SECTION 8D
CENTRAL CONTROL MODULE

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to CAUTIONS in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

CONTENTS

GENERAL DESCRIPTION

SYSTEM FUNCTIONS

The Central Control Module (CCM) performs the following functions:

Ambient Light Signal Processing
Chime (Belts/Lights/Key Warning/Turn Signal
    Minder) Control
Courtesy Lamp Control
Delayed Accessory Bus (DAB) Control
    Power Windows
    Audio System
Dimming Control
    Instrument Cluster LCD Backlighting
    Instrument Cluster Gages Backlighting
    LCD Backlighting (Radio, C68 HVAC)
    LED Indicator Dimming
    High-Beam Indicator Dimming
Driver Information Center (DIC) Switches
    Trip Odometer Reset
    Average Fuel Economy Reset
    Display Instant/Average Fuel Economy
    Display Fuel Range
    Display Normal/Trip Odometer
    Display Digital Coolant Temperature
    Display Digital Oil Temperature
    Display Digital Voltage
    English/Metric Mode Selection
    On-Board Diagnostics Control
    Engine Oil Life Monitor Reset
Fuel Level Detection/Processing
Instrument Panel LCD Digit Display
    Fuel Level
    Vehicle Speed
    Trip Odometer
    Normal Odometer
    Fuel Range
    Instant Fuel Economy
    Average Fuel Economy
    Digital Coolant Temperature
    Digital Oil Temperature
    Digital Voltage
    Diagnostic Information Display
PASS-Key® (Personal Automotive Security
System)
Rear Defog Control
Odometer Processing
Oil Level Monitoring
Status Warnings ("Check Gauges" Indicator)
    Engine Coolant Overtemperature
    Engine Oil Overtemperature
    Fuel Level Low
System Component Fault Detection
System Diagnostics Processor/Controller
Trip Computer Processing For:
    Instantaneous Fuel Economy
    Average Fuel Economy
    Fuel Range
    Trip Odometer
UART Serial Communications Master
Universal Theft Deterrent (UTD) Control
Vehicle Speed Detection/Processing

WAKE-UP/ASLEEP STATES

"Wake-Ups" are signals that will turn the CCM "ON" and cause it to begin active control and/or monitoring. The CCM is "Asleep" when it has stopped control or monitoring and has become idle again. The Wake-Ups are as follows:

- Key In Door Lock Switch; L & R
- Door Ajar Switch; L & R
- Power Door Lock/Unlock Switch; L & R
- Hatch Ajar Switch
- Key In Ignition Switch
- Ignition "ON" (IGN 3)
- Park or head lamps "ON"

After the CCM is awake and the wake-up input is removed (i.e., a door is opened, then closed) the CCM will "go to sleep" again in 5-15 seconds. An exception to this is if the CCM sees engine rpm while it is awake (as it would under normal operating conditions). In this instance, the CCM will stay awake for approximately 30 seconds, after the ignition is turned "OFF" and all wake-ups are removed, including removing the ignition key. If the ignition key is in the ignition switch, but the switch is not in the "START" or "RUN" position, the CCM will stay awake for 30 minutes.

If the CCM sees a Door Ajar wake-up, and that wake-up remains active (i.e., the door remains open) for 15 minutes, the CCM will turn courtesy lights "OFF" if they were "ON." This is done to prevent battery drain if a door is inadvertently left open for an extended period of time. If the CCM sees the Hatch Ajar wake-up, and the hatch remains open, but all other wake-ups are removed, after 10 minutes the CCM will go to sleep. However, the cargo area lamps will stay "ON" until the hatch is closed.

POWER REQUIREMENTS

Operating current at the CCM's battery terminals should not exceed 1.0 amp while the CCM is awake; 200 milliamps is an approximately "normal" value. This may be higher if Delayed Accessory Bus (DAB) is active. The Delayed Accessory Bus system allows operation of the Audio System and/or power windows until a door is opened or 15 minutes passes. When the CCM is asleep, the current should not exceed 15 milliamps. Operating current drawn by the IGN 1 and IGN 3 terminals of the CCM should not exceed 100 milliamps each. See SECTION 6D1 for more details on CCM current drain in various awake and asleep conditions.

For most CCM functions, the CCM will operate properly with a system voltage of 9-16 volts.

ABBREVIATIONS/DEFINITIONS

Several abbreviations are commonly used throughout this section. They are presented here for easy reference.

ABS . . . . Antilock Brake System
ASR . . . . Acceleration Slip Regulation
ALDL . . . . Assembly Line Diagnostic Link
CKT . . . . Circuit
DAB . . . . Delayed Accessory Bus
DIC . . . . Driver Information Center
DVM . . . . Digital Volt Meter
EBCM . . . . . . Electronic Brake Control Module
ECM . . . . Electronic Control Module
EEPROM . . . . Electrically Erasable
Programmable Read-Only Memory
FEDS . . . . Fuel Enable Data Stream
HVAC . . . . Heating, Ventilation and
Air Conditioning
LCD . . . . Liquid Crystal Display
LED . . . . Light Emitting Diode
PASS . . . . Personalized Automotive
Security System
PWM . . . . Pulse-Width Modulated
SIR . . . . Supplemental Inflatable Restraint
UART . . . . . . Universal Asynchronous Receive
and Transmit
UTD . . . . Universal Theft Deterrent

OIL LEVEL MONITORING

CCM Monitoring Technique

The CCM monitors the engine oil level using a normally-closed grounding switch. The switch opens when the oil level is low. The procedure the CCM uses to determine a "Low Oil" condition considers many different variables and sequences of events, and is the same for both LT1 and LT5 engines.

To turn "ON" the "Low Oil" warning light, the following parameters must be met:

- Oil temperature during the previous ignition cycle must have been at least 90.6°C (195°F).
- Oil temperature must have dropped at least 40.6°C (105°F) since the engine was last running.
- The Oil Level Sensor must be open, indicating low oil, when the Ignition Switch is turned "ON."

Verification of Oil Level

If the "Low Oil" warning light comes "ON," verification of the oil level with the Oil Level Indicator ("dipstick") requires a 10 minute wait with the engine "OFF" for the LT1 engine, and a 2 hour wait with the

engine "OFF" for the LT5 engine. This waiting time is required for the oil to drain back into the oil pan from the various areas of the engine, and is especially important with the LT5 engine.

RESETTING "CHANGE OIL" INDICATOR

The "Change Oil" indicator is reset by using a sequence of Driver Information Center (DIC) keypresses as follows:

1. Turn ignition "ON," but do not start engine. (ALDL pin "G" should *NOT* be grounded.)
2. Press the "ENG/MET" button and release, then, within 5 seconds, press it again.
3. Within 5 seconds of Step 2, press and hold the "GAUGES" button. While the button is held, the "Change Oil" indicator will flash.
4. Continue holding the "GAUGES" button until the "Change Oil" indicator stops flashing and goes out, indicating successful completion of the reset cycle. This should take about 10 seconds. If it does not successfully reset, turn ignition "OFF" and repeat the procedure from Step 1.

DIAGNOSIS

The Central Control Module (CCM) utilizes the speedometer, odometer, and the trip monitor located on the instrument cluster to display information while in the diagnostic mode.

The speedometer is used to display fault codes (CCM, ABS/ASR and ECM), the odometer displays data, and the trip monitor indicates the system being tested and the test which is being performed. See Figure 1. The buttons on the Driver Information Center (DIC) are used to send instructions to the CCM when in the diagnostic mode. See Figure 4.

Unlike other vehicle electronic systems, such as ECM, SIR, etc., *there is no specific "CCM" lamp to indicate a fault.* A code-setting fault in any of the CCM-monitored systems is indicated by "SYS" (SYSTEM ERROR) flashing in the instrument cluster trip monitor. If a fault does not recur within 100 ignition cycles the CCM will automatically clear the code.

The "SYS" indicator will flash 3 times every 15 seconds while a current-code fault is present. An exception to the "SYS" fault indicator is that PASS-Key® faults (Codes 51-53) will be indicated by the "SECURITY" lamp being illuminated without the "SYS" indicator flashing. If there is a Fuel Enable Data Stream (FEDS) failure (Code 54), the "SECURITY" indicator and "SYS" indicator will flash together, to illustrate that the problem condition affects vehicle security. Refer to SECTION 9D for more information on the CCM and security system interaction.

DIAGNOSTIC MODE

To enter the diagnostic mode, ground pin "G" of the ALDL connector (Figure 3) and turn the ignition switch to the "ON" position.

⚡ Important

• If the A/C fuse is blown, the CCM will not receive IGN 3 power and will not enter Diagnostic Mode. This condition should also be indicated by a Code 16 being set.

After turning the ignition "ON," the CCM will display any fault codes and the module for which they apply in an automatic code display sequence. The CCM is Module 1, the ECM is Module 4, the ABS/ASR EBCM is Module 9. During the automatic display sequence, each code is displayed for three seconds, followed by a one second pause before the next code is displayed. There is a three second pause between the code display sequence for each module. The end of the code list for each module is indicated by "---" being displayed in the speedometer. If there is a communications problem between the ECM or EBCM and the CCM, the speedometer will display "Err" when the CCM is trying to communicate with the ECM or EBCM.

The particular module being interrogated is indicated on the trip monitor, and the codes are displayed on the speedometer. See Figure 2. The speedometer also indicates if the fault code is a current code (fault present now) or history code (fault has occurred, but is not present now) with a "C" or an "H", respectively. All ECM and EBCM codes will be displayed by the CCM as history codes, whether they are current or history.

When all fault codes have been displayed for all modules, the trip monitor will display 1.0 and the speedometer will be blank; this indicates the CCM is in the Manual Mode, waiting for input from the technician. At any time during the automatic code display sequence, the Manual Mode may be entered by pressing any button on the DIC.

MANUAL MODE

The Manual Mode can be entered as described previously, or will automatically be entered after the the automatic code display sequence is complete.

When Manual Mode is entered, the speedometer will be blank, and the trip monitor will display "1.0", indicating that module "1" (the CCM) is ready for further instructions. The buttons on the DIC are used to control other systems and options as illustrated in Figure 4.

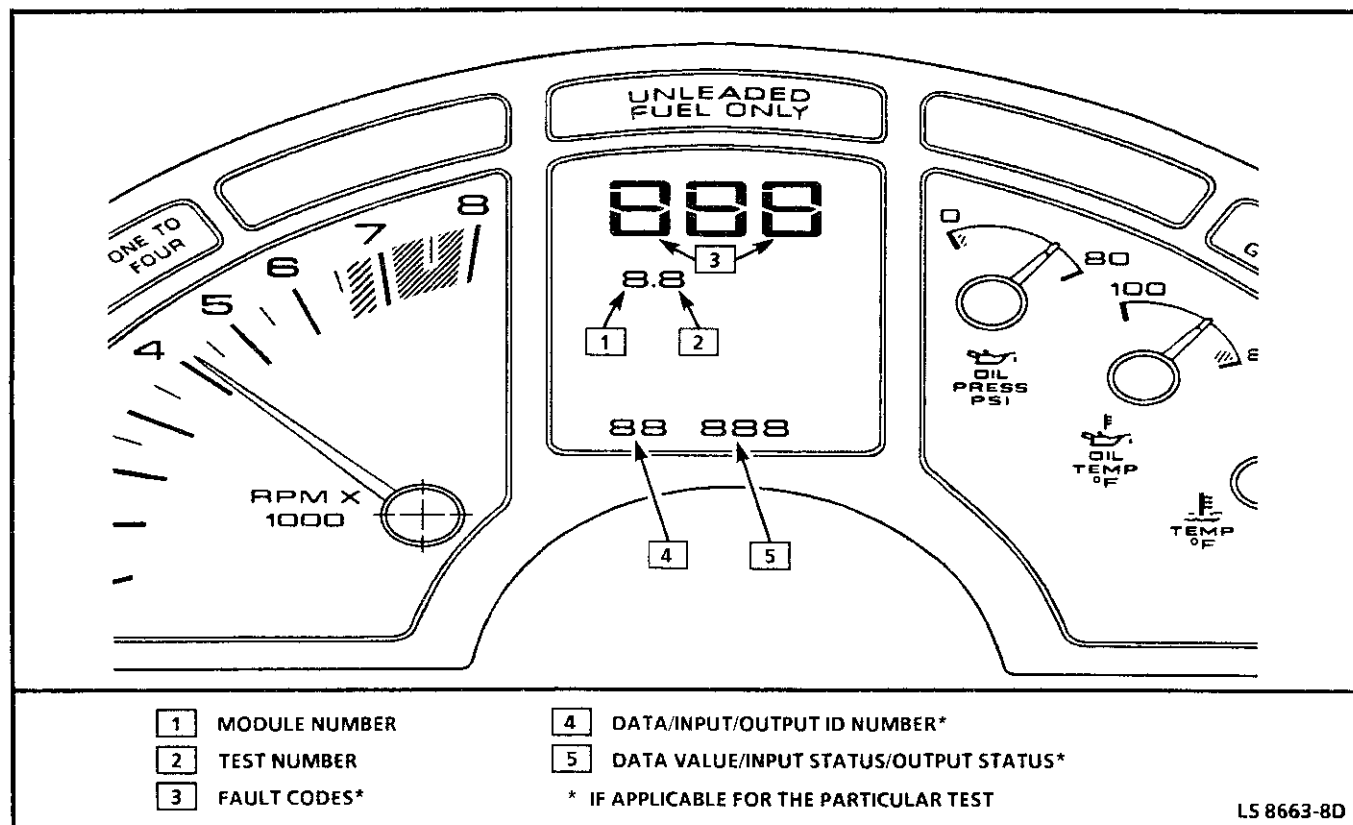| 1	MODULE NUMBER	4	DATA/INPUT/OUTPUT ID NUMBER*
2	TEST NUMBER	5	DATA VALUE/INPUT STATUS/OUTPUT STATUS*
3	FAULT CODES*		* IF APPLICABLE FOR THE PARTICULAR TEST

LS 8663-8D

Figure 1 - CCM Diagnostic Mode
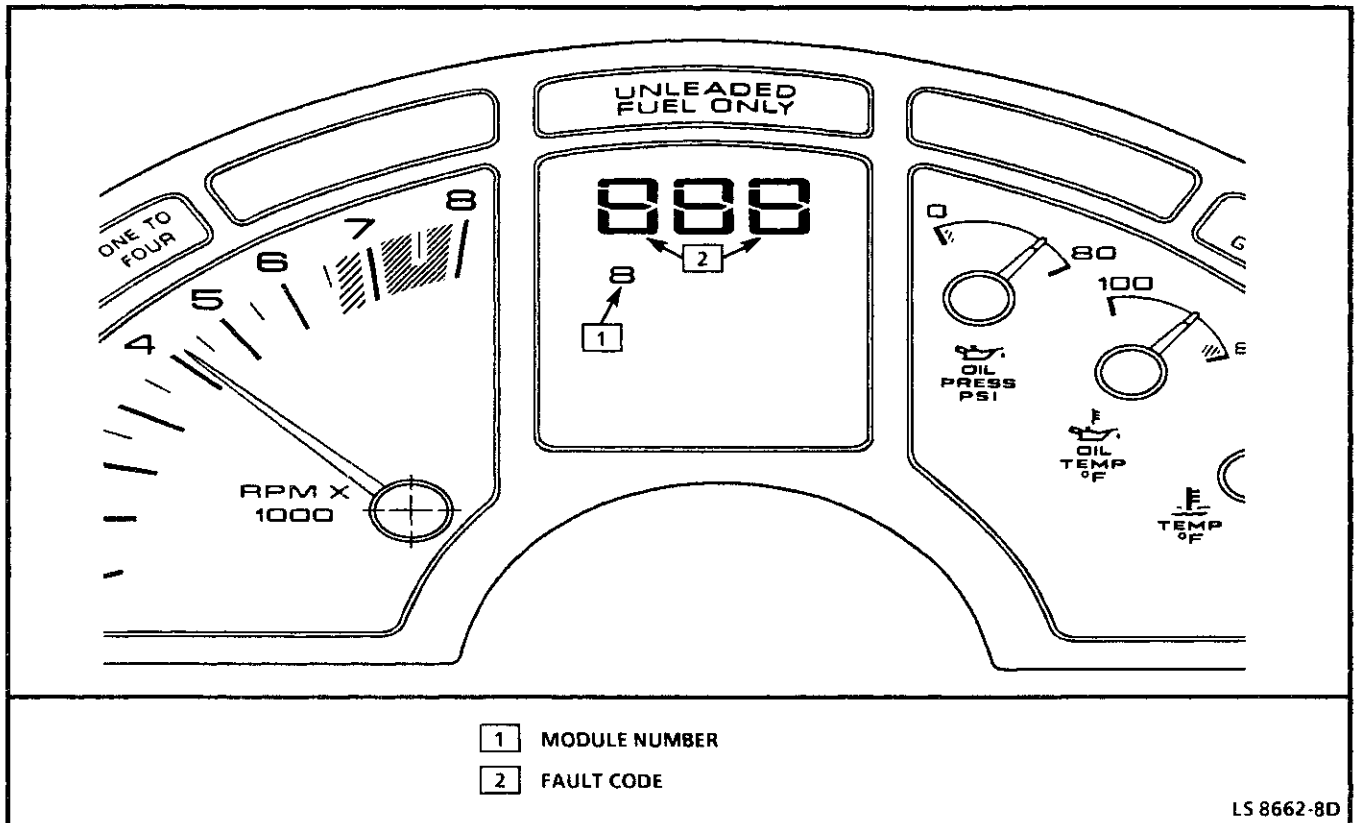
1 MODULE NUMBER

2 FAULT CODE

LS 8662-8D

Figure 2 - CCM Automatic Display Mode

The indicator "---" will be displayed on the speedometer if the end or the beginning of a list of malfunction codes is reached (using the "Next Value" or "Previous Value" button). The "---" will also display if no codes are present for the module being checked.

DIAGNOSTIC SYSTEM FUNCTIONS

In addition to displaying fault codes, the CCM is capable of displaying the state of its inputs and the data values it is using to make decisions. It is also capable of cycling many of its systems "ON" and "OFF." These diagnostic features are selected by using the DIC buttons. The functions available are shown on the trip monitor display as follows:

Display On Trip Monitor	Function
1.0	Waiting for Instructions; CCM
1.1	Display CCM Fault Codes
1.2	Display CCM Data
1.3	Display CCM Inputs Status
1.4	Cycle CCM Outputs
1.7	Clear CCM Fault Codes
4.0	Waiting for Instructions; ECM
4.1	Display ECM Fault Codes
4.7	Clear ECM Fault Codes

TERMINAL IDENTIFICATION

A	GROUND	G	CCM DIAGNOSTIC
B	ECM DIAGNOSTIC/LTPW DIAGNOSTIC	H	ANTILOCK BRAKE
C	RIDE CONTROL DIAGNOSTIC	J	E & C BUS DATA
		K	SIR DIAGNOSTIC
F	T.C.C. (VIN P)	L	SIR SERIAL DATA
* ECM, ANTILOCK BRAKE, CCM, HEATER/AC		M	SERIAL DATA * 5-9-91

9S 6984-6E
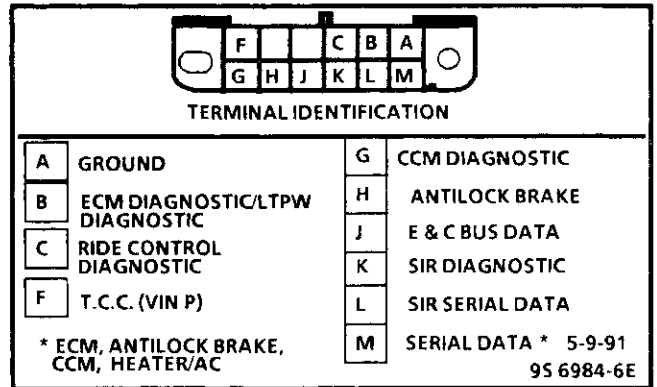
Figure 3 - ALDL Connector

9.0	Waiting for Instructions; ABS/ASR
9.1	Display ABS/ASR Fault Codes
9.7	Clear ABS/ASR Fault Codes

It is beneficial to become familiar with the features, operation, and capabilities of the CCM's diagnostics. These self-diagnostic features are referenced often in the CCM code charts, and also can be a great help in quick and correct diagnosis of non-code-setting problems.

Display CCM Fault Codes
(Diagnostic Mode 1.1)

To display CCM Fault Codes, select the Display Codes mode by pressing the "TRIP/ODO" button until "1.1" appears in the Trip Monitor area of the cluster. Then, press the "ENG/MET" button to display the first code. Continue pressing the "ENG/MET" button to display additional CCM codes, until the End-Of-Information indicator ("---") is displayed in the speedometer. A "C12" indicates no stored codes for the CCM.

If it is necessary to go backward in the list, use the "FUEL INFO" button. The top of the code list will be indicated by the "---" display in the speedometer.

The CCM Fault Code list is presented below.

CCM Fault Code List

Code	Definition
12	On-Board Diagnostics Operational; No Codes
13	DIC Switches Open or Shorted to B +
14	DIC Switches Shorted To Ground
16	Ignition 3 Fuse Circuit Open
21	Horn Relay Coil Shorted To B + or CCM Internal Open
22	Rear Defogger Relay Coil Shorted To B + or CCM Internal Open
24	Courtesy Lamp Relay Coil Shorted To B + or CCM Internal Open
25	Courtesy Lamp Relay Coil Circuit Open or Shorted To Ground
26	LCD Blanking Control Circuit Shorted To B + or CCM Internal Open
27	LCD Blanking Control Circuit Open or Shorted To Ground
31	LCD Data Circuit Shorted to B + or CCM Internal Open
32	LCD Data Circuit Open or Shorted to Ground
33	Data Clock Circuit Shorted to B + or CCM Internal Open
34	Data Clock Circuit Open or Shorted to Ground
35	Data Strobe Circuit Shorted to B + or CCM Internal Open
36	Data Strobe Circuit Open or Shorted to Ground
37	M Clock Circuit Shorted to B + or CCM Internal Open
38	M Clock Circuit Open or Shorted to Ground
41	Loss of ECM Serial Data Communications
51	PASS-Key® - Invalid Key Detection
52	PASS-Key® - Key Detection Circuit Shorted
53	PASS-Key® - Key Detection Circuit Open or Shorted to B +
54	FEDS - Fuel Enable Failure
61	PASS-Key® - Key #1 Programming Resistance Out of Range
62	PASS-Key® - Key #2 Programming Resistance High
63	PASS-Key® - Key #2 Programming Resistance Low
71	LCD Dimming Output Circuit Shorted to B + or CCM Internal Open
72	LCD Dimming Output Circuit Open or Shorted to Ground
73	LED Display Dimming Output Circuit Shorted to B + or CCM Internal Open
74	LED Display Dimming Output Circuit Open or Shorted to Ground

Display CCM Data
(Diagnostic Mode 1.2)

The CCM can display the data it is using to make its control decisions. This data can be helpful in determining if a system is operating properly and/or sending correct data to the CCM.

Select the Display Data function by repeatedly pressing the "TRIP/ODO" button until "1.2" is shown in the Trip Monitor area of the cluster. Then, press the "ENG/MET" button until the identifying number for the data value to be displayed is shown in the first two digits of the odometer. If it is necessary to go backward in the list, use the "FUEL INFO" button.

The data value is displayed as the last three digits of the odometer when in the Data Display mode. The data units displayed differ from item to item, and are listed below with the description of the Data ID Number and the system data. Letters in parentheses before an item's description indicate that there is a special note about that item. The notes are shown below the list.

An example of the use of the Data Display function, using a theoretical Courtesy Lamp system problem as an example, might involve the Ambient Light Sensor. The Courtesy Lamp system does not operate if there is a substantial amount of ambient light (i.e. it is not dark outside). If there were a problem with the Ambient Light Sensor circuit in which the CCM was always interpreting that it was daytime outside, the CCM would never turn the Courtesy Lights "ON." To check this possibility, select the Data Display function, then select the Ambient Light Sensor Data (Data ID 03). When the data is displayed, cover the light sensor and see if the data value changes. If not, the light sensor may be faulty, there may be a wiring fault, etc. This is an example of how the CCM's diagnostics can provide valuable information without any time spent on disassembly of the vehicle or probing of circuits.
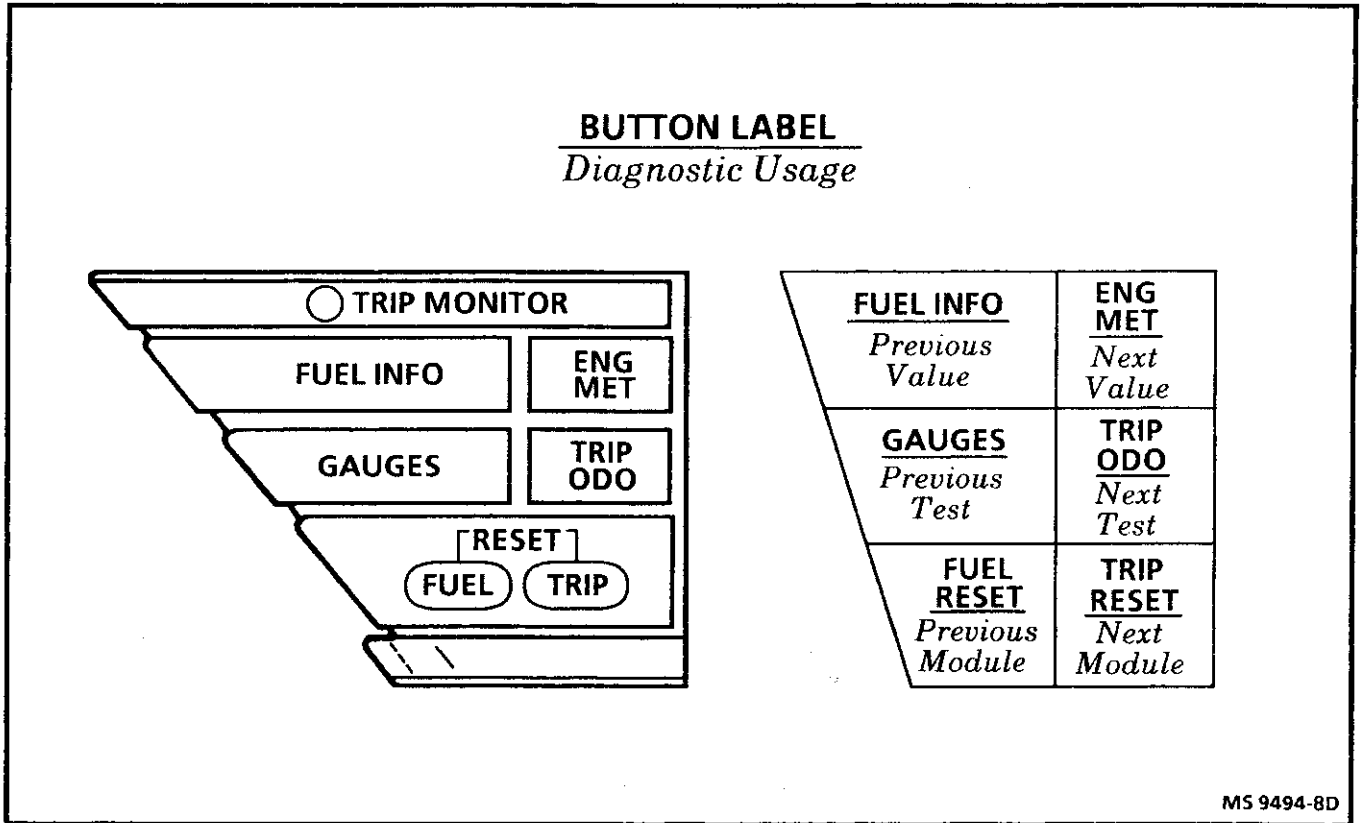
BUTTON LABEL
Diagnostic Usage

Figure 4 - Driver Information Center Buttons

Data ID
Number   Data (Units)
- 01   Fuel Level (Gallons.Tenths)
- 02   (A) Dimming Potentiometer (A/D Counts)
- 03   Ambient Light Sensor (A/D Counts)
- 04   (B) Rear Defogger Timer (Seconds)
- 05   Vehicle Speed (M.P.H.)
- 06   PASS-Key® A/D Counts
- 07   Ignition Voltage (Volts.Tenths)
- 08   Switched Battery Voltage (Volts.Tenths)
- 09   Cluster Incandescent Lamp Dimming PWM (0-100%)
- 10   Cluster LCD Backlight Lamps Dimming PWM (0-100%)
- 11   Radio & Climate Control LCD Backlight Lamps Dimming PWM (0-100%)
- 12   LED Dimming PWM (0-100%)
- 13   (C) Oil Monitor Effective Revolution (100,000 revolutions per count)
- 14   (D) CCM Software Version

NOTES:
(A) Headlights or Parking Lights must be "ON"
(B) Engine must be running.
(C) LT1: 0-200 counts/LT5: 0-250 counts.
(D) See Figure 5 for version number identification; note that the number 14 Data ID Number will not be displayed, due to the length of the version number.
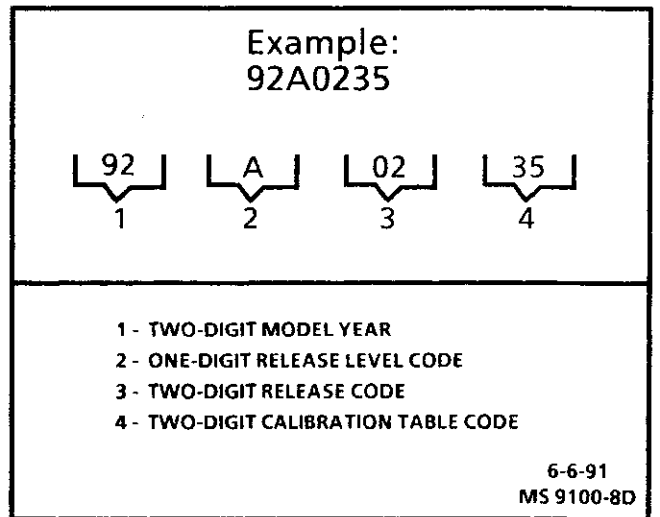
Figure 5 - Software Version Number Identification

Display CCM Inputs Status
(Diagnostic Mode 1.3)

The CCM can display the status of its inputs. This can assist in determining if the CCM is "seeing" a system operate as intended. For example, courtesy light operation requires seeing a door open, indicated by the Door Ajar Switch. If the courtesy lamps are not operating properly, a starting point might be selecting this diagnostic function and watching if the CCM recognizes the door opening and closing.

Select the Display Inputs function by repeatedly pressing the "TRIP/ODO" button until "1.3" is shown in the Trip Monitor area of the cluster. Then, press the "ENG/MET" button until the identifying number for the item to be monitored is shown in the first two digits of the odometer. If it is necessary to go backward in the list, use the "FUEL INFO" button.

The status of the item being monitored will appear in the last three digits of the odometer. The input status will be displayed as a "1" ("ON") or "0" ("OFF"). The display will constantly move to the left, one digit at a time. The first two digits in the odometer show the last two states of the selected input; the third digit shows the current state of the input. If, again using the Door Ajar Switch as our example, this mode was entered with the door open, a "1" would be displayed as the last digit in the odometer. If the door is then closed, the display would show "10" (system input "ON," then "OFF"). If we were to open the door again, a "101" in the odometer would indicate the system was "ON," then "OFF," and is currently "ON."

If an input state display never changes when a system is operated, that system could be stuck. If the display is constantly a "1", never changing to a "0", the input could be stuck "ON." This could be a short, a faulty switch, etc. If the input state is constantly a "0", the problem could be an open, a faulty switch, or a similar problem. Exceptions to this are Input ID's 01, 02, 06, and 14, which should not change or cannot be changed during diagnostics.

Letters in parentheses before an item's description indicate that there is a special note about that item. The notes are shown below the list.

Input ID

Number	*Input*	*1 =*
01	PASS-Key® Fuel	Enabled
02	(A) English/Metric Status	Metric
03	Door Key Switch	"ON"
04	Right Door Ajar	Open
05	Left Door Ajar	Open
06	(B) Key In Ignition	Closed
07	Hatch Ajar	Open
08	Power Door Unlock	Yes
09	Power Door Lock	Yes
10	Parking Lights	"ON"
11	(C) Rear Defogger Input	"ON"
12	(D) Seat Belt Switch	Buckled
13	(E) High Beam Switch Input	"ON"
14	Low Oil Level Switch	Low Oil

NOTES:

(A) English or Metric status must be selected with the system in normal operating mode, before the diagnostic mode is entered by grounding ALDL 'G'.

(B) The Key In Ignition switch is closed only if there is a key in the ignition when the Ignition Switch is in the "OFF" or "ACC" position. Therefore, if the input display shows a "1", the Key In Ignition switch or its circuits must be faulty; the CCM should not see a key when in the "RUN" position, which is the switch position when in diagnostics.

(C) The engine must be running to monitor this input. Also, with C68 HVAC systems, the rear defog switch sends a very short (90 millisecond) pulse when depressed. The CCM may not see the pulse the first time, so pressing the button more than once may be required.

(D) Driver's side seat belt only

(E) Headlights must be "ON"

Cycle CCM Outputs (Diagnostic Mode 1.4)

The CCM can cycle its outputs "ON" and "OFF." This can be very helpful in determining if certain portions of a circuit or components are in working order.

Select the Cycle Outputs function by repeatedly pressing the "TRIP/ODO" button until "1.4" is shown in the Trip Monitor area of the cluster. Then, press the "ENG/MET" button until the identifying number for the item to be cycled is shown in the first two digits of the odometer. If it is necessary to go backward in the list, use the "FUEL INFO" button.

The status of the output being cycled is shown as a "0" ("OFF") or a "1" ("ON"), in the last digit of the odometer. The output status cycles between "ON" and "OFF" every three seconds.

Using the courtesy lamp system as an example, cycling the output to the Courtesy Lamp Relay can indicate whether the circuitry from the CCM to the relay, the relay itself, and the circuitry from the relay to the bulbs are good. If, for example, when cycling the output to the Courtesy Lamp Relay, the relay is heard to be clicking and the I/P output indicator is cycling from "0" to "1" to "0", but the bulbs are not lighting when the display indicates "1" ("ON"), there is a good possibility that the problem lies in the wiring from the relay to the bulbs. In the same instance, if the relay were not cycling, it could be the wiring from the CCM to the relay, the relay, or in rare instances, the CCM itself.

Letters in parentheses before an item's description indicate that there is a special note about that item. The notes are shown below the list.

Output ID
Number	*Output*
01	Change Oil Indicator
02	(A) Check Gauges Indicator
03	Fasten Seatbelt Indicator
04	Security Lamp Indicator
05	High Beam Indicator
06	Chime 1
07	Chime 2
08	LCD Blanking Control
09	Rear Defogger Relay
10	Courtesy Lamp Relay
11	Low Oil Indicator
12	(B) Starter Enable Relay
13	Delayed Accessory Bus Relay
14	Horn Relay

NOTES:

(A) Engine must be running to see this indicator cycle; it will be "ON" without engine running because the gage systems it monitors will be outside their correct range.

(B) The starter enable relay output will be cycled only if the proper PASS-Key® is in the ignition or if PASS-Key® is unprogrammed.

Clear CCM Fault Codes (Diagnostic Mode 1.7)

After all diagnosis and repairs are completed, clear the CCM codes as follows. (If already in CCM Diagnostic Mode, begin at Step 3.)
1. With ignition "OFF," ground pin "G" of ALDL connector.
2. Turn ignition "ON."
3. Press "TRIP/ODO" button on DIC until "1.7" appears in the trip monitor area of the instrument cluster.
4. Press "ENG/MET" button on DIC and hold until "---" appears in speedometer area of cluster; this will clear CCM codes.
5. Turn ignition "OFF."
6. Turn ignition "ON" and verify that no CCM codes are present.
7. Turn ignition "OFF," then remove ALDL ground to pin "G".

Display ECM Fault Codes (Diagnostic Mode 4.1)

To display ECM Fault Codes, first select ECM as the appropriate module by pressing "TRIP RESET" until "4.0" is displayed in the Trip Monitor area of the cluster.

Then select the Display Codes mode by pressing the "TRIP/ODO" button until "4.1" appears. Then, press the "ENG/MET" button to display the first code. All ECM codes, whether current or not, will show as history codes. Continue pressing the "ENG/MET" button to display additional ECM codes, until the End-Of-Information indicator ("---") is displayed in the speedometer. If it is necessary to go backward in the list, use the "FUEL INFO" button. The top of the code list will be indicated by the "---" display in the speedometer.

The ECM fault code lists for both the LT1 and LT5 engines are shown below.

ECM Fault Code List (LT1; VIN P)

Code	*Definition*
13	Left Oxygen Sensor Open
14	Coolant Temp Sensor High Temp
15	Coolant Temp Sensor Low Temp
16	OPTI-Spark Low Res Pulse
21	TPS Signal Voltage High
22	TPS Signal Voltage Low
23	Intake Air Sensor Low Temp
24	Vehicle Speed Sensor
25	Intake Air Sensor High Temp
26	Quad-Driver Module #1
27	Quad-Driver Module #2
28	Quad-Driver Module #3
32	EGR System
33	MAP Sensor Voltage High/Low Vacuum
34	MAP Sensor Voltage Low/High Vacuum
36	OPTI-Spark High Res Pulse
41	EST Open or Shorted
42	EST Grounded
43	ESC Circuit Fault
44	Left Oxygen Sensor Lean
45	Left Oxygen Sensor Rich
51	MEM-CAL Faulty or Incorrect
52	Engine Oil Temp Sensor Low Temp
53	System Voltage Fault
55	Fuel Lean Monitor
62	Engine Oil Temp Sensor High Temp
63	Right Oxygen Sensor Open
64	Right Oxygen Sensor Lean
65	Right Oxygen Sensor Rich
66	A/C Pressure Sensor Open or Shorted
67	A/C Press Sens Degraded or Clutch Fault
68	A/C Relay Short
69	A/C Clutch Circuit
72	Gear Selector Switch Circuit

ECM Fault Code List
(LT5; VIN J)

Code	Definition
13	Left Oxygen Sensor (Open)
14	Coolant Sensor (High Temp)
15	Coolant Sensor (Low Temp)
16	DIS Fault Line Malfunction
21	TPS (Voltage High)
22	TPS (Voltage Low)
23	IAT Sensor (Temp Low)
24	Vehicle Speed Sensor
25	IAT Sensor (Temp High)
31	Cam Sensor Signal Problem
33	MAP Sensor (Voltage High)
34	MAP Sensor (Voltage Low)
36	DIS Fault Line/Missing or Extra EST Signal
41	Cylinder Select Error
42	EST System Malfunction
43	ESC System Malfunction
44	Left Oxygen Sensor (Lean)
45	Left Oxygen Sensor (Rich)
51	MEM-CAL Problem
52	Engine Oil Temp Sensor (Low Temp)
53	System Voltage Error
54	Fuel Pump Voltage Low
55	Fuel Lean Monitor
56	Vacuum Sensor Voltage Problem
61	Secondary Port Throttle System Malfunction
62	Engine Oil Temp Sensor High
63	Right Oxygen Sensor Circuit (Open)
64	Right Oxygen Sensor (Lean)
65	Right Oxygen Sensor (Rich)
66	Engine Power Switch Voltage (High or Low)

Clear ECM Fault Codes
(Diagnostic Mode 4.7)

After all diagnosis and repairs are completed, clear the ECM codes as follows. (If already in CCM Diagnostic Mode, begin at Step 3.)

1. With ignition "OFF," ground pin "G" of ALDL connector.
2. Turn ignition "ON."
3. Press "TRIP RESET" button on DIC until "4.0" appears in the trip monitor area of the instrument cluster.
4. Press "TRIP/ODO" button on DIC until "4.7" appears in the trip monitor area of the instrument cluster.
5. Press "ENG/MET" button on DIC and hold until "---" appears in speedometer area of cluster; this will clear ECM codes.
6. Turn ignition "OFF."

7. Turn ignition "ON" and verify that no ECM codes are present.
8. Turn ignition "OFF," then remove ALDL ground to pin "G".

Display ABS/ASR Fault Codes
(Diagnostic Mode 9.1)

To display ABS/ASR Fault Codes, first select ABS/ASR as the appropriate module by pressing "TRIP RESET" until "9.0" is displayed in the Trip Monitor area of the cluster, then select the Display Codes mode by pressing the "TRIP/ODO" button until "9.1" appears. Then press the "ENG/MET" button to display the first code. Continue pressing the "ENG/MET" button to display additional ABS/ASR codes until the End-Of-Information indicator ("---") is displayed in the speedometer. If it is necessary to go backward in the list, use the "FUEL INFO" button. The top of the code list will be indicated by the "---" display in the speedometer. The ABS/ASR Fault Code list is shown below.

ABS/ASR Fault Code List

Code	Description
21	RF Wheel Speed Sensor Fault
23	RF Wheel Speed Sensor Continuity Fault
25	LF Wheel Speed Sensor Fault
27	LF Wheel Speed Sensor Continuity Fault
28	Wheel Speed Sensor Frequency Error
31	RR Wheel Speed Sensor Fault
33	RR Wheel Speed Sensor Continuity Fault
35	LR Wheel Speed Sensor Fault
37	LR Wheel Speed Sensor Continuity Fault
41	RF Valve Solenoid Fault
44	Pilot Valve Solenoid Fault
45	LF Valve Solenoid Fault
51	RR Valve Solenoid Fault
55	LR Valve Solenoid Fault
57	Cruise Control Output Monitoring Fault
58	EBCM Internal Adjuster Assembly Fault
61	Pump Motor or Pump Motor Relay Fault
62	Tach Pulses Fault
63	Valve Solenoid Relay Circuit Fault
64	Throttle Position Signal Fault
65	Adjuster Assembly Fault
66	Adjuster Assembly Control Fault
71	EBCM Internal Fault
72	Serial Data Link Fault
73	Spark Retard Monitoring Fault
74	Low Voltage
75	Lateral Accelerometer Wiring Fault
76	Lateral Accelerometer Signal Out of Range
83	Brake Fluid Level Low

Clear ABS/ASR Fault Codes
(Diagnostic Mode 9.7)

After all diagnosis and repairs are completed, clear the ABS/ASR codes as follows. (If already in CCM Diagnostic Mode, begin at Step 3.)

1. With ignition "OFF," ground pin "G" of ALDL connector.
2. Turn ignition "ON."
3. Press "TRIP RESET" button on DIC until "9.0" appears in the Trip Monitor area of the instrument cluster.
4. Press "TRIP/ODO" button on DIC until "9.7" appears in the Trip Monitor area of the instrument cluster.
5. Press "ENG/MET" button on DIC and hold until "---" appears in speedometer area of cluster; this will clear ABS/ASR codes.
6. Turn ignition "OFF."
7. Turn ignition "ON" and verify that no ABS/ASR codes are present.
8. Turn ignition "OFF," then remove ALDL ground to pin "G".

HISTORY CODES

CCM history codes are those indicating that the CCM previously detected a fault which later disappeared. The reason could be either that the fault is an intermittent, only happening occasionally, or that the system for which the code is set is not currently being operated. An example of this would be the Rear Defogger system; it does not operate unless the engine is running. Since a technician would most likely be using CCM Diagnostics with the engine "OFF," a rear defogger code would always show as history, though the fault was currently present. For this reason, if a CCM code is displayed as a history code and the fault cannot be found easily, try clearing the codes and operating the system that the code applies to. Be sure to read the "Diagnostic Aids" portion of the code description page. "Diagnostic Aids" often contains information on certain settings the system must have before the code will set. If the code resets, it can be assumed that the condition is present.

⚠ Important

● All ECM and EBCM (ABS/ASR) codes will be displayed by the CCM as history codes, whether they are current or history.

INTERMITTENTS AND POOR CONNECTIONS

Refer to SECTION 8A-4 for a very thorough discussion of how to locate and repair intermittents and/or poor connections.