center speaker balance control.
(2) Rotate squelch control fully counterclockwise.
(3) Set Radio/CB selector switch to CB position.

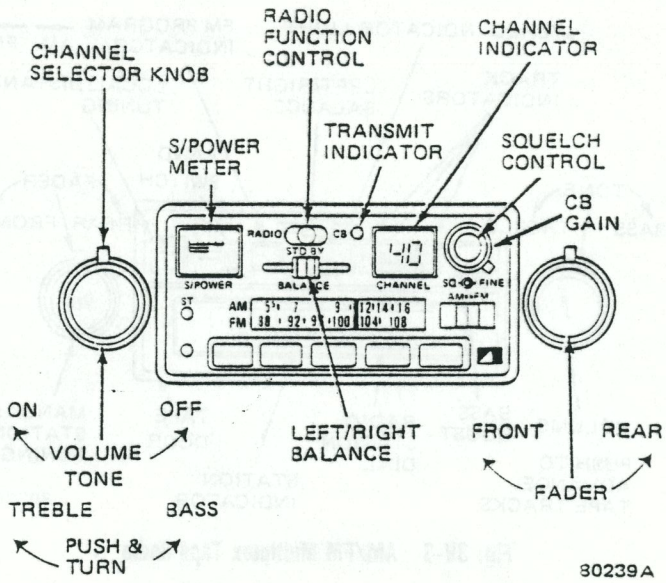

Fig. 3V-6 AM/FM/CB Radio—CB Controls

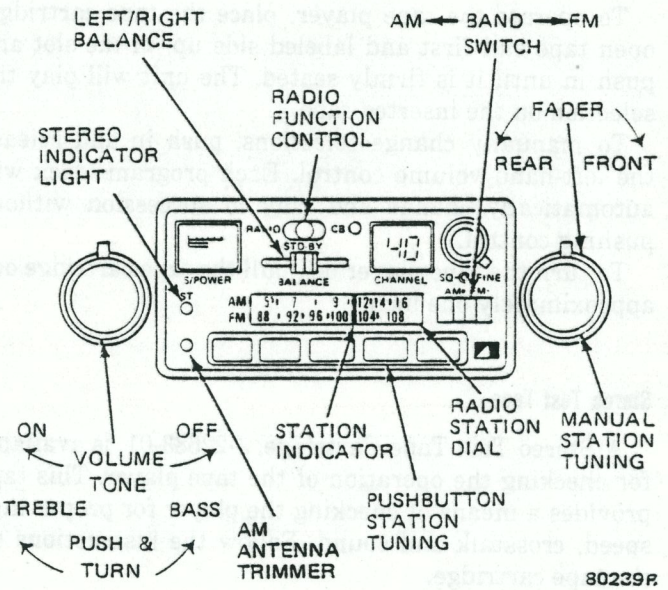

Fig. 3V-7 AM/FM/CB Radio—AM/FM/Controls

(4) Rotate On-Off switch clockwise until noise or signal is heard in speaker.
(5) Check to see that CB Channel indicator light is illuminated.
(6) Select desired channel.
(7) Rotate CB squelch control slowly clockwise until background noise just disappears. Do not advance control too far as weaker signals will not be heard.

CB Operation—To Transmit

(1) Select desired channel for transmitting.
(2) Depress microphone button and speak in a normal voice.
(3) Check relative output power on S-RF meter.
(4) To receive, release microphone button.

Premium Audio System

The premium audio system is used in conjunction with the AM/FM/CB, AM/FM/8-Track Tape Stereo or AM/FM/Cassette Stereo Radios.

The premium sound system provides an improved treble and bass range along with increased volume. The system is turned on and off by the ON/OFF/FADER switch located on the instrument panel. The amplifier is located on the passenger side of the vehicle above the air conditioning housing. When the system is On, the indicator lamp next to the switch will illuminate. To control the front to rear speaker balance, rotate the ON/OFF/FADER switch.

Refer to Wiring Diagrams at the end of this manual for circuit details.

RADIO RECEPTION CHARACTERISTICS

Definitions of Frequently Used Terms

AM (Amplitude Modulation): Common system of radio broadcasting (520 to 1610 kHz)..
Antenna: Device used for transmitting and receiving radio signals..
Circular Polarization: A technique of transmitting radio signals to minimize the affects of fading.
Distortion: False reproduction of the original transmitted signal.
FM (Frequency Modulation): System of radio broadcasting (88 to 108 mHz) with the added advantage of wider audio frequency response.
Fading: Variation of intensity of received radio signals.
Flutter: Momentary loss of received radio station, sometimes referred to as *picket-fencing*.
Hertz: Cycles per second.
Ignition Noise: Undesirable radio signals or noises transmitted from the automobile or an adjacent automobile that interfere with the reception of desired radio signal.
Monaural: A system utilizing a single signal on a single radio frequency (station) as distinguished from a dual channel system (FM stereo).
Multipath Reception: Signal loss or reduction due to a direct signal and a reflected signal arriving at the antenna simultaneously.
Selectivity: The ability of a radio receiver to accept the signal of one station while rejecting signals of undesireable adjacent stations.
Sensitivity: The ability of the radio receiver to receive weak stations.

AM and FM Reception

The following is a brief explanation of AM and FM reception characteristics.

Signal Transmission

The range of normal hearing is approximately 30 Hz (cyles per second) to 14,000 Hz. AM has a range of 50 to 5000 Hz. While FM, covers the entire range of normal hearing. Both AM and FM are received on a regular radio as a monaural signal.

FM Stereo receivers are capable of receiving both monaural and FM stereophonic broadcasts. These stereo broadcasts are sometimes referred to as multiplex.

Fading—Fading is not usually a problem with AM because of its long distance reception capability (fig. 3V-8). FM, on the other hand, is limited to line-of-sight reception (25 to 40 miles) under average conditions of terrain and transmitted power (fig. 3V-9). The area of good FM Stereo reception may even be slightly less than that of regular FM because of stronger signal requirements. Figure 3V-10 illustrates fading of an FM signal due to differences in terrain. Reception behind hills may be noisy (hissing or popping). This noisy reception is sometimes referred to as flutter or picket fencing.

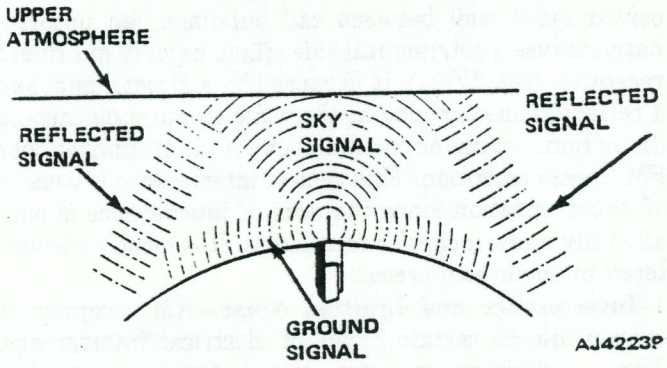

Fig. 3V-8 AM Reception—Long Distance: Follows Curvature of Earth: Reflected by Upper Atmosphere

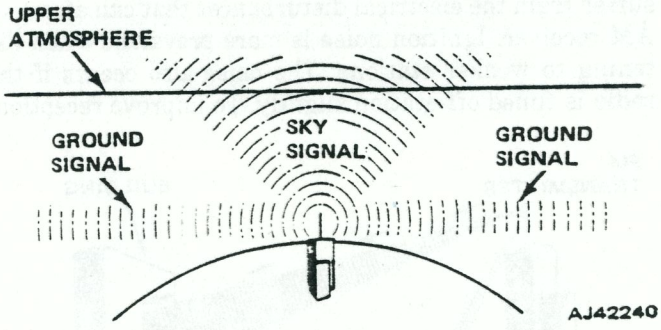

Fig. 3V-9 FM Reception—Shorter Distance: Does Not Follow Curvature of Earth: Not Reflected by Upper Atmosphere

Flutter is produced in the fringe area when objects come between the station and the receiver. The signal will be lost momentarily, then it will return. The rate which the flutter occurs is dependent upon the vehicle's speed in passing objects. The effect is very similar to the way a television set flutters in the fringe area when an airplane passes between it and the station.

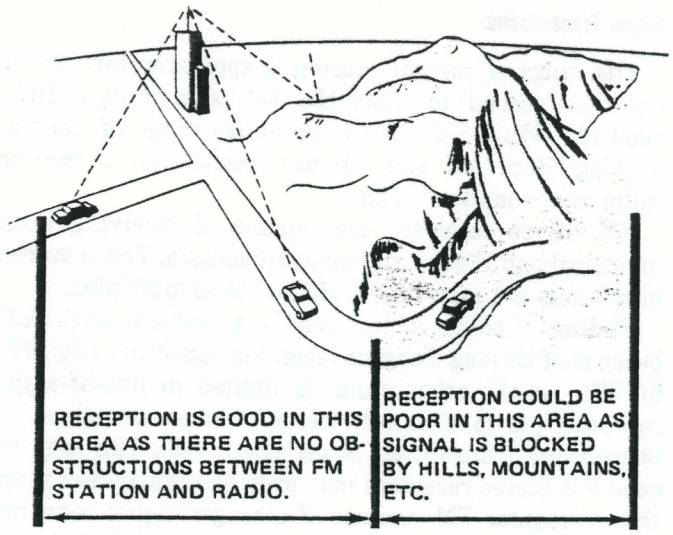

Fig. 3V-10 FM Fading

Multipath Reception—The fact that FM can be received quite well between tall buildings can unfortunately cause a detrimental side effect, namely multipath reception (fig. 3V-11). It is caused by a direct signal and a reflected one arriving at the vehicle's antenna causing distortion, partial or complete loss of the station, or poor FM Stereo reception. This type of interference is usually of short duration since the area of interference is usually only a few inches or feet across. It is mostly encountered in downtown areas.

Interference and Ignition Noise—AM reception is susceptible to certain types of electrical interference. These include power lines, thunderstorms, and other situations where electrical charges in the air cause disturbances resulting in buzzing and static.

Ignition Noise Interference—FM does not usually suffer from the electrical disturbances that can affect an AM receiver. Ignition noise is more prevalent when listening to weaker stations. The noise also occurs if the radio is tuned off-station slightly. To improve reception, make sure the radio is tuned exactly to the station or tune to a station with a strong signal. This increases station signal strength, the FM circuit rejects the noise, and it disappears. Noise will not be noticed in metropolitan areas or within approximately 25 miles of the station.

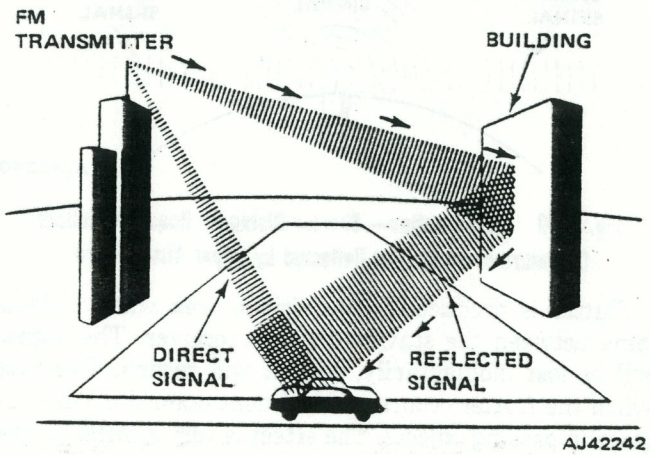

Fig. 3V-11 Multipath Reception

Other FM Interference—Occasionally, when listening to a station while driving in the vicinity of another station (especially one with a strong signal), the possibility of receiving both stations simultaneously can exist. The phenomenon is called adjacent channel interference or cross-modulation.

Using Control Effectively—Proper use of radio controls will enhance listening pleasure.

(1) Always fine-tune radio manually for clearest sound and minimum noise.

(2) Weak FM Stereo signals are inherently noisier than monaural ones when received on an FM stereo radio. To prevent this type of noise from being heard, the FM Stereo radio automatically switches from stereo to the monaural mode. The Stereo-Indicator light goes out, both speakers still operate, but without the stereo effect. When the signal strength increases to a noise-free level, the receiver switches back to the stereo mode. This action is automatic and requires no adjustment.

(3) Occasionally, conditions will be such that noise-free reception simply cannot be attained. If this occurs, set the tone control to the bass (counterclockwise) position to reduce the noise level. When out of the noisy area, set the tone control back to its normal position.

CB Radio Reception

The range of CB broadcasts and reception depends on weather conditions, amount of air traffic, strength and condition of transmitter and receiver, and the adjustment of antenna and splitter box. Range also depends on the movement between the transmitter and receiver. Reception will be clearer in open spaces with little air traffic than in congested metropolitan areas. Hilly terrain may also affect operation. Electrical interference affects reception similar to AM broadcasts.

Reception should not be fuzzy or screechy unless the network is congested.

RADIO INTERFERENCE DIAGNOSIS

General

The object of this diagnosis is to present a systematic approach to troubleshooting interference (noise) problems. First, determine if the noise is normal by referring to Radio Reception Characteristics. If the noise is abnormal, the following procedures outline methods of determining interference point of entry and elimination.

There are two major ways interference enters the radio—the antenna and the A-line or power feed wire to the radio.

Interference Entry—Antenna

Disconnect the antenna. If this causes the noise to stop, the problem is reduced to three possibilities:

- A defective antenna; refer to Radio Antenna Ohmmeter Tests
- Noise radiated upward from the dash
- Noise radiated from the engine compartment

Noise Radiated Upward from Dash

This noise can be determined by fabricating a tool out of a piece of aluminum or copper screen approximately 36 inches by 12 inches (fig. 3V-12).

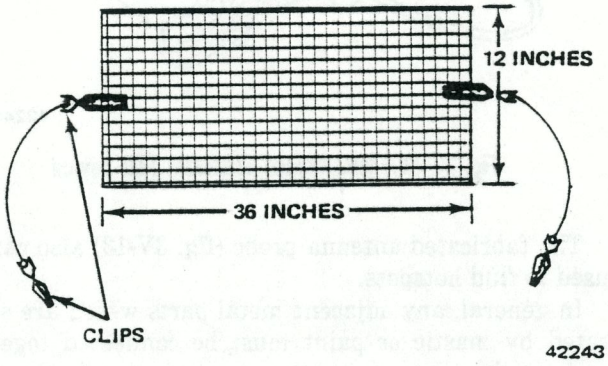

Fig. 3V-12 Improvised Noise Suppression Tool

Lay the screen across the top of the dash and attach the clips to body grounds. If the noise is diminished or disappears, the noise is being radiated up through the dash.

To determine exactly where the noise source is, a useful noise probe can be improvised from an antenna lead-in cable.

To make the probe, cut or remove the lead-in from the antenna at the antenna, remove approximately 2 inches of the outer plastic covering and the woven wire shield (fig. 3V-13).

(1) Disconnect original antenna lead-in and plug in noise probe.

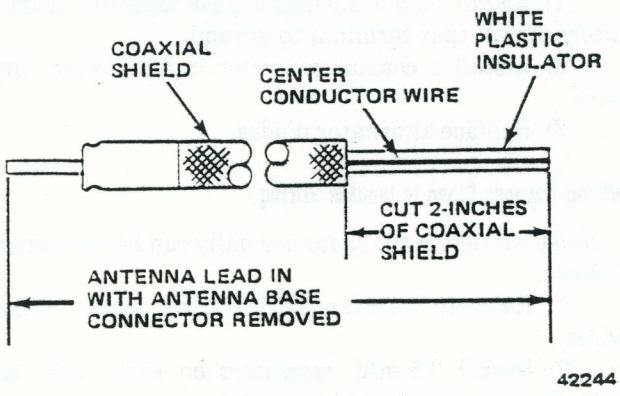

Fig. 3V-13 Noise Probe Fabrication

(2) Turn radio on and use probe to discover hotspot or source of noise. Do not touch the end of the probe with your hand as this would give an incorrect indication. As the probe comes closer to the noise source, the loudness of the noise will increase.

(3) If the source is found to be a switch, connect a 0.5-mfd capacitor from the power feed side of the switch to a good chassis ground.

(4) Gauges and sender units generally can be silenced by installing 0.5-mfd capacitors at their terminals. Install a 0.5-mfd capacitor at the battery terminal of the CVR or a 0.1-mfd, radio-type capacitor directly across the CVR terminals.

(5) If the source is found to be a wire, reroute the wire, or wrap a piece of screen around the wire or wire harness and attach one or more ground leads to the wire screen. It also may be possible to screen off the area found to be radiating noise. Be sure to ground the screen.

(6) If the noise is found to be an electric motor, install a 0.25-mfd coaxial (feed-through) capacitor in series with the motor.

Noise Radiated from the Engine Compartment

These noises can be separated into three areas:

- Primary Ignition Noise
- Secondary Ignition Noise
- Alternator Whine (Antenna)

Primary Ignition Noise

This type of noise generally affects the AM band. The noise usually appears as:

- Frequency varying with engine rpm
- Loudness varying with engine rpm
- Stops instantly when the ignition is turned to the Off position and turned to Accessory position

The first two classifications are usually the result of poor grounds on the coil capacitors or a wire routing problem. Cleaning the grounds or rerouting the wires may solve the problem.

An extra long antenna lead-in may be prepared as shown in figure 3V-12, and used as a hotspot probe.

Remove the ignition coil and its mounting bracket. Clean the paint off the bracket and the engine block, then assemble tightly. In many cases, this helps reduce the amount of interference radiated from the ignition system. Also, the installation of a hood bonding strap or device will help reduce interference radiated from the ignition system. Be sure to check the coil polarity.

In some rare cases, extra suppression may be required if the vehicle is operating in fringe areas. For those special cases perform the following steps:

(1) Install a 0.1-mfd coaxial capacitor as close as possible to the coil battery terminal, not the distributor terminal. Do not use an ordinary bypass capacitor.

(2) Install a 0.005-mfd, 1000-volt ceramic disc capacitor at the coil distributor terminal.

(3) Install a 0.5-mfd coaxial capacitor at the alternator output terminal. Be sure it is rated to handle the maximum alternator voltage.

Secondary Ignition Noise

Secondary ignition noise will always affect FM and, if severe enough, may also affect AM. Normally one of two conditions will be found in the radio.

- Ignition noise all across FM band (and possible on AM)
- Ignition noise (loud) in between stations but not on a strong station

When these conditions exist in the radio, the problem is more than likely the result of:

- Distributor cap carbon ball eroded, or cracked or loose cap
- Rotor with a burned carbon contact spot
- Secondary wire not seated in the coil or distributor
- Defective coil
- An oil film on some of the lead terminals
- Copper core secondary wiring
- Defective or improper spark plugs

If a wire was found not seated, remove the wire and check for carboned end. It is not advisable to repair an end terminal on carbon core wire; replace the entire cable.

If the noise in question sounds like one or two cylinders and definitely not all of them, then the problem is after the coil. Using the fabricated noise probe, which plugs into the radio, have someone sit in the vehicle and listen to the radio. Move the probe from plug to plug. The person in the vehicle should notice an appreciable increase in the plug noise when the defective plug is reached.

It is a good idea to install resistor spark plugs when experiencing spark plug noise. If the vehicle has copper core secondary wiring, these wires should be replaced with original equipment, carbon core resistor wires.

Alternator Whine (Antenna)

Alternator whine can be described as an annoying, high-pitched whistle, or a siren-type sound that increases and decreases with engine rpm.

Methods of eliminating alternator whine and engine interference noise:

(1) Install front fender ground straps.

(2) Install hood bonding strap or device.

(3) Run offending wire through a shielded (grounded) cable.

(4) Clean slip rings and be sure the brushes are making good contact.

A-Line (Power Feed Wire to Radio)

If disconnecting the antenna did not eliminate radio noise, the noise is probably on the A-line.

Motor noise on the A-line is usually the result of voltage spikes on this line being so large that the input filter circuit in the radio cannot handle them. There are two ways to handle this problem:

(1) Locate the cause of line noise and eliminate it.

(2) Add external filters to reduce the spikes to a point where the radio filter can handle the spikes.

A grounded capacitor touched to all hot electrical connections will often identify the offenders (fig. 3V-14).

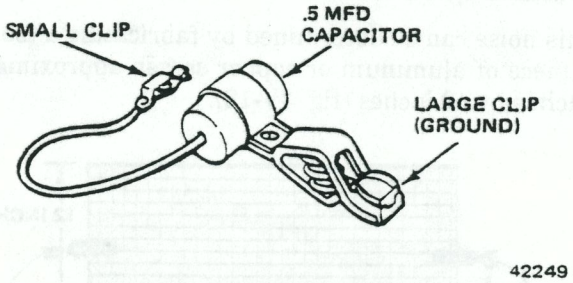

Fig. 3V-14 Interference Eliminator Test Device

The fabricated antenna probe (fig. 3V-13) also can be used to find hotspots.

In general, any adjacent metal parts which are separated by mastic or paint must be connected together electrically.

Effective bonding requires more than physically clean surfaces and self-tapping screws. Tooth-type lockwashers must be used to cut into the surface layers of metal. Grounding straps must be as short and as heavy as possible.

A-line noise is normally the result of:

- Alternator whine (A-line)
- Wiring harness too close to ignition wiring
- Radio noise suppressor
- Poor radio grounding

Alternator Whine (A-Line)

Alternator whine does not stop instantly when the key is turned quickly to the accessory position at fast idle. It is a high pitched whine which increases with rpm. Correct alternator whine as follows:

(1) Install a 0.5 to 2.0 mfd bypass capacitor from the alternator output terminal to ground.

(2) Install a coaxial capacitor in alternator output wire.

(3) Replace alternator diodes.

Wiring Harness Close to Ignition Wiring

Noise carried to the radio normally can be corrected as follows:

(1) Relocate harness wiring away from ignition wires.

(2) Install 0.5-mfd capacitors on each fuse panel lead. Be sure capacitor is grounded.

Instrument Cluster Radio Noise Suppressor

A noise suppressor is installed on Cherokee, Wagoneer and Truck models equipped with a radio. This suppressor (choke) is plugged into the back of the cluster on a printed circuit board. Be sure the choke has not been installed over the copper strip installed on vehicles not originally equipped with a radio.

Tap on the instrument panel with the ignition in the ON position and the ACC position to activate the CVR point movement. If noise only occurs in the ON position, repair noise suppressor as follows:

(1) Remove radio choke.

(2) Remove plastic covering.

(3) Unsolder one end of coil wire and remove approxiately 6-1/2 inches of wire.

(4) Resolder wire end.

(5) Wrap coil with several turns of plastic electrical tape and install choke.

Poor Radio Ground

To check for a poor ground, attach a jumper wire to the radio case and connect to a good chassis ground. If there is no change in radio noise, the radio has a good ground.

If noise changed, check for loose mounting screws and a poor ground.

Other Sources of Interference

Speaker Leads

To determine if speaker leads are inducing or picking up noise, lay the wires on top of the carpet with the wires separated. If the noise is gone, the harness is at fault. Perform one or more of the following:

(1) Separate coil wires by installing a loom over each of the wires.

(2) Install a 0.001-mfd, thumbnail-type capacitor across each speaker.

(3) Remove ground wire from harness and ground each rear speaker at the rear of vehicle.

Speaker-induced noise will normally not occur on front-mounted instrument panel speaker systems. It is more apt to occur on four-speaker systems and when the fader control is in the mid-position.

Defective Radio

Exchange with a known good radio to determine if the radio is defective.

Direct Entry into the Radio

(1) Be sure radio has a good ground.

(2) Tighten all radio chassis screws.

Wheel and Tire Static

Wheel static is another source of interference. This is a running noise most likely to be encountered when the vehicle is in motion on a hard, dry-surfaced road. The noise will remain when the vehicle is coasting with the engine and all electrical equipment turned off. The static occurs in the front wheels due to insulating film produced by the lubricant in the wheel bearings.

In some instances, static discharges take place between the tire and the road surface. An anti-static powder kit is available from radio supply houses which applies conducting material to the inside surface of the tire to eliminate noise from this source. Tire static can be checked by washing the tire with water. The water provides a conduction path to ground for the discharges. Tire static is most likely to be encountered during hot, dry seasons.

Turn and Stop Signals

The flasher in the turn signals and the switch in the stop signal may cause popping noises in the radio. In most cases, the noises are interference due to arcing in the contacts. The correction is a 0.5-mfd bypass capacitor installed at the battery connection of the switch or the flasher. It is less likely, but possible, that the low frequency components of the interruptions are reaching audio stages of the radio. The test is to check if the noise is present with the volume control turned down. If so, install a 1,000-mfd condenser.

Horn Noise

The diagnosis and cure for a growling noise in the radio when the horn is operated is the same as for Turn and Stop Signals detailed above. The suppressor capacitors are installed at the point where the battery lead feeds the horn relay.

Be sure the horn relay cover is not loose.

Accessories

Electric windshield wipers, blower motors, window regulator motors, or any brush-type motors, generally can be suppressed by installing 0.25-mfd capacitors at the terminals.

CB RADIO DIAGNOSIS

For possible CB radio problems, refer to *CB Radio Reception* to determine if the condition is normal. If problem still exists, use CB Radio test instruments (fig. 3V-15) to diagnose trouble.

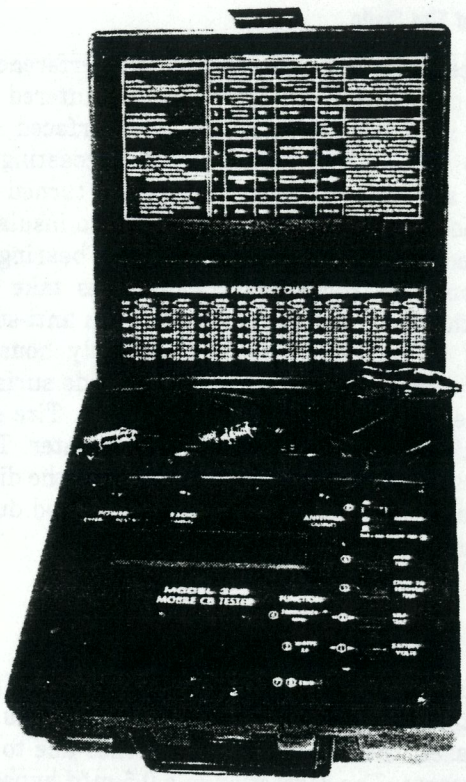

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Fig. 3V-15 Amserv AMX 386S Mobile CB Tester

RADIO REPLACEMENT

CJ Models

NOTE: *If equipped with air conditioning, remove screws attaching evaporator assembly to instrument panel and lower evaporator assembly.*

(1) Disconnect battery negative cable.
(2) Remove radio control knobs, attaching nuts, and bezel.
(3) Disconnect radio support bracket from instrument panel.
(4) Remove radio by tilting it downward and toward steering wheel.
(5) Disconnect antenna lead, speaker wires, and feed wire.
(6) Remove bracket from radio and install on replacement radio.
(7) Connect antenna lead, speaker wires, and feed wire to replacement radio.
(8) Install radio in instrument panel.
(9) Connect radio support bracket to instrument panel.
(10) Install radio bezel, attaching nuts, and control knobs.
(11) Connect battery negative cable.

Cherokee-Wagoneer-Truck Models

(1) Open glove box door and remove glove box liner and lock striker.
(2) Disconnect microphone lead from radio, if equipped.
(3) Disconnect antenna lead(s).
(4) Disconnect feed wire from fuse panel.
(5) Disconnect speaker leads from radio.
(6) Disconnect rear support bracket from radio.
(7) Remove radio control knobs and attaching nuts.
(8) Push radio back to clear instrument panel and remove it through glove box opening.
(9) Install radio in instrument panel.
(10) Install radio attaching nuts and control knobs.
(11) Connect rear support bracket.
(12) Connect feed wire to fuse panel.
(13) Connect speaker leads to radio.
(14) Connect antenna lead(s).
(15) Connect microphone lead to radio, if equipped.
(16) Install glove box liner and lock striker.

BULB REPLACEMENT

All Models

NOTE: *AM/FM/CB radio bulb replacement is accomplished by exchanging the radio.*

(1) Remove radio.
(2) Remove radio dial cover retainers and cover.
(3) Rotate manual tuning control to move pointer to extreme left or right.
(4) Remove dial light reflector clips and deflector.
(5) Remove bulb and bulb diffuser.
(6) Install diffuser on bulb and install bulb.
(7) Install dial light deflector.
(8) Install dial cover.
(9) Install radio.

ANTENNA

AM and AM/FM Models

All antennas must have good ground to eliminate static noises. The mast of the antenna is not grounded except through the radio. The base of the antenna is grounded to the vehicle sheet metal. The coaxial shield (the wire mesh) surrounding the center conductor wire of the antenna lead-in cable is grounded to the radio and the antenna base.

Tests

There are three antenna tests to be made with the use of an ohmmeter:

- Mast to ground
- Tip of mast to tip of conductor
- Body ground to battery ground

Refer to figure 3V-17.

Operating Instructions for Amserv AMX 386S Mobile CB Tester

NOTES

CAUTION:

Do not key microphone without antenna connected or antenna button in int. position if antenna is not connected.

RADIO UNDER TEST CONTROL SETTINGS

Squelch – Minimum (audible noise)
Volume – Mid-Range
Channel – 2

FAILURE OF –

Test 1 – Probable Faulty Battery or Harness
Test 2,7 – Faulty Model 386S
Tests 3 to 6 – Faulty CB
Test 8 – After antenna adjustment indicates faulty antenna.

*Limits set for typical CB systems. See specific manufacturers specifications for other radio's and antenna's.

TEST PROCEDURE

Test Step	Function Setting	Antenna	Instructions	*Readings Min.-Max.	Special Notes
1	Watts	Int.	Press-Battery Volts	12.0-16.0	Key mic., battery volts should not change more than 0.5 volts.
2	Frequency MHZ	Int.	Press-Self Test	→	27.2035 min., 27.2065 max.
3	Watts RF	Int.	Key Mic.	03.0 Min.	
4	Frequency MHZ	Int.	Key Mic.	See Freq. Chart	Rotate CB channel selector. See frequency chart for min./max. on each channel.
5	Frequency MHZ	Int.	Press-Receiver Test (Channel 20)	→	Set to channel 20. Listen for clear tone (1kHz) from radio. Adjust squelch clockwise, tone should reappear.
6	Frequency MHZ	Int.	Key Mic. Press-Mod. Test	→	Talk into mic., voice should be heard from Model 386 speaker. Note - if mic. is held near speaker, squealing sound is normal.
7	SWR	Int.	Key Mic.	1.00-1.20	
8	SWR	Ext.	Key Mic.	1.00-3.50	Adjust antenna for minimum reading.

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CB RADIO FREQUENCY CHART

CH. < MAX. / MIN.	CH. < MAX. / MIN.	CH. < MAX. / MIN.	CH. < MAX. / MIN.	CH. < MAX. / MIN.	CH. < MAX. / MIN.	CH. < MAX. / MIN.	CH. < MAX. / MIN.
01 < 26.9663 / 26.9637	06 < 27.0263 / 27.0237	11 < 27.0863 / 27.0837	16 < 27.1563 / 27.1537	21 < 27.2163 / 27.2137	26 < 27.2663 / 27.2637	31 < 27.3163 / 27.3137	36 < 27.3663 / 27.3637
02 < 26.9763 / 26.9747	07 < 27.0363 / 27.0337	12 < 27.1063 / 27.1037	17 < 27.1663 / 27.1637	22 < 27.2263 / 27.2237	27 < 27.2763 / 27.2737	32 < 27.3263 / 27.3237	37 < 27.3763 / 27.3737
03 < 26.9863 / 26.9837	08 < 27.0563 / 27.0537	13 < 27.1163 / 27.1137	18 < 27.1763 / 27.1737	23 < 27.2363 / 27.2337	28 < 27.2863 / 27.2837	33 < 27.3363 / 27.3337	38 < 27.3863 / 27.3837
04 < 27.0063 / 27.0037	09 < 27.0663 / 27.0637	14 < 27.1263 / 27.1237	19 < 27.1863 / 27.1837	24 < 27.2463 / 27.2437	29 < 27.2963 / 27.2937	34 < 27.3463 / 27.3437	39 < 27.3963 / 27.3937
05 < 27.0163 / 27.0137	10 < 27.0763 / 27.0737	15 < 27.1363 / 27.1337	20 < 27.2063 / 27.2037	25 < 27.2563 / 27.2537	30 < 27.3063 / 27.3037	35 < 27.3563 / 27.3537	40 < 27.4063 / 27.4037

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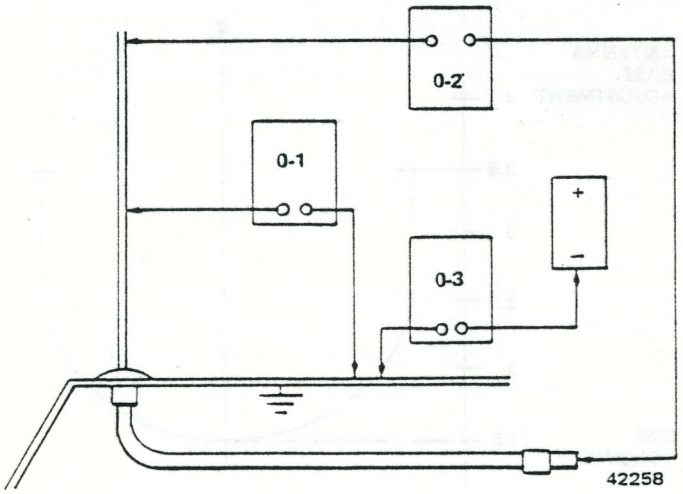

Fig. 3V-16 Antenna Ohmmeter Test

Mast-to-Ground Test

This test verifies that the antenna is making electrical contact with the radio and that the mast is insulated from the base.

(1) Touch one ohmmeter prod to tip of antenna mast and other prod to antenna base (0-1). With antenna installed in radio, there should be continuity (approximately 15 ohms).

(2) Disconnect antenna from radio and repeat step (1). There should not be any continuity with antenna disconnected from radio.

Tip of Mast-to-Tip of Conduct Test

This test verifies that the antenna does not have an open circuit.

(1) Disconnect antenna from radio.

(2) Touch one ohmmeter prod to mast tip and other prod to tip of lead-in (part inserted into the radio) (0-2). There should be continuity (fraction of an ohm).

Body Ground-to-Battery Ground Test

This test verifies that the antenna base has a good ground. Touch one ohmmeter lead to the fender and the remaining prod to the battery negative post (0-3). The resistance should be extremely low (less than one ohm).

AM/FM/CB Radio

VSWR is a measurement of the magnetic fields which reflect back into the antenna. Besides limiting the range of the transmitter, these also cause a heat build-up which can damage the transmitter circuitry. A high VSWR reading indicates a high level of reflected magnetic fields. A reading less than 2.0:1 is excellent. A reading above 3.5:1 is excessive and requires adjustment (see VSWR Reading by CB Channels chart). VSWR readings can vary depending upon atmospheric conditions. VSWR can also vary with respect to surrounding objects that affect reflection and conductivity.

VSWR Reading by CB Channels

CB CHANNELS	VSWR READING
1 thru 5	Less Than 3.5:1
6 thru 10	Less Than 3.0:1
11 thru 15	Less Than 2.5:1
16 thru 25	Less Than 2.0:1
26 thru 30	Less Than 2.5:1
31 thru 35	Less Than 3.0:1
36 thru 40	Less Than 3.5:1

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Tuning the CB Antenna/Splitterbox

Tuning the CB antenna or splitterbox involves reducing the SWR level by using a VSWR meter or the Amserv AMX 386S Mobile CB Tester and chart covering operating instructions for Amserv AMX 386S Mobile CB Tester. Trim the antenna/splitterbox as follows:

NOTE: *When checking SWR, vehicle should be located out-of-doors and at least 100 feet from other vehicles, people, or buildings. Doors of test vehicle should be closed.*

(1) Disconnect coaxial cable at inline connection near splitterbox.

(2) Connect transmitter end of coaxial cable to a jumper coaxial cable.

NOTE: *Jumper should not exceed 18 inches.*

(3) Connect jumper coaxial cable to transmitter terminal of test instrument.

(4) Connect splitterbox end of coaxial cable to antenna terminal of test instrument.

NOTE: *If a VSWR meter is used, it is recommended to connect a 50-ohm dummy load to VSWR meter antenna connection. Radio will not transmit with a dummy load.*

(5) With engine running, turn radio on, key mike, and measure SWR on channels 1 and 40 following test instrument manufacturer's instructions.

(a) If SWR reading on test instrument is less than 3.5 between channels 1 and 40 and within 0.5 of one another, no further adjustment is required.

(b) If SWR reading on test instrument is more than 3.5 between channels 1 and 40 adjust splitterbox.

(6) Adjust splitterbox using a 5/64-inch hexagon nonmetallic alignment tool (available at most radio/television repair shops).

NOTE: *If a metal Allen wrench is used for the adjustment, remove the wrench from the splitterbox before reading the test instrument.*

(a) Insert alignment tool into splitterbox adjusting slug.

(b) Turn slug clockwise or counterclockwise, in one quarter turn increments, until SWR reading on test instrument is less than 3.5 between channels 1 and 40 and within 0.5 of one another, no further adjustment is required.

(c) If desired SWR reading cannot be obtained the antenna base slug must be adjusted.

(7) Turn transmitter channel selector to channel 20 and record SWR reading.

(8) Disconnect antenna mast from base and remove protective mylar tape from antenna base.

(9) Adjust antenna base slug using a 5/64-inch Allen wrench at least 3-1/2-inches long.

(a) With antenna mast installed, insert wrench into antenna base slug and turn slug clockwise or counterclockwise, in one quarter turn increments, to obtain lowest possible SWR reading on test instrument.

(b) Readjust splitterbox as outlined above.

Changing the splitterbox adjustment will lower or raise the frequency of the best channel match. Changing the load coil adjustment in the antenna base will raise or lower the SWR curve (fig. 3V-17).

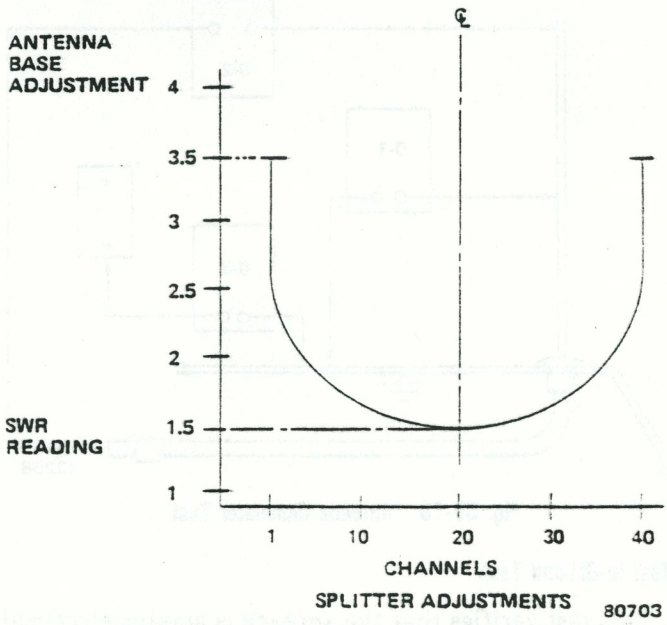


Fig. 3V-17 Typical SWR Curve

NOTE: *Although you are not talking while checking VSWR, a carrier signal is being transmitted which can eliminate another transmission. Try to pick a time when the channel is not in use to check VSWR.*

SPEAKERS

Speakers have an impedance of either 3.2 or 8 ohms. A speaker should be replaced with a speaker having the proper part number. If the exact replacement is not available, select a speaker which matches the ohm value stamped on the radio chassis with a black ink stamp.

AM/FM stereo radios are more critical in the selection of a speaker than are AM radios. A noticeable deterioration in sound will be noticed if the correct speaker is not used.

Stereo speakers are paired together for a truer stereo sound, right front with right rear, left front with left rear.

Speaker Repairs

A speaker, once it has been damaged, is usually not repairable and should be replaced. Defective speakers usually have one or more of the following symptoms:

- Loose mounting.
- Screws or other objects stuck to back of magnet.
- Audio distortion, particularly on the low frequency notes and at high volume.
- Rattles and buzzes caused by foreign material hitting or rubbing against the speaker cone.
- Raspy noises caused by foreign matter inside the speaker restricting free movement of the speaker cone.
- Muffled sound caused by speaker opening obstruction.

Use a light to check the speaker opening(s).

If the entire speaker is not visible through the speaker grille openings, remove the obstruction as follows:

Front Door Speakers

(1) Remove door trim panel lower screws.

(2) Carefully lift the door trim panel away from door to expose speaker.

(3) Cut out excess water dam paper around speaker.

(4) Install door trim panel lower screws.

NOTE: *Be sure the speaker mounting screws are tightened securely.*

Speaker Harness Test

Ground Condition

(1) Disconnect speaker feed wires at radio connector and each individual speaker.

NOTE: *When reconnecting the speaker harness to the radio, be sure the antenna lead-in cable is fully engaged in the radio socket.*

(2) Connect one lead of an ohmmeter to the speaker feed wire and the other lead to a good ground. An infinity reading should be indicated. Check each individual speaker wire in this manner.

(3) If resistance is indicated on the ohmmeter, the wire being checked is grounded.

NOTE: *Grounded speaker harnesses are generally caused by screws piercing wire harness.*

Short Condition

(1) Disconnect speaker feed wires at the radio connector and at each individual speaker.

(2) Connect ohmmeter leads to speaker feed wires at the radio connector.

(3) An infinity reading should be indicated.

(4) If resistance is indicated on ohmmeter, the feed wires being checked are shorted.

Speaker Test

Speakers may be isolated for grounds by testing the impedance with an ohmmeter. Connect ohmmeter between the two speaker leads. The specified value should match the ohm value stamped on the radio chassis.

Speaker Replacement

CJ Models

To remove the AM speaker, remove the four attaching nuts from the mounting studs.

NOTE: *On vehicles equipped with air conditioning, the evaporator must be lowered for removal of the speaker.*

On models equipped with the two-speaker stereo radio system, the speakers can be removed by removing the four retaining nuts from each speaker.

NOTE: *On vehicles equipped with air conditioning the evaporator must be lowered for removal of the passenger side speaker.*

Cherokee-Wagoneer-Truck Models

The AM speaker is located above the radio. To remove the speaker, remove the radio, then remove the four attaching nuts from the speaker mounting studs.

On vehicles equipped with a stereo radio, interior trim panels must be removed for access to the speaker.

PREMIUM AUDIO SYSTEM

Fader Switch

Removal

(1) Disconnect negative battery cable.
(2) Remove screws attaching switch housing to instrument panel or evaporator housing. Lower housing.
(3) Disconnect wires from fader switch.
(4) Disconnect lamp wires.
(5) Remove control knob.
(6) Remove retaining nut from switch.
(7) Remove switch.

Installation

(1) Position fader switch into housing.
(2) Install fader switch retaining nut.
(3) Connect lamp wires.
(4) Connect wires to fader switch.
(5) Position switch housing on instrument panel or evaporator housing and install attaching screws.
(6) Install control knob.
(7) Connect negative battery cable.
(8) Reset clock, if equipped.

Indicator Lamp

Removal

(1) Disconnect negative battery cable.
(2) Remove screws attaching switch housing to instrument panel or evaporator housing. Lower housing.
(3) Disconnect lamp wires.
(4) Remove lamp.

Installation

(1) Install lamp.
(2) Connect lamp wires.
(3) Position switch housing on instrument panel or evaporator housing and install attaching screws.
(4) Connect negative battery cable.
(5) Reset clock, if equipped.

Amplifier

Removal

(1) Disconnect negative battery cable.
(2) Remove evaporator housing attaching screws and lower housing, if equipped.
(3) Disconnect amplifier wiring harness from fader switch.
(4) Remove amplifier attaching hardware.
(5) Remove amplifier assembly using care not to damage wiring harness.

Installation

(1) Position amplifier assembly in vehicle.
(2) Install amplifier attaching hardware.
(3) Route wiring harness to switch and connect.
(4) Position evaporator housing and install attaching screws, if equipped.
(5) Connect negative battery cable.
(6) Reset clock, if equipped.

SPECIFICATIONS

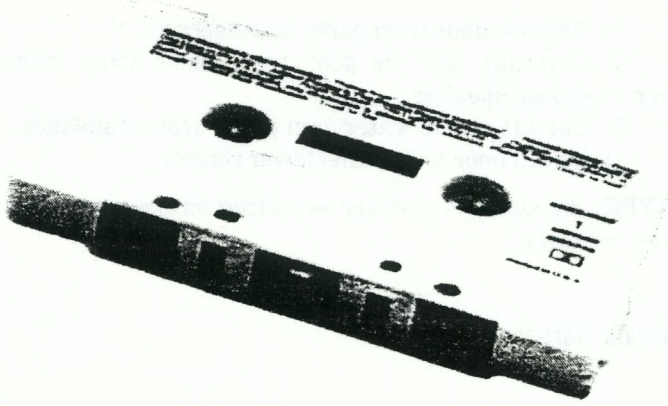
Radio Bulb Chart

	Number of Bulbs/ Bulb Trade Number
CJ	1/1892
Cherokee-Wagoneer-Truck	1/1893

70320

Tools

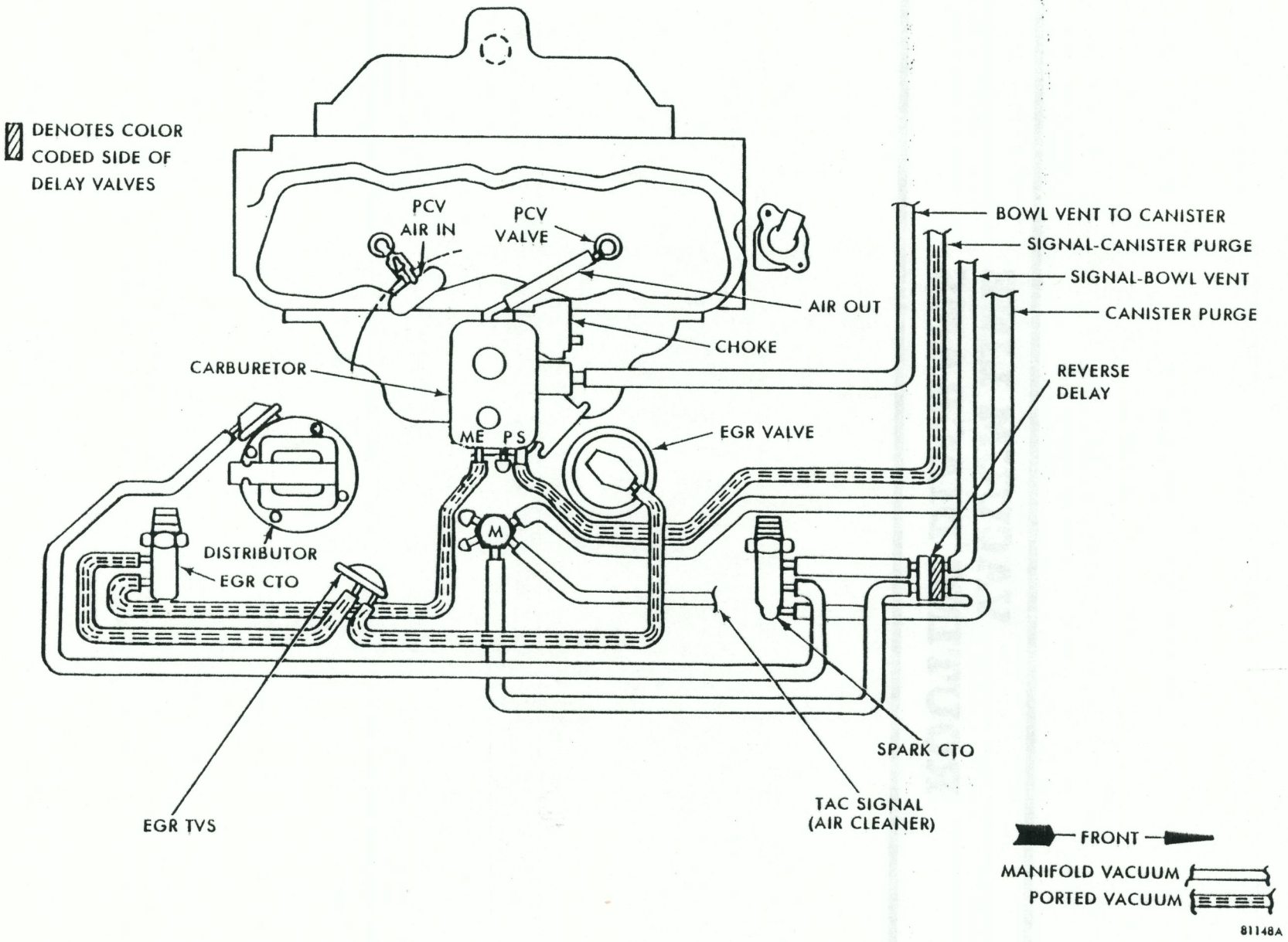
J-22683-01
STEREO TEST TAPE



J-23724
CASSETTE TEST TAPE

70319

VACUUM LINE ROUTING DIAGRAMS



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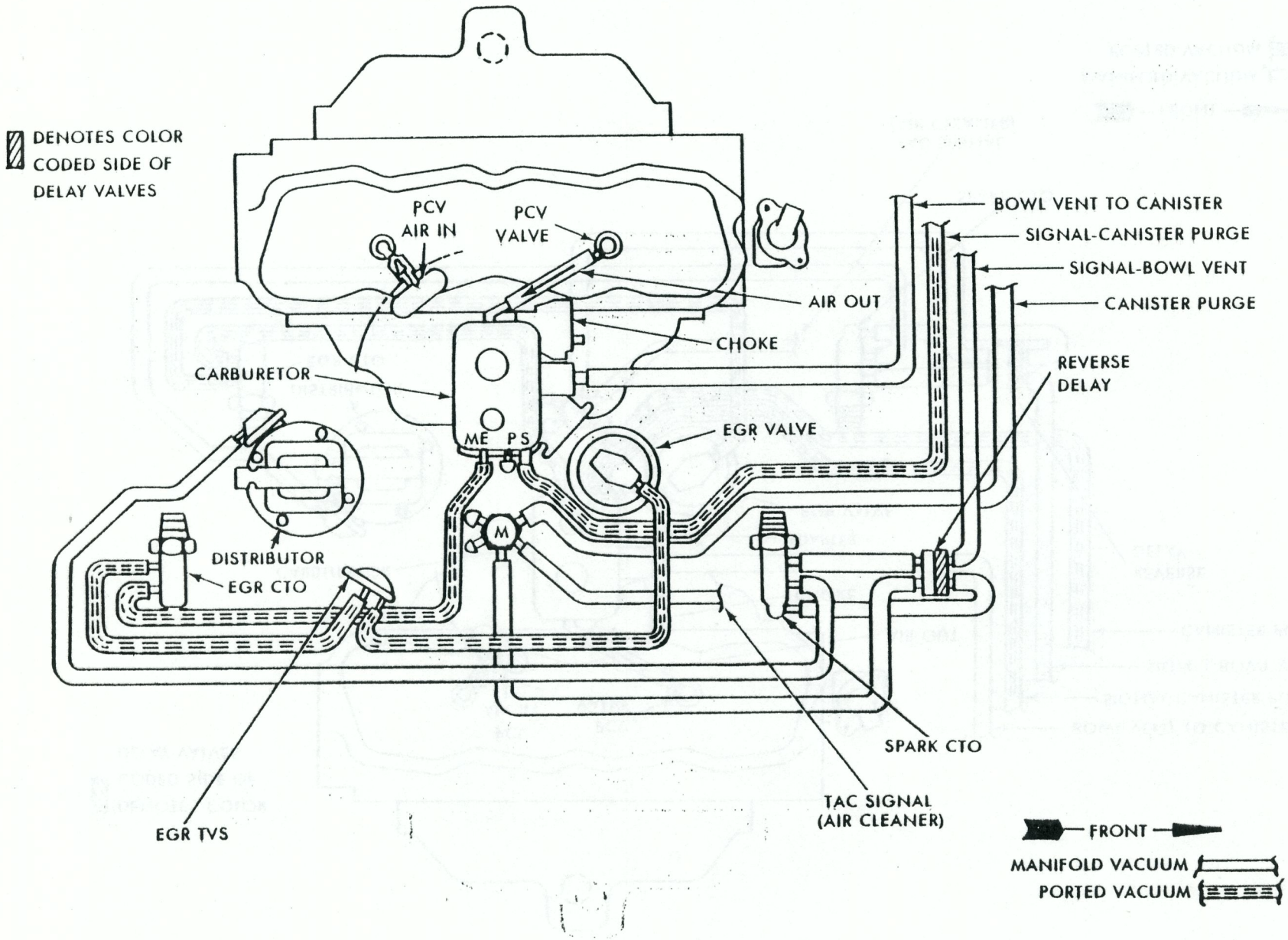

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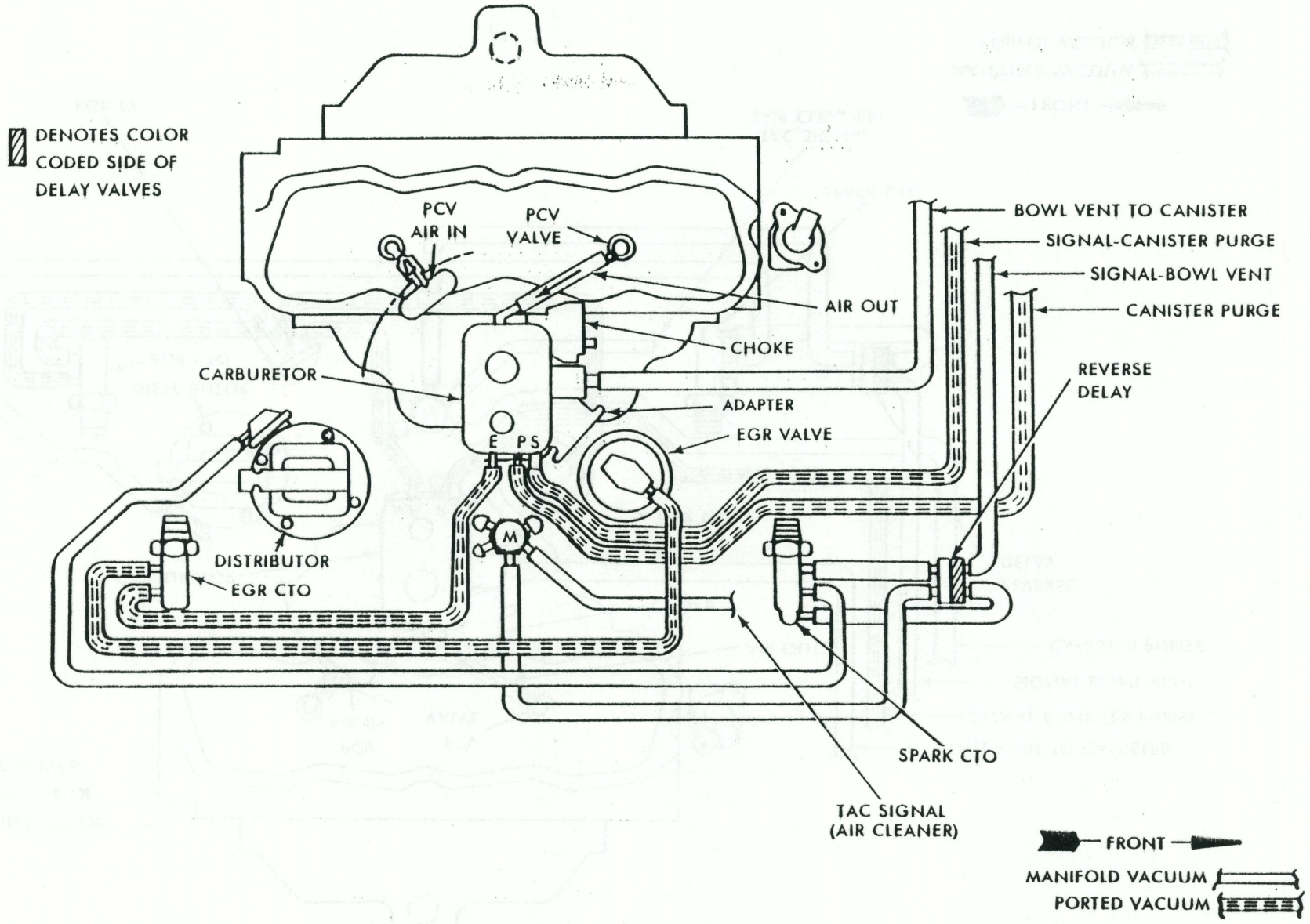

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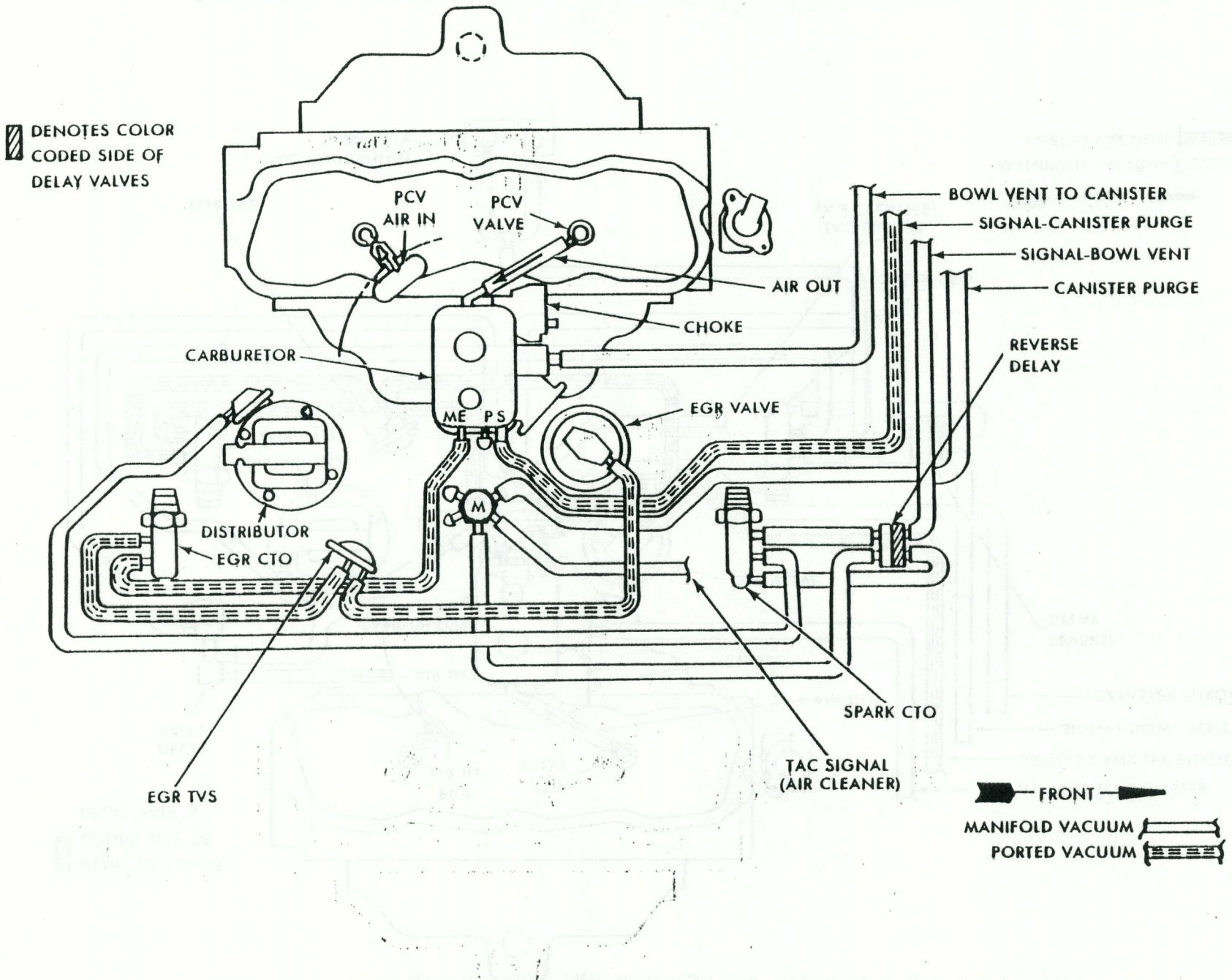

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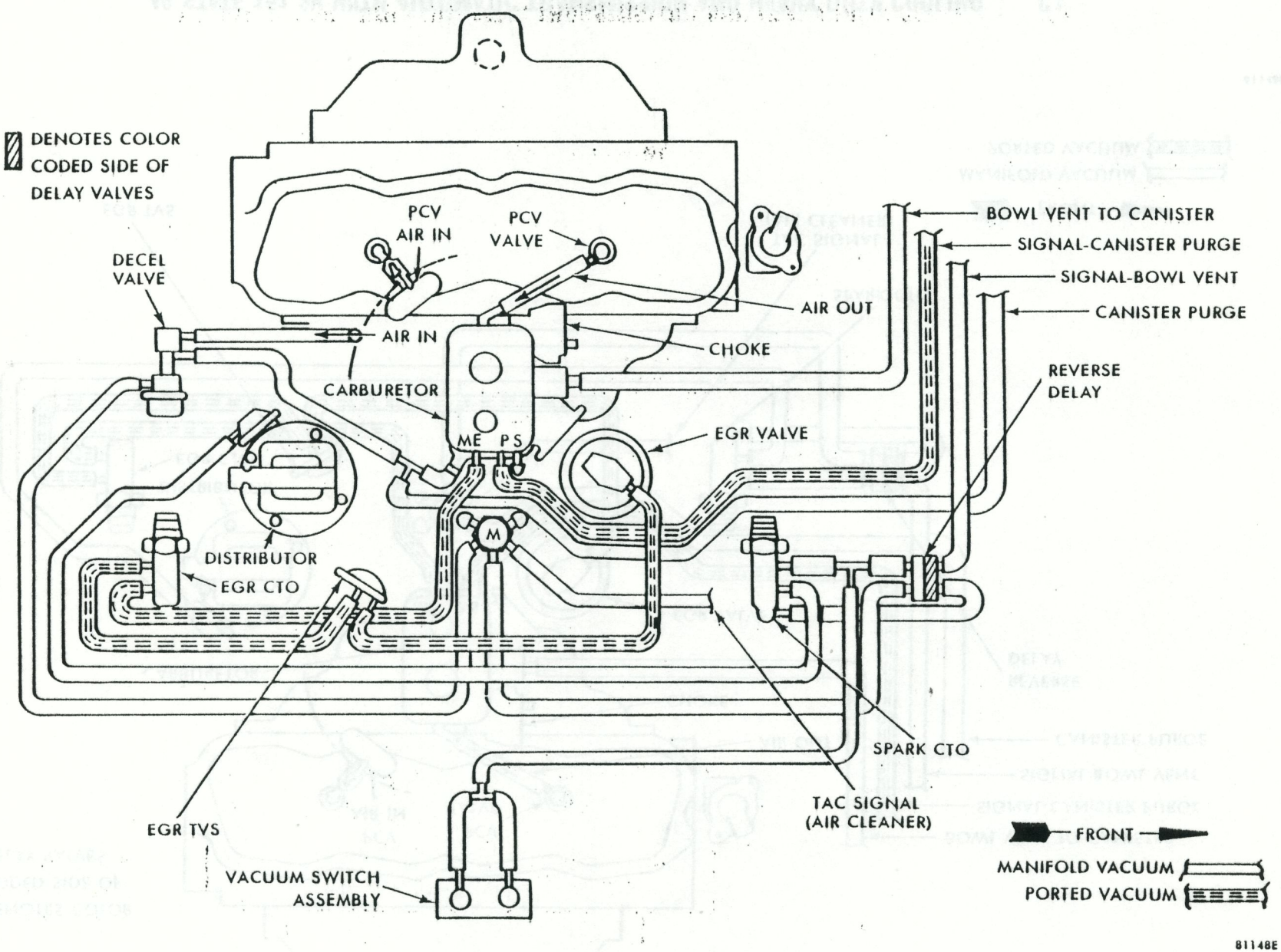

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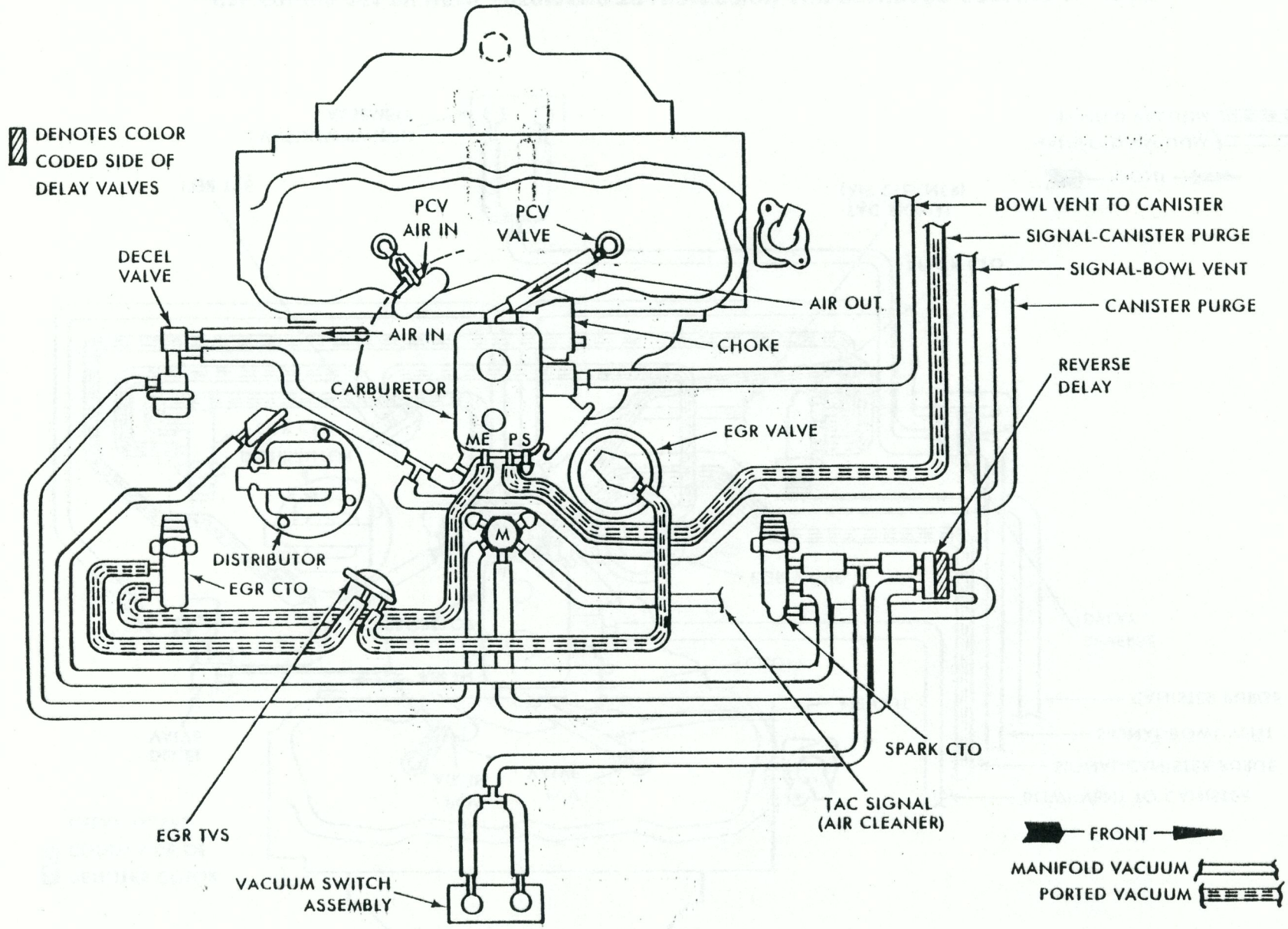

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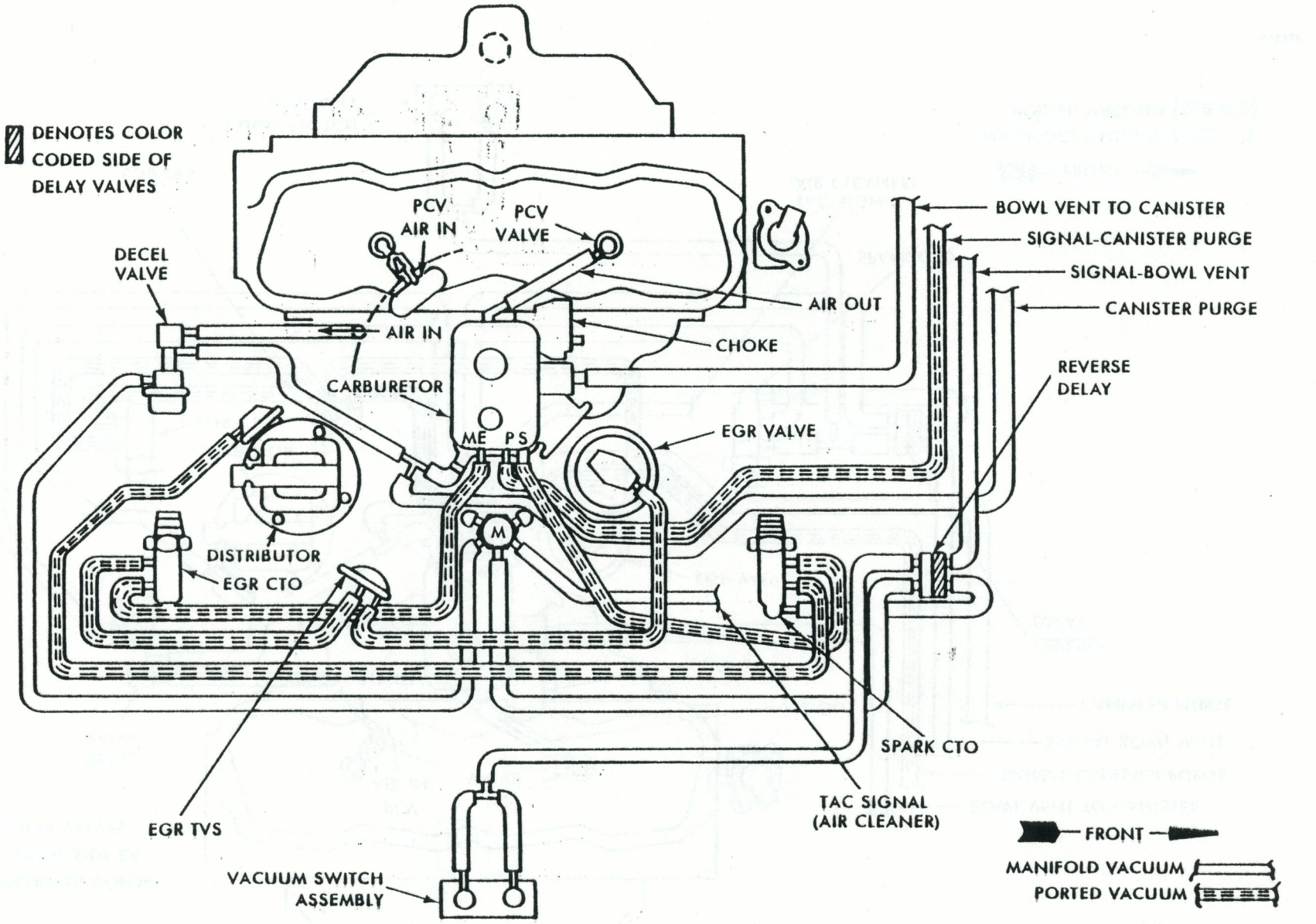

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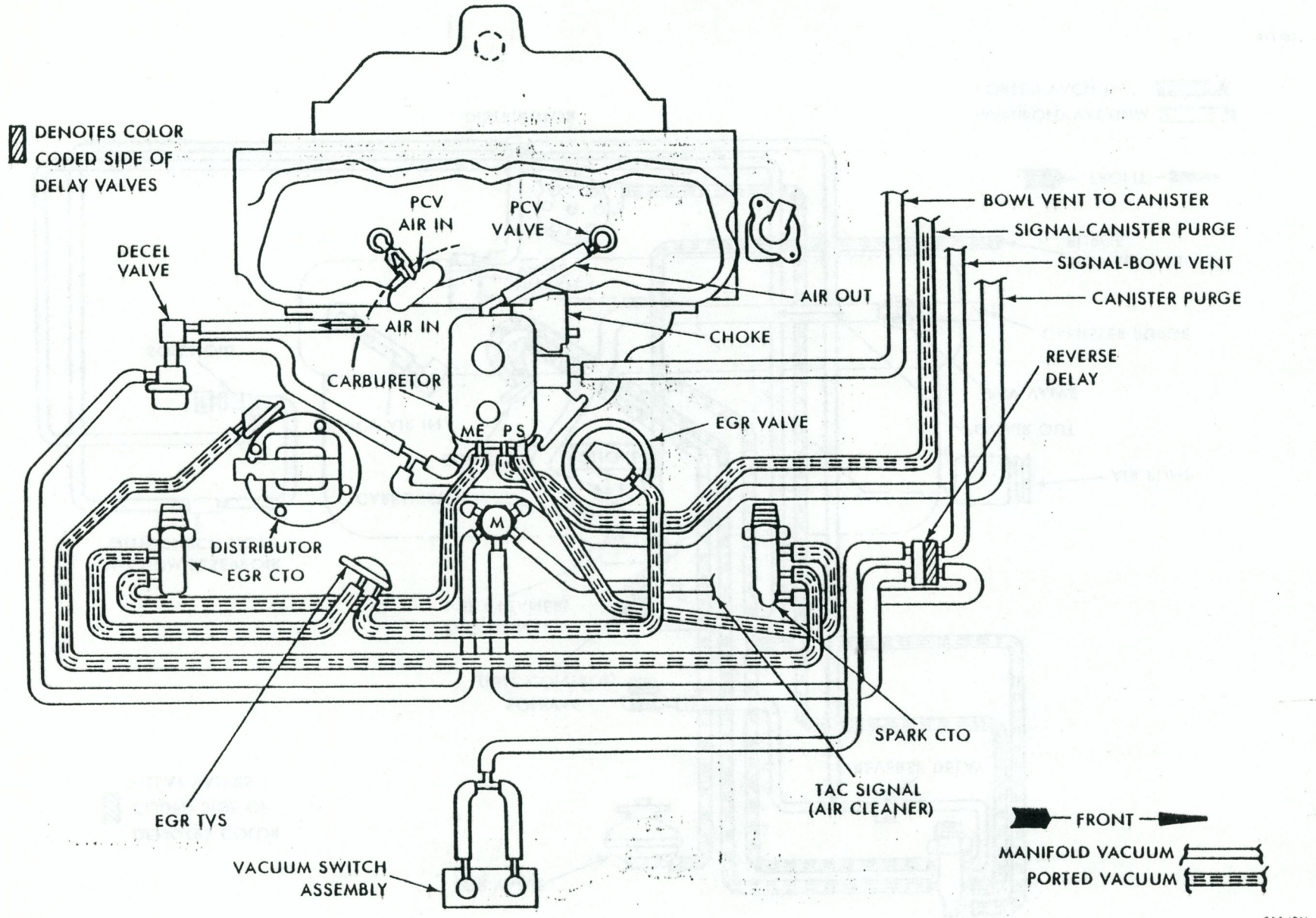

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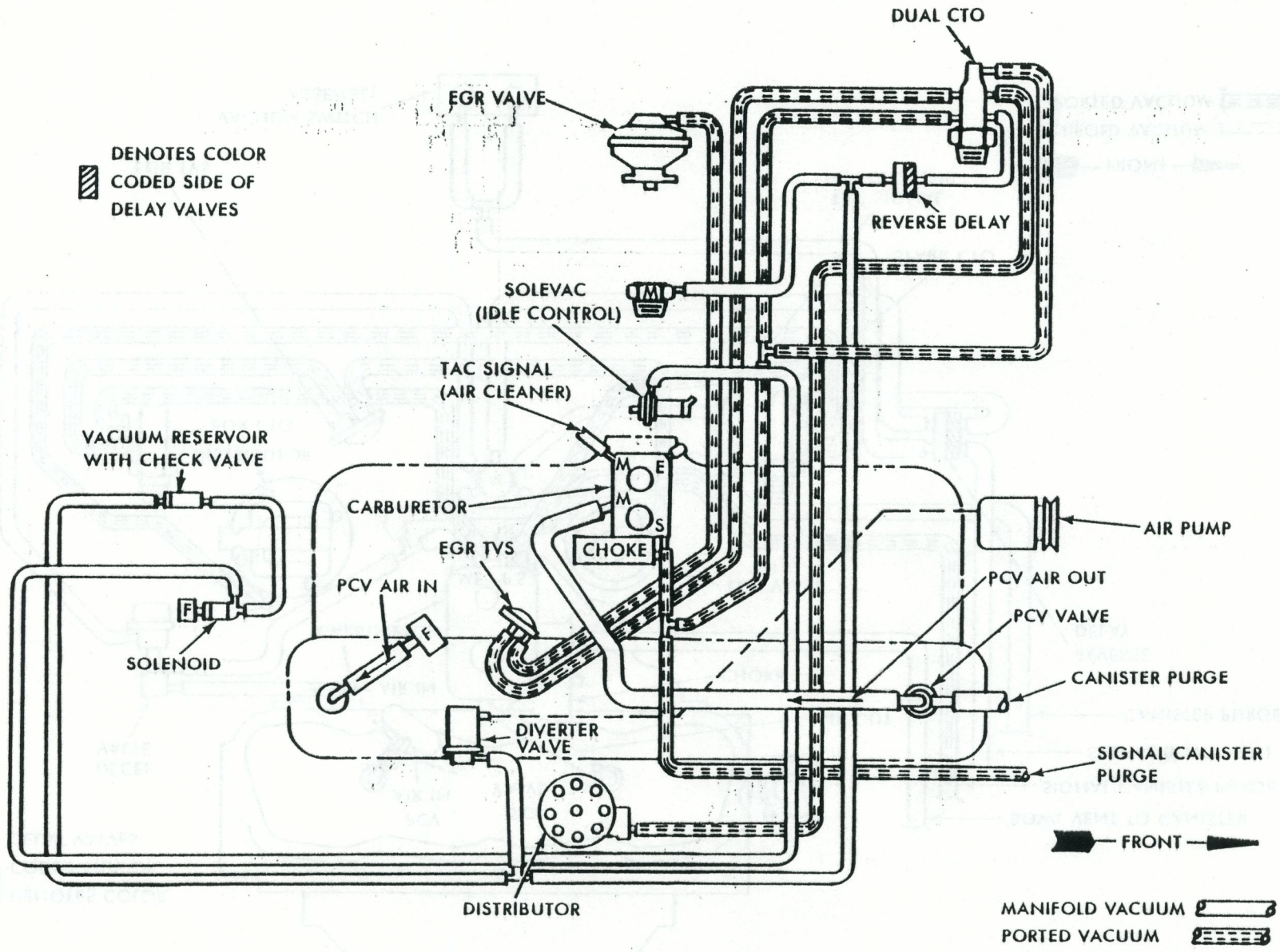

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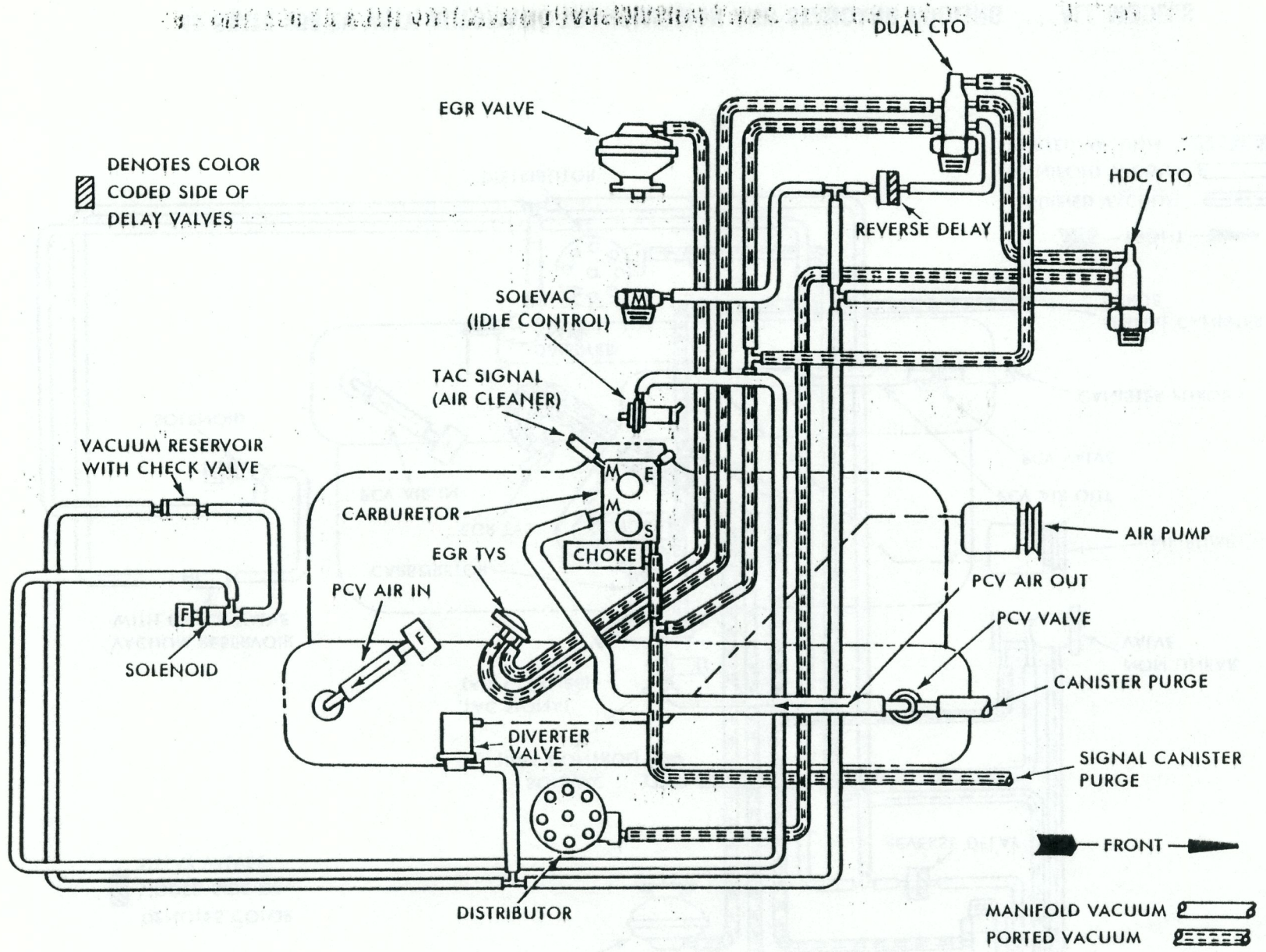

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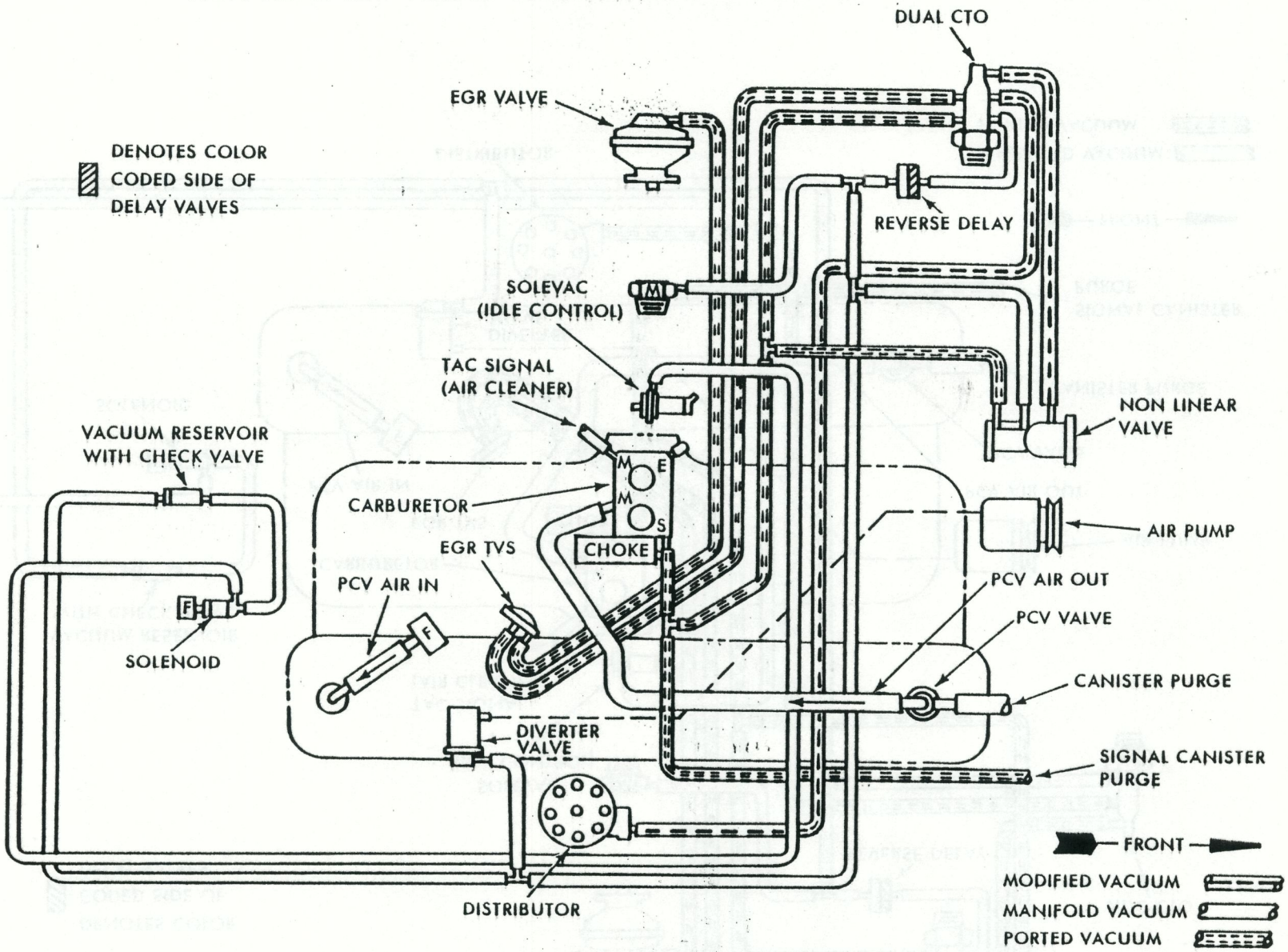

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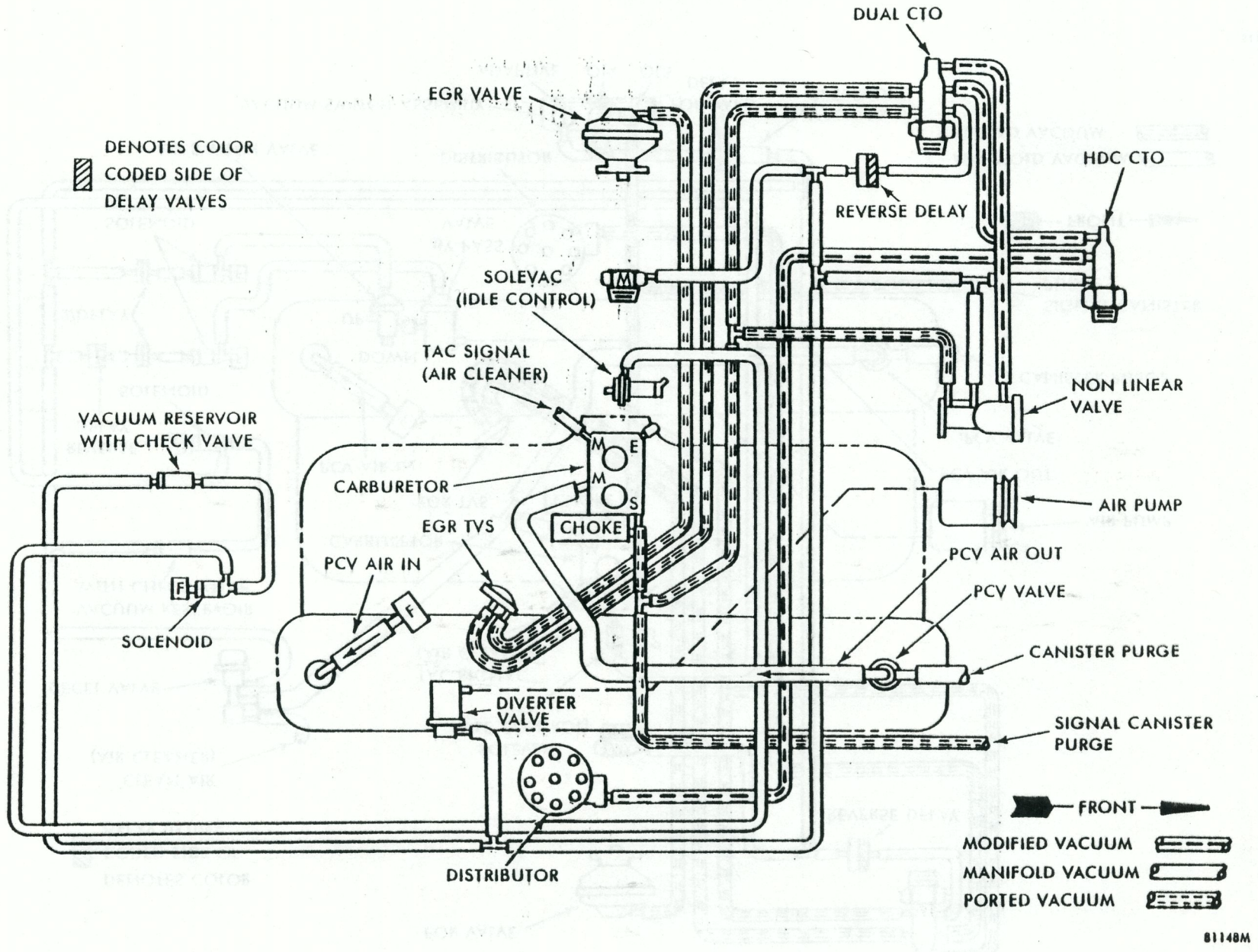

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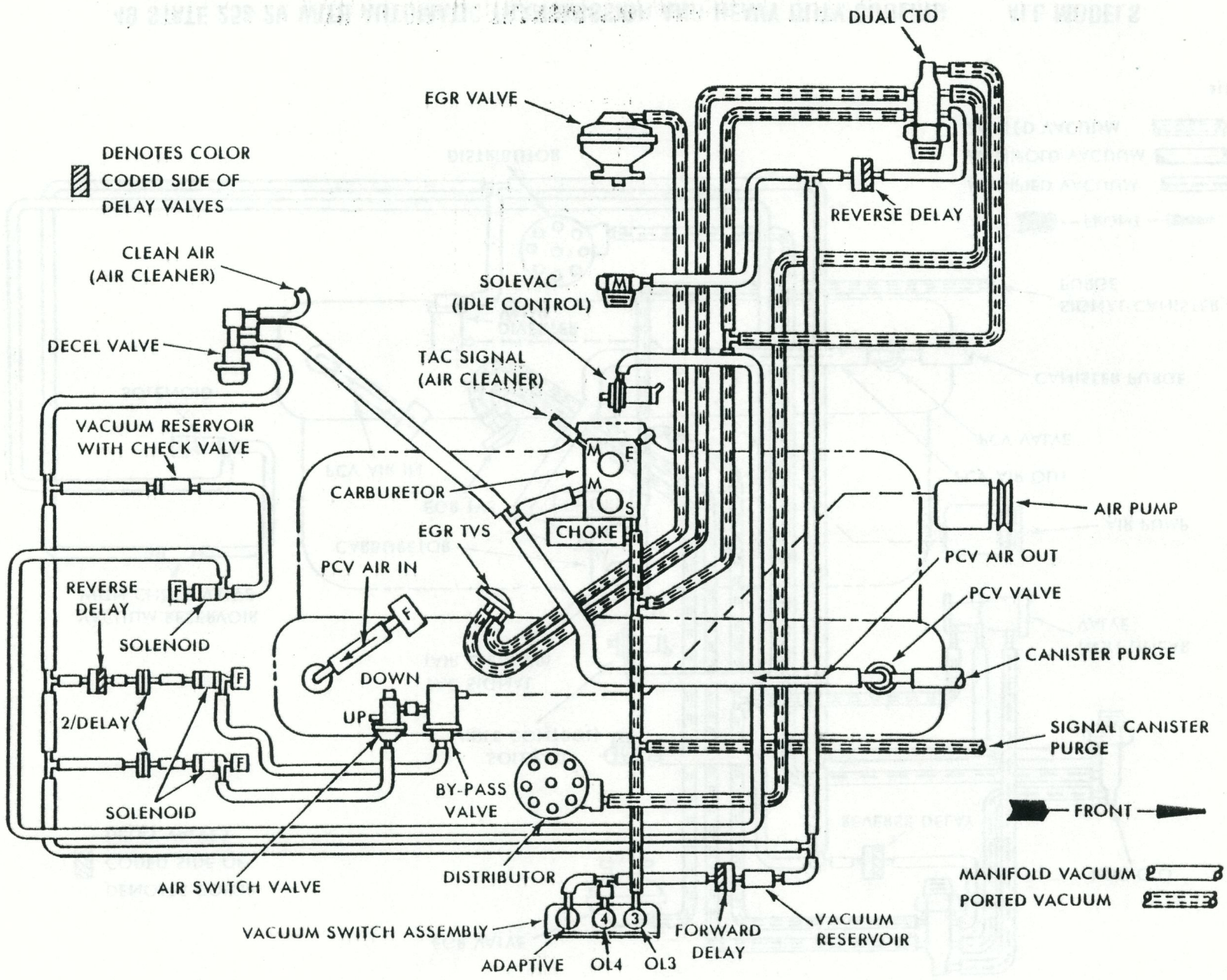

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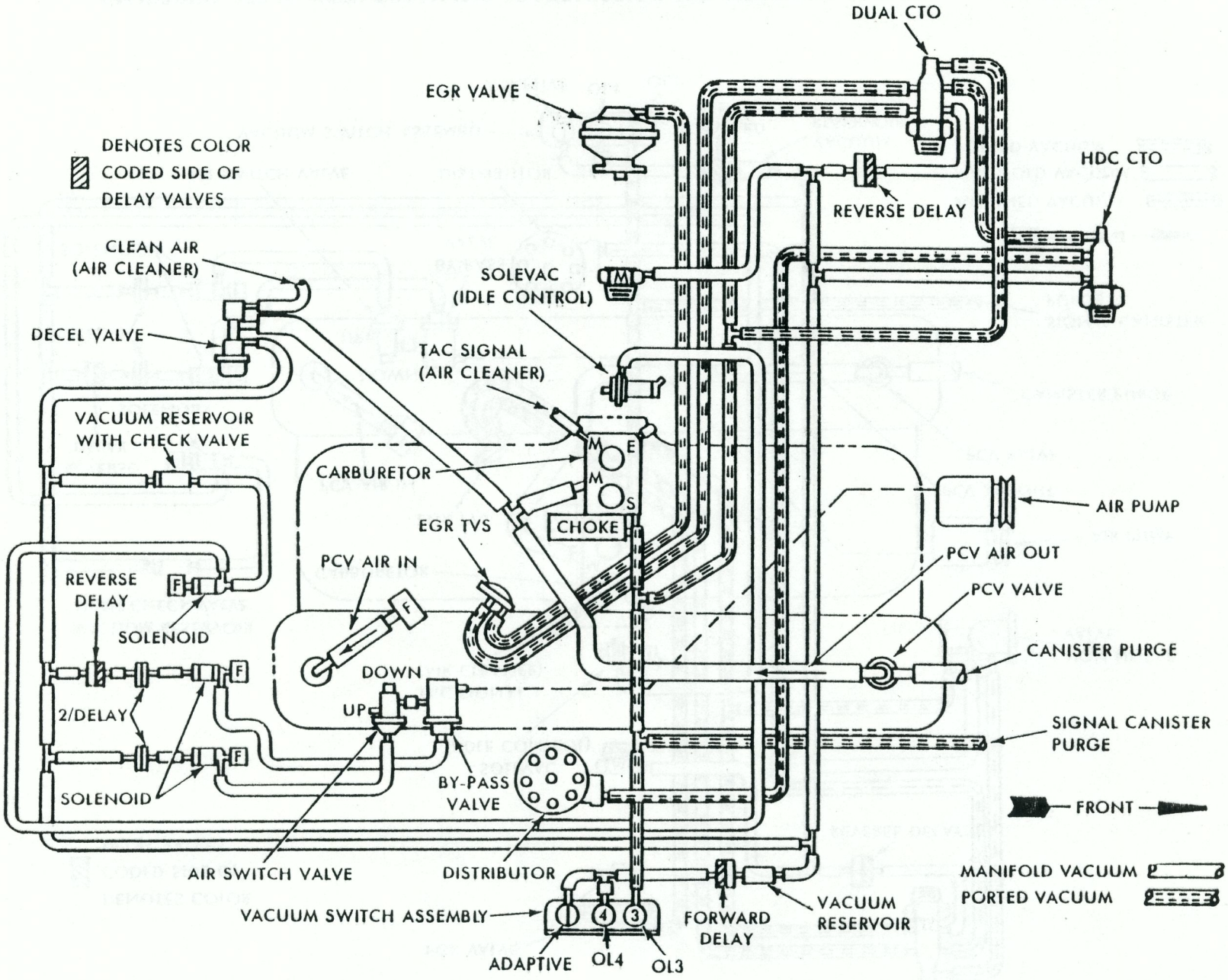

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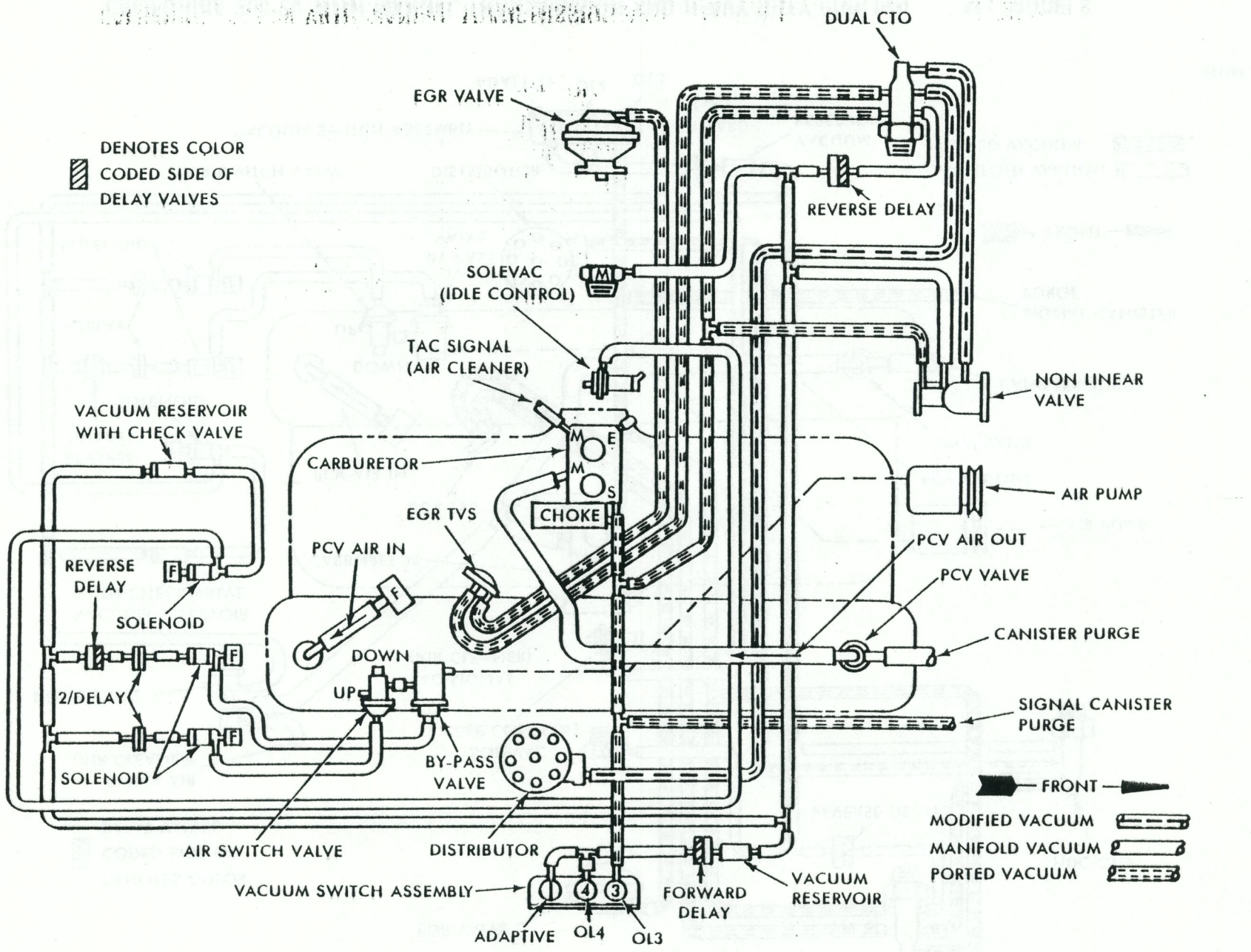
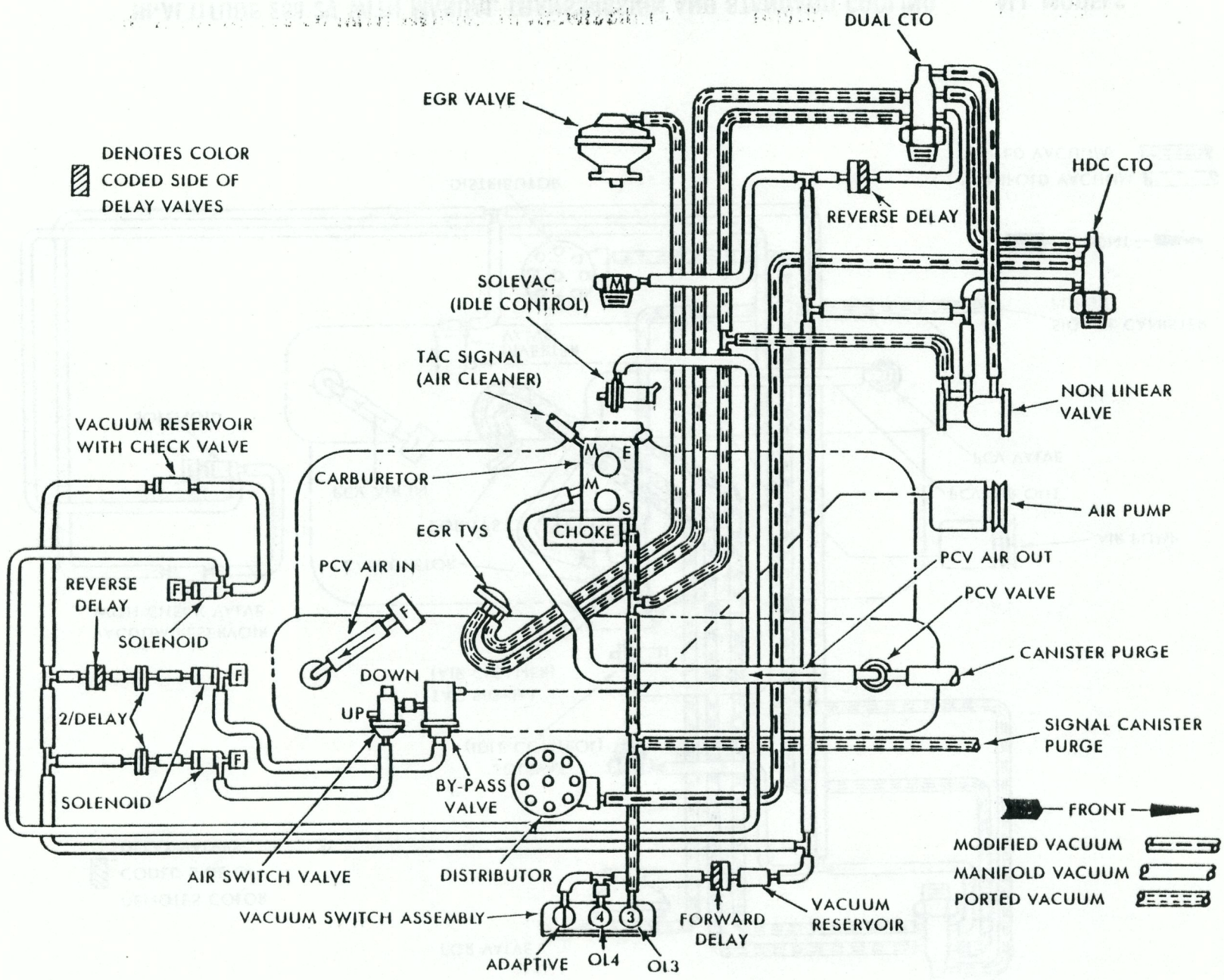
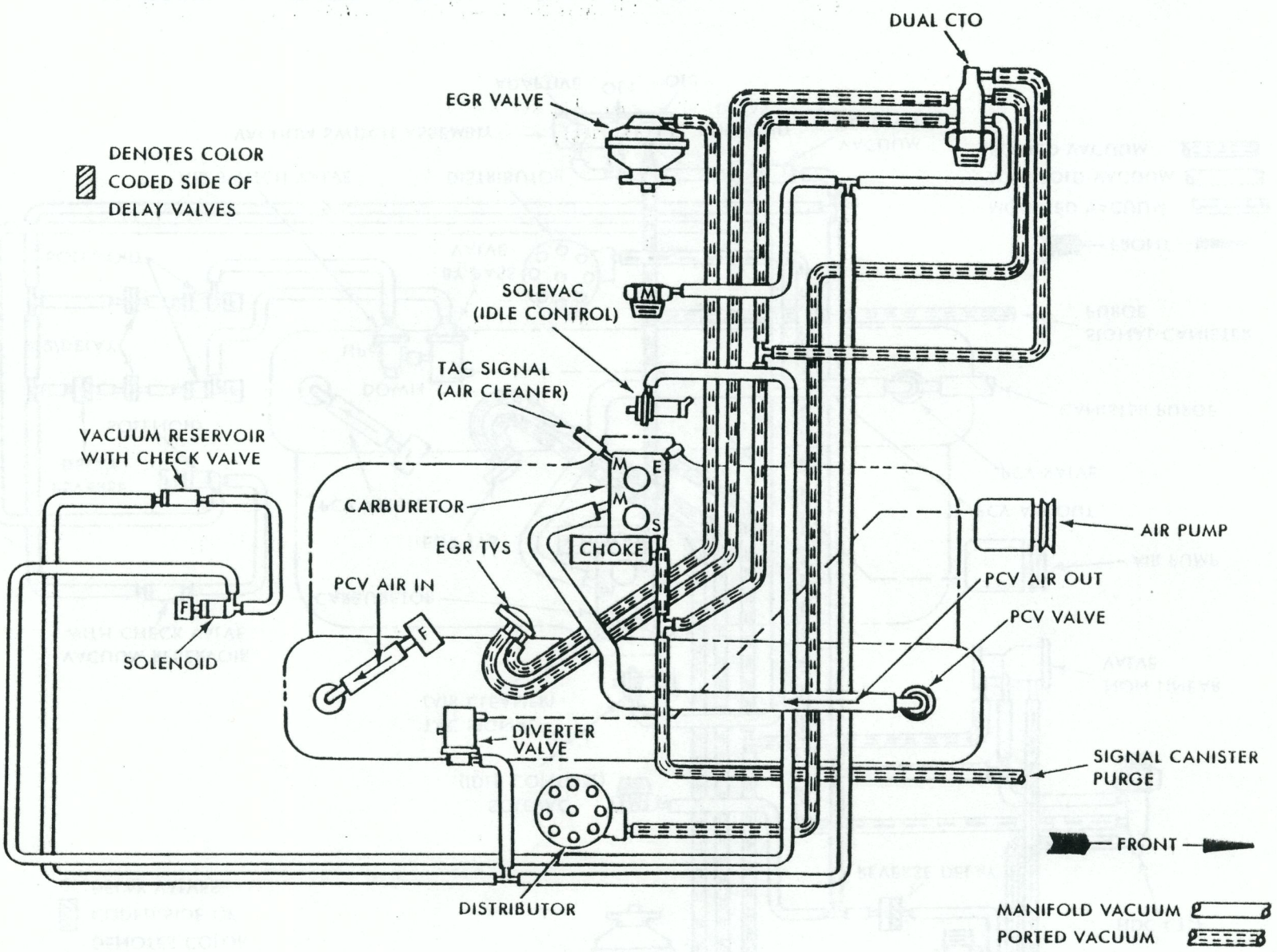


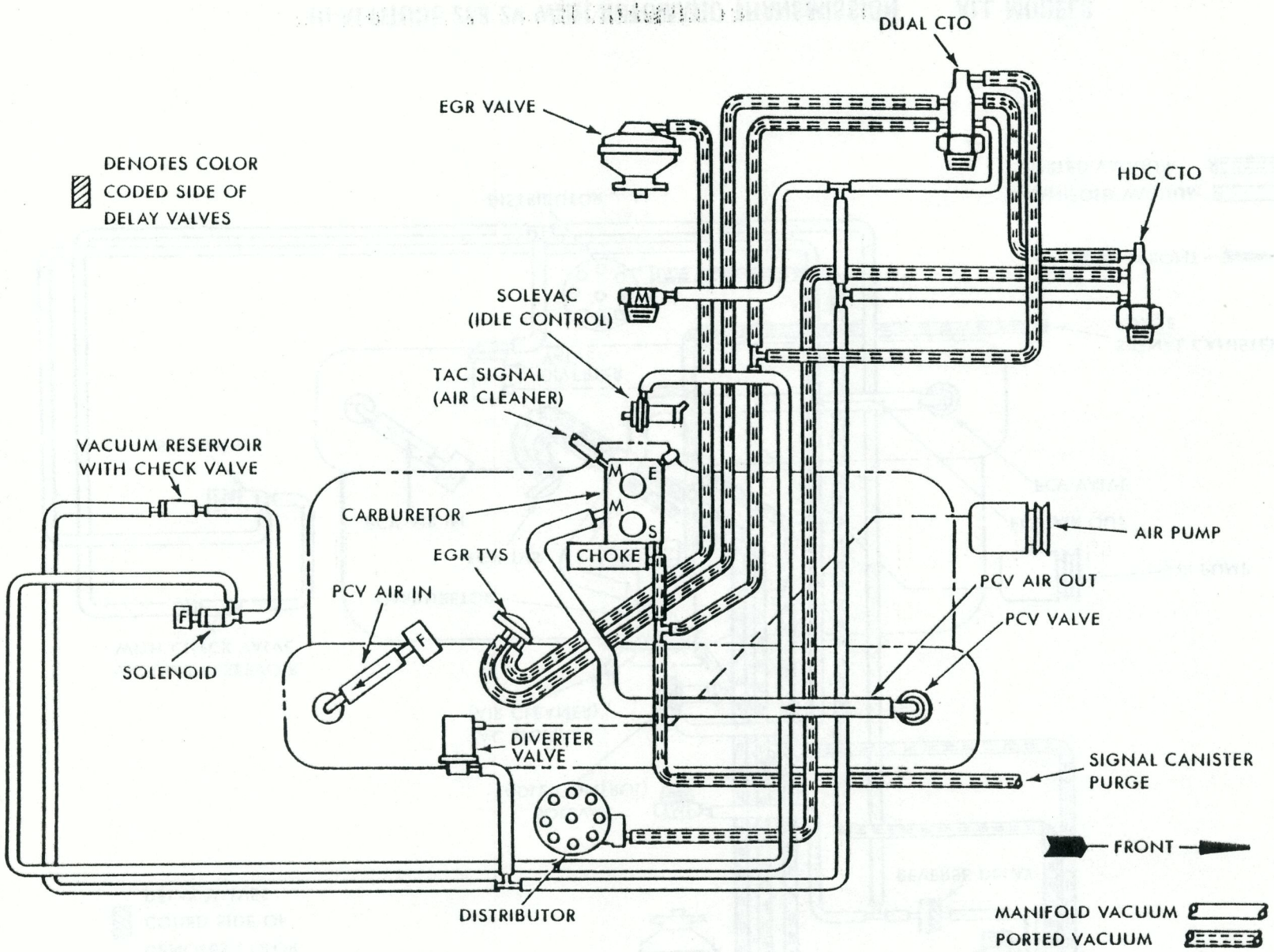
CALIFORNIA 258 2V WITH AUTOMATIC TRANSMISSION AND STANDARD COOLING ALL MODELS



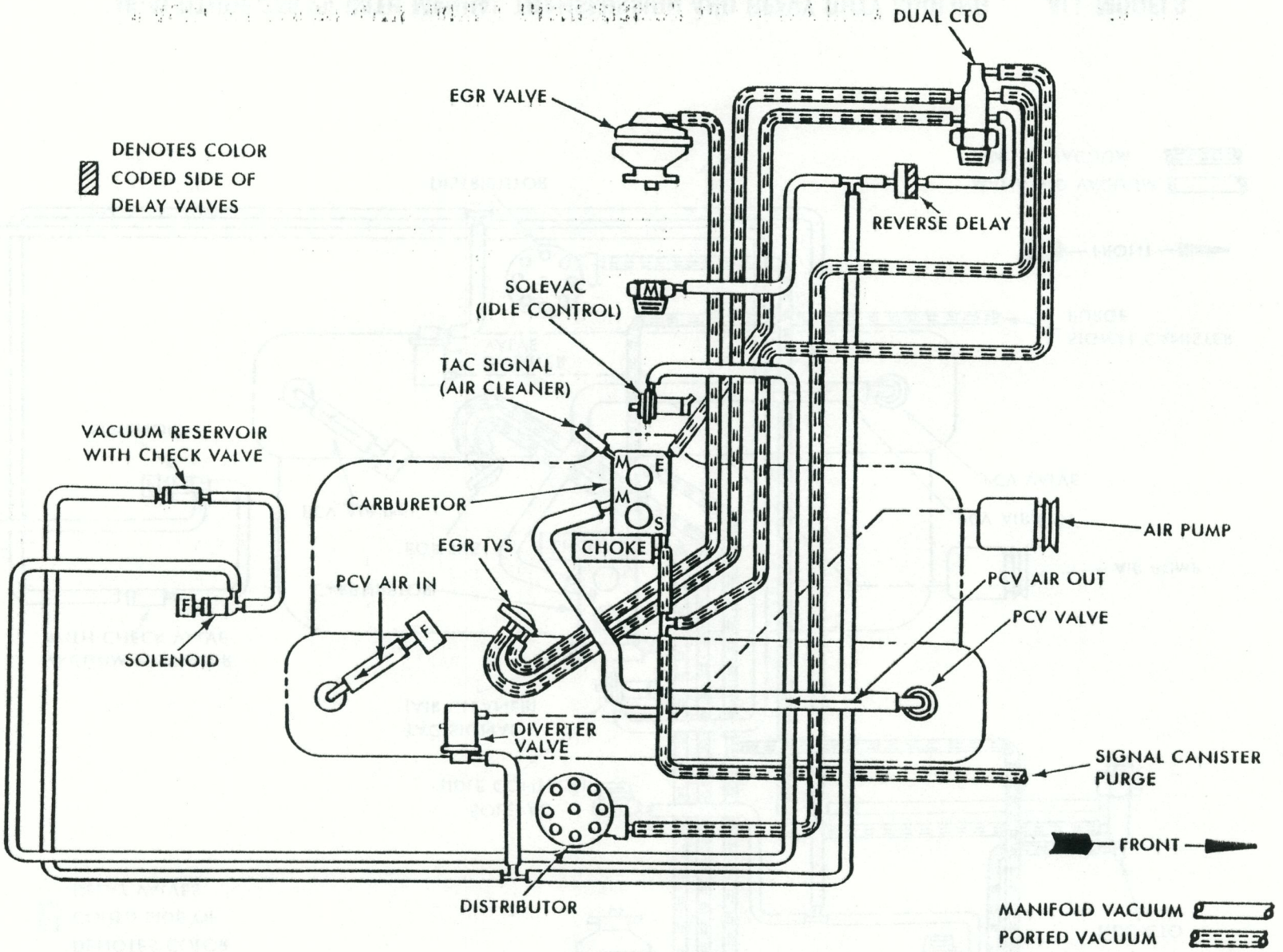
CALIFORNIA 258 2V WITH AUTOMATIC TRANSMISSION AND HEAVY DUTY COOLING ALL MODELS



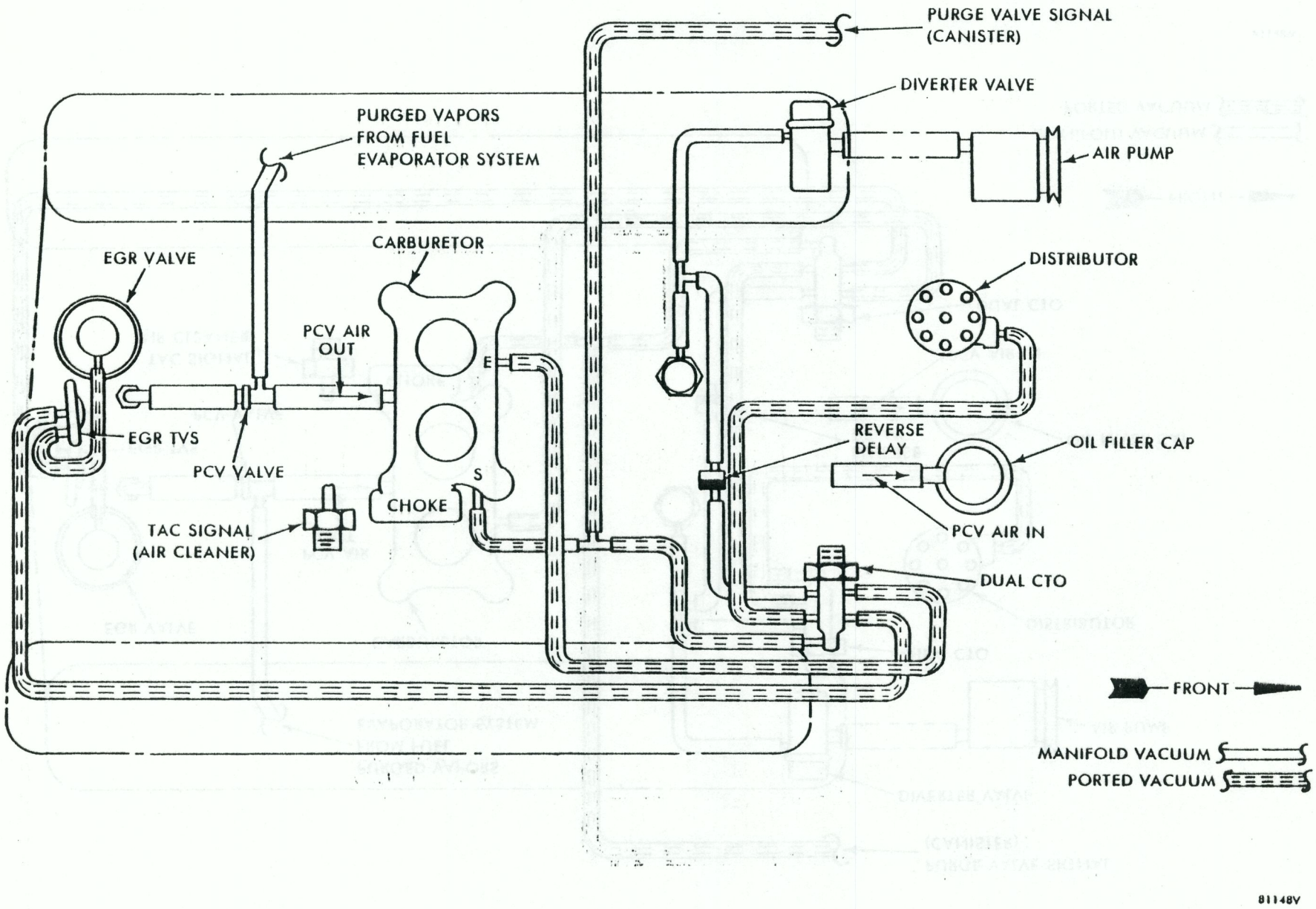
HI-ALTITUDE 258 2V WITH MANUAL TRANSMISSION AND STANDARD COOLING **ALL MODELS**



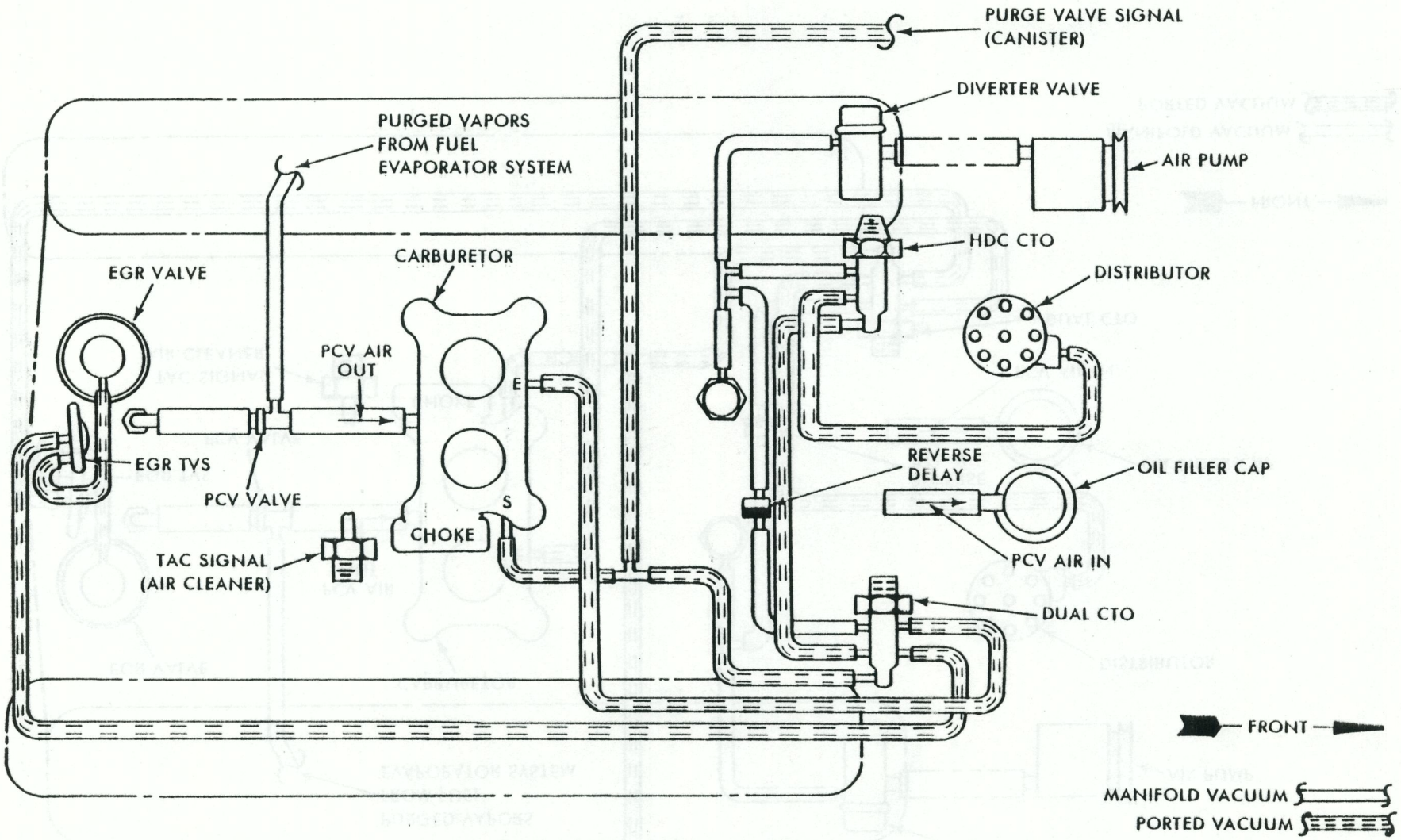
HI-ALTITUDE 258 2V WITH MANUAL TRANSMISSION AND HEAVY DUTY COOLING ALL MODELS



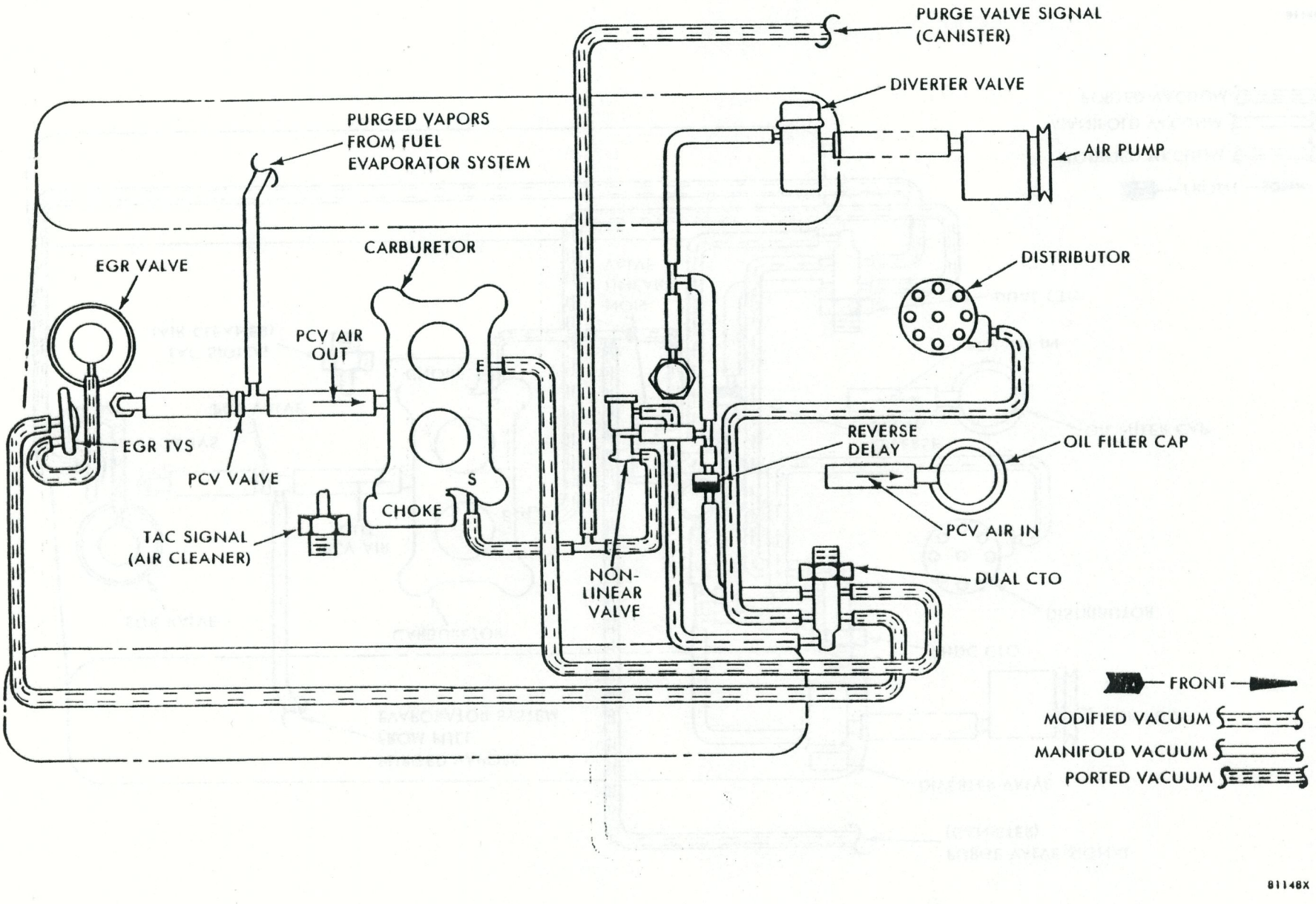
HI-ALTITUDE 258 2V WITH AUTOMATIC TRANSMISSION ALL MODELS



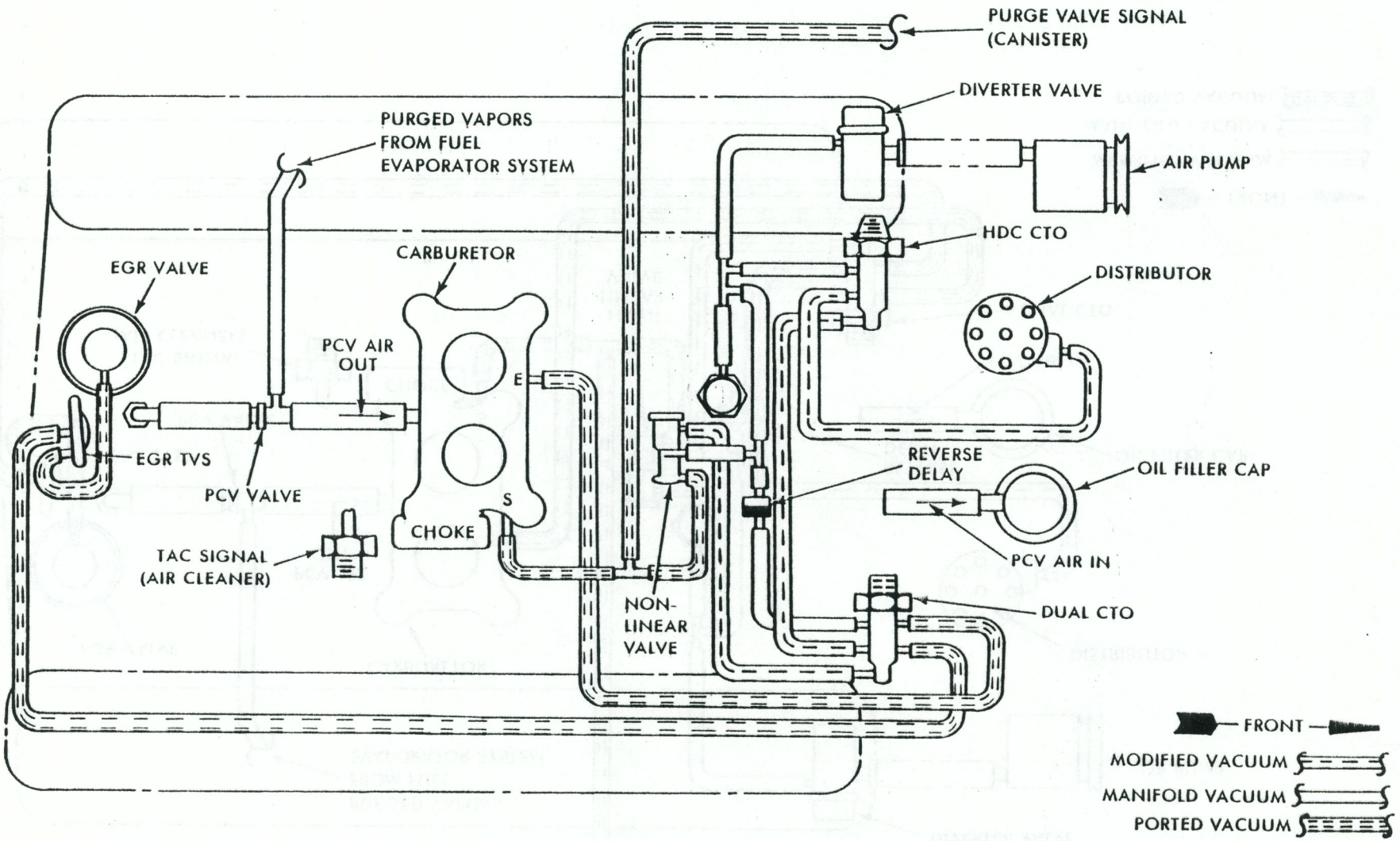
49 STATE 304 2V WITH MANUAL TRANSMISSION AND STANDARD COOLING CJ



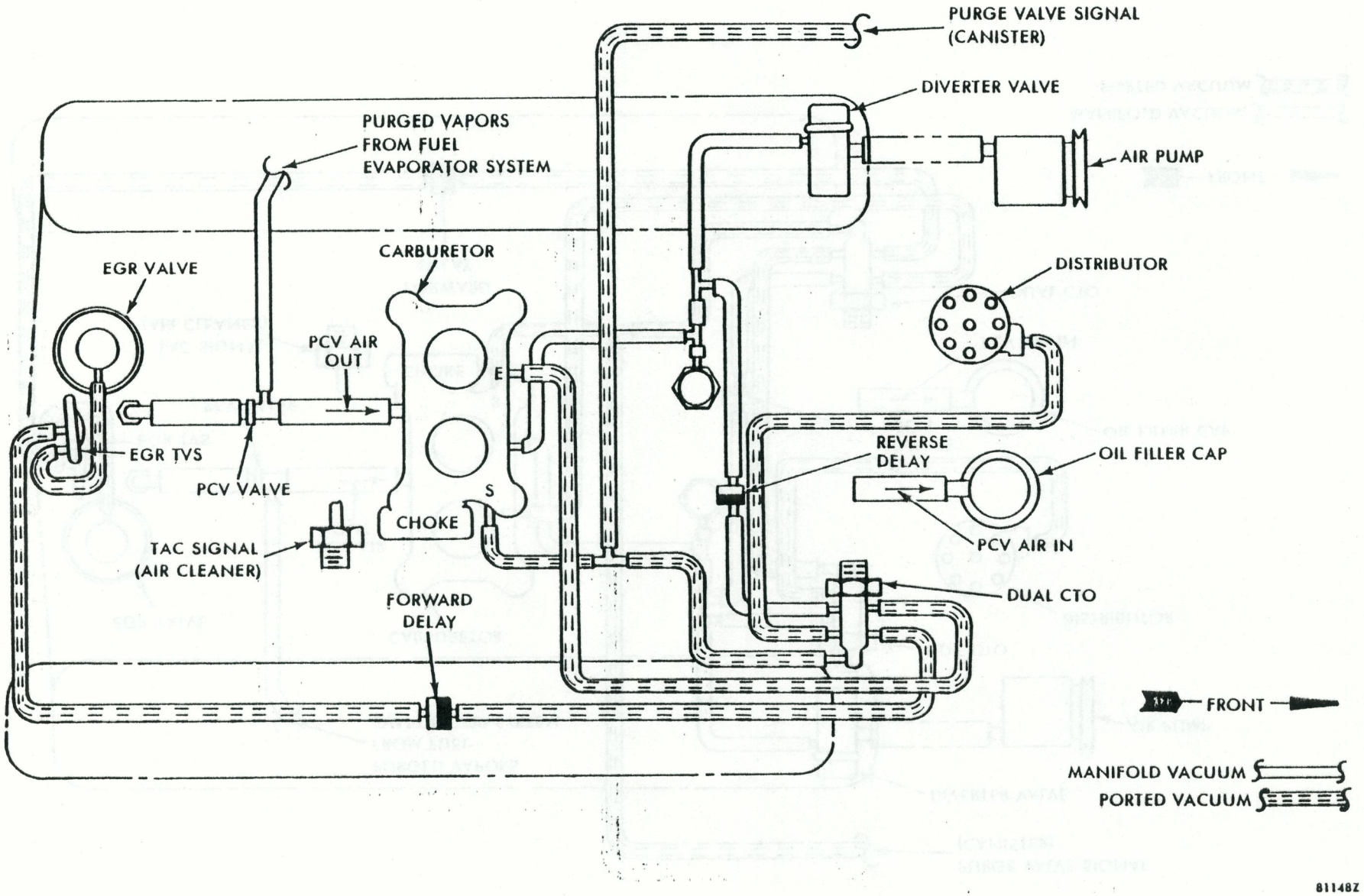
49 STATE 304 2V WITH MANUAL TRANSMISSION AND HEAVY DUTY COOLING CJ



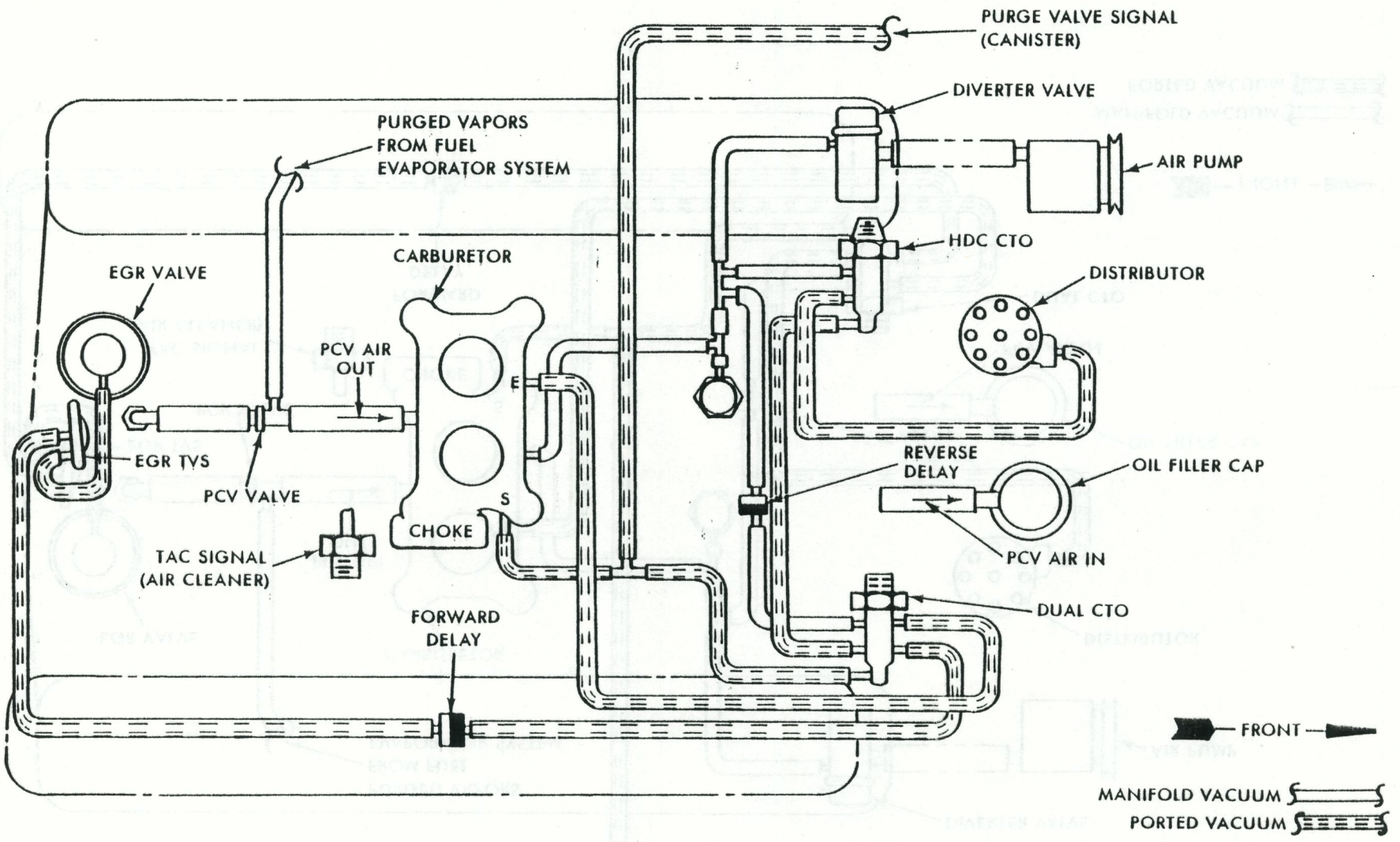
49 STATE 304 2V WITH AUTOMATIC TRANSMISSION AND STANDARD COOLING CJ



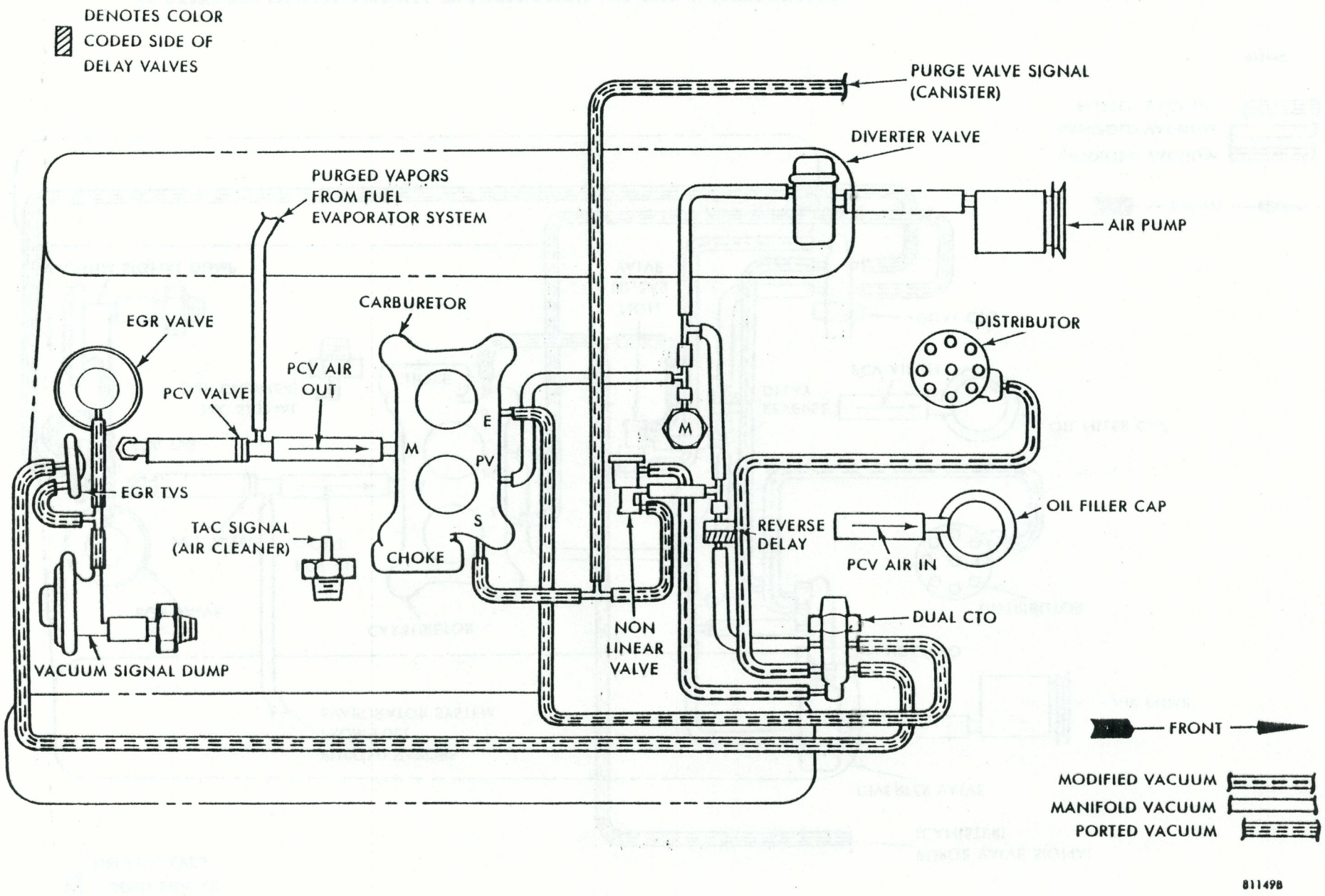
49 STATE 304 2V WITH AUTOMATIC TRANSMISSION AND HEAVY DUTY COOLING CJ



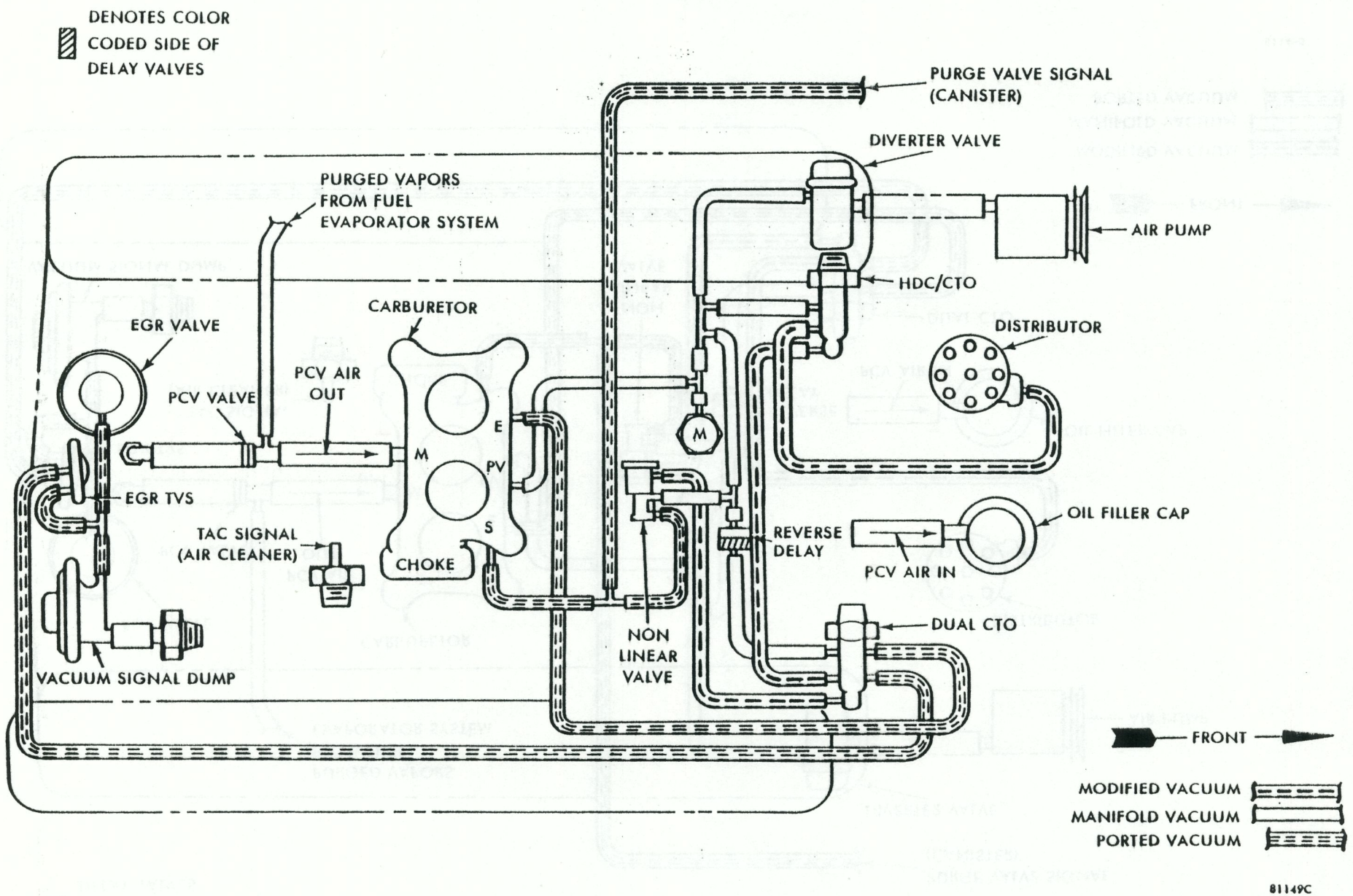
HI-ALTITUDE 304 2V WITH MANUAL TRANSMISSION AND STANDARD COOLING CJ



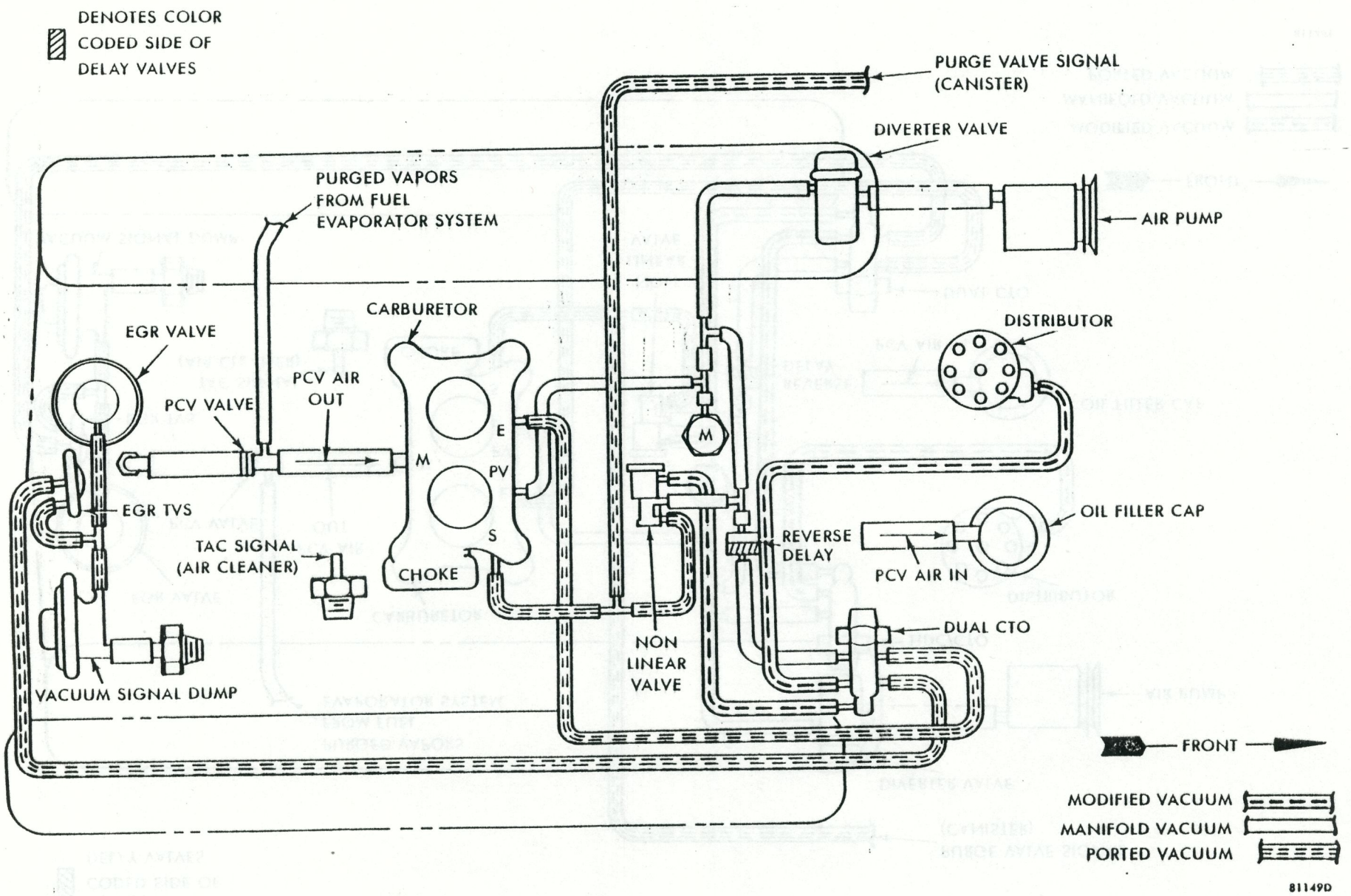
HI-ALTITUDE 304 2V WITH MANUAL TRANSMISSION AND HEAVY DUTY COOLING CJ



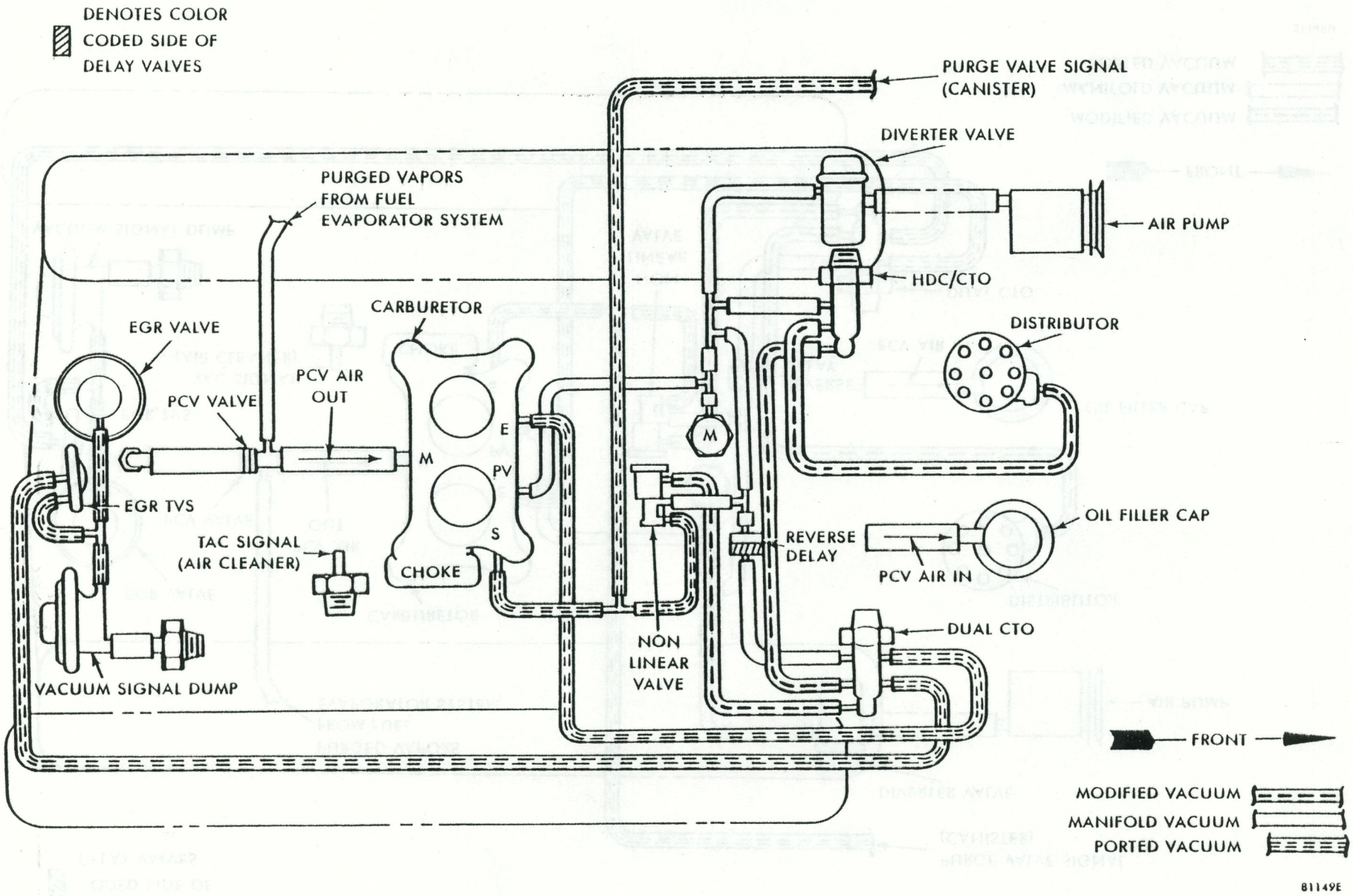
49 STATE 360 2V WITH MANUAL TRANSMISSION AND STANDARD COOLING · CHEROKEE, WAGONEER, TRUCK



49 STATE 360 2V WITH MANUAL TRANSMISSION AND HEAVY DUTY COOLING **CHEROKEE, WAGONEER, TRUCK**



49 STATE 360 2V WITH AUTOMATIC TRANSMISSION AND STANDARD COOLING , CHEROKEE, WAGONEER, TRUCK



49 STATE 360 2V WITH AUTOMATIC TRANSMISSION AND HEAVY DUTY COOLING CHEROKEE, WAGONEER, TRUCK