

## FORD MOTOR CO.

Ford

### DESCRIPTION & OPERATION

**Ammeter Gauge** — Gauge senses the direction and rate of flow of electrical current to or from the battery indicating whether the battery is being charged or discharged.

A shunt-type ammeter is used except for Bronco trucks which have loop-type ammeters. All ammeters are not adjustable and must be replaced as a unit.

**Fuel Gauge** — Gauge pointer is operated by current flow heating a wire-wound bi-metal strip in gauge. Current flow is controlled by a variable resistor float type sending unit in the fuel tank. As the amount of fuel decreases, more resistance is placed in the circuit, allowing less current flow and heat at the bi-metal strip, causing the pointer to move a shorter distance.

**NOTE** — Electronic sensor/switch can not be tested or repaired, but indicator circuit can be tested.

**Instrument Voltage Regulator** — IVR is used in conjunction with all gauges (exc. ammeter). It controls and maintains an average pulsating value of five volts at gauge. A suppression choke is connected in series between printed circuit and IVR to prevent radio interference.

**Oil Pressure Gauge** — Oil pressure gauge circuit consists of an IVR, oil pressure gauge and a pressure-operated sending unit. As oil pressure increases, resistance in sending unit decreases causing an increase in current flow and gauge pointer movement.

**Oil Pressure Indicator** — The light is connected between the oil pressure sending unit and the coil terminal of the ignition switch. Light should come on when ignition switch is turned to the "ON" position or when oil pressure is not above the prescribed pressure.

**NOTE** — On models with an "ENGINE" warning light, disconnect temperature switch lead before testing the oil pressure indicator circuit.

**Temperature Gauge** — System consists of a variable resistance type sending unit and a gauge. As coolant temperature increases, resistance in sending unit decreases allowing an increase of current flow and gauge pointer movement. It is possible, under certain driving conditions, for pointer to read at the top of the normal band and still have coolant temperature within limits.

### TESTING

#### GAUGES

**Oil Pressure Gauge** — 1) Remove oil pressure sender unit and temporarily attach a mechanical oil pressure gauge in its place.

2) Operate engine to determine oil pressure. If engine oil pressure is normal, instrument cluster gauge should also indicate normal pressure.

3) To test oil pressure gauge and IVR proceed as follows: Disconnect gauge lead from terminal at sender unit. Connect other test lead to a good ground. With ignition on, a flashing light or fluctuating voltmeter indicates IVR is operating properly and gauge circuit is not interrupted.

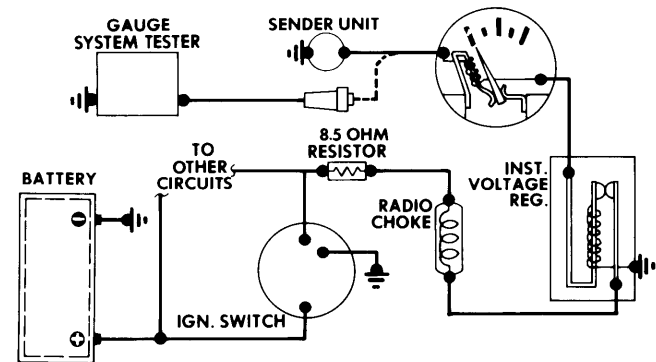


Fig. 1 Testing IVR, Fuel, Oil or Temperature Gauge

4) If pulsating voltage is shown but gauge is not accurate, replace gauge. If light stays on or voltage reading is steady, replace IVR.

5) If no voltage is indicated by voltmeter or test light, check for an open circuit in IVR, gauge windings, or printed circuit. Do not spark or ground either terminal of IVR.

**Ammeter** — 1) Turn headlights on; engine off. Meter pointer should move toward the "D" or discharge side of the gauge. If no pointer movement is noted, check rear of meter housing for loose connections, printed circuit connections and multiple connector at printed circuit.

2) If connections are good, replace ammeter. Should ammeter pointer move toward "C" with lights on and engine off, ammeter connections are reversed. This is most likely to occur in an ammeter system that uses a wiring harness rather than a printed circuit.

**Fuel Level Gauge** — 1) Disconnect wiring connector from terminals at sender unit. Check terminals for possible corrosion or undercoating, and clean as necessary.

2) Connect the lead of a 12-volt test light, or positive lead of a voltmeter to gauge lead that was disconnected from sender. Connect other test lead to a good ground.

3) With ignition on, a flashing light or fluctuating voltmeter will indicate instrument voltage regulator is operating and that gauge indicator circuit is not interrupted.

4) If light stays on, or voltage reading is steady, replace IVR. If no voltage is indicated by meter or test light, check IVR for proper ground or open circuit across IVR. Do not ground or spark either terminal of IVR.

**Temperature Gauge** — 1) Place a thermometer in coolant in radiator filler neck. Start engine and allow to run until thermometer reads a minimum of 180°F. Instrument panel gauge should indicate within normal range.

# 6-30 Switches, Gauges & Instrument Panels

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**NOTE** — During tests do not apply 12 volts directly to temperature sender terminal or sender unit will be damaged.

2) To test gauge proceed as follows: Disconnect gauge lead from terminal at sender unit. Connect lead of a 12 volt test light or positive lead of voltmeter (20 volt scale) to gauge lead that was disconnected from sender unit. Connect other lead to a good ground, turn ignition on.

3) A flashing light or fluctuating light of fluctuating voltmeter indicates IVR is good and gauge circuit is not interrupted.

4) If a pulsating voltage is shown but gauge is not accurate, replace gauge. If light stays on, or voltage reading is steady, replace IVR. If no voltage is indicated by voltmeter or test light, check for an open in IVR, gauge windings or printed circuit.

**NOTE** — Do not spark or ground either terminal of IVR.

## REMOVAL & INSTALLATION

### SPEEDOMETERS & GAUGES

**All Models** — Instrument cluster must be removed to allow any repair or replacement of speedometer or gauges.

### INSTRUMENT CLUSTER

**"E" Models** — 1) Disconnect battery ground, remove seven screws retaining cluster to instrument panel. Position cluster part way out of panel for access to rear of cluster. At back of cluster, disconnect speedometer cable.

**NOTE** — It may be necessary to remove speedometer cable at transmission to allow room to reach speedometer quick disconnect.

2) Disconnect multiple feed plug from printed circuit board and remove the cluster assembly from instrument panel.

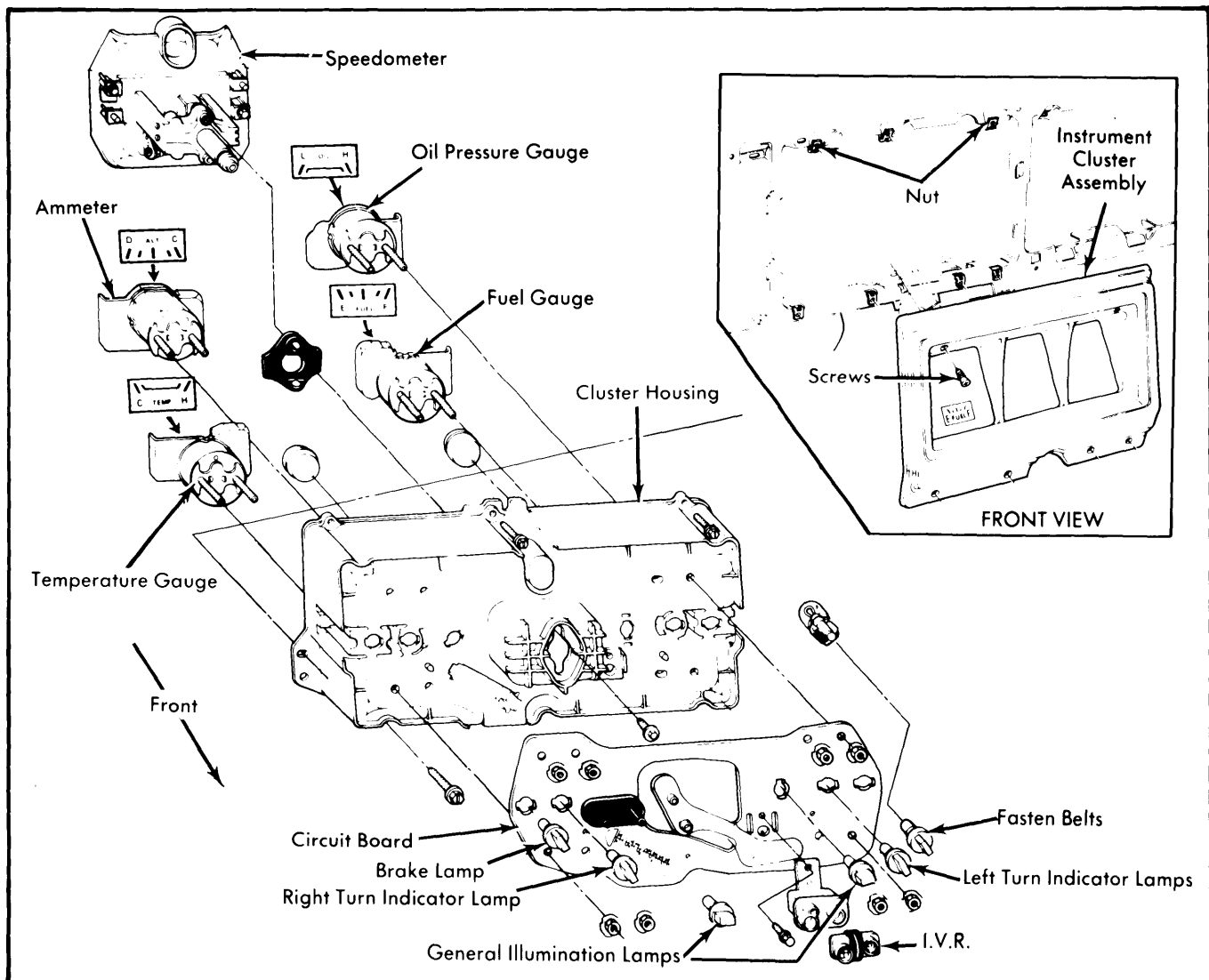


Fig. 2 Exploded View of "E" Models Instrument Cluster

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3) To install, reverse removal procedure while noting the following: Apply approximately  $\frac{3}{16}$ " diameter ball of suitable silicone lubricant in drive hole of speedometer head.

**"F" Models and Bronco** — Disconnect battery ground cable. Pull knobs from radio shafts (if equipped), fuel gauge switch knob, heater control knobs and wiper/washer knob. Use a hook tool to release each knob lock tab. Remove knob and shaft from light switch.

2) Remove one nut and washer from each radio control shaft and remove radio bezel. Remove cluster trim cover attaching screws which are located along top of bezel (four screws), between headlight and wiper/washer switches (one screw), and below radio (two screws).

3) Disconnect air conditioning duct (if equipped) and illumination light from bezel (light is located between headlight and wiper/washer switches).

4) Remove four screws attaching cluster, disconnect speedometer cable, and wire connector from printed circuit. Remove cluster assembly from vehicle.

5) To install, reverse removal procedure.

### INSTRUMENT VOLTAGE REGULATOR & PRINTED CIRCUIT

**"E" & "F" Models** — 1) Remove instrument panel cluster. Disconnect (snap off) printed circuit connector buttons from instrument voltage regulator.

2) Disconnect multiple feed plug and remove the one attaching screw, then remove the IVR from cluster assembly. Remove gauge retaining nuts, light bulbs, and printed circuit board from cluster.

3) To install, reverse removal procedure while noting the following: Printed circuit board must be carefully positioned to back of cluster and engaged with the plastic locating pins.

### HEADLIGHT SWITCH

**All Models** — Disconnect battery ground cable. With headlight switch in full "ON" position, release knob and shaft by pressing knob release button on switch housing. Pull knob and shaft out of switch. Carefully remove bezel nut holding switch to instrument panel, lower switch and unplug electrical connector and remove switch. To install, reverse removal procedure.

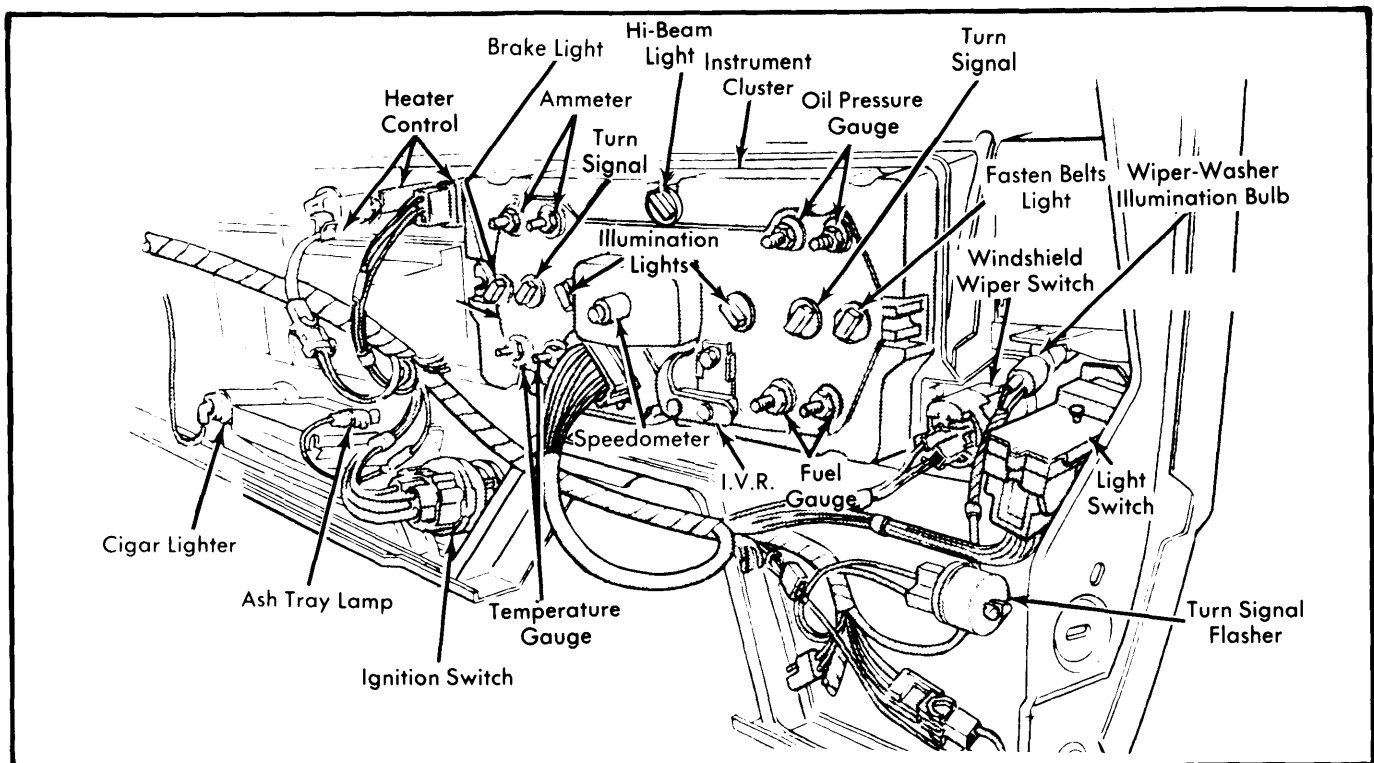


Fig. 3 Exploded View of "F" Models & Bronco Instrument Cluster (Back View)