

GAUGES

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SPECIFICATIONS:

DESCRIPTION AND OPERATION

INSTRUMENT CLUSTER ASSEMBLY

The B-C-E instrument cluster assembly is of new design for 1975. All instruments and switches are replaceable from the front of the assembly. Except for the turn signal indicators, all indicators are conveniently located in one area at the right end of the cluster assembly. The shift quadrant is now independent of the speedometer head. See Figure 1H-1.

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

ELECTRIC CLOCK

The dial face clock is optional or standard on A-H and X series cars for 1975 while the digital clock is optional or standard on B-C and E cars.

The clock wiring circuit is protected by a fuse in the fuse block. Clock lighting is controlled by the rheostat in the headlight switch and is protected by the instrument lamps fuse in the fuse block.

Clock Time Reset and Automatic Regulation

The dial face and digital clocks may be reset by pulling and turning the reset knob as required. On early production digital clocks, it is necessary to manually push the time adjustment knob and stem assembly in after reset as it is not spring loaded.

Time regulation of the dial face clock 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.

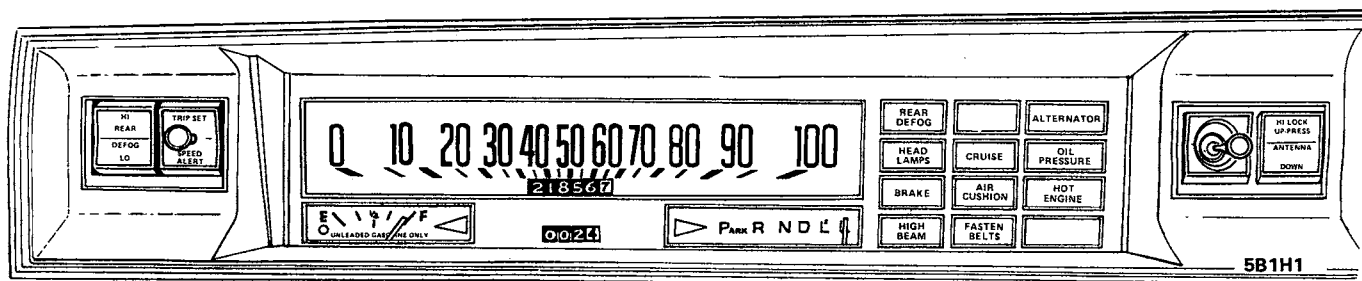


Figure 1H-1 - "B-C-E" Instrument Cluster

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.

The digital clock, because of the accuracy of its quartz crystal, requires no regulation.

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 service or repairs 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.

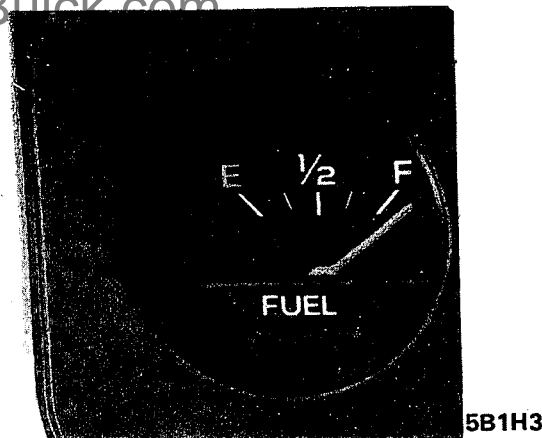


Figure 1H-3 - "X" Fuel Usage Indicator

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 "GAUGES" 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.

FUEL USAGE GAUGE

An optional "Fuel Usage" gauge or indicator lamp is available on all except "H" series cars. This option includes a gauge in the instrument cluster on "A-B-C and E" cars (See Figure 1H-2) and an amber indicator lamp just below the fuel gauge on "X" cars. See Figure 1H-3.

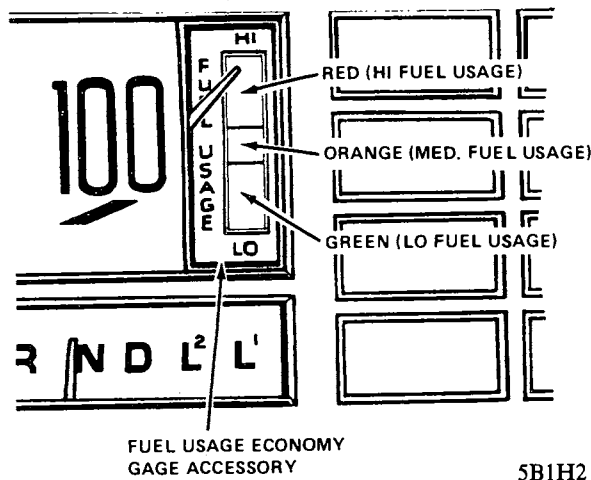


Figure 1H-2 - "B-C-E" Fuel Usage Gauge

The face of the gauge has three colors. Red indicates high fuel usage, orange indicates medium usage and green indicates low fuel usage.

The amber indicator lamp on the "X" car will glow when the engine is operated in an uneconomical manner.

The gauge is actually reading engine vacuum and the indicator lamp is activated by a vacuum electric switch preset to engine vacuum.

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

SPEEDOMETER

Displayed on the speedometer face for both H and X series cars are graphics indicating miles per hour (MPH) and kilometers per hour (KPH). See Figure 1H-4.

Speedometer Head

The speedometer head has a magnetic speed indicator 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

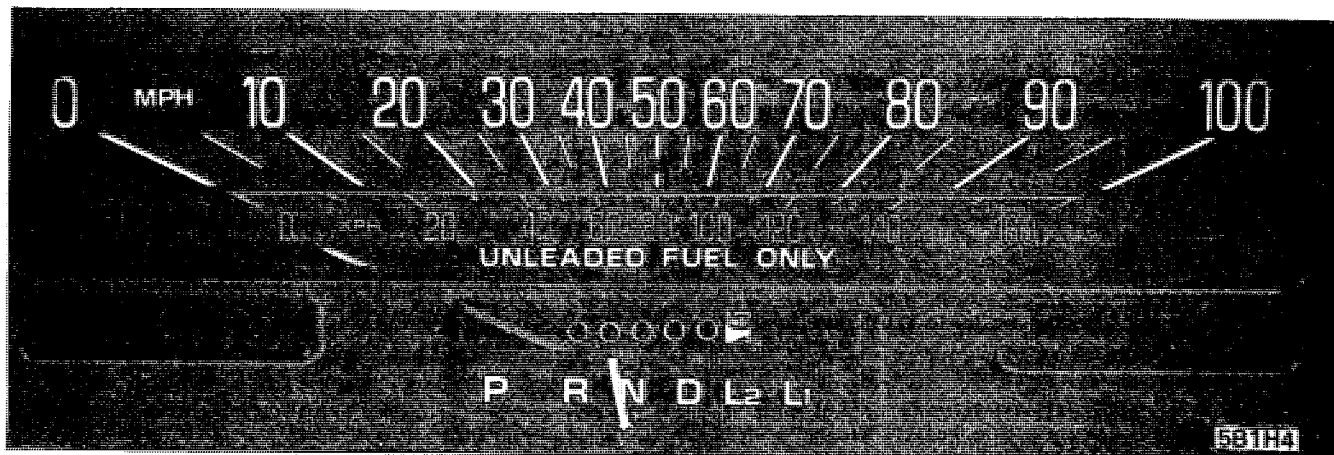


Figure 1H-4 - "X" Speedometer Graphics

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 100 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 V-6 and V-8 engines and at right side rear on L-6 engines.

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.

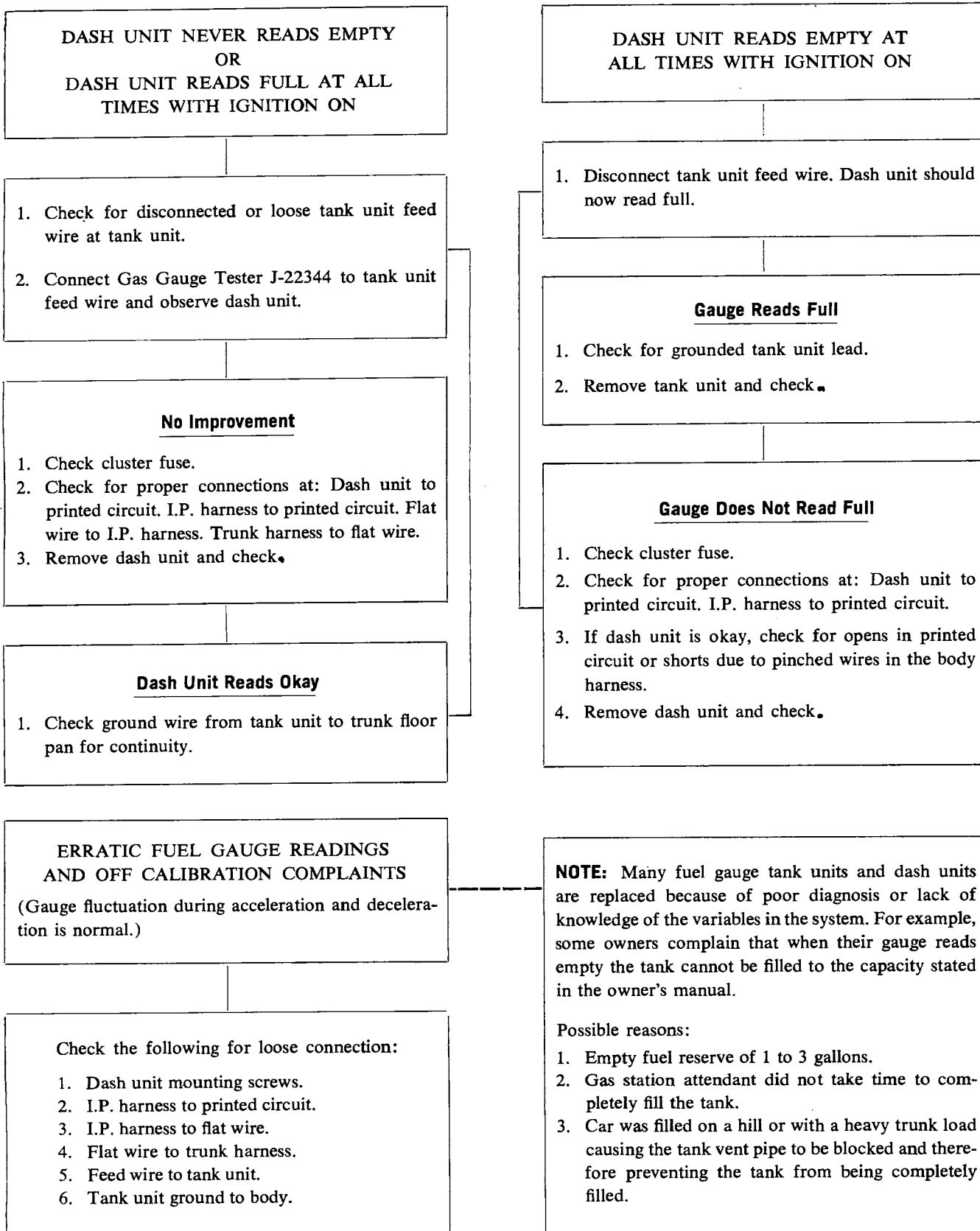
COOLANT TEMPERATURE INDICATOR

A water temperature sending switch is located in the right front of the intake manifold on the 231, 350 and 455 cu. in. engines and in the left front side of the cylinder head on L6 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.

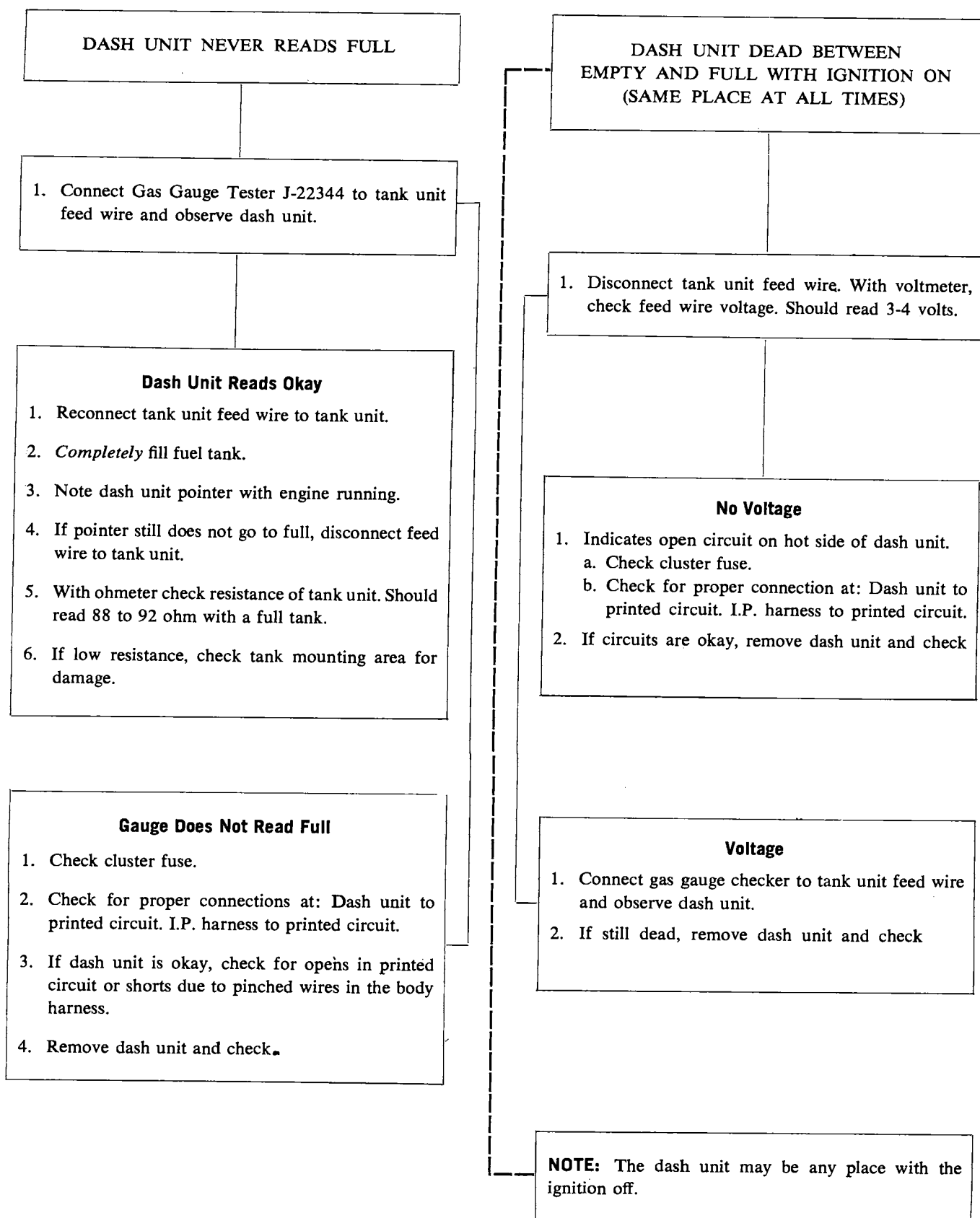
CHARGING SYSTEM INDICATOR

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, the charging circuit may be defective or there may be a blown fuse.



3B1H1

Figure 1H-5 Fuel Gauge System Diagnosis



3B1H2

Figure 1H-6 Fuel Gauge System Diagnosis

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 repair.*

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.

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.

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. ST700 speedometer cable lubricant into the cable

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.

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

- Carefully pry instrument cluster trim plate loose from instrument cluster housing.
- Remove two screws, lift clock out of I.P. and disconnect wire connector.

Installation

- Connect electrical connector to clock, position clock in I.P. and install two screws.
- Position trim plate to I.P. housing and snap into place.

Clock Removal "B-C-E" Series

- Remove right trim plate.
- Remove two screws, clock and disconnect light and feed wires.

Installation

1. Connect light and feed wires to clock.
2. Position clock in instrument panel and install screws.
3. Install trim plate.

Clock Replacement "X" Series

1. Disconnect ground cable from battery.
2. Remove radio entirely.
3. Remove clock set stem knob at front of cluster.
4. Remove cluster lamps from rear cluster cover and circuit attaching screws from clock area.
5. Move printed circuit away from clock and remove screws retaining clock to cluster housing.
6. Remove clock from rear of cluster housing.
7. To install, reverse removal procedure.

Clock Removal and Installation "H" Series

1. Disconnect negative cable from battery.
2. Remove instrument cluster bezel.
3. Remove instrument panel cover.
4. Remove instrument cluster lens.
5. Remove two screws, pull clock outward and disconnect from wire connector.
6. Reverse removal procedures for installation.

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.

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 and Installation "B-C-E" Series

1. Remove instrument cluster bezel and lens.
2. Remove screws and pull speedometer head assembly out of cluster housing.
3. Reverse removal procedure for installation.

Removal and Installation

1. Remove right trim plate.
2. Disconnect shift quadrant cable.
3. Remove speedometer head assembly.
4. Remove two screws and pull shift quadrant outward to remove.
5. Reverse removal procedures for installation.

Speedometer Replacement "X" Series

1. Remove instrument cluster as previously described in Section G.
2. Remove screws retaining rear cover to the cluster assembly. Bend ground strap away from cover and remove cover.
3. Remove screws retaining speedometer to the housing and remove speedometer from rear cover.

NOTE: *Servicing of the speedometer assembly should be performed by an authorized AC Speedometer Service Station.*

4. To install, reverse the removal procedure. **DO NOT KINK CABLE HOUSING.**

Speedometer Removal and Installation—"H" Series

1. Remove instrument cluster bezel.
2. Remove instrument panel cover.
3. Remove instrument cluster lens.
4. Remove two screws and pull speedometer assembly outward to remove.
5. Reverse removal procedures for installation.

SPEEDOMETER CABLE (H)**Removal and Installation**

1. Remove left A/C duct if equipped.
2. Reach under instrument panel and release cable housing from cluster housing.
3. Carefully bend cable housing downward and remove cable.
4. Reverse removal procedures for installation.

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.

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.

Fuel Gauge Removal and Installation "B-C-E" Series

1. Remove instrument cluster bezel, lens and speedometer head assembly.
2. Remove screws and pull gas gauge out of instrument cluster housing.
3. Reverse removal procedures for installation.

Fuel Gauge Removal and Installation—"H" Series

1. Disconnect negative cable from battery.
2. Remove instrument cluster bezel.
3. Remove instrument panel cover.
4. Remove instrument cluster lens.
5. Remove two screws pull gauge outward and disconnect from wire connector.
6. Reverse removal procedures for installation.

IGNITION SWITCH (H)**Removal and Installation**

1. Disconnect negative cable from battery.
2. Remove left A/C duct if equipped.
3. Remove steering column to support retaining nuts and allow column to lower.
4. Disconnect wire connector from switch.
5. Remove two switch retaining screws and switch.
6. Reverse removal procedures for installation.

NEUTRAL START SWITCH (H)**Removal and Installation**

1. Disconnect negative cable from battery.
2. Remove console cover assembly.
3. Disconnect wire connectors from switch.
4. Remove two screws and switch.
5. Reverse removal procedures for installation making sure of correct adjustment.

AMMETER (H)**Removal and Installation**

1. Disconnect negative cable from battery.
2. Remove instrument cluster bezel.
3. Remove instrument panel cover.
4. Remove instrument cluster lens.
5. Remove two screws, pull ammeter outward and disconnect from wire connector.
6. Reverse removal procedures for installation.

TEMPERATURE GAUGE (H)**Removal and Installation**

1. Disconnect negative cable from battery.
2. Remove instrument cluster bezel.
3. Remove instrument panel cover.
4. Remove instrument cluster lens.
5. Remove two screws pull gauge outward and disconnect from wire connector.
6. Reverse removal procedures for installation.

TACHOMETER (H)**Removal and Installation**

1. Disconnect negative cable from battery.
2. Remove instrument cluster bezel.
3. Remove instrument panel cover.
4. Remove instrument cluster lens.
5. Remove three screws, pull tachometer outward and disconnect wire connector.
6. Reverse removal procedures for installation.

Engine Coolant Temperature Sending Unit Replacement

NOTE: *The engine coolant warning system is designed to warn the driver of an overheating condition at approximately 5 - 10° below the system coolant boiling point. Use of plain water without the addition of permanent anti-freeze to a protection level of 0°F. can cause the temperature overheat warning light not to come on even though water is boiling.*

1. Relieve coolant system pressure by loosening radiator cap, then reinstall cap tightly.
2. Remove sending unit and replace with new unit.
3. Check coolant system level and operation of unit.

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 and Installation "B-C-E" Series

1. Remove instrument panel cover.
2. Disconnect multiple wire connectors from rear of cluster housing.
3. Remove gas gauge and shift quadrant.
4. Remove seven screws and cluster housing insert.
5. Remove printed circuit.
6. Reverse removal procedures for installation.

Printed Circuit Replacement "X" Series

1. Remove instrument cluster as described in Section G.
2. Remove all cluster illuminating and indicator lights from cluster housing.
3. Remove fuel gauge and clock terminal nuts securing printed circuit to housing.
4. Remove four hex head screws retaining printed circuit to the cluster housing and remove the printed circuit.
5. To install, reverse the removal procedure.

CAUTION: *The retaining screws and terminal nuts are part of the grounding circuit and must be installed to provide the proper ground connections for the printed circuit.*

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 and Installation "B-C-E" Series

1. Remove left trim plate as previously described.
2. Through slots at bottom of switch assembly, release the two lower back tabs.
3. Holding bottom of switch outward and downward, release the two top locking tabs through the top slots.
4. Pull switch assembly outward to disconnect the seelite cable and wire connector.

5. To install, connect wire connector and seelite cable to switch assembly, press switch into position and install trim plate.

Washer and Wiper Switch Replacement "X" Series

1. Remove harness connector from rear of switch.
2. Remove retaining screws and switch assembly from I/P.
3. Reverse removal for installation.

Washer and Wiper Switch Replacement—"H" Series

1. Disconnect negative cable from battery.
2. Remove left A/C duct if equipped.
3. Disconnect headlight switch from instrument panel.
4. Disconnect wire connectors from wiper switch and seat belt-key buzzer.
5. Remove three screws, seat belt-key buzzer and wiper switch.
6. Reverse removal procedures for installation.

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 Replacement "B-C-E" Series

1. Remove instrument cluster bezel.
2. Unplug switch or remove screws and switch.
3. Reverse removal procedure for installation.

Trip-Set and Speed-Alert Cable Replacement "B-C-E" Series

1. Reach under left end of instrument panel and pull cable assembly out of cluster housing.
2. Remove cluster bezel.
3. Pull cable assembly out instrument panel.
4. Remove knob and hex nut to separate cable from retainer.
5. Reverse removal procedure for installation.