SECTION 10-H

INSTRUMENTS AND CLOCK

CONTENTS OF SECTION 10-H

Paragrap	h Subject	Page	Paragrap	h
10-48	Instrument Cluster Assembly,		10-50	C
	Generator Indicator, Oil			Γ
	Pressure Indicator,		10-51	C
	Temperature Indicator	10-71		Ι
10-49	Electric Clock	10-75	10-52	S

10-48 INSTRUMENT CLUSTER ASSEMBLY, GENERATOR INDICATOR, OIL PRESSURE INDICATOR, TEMPERATURE INDICATOR

CAUTION: Disconnect battery ground strap before removing any instrument panel unit or wiring.

a. Description of Instrument Cluster Assembly

The generator, temperature and oil pressure indicators use lights to warn the driver of conditions other than normal when the engine is operating at speeds above idle. See Figure 10-62.

A printed circuit is used to complete the circuits for all the lights and instruments in the cluster assembly. See Figure 10-63. A disconnect plug which is part of the instrument panel wiring harness attaches to the printed circuit connector pins. A key way is located

Paragrapl	n Subject	Page	
10-50	Gasoline Gauge System-		
	Description and Operation	10-75	
10-51	Gasoline Gauge-Trouble		
	Diagnosis	10-76	
10 - 52	Speedometer	10-79	
10 - 53	Accessory Switch Mounting Panel	10 - 83	

in the printed circuit to insure correct assembly of the disconnect plug on the connector pins. If the printed circuit should become defective, it should be replaced as it is not practical to repair it.

b. Removal and Installation of Instrument Cluster Assembly

1. Remove four screws located along front edge of instrument panel cover. See Figure 10-75.

2. Remove cover by lifting up and pulling it toward rear of car.

3. Lower left control plate and disconnect printed circuit plug. Care must be used when removing plug to prevent damage to pins on printed circuit.

4. On cars with parking brake warning light, unplug light socket from cluster by reaching under instrument panel.

5. Remove three nuts that attach cluster



Figure 10-62-Instrument Cluster Assembly



Figure 10-63—Instrument Cluster - Back Side

assembly to instrument panel, lift cluster up and disconnect speedometer cable and remove assembly. See Figure 10-74.

6. Reinstall instrument cluster by reversing above steps.

NOTE: The projection on the disconnect plug must be lined up with the key way in the printed circuit when assembling plug on connector pins.

c. Generator Indicator

The red "Gen" warning light should light when the ignition is turned "on" and before the engine is started. If not lit, either the bulb is burned out or the wiring or generator circuit has an open circuit.

Battery voltage is supplied to the generator indicator light when ignition is "on". The ground for the light is through the armature of the generator. See Figure 10-64. Therefore, when the generator is not charging the "Gen" indicator will be lit. When the engine is running and generator output voltage is slightly less than the battery voltage, the red "Gen" indicator will go out. It is normal for the light to "glow" at idle speeds. The "Gen" indicator does not indicate whether the battery is being charged or discharged. If the light stays on at engine speeds above idle or if trouble is experienced with the battery or the charging system, the generator output should be tested as described in paragraph 10-21.

d. Oil Pressure Indicator

The engine oil pressure indicator light is controlled by a pressure operated switch located in the main oil gallery at the right rear of the engine. See Figure 10-84. 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.

ELECTRICAL SYSTEMS

e. Temperature Indicator

A temperature switch located in right cylinder head controls the operation of a "Cold" temperature indicator with a green lens and a "Hot" temperature indicator with a red lens. See Figure 10-86.

When the cooling system water temperature is below approximately 110 degrees F., the temperature switch grounds the "Cold" indicator circuit and the "Cold" on the instrument cluster is lit. When the "Cold" light goes out, the water temperature is high enough so that the heater can be turned on and be effective. The car should never be subjected to full throttle accelerations or high speeds until after the "Cold" light has gone out.

If the engine cooling system is not functioning properly and the water temperature should reach approximately 248 degrees F., the "Hot" indicator will be turned on by the temperature switch. As a test circuit to check whether the "Hot" indicator bulb is functioning properly, a wire which is connected to the "GND" terminal of the ignition switch is tapped in to its circuit. See Figure 10-68. When the ignition is in the "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 in the "On" position, the test circuit is opened and the bulb is then controlled by the temperature switch.

f. Trouble Diagnosis—Generator Indicator, Oil Pressure Indicator, Temperature Indicator

Use Figure 10-64 to trace wiring circuits for indicator lights and Figure 10-63 for location of indicator light bulb socket. To determine if there is a ground in the indicator light circuit, remove connector from control switch, if light stays on, trouble is in circuit.



Figure 10-64—Indicator Light Circuits

10-74 TROUBLE DIAGNOSIS

ELECTRICAL SYSTEMS

COMPLAINT	POSSIBLE CAUSE			
1. GENERATOR INDICATOR				
Light not lit, ignition "On" and engine	Bulb burned out. Replace.			
not running.	Open in light circuit. Locate and correct.			
Light on, engine running above idle speed.	No generator output. Check output, para- graph 10-21.			
	Wiring between light and generator "A" terminal grounded. Locate and correct.			
NOTE: If generator indicator light comes on at a fairly high speed and gets brighter with increased speed, it signifies the generator to battery circuit is open. A blown generator regulator fuse will cause this condition.				
2. OIL PRESSURE INDICATOR				
Light not lit, ignition "On" and engine	Bulb burned out. Replace.			
not running.	Open in light circuit. Locate and correct.			
	Oil pressure switch defective. Replace.			
Light on, engine running above idle speed.	Wiring between light and switch grounded. Locate and correct.			
	Oil pressure switch defective. Replace.			
	Low oil pressure. Locate cause and correct.			
3. TEMPERATURE INDICATORS				
(a) Hot Indicator				
Light not lit when cranking engine.	Bulb burned out. Replace.			
	Open in light circuit. Locate and correct.			
	Ignition switch defective. Replace.			
	Temperature switch defective. Replace.			
Light on, engine running.	Wiring between light and switch grounded. Locate and correct.			
	Temperature switch defective. Replace.			
	Cooling system water temperature above 248 ⁰ F. Find cause and correct.			
	Ignition switch defective. Replace.			
(b) Cold Indicator				
Light not lit, ignition "On" and engine	Bulb burned out. Replace.			
cold.	Open in light circuit. Locate and correct.			
	Water temperature switch defective. Replace.			

ELECTRICAL SYSTEMS

COMPLAINT	POSSIBLE CAUSE
Light on, after normal engine warm- up period.	Wiring between light and switch grounded. Locate and correct.
	Water temperature switch defective. Replace.
	Thermostat in cooling system defective. Replace.

10-49 ELECTRIC CLOCK

The electric clock is mounted on the center of the instrument panel. The clock wiring circuit is protected by the "CLOCK" fuse on the fuse block. The clock light is controlled by the rheostat in the lighting switch and is protected by the "TNST. LTS." fuse on the fuse block. If burned out, this bulb is accessible by removing the instrument panel cover.

a. Clock Time Reset and Automatic Regulation

The electric clock incorporates a sweepsecond hand and an automatic regulator. A reset knob extends through the glass on right side of the clock dial. To reset the time, pull the knob out and turn in either direction as required. See Figure 10-65.

There is no regulator knob 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



Figure 10-65-Electric Clock

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 15 seconds per day).

A lock-out feature prevents the regulator mechanism from being moved more than once during a rewind period (approximately 3 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.

b. 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. <u>The manufacturer's warranty is void if repairs have</u> been attempted outside of an authorized service station.

10-50 GASOLINE GAUGE SYSTEMS-DESCRIPTION AND OPERATION

The gasoline gauge system consists of two units; the dash unit located in the instrument cluster, and the tank unit located in the gasoline tank. One terminal of the dash unit is connected to the ignition switch so that the unit registers only when the ignition switch is turned on. With the ignition turned off, the pointer may register any place on the dial of the dash unit.



Figure 10-66-Gasoline Gauge Circuit

The dash unit pointer is moved by changing the magnetic pull of two coils in the unit. The magnetic pull is controlled by action of the tank unit which contains a variable rheostat, the value of which varies with movement of a float and arm. 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 gallon reserve when the dash unit pointer is at the dot next to the "E" position. The tank unit has only one wire leading to it from the instrument panel. See Figure 10-66. This wire is brown in color and



Figure 10-67—Gasoline Gauge—Dash Unit

is the dash unit sender wire.

When the ignition switch is "On" and the tank unit arm is in the full position (maximum resistance for the brown wire to ground), the current flow to ground is through the resistor, battery coil and the ground coil. Due to the fact that the ground coil has more windings then the battery coil is builds up a stronger magnetic field and the dash unit pointer is pulled to the "F" position. See Figure 10-66. When the tank unit arm is in the empty position (no resistance for brown wire to ground), the current flow is through the resistor, the battery coil and the brown wire to ground at the tank unit. The dash unit pointer is thus pulled to the "E" position. The resistor in series with the battery coil is for a balance of resistance between the two coils in the dash unit as the ground coil has more windings.

10-51 GASOLINE GAUGE-TROUBLE DIAGNOSIS

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 a known good tank unit with a 12 foot piece of red insulated (#16) wire attached to binding post of unit and a similar 5 foot piece of black wire attached to flange of unit. Attach a spring clip to end of black wire and a terminal to end of red wire.

1. Test of Dash Unit and Tank Unit Wiring.





(a) Disconnect the tank unit brown wire at frame side rail. This connector is located at top of right frame rail just forward of gas tank on all models except Estate Wagons. See Figure 10-68. On Estate Wagons the connector is located at the left front corner of gas tank. See Figure 10-69.

Plug the red test wire terminal into the connector and attach the black test wire to any convenient ground on the car.

(b) Turn ignition switch on and move arm of test unit up and down against the stops while observing dash unit. If dash unit and wiring are okay, dash unit pointer will move freely from "Empty" to "Full" with movement of tester arm, indicating that trouble is in tank unit or the short wire leading to it.

(c) If, on the test of dash unit and tank unit wiring, dash unit reads "Empty" or noticeably low at all times, look for a ground in the wiring circuit between dash unit and connector at frame rail. Also an improper grounded dash unit will cause unit to read low. If dash unit reads above "Full" or noticeably high at all times during test, look for points of high resistance or open circuit in wiring.

(d) To eliminate the tank unit brown wire which runs through body to connector at frame rail, remove the left kick pad and unplug wiring harness connector. Contact brown wire in connector with red wire of test unit, ground test unit and turn ignition switch on. If the dash unit functions properly with movement of test unit arm, trouble was caused by the brown wire.

2. Test of Dash Unit

(a) Disconnect the wiring connector under left kick pad. Attach the test unit black wire to ground. Lower right control plate from instrument panel.

(b) Turn ignition on. Then with terminal of red test wire contacting the dash unit to tank unit circuit (rearmost circuit) on printed circuit, move arm of test unit up and down against stops. See Figure 10-63. If dash unit is okay, the pointer will move freely from "Empty" to "Full" with movement of tester arm, indicating that trouble is in wiring. If pointer does not move or only moves part way, the printed circuit may be defective, dash unit may not be grounded properly or the unit may be faulty and should be replaced. CAUTION: If the wrong circuit is contacted on printed circuit, the rheostat in test unit may be damaged. 3. Test of Tank Unit.

(a) If tests given above indicate that the trouble is in the tank unit, check the tank unit wiring and if necessary, remove the unit so that it may be cleaned and tested. Tank unit is accessible through trunk compartment by removing cover from floor pan. See Figure 10-68.

(b) After thorough cleaning of tank unit, connect it to ground and to wire leading to dash unit, and test in the same manner as when using tester. If tank unit tests okay it should be reinstalled in tank, otherwise, it should be replaced with a new unit. When installing tank unit make certain that insulation is folded over the terminal and snapped over wire.

10–52 SPEEDOMETER

a. Speedometer Heads

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. See Group 6 for gear ratios.

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.

Some speedometers have a trip odometer and a reset knob. Pulling the reset knob out and turning clockwise gives a quick reset to zero; turning the knob counterclockwise resets the trip odometer 1/10 mile at a time. Speedometers which have the trip odometer also have the safety buzzer feature.

b. Checking 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.



10-80

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 installation is at fault.

5. If noise disappears with transmission stationary, check further for cause of noise by checking for proper installation of speedometer cable as shown in Figure 10-70.

6. If cable installation is okay, next remove inner cable from casing. Lay inner cable on clean paper to keep dirt from cable lubricant. Reconnect empty casing to speedometer and recheck for noise at various speeds. If noise still continues, noise is coming from transmission rather than from speedometer or cable.

7. If noise stops with inner cable removed, speedometer or cable is at fault. Inspect cable as described in subparagraph c.

c. Inspection of Speedometer Cable and Casing

If the speedometer installation appears to be noisy or the speed indicator wavers, inspect the cable casing for damage, sharp bends, or for being out-of-position in the supporting clips. See Figure 10-70. If casing is in good condition and properly installed, remove inner cable for inspection.

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.

d. Trouble-Shooting Speedometer Safety-Buzzer

The safety-buzzer consists of a buzzer which may be adjusted by the driver to sound at any speed between 25 and 110 MPH by turning a knob on the left side of instrument cluster. See Figure 10-62. The speed at which the safety-buzzer is set is indicated by a special yellow pointer in the speedometer face.

The safety-buzzer electrical circuit starts at a 5 ampere fuse marked 'BK & BZ'' located on the fuse block. Since this fuse also protects the parking brake warning light, a functioning warning light indicates that this fuse is OK. This circuit is 'hot'' whenever the ignition switch is turned on. From the fuse, a dark green wire carries the current to a buzzer mounted on a bracket located under right side of instrument cluster. See Figure 10-71. 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 blue wire to the connector plug located on the speedometer case.

In the speedometer, current is conducted from the multiple connector pin through a wire to an insulated pin in the lower end of the safety buzzer pointer. See Figure 10-71. As the speedometer pointer moves up to coincide with the safety buzzer pointer, a light grounding hair spring on the lower end of the speedometer pointer makes contact with the "hot" insulated pin on the safety buzzer pointer. This grounds the circuit, causing the buzzer to buzz. If the car speed is increased beyond the safety buzzer setting, the insulated pin on the safety buzzer pointer "picks-up" the hair spring as the speedometer pointer passes under the safety buzzer pointer and the light grounding hair spring winds-up slightly.

1. <u>Buzzer Will Not Operate Or Operates</u> Intermittently.

(a) Turn ignition switch on.

(b) To check buzzer, stick a prod in terminal at buzzer connector with the blue wire and run jumper to ground. If buzzer now operates, circuit is OK through buzzer and trouble must be in wire to speedometer or in speedometer. To check buzzer circuit up to speedometer, stick prod in instrument cluster multiple connector at "B" terminal. See Figure 10-63. If buzzer operates, circuit is OK to speedometer.



ELECTRICAL SYSTEMS

(c) If buzzer did <u>not</u> operate when buzzer connector was gounded (in step b), trouble may be in buzzer circuit. Check "BK & BZ" fuse on fuse block and replace 5 ampere fuse if necessary.

NOTE: Since this fuse also protects the parking brake warning light, a functioning warning light indicates that this fuse is OK.

(d) Check buzzer circuit wiring connectors at fuse block and at buzzer. See Figure 10-71.

(e) Next eliminate buzzer as source of trouble by unplugging connector at buzzer. Then plug a known good buzzer onto the connector.

2. Buzzer Operates Continuously

(a) Check blue wire from buzzer to speed-ometer for ground.

(b) Remove printed circuit disconnect plug. If buzzer stops, circuit is grounded inside speedometer and speedometer must be removed for repair. If buzzer still operates, however, buzzer unit is defective and must be replaced.

3. Speedometer Defective

A defective speedometer assembly must be sent to the nearest UMS Service Station for repairs.

10–53 ACCESSORY SWITCH MOUNTING PANEL

The accessory switch mounting panel located above the radio contains toggle switches to operate the electric rear window on Estate Wagons, power top on convertible models, rear seat speaker, electric antenna and courtesy lights, when so equipped. See Figure 10-74.

To avoid accidental operation of the convertible top or Estate Wagon rear window, these switches are of the safety type. To operate either unit, the switch must first be pressed straight up before being moved right or left to raise or lower the top or window.

To remove one of these switches from the mounting, it is necessary to first remove instrument panel cover (Figure 10-73), then remove switch.





Figure 10-73-Instrument Panel Lower Control Plate Installation



Figure 10-74-Radio Grille, Clock and Instrument Cluster Installation







Figure 10-77—Steering Column Housing Installation



Figure 10-78—Instrument Panel Moulding, Lens and Lamp Housing Installation



Figure 10-79-Glove Box, Lamp and Switch Installation

ELECTRICAL

SYSTEMS