

GAUGES

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DESCRIPTION AND OPERATION

INSTRUMENT CLUSTER ASSEMBLY

The instrument cluster assembly contains the, washer and wiper switch, headlamp switch, accessory switches, clock, speedometer, gauges, indicator lights, radio, heater and air-conditioning controls. All controls are within easy reach of the driver, the gauges and instruments are in full view of the driver and every unit is relatively easy to service.

The "A" series cluster assembly displays separate speedometer and gauges assemblies while the "B-C-E" series cluster has a combined speedometer and gauges assembly.

ELECTRIC CLOCK

The electric clock is mounted in the right of the instrument cluster housing. The clock wiring circuit is protected by a fuse on the fuse block. Clock lighting is controlled by the rheostat in the lighting switch and is protected by the instrument lamps fuse on the fuse block.

Clock Time Reset and Automatic Regulation

The electric clock has a sweep-second hand and an automatic regulator. A reset knob extends through the glass of the clock dial. To reset the time, pull the knob out and turn in either direction as required.

There is no regulator because regulation is accomplished automatically by the action of resetting the time. If a clock is running fast, the action of turning the hands back to correct the time will automatically cause the clock to run slightly slower; if a clock is running slow, the action of turning the hands forward to correct the time will automatically cause the clock to run slightly faster (10 to 45 seconds per day). If clock varies over 10 minutes a day, the clock will never adjust sufficiently and must be disassembled for repair.

A lock-out feature prevents the regulator mechanism from being moved more than once during a rewind period (approximately 2 minutes), regardless of the number of times the clock reset is operated. After clock rewinds, if it is again reset, automatic regulation will take place.

Clock Service

The clock manufacturers have established Authorized Service Stations in many cities throughout the United States and Canada. These service stations are prepared to carry out terms of the manufacturer's warranty and also to perform any repairs made necessary through use of clock.

When a clock requires warranty service or repairs other than regulation, it should be removed by the Buick dealer and sent to the nearest authorized service station. The manufacturer's warranty is void if repairs have been attempted outside of an authorized service station.

FUEL GAUGE SYSTEM

The gasoline gauge system consists of a dash unit (located in the instrument cluster), a tank unit (located in the gasoline tank), a wire between these two units, and a wire to supply battery voltage to the dash unit. The single tank unit terminal is connected to one dash unit terminal with a tan wire. The other dash unit terminal is connected to the ignition switch, through the "GAGES" fuse, with a pink wire, so that voltage to energize the system is supplied only when the ignition switch is turned on. The dash unit has a balanced-type pointer; when the ignition is turned off, the pointer may come to rest any place on the dial.

The dash unit pointer is moved by changing the balance between the magnetic pull of three coils in the unit. This balance is controlled by action of the tank unit which contains a variable rheostat, the value of which varies with movement of a float. The tank unit is mounted in the tank so that the float rises and falls on the surface of the gasoline. The float is adjusted to provide approximately 1 to 3 gallons reserve when the dash unit pointer is at the "E" position.

When the ignition switch is "ON" and the float is in the full position (maximum resistance for the tan wire to ground), the current flow to ground is through the resistor, empty coil, the full coil and the bucking coil. Due to the fact that the bucking coil opposes the empty coil, the full coil has the stronger magnetic pull, and the dash unit pointer is pulled to the "F" position. When the float is in the empty position (practically no resistance for tan wire to ground), the current flow is through the resistor, the empty coil and the tan wire to ground at the tank unit. The dash unit pointer is thus pulled to the "E" position.

SPEEDOMETER

Speedometer Heads

The speedometer head has a magnetic speed indica-

tor and a gear driven odometer. It is driven by a flexible cable connected to a worm gear in the transmission rear bearing retainer.

The speed indicating portion of the speedometer operates on the magnetic principle. There is a permanent magnet in the speedometer head which rotates at the same speed as the cable. This magnet exerts a pull on a speed cup causing it to move through an arc in direct ratio to the revolving magnet speed. A pointer is attached to the speed cup spindle to indicate speed on the speedometer dial. A calibrated hair spring (part of speed cup) opposes the magnetic pull on the speed cup so the pointer indicates speed accurately; this spring also rotates the cup and pointer to zero when the car stops.

Speedometer Buzzer

The speedometer buzzer consists of a buzzer which may be adjusted by the driver to sound at any speed between 30 and 120 MPH by turning a knob at the left of the speedometer face. The speed at which the buzzer is set is indicated by a special pointer in the speedometer face.

The speed alert electrical circuit starts at the battery. It feeds through the fusible links to the starter solenoid, to the buzzer contacts. After passing through the buzzer contacts, a very small amount of current goes through a resistor to ground and the rest of the current passes through a pink wire to the connector located on the speedometer case.

In the speedometer, current is conducted from the separate buzzer connector through a wire to an insulated pin in the lower end of the buzzer pointer. As the speedometer pointer moves up to coincide with the buzzer pointer, a light grounding hair spring on the lower end of the speedometer pointer makes contact with the "hot" insulated pin on the speed alert pointer.

This grounds the circuit, causing the buzzer to buzz. If the car speed is increased beyond the buzzer setting, the insulated pin on the safety-buzzer pointer "picks-up" the hair spring as the speedometer pointer passes under the buzzer pointer and the light grounding hair spring winds up slightly.

OIL PRESSURE INDICATOR

The engine oil pressure indicator light is controlled by a pressure operated switch located in the main oil galley at the right front of the engine.

This light should come on when the ignition is turned "ON" and the engine is not running. If not lit, either the bulb is burned out, the wiring has an open or the oil switch is defective.

If the engine oil pressure drops below a safe level during operation, the circuit is completed through the pressure switch to ground, and the "OIL" indicator light in the cluster will be turned on.

If the "OIL" indicator stays on or comes on when the engine is running at speeds above idle, the following may be the cause rather than low oil pressure:

1. Wiring circuit between oil pressure switch and light grounded. Remove connector from pressure switch, if light stays on trouble is in wiring.

2. Switch defective. Replace switch.

COOLANT TEMPERATURE INDICATOR

A water temperature switch is located in the right front of the intake manifold on both the 350 and 455 cu. in. engines. This switch controls the "HOT" indicator light located in the instrument cluster.

If the engine cooling system is not functioning properly and the water temperature should reach 258 degrees F., the "HOT" indicator will be turned on by the water temperature switch. As a test circuit to check whether the "HOT" indicator bulb is functioning properly, a light wire which leads to the "GND" terminal of the ignition switch is connected into the temperature switch circuit. When the ignition is in "START" position (engine cranking), the "GND" terminal is grounded inside the switch and the "HOT" indicator bulb will be lit. When the engine is started and the ignition switch is returned to the "ON" position, the test circuit is opened and the indicator bulb is then controlled by the temperature switch.

The 455 cu. in. engines also use a metal temperature switch which is located in the rear of the left cylinder head. This switch controls a "STOP ENGINE" in-

dicator light in the instrument cluster. If the metal temperature of the left cylinder head should reach approximately 265 degrees F., the "STOP ENGINE" indicator will be turned on by the metal temperature switch. This indicator bulb has a separate test circuit to ground in the ignition switch when cranking.

CHARGING SYSTEM INDICATOR

The red "GEN" warning light should light when the ignition is turned "ON" and before the engine is started; if not lighted, either the bulb is burned out or the indicator light wiring has an open circuit. After the engine is started, the "GEN" light should be out at all times; if the light comes on, the generator belt may be loose or missing, the generator or regulator may be defective, or the charging circuit may be defective.

DIAGNOSIS

FUEL SYSTEM

If the gasoline gauge does not operate properly, the dash unit, tank unit wiring and the tank unit should be separately tested to determine which is at fault. The units and wiring may be tested by using Gas Gauge Tester J-22344. To use the tester, disconnect the tan wire from the gas gauge tank unit terminal and plug the tester into the end of the tan wire. Connect the other tester lead to a good ground. With the tester switched into the empty position, the gas gauge dash unit pointer should touch the empty line or rest slightly below; with the tester switched to the full position, the gas gauge dash unit pointer should touch the full line or rest slightly above it.

If the gas gauge system fails to pass these two tests, refer to the following diagnosis charts.

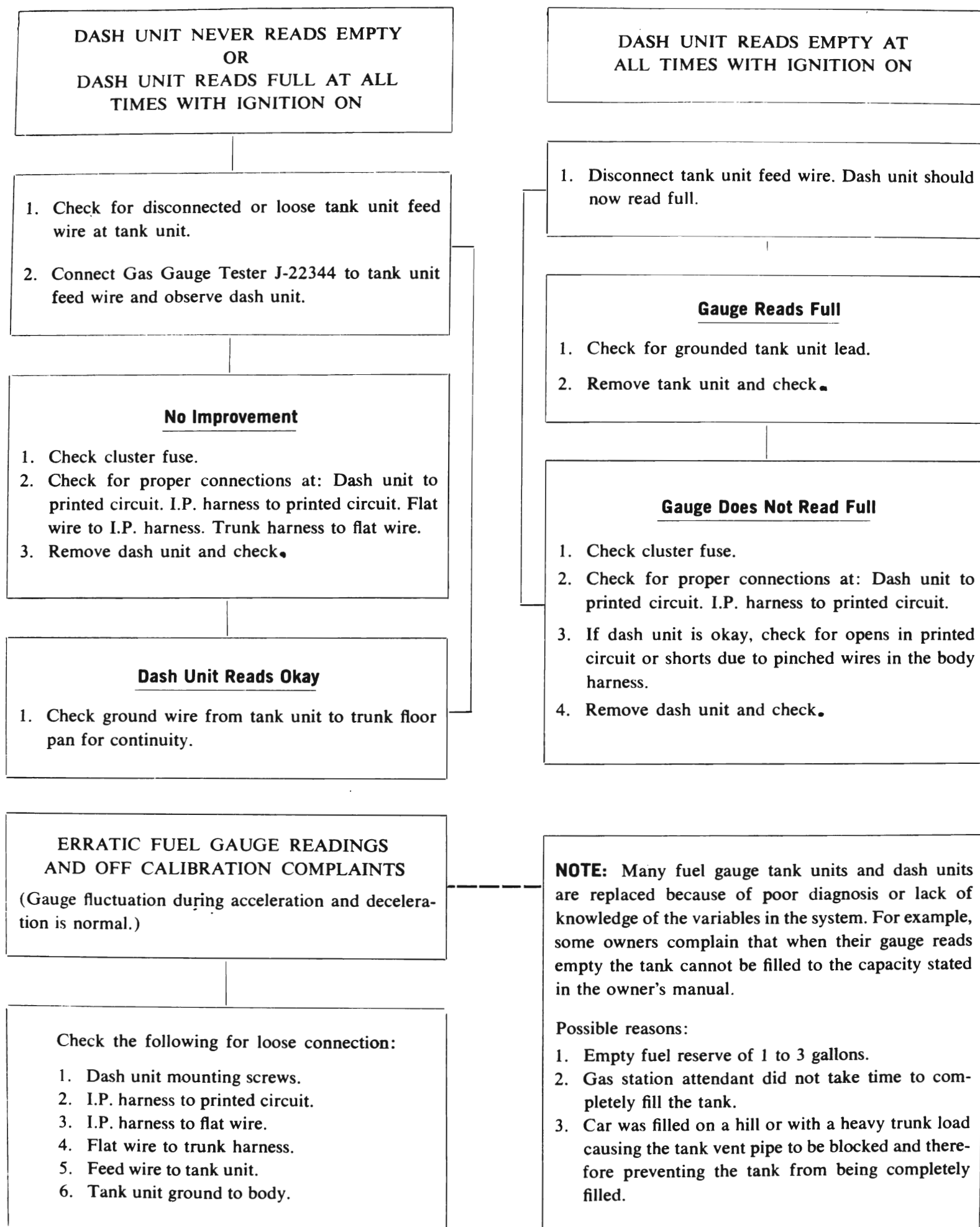


Figure 1H-1 Fuel Gauge System Diagnosis

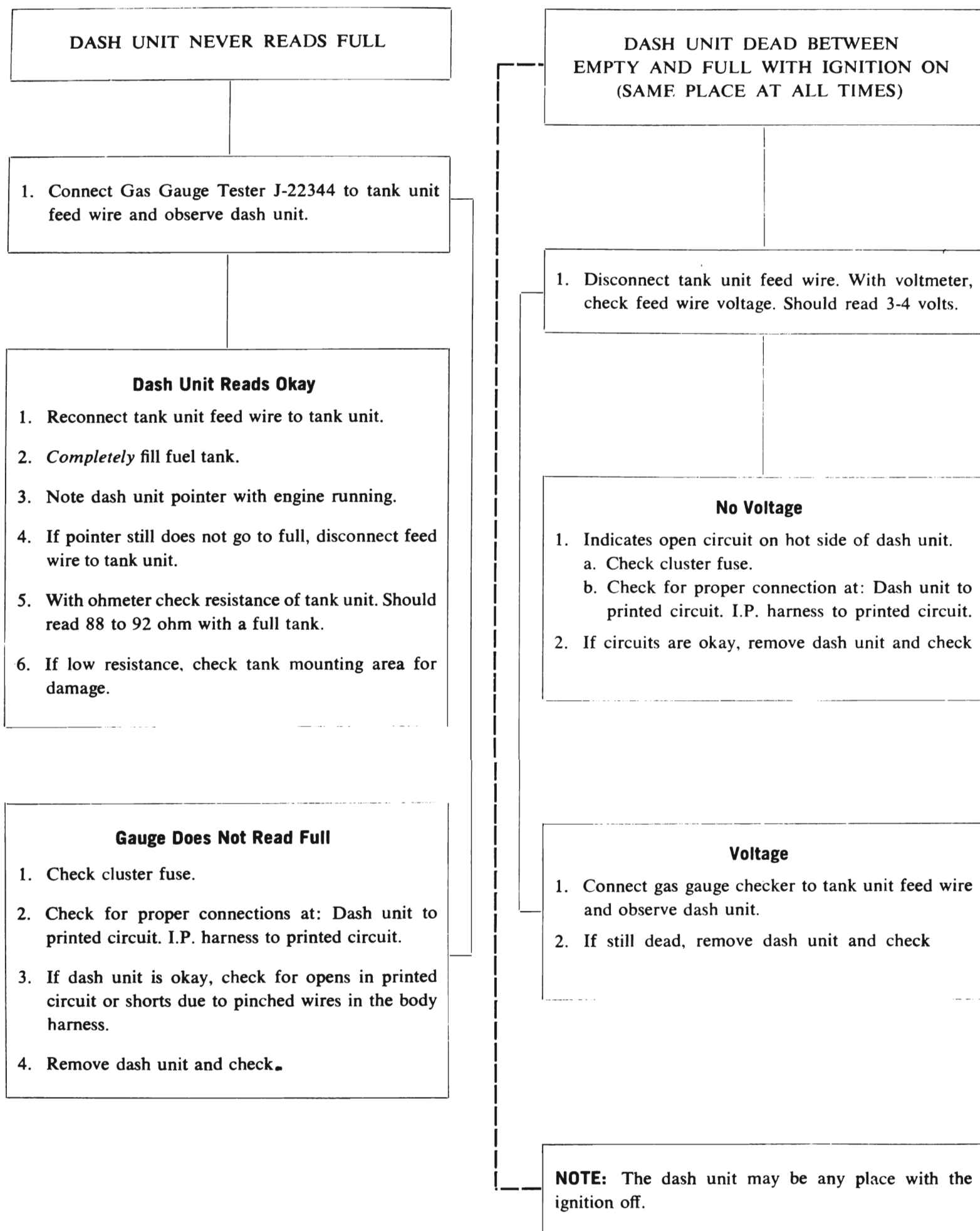


Figure 1H-2 Fuel Gauge System Diagnosis

SPEEDOMETER

Noisy Speedometer

1. Jack up rear wheels in a safe manner and close car windows to exclude outside noises.
2. With transmission in direct drive, run slowly from 0 to 50 MPH and back to 0, noting speed range where noise appears.
3. Apply brakes and shift transmission to park position, then run engine through same speed range as before.
4. If the noise continues even with the transmission output shaft stationary, something other than the speedometer is at fault.
5. If noise disappears with transmission stationary, check further for cause of noise by checking for proper installation of speedometer cable.
6. If cable installation is okay, next remove inner cable from casing.
7. If noise stops with inner cable removed, speedometer or cable is at fault. Inspect cable.

Inspection of Speedometer Cable and Housing

If the speedometer installation appears to be noisy or the speed indicator wavers, inspect the cable casing for damage, sharp bends, for being out-of position in the supporting clips.

If casing is in good condition and properly installed, remove inner cable for inspection. If casing is kinked, replace it.

1. Disconnect cable casing at speedometer head, then pull inner cable out of upper end of casing.
2. Inspect cable for worn spots or breaks. Check cable for kinks by holding one end vertically in each hand and turning cable slowly; if cable is kinked, the loop will "flop". Replace a cable which has kinks or bent tips.
3. Before installing a new inner cable, work AC spec. 640 speedometer cable lubricant into the cable thoroughly then wipe off all excess lubricant. Since the speedometer casing has a Delrin (plastic) liner, this lubricant is used as a rust preventive only.
4. If noise is still present, install a new speedometer cable assembly.
5. If this does not correct noise, have speedometer head checked by a UMS Service Station.

Trouble Shooting Speedometer and Ignition Key Buzzer

Since both circuits simply provide a separate ground for the same buzzer, trouble-shooting will involve both circuits. Check ignition key buzzer circuit by turning the ignition key to the accessory position and opening the driver's door. Check speedometer buzzer by setting speedometer pointer to a low speed, raising rear wheels of car, and running car in drive until the speedometer speed comes up to the set buzzer speed.

1. Buzzer Will Not Operate On Either Circuit.

(a) Check buzzer operation by sticking a prod in pink wire terminal at buzzer and running a jumper to ground. If buzzer now operates, circuit is okay through buzzer and trouble must be in wire to speedometer and door jamb switch. If buzzer still does not operate, replace buzzer.

2. Speedometer Buzzer Operates - Ignition Key Buzzer Does Not Operate.

(a) Remove driver's door jamb switch. Ground black wire with ignition key in accessory position. If buzzer now operates, replace door jamb switch.

(b) If buzzer still does not operate, remove column lock cylinder buzzer switch and place a jumper between the buzzer terminals. If buzzer now operates, replace column lock cylinder buzzer switch.

3. Ignition Key Buzzer Operates - Speedometer Buzzer Does Not Operate.

(a) Disconnect pink wire from speedometer and run jumper to ground. If buzzer now operates, circuit is okay as far as speedometer and trouble is in speedometer or in cluster ground circuit.

(b) If cluster ground wire is disconnected, there will be a poor ground for the speedometer buzzer, panel illumination lamps and wiper motor. To check for adequate cluster ground, turn on panel lights full bright, then turn on wiper motor and note panel light brightness. If panel lights do not dim, cluster has an adequate ground and trouble in (a) above must be due to a defect in speedometer. *A defective speedometer assembly must be sent to the nearest UMS Service Station for repairs.*

4. Buzzer Operates Continuously.

(a) Eliminate possibility of a continuous ground at door jamb switch by removing switch from door jamb. (b) Eliminate possibility of a continuous ground in speedometer by disconnecting pink wire from speedometer.

(c) If neither (a) or (b) stops buzzer, pink wire must be pinched or accidentally grounded between buzzer and one of these units.

OIL PRESSURE INDICATOR

Condition	Possible Cause	Correction
Light not lit, ignition on and engine not running.	1. Bulb burned out.	1. Replace bulb.
	2. Open in light circuit.	1. Locate and correct open.
	3. Defective oil pressure switch.	1. Replace oil pressure switch.
Light on, engine running above idle speed.	1. Grounded wiring between light and switch.	1. Locate and repair ground.
	2. Defective oil pressure switch.	1. Replace oil pressure switch.
	3. Low oil pressure.	1. Locate cause of low oil pressure and correct.

COOLANT TEMPERATURE INDICATOR

Condition	Possible Cause	Correction
"HOT" indicator; light not lit when cranking engine.	1. Bulb burned out.	1. Replace bulb.
	2. Open in light circuit.	1. Locate and correct open.
	3. Defective ignition switch.	1. Replace ignition switch.
Light on, engine running.	1. Wiring grounded between light and switch.	1. Locate and correct grounded wiring.
	2. Defective temperature switch.	1. Replace temperature switch.
	3. Defective ignition switch.	1. Replace ignition switch.
	4. Coolant temperature above 258 degrees F.	1. Locate and correct cause of high coolant temperature.
STOP ENGINE indicator out when cranking engine. (455 engine only)	1. Bulb burned out.	1. Replace bulb.
	2. Open in light circuit.	1. Locate and correct open.
	3. Defective coolant temperature switch	1. Replace water temperature switch.

CHARGING SYSTEM INDICATOR

Condition	Possible Cause	Correction
Light on, ignition off.	1. Shorted positive diode.	1. Locate and replace shorted diode.
Light not on, ignition on and engine not running.	1. Bulb burned out.	1. Replace bulb.
	2. Open in light circuit.	1. Locate and correct open.
	3. Shorted positive diode.	1. Locate and replace shorted diode.
Light on, engine running above idle speed.	1. No generator output.	1. Check and correct cause of no output.
	2. Shorted negative diode.	1. Locate and replace shorted diode.
	3. Loose or broken generator belt.	1. Tighten or replace and tighten generator belt.
	4. Resistance or open in field circuit.	1. Locate and repair open.
	5. Defective field light relay.	1. Replace relay.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF INSTRUMENT CLUSTER PARTS

Before starting any instrument panel repair, always disconnect the battery ground cable.

Clock Removal "A" Series

1. Carefully pry instrument cluster trim plate loose from instrument cluster housing.

2. Remove two screws, lift clock out of I.P. and disconnect wire connector. See Figure 1H-3.

Installation

1. Connect electrical connector to clock, position clock in I.P. and install two screws.

2. Position trim plate to I.P. housing and snap into place.

Clock Removal "B-C-E" Series

1. Remove radio knobs and escutcheons and speed alert and trip set knobs if so equipped.

2. Carefully pry out and remove right trim plate.

3. Remove two clock retaining screws, lift clock out of I.P. and disconnect wire connector. See Figure 1H-4.

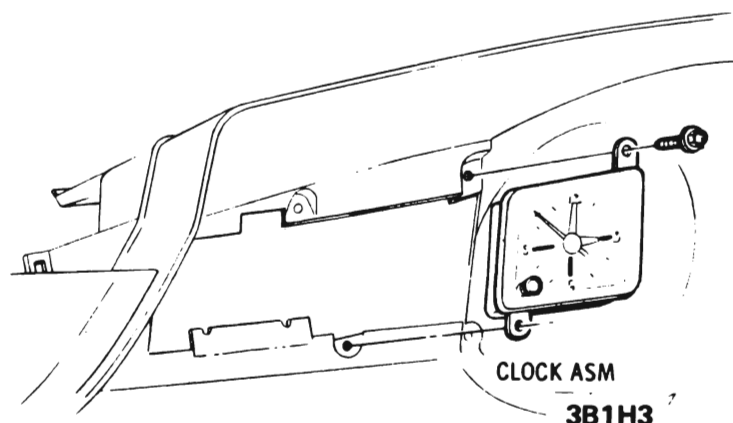


Figure 1H-3 Clock Removal

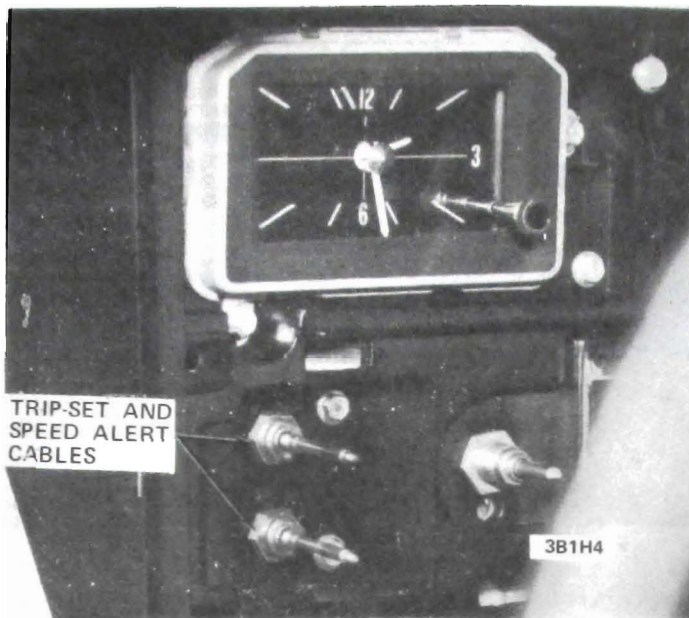


Figure 1H-4 Removing Clock

Installation

1. Attach wire connector to clock, position clock in I.P. and install two retaining screws.
2. Snap right trim plate in place.
3. Install speed alert and trip set knobs if so equipped, and radio escutcheons and knobs.

Speedometer Removal "A" Series

1. Position shift lever in "L" and disconnect shift indicator cable from steering column.
2. Carefully pry out and remove trim plate from I. P.
3. Remove three speedometer retaining screws, release speedometer cable, disengage wire connector and lift speedometer out of I.P. See Figure 1H-5.

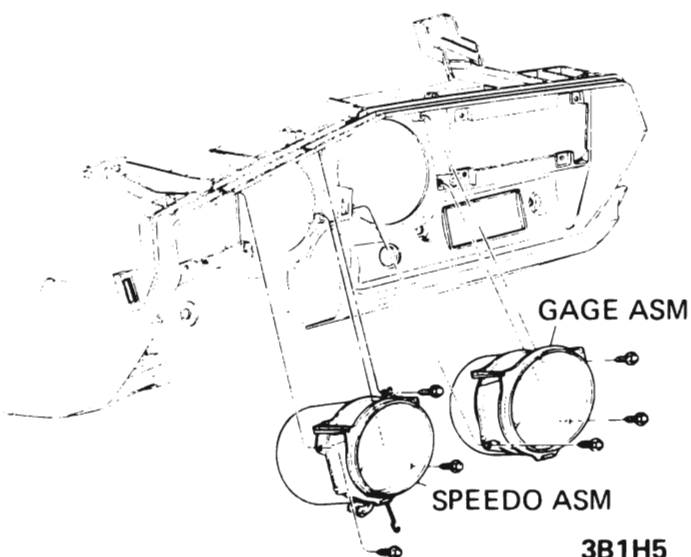


Figure 1H-5 Speedometer Removal

Installation

1. Attach speedometer cable and wire connector to speedometer.
2. Hold speedometer into I.P. and install three retaining screws.
3. Snap trim plate into place.
4. Connect shift quadrant cable to steering column with shift lever in "L" position.

Speedometer Removal B-C-E Series

1. Remove lower instrument filler panel.
2. With shift lever in "L" position, disconnect shift indicator cable from steering column.
3. Disconnect speedometer cable.
4. Remove two instrument bezel screws and rotate bezel out of I.P. See Figure 1H-6.

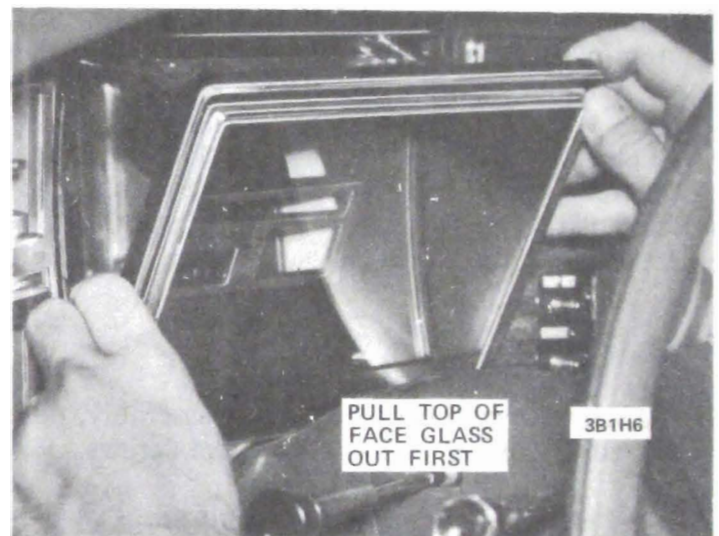


Figure 1H-6 Removing Instrument Bezel

5. Remove three speedometer assembly attaching screws and lift speedometer out of I.P. See Figure 1H-7.

Installation

1. Position speedometer in I.P. with shift indicator cable threaded through housing and install the three retaining screws.
2. With shift lever in "L" position connect shift indicator cable to steering column.
3. Connect speedometer cable.
4. Install instrument panel lower filler.

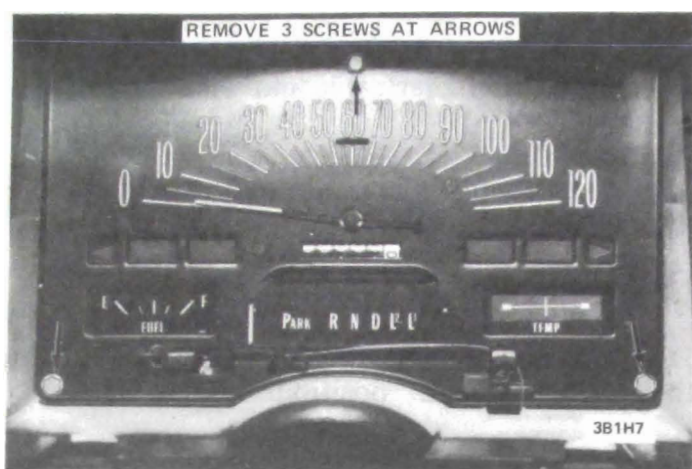


Figure 1H-7 Removing Speedometer

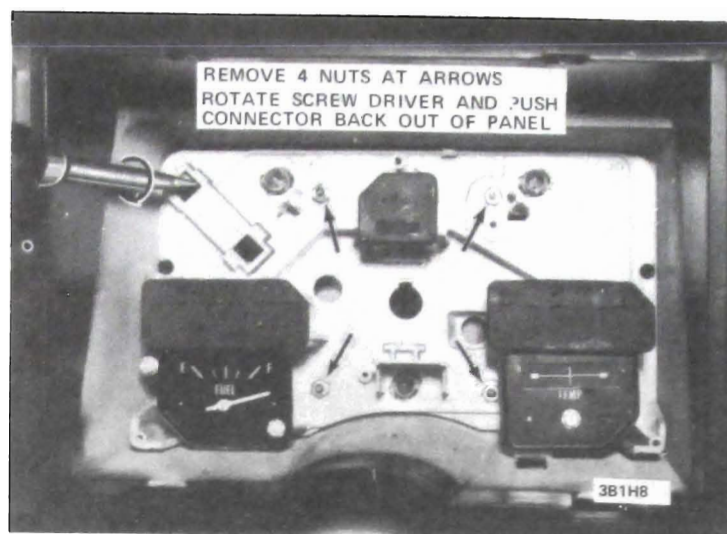


Figure 1H-8 Removing Fuel or Temperature Gauge

5. Position bezel in I.P. and install the two screws.

Fuel Gauge Removal "A" Series (Dash Unit)

1. Carefully pry out and remove instrument trim plate.
2. Remove three screws, disconnect wire connectors and remove gas gauge and housing assembly. See Figure 1H-5.

In the event that the gauge assembly has the gauges option (temperature gauge and oil pressure gauge), and one of the three is defective, all three must be replaced as they are only serviced as an assembly.

Installation

1. Attach wire connectors to gauge assembly, position assembly in I.P. and install three screws.
2. Snap trim plate to instrument housing.

Fuel or Temperature Gauge Removal B-C-E Series

1. Remove instrument panel lower filler.
2. With shift lever in "L" position, disconnect shift indicator cable from steering column.
3. Disconnect speedometer cable.
4. Remove two screws and speedometer bezel.
5. Remove three screws and fuel gauge and or remove one screw and temperature gauge. See Figure 1H-8.

Installation

1. Position fuel gauge and install two screws or position temperature gauge and install one screw.

2. Position speedometer in I.P. with shift indicator cable threaded through housing and install the three retaining screws.

3. With shift lever in "L" position connect shift indicator cable to steering column.

4. Connect speedometer cable.

5. Position bezel in I.P. and install two screws.

Printed Circuit Removal "A" Series

In addition to removing the speedometer or fuel gauge as previously described:

1. Remove three screws and five bulb sockets to remove speedometer cluster printed circuit or remove eight nuts, one or three resistors (as equipped), two screws and four bulb sockets to remove the tell-tail and fuel gauge cluster printed circuit.

Installation

1. Position printed circuit on speedometer cluster housing and install three screws and five bulb sockets.

2. Position printed circuit on tell-tail and fuel gauge cluster housing and install one or three resistors (as required), two screws (one with wire connector terminal), eight washers and nuts and four bulb sockets.

3. Install speedometer cluster assembly or tell-tail and fuel gauge cluster housing as previously described.

Printed Circuit Removal B-C-E Series

In addition to removing the fuel or temperature gauges as previously described:

1. Insert screw driver as shown in Figure 1H-8, rotate and push connector off printed circuit on back of panel.

2. Remove four nuts as shown in Figure 1H-8 and lift out panel and printed circuit assembly.

3. Remove eleven bulb sockets, three fuel gauge clips and printed circuit from panel. See Figure 1H-9.



Figure 1H-9 Removing Printed Circuit

Installation

1. Position printed circuit on panel and install three fuel gauge clips and eleven bulb sockets.

2. Position printed circuit and panel assembly in housing, attach wire connector and install the four retaining nuts as in Figure 1H-8.

3. Install speedometer etc., as previously described.

Washer and Wiper Switch Removal "A" Series

Because of the fact a windshield wiper-washer switch normally requires removal only when it is found defective, is the basis for the "A" Series procedure.

1. Using one or two narrow bladed screw drivers (1/8" to 3/16"), insert the blade into each of the two slots within the switch face immediately above the knobs and bend the retaining clips downward or break them off, then rotate top of switch outward to remove.

2. Disconnect wire connector from switch.

Installation

1. Attach new switch to wire connector, align assembly with hole in I.P. and press into place.

Washer and Wiper Switch Removal B-C-E Series

1. Remove headlight switch knob and escutcheon.

2. Carefully remove left trim plate.

3. Using a screw driver depress the retaining clips indicated in Figure 1H-10 as shown in Figures 1H-11 and 1H-12 and remove switch.

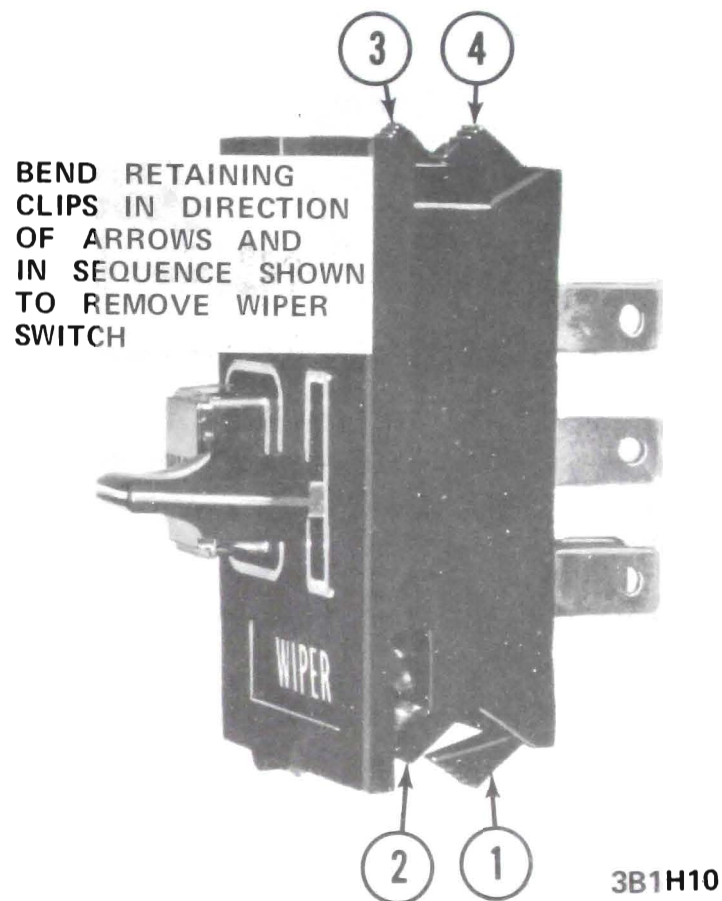


Figure 1H-10 Washer-Wiper Switch



Figure 1H-11 Releasing Top of Switch Assembly

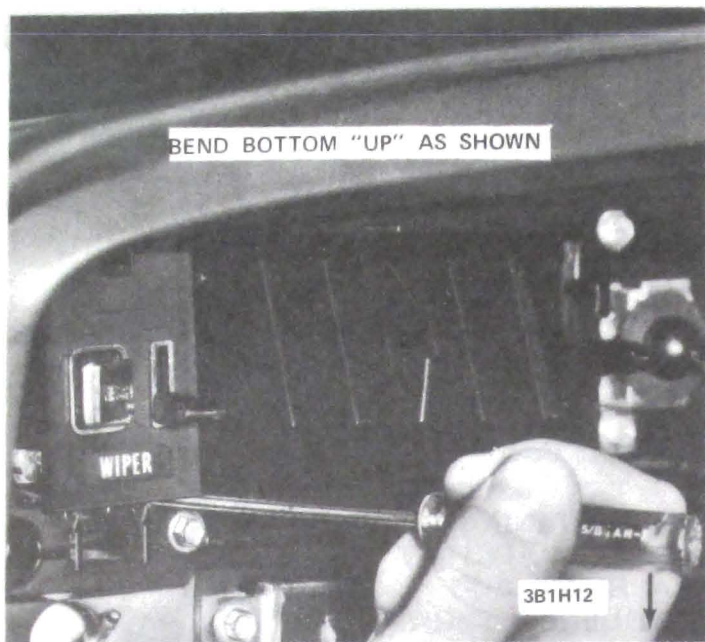


Figure 1H-12 Releasing Bottom of Switch Assembly

4. Disconnect seelite cable and wire connector.

Installation

1. Attach wire connector and seelite cable to switch.
2. Align switch to hole in I.P. and press into place.
3. Snap left trim palte into place.
4. Install headlamp escutcheon and knob assembly.

Accessory Switch Removal "A" Series

1. Carefully pry left end of switch outward to release spring clip.
2. Holding left end of switch assembly, rotate outward to clear I.P., then pull assembly to the left removing it from the I.P.
3. Disconnect the wire connector and seelite cable.

Installation

1. Attach seelite cable and wire connector to switch.
2. Insert right end of switch assembly into I.P. opening far enough to snap left end into place.

Accessory Switch Removal B-C-E Series

1. Remove headlamp switch knob and escutcheon.
2. Carefully pry loose and remove left trim plate.
3. Remove switch retaining screws, switch and disconnect wire connector.

Installation

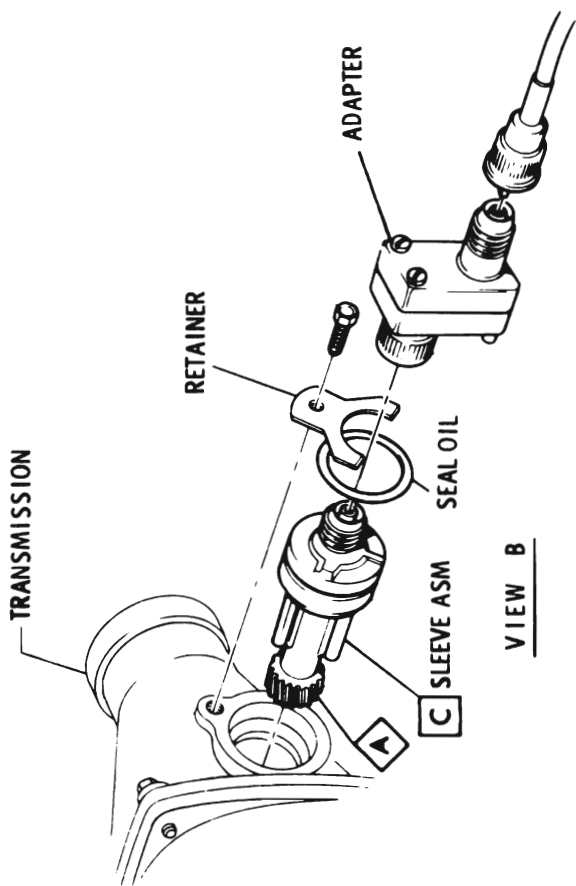
1. Attach wire connector to switch, locate switch in I.P. and install screws.
2. Snap left trim plate into place and install headlamp escutcheon and knob assembly.

Trip-Set and Speed-Alert Cable Removal B-C-E Series

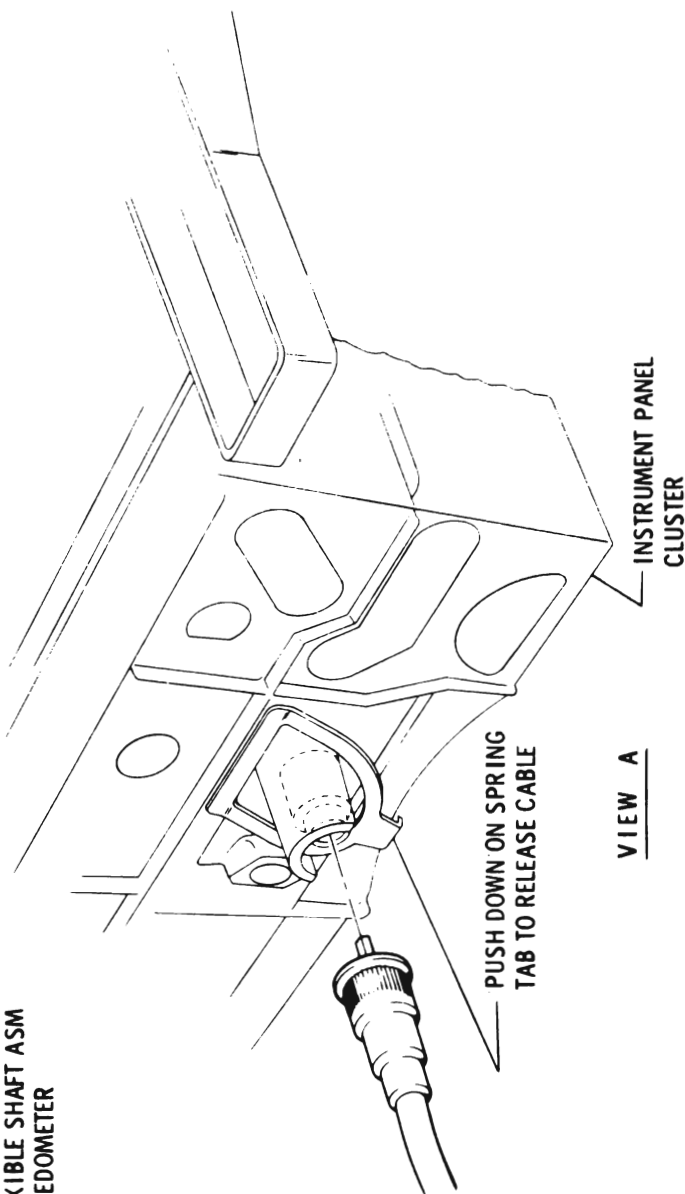
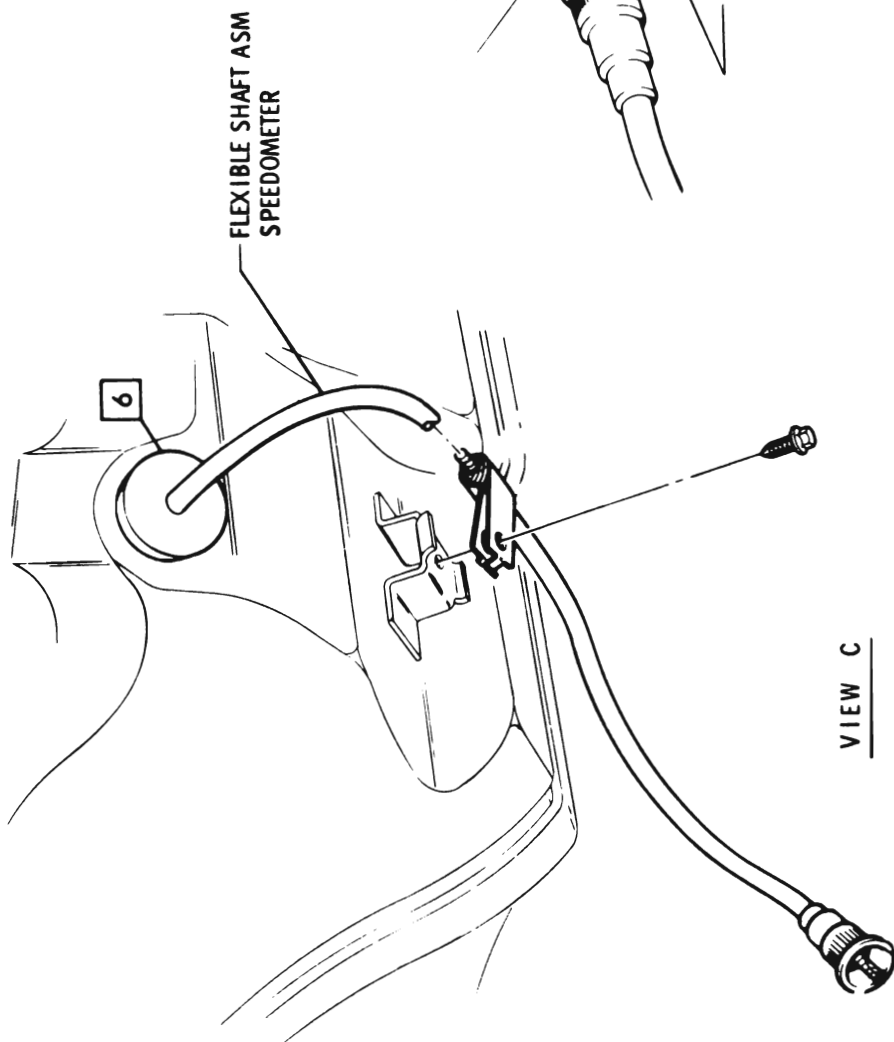
1. Remove radio knobs, escutcheon or fader control and trip-set knob.
2. Carefully pry out and remove right trim plate.
3. Remove cable retaining nut.
4. Remove instrument panel lower filler.
5. Place shift lever in "L" position and disconnect shift indicator cable.
6. Disconnect speedometer cable and remove speedometer from cluster.
7. Remove trip-set cable by bending retaining clips with needle nose pliers and removing from back of panel.

Installation

1. Snap cable into speedometer panel.
2. Position cable in right panel and install retaining nut.
3. Install right trim plate, radio escutcheon and knob assembly and trip-set knob.
4. Install speedometer into cluster and connect cable.
5. Connect shift indicator cable to steering column.
6. Install instrument panel lower filler.



BEFORE CONNECTING TO TRANS. TURN CABLE FROM LOWER END WITH THUMB & FINGERS. THERE MUST BE NO BIND IN THE SYSTEM. (BINDING CABLES MUST BE REPLACED).



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Figure 1H-13 Speedometer Cable Installation "A" Series

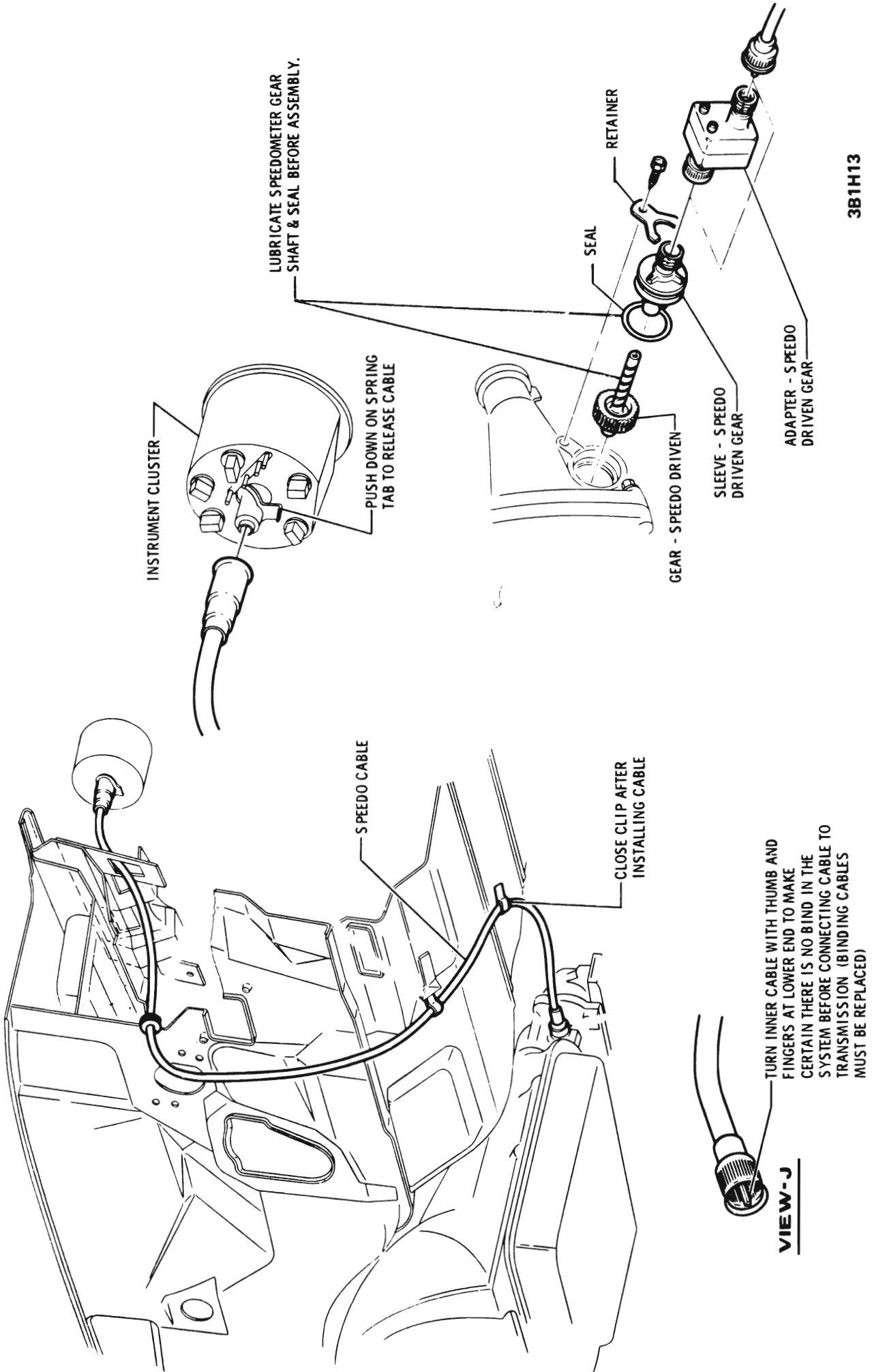


Figure 1H-14 Speedometer Cable Installation B-C-E Series

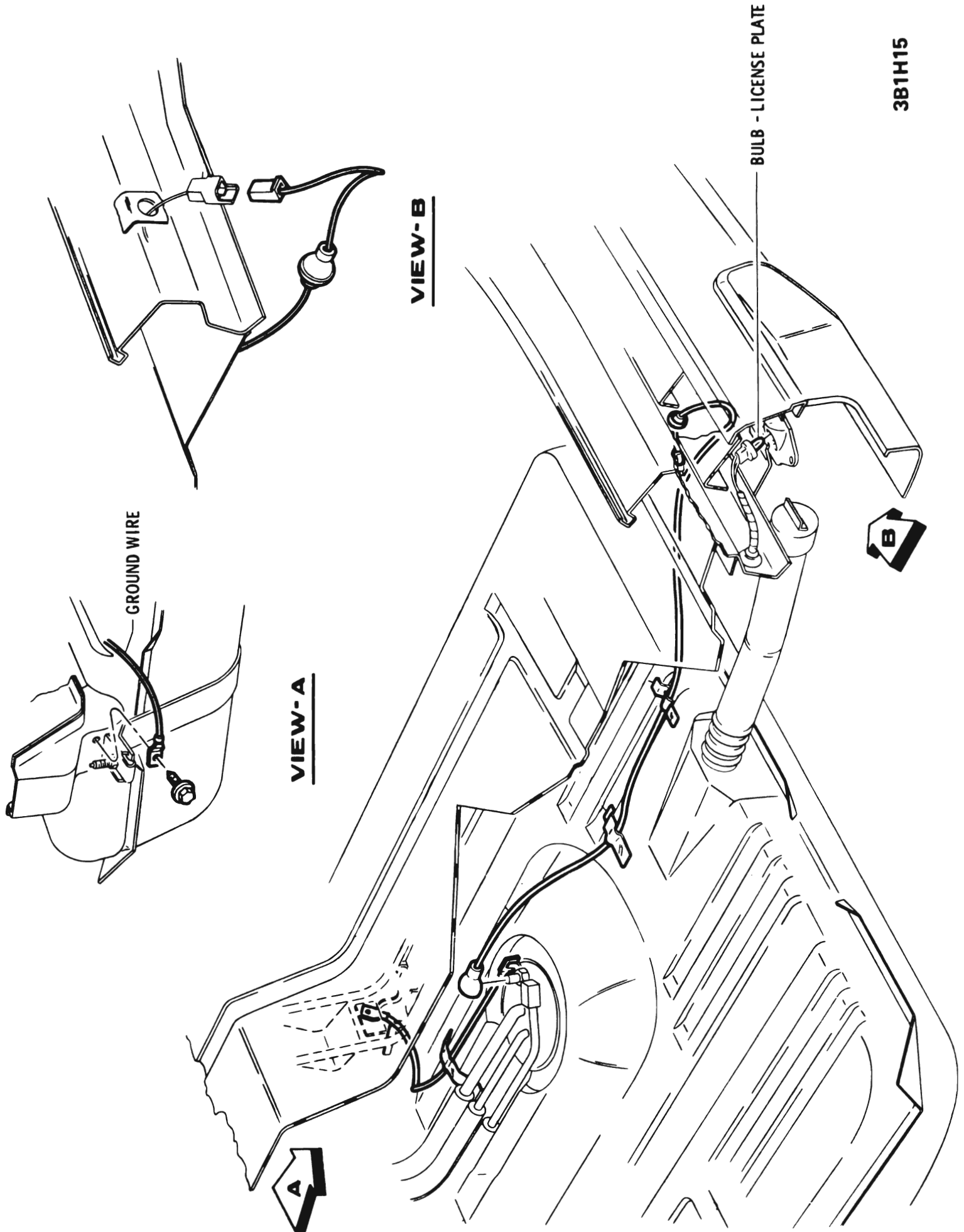
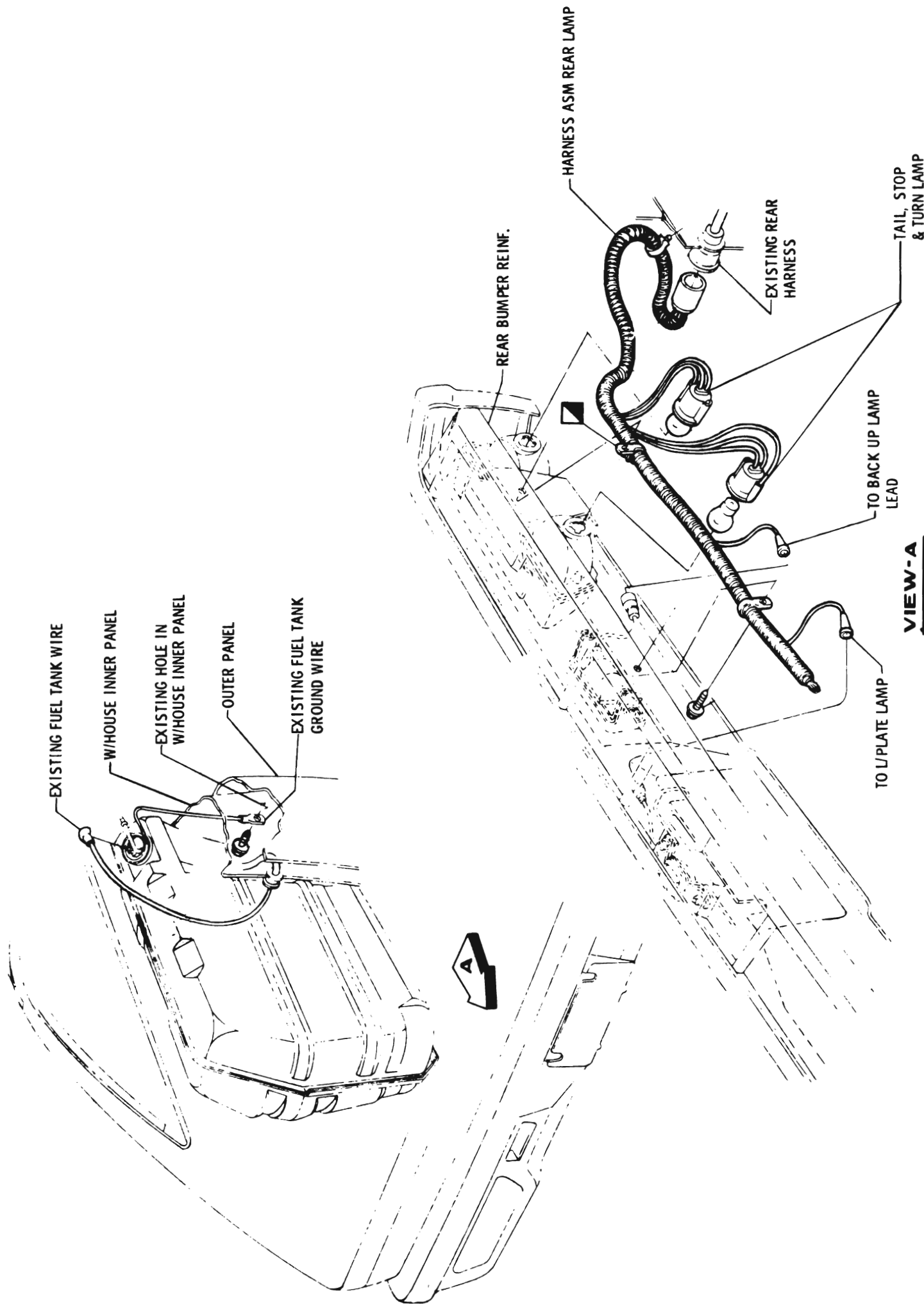
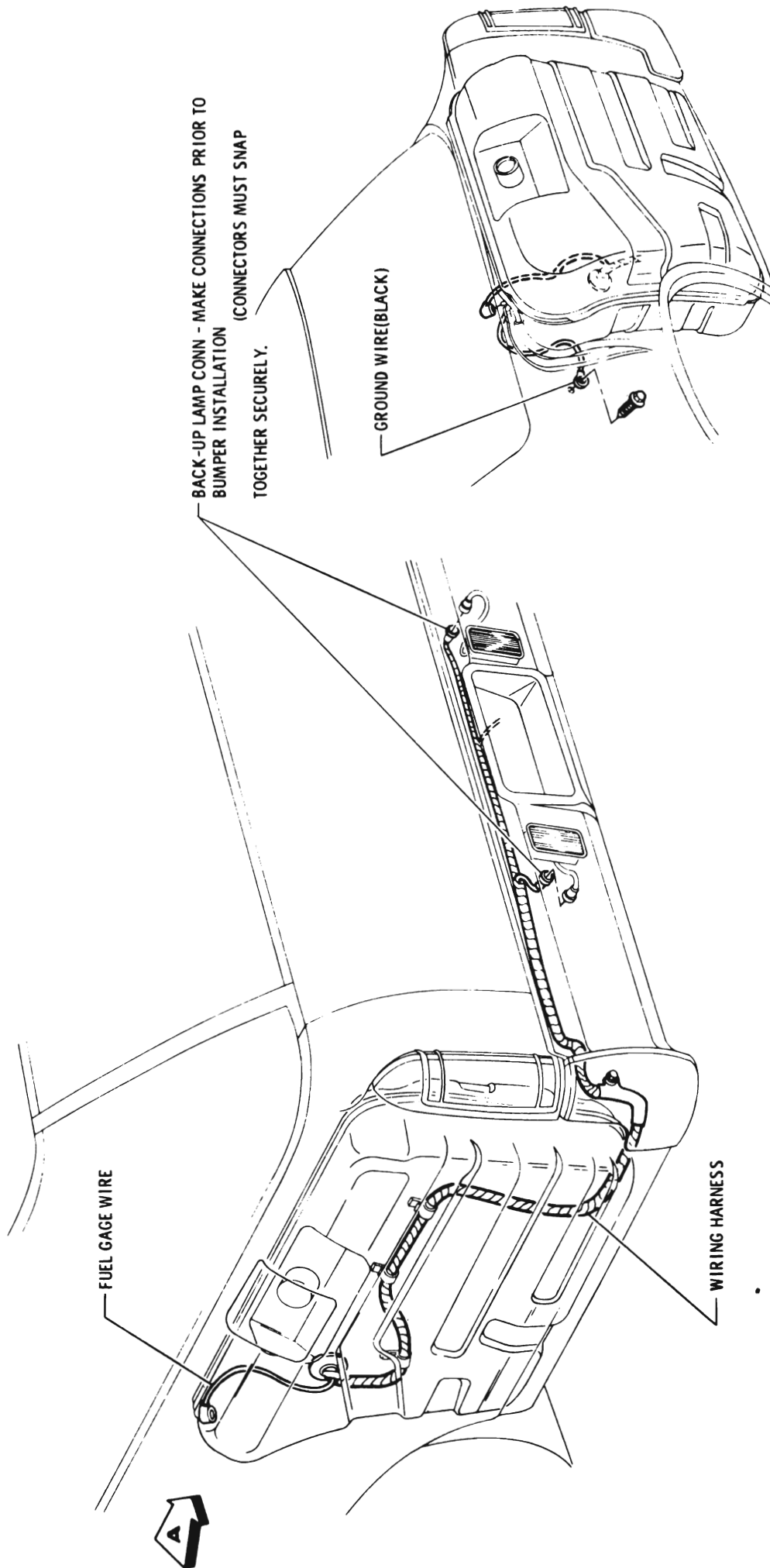


Figure 1H-15 Rear Lamp and Fuel Gauge Wiring "A" Series



3B1H16

Figure 1H-16 Rear Lamp and Fuel Gauge Wiring "A" Wagon



VIEW-A

3B1H17

Figure 1H-17 Backup Lights and Fuel Gauge Wiring "B" Wagon

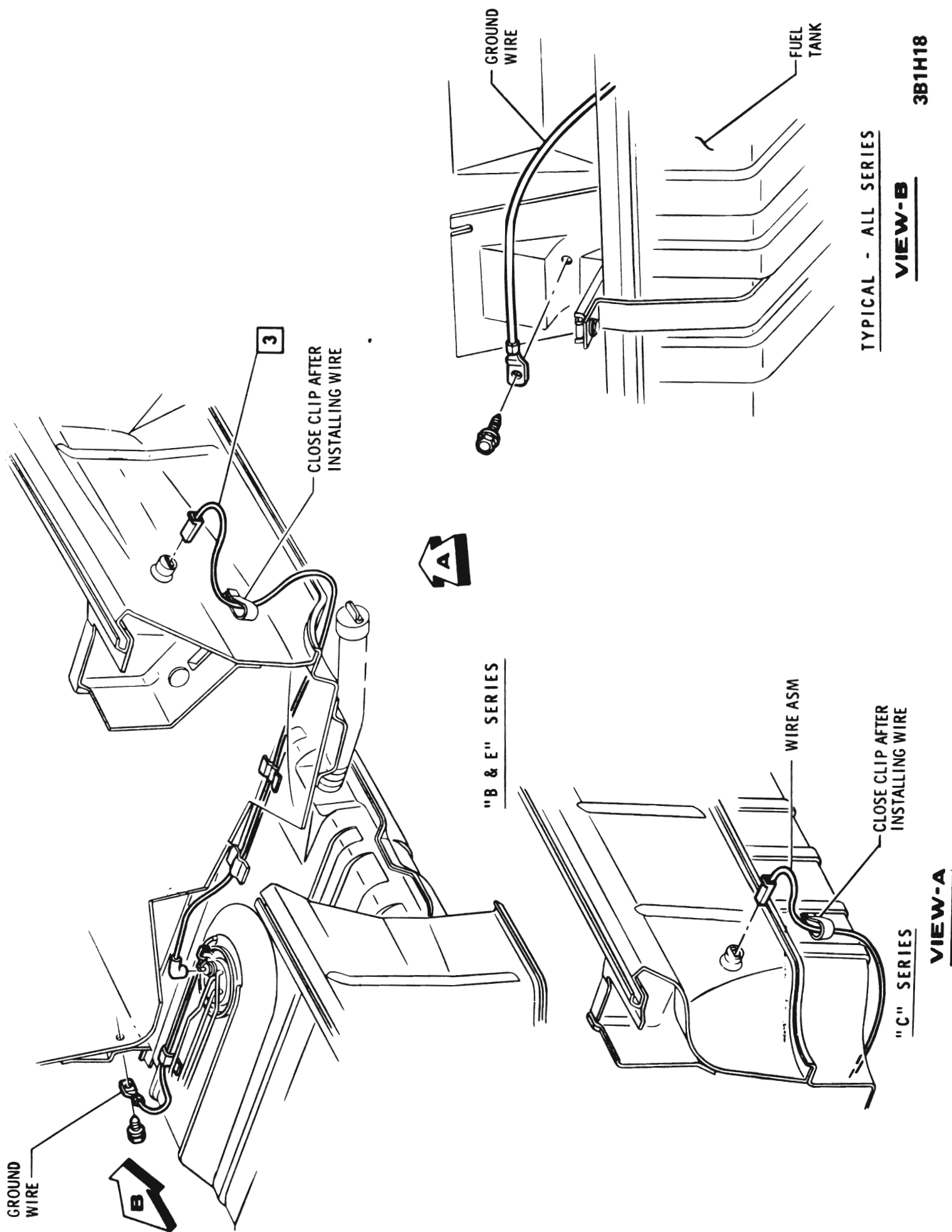


Figure 1H-18 Fuel Gauge Wiring B-C-E Series

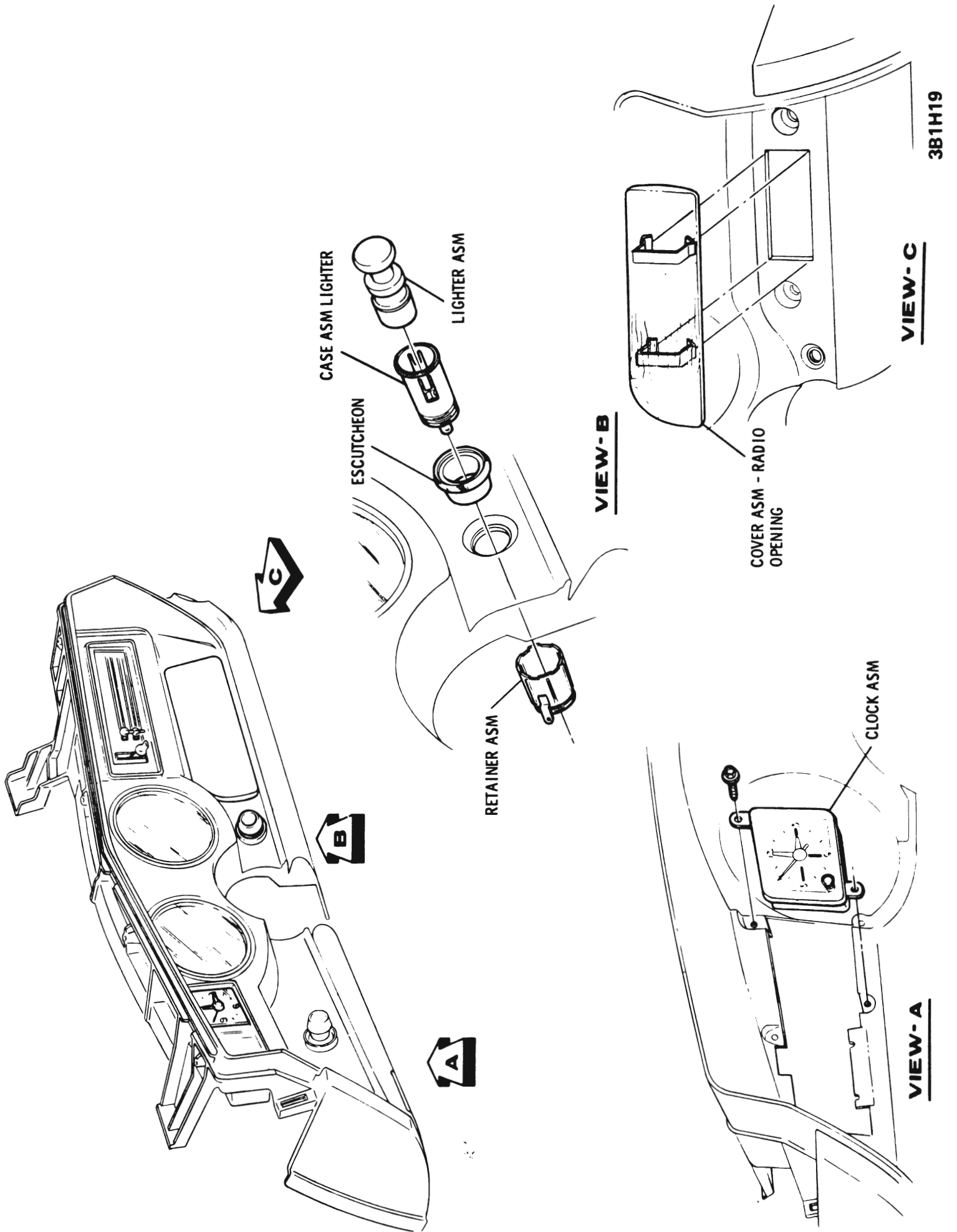


Figure 1H-19 Cigar Lighter and Clock "A" Series

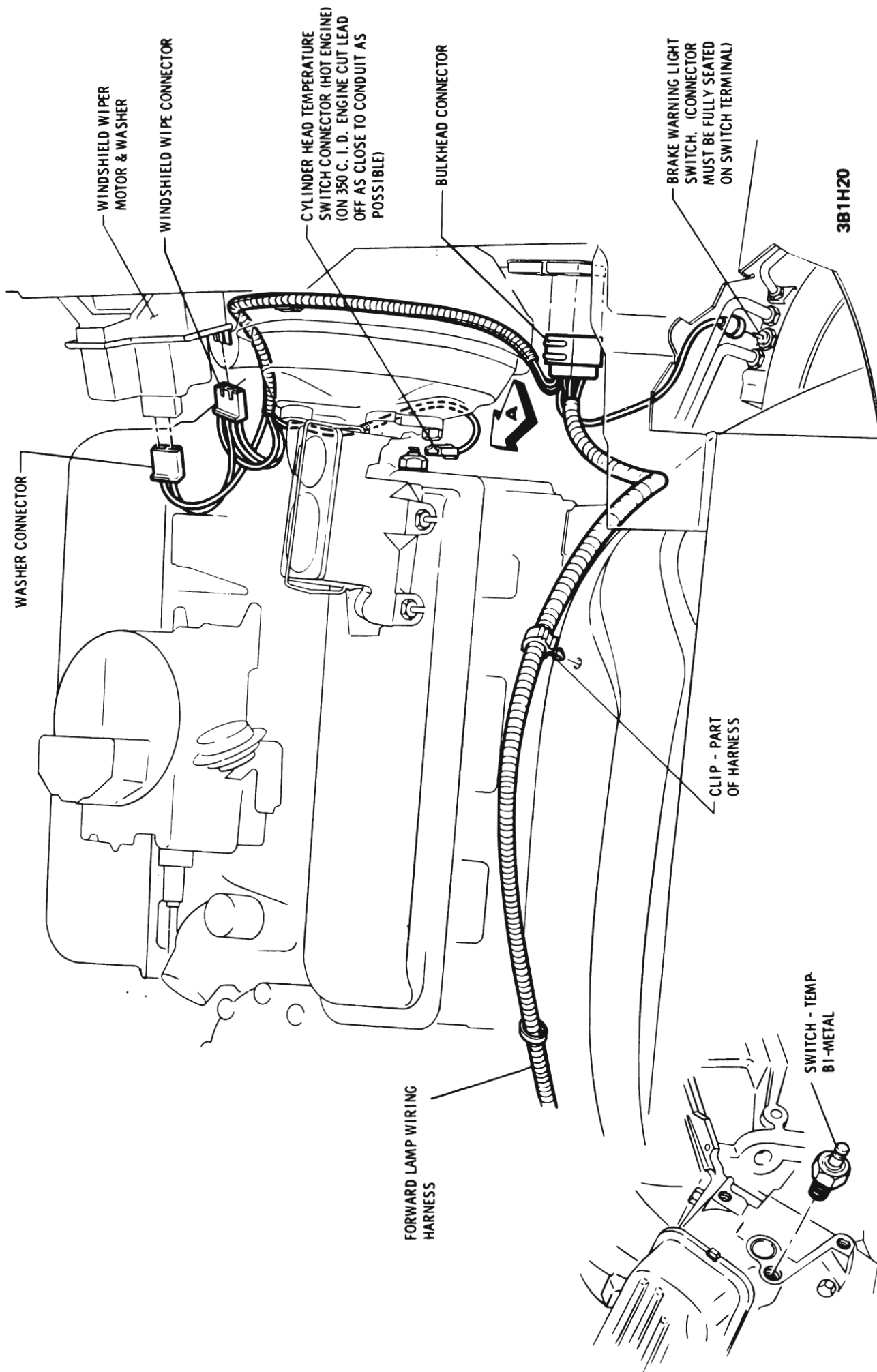


Figure 1H-20 Cylinder Head (HOT ENGINE) Indicator 455 Engine

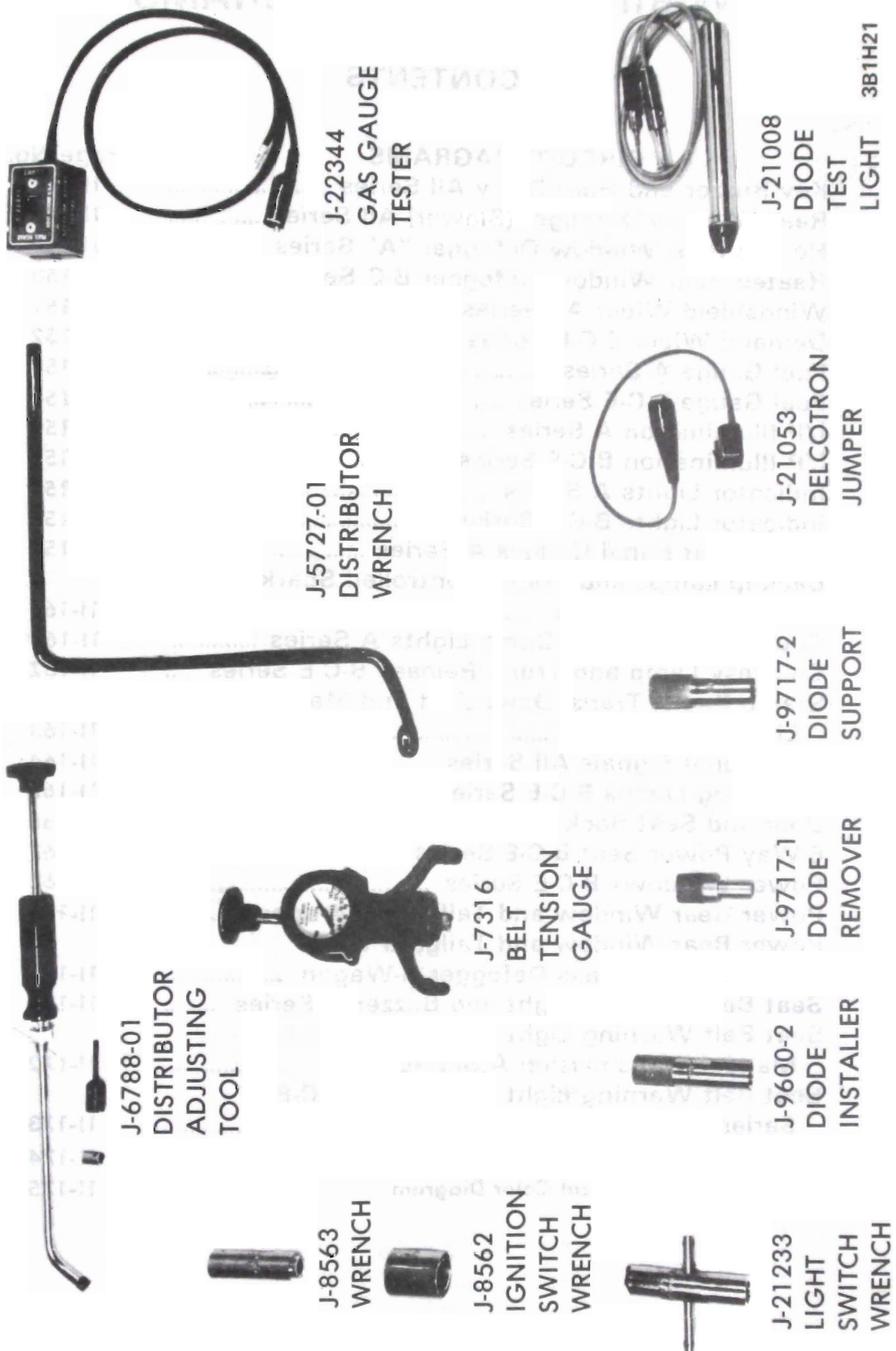


Figure 1H-21 Electrical Systems Special Tools