

SECTION 12K - TELEMATICS

IMPORTANT

Before performing any Service Operation or other procedure described in this Section, refer to Section 00 CAUTIONS AND NOTES for correct workshop practices with regard to safety and/or property damage.

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TOO LOW
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TOO HIGH
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STRENGTH PRESENT
DTC 45 – END CALL / INFORMATION
BUTTON STUCK
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DTC 47 - EMERGENCY BUTTON STUCK

5.9 SYMPTOMS CHARTS

NO SERIAL DATA
STATUS INDICATOR LEDS DO NOT
ILLUMINATE
VEHICLE BATTERY VOLTAGE
BACKUP BATTERY

NO GPS SIGNAL
NO GSM SIGNAL
EMERGENCY BUTTON
HOLDEN ASSIST BUTTON
END CALL / INFORMATION BUTTON
THEFT DETERRENT HORN CIRCUIT
DRIVER'S DOOR AJAR SWITCH
PASSENGERS DOOR AJAR SWITCHES
MICROPHONE
FUEL PUMP RELAY DRIVE CIRCUIT
AUDIO MUTE CIRCUIT
AUDIO SYSTEM INTERFACE
UNABLE TO MAKE OR RECEIVE A CALL
HOLDEN ASSIST TELEMATICS SYSTEM
TEST

6. TORQUE WRENCH SPECIFICATIONS

1. GENERAL INFORMATION

The telematics system has been developed using some of the most advanced Global Positioning System (GPS) and telecommunications technology, Global System for Mobile (GSM) Communications available. The telematics system provides in-vehicle safety, security and information services by providing a two way, hands free communication to either the Holden Assist Centre or, in the case of an emergency, to the National Emergency Response Centre (NERC™).

Holden Assist provides several services, some of which include remote door unlocking, connection to Holden Roadside Assistance, Low Battery Alert and Accident Inquiry. In addition it will know if theft of the vehicle is attempted, can then track the vehicle and in certain circumstances, remotely immobilise the engine. For a full list of services provided by Holden Assist, refer to the Holden Assist Handbook Supplement.

The link between the vehicle and the Holden Assist Centre or the National Emergency Response Centre uses GPS for vehicle location and tracking and the Australian digital mobile phone network to transmit and receive voice and SMS (Short Message Service) data. If the vehicle is outside network coverage, the link to and from the vehicle will not be available and no services can be provided. Signal strength may be affected in locations like basement car parks or tunnels. However, in most cases, as the vehicle emerges from the obstruction or re-enters the digital phone network area the signal will be available again.

A vehicle equipped with the telematics system will be delivered from the vehicle assembly plant to the retail outlet with the telematics system in the pre delivery mode. During the pre delivery of the vehicle, the telematics module pre delivery mode must be disabled and the service mode must be enabled using TECH 2. In service mode, limited service will be provided until the customer has signed the terms and conditions document and the customer has set up the system by pressing the Holden Assist button located in the telematics button pad on the interior rear view mirror. The Holden Assist operator will then disable service mode and the system will be fully operational. The set up procedure information is provided in the Holden Assist Handbook Supplement.

The telematics module has a built-in diagnostic system that identifies system operational problems and alerts the driver by illuminating the Red LED in the interior rear view mirror. If the LED is continuously illuminated with the ignition on, the telematics system will not be functional and the cause of the lamp coming on should be checked as soon as is reasonably possible.

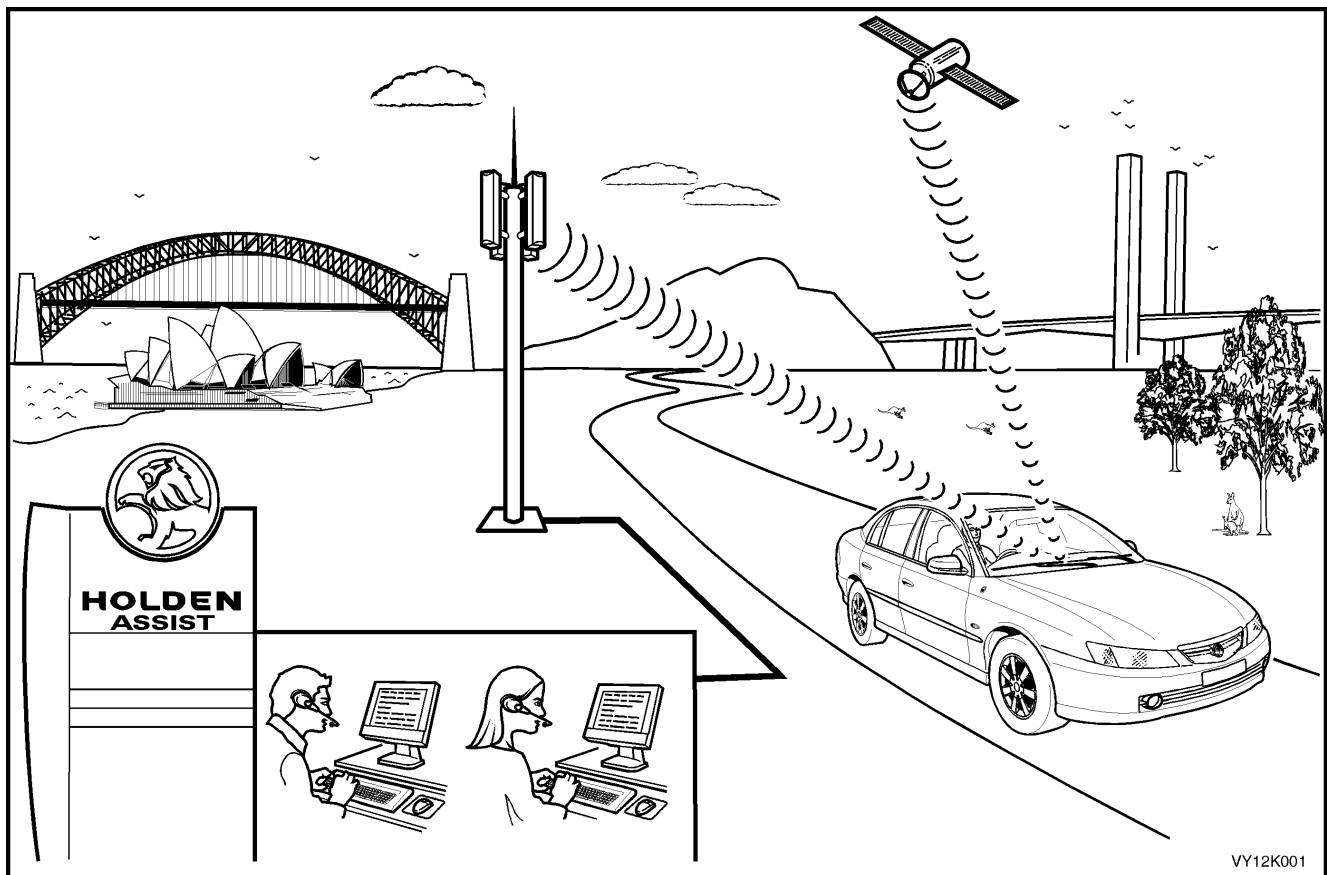
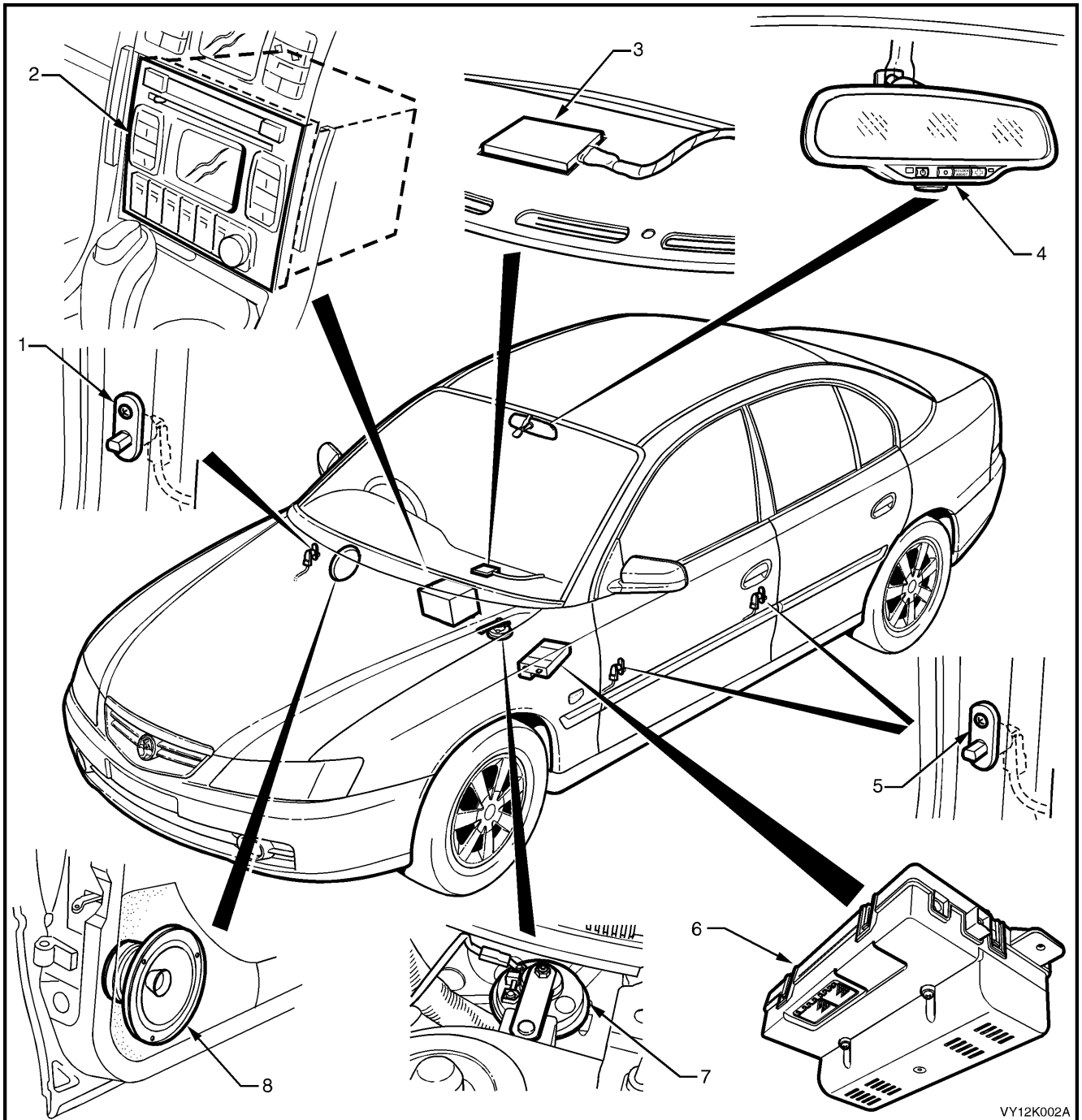


Figure 12K-1



VY12K002A

Figure 12K-2

Legend:

- | | | |
|---------------------------------|----------------------------------|-----------------------------|
| 1. Driver's Door Ajar Switch | 4. Interior Rear View Mirror | 7. Theft Deterrent Horn |
| 2. Audio Head Unit | 5. Passengers Door Ajar Switches | 8. Right Front Door Speaker |
| 3. Telematics GSM & GPS Antenna | 6. Telematics Module | |

2. PRINCIPLES OF OPERATION

2.1 OPERATING MODES

The telematics system has six operating modes, Pre Delivery, Service, Active, Stand-by, Sleep and Battery Saver. The purpose of these different operating modes is to minimise the system current draw and allow features to be enabled or disabled depending on the operating mode.

PRE DELIVERY MODE

In the pre delivery mode the system is not operational. The vehicle will be delivered from the assembly plant to the dealer with the telematics system in the pre delivery mode. Before the vehicle is delivered to the customer, the telematics system must be taken out of the pre delivery mode using TECH 2. Refer to **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode, in this Section. When in pre delivery mode the telematics module will only communicate with TECH 2, and only when the ignition is ON.

SERVICE MODE

When the vehicle is scheduled to be serviced, the telematics system service mode should be activated. The customer may request the Holden Assist Centre to remotely enable or disable service mode. A service technician can also activate or inactivate service mode with TECH 2. Refer to **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode, in this Section.

When the service mode is activated the telematics module will ignore all button presses except for the Holden Assist button. In addition, the module will not transmit alert messages for unauthorised entry or low battery. However the module will transmit an airbag activation alert.

ACTIVE MODE

This is the normal telematics system operating mode. In this mode the telematics system is fully functional and can make and receive calls, and transmit data via the GSM network. The current draw of the telematics module in this mode will be approximately 150 mA.

STAND-BY MODE

Two hours after the ignition has been turned off or two minutes after the ignition has been turned off and a door has been opened and closed, or two minutes after the conclusion of a call while the ignition is off if stand-by mode is pending, the telematics module will enter stand-by mode. In stand-by mode the GPS, audio and the keypad buttons are turned off to reduce the standing current of the telematics module.

The telematics module will enter the stand-by mode:

Two hours after the ignition is turned off, or two minutes after the ignition has been turned off and a door has been opened, or two minutes after the conclusion of a call when the ignition is off if stand-by mode is pending.

The telematics module will be “woken” from the stand-by mode by any of the following:

- An incoming message / call.
- The ignition is turned on.
- Any door is opened.
- The alarm is triggered.
- The vehicle battery is disconnected.
- A TECH 2 diagnostic request.

SLEEP MODE

The telematics module will enter the sleep mode on request from the Holden Assist Centre or 30 minutes after a low battery alert has been sent to Holden Assist Centre, or after five days of uninterrupted ignition off. In sleep mode the telematics module only monitors the inputs required for it to be “woken” from sleep mode.

The system may be “woken” from sleep mode by any of the following:

- Any door is opened.
- The alarm is triggered.
- A battery removal alert.

BATTERY SAVER MODE

The purpose of the battery saver mode is to limit the standing current of the telematics module while still providing the ability to remotely unlock the vehicle. After 24 hours of no activity (ignition on, any door opened, SMS received, unauthorised entry alert, low battery alert) the telematics module will enter battery saver mode. In this mode, the telematics module will switch between sleep mode and active mode. During active mode operation the telematics module will log onto the GSM network and any pending remote unlock SMS messages stored in the network will be received by the telematics module, and the doors will be unlocked. If no SMS messages are received, the telematics module will return to sleep mode. After four days of this mode operation and no activity, the telematics module will remain in sleep mode.

2.2 ALERTS

AIRBAG ACTIVATION ALERT

If the vehicle is involved in an accident where the airbags and/or the seat belt pre-tensioners are activated, an "Airbag Activation Alert" message will be transmitted to the Holden Assist Centre. If the Holden Assist Centre operator is unable to contact the driver via two-way voice communication in the vehicle, or if the driver cannot respond, the operator will hand the call over to the National Emergency Response Centre, who will then contact the Police. The Police may then contact the ambulance service. For further information regarding the airbag activation alert, refer to the Holden Assist Handbook Supplement.

LOW BATTERY VOLTAGE ALERT

If the vehicle battery voltage falls below a preset voltage for longer than 30 minutes, the telematics module will transmit a "Low Battery Alert" message to the Holden Assist Centre. The low battery alert voltage is displayed in the TECH 2 data list. For further information regarding the low battery alert refer to the Holden Assist Handbook Supplement.

BATTERY REMOVAL ALERT

If the vehicle battery is disconnected, (battery voltage less than one volt), the telematics module will transmit a "Battery Removal Alert" message to the Holden Assist Centre. For further information regarding the battery removal alert refer to the Holden Assist Handbook Supplement.

UNAUTHORISED ENTRY ALERT

If the vehicle entry deterrent system is triggered for longer than 20 seconds, the telematics module will transmit an "Unauthorised Entry Alert" message to the Holden Assist Centre. For further information regarding the unauthorised entry alert refer to the Holden Assist Handbook Supplement.

2.3 HOLDEN ASSIST REMOTE REQUESTS

ENGINE IMMOBILISATION

In the event of the vehicle being stolen, it is possible for the NERC™ to remotely immobilise the engine by sending an “immobilise” message to the telematics module. This function can only be activated by the NERC™ under instruction from the Police. On receiving the “immobilise” message, the telematics module will then turn off the fuel pump relay, cutting off the supply of fuel to the engine and command the BCM (via the serial data circuit) to flash the indicators. The engine will remain immobilised until the “re-mobilise” message is received from NERC™.

There are two types of remote immobilisation:

IMMEDIATE ENGINE IMMOBILISATION

On receiving an “Immediate Engine Immobilisation” message from the NERC™, the telematics module will immediately turn off the fuel pump relay, cutting off the supply of fuel to the engine and command the BCM (via the serial data circuit) to flash the indicators.

UNDER 10 KPH ENGINE IMMOBILISATION

On receiving an “Under 10 kph Engine Immobilisation” message from the NERC™, the telematics module will wait until the vehicle speed is less than 10 kph before turning off the fuel pump relay, cutting off the supply of fuel to the engine and command the BCM (via the serial data circuit) to begin flashing the indicators.

REMOTE UNLOCKING

On receiving a “Remote Unlock” message from the Holden Assist Centre, the telematics module will command the BCM (via the serial data circuit) to unlock the doors. When any door is opened after a remote unlock, the alarm will be activated. To turn the alarm off, locate the keys and either press the unlock button, or turn the ignition on. If the telematics module is operating in Battery Saver Mode the remote unlock may be delayed as much as 15 minutes.

NOTE: A Remote Unlock from the Holden Assist Centre will not function while the TECH 2 is accessing any module diagnostic information.

2.4 TELEMATICS MODULE

The telematics module, located under the instrument panel, above and to the left of the instrument panel compartment, controls the operation of the telematics system. The telematics module consists of a GPS and GSM engine and a Serial Data Interface. The telematics module monitors vehicle operating conditions via discrete inputs, the serial data bus and controls system outputs.

The telematics module also receives and transmits GSM information via the GSM antenna and receives GPS information via the GPS antenna.

The telematics module interfaces with other control modules in the vehicle via the serial data circuit normal mode message. For further information regarding the serial data bus and normal mode message refer Section **1.2 SERIAL DATA COMMUNICATION** in Section 12J Body Control Module. TECH 2 is also capable of communicating with the telematics module via the serial data circuit.

NOTE:

If at any time a new telematics module is installed into the vehicle, then this new module must be registered with Holden Assist. To register this new module with Holden Assist refer to **3. SERVICE OPERATIONS** Telematics Module Changeover Process in this Section.

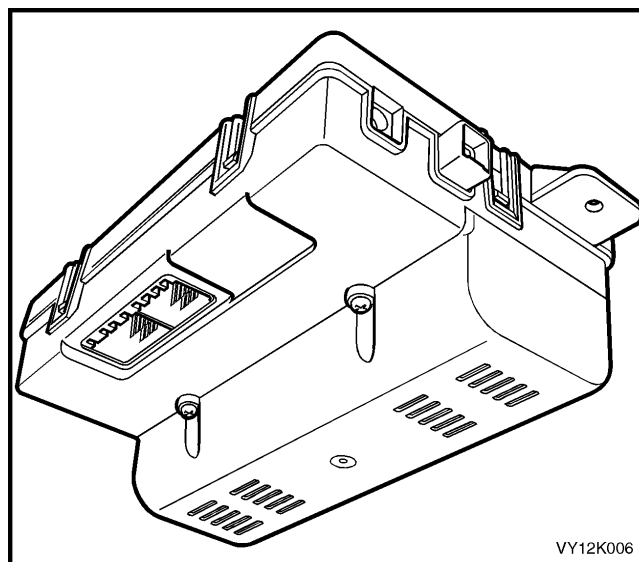


Figure 12K-3

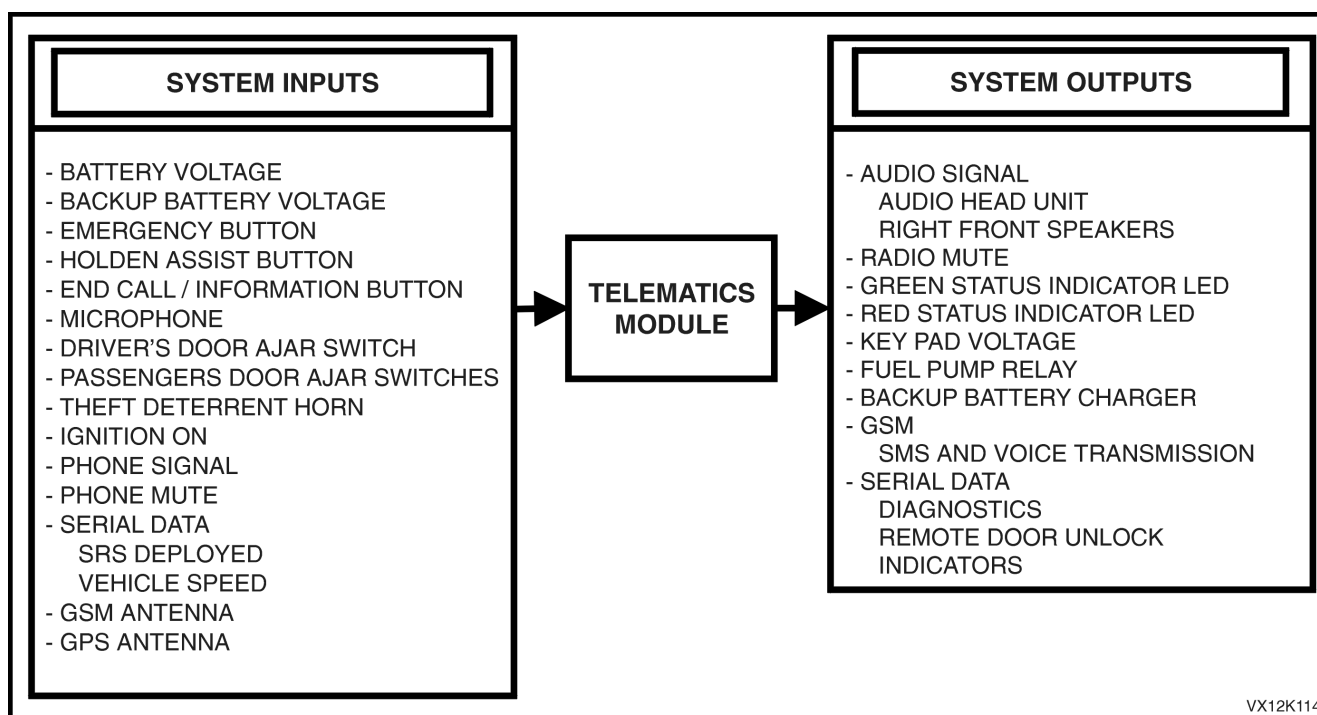


Figure 12K-4

2.5 INTERIOR REAR VIEW MIRROR

The interior rear view mirror assembly contains the telematics button pad, microphone and the status LEDs.

Legend:

1. End Call / Information Button
2. Holden Assist Button
3. Microphone
4. Emergency Button
5. Status Indicator LEDs

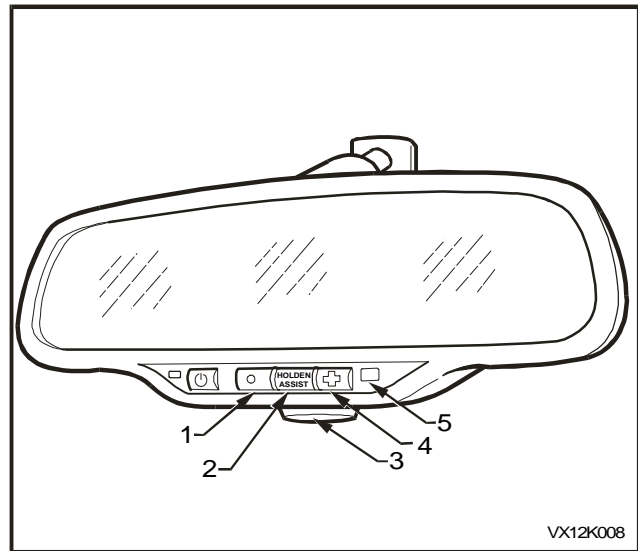


Figure 12K-5

TELEMATICS BUTTON PAD

The telematics button pad is a resistor encoded switch, which means that each button has a separate and different value resistor connected to it. The telematics module uses a voltage divider circuit to determine which button has been pressed. The telematics module A158 (refer Figure 12K-6) supplies a 12 volt signal voltage to terminal X1-12 of the rear view mirror connector circuit 2515 (Light Green/Black wire). Whenever a button is pressed the corresponding switch is closed and circuit 2514 (Dark Green/White wire) is connected to ground through a resistor, each switch having a different value resistor. The telematics module monitors the voltage on circuit 2514 (Dark Green/White wire) at terminal X2-9, which will change when any of the buttons are pressed.

EMERGENCY BUTTON

When the emergency button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 3.8 Volts. The telematics module determines this voltage at terminal X2-9 as an emergency button press. The telematics module will initiate a voice call to an operator at the National Emergency Response Centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

If the emergency button is pressed while a Holden Assist call is in progress then the status of the call shall be upgraded to an emergency call, and the telematics module will not be permitted to terminate the call by pressing the "End Call / Information" button.

If the emergency button is pressed while the vehicle is outside GSM network range, the telematics module will enter "Emergency Call Mode" where by the emergency call request will be retained. When contact is re-established with the GSM network, the emergency call will be placed immediately.

HOLDEN ASSIST BUTTON

When the Holden Assist button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 2.3 Volts, the telematics module determines this voltage at terminal X2-9 as an Holden Assist Button press. The telematics module will initiate a voice call to the call centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

END CALL / INFORMATION BUTTON

When the end call / information button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 0.7 Volts, the telematics module determines this voltage at terminal X2-9 as an end call / information button press. If end call / information button is pressed to make a call, you will be connected to Holden Assist information services. Pressing this button while a call is connected will disconnect the call. It however will not disconnect a call while the call is ringing the information service number or the Holden Assist number. It is not possible for the end call / information button to disconnect an emergency call or a Holden Assist call that has been upgraded to emergency call status.

MICROPHONE

The active microphone in the interior rear view mirror provides a means for voice communication to the vehicle occupants and the Holden Assist Centre.

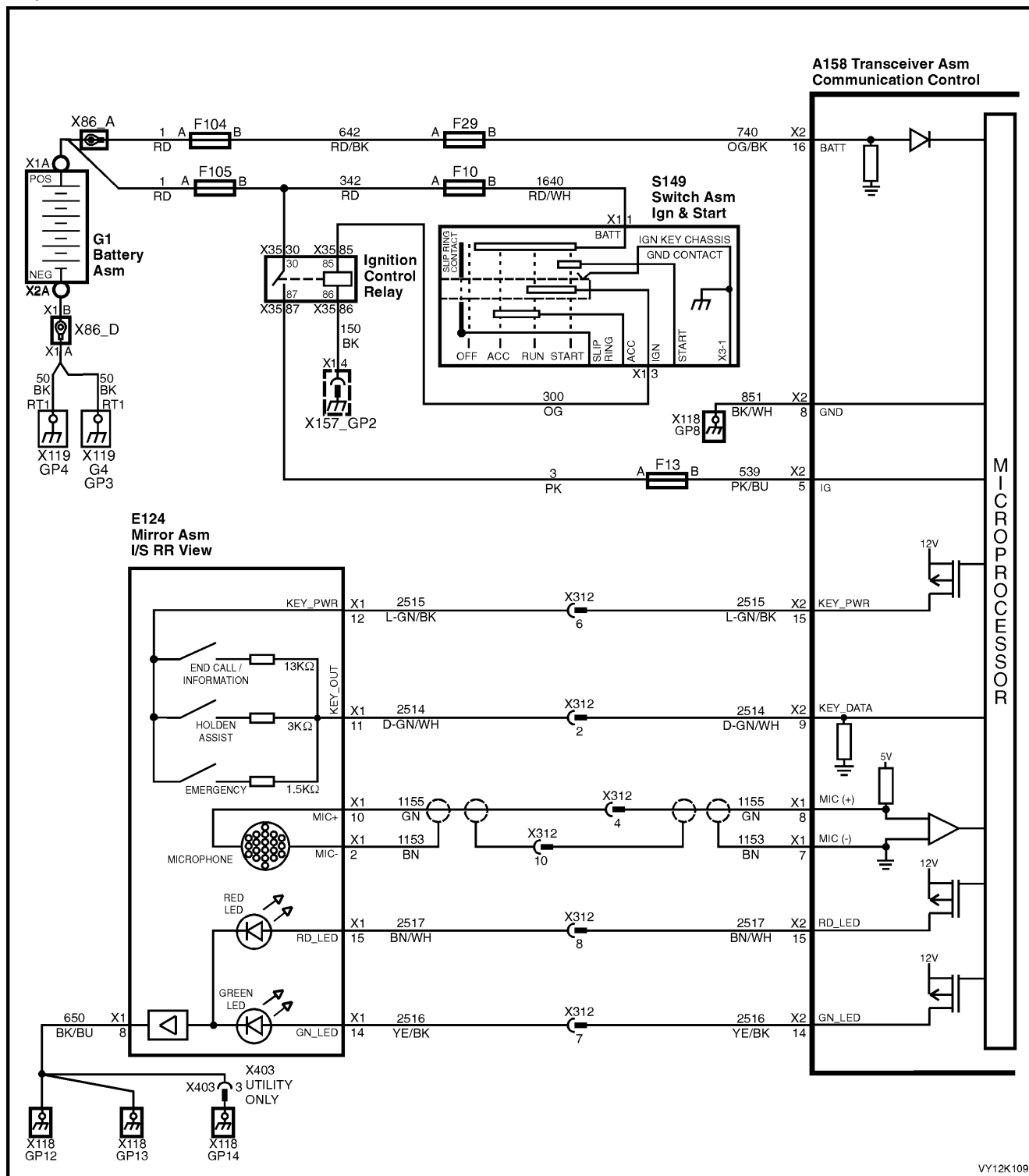


Figure 12K-6

STATUS INDICATOR LEDS

The red and green status indicator LEDs in the interior rear view mirror indicate the current status of the telematics system. The telematics module activates the LEDs by switching a 12 power supply to each LED on or off. The brightness of the LEDs is controlled by the interior rear view mirror electronics, which will vary the brightness of the LEDs depending on the ambient light and the ignition switch position. If the ambient light is low the brightness of the LEDs will be decreased when the ignition is on. If the ambient light is high there will be no change to the brightness of the LEDs when the ignition is turned on.

LED	Condition	Current Status
Green	Continuous	Self-test pass, system OK (no current DTC logged).
Green	Flashing (0.5 sec ON / 0.75 sec OFF)	System OK (no current DTC logged), and <ul style="list-style-type: none">• Call being connected, or• Call in progress.• Emergency call mode
Red	Continuous	<ul style="list-style-type: none">• Self-test failure (current DTC logged), or• Unit is in Service Mode, or• System test in progress.
Red	Flashing (0.5 sec ON / 0.75 sec OFF)	Self-test failure (current DTC logged), and <ul style="list-style-type: none">• Call being connected, or• Call in progress.
Red & Green	OFF	<ul style="list-style-type: none">• Performing power-up self-test• Stand-by mode• Sleep mode• No power to telematics module
Orange (Red & Green)	Continuous	<ul style="list-style-type: none">• Vehicle is not within GSM network range
Orange (Red & Green)	Flashing	<ul style="list-style-type: none">• Unit is in "Emergency Call Mode"
Red/Green	Alternate Flashing (0.5 second alternating) (5 second duration after ignition on)	<ul style="list-style-type: none">• Unit in service mode, or• Unit in VAP mode.

The colour of the LED indicates the status of the system. If there is a system fault during a call the LED will flash red. If there are no system faults, then the LED will flash green.

2.6 AUDIO SYSTEM INTERFACE

AUDIO SYSTEM AND RHF SPEAKERS

The telematics system uses the vehicle audio system to provide a means for voice communication from the Holden Assist call centre. The telematics module also has the ability to detect if the audio system is not operational, and will switch from the vehicle audio system to the RHF speakers, if it detects that the audio system is not operational.

Whenever the telematics audio is activated the radio mute signal is also activated and the telematics module grounds the radio mute circuit 5211 (Yellow/Black wire) causing the circuit voltage to be pulled low, less than two Volts. This low voltage is detected by the radio as a mute request and when received, the audio system will mute. The volume of the telematics call can then be adjusted using the audio system volume control. If the telematics module switches to the RHF speakers the volume is fixed by the telematics module.

Whilst the telematics system is not on a call the audio and mute request from the cellular telephone connector will be passed through the telematics module to the audio system. When a Holden Assist call is active, the telematics module will ignore the phone audio and transmit the telematics audio to the audio system.

AUDIBLE TONES

Audible tones are also provided to indicate the system status and are broadcast via the speaker to alert the customer to certain operating conditions.

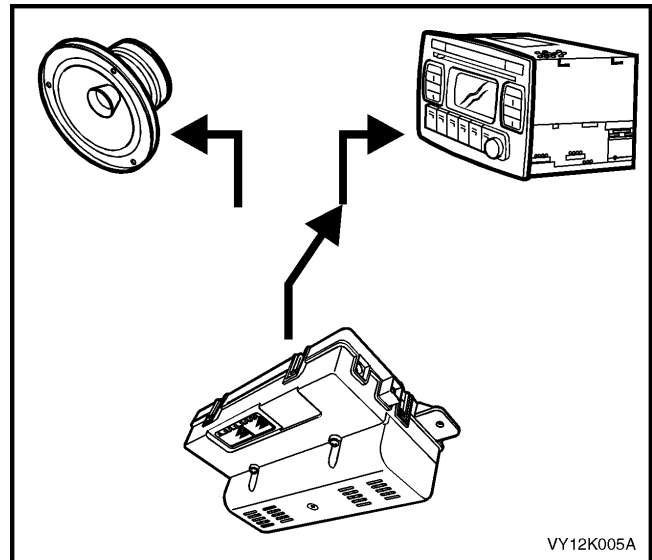


Figure 12K-7

Tone	Operating Condition
Five Tones	<ul style="list-style-type: none">Attempting to make call when vehicle is not within GSM network range, or if the five tones occur after the ignition is turned off, the vehicle is not within GSM network range.Warning that Service Mode is active or a system malfunction has been detected and a Diagnostic Trouble Code has been stored in the telematics module.

2.7 BACKUP BATTERY

The backup battery (1) is housed in the battery compartment of the telematics module. The backup battery will provide power to the telematics module for at least 30 minutes in the event of the vehicle battery being discharged or disconnected. The telematics module has a backup battery charging circuit that maintains the backup battery state of charge. This circuit also includes an over current protection device. The telematics module has a back up battery timer that monitors the time the back up battery has been in the vehicle.

After the back up battery has been in the vehicle for 5 years (43680 hours) it has reached the end of its useful life (internal deterioration causing low charge acceptance) DTC 13 will be set and the red status LED will be illuminated, for further information refer **DTC 13 - Backup Battery Timer Expired** in this Section.

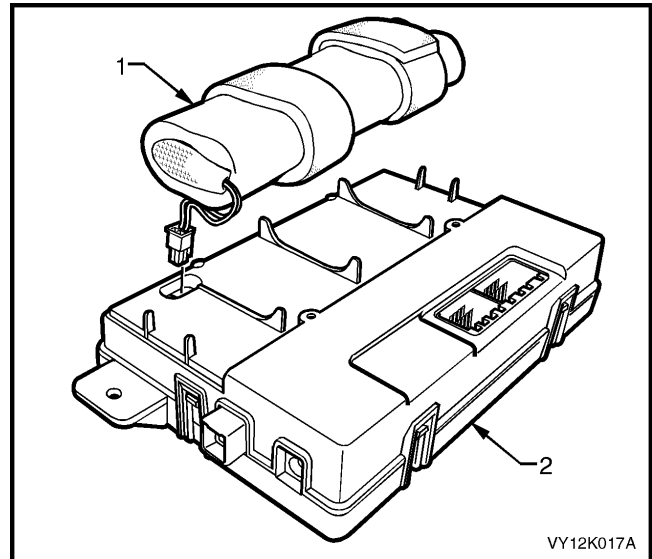


Figure 12K-9

2.8 BATTERY VOLTAGE

Battery voltage is applied to the telematics module terminal X2-16 at all times via circuit 740 (Orange/Black wire), fuse F29 and fusible link F104 (refer Figure 12K-10). If the battery voltage fails below a preset voltage for longer than 30 minutes, the telematics module will transmit a Low Battery Alert to the Holden Assist Centre. Refer [2.2 ALERTS, Low Battery Voltage Alert](#) in this Section for further information. If the battery is removed the telematics module will transmit a Battery Removal Alert to the Holden Assist Centre. Refer [2.2 ALERTS, Battery Removal Alert](#) in this Section for further information.

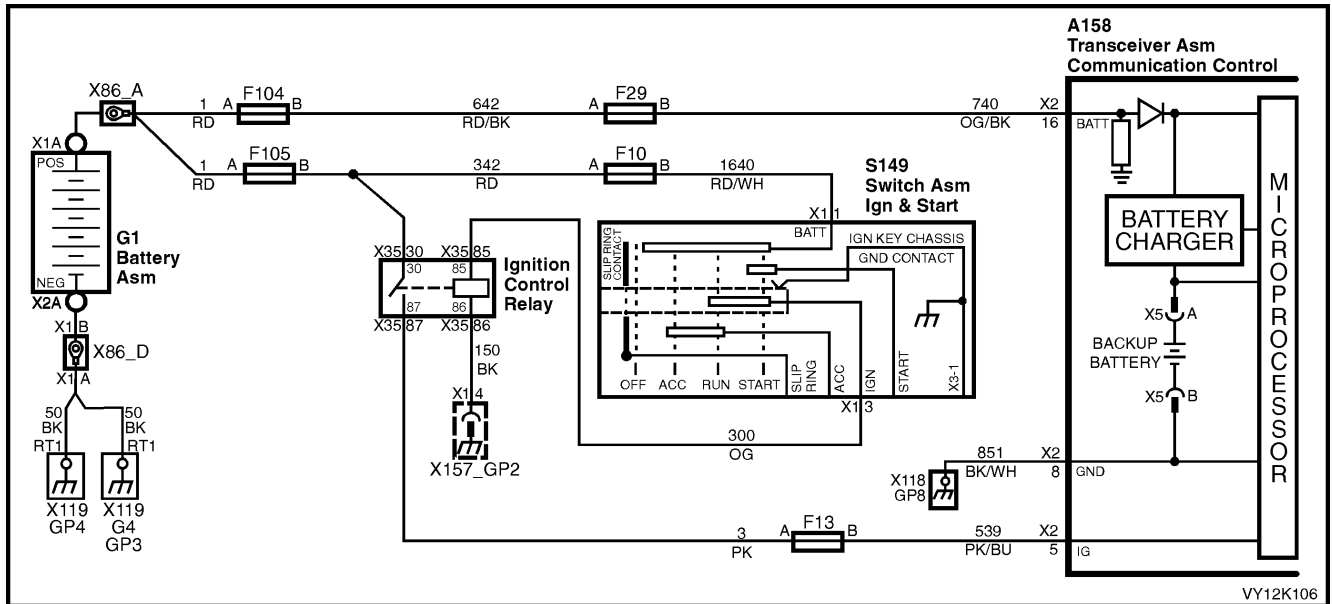


Figure 12K-10

2.9 BACKUP BATTERY CHARGER

The telematics module constantly monitors both vehicle battery voltage and backup battery voltage. The charging circuit constantly monitors the backup battery voltage to determine if the backup battery needs to be charged at a maximum of up to 300mA.

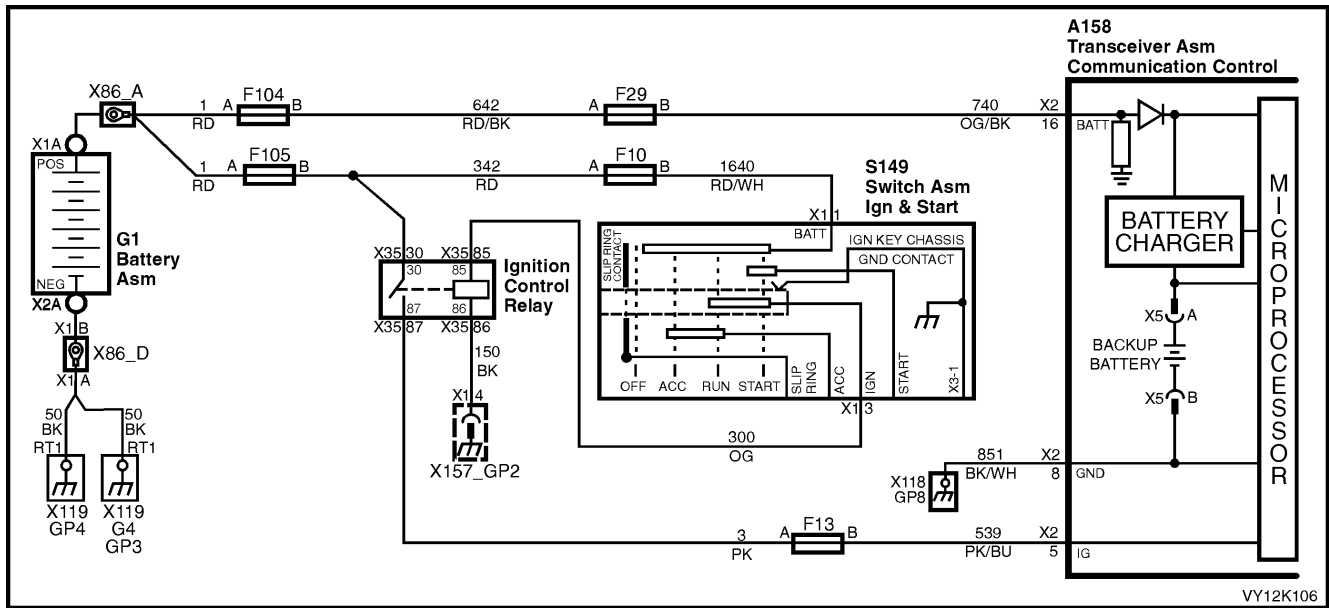


Figure 12K-11

2.10 SERIAL DATA

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM and Vehicle Speed from the PCM. For further information regarding the serial data bus and normal mode message, refer [1.2 Serial Data Communication](#) in Section 12J Body Control Module in this Service Information.

If the telematics module receives a "Remote Unlock" message from the Holden Assist Centre, the telematics module will request the BCM (via the serial data circuit) to unlock the doors. For further information regarding the BCM door lock operation, refer [Section 12J Body Control Module, Central Door Locking Systems](#) in this Service Information.

If the telematics module receives a "Immobilise" message from NERCTM, the telematics module will then turn off the fuel pump relay (refer [2.15 Fuel Pump Relay Drive Circuit](#) in this Section) cutting off the supply of fuel to the engine and request the BCM (via the serial data circuit) to flash the indicators. For further information regarding the BCM indicator operation, refer [Section 12J Body Control Module, Theft Deterrent System](#) in this Service Information.

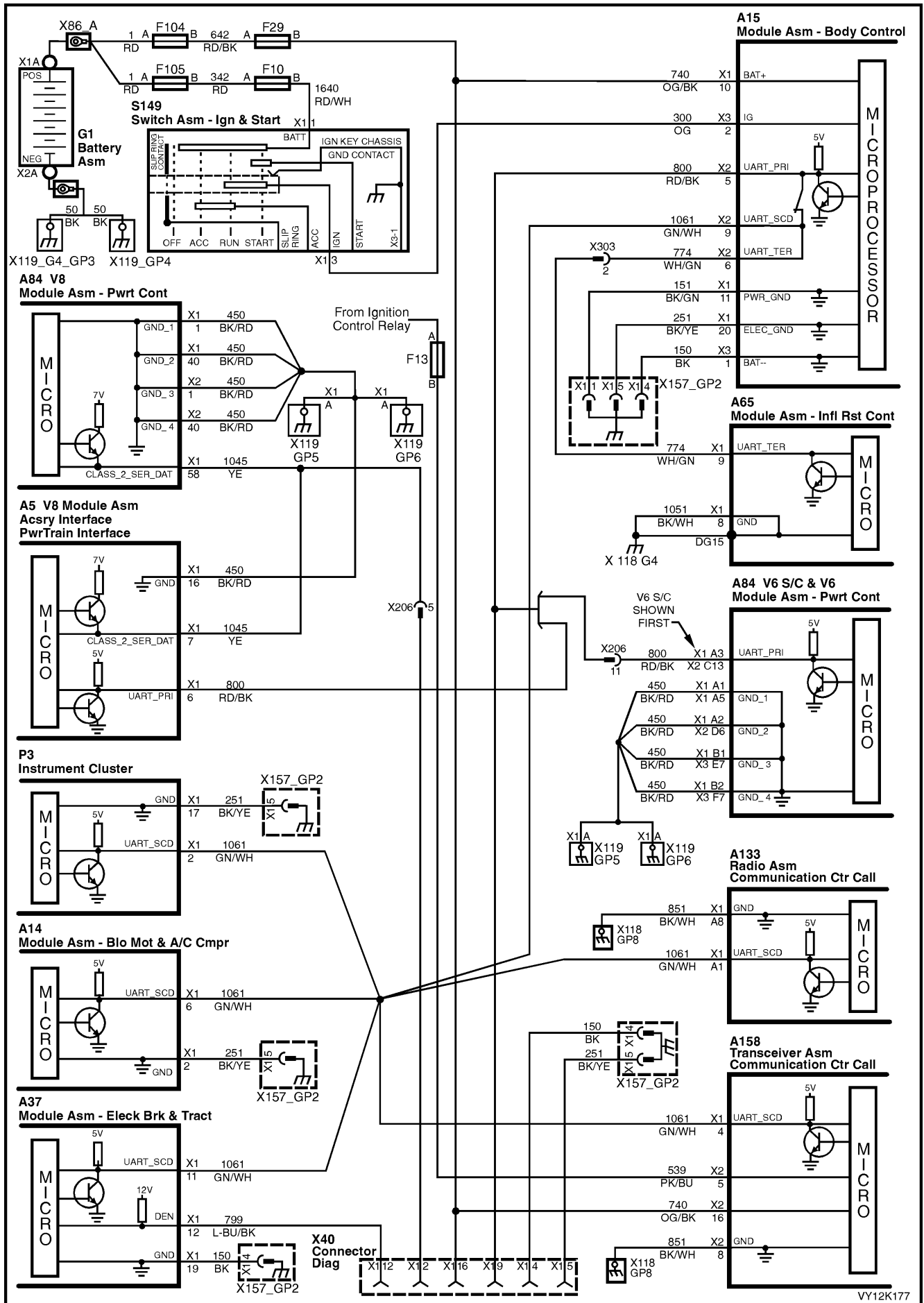


Figure 12K-12

2.11 DRIVER'S DOOR AJAR SWITCH

The telematics module uses the driver's door ajar input signal to determine if the driver's front door is opened or closed. When the door is opened, the driver's door ajar switch grounds terminal X2-11 of the telematics module via circuit 746 (Grey/White wire). This causes the voltage at terminal X2-11 to be pulled low, less than 0.2 Volts (driver's door open). This low voltage at terminal X2-11 is detected by the telematics module as the driver's door open input signal. This is one of the inputs the telematics module uses to determine the system operating mode, refer **2.1 OPERATING MODES** in this Section.

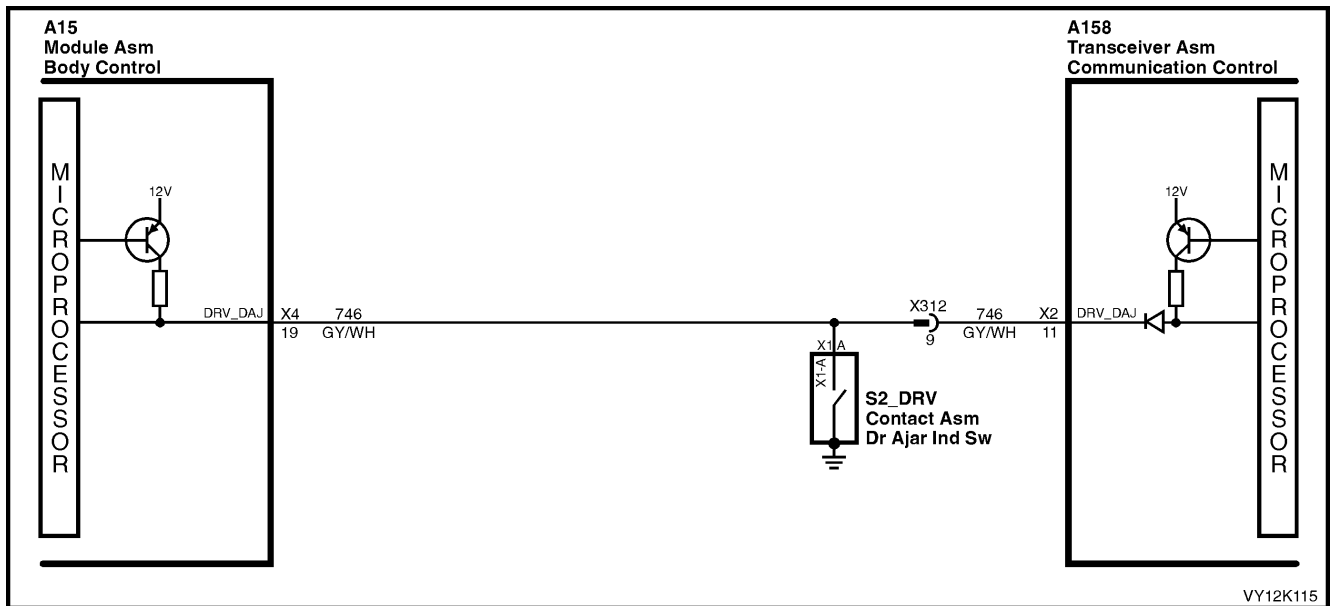


Figure 12K-13

2.12 PASSENGER DOOR AJAR SWITCHES

The telematics module uses this passengers door ajar input signal to determine if any of the passenger doors are opened or if all passenger doors are closed. If the right hand rear, left hand front or left hand rear door is open, terminal X2-1 of the telematics module is grounded via circuit 745 (White wire). This causes the voltage at terminal X2-1 to be pulled low, less than 0.2 Volts (if any one of the passenger doors is opened). The telematics module determines this low voltage at terminal X2-1 as the passengers door open input signal. This is one of the inputs the telematics module uses to determine the system operating mode, refer [2.1 OPERATING MODES](#) in this Section.

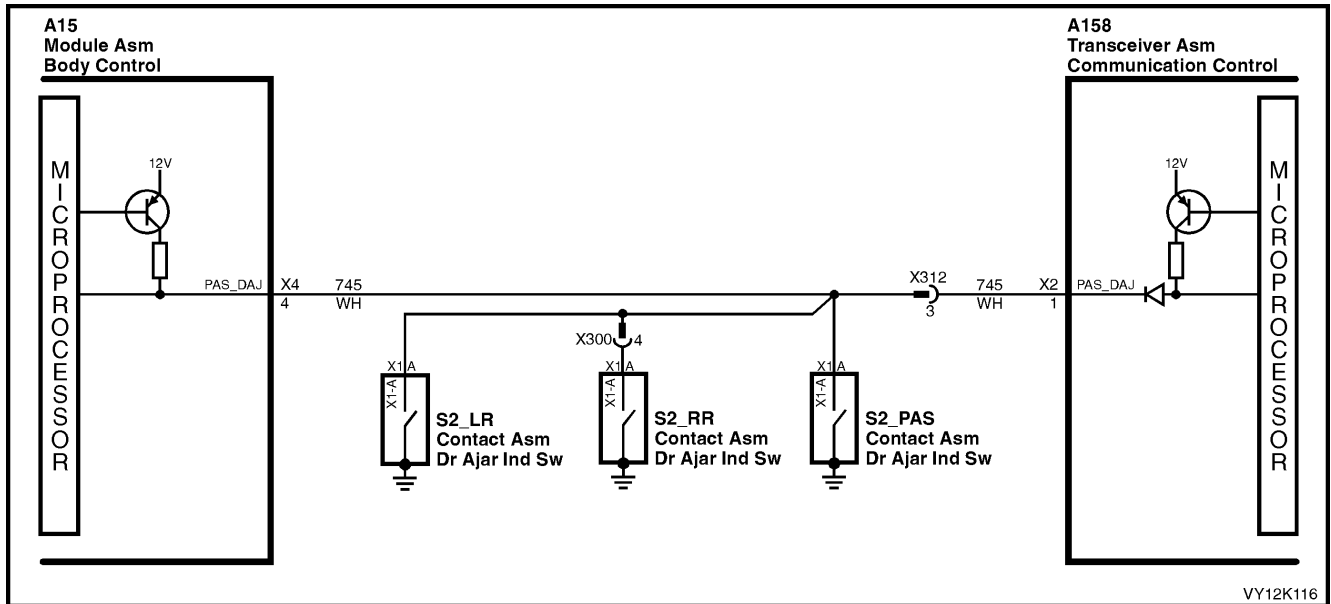


Figure 12K-14

2.13 ALARM INPUT (THEFT DETERRENT HORN)

The telematics module monitors the theft deterrent horn circuit to determine if the alarm has been triggered. If the alarm has been triggered, the BCM pulses the vehicles horns at a rate of once per second. To pulse the theft deterrent horn the BCM supplies 12 Volts to the theft deterrent horn circuit 1149 (Green wire). When the theft deterrent horn circuit is activated, the voltage at terminal X2-2 of the telematics module is pulled high. The telematics module determines this high voltage at terminal X2-2 as the theft deterrent system having been triggered. If the vehicle theft deterrent system is triggered for longer than 20 seconds, the telematics module will transmit an "Unauthorised Entry Alert" message to the Holden Assist Centre. For further information regarding the unauthorised entry alert, refer to the Holden Assist Handbook Supplement.

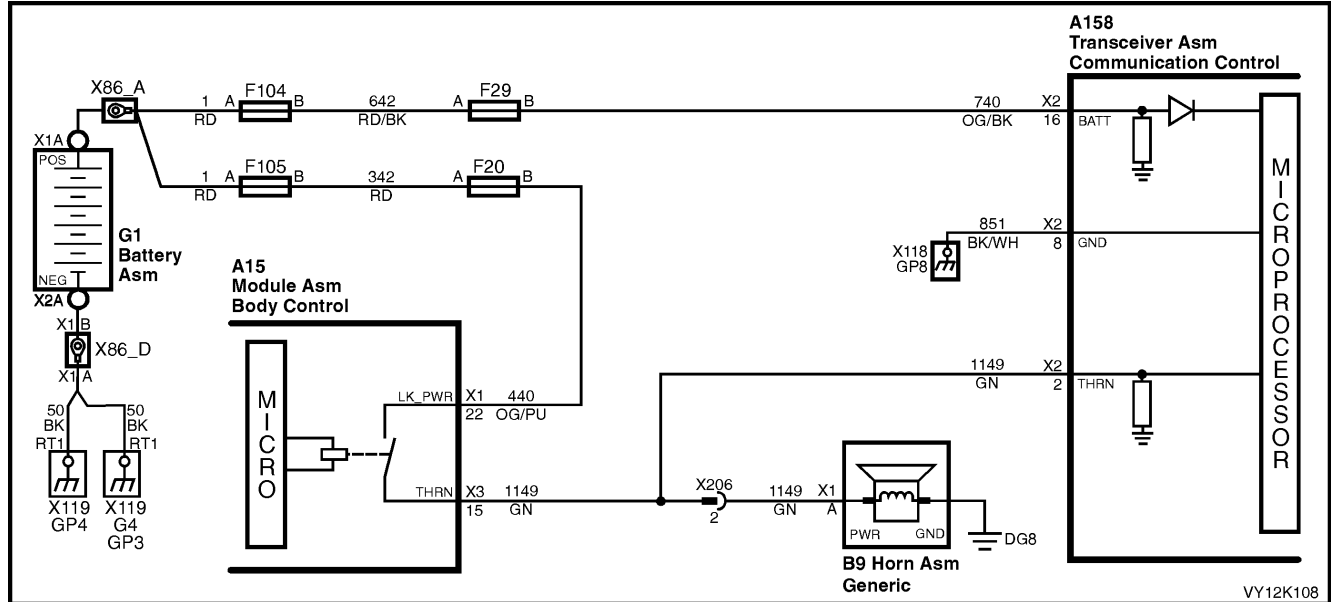


Figure 12K-15

2.14 TELEMATICS ANTENNA

The telematics antenna (1) contains both the GPS and GSM antennas in one unit, and is located under the instrument panel. The antenna has two leads, one for the GPS antenna and the other for the GSM antenna.

NOTE: The area directly above the telematics antenna should be free from obstructions as they may adversely affect antenna operation and the system may not have full functionality.

Aftermarket window tinting may also affect the antenna operation.

GSM ANTENNA

The GSM antenna is capable of transmitting and receiving both voice and data signals via the GSM network. The telematics module uses the GSM network to transmit and receive voice and data. Signal strength may be affected in locations like basement car parks or tunnels. However, in most cases, as the vehicle emerges from the obstruction or re-enters the digital phone network area the signal will be available again and any stored data will be transmitted. The GSM antenna is connected to the telematics module by a plug in type connector, refer Figure 12K-17 (1).

TECH 2 displays the GSM signal strength in dBm, which is decibels per milliwatt. When measuring GSM signal strength, the measurement is referenced to 1 mW, and as the signal strength is less than the reference, it is always negative. The signal strength will range from -113 dBm (poor signal) to -50 (good signal).

GPS ANTENNA

The GPS antenna receives signals from satellites orbiting the earth and transmits these to the telematics module to determine the vehicle's position. Signals from at least three GPS satellites must be received to accurately determine the vehicle's two dimensional (2D) position. Signals from at least four GPS satellites must be received to accurately determine the vehicle's three dimensional (3D) position. If signals from only three satellites are received, the telematics module cannot determine the vehicle's altitude. The GPS antenna must not be obscured by any objects, such as underground car parks, tunnels, bridges or buildings as any of these may affect GPS reception. The GPS antenna is connected to the telematics module by a plug in type connector, refer Figure 12K-17 (2).

The telematics module uses a principle called triangulation to determine the location of the vehicle. This principle states that you can determine the location of an object if you know its distance from three known locations. GPS uses 24 satellites orbiting the earth, the location of each satellite is known at any given time. The satellites constantly broadcast radio signals and the telematics GPS module compares the amount of time it takes for the signals from at least three different satellites to reach the GPS module. By converting time into distance, it can calculate the modules location on earth. The telematics module receives GPS data, decodes it, and transmits the vehicles location via SMS when requested by Holden Assist or NERC™.

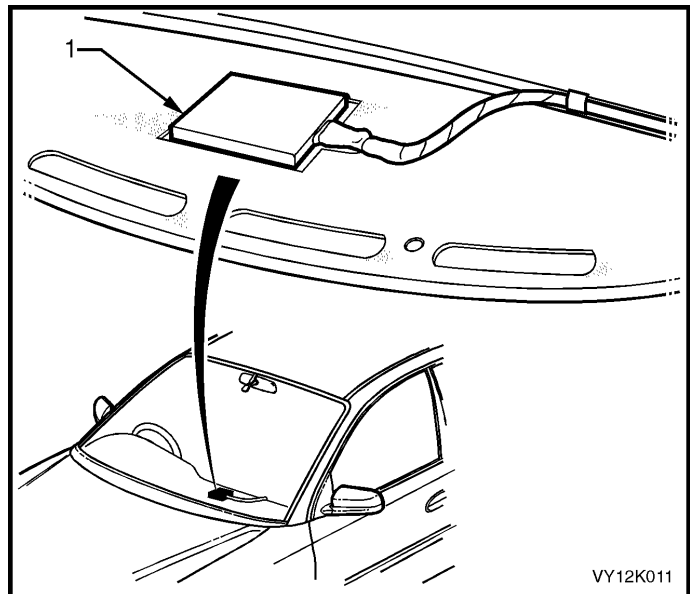


Figure 12K-16

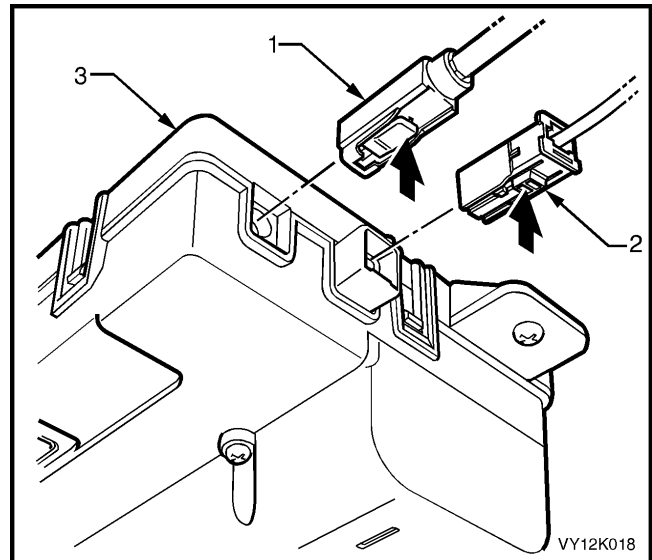
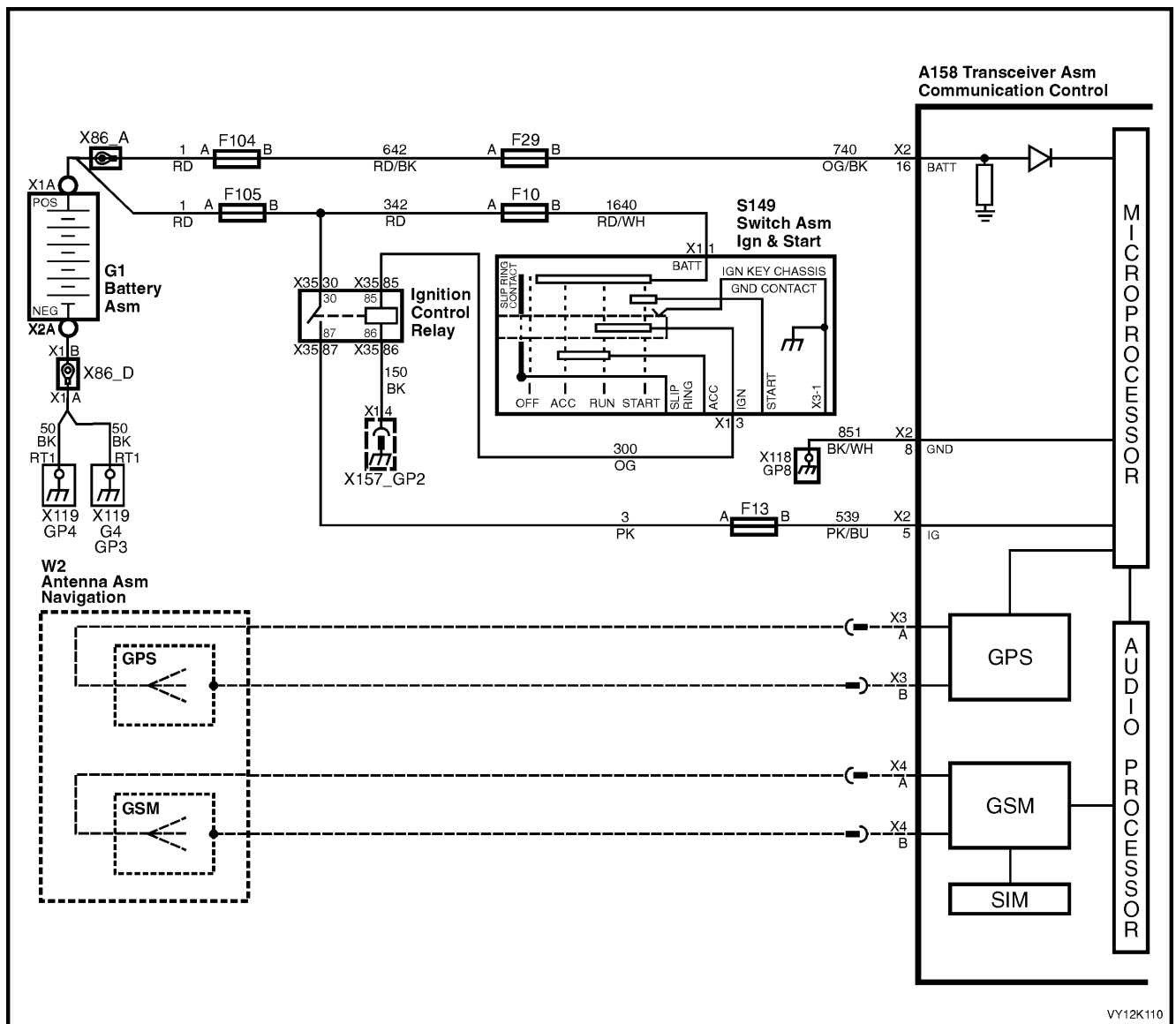


Figure 12K-17



VY12K110

Figure 12K-18

2.15 FUEL PUMP RELAY DRIVE CIRCUIT

The PCM energises the fuel pump relay drive circuit via circuit 465 (Green/White wire), the telematics module terminals X1.18 circuit 497 (Light/Green wire) and X1.19 circuit 465 (Dark Green/White wire). The fuel pump relay drive circuit is grounded through circuit 550 (Black/White wire) at ground location X157_GP2. The telematics module can immobilise the vehicle by opening the fuel pump relay drive circuit, causing the fuel pump to stop operating. This function can only be activated by the National Emergency Response Centre (NERC™) under instruction from the Police. For further information refer **2.3 HOLDEN ASSIST REMOTE REQUESTS**, Engine Immobilisation in this Section.

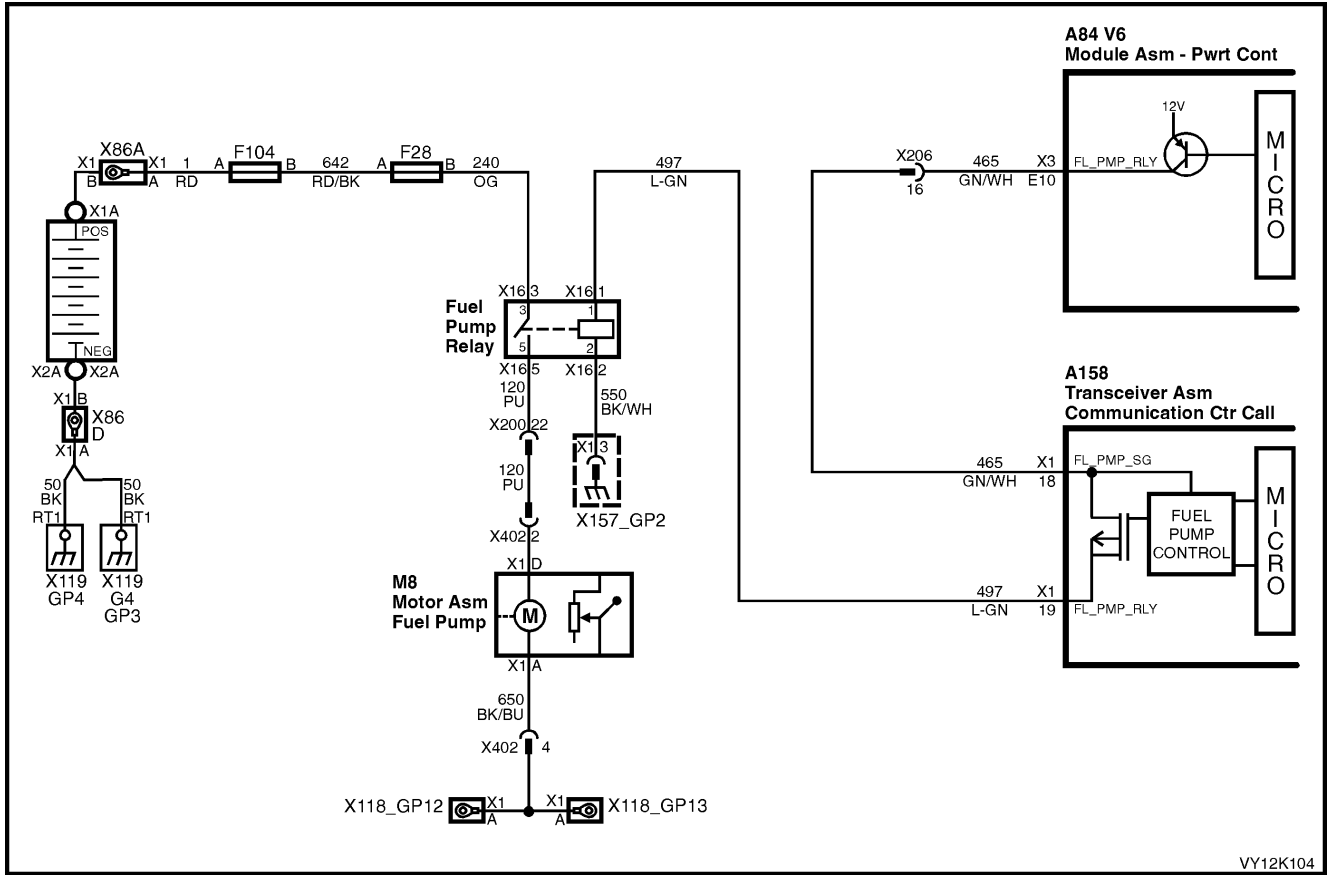


Figure 12K-19 V6 Fuel Pump Circuit

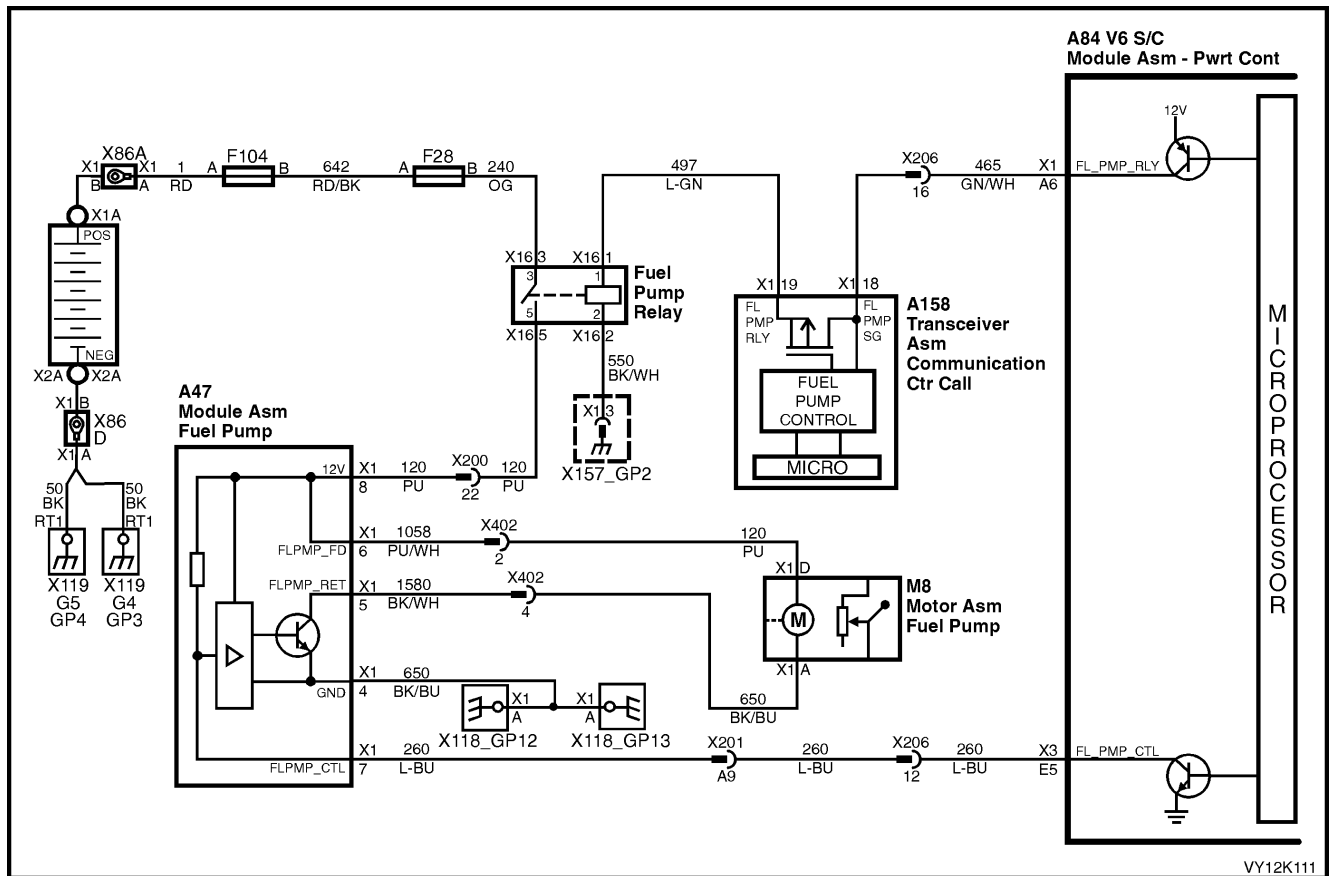


Figure 12K-20 V6 S/C Fuel Pump Circuit

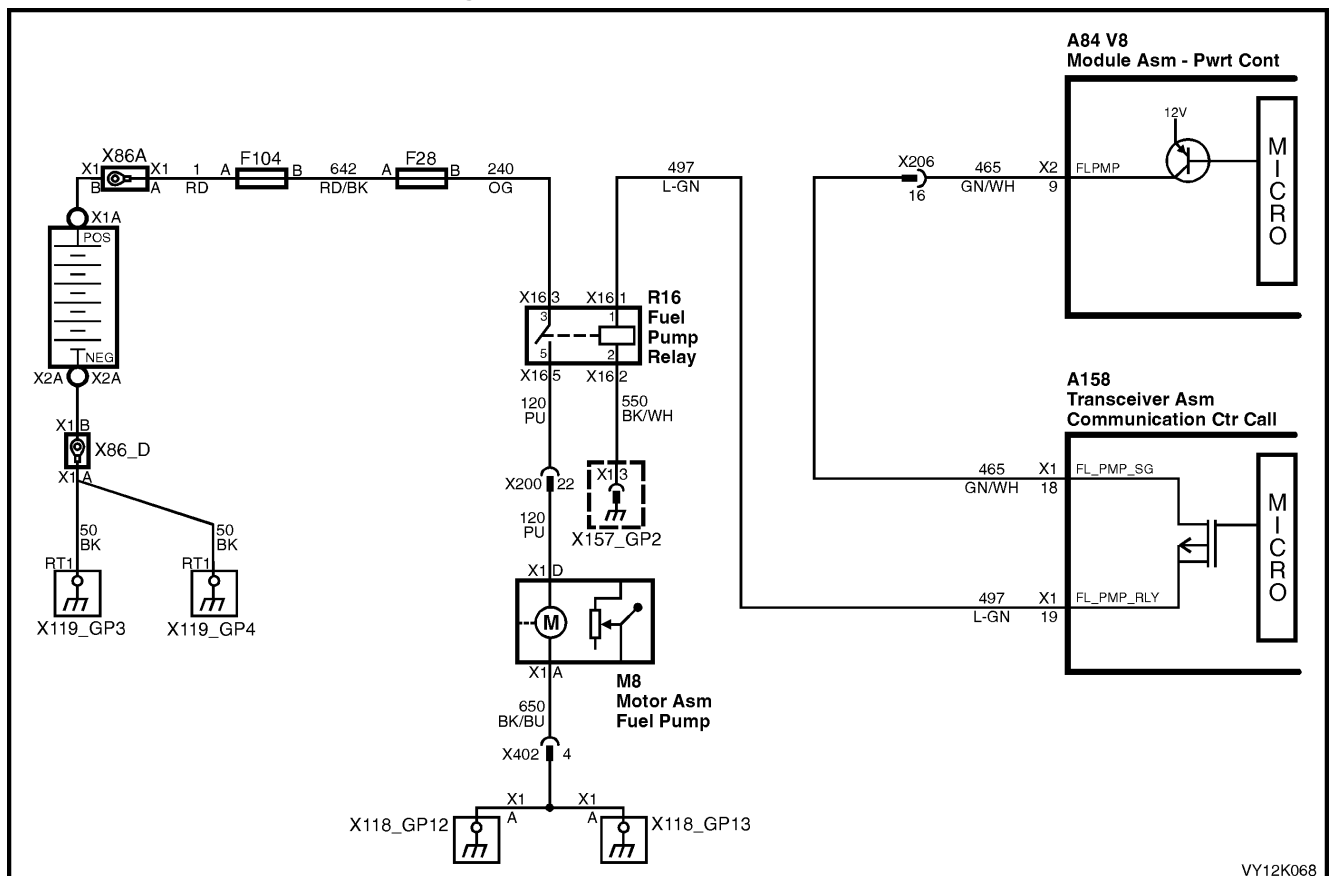


Figure 12K-21 V8 Fuel Pump Circuit

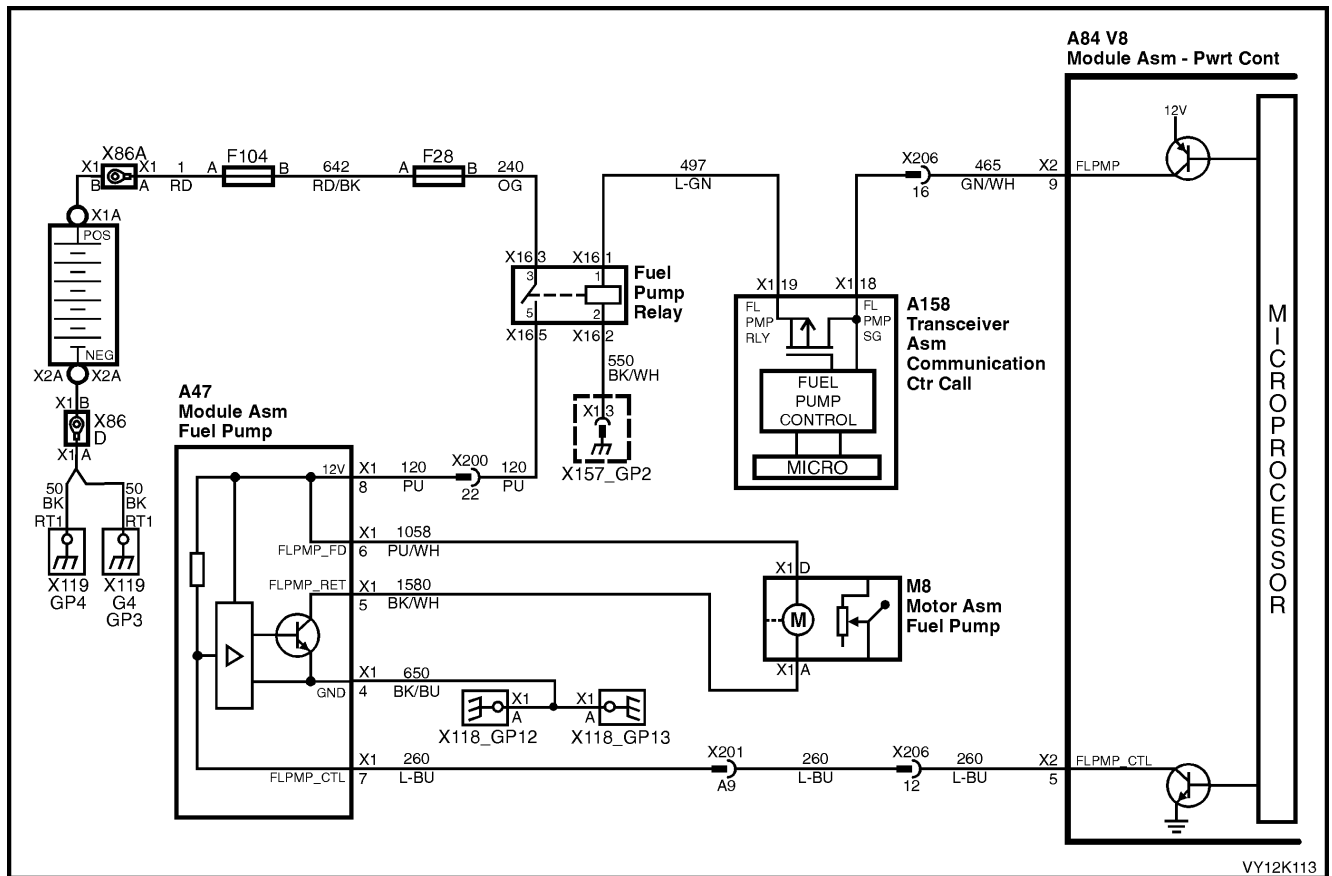
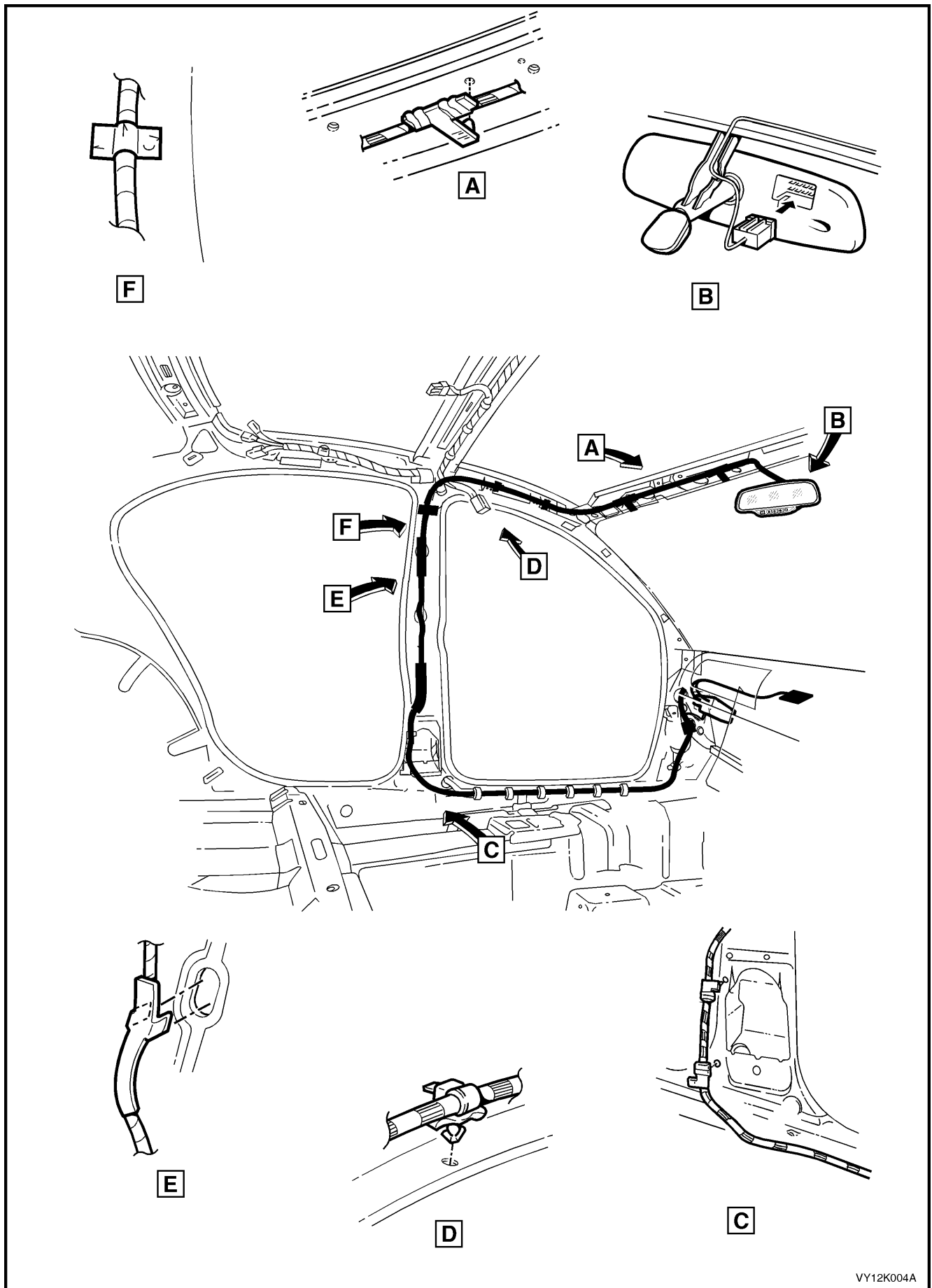


Figure 12K-22 V8 Utility Fuel Pump Circuit

2.16 WIRING HARNESSES

VY Series vehicles equipped with the telematics system have specific main and body harnesses.



VY12K004A

Figure 12K-23

3. SERVICE OPERATIONS

When carrying out any service procedure on the vehicle that involves disconnecting the battery cables or any procedure that may cause the battery voltage to fall below 12 Volts, the telematics module Service Mode **MUST BE ENABLED**. Refer to **4.3 TECH 2 TEST MODES**, F5: Program, F1 Operating Mode, in this Section.

If the telematics module service mode is not enabled, a “Battery Removal Alert” will be transmitted to the Holden Assist Centre whenever the battery is disconnected, or a “Low Battery Voltage Alert” when the battery voltage is low.

3.1 TELEMATICS MODULE

LT Section No. **09-540**

REMOVE

1. Using TECH 2, put the telematics module into service mode. Refer to **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode, in this Section.
2. Disconnect the negative battery cable from the battery.
3. Remove the instrument panel compartment, refer **3.2 INSTRUMENT PANEL COMPARTMENT** in Section 1A3 INSTRUMENT PANEL & CONSOLE.
4. Remove the left-hand side instrument panel lower trim plate assembly., refer **3.1 INSTRUMENT PANEL LOWER TRIM PLATE ASSEMBLY** in Section 1A3, INSTRUMENT PANEL & CONSOLE in this Service Information.
5. Remove air conditioning vacuum tank, refer **8.1 VACUUM TANK** in Section 2B HVAC CLIMATE CONTROL (MANUAL A/C) in this Service Information.
6. Disconnect telematics module, GSM antenna connector (1), and the GPS antenna connector (2), from the telematics module (3).
7. Disconnect telematics module harness connector (3), from the telematics module.
8. Remove the telematics module assembly retaining screw (4).
9. Lower the front end of the module and slide the telematics module out of the retaining bracket.

REINSTALL

1. Reverse of the removal, noting the following.
2. Tighten the telematics module assembly retaining screw to the correct torque specification.

TELEMATICS MODULE ASSEMBLY RETAINING SCREW TORQUE SPECIFICATION

1 – 3 Nm

3. Use TECH 2 to disable the telematics module Service Mode. Refer to **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode, in this Section.

NOTE: If the telematics module service mode is not disabled, the system will not have full functionality.

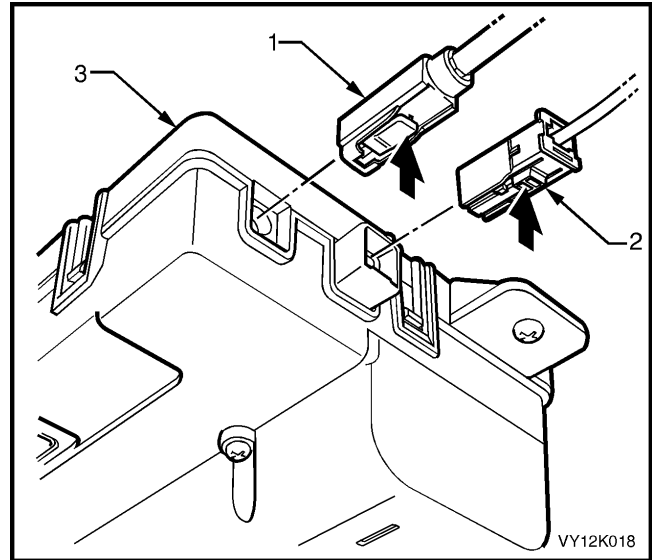


Figure 12K-24

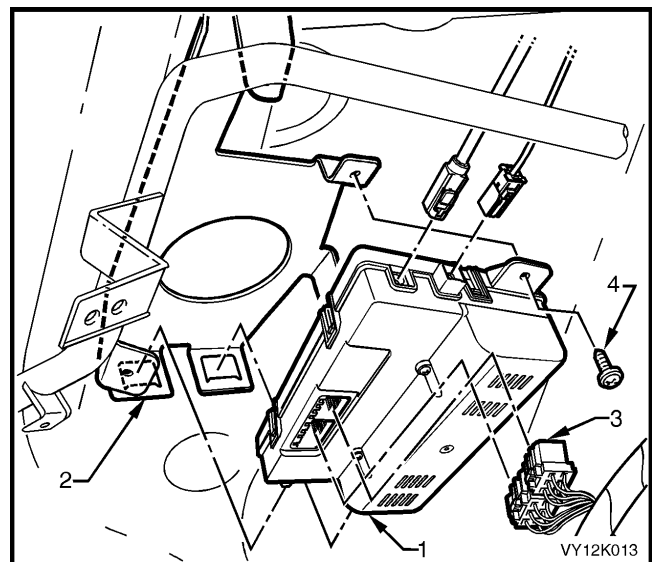


Figure 12K-25

TELEMATICS MODULE CHANGEOVER PROCESS

If a new telematics module has been installed into the vehicle, then this new module must be registered with Holden Assist. To register this new module with Holden Assist the following procedure must be performed.

1. Once the new module has been installed into the vehicle turn the ignition on and make a call to Holden Assist by pressing the Holden Assist button.
2. When the Holden Assist operator answers, inform the operator who you are and what retail outlet you are from, and that you have just installed a new telematics module into the vehicle. You will also be required to provide the operator with the complete Vehicle Identification Number (VIN) and if the vehicle is registered, the registration number of the vehicle.
3. The new telematics module is now registered to this vehicle.

3.2 BACKUP BATTERY

LT Section No. 09-540

REMOVE

1. Using TECH 2, enable the telematics module service mode. Refer to **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode, in this Section.
2. Remove the telematics module. Refer **3.1 TELEMATICS MODULE ASSEMBLY** in this Section
3. Remove the four backup battery cover retaining screws (2) and remove the backup battery.

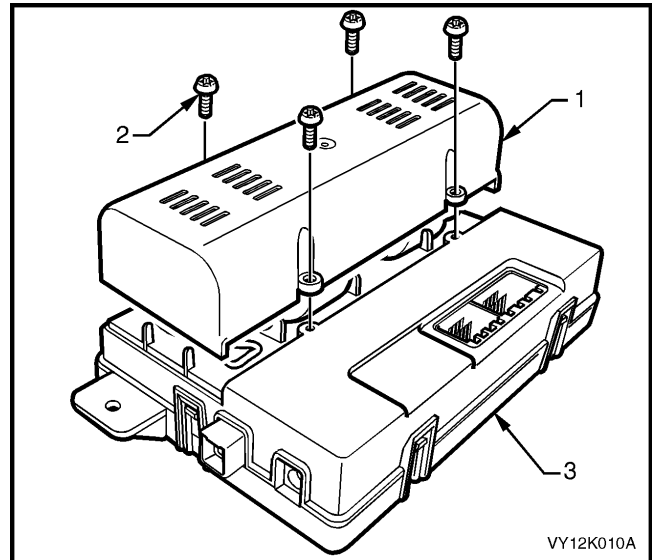


Figure 12K-26

4. Disconnect the backup battery connector (3) from the telematics module (2).

REINSTALL

1. Reverse of the removal noting the following.
2. Tighten backup battery cover retaining screws to the correct torque specification.

TELEMATICS BACKUP BATTERY
COVER RETAINING SCREWS
TORQUE SPECIFICATION

1 – 3 Nm

3. Use TECH 2 to reset the Back Up Battery Timer, **4.3 TECH 2 TEST MODES** F4: Additional Functions, Backup Battery Timer Reset.
4. Use TECH 2 to disable the telematics module Service Mode. Refer to **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode in this Section.

NOTE: If the telematics module service mode is not disabled, the system will not have full functionality.

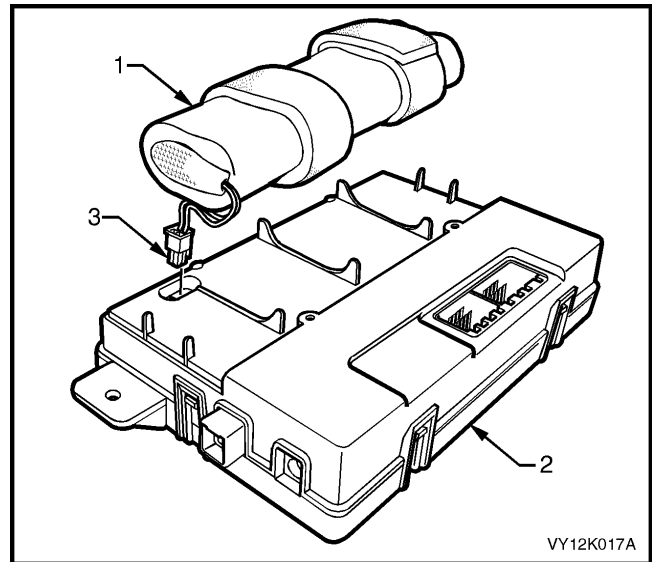


Figure 12K-27

3.3 TELEMATICS ANTENNA

LT Section No. 09-540

REMOVE

1. Using TECH 2, enable the telematics module service mode. Refer **4.3 TECH 2 TEST MODES** F5: Program, F1: Operating Mode, in this Section.
2. Disconnect the negative battery cable from the battery.
3. Remove the instrument panel pad assembly, refer to **3.21 INSTRUMENT PANEL PAD ASSEMBLY** in Section 1A3 INSTRUMENT PANEL & CONSOLE in this Service Information.
4. Disconnect the GSM and GPS antenna connectors (1&2) from the telematics module (3).

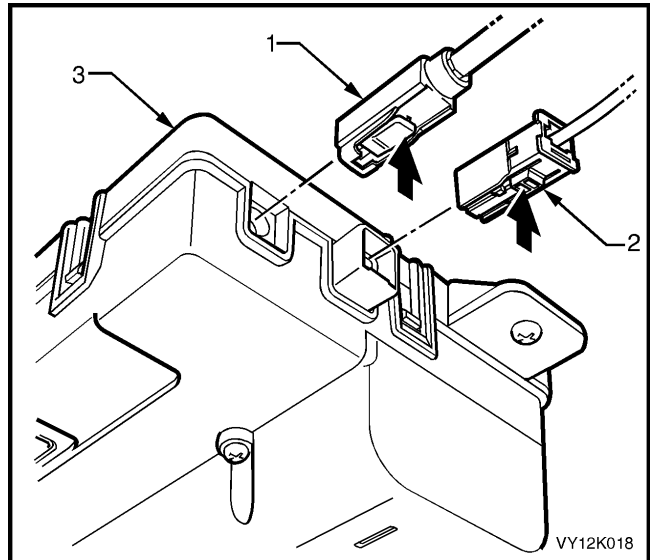


Figure 12K-28

5. Remove the telematics antenna lead retaining clips.

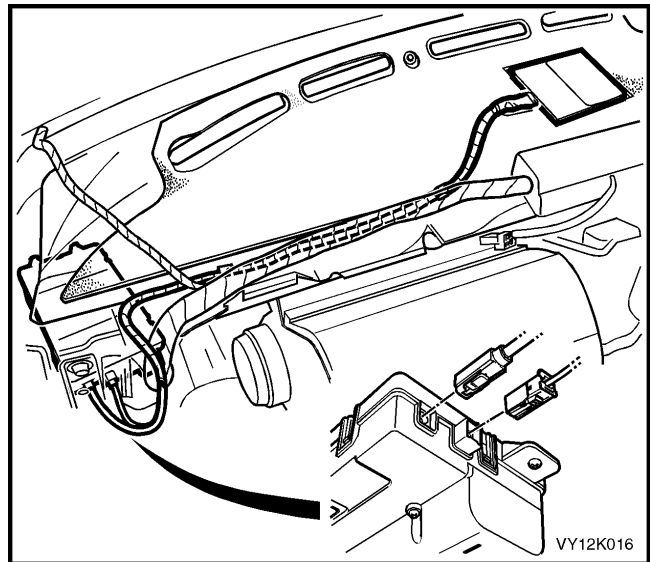


Figure 12K-29

6. Using a commercial available paint scraper (2) prise the antenna (1) from the dash panel.

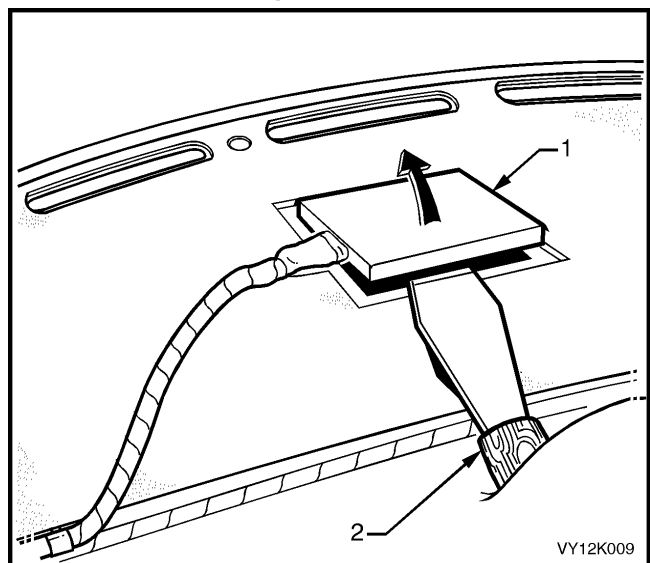


Figure 12K-30

REINSTALL

1. Ensure the dash panel to telematics antenna mating surface is clean.
2. If you are reinstalling the original antenna remove the used double sided tape, and apply new double sided tape (3M 4428 or equivalent), meeting Holden Standard HN2021 Type 6 to the antenna mating surface.
3. Remove the backing from the double sided tape.
4. Reinstall the antenna to the dash panel by aligning the antenna into the cut out in the dash panel insulation and then press down firmly on the antenna.
5. Reinstall the telematics antenna lead retaining clips.

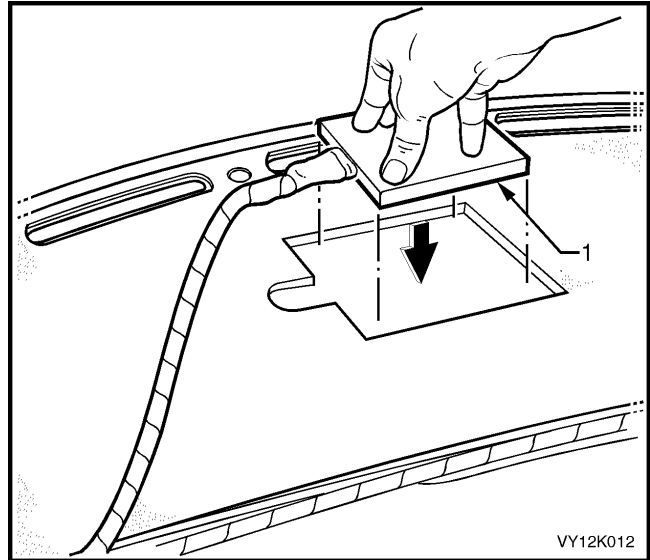


Figure 12K-31

6. Reinstall the GSM and GPS antenna connectors to the telematics module.
7. Reinstall the instrument panel pad assembly, refer [3.21 INSTRUMENT PANEL PAD ASSEMBLY](#) in Section 1A3 INSTRUMENT PANEL & CONSOLE in this Service Information.
8. Reconnect the negative battery cable to the battery.
9. Use TECH 2 to disable the telematics module Service Mode. Refer [4.3 TECH 2 TEST MODES](#) F5: Program, F1: Operating Mode, in this Section.

NOTE: If the telematics module service mode is not disabled, the system will not have full functionality.

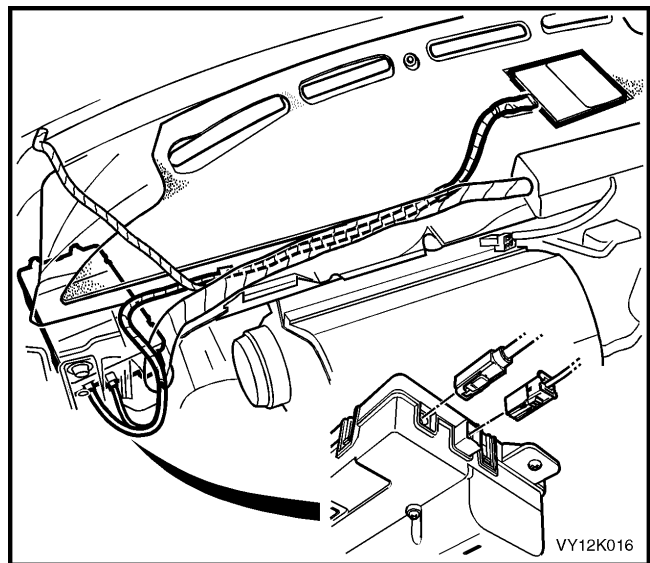


Figure 12K-32

3.4 INTERIOR REAR VIEW MIRROR

LT Section No. 09-540

REMOVE

1. Remove mirror wiring harness cover (1) by sliding cover upwards slightly (direction A) and pull cover outwards (direction B).

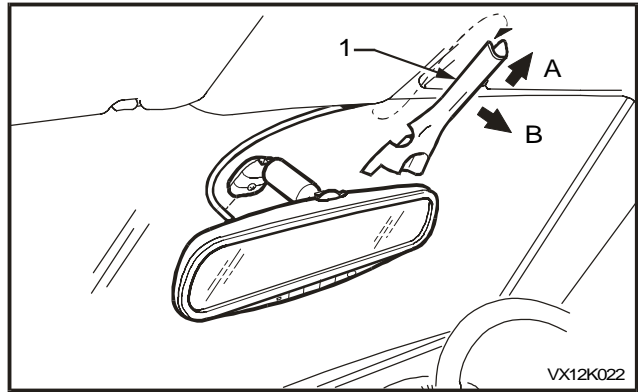


Figure 12K-33

2. Disconnect the interior rear view mirror wiring harness connector.

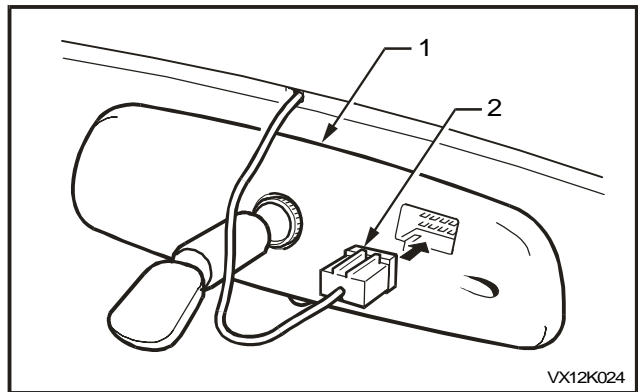


Figure 12K-34

3. Remove the interior rear view mirror retaining screw and disengage the interior mirror from the boss on the windshield by sliding the mirror (2) upwards.

REINSTALL

Reinstallation of the interior rear view mirror is the reverse of the removal procedure, noting the following:

Tighten the interior rear view mirror retaining screw to the correct torque specification.

INTERIOR REAR VIEW
MIRROR RETAINING SCREW
TORQUE SPECIFICATION

2.5 – 4.5 Nm

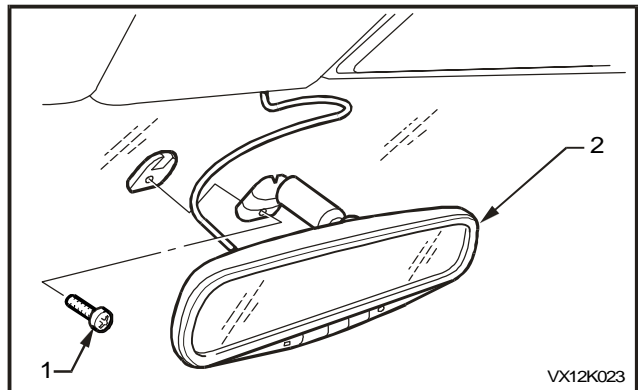


Figure 12K-35

4. TECH 2 DIAGNOSIS FOR TELEMATICS

4.1 BASIC KNOWLEDGE REQUIRED

Before attempting to diagnose the telematics system, you must have a good understanding of electrical system basics and the use of circuit testing tools. Without this basic knowledge it will be difficult to use the diagnostic procedures detailed in this Section.

Some electrical basics, troubleshooting procedures and hints as well as the use of circuit testing tools are covered in **Section 12P WIRING DIAGRAMS** in the VY Service Information.

Basic Electrical Circuits - You should understand the basic theory of electricity, series and parallel circuits, and voltage drops across series resistors. You should know the meaning of voltage (Volts), current (Amps), and resistance (Ohms). You should understand what happens in a circuit with an open or shorted wire (shorted either to voltage or ground). You should also be able to read and understand a wiring diagram.

Use of Circuit Testing Tools - You should know how to use a jumper lead to test circuits. You should be familiar with the use of a high input impedance (10 Meg Ohm) digital type multimeter such as tool No. J39200 or equivalent and be able to measure voltage, current, and resistance. You should be familiar with the proper use of the TECH 2.

4.2 CONNECTING TECH 2

TECH 2, with the appropriate software, cables and adaptors, when connected to the Data Link Connector (DLC) is capable of reading telematics module serial data. The DLC is connected to the instrument panel lower right hand trim, to the right of the steering column.

For additional general information on connecting and operating TECH 2, refer to [Section 0C TECH 2](#) in this Service Information.

1. DLC
2. DLC Adaptor
3. DLC Cable
4. TECH 2

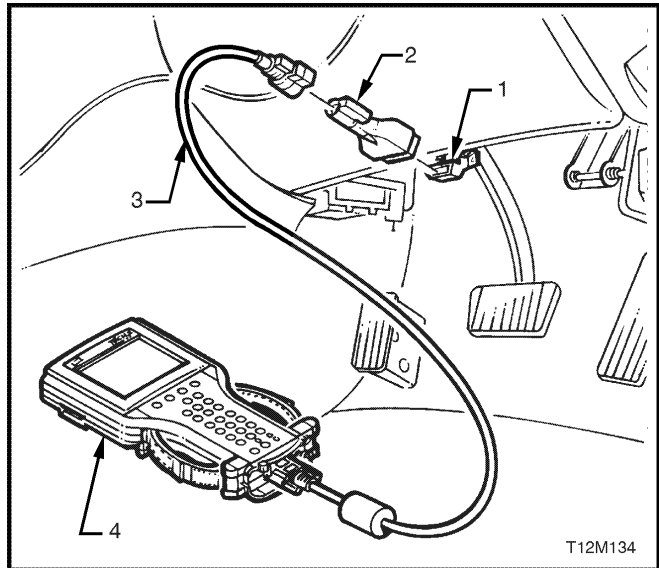


Figure 12H-36

TECH 2 has five test modes for diagnosing the telematics module. The five test modes are as follows:

MODE F0: DIAGNOSTIC TROUBLE CODES

In this mode TECH 2 has the ability to display and clear DTCs.

MODE F1: DATA DISPLAY

In this test mode, TECH 2 displays the status of inputs and outputs of the telematics module.

MODE F2: SNAPSHOT

In this test mode, TECH 2 captures telematics module data before and after a forced manual trigger.

MODE F3: MISCELLANEOUS TESTS

In this test mode, TECH 2 performs various tests to assist in problem isolation during troubleshooting.

MODE F4: ADDITIONAL FUNCTIONS

In this test mode, TECH 2 performs a system function test, of the Microphone, Speaker, End Call / Information Button, Holden Assist Button and the Emergency Button.

MODE F5: PROGRAM

In this test mode, TECH 2 allows the programming of various features by enabling or disabling the feature or adjusting settings.

Body
F0: Diagnostic Trouble Codes
F1: Data Display
F2: Snapshot
F3: Miscellaneous Tests
F4: Additional Functions
F5: Program

VY12K176

Figure 12K-37

4.3 TECH 2 TEST MODES

As a prerequisite to this diagnostic section the user must be familiar with the proper use of TECH 2. The following information illustrates only the telematics module TECH 2 screen displays and provides an explanation of their function for diagnosing the telematics module. If additional information is required on the operation of TECH 2, reference should be made to either [Section 0C TECH 2](#) in this Service Information, or the TECH 2 Operators Manual.

SYSTEM SELECT MENU

With TECH 2 connected to the DLC and turned on, and the F0: Diagnostics selected from the Main Menu, the appropriate Model Year and Vehicle Type must be selected for access to the System Select Menu. From the System Select Menu, Select F3: BODY.

This mode contains all functions to test, diagnose, monitor and program the vehicles body systems including the telematics module as well as providing the opportunity to check all DTCs that may be set in the vehicle.

System Select Menu
(3) 2003 VY Commodore
F0: Engine
F1: Transmission
F2: Chassis
F3: Body
F4: Vehicle DTC Check

VY12K174

Figure 12K-38

BODY APPLICATION MENU

Once F3: BODY has been selected from the System Select Menu, the Telematics Module can be selected from the body application menu.

Select Telematics Module and press enter to continue.

Once the Telematics Module has been selected and entered, the following Telematics Module System Identification screen will be displayed, once the ignition has been turned on (as requested).

Vehicle Identification
Select one of the following Body
Body Control Module
Powertrain Interface Module
SRS
Instrument
Occupant Climate Control
Telematics Module
Audio System

6 / 7

Telematics Module

VY12K174

Figure 12K-39

SYSTEM IDENTIFICATION

The telematics module system identification screen will then display the following information:

Identifier

(Diagnostic Data Identifier)

Partnumber

(telematics module part number)

Production Date

(telematics module production date)

(DD/MM/YY)

Software Version Number

(Eg. 001.000.002)

SIM Serial Number

(SIM serial number)

Telematics Module Serial Number

(telematics module serial number)

Code Index

(software index number)

Code Version

(software version number)

VAP Process Number

(vehicle assembly plant process number)

TIS Hardware Key Number

(TIS 2000 Hardware Key Number)

VIN Digit 1-10

(Vehicle Identification Number digits 1-10)

VIN Digit 11-17

(Vehicle Identification Number digits 11-17)

Press the **Confirm** soft key, the telematics module application menu will then be displayed.

APPLICATION MENU

The following functions will now be available:

F0: Diagnostic Trouble Codes

F1: Data Display

F2: Snapshot

F3: Miscellaneous Tests

F4: Additional Functions

F5: Program

Body	
(3) 2003 VY Commodore Telematics Module	
Identifier	101
Partnumber	92084575
Production Date	231102
SIM Serial Number	5050101962136400
Telematics Module	123456123456
Code Index	1
1 / 11	
Identifier	
Confirm	

VY0C105

Figure 12K-40

Body
F0: Diagnostic Trouble Codes
F1: Data Display
F2: Snapshot
F3: Miscellaneous Tests
F4: Additional Functions
F5: Program

VY12K120

Figure 12K-41

F0: DIAGNOSTIC TROUBLE CODES

In this test mode, DTCs stored by the telematics module can be displayed or cleared. When F0: Diagnostic Trouble Codes is selected the following two modes are available:

F0: Read DTC Information: All current DTC(s) will be displayed.

F1: Clear DTC Information History DTC. The telematics module is capable of storing history data for six DTCs.

F0: READ DTC INFORMATION

When this mode is selected TECH 2 will display the following DTC information:

The DTC Number.

DTC Status either Current or History.

DTC Description

Times Occurred

Ignition Cycles since the DTC last set.

Number of DTCs set.

NOTE: Times occurred and Ignition cycles since DTC last set is only available for the six most recent DTCs.

Read DTC Information	
(3) 2003 VY Commodore Telematics Module	
DTC#: 4	History
No Serial Data From Audio System	
Times Occurred	2
Ignition Cycles	3
Number of DTC's set:	5
Quit	Previous DTC
Next DTC	

VY12K170

Figure 12K-42

F1: CLEAR DTC INFORMATION

When F1: Clear DTC Information is selected TECH 2 will display "Do you want to clear DTCs?" If the **Yes** soft key is pressed TECH 2 will clear all DTC information. If the **No** soft key is depressed the TECH 2 will exit to menu.

Clear DTC Information	
(3) 2003 VY Commodore Telematics Module	
Do you want to clear DTCs? (Yes/No)	
No	Yes

VY12K172

Figure 12K-43

F1: DATA DISPLAY

NOTE: Before referring to any Data Display to diagnose a system problem the Telematics On-Board Diagnostic System must be performed.

F0: INPUTS AND OUTPUTS

In this test mode, TECH 2 checks if the telematics module is actually receiving an input or inputs from the appropriate sensor/s or antenna/s. If the sensor/s or antenna/s input/s are not being received, then carry out the relevant system diagnosis as defined in the following chart.

Typical data list parameter nominal values, relevant telematics module pin number and specific diagnostic charts are detailed in the following chart. If the actual data does not match the nominal value, then refer to the specific diagnostic chart for that data parameter.

Data Parameter	Display	Pin No	Nominal Values	Diagnostic Chart
Battery Voltage	Volts	X2-16	Should be within 0.5 Volts of actual vehicle battery voltage.	Refer Vehicle Battery Voltage Diagnostic Chart in this Section.
Backup Battery Voltage	Volts	X5-A X5-B	Backup Battery Voltage, should be greater than 7.2 Volts.	Refer Backup Battery Diagnostic Chart, in this Section.

Data Parameter	Display	Pin No	Nominal Values	Diagnostic Chart
Backup Battery Charger	Active / Inactive	X5-A X5-B	Backup Battery Charger, will display Active when the telematics backup battery is being charged via the telematics backup battery charging circuit.	Refer Backup Battery Diagnostic Chart in this Section.
Ignition Switch	On / Off	X2-5	Should display the current status of the ignition switch.	Refer No Serial Data Diagnostic Chart in this Section.
Accessories Switch	On / Off	SD	Should display the current status of the accessories switch.	Refer No Serial Data Diagnostic Chart in this Section.
Operating Mode	VAP Pre-Delivery Service Active Stand By Sleep	Int	Telematics module Operating Mode. When the system is operating, should display Active . Refer 2.15 OPERATING MODES in this Section for further information.	Refer 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section.
Fuel Pump Relay Drive Circuit	Active / Inactive	X1-18 X1-19	Fuel pump relay drive circuit, should be active at all times. Should only display Inactive if remote immobilisation has been requested.	Refer Fuel Pump Relay Drive Circuit Diagnostic Chart in this Section.
Keypad Supply Voltage	On / Off	X2-15	Displays the commanded state of the interior rear view mirror key pad supply voltage. Should be On whenever this system is in active or service mode.	Refer 4.3 TECH 2 TEST MODES F3: Miscellaneous Tests F3: Keypad Power Supply in this Section.
Keypad Signal Voltage	Volts	X2-9	Signal voltage from the resistor encoded keypad in the interior rear view mirror. Will vary depending upon which button is depressed. Emergency Button 3.8 Volts. Holden Assist Button 2.3 Volts. End Call / Info Button 0.7 Volts. Note: This will make a call to the Holden Assist Centre.	Refer End Call / Information Button Diagnostic Chart in this Section.
End Call / Information Button	On / Off	X2-9	End Call / Information Button status, should display On when button is depressed. Note: This will make a call to the Holden Assist Centre.	Refer End Call / Information Button Diagnostic Chart in this Section.
Holden Assist Button	On / Off	X2-9	Holden Assist Button status, should display On when button is depressed. Note: This will make a call to the Holden Assist Centre.	Refer Holden Assist Button Diagnostic Chart in this Section.
Emergency Button	On / Off	X2-9	Emergency Button status, should display On when button is depressed. Note: This will make a call to the National Emergency Response Centre. The operation of this button should only be tested using the F1: Function Test.	Refer Emergency Button Diagnostic Chart in this Section.

Data Parameter	Display	Pin No	Nominal Values	Diagnostic Chart
Red Status LED	On / Off	X2-7	Displays the commanded state of the interior rear view mirror red status LED.	Refer Status Indicators Do Not Illuminate Diagnostic Chart in this Section.
Green Status LED	On / Off	X2-9	Displays the commanded state of the interior rear view mirror green status LED.	Refer Status Indicators Do Not Illuminate Diagnostic Chart in this Section.
Indicator Drive	On / Off	SD	Display should change from Off to On when the telematics module is commanding the indicators On.	Refer 4.3 TECH 2 TEST MODES F3: MISCELLANEOUS TESTS F7: indicators in this Section.
Theft Deterrent Horn	On / Off	X2-2	Displays the commanded state of the theft deterrent horn.	Refer Theft Deterrent Horn Diagnostic Chart in this Section.
Driver's Door	Door Closed / Door Open	X2-11	Driver's door ajar switch status, should display Door Open when the driver's door is open.	Refer Driver's Door Ajar Switch Diagnostic Chart in this Section.
Passenger Doors	Door Closed/ Door Open	X2-1	Passenger door ajar switch status, should display Door Open when any passenger door is open.	Refer Passenger Door Ajar Switch Diagnostic Chart in this Section.
Phone Mute Input	Active / Inactive	X2-12	When Active , Audio System mute is required by the telematics module.	Refer Audio Mute Diagnostic Chart in this Section.
Audio Source	Hands Free Telematics Module Tone Generation	int	Display the current audio source.	Refer Audio Source Diagnostic Chart in this Section.
Unauthorised Entry Alert Delay	Seconds	Int	Displays the amount of time in seconds after the theft deterrent system is activated that an Unauthorised Entry Alert (UEA) is sent to Holden Assist.	N/A
Low Battery Alert Delay	Seconds	Int	Displays the amount of time in seconds after the battery voltage has reached the Low Battery Alert (LBA) threshold that a LBA is sent to Holden Assist.	N/A
Vehicle Speed	Km/h	SD	Display the current Vehicle Speed	Refer DTC 5 No Serial Data in this Section.
SRS Deployed This ignition Cycle	Yes/No	SD	Displays the status of the SRS Deployed this ignition cycle serial data message.	Refer DTC 3 No Serial Data From SDM in this Section.
Radio Status	On / Off	SD	Displays the current status of the Audio System (Radio).	Refer DTC 5 No Serial Data in this Section.
Low Battery Alert Threshold 1	Volts	Int	Displays the battery voltage at which a Low Battery Alert (LBA) will be sent to the Holden Assist centre.	N/A

Data Parameter	Display	Pin No	Nominal Values	Diagnostic Chart
Low Battery Alert Threshold 1 Timeout	Minutes	Int	Displays the length of time that the battery must be at Low Battery Alert Threshold 1 before a low battery alert is set.	N/A
Low Battery Alert Threshold 2	Volts	Int	Displays the battery voltage at which a Low Battery Alert (LBA) will be sent to the Holden Assist centre.	N/A
Low Battery Alert Threshold 2 Timeout	Minutes	Int	Displays the length of time that the battery must be at Low Battery Alert Threshold 2 before a low battery alert is set.	N/A
Low Battery Alert Threshold 3	Volts	Int	Displays the battery voltage at which a Low Battery Alert (LBA) will be sent to the Holden Assist centre.	N/A
Low Battery Alert Threshold 3 Timeout	Minutes	Int	Displays the length of time that the battery must be at Low Battery Alert Threshold 3 before a low battery alert is set.	N/A
Backup Battery In Vehicle Timer	Hours	Int	Displays the amount of time the backup battery has been in the vehicle.	N/A
Backup Battery Charge Time	Hours	Int	Displays the backup battery the charge time.	N/A
Backup Battery Operating Time	Minutes	Int	Displays the amount of time the system has been operating on the backup battery.	N/A

SD = Serial Data, Int = Internal Telematics Module Value, N/A = Not Applicable

F1: GLOBAL POSITIONING SYSTEM

In this test mode, TECH 2 display Global Positioning System Information (GPS).

NOTE: If the "Time of Last Known GPS Fix" data list parameter is incrementing, then the telematics module is receiving information from GPS satellites.

Data Parameter	Display	Nominal Values	Diagnostic Chart
GPS Module	Inactive/Active	GPS Module status, should display Active when the GPS engine is operational.	Refer No GPS Signal Diagnostic Chart in this Section.
Time of Last Known GPS Fix	Hours/Minutes/ Seconds	Display the time of the last know GPS fix.	
Distance from Last Known GPS Fix	Meters	Display the distance in meters from the last know GPS fix.	
GPS Satellites Visible	0 - 99	Should display the actual number of satellites visible, when the module had a GPS fix.	
Latitude	Degrees/Minutes/ Seconds	Display the vehicles last known Latitude eg. -37° 49'24.950 Minus (-) = South	
Longitude	Degrees/Minutes/ Seconds	Display the last known Longitude eg. 144° 55'7.800 Minus (-) = West	
UTC (Coordinated Universal Time)	Hours/Minutes/ Seconds	Displays the Coordinated Universal Time. Will continuously update if the telematics module has a valid GPS fix.	
UTC Date	Day/Month/Year	Displays the current UTC Date.	

F2: GSM

In this test mode, TECH 2 display Global System for Mobile (GSM) Communications Information.

GSM Module	Active / Inactive	Should display Active if GSM Module is active and registered on the mobile phone network.	Refer No GSM Signal Diagnostic Chart in this Section.
RSSI (Received Signal Strength Indication)	0 – 31 / Not Available / Invalid	Displays the GSM Received Signal Strength Indication from 0 (poor signal) to 31 (good Signal). Refer RSSI Table below.	
GSM Signal Strength	 to >>>>>>	Display the GSM Signal Strength as a Bar Graph. Refer RSSI Table below.	
GSM Signal Strength dBm	-113 dBm (Poor Signal) to - 50 dBm (Good Signal) Not Available / Invalid	Display the GSM Signal Strength, in decibels per milliwatt dBm. Refer RSSI Table below.	
Last SMS Message Status	None Initiated, Message Pending, Initiated, In Progress, Awaiting Reply, Modem Busy, No Coverage, No Registration, Modem Timeout, Unknown Error, Command Error	Displays the status of the last SMS message.	
GSM Registration	None Home Seeking Unknown Roaming	Display the current GSM Registration.	

RSSI (Received Signal Strength Indication)

TECH 2 displays the GSM signal strength in dBm, which is decibels per milliwatt, when measuring GSM signal strength, the measurement is referenced to 1 mW, and as the signal strength is less than the reference, it is always negative. The signal strength will range from –113 dBm (poor signal) to –50 (good signal). TECH 2 will also display the RSSI from 0 to 31 and as a bar graph.

RSSI	Bar Graph	dBm
0		-113
0		-112
1		-111
1		-110
2	>	-109
2	>	-108
3	>	-107
3	>	-106
4	>	-105
4	>	-104
5	>	-103
5	>	-102
6	>	-101
6	>	-100
7	>>	-99
7	>>	-98
8	>>	-97
8	>>	-96
9	>>	-95
9	>>	-94
10	>>	-93
10	>>	-92
11	>>	-91
11	>>	-90
12	>>	-89
12	>>	-88
13	>>>	-87
13	>>>	-86
14	>>>	-85
14	>>>	-84
15	>>>	-83
15	>>>	-82

RSSI	Bar Graph	dBm
16	>>>	-81
16	>>>	-80
17	>>>	-79
17	>>>	-78
18	>>>	-77
18	>>>	-76
19	>>>>	-75
19	>>>>	-74
20	>>>>	-73
20	>>>>	-72
21	>>>>	-71
21	>>>>	-70
22	>>>>	-69
22	>>>>	-68
23	>>>>	-67
23	>>>>	-66
24	>>>>	-65
24	>>>>	-64
25	>>>>>	-63
25	>>>>>	-62
26	>>>>>	-61
26	>>>>>	-60
27	>>>>>	-59
27	>>>>>	-58
28	>>>>>	-57
28	>>>>>	-56
29	>>>>>	-55
29	>>>>>	-54
30	>>>>>>	-53
30	>>>>>>	-52
31	>>>>>>	-51
31	>>>>>>	-50

F3: GSM Call Register

In this test mode, TECH 2 display the last ten GSM calls that have been made or received.

Data Parameter	Display
GSM Call Number 1	Refer following GSM Call Register Display Table
GSM Call Number 2	
GSM Call Number 3	
GSM Call Number 4	
GSM Call Number 5	
GSM Call Number 6	
GSM Call Number 7	
GSM Call Number 8	
GSM Call Number 9	
GSM Call Number 10	

GSM Call Register Display Table

The TECH 2 can display any of the following incoming or outgoing calls for any or all of the ten call registers.

Display	Description
No Activity	Will be displayed if there is no GSM register information stored in the telematics module, this will occur after a GSM Call Register reset has been carried out.
Unlock	An unlock request has been received from the Holden Assist Call Centre.
Unlock & Status	An unlock request and telematics module operating mode status request has been received from the Holden Assist Call Centre.
Unlock & Position	An unlock request and vehicle position request has been received from the Holden Assist Call Centre.
Lock	A lock request has been received from the Holden Assist Call Centre
Lock & Status	A lock request and telematics module operating mode status request has been received from the Holden Assist Call Centre.
Lock & Position	A lock request and vehicle position request has been received from the Holden Assist Call Centre.
Information	An information call has been sent to the Holden Assist Call Centre.
Holden Assist	A Holden Assist call has been sent to the Holden Assist Call Centre.
Emergency	A Emergency call has been sent to the Holden Assist Call Centre.
Low Battery	A low battery alert has been sent to the Holden Assist Call Centre.
Airbag	A airbag deployed alert has been sent to the Holden Assist Call Centre.
Unauth. Entry	An unauthorised entry alert (UEA) has been sent to the Holden Assist Call Centre.
Position	A current vehicle position request has been received from the Holden Assist Call Centre.
Tracking	A vehicle tracking request has been received from the Holden Assist Call Centre.
Tracking Change	A change vehicle tracking request has been received from the Holden Assist Call Centre.
Vehicle Locate	A vehicle locate request has been received from the Holden Assist Call Centre.
Immobilisation	An immobilisation request has been received from the Holden Assist Call Centre.
Remobilise	A remobilise request has been received from the Holden Assist Call Centre.
Parameter Update	A parameter update request has been received from the Holden Assist Call Centre.
Identification	An identification request has been received from the Holden Assist Call Centre.
Modify Operation	A modify operation request has been received from the Holden Assist Call Centre.
Acknowledge	An acknowledge has been set from the telematics module to the Holden Assist Call Centre.

F4: SYSTEM IDENTIFICATION

In this test mode, TECH 2 display system identification information. Refer [System Identification](#) in this Section.

F2: SNAPSHOT

In this mode, TECH 2 captures data before and after a forced manual trigger.

The purpose of the SNAPSHOT test mode is to help isolate an intermittent or transient problem by storing telematics module data parameters just before and just after a problem occurs.

Snapshot Options	
Trigger Type :	Manual Trigger
F0: Manual Trigger	
Trigger Point :	Center
F4: Beginning	
F5: Center	
F6: End	
Record Snapshot	Review Data

VX12K123

Figure 12K-44

F3: MISCELLANEOUS TESTS

Miscellaneous tests allows for the testing of various components of the telematics system, such as the status LEDs, radio mute or fuel pump circuit to assist in problem isolation during troubleshooting.

Each test will run for four seconds. Further activation of the soft key will run the test for another four seconds. Once miscellaneous tests has been selected, the following tests will be available.

- F0: Fuel Pump Circuit
- F1: Red Status LED
- F2: Green Status LED
- F3: Keypad Supply Voltage
- F4: Audio System Mute
- F5: Backup Battery Charger
- F6: Unlock Doors
- F7: Indicators
- F8: Audio Output

Miscellaneous Tests
F0: Fuel Pump Circuit
F1: Red Status LED
F2: Green Status LED
F3: Keypad Supply Voltage
F4: Audio System Mute
F5: Backup Battery Charger
F6: Unlock Doors
F7: Indicators
F8: Audio output

VY12K122

Figure 12K-45

F0: Fuel Pump Circuit

Provides a means of activating and deactivating the fuel pump relay drive circuit by pressing the Inactive or Active soft keys.

When inactive, the telematics module opens the fuel pump relay drive ground circuit and the fuel pump will stop. The fuel pump relay drive circuit will change from approximately 12 Volts engine running to 1.4 Volts when the engine is not running.

Pressing the Quit soft key will exit the test.

Precondition: System not in pre delivery mode.

If this miscellaneous test is unsuccessful replace the telematics module refer [3.1 TELEMATICS MODULE](#) in this Section.

Fuel Pump Circuit	
(3) 2003 VY Commodore	
Telematics Module	
Battery Voltage	13.0 V
Backup Battery Voltage	7.7 V
Backup Battery Charger	Inactive
Ignition Switch	On
Operating Mode	Active
Sleep Mode Pending	No
Fuel Pump Relay Drive C	Active
Fuel Pump Relay Drive C	Active
Quit	Inactive Active

1 / 31

VY12K124

Figure 12K-46

F1: Red Status LED

Provides a means of turning the red status LED on and off using the On and Off soft keys.

Pressing the Quit soft key will exit the test.

Precondition: System not in pre delivery mode.

If this miscellaneous test is unsuccessful refer [Status Indicator LEDs Do Not Illuminate](#) Diagnostic Chart in this Section.

Red Status LED	
(3) 2003 VY Commodore Telematics Module	
Battery Voltage	13.0 V
Backup Battery Voltage	7.7 V
Backup Battery Charger	Inactive
Ignition Switch	On
Operating Mode	Active
Sleep Mode Pending	No
Fuel Pump Relay Drive C	Active
Red Status LED	On
1 / 31	
Quit	Off On

VY12K126

Figure 12K-47

F2: Green Status LED

Provides a means of turning the green status LED on and off using the On and Off soft keys.

Pressing the Quit soft key will exit the test.

Precondition: System not in pre delivery mode.

If this miscellaneous test is unsuccessful refer [Status Indicator LEDs Do Not Illuminate](#) Diagnostic Chart in this Section.

Green Status LED	
(3) 2003 VY Commodore Telematics Module	
Battery Voltage	13.0 V
Backup Battery Voltage	7.7 V
Backup Battery Charger	Inactive
Ignition Switch	On
Operating Mode	Active
Sleep Mode Pending	No
Fuel Pump Relay Drive C	Active
Green Status LED	On
1 / 31	
Quit	Off On

VY12K128

Figure 12K-48

F3: Keypad Supply Voltage

This test provides the means of turning the supply voltage from the telematics module to the keypad on and off using the On and Off soft keys. When the keypad supply voltage is turned off the keypad illumination will go out and the keypad buttons will not function.

Pressing the Quit soft key will exit the test.

Precondition: System not in pre delivery mode.

If this miscellaneous test is unsuccessful refer [Status Indicator LEDs Do Not Illuminate](#) Diagnostic Chart in this Section.

Keypad Supply Voltage	
(3) 2003 VY Commodore Telematics Module	
Battery Voltage	13.0 V
Backup Battery Voltage	7.7 V
Backup Battery Charger	Inactive
Ignition Switch	On
Operating Mode	Active
Sleep Mode Pending	No
Fuel Pump Relay Drive C	Active
Keypad Supply Voltage	On
1 / 31	
Quit	Off On

VY12K128

Figure 12K-49

F4: Audio System Mute

Provides a means of activating and deactivating the telematics audio system mute circuit. To activate the audio system mute press the Active soft key, to deactivate the radio mute press the Inactive soft key.

Precondition: System not in pre delivery mode.

If this miscellaneous test is unsuccessful refer [Audio Mute Circuit Diagnostic Chart](#) in this Section.

Audio System Mute	
(3) 2003 VY Commodore Telematics Module	
Battery Voltage	13.0 V
Backup Battery Voltage	7.7 V
Backup Battery Charger	Inactive
Ignition Switch	On
Operating Mode	Active
Sleep Mode Pending	No
Fuel Pump Relay Drive C	Active
Audio System Mute	Inactive
1 / 31	
Quit	Inactive
Active	

VY12K127

Figure 12K-50

F5: Backup Battery Charger

Provides a means of activating and deactivating the telematics backup battery charging circuit. To activate the backup battery charger press the Active soft key, to inactivate the backup battery charger press the Inactive soft key.

Precondition: System not in pre delivery mode.

If this miscellaneous test is unsuccessful refer [Backup Battery Diagnostic Chart](#) in this Section.

Backup Battery Charger	
(3) 2003 VY Commodore Telematics Module	
Battery Voltage	13.0 V
Backup Battery Voltage	7.7 V
Backup Battery Charger	Inactive
Ignition Switch	On
Operating Mode	Active
Sleep Mode Pending	No
Fuel Pump Relay Drive C	Active
Backup Battery Charger	On
1 / 31	
Quit	Inactive
Active	

VY12K129

Figure 12K-51

F6: Unlock Doors

Provides a means of locking and unlocking the doors.

Precondition: System not in pre delivery mode.

When the **Lock** soft key is depressed TECH 2 will request the telematics module to send a lock request to the BCM via the serial data bus. On receiving this request from the telematics module the BCM will then lock all doors.

When the **Unlock** soft key is depressed TECH 2 will request the telematics module to send an unlock request to the BCM via the serial data bus. On receiving this request from the telematics module the BCM will then unlock all doors.

When the quit soft key is depressed the TECH 2 will send an Unlock request to the BCM, this will cause the doors to unlock when quitting this test.

If this miscellaneous test is unsuccessful refer to [Section 12J Body Control Module](#) in this Service Information.

Unlock Doors	
(3) 2003 VY Commodore Telematics Module	
Press the Appropriate Soft Key to Lock or Unlock the Doors!	
Quit	Lock
Unlock	

VY12K130

Figure 12K-52

F7: Indicators

Provides a means of causing the indicators to flash On and Off.

Precondition: System not in pre delivery mode.

When the **On** soft key is depressed TECH 2 will request the telematics module to send an indicators on off request to the BCM via the serial data bus. On receiving this request the BCM will then flash the indicators on and off.

When the **OFF** soft key is depressed TECH 2 will request the telematics module to stop sending indicators on off request to the BCM.

If this miscellaneous test is unsuccessful refer to [Section 12J Body Control Module](#) in this Service Information.

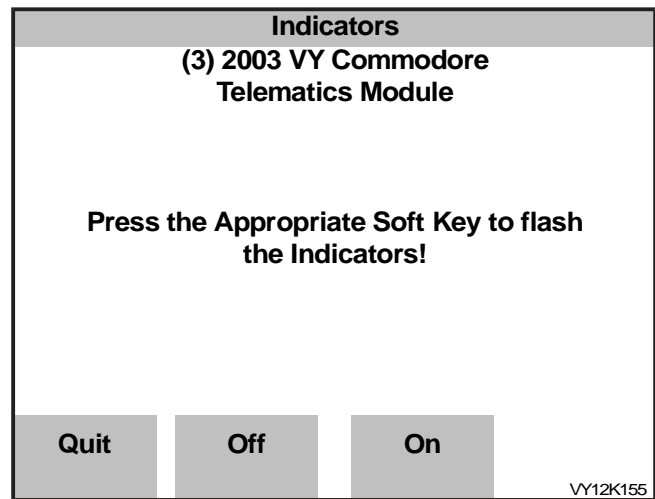


Figure 12K-53

F8: Audio Output

Provides a means of testing the two telematics audio outputs either the audio system or the front right speaker channel.

Precondition: System not in pre delivery mode.

When the **Audio System** soft key is depressed TECH 2 will request the telematics module to send a test tone to the Audio Head Unit (AHU). This test tone should then be heard through all audio system speaker channels.

When the **Front Right** soft key is depressed TECH 2 will request the telematics module to send a test tone to the right front speaker channel. This test tone should then be heard through the front right speaker channel. When this occurs a mute signal is sent to the AHU.

If this miscellaneous test is unsuccessful refer to [Audio Mute Circuit](#) in this Service Information.

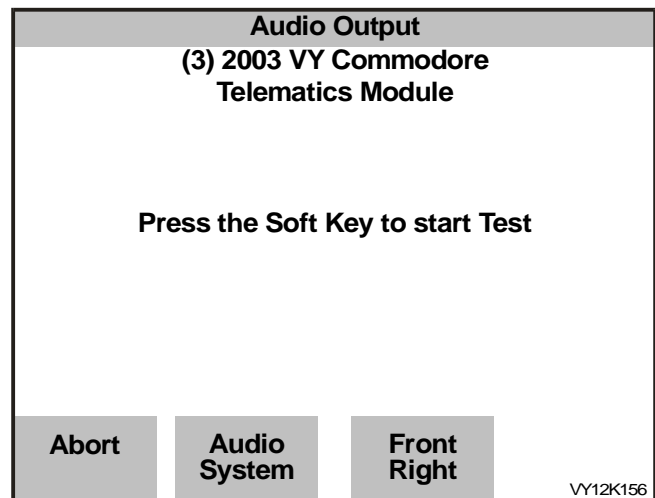


Figure 12K-54

F4: ADDITIONAL FUNCTIONS

When additional functions has been selected the following telematics module resets will be available.

F0: GSM Call Register Reset

F1: Backup Battery Timer Reset

F2: Telematics Module Reset

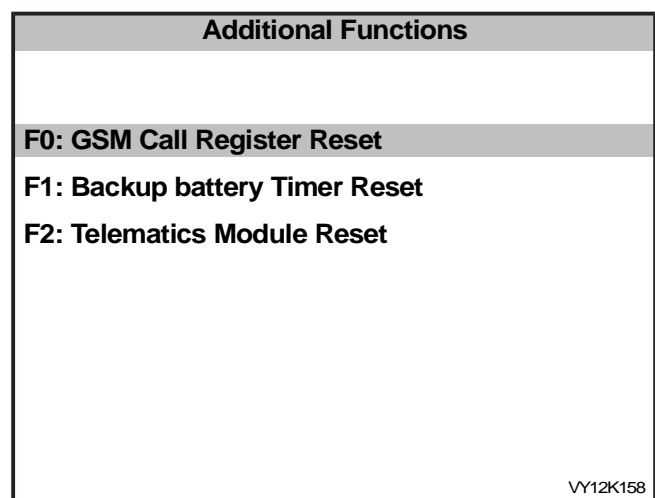


Figure 12K-55

F0: GSM Call Register Reset

This additional function will reset the GSM call register data list and all GSM Call Register data list parameters will then display “No Activity” until a call is made or received.

When selected, TECH 2 will display “Do you want to reset the GSM Call Register?” Depressing the **Yes** soft key will reset the GSM Call Register, depressing the **No** soft key will exit the function.

On completion of the reset TECH 2 will display GSM Call Register Reset Completed! Depress the **Confirm** soft key to exit.

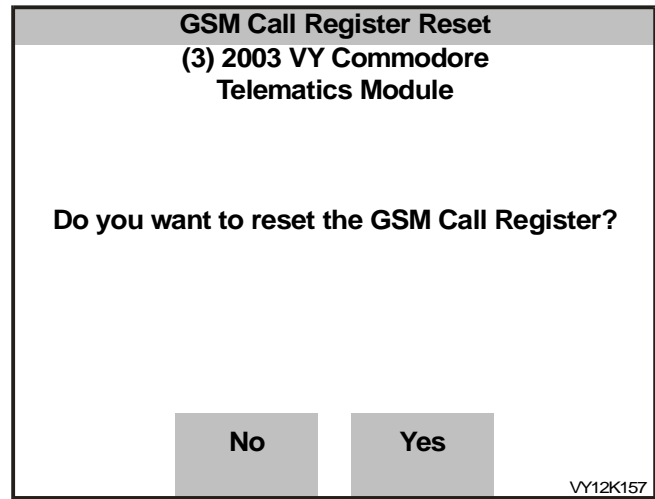


Figure 12K-56

F1: Backup Battery Timer Reset

This additional function allows you to reset the Backup Battery Timer. This should only be performed after the backup battery has been replaced.

Once this function has been selected, TECH 2 will request that you “Please get programming approval from TIS”. Refer [Section 0C TECH 2, Enabling Programing in this Service Information](#).

Once enable programming has been successful, return to and select **F1: Backup Battery Timer** and TECH 2 will continue to the following screen.

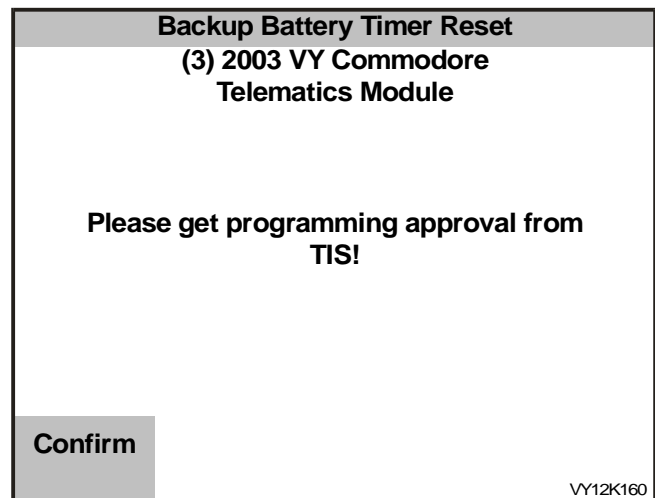


Figure 12K-57

TECH 2 will then display “Do you want to reset the Backup Battery Timer?”. Depressing the **Yes** soft key will clear the GSM Call Register, Depressing the **No** soft key will exit the function.

On completion of the reset TECH 2 will display “Backup Battery Timer Reset Completed!” Depress the **Confirm** soft key to exit.

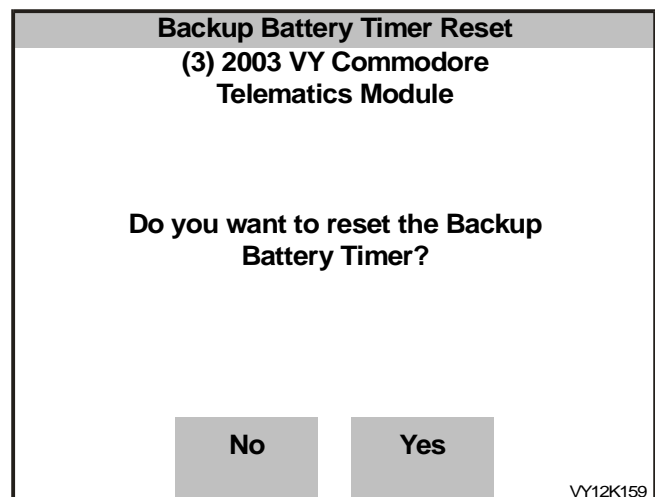


Figure 12K-58

F2: Telematics Module Reset

This additional function allows you to reset the telematics module. When selected TECH 2 will display “Do you want to reset the Telematics Module?” Depressing the **Yes** soft key will reset the telematics module, depressing the **No** soft key will exit the function.

On completion of the reset TECH 2 will display “Telematics Module Reset Completed!” Depress the **Confirm** soft key to exit.

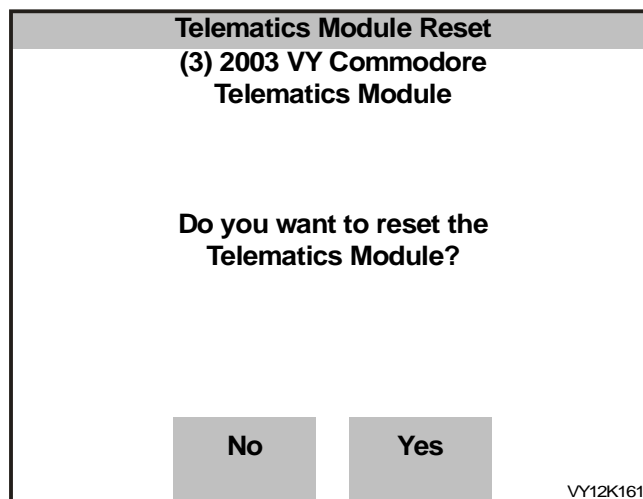


Figure 12K-59

F3: SIM Reset

In this function, TECH 2 will reset the SIM number, if required. If TECH 2 determines that a SIM Number reset is not required, SIM Reset Not Required will be displayed.

On completion of the reset, TECH 2 will display “SIM Reset Successful!” Depress the **Confirm** soft key to exit.

This reset if successful, this will clear DTC 8 SIM Mismatch.

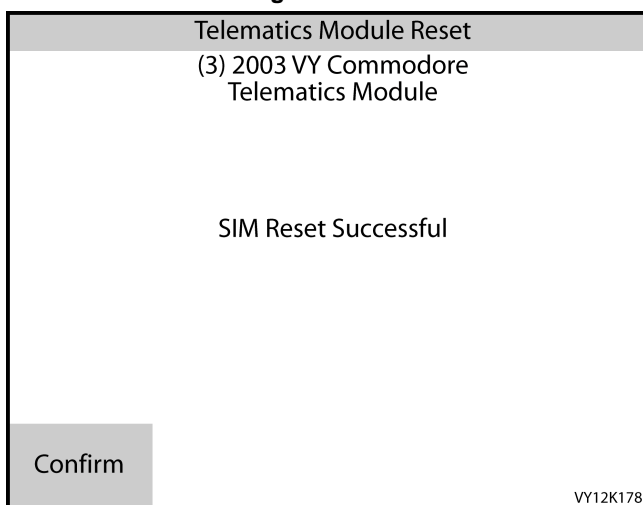


Figure 12K-60

F5: PROGRAM

In this mode, TECH 2 allows the programming of the telematics module. When the Program option is selected, the following two options will be available:

F0: Program Code Index

F1: Operating Mode

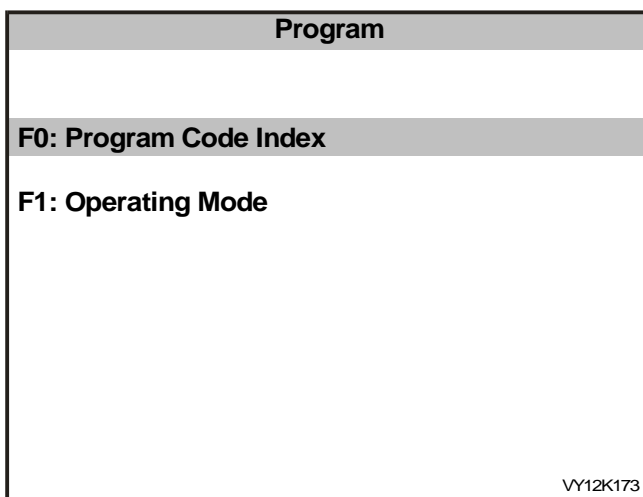


Figure 12K-61

F0: Program Code Index

In this mode, the code index and programmed code version are displayed, as well as providing the operator the option of reprogramming the code version.

Code Index: The code index identifies the telematics software level. A higher number indicates the latest version of software.

Code Version: The code version identifies the calibration level. Each software level may have different code versions, a higher number indicates the latest version of calibration.

Precondition: System not in Pre Delivery Mode.

Once **F0: Program Code Index** has been selected the screen opposite showing the current code index and code version numbers will be displayed. If you wish to change the software level, press the **Modify** soft key.

You will then be requested to enter the code index. Once the code index has been entered using the numerical keypad, press the Enter key to program.

NOTE: Leading zeros have to be entered.

Code Index

Model	Code Index
Berlina & Calais	001
Executive, Acclaim, S & SS	002

Code Index
(3) 2003 VY Commodore
Electronic System: Telematics Module

Code Index | 1
Code Version | 1

Modify Okay

VY12K178

Figure 12K-62

Code Index
(3) 2003 VY Commodore
Electronic System: Telematics Module

Enter Ecu Code Index
001

VY12K179

Figure 12K-63

F1: OPERATING MODE

This programming mode allows you to program the telematics module into one of the four operating modes.

Pressing the appropriate soft key will program the telematics module into the selected operating mode.

TIS approval is required to enable or disable Pre Delivery Mode.

Service Mode

If the Service soft key is depressed, the telematics module will immediately switch to service mode.

Active Mode

If the Active soft key is depressed, the telematics module will switch to active mode.

Sleep Mode

If the Sleep soft key is depressed the telematics module will switch to active mode the telematics module will then switch to sleep mode approximately two minutes after TECH 2 has been removed the ignition has been turned off and all doors have been shut.

Pre Delivery Mode

If the Pre-Delivery soft key is depressed TECH 2 will request that you "Please get programming approval from TIS". Refer to [Section 0C TECH 2](#), Enabling Programing in this Service Information.

Once enable programming has been successful, return to and select Pre Delivery Mode and TECH 2 will enable pre delivery mode.

Vehicles will be delivered to the dealer with the pre delivery mode enabled. With the pre delivery mode enabled the telematics system is turned off. The pre delivery mode must be disabled and the telematics module the service mode enabled by pressing the Service Mode Soft Key. TECH 2 will request that you "Please get programming approval from TIS". Refer to [Section 0C TECH 2](#), Enabling Programing in this Service Information.

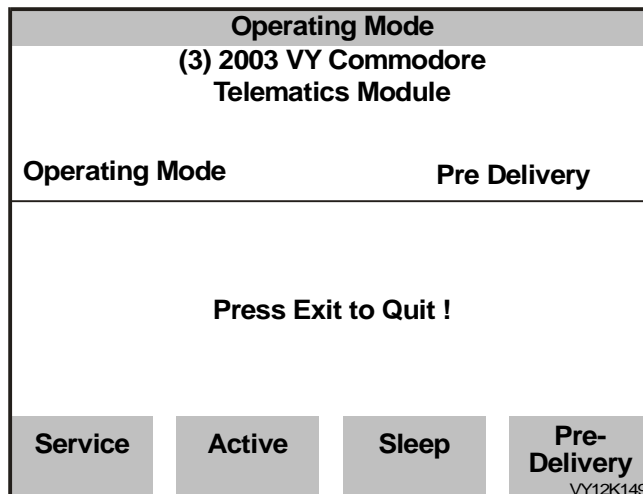


Figure 12K-64

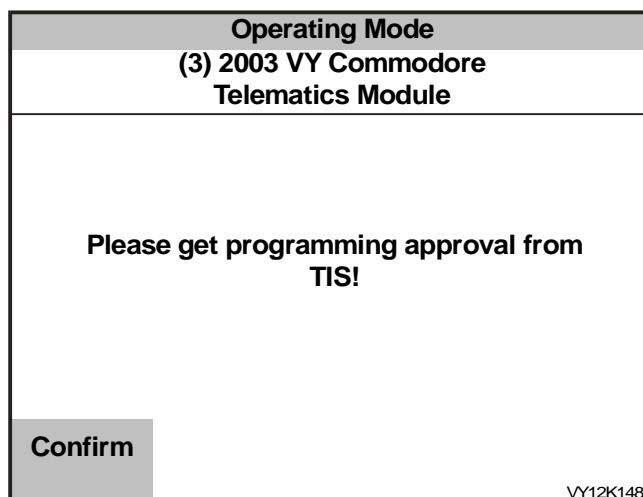


Figure 12K-65

Once F1: Operating Mode as been selected the current telematics module operating mode will be displayed. To change the operating mode press the appropriate soft Key and the telematics module will switch to the selected operating mode.

Note: TIS Approval is required to enable or disable Pre Delivery mode. If Pre Delivery mode is enabled then only the Service Mode Soft key will be displayed.

Press the Exit key to quit.

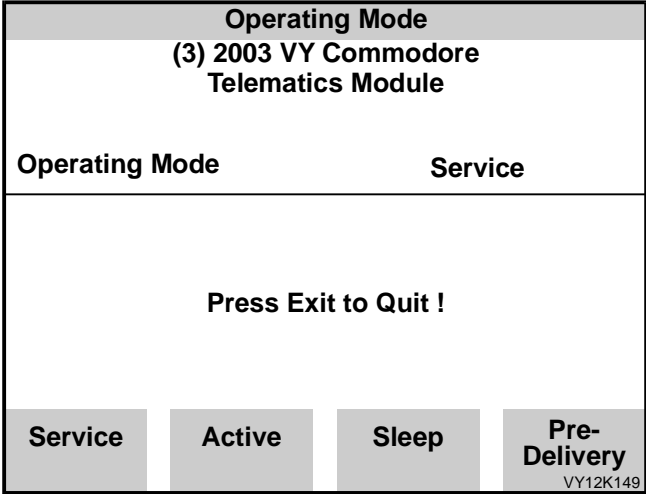


Figure 12K-66

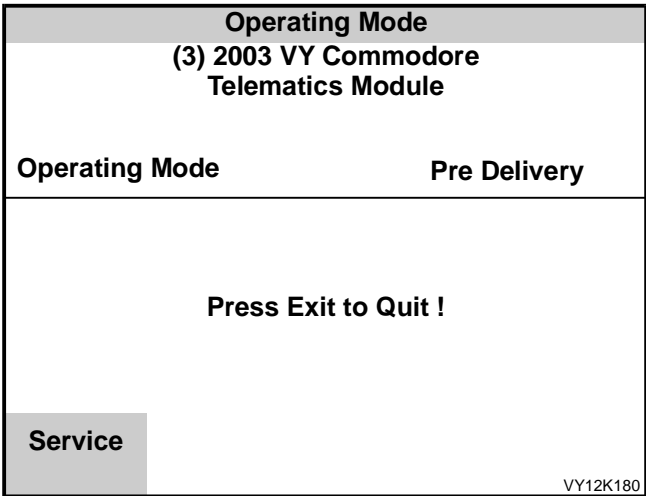


Figure 12K-67

5. DIAGNOSIS

The information contained in this Section is where to start all system diagnosis. Once you have read and understood the General Information Section, which contains reference material: wiring diagrams, telematics module terminal end views and nominal voltages, and component locations. (Remember, this information is for reference; do not start diagnosis using these pages). Always start diagnosis on the page titled On-Board Diagnostic System Check. This check first verifies that the diagnostic circuits are operating properly and then sends you to the correct chart for diagnosis.

5.1 BASIC KNOWLEDGE AND TOOLS REQUIRED

To use the Service Information effectively, you should understand the basic theory of electricity, series and parallel circuits, and voltage drops. You should know the meaning of voltage (Volts), current (Amps), and resistance (Ohms). You should understand what happens in a circuit with an open or shorted wire (shorted either to voltage or ground). You should also be able to read and understand a wiring diagram, refer to **Section 12P WIRING DIAGRAMS** in this Service Information.

To perform system diagnosis, the use of a TECH 2 is required. Tech 31 or a Digital Multimeter (DMM) with 10 megohms impedance, a test light, and jumper wires are also required. Please become acquainted with the tools and their use before attempting to diagnose a vehicle.

Exercise care when taking readings from wiring harness connectors. It is preferred that the back probing method with individual connectors is employed wherever possible, to avoid terminal damage and subsequent connection failure. Carrying out wiring checks as directed by the diagnostic charts, rather than probe terminals and connectors with incorrect sized multimeter connections. Use the adaptors contained in connector test adaptor kit KM-609. This will prevent any possibility of spreading or damaging wiring harness terminals.

Testing of the various systems will also involve gaining access to specific wiring harness connectors. For the location of these connectors, refer to **Section 12P WIRING DIAGRAMS** in this Service Information.

5.2 DIAGNOSTIC PRECAUTIONS

The following requirements must be observed when working on vehicles:

1. Before performing any Service Operation or other procedure described in this Section, refer to **Section 00 CAUTIONS AND NOTES** in this Service Information for correct workshop practices with regard to safety and/or property damage.
2. Disconnect the negative battery cable before removing any system component.
3. Never start the engine without the battery being connected correctly.
4. Never separate the battery from the on board electrical system while the engine is running.
5. When charging the battery, disconnect it from the vehicle's electrical system.
6. Never subject the telematics module to temperatures above 80°C eg. a paint oven. Always remove the telematics module first, if this temperature is to be exceeded.
7. Ensure that all cable harness plugs are connected solidly and that battery terminals are thoroughly clean.
8. The harness connectors are designed to fit in only one way, forcing connectors into place is not necessary if it is being installed with the proper orientation. Failure to take care to match the indexing tabs and slots to ensure the connector is being installed correctly can cause damage to the connector, the telematics module, or other vehicle components or systems.
9. Never connect or disconnect telematics module cable harness connectors when the ignition is switched on.
10. Before attempting any electric arc welding on the vehicle, disconnect the battery leads and the telematics module connectors.
11. Use only the test equipment specified in the diagnostic charts, since other test equipment may either give incorrect results or damage good components.
12. All voltage measurements using a voltmeter must use a digital voltmeter with an internal impedance rating of at least 10 million ohms per volt (10 meg ohms).
13. When a test light is specified, a low-power test light must be used. Do not use a high - wattage test light. While a particular brand of test light is not suggested, a simple test on any test light will ensure it to be OK for circuit testing. Connect an accurate ammeter (such as the high-impedance digital multimeter) in series with the test light being tested, and power the test light-ammeter circuit with the vehicle battery.

If the ammeter indicates less than 3/10 amp current flow (0.3 A or 300 mA), the test light is **OK** to use.

If the ammeter indicates more than 3/10 amp current flow (0.3 A or 300 mA), the test light is **NOT OK** to use.

BLOCKING DRIVE WHEELS

The vehicle drive wheels should always be blocked and the parking brake firmly applied while checking the system.

VISUAL/PHYSICAL INSPECTION

A careful visual and physical inspection must be performed as part of any diagnostic procedure. This can often lead to fixing a problem without further steps. Inspect all electrical wires for correct routing, pinches, cuts, or disconnections. Be sure to inspect wires that are difficult to see. Inspect all the wires for proper connections, burned or chafed spots, or contact with sharp edges or hot exhaust manifolds. This visual/physical inspection is very important. It must be done carefully and thoroughly.

5.3 DIAGNOSTIC CHART DESCRIPTION

The diagnostic charts are designed to provide fast and efficient means of fault location for all functions associated with the telematics module. Each diagnostic chart uses 2 pages; a chart on the right side page, and a facing page on the left side page. The left side "facing page" contains pertinent information and circuit diagrams. The chart steps are explained by the corresponding numbered paragraph on the left side facing page.

When diagnosing any problem, always begin with the **On-Board Diagnostic System Check**. The On-Board Diagnostic System Check will lead you to the other charts. **DO NOT GO DIRECTLY TO A SPECIFIC CHART** or false diagnosis and replacement of serviceable parts could result. After a fault is corrected and all DTCs have been cleared, repeat the On-Board Diagnostic System Check to assure that the proper repairs have been made.

The box at the top of the left page contains a circuit diagram showing the components involved in each circuit.

Immediately below the box is a brief circuit description. On the facing right hand page a troubleshooting chart for diagnosing conditions. Step numbers on the right-hand page next to the action boxes in the chart relate to the items in the Test Description on the left-hand page. These items provide an explanation of each test in the chart.

The facing right hand page also contains a three quarter view of the connectors that are listed in the diagnostic charts.

The appropriate step in any of the trouble shooting chart will instruct you either to make a specific repair or to continue diagnosis. If further diagnosis is needed, the step will specify where to continue.

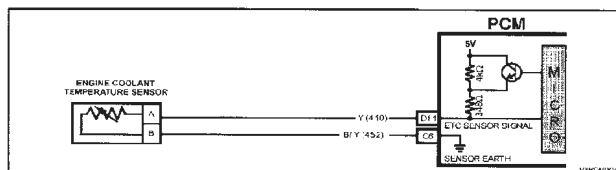
The Yes or No column in any diagnostic chart will instruct you either to make a specific repair or to continue diagnosis. If further diagnosis is needed, the Yes or No column will specify where to continue.

If the condition is intermittent, the trouble shooting chart will direct you to the diagnostic aids on the facing page. This Section gives suggestions for diagnosing intermittent conditions and explains how some faults can occur.

Remember, charts are for solving active conditions, not intermittent conditions.

6C1-2A-104

DIAGNOSTIC TABLES – V6 ENGINE



DTC P0118 V6 PCM

ENGINE COOLANT TEMPERATURE (ECT) SENSOR LOW VOLTAGE

Circuit Description:

The Engine Coolant Temperature (ECT) sensor uses a thermistor to control the signal voltage to the PCM. The PCM applies about 5 volts on circuit 410 to the sensor. When the engine coolant is cold, the sensor (thermistor) resistance is high; therefore the PCM will see high signal voltage about 4.0 - 4.5 volts.

As the engine coolant warms, the sensor resistance becomes less, and the PCM sees a lower signal voltage. At normal engine operating temperature (85 degrees C to 95 degrees C), the voltage should measure about 2.2 to 1.8 volts.

A DTC P0118 may enable TCC operation when cold.

Conditions for Running the DTC

- Time since engine started is greater than 70 seconds

Conditions for Setting the DTC

- ECT sensor signal voltage is less than 0.3 volts, indicating an engine coolant temperature at or above 140 C for one second.

When DTC P0118 is set, the PCM will default to a 55° C value for engine operation.

Action Taken When the DTC Sets

- The PCM illuminates the Malfunction Indicator Lamp (MIL) when the diagnostic runs and fails.
- The PCM records the operating conditions at the time the diagnostic fails. The PCM stores this information in the History Data.

Conditions for Clearing the MIL/DTC

- The PCM turns the MIL OFF after three consecutive ignition cycles that the diagnostic runs and does not fail.
- A History DTC clears after forty consecutive warm-up cycles, if this or any other emission related diagnostic does not report any failure.
- Use a Tech 2 scan tool in order to clear the MIL/DTC.

Diagnostic Aids:

Check harness routing for a potential short to earth in circuit 410.

Check terminals at ECT sensor for a good connector.

The Tech 2 scan tool reads engine coolant temperature in degrees Celsius. After engine is started, the temperature should rise steadily to about 90 C then stabilise when thermostat opens.

The "Temperature to Resistance Value" scale may be used to test the engine coolant temperature sensor at various temperature levels to evaluate the possibility of a "shifted" (mis-scaled) sensor. A "shifted" sensor could result in poor driveability complaints.

When Diagnostic Trouble Code P0118 is set, the TCC will be applied with a cold engine and the engine cooling fan will be turned "ON".

Refer to "Intermittents" in Section 6C1-2B SYMPTOMS in this Volume.

ECT SENSOR TABLE TEMP. TO RESISTANCE VALUES (APPROXIMATE)

C	OHMS
110	134
100	180
90	244
70	474
40	1,483
30	2,268
20	3,555
0	9,517
-10	15,320
-20	28,039

Test Description: Number(s) below refer to step number(s) on the diagnostic Table.

- This test will determine if circuit 410 is shorted to earth, which will cause the conditions for DTC P0118.
- If checking resistance at the engine coolant temperature sensor is difficult because of sensor location, disconnect the PCM connectors and check resistance between engine coolant temperature signal and sensor earth terminals.

DIAGNOSTIC TABLES – V6 ENGINE

6C1-2A-105

DTC P0118 V6 PCM

ENGINE COOLANT TEMPERATURE (ECT) SENSOR LOW VOLTAGE

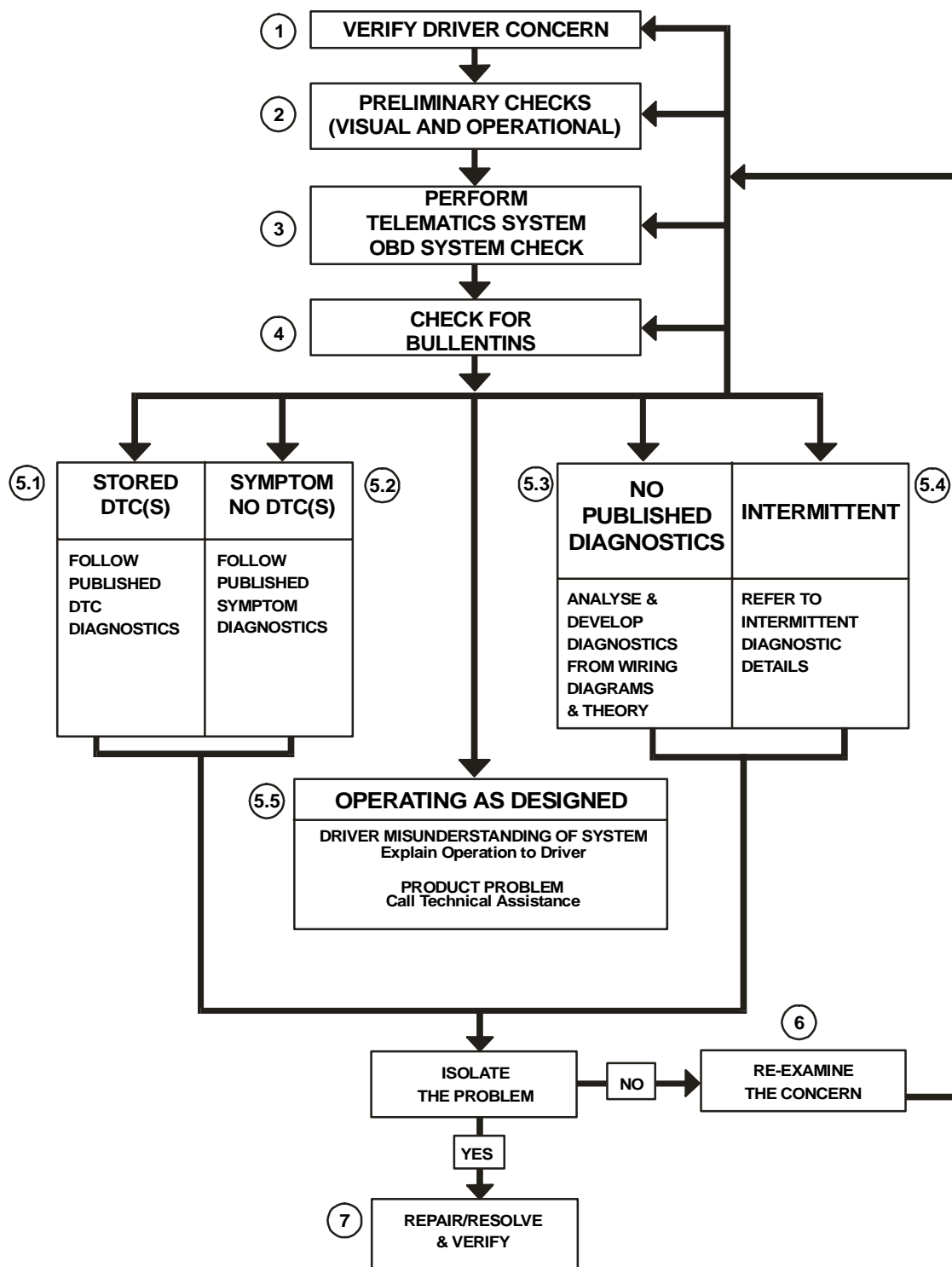
STEP	ACTION	VALUE	YES	NO
1.	Was the "On-Board Diagnostic" (OBD) System Check performed?		Go to Step 2.	Go to OBD System Check in this Section.
2.	Using Tech 2 scan tool, select 'Eng. Coolant Temp' on the data display. Is the 'Eng. Coolant Temp' display value at or above the specified value?	140 degrees C	Go to Step 3.	If no additional DTCs were stored, refer to "Intermittents" in Section 6C1-2B SYMPTOMS in this Volume.
3.	1. Ignition "Off". 2. Disconnect engine coolant temperature sensor wiring harness. 3. Ignition "On". Does Tech 2 scan tool display 'Eng. Coolant Temp' below specified value?	-30 degrees C	Go to Step 4.	Go to Step 7.
4.	Check resistance across engine coolant temperature sensor terminals. Does DVM ohms reading match the specified values for temperature to sensor resistance?	See table on facing page.	Go to Step 5.	Go to Step 8.
5.	Check for intermittent or loose terminals in sensor harness connector, or for the 2 terminals shorting together when connected to the sensor. Was a faulty connection found?		Verify Repair.	Go to Step 6.
6.	Replace PCM. Refer to Section 6C1-3 SERVICE OPERATIONS in this Volume, for PCM Programming and Security Link procedure. Is action complete?		Verify Repair.	
7.	Check circuit 410 for short to earth or to sensor earth. Was a short found?		Verify Repair.	Go to Step 8.
8.	Replace ECT sensor. Is replacement complete?		Verify Repair.	

Figure 12K-68

5.4 STRATEGY BASED DIAGNOSTICS

The strategy based diagnostic is a uniform approach to repair all Electrical/Electronic systems. The diagnostic flow can always be used to resolve an Electrical/Electronic system problem and is a starting point when repairs are necessary. The steps below are defined to instruct the technician how to proceed with a diagnostic process. Steps below also refer to step numbers found on the Strategy Based Diagnostic chart.

1. **Verify the Driver Concern:** To verify the driver concern, the technician should know the normal operation of the system.
2. **Preliminary Check:** Conduct a thorough visual and operational inspection, review the service history, detect unusual sounds or odours, and gather diagnostic trouble code information to achieve effective repair.
3. **Service information System Check(s):** System checks verify proper operation of the system. This will lead the technician in an organised approach to diagnostics.
4. **Check Bulletins and Other Service Information:** This should include, Service Techlines, All Dealer letters, and Service Training Publications.
5. **Service Diagnostics (Paper/Electronic)**
 - 5.1 **Current DTC Stored:** Follow the designed DTC chart exactly to make an effective repair.
 - 5.2 **Symptom, No DTC:** Select the symptom from the diagnostic charts and follow the diagnostic paths or suggestions to complete the repair, or refer to the applicable component/system checks in this Service Information.
 - 5.3 **No Published Diagnostics:** Analyse the complaint and develop a plan for diagnostics. Utilise the wiring diagrams and theory of operation.
Call Technical Assistance for similar cases where repair history may be available. Combine technician knowledge with efficient use of the available service information.
 - 5.4 **Intermittent faults:** Conditions that are not always present are intermittent. To resolve intermittence, perform the following steps:
 - 5.4.1 Observe history DTCs, DTC modes and Freeze Frame data if available.
 - 5.4.2 Evaluate the symptoms and conditions described by the driver.
 - 5.4.3 Use a check sheet or other method to identify the circuit or electrical system component.
 - 5.4.4 Follow the suggestions for intermittent diagnosis found in the service documentation.The TECH 2, Tech 31 and a DMM have data capturing capabilities that can assist in detection of intermittents.
 - 5.5 **Vehicle Operates As Designed/No Trouble Found:** This condition exists when the vehicle is found to be operating normally. The condition described by the driver may be normal. Verify against another vehicle that is operating normally. The condition may be intermittent. Contact Technical Assistance if the concern is common. Verify the complaint under the conditions described by the driver before releasing the vehicle.
6. **Re-examine the Concern:** When the complaint cannot be successfully found or isolated, a re-evaluation is necessary. The complaint should be re-verified and could be intermittent or normal as per step 5.3 or 5.5.
7. **Repair and Verification Tests:** After isolating the cause, the repair should be made. Then validate for proper operation and verify that the symptom has been corrected. This may involve road testing or other methods to verify the complaint has been resolved under the following conditions:
 - Conditions noted by the driver.
 - If a DTC was diagnosed, verify a repair by duplicating conditions present when a DTC was set.



12K DIAGNOSTIC CHART

Figure 12K-69 Strategy Based Diagnostic

5.5 ON-BOARD DIAGNOSTIC SYSTEM CHECK

After the visual/physical vehicle inspection, the On-Board Diagnostic System Check is the starting point for all diagnostic procedures or finding the cause of a system malfunction or failure.

All Diagnostic procedures must always begin with the **ON-BOARD DIAGNOSTIC SYSTEM CHECK**.

Diagnostic procedures must begin with the On-Board Diagnostic System Check, which represents an organised approach for identifying system problems.

The ON-BOARD DIAGNOSTIC SYSTEM CHECK makes an initial check of the system, then will direct the technician to other charts in the Service Information. It must be used as a starting point for all procedures. The entire diagnostic section in the Service Information is set up in a specific order, that is, the ON-BOARD DIAGNOSTIC SYSTEM CHECK will lead the technician to other charts, and those charts may lead to still other charts. **THE SEQUENCE MUST BE FOLLOWED.** The telematics module uses many input signals and controls many output functions. If the correct diagnostic sequence is not followed, incorrect diagnosis and replacement of good parts may happen.

Diagnostic charts incorporate diagnosis procedures using a TECH 2 where possible. TECH 2 is a small hand-held computer in itself. Its job is to give information to a technician about what is happening in the system.

The Data Link Connector (DLC) is used by the assembly plant to perform end of line tests. This connector can also be used by technicians to monitor certain inputs and outputs as detected by the telematics module. The TECH 2 reads and displays the information (serial data) supplied to the data link connector from the telematics module.

The correct procedure to diagnose a problem is to follow three basic steps.

1. Are the On-Board Diagnostics working? This is determined by performing the On-Board Diagnostic System Check. Since this is the starting point for the diagnostic procedures or finding the cause of a failure, always begin here.

If the On-Board Diagnostics are not working, the On-Board Diagnostic System Check will lead to a diagnostic chart to correct the problem. If the On-Board Diagnostics are working correctly, the next step is:

2. Is there a Diagnostic Trouble Code stored? If a diagnostic trouble code is stored, go directly to the numbered diagnostic trouble code chart. This will determine if the fault is still present. If no diagnostic trouble code is stored, then:
3. Observe Serial Data transmitted by the telematics module: This involves reading the TECH 2 information. TECH 2 Information and the meaning of the various displays can be found in the Service Information. Typical data readings under a particular operating condition can be found on the TECH 2 Data page. If the actual data does not match the typical data, then refer to the specific diagnostics for that data parameter.

5.6 DIAGNOSTIC TROUBLE CODES

When the telematics module detects an operating parameter which is outside its calibrated values it will set a DTC and stored this DTC into its memory as a current DTC. When a current DTC is set the Red Status LED may be illuminated whenever the ignition is on.

The six most recent DTCs that have occurred will be logged into the telematics module memory into a table known as the “DTC List”. The DTC list can contain history data for the six most recent DTCs. Therefore, if more than six DTCs are set, only history data for the last six will be tracked. That is, the oldest DTC will be removed from the list regardless of its position within the list.

NOTE: Once a DTC has been removed from the “DTC List” it is maintained in the memory of the telematics module as a History DTC, however there will be no DTC history data available for this DTC.

The DTC history data contained in the “DTC List” is as follows:

List Position	Position within the list numbered from 1 to 6.
DTC Number	The DTC number is the number used to identify a particular fault condition.
Occurrence Count (0 to 255)	The Occurrence Count is the number of times the particular fault condition has been detected.
History Count (0 to 255)	The History Count is the number of ignition cycles that have occurred since the fault was last detected. A count of 0 indicates the fault has occurred on the current ignition cycle, while a count of 255 indicates that the fault occurred 255 or more ignition cycles ago.

Algorithms for detecting each fault condition and setting the corresponding DTC vary. However, a particular DTC is only set once per ignition cycle. When a DTC is set, the following occurs:

- If the DTC does not exist in the DTC List, it is inserted into the list at the first vacant location with the Occurrence Count set to 1 and the History Count set to 0. In the event of the DTC List being full, the oldest DTC will be removed from the list. The History Count determines the age of a DTC List entry. The item in the list with the highest History Count will be removed to make space for the new DTC.
- If the DTC already exists in the DTC List, then the Occurrence Count will be incremented (up to 255, at which point it is no longer incremented). Each time the DTC is set, the History Count is cleared.

This ensures that the six most recent fault conditions are tracked. The Occurrence and History Counters provide a means of determining how often the fault has occurred, and how long it has been since the fault last occurred. For instance, if the DTC Occurrence Count is 1, and the History Count is 201, then it can be determined that the fault condition existed only once, and it happened 201 ignition cycles ago (and has not been detected since). Another example would be an Occurrence Count of 4 and a History Count of 0. This would indicate that the fault has been detected a total of four times, and that it was detected on the current ignition cycle.

The DTCs are not removed from the list unless six newer fault conditions occur pushing the oldest fault off the list, or they are cleared using TECH 2.

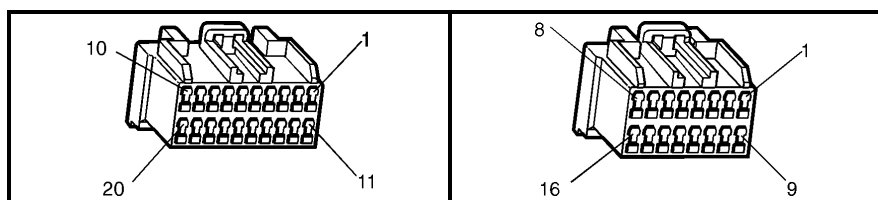
NOTE: Once a DTC has been removed from the “DTC List” it is maintained in the telematics module memory as a History DTC, however there will be no DTC history data available for this DTC.

DIAGNOSTIC TROUBLE CODES

DTC #	TECH 2 DISPLAY	RED STATUS LED ILLUMINATED
1	No Serial Data From BCM	No
2	No Serial Data From Instrument	No
3	No Serial Data From SDM	Yes
4	No Serial Data From Audio System	No
5	No Serial Data	Yes
7	GPS Module Failure	Yes
8	SIM Mismatch	No
9	Vehicle Battery Voltage Too High	No
10	Vehicle Battery Voltage Too Low	Yes
11	RAM Error	Yes
12	EEPROM Error	Yes
13	Backup Battery Timer Expired	Yes
14	Backup Battery Voltage Too High	Yes
15	Backup Battery Voltage Too Low	Yes
16	Backup Battery Not Detected	Yes
17	Microphone Not Detected	Yes
18	Microphone Circuit Voltage Too Low	Yes
19	Microphone Circuit Voltage Too High	Yes
21	Speaker Circuit Voltage Too Low	Yes
22	Speaker Circuit Voltage Too High	Yes
30	Keypad Circuit Voltage Too High	Yes
35	GPS Antenna Circuit Voltage Too Low	Yes
39	Telephone Number Error	Yes
44	GSM Not Logged With Signal Strength Present	Yes
45	End Call / Information Button Stuck	Yes
46	Holden Assist Button Stuck	Yes
47	Emergency Button Stuck	Yes

5.7 TELEMATICS MODULE TERMINAL DESCRIPTIONS

Terminal No A158	Circuit No	Circuit Colour	IVED ABV.	Description	Circuit Type
X1-1	117	Green	SPK_-	Speaker Negative	Output
X1-2	200	Light Green	SPK_+	Speaker Positive	Output
X1-4	1061	Green / White	UART_SCD	Serial Data (Secondary)	I/O
X1-5	659	Dark Green	CLTEL_GND	Phone Signal In Ground	Ground
X1-6	658	Grey	CLTEL_SIG	Phone Signal In	Input
X1-7	1153	Brown	MIC-	Microphone Negative	Ground
X1-8	1155	Green	MIC+	Microphone Positive	Input
X1-9	2506	Black	TEL_GND	Phone Signal Out Ground	Ground
X1-10	655	Blue / Black	TEL_SIG	Phone Signal Out	Output
X1-18	465	Green White	FL_PMP_SG	Fuel Pump Relay In	Input
X1-19	497	Light Green	FL_PMP_RLY	Fuel Pump Relay Out	Output
X2-1	745	White	PAS_D_AJ	Passenger Door Switches	Input
X2-2	1149	Green	THRN	Theft Deterrent Horn Relay	Input
X2-5	539	Pink / Blue	IG	Ignition	Input
X2-6	5211	Yellow / Black	TEL_MUT	Radio Mute	Output
X2-7	2517	Brown / White	RD_LED	Red LED	Output
X2-8	851	Black / White	GND	Ground	Ground
X2-9	2514	Dark Green / White	KEY_DAT	Key Pad Signal	Input
X2-11	746	Grey / White	DRV_DAJ	Driver's Door Switch	Input
X2-12	693	Yellow	CLTEL_MUT	Phone Mute In	Input
X2-14	2516	Yellow / Black	GN_LED	Green LED	Output
X2-15	2515	Light Green / Black	KEY_PWR	Key Pad Supply Voltage	Output
X2-16	740	Red / White	BATT+	Battery Positive	B+
X3-A	N/A	N/A	N/A	GPS Antenna Signal	Input
X3-B	N/A	N/A	N/A	GPS Antenna Ground	Ground
X4-A	N/A	N/A	N/A	GSM Antenna Signal	Input
X4-B	N/A	N/A	N/A	GSM Antenna Ground	Ground
X5-A	N/A	N/A	N/A	Back Up Battery Positive	7.2 Volts
X5-B	N/A	N/A	N/A	Back Up Battery Negative	Ground



A158 X1

A158 X2

5.8 DIAGNOSTIC CHARTS

ON-BOARD DIAGNOSTIC SYSTEM CHECK

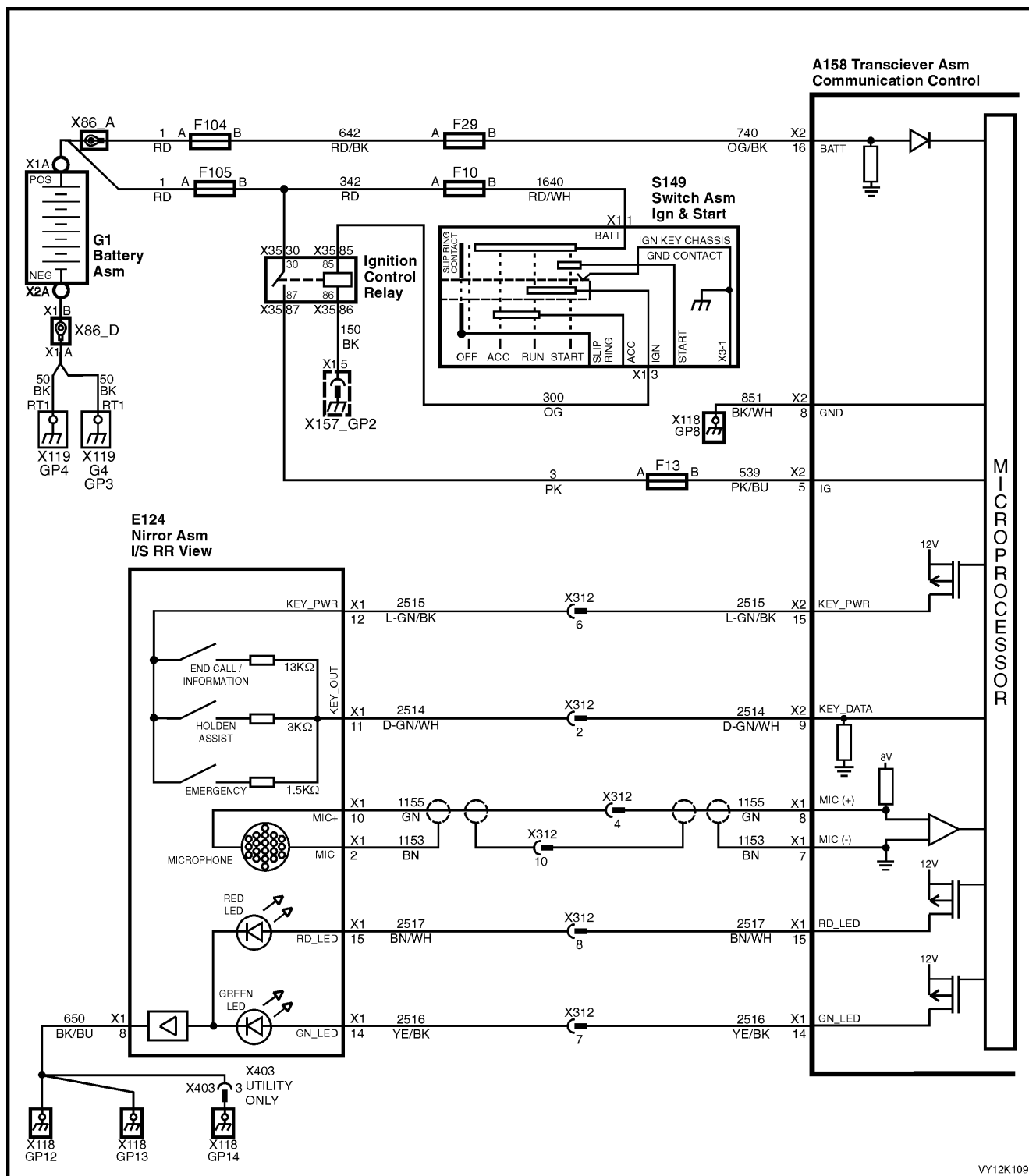


Figure 12K-70

CIRCUIT DESCRIPTION

The On-Board Diagnostic System Check is an organised approach in identifying a telematics system problem. It must be the starting point for any system diagnostics, as it directs the service technician to the next logical step in diagnosing a complaint. Understanding the diagnostic chart and using it correctly will reduce diagnostic time and prevent the replacement of good parts.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. If either the RED or Green or both (Orange) Status indicator LEDs are illuminated, the telematics module is powered up and supply power to the interior rear view mirror.
2. Confirms TECH 2 operation and that TECH 2 is being powered up.
3. Confirms that TECH 2 can communicate with the telematics module.

4. The VIN in the telematics module must match the actual vehicle VIN. The correct VIN is critical for proper telematics system operation.
5. If the engine starts and runs then the fuel pump relay drive circuit is OK.
6. In this you are checking if there are any current DTCs. If there are current DTCs, refer to the applicable diagnostic chart.
7. This test determines if the telematics module is in pre delivery mode. In pre delivery mode the telematics module is turned off. If the pre delivery mode is enabled it should be disabled and the On-Board Diagnostic System Check should be performed again.
8. In this test you should refer to the telematics data list nominal values. If the values in the TECH 2 Data List do not meet the nominal values listed, refer to the applicable diagnostic chart.
9. In this test step all of the TECH 2 Miscellaneous Tests should be conducted and all tests should pass successfully, if any test fails you should refer to the applicable diagnostic chart.
10. The vehicle must be positioned where the GSM signal strength is greater than -90 dbm and the GPS data list parameter "Time of Last Known GPS Fix" is updating. You can then begin the Holden Assist Telematics System Test. You must refer to the Holden Assist Telematics System Test in this Section.
11. This test step confirms that the connector terminal retention is OK, Terminal retention should always be checked before any component is replaced.
12. The telematics system is operating as designed and has passed the On-Board Diagnostic System Check. You should discuss the system complaint with the driver (System Subscriber) of the vehicle to ensure that they understand the correct operation of the system, have them demonstrate the problem.

STEP	ACTION	YES	NO
1.	1. Turn ignition on, engine off. Are either the Red or Green or both (Orange) the Status indicator LEDs in the interior rear view mirror illuminated?	Go to Step 2.	Refer Status Indicator LEDs Do Not Illuminate in this Section.
2.	1. Turn ignition off, install TECH 2 to DLC, turn ignition on and turn on TECH 2. Does TECH 2 power up and display the title display screen?	Go to Step 3.	Refer TECH 2 Diagnosis, Section 0C TECH 2 in this Service Information.
3.	1. With TECH 2 still connected and ignition on, press the ENTER key, then select Diagnostics / (3) 2003 / VY Commodore / F4: Body / Telematics Module and then follow the screen instructions. Does TECH 2 display telematics system identification information?	Go to Step 4.	Go to No Serial Data Chart in this Section.
4.	Did the VIN displayed in step 3 match the actual VIN of the vehicle?	Go to Step 5.	Go to Step 11.
5.	Does the engine start and run?	Go to Step 6.	Go to Fuel Pump Relay Drive Circuit Chart in this Section.
6.	1. From the Telematics Application Menu, select F0: Diagnostic Trouble / F0: Read DTC Information. Are there any current DTCs?	Go to the applicable DTC Diagnostic Chart in this Section.	Go to Step 7.
7.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs. Scroll to "Operating Mode". Does TECH 2 display "Pre Delivery"?	Disable Pre Delivery Mode. Refer F5: Program / F1: Operating Mode in this Section.	Go to Step 8.
8.	1. From the Telematics Application Menu Select / F1: Data Display (Refer 4.3 TECH 2 TEST MODES, F1: Data Display in this Section). Do the Telematics Data List parameters match the Nominal Values?	Go to Step 9.	Refer to the appropriate Data Display Diagnostic Chart in this Section.
9.	1. From the TECH 2 Telematics application menu Select / F2: Miscellaneous Tests (Refer 4.3 TECH 2 TEST MODES / F3: Miscellaneous Tests in this Section). 2. Perform all the Miscellaneous Tests. Were all the Miscellaneous Tests successful?	Go to Step 10.	Refer to the Applicable Miscellaneous Test Failure Diagnostic Chart in this Section.

STEP	ACTION	YES	NO
10.	1. Ignition on. 2. Position the vehicle where the GSM Signal strength is greater than -90 dbm and the GPS data list parameter "Time of Last Known GPS Fix" is updating. 3. Perform a Holden Assist Telematics System Test. (Refer Holden Assist Telematics System Test Chart in this Section). Was the Telematics System Test successful?	Go to Step 12.	Go to Step 11.
11.	1. Check telematics module connector A158 X1 & X2 terminal retention. Is the terminal retention OK?	Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
12.	Telematics system is operating correctly. If the owner (System Subscriber) was complaining about a system fault, discuss the complaint with the owner, and have them demonstrate the problem.		

DTC 1 - NO SERIAL DATA FROM BCM

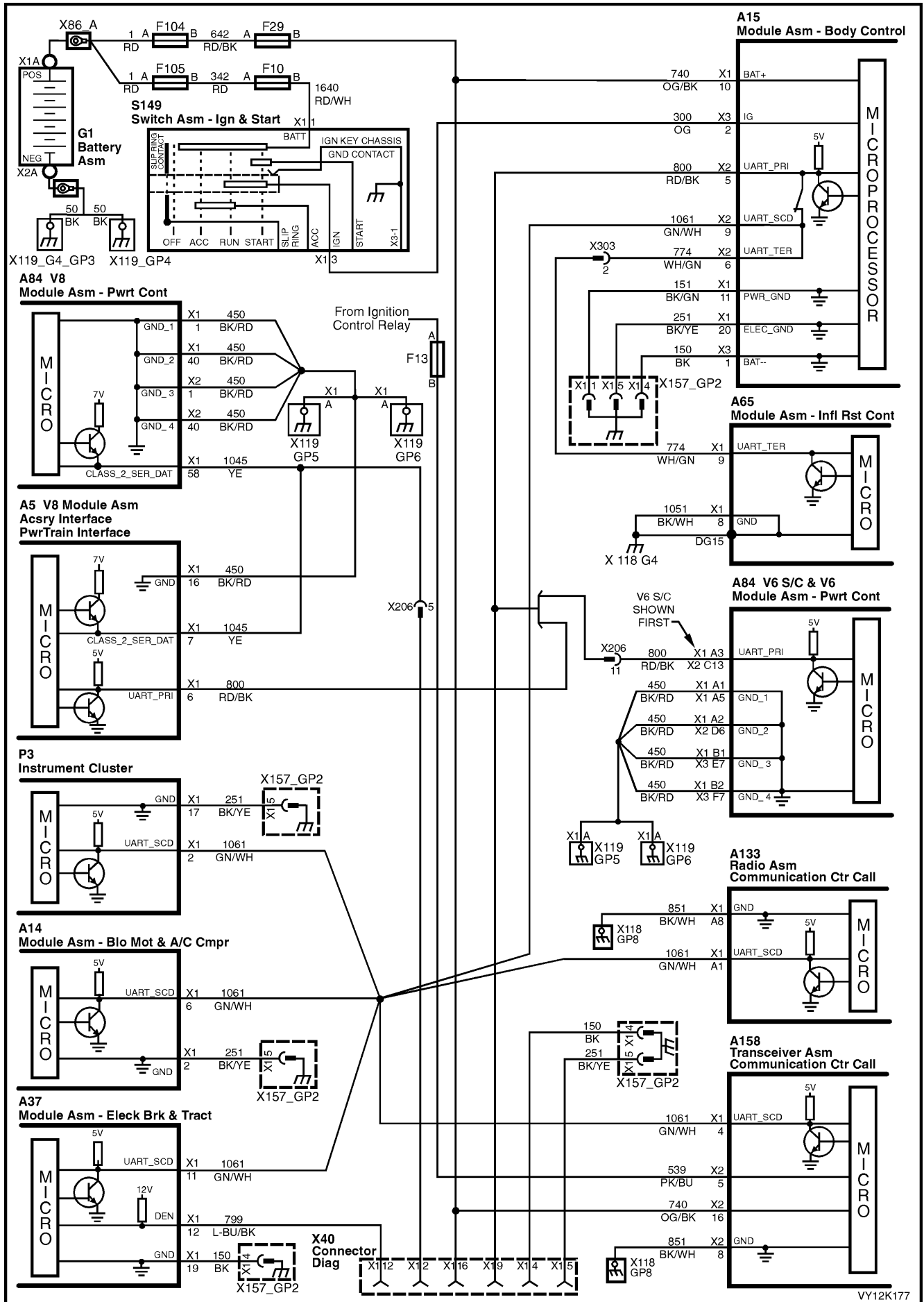


Figure 12K-71

VY12K177

CIRCUIT DESCRIPTION

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM, Vehicle Speed from the PCM and Audio System status information from the Audio Head Unit. For further information regarding the serial data bus and normal mode message, refer [1.2 Serial Data Communication](#) in Section 12J BODY CONTROL MODULE in this Service Information

If the telematics module receives a "Remote Unlock" message from the Holden Assist Centre, the telematics module will request the BCM (via the serial data circuit) to unlock the doors. For further information regarding the BCM door lock operation, refer [Section 12J-1 BODY CONTROL MODULE, Central Door Locking Systems](#) in this Service Information.

If the telematics module receives a "Immobilise" message from the Holden Assist Centre, the telematics module will then turn off the fuel pump relay cutting off the supply of fuel to the engine and request the BCM (via the serial data circuit) to flash the indicators. For further information regarding the BCM indicator operation, refer to [Section 12J BODY CONTROL MODULE, Theft Deterrent System](#) in this Service Information.

CONDITIONS FOR SETTING THE DTC

- The telematics module does not receive any BCM serial data for more than ten second.

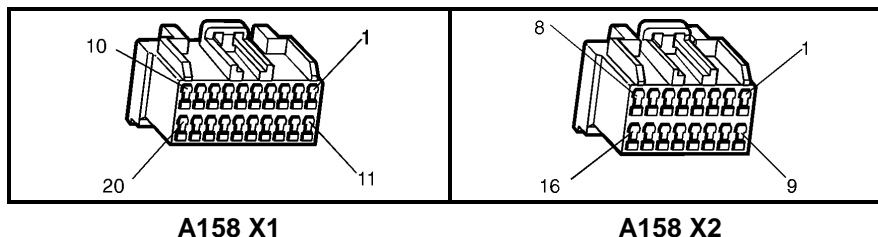
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

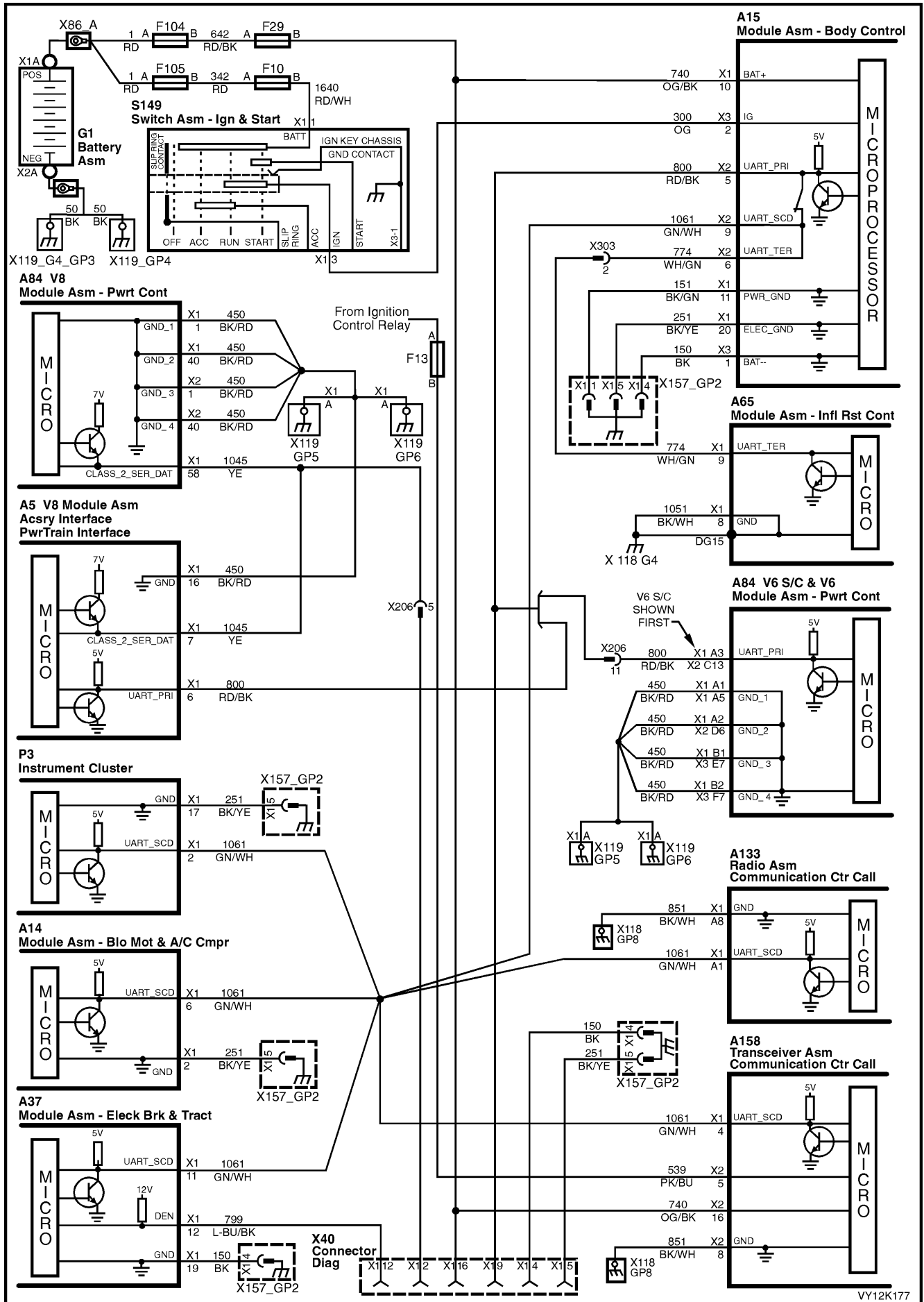
1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. If "NO Communication with the Vehicle" or "No Data" is displayed next to BCM DTC Status, then there is no communication between TECH 2 and the BCM. If TECH 2 can communicate with the BCM the primary serial data circuit 800 and the BCM are OK.
3. If DTC 1 is intermittent check for an open or short to ground or voltage in circuit 1061.
4. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 1 - NO SERIAL DATA FROM BCM

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 System Select Menu select F5: Vehicle DTC Check, Ignition On and follow screen instructions. Does TECH 2 Display "NO Communication with Vehicle" or "BCM DTC Status, No Data"?		Refer BCM Serial Data Communication diagnostics in Section 12J BCM in this Service Information.	Go to Step 3.
3.	1. With TECH 2 still connected, switch Ignition On, Engine Off. 2. From the Telematics Menu Select F0: Diagnostic Trouble Codes / F1: Clear DTC Information and clear the Telematics Module DTCs. 3. Ignition on for at least ten seconds. Is DTC 1 No Serial Data from BCM set?		Go to Step 4.	DTC 1 is intermittent, Refer Test Step Description.
4.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 2 - NO SERIAL DATA FROM INSTRUMENT



CIRCUIT DESCRIPTION

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM, Vehicle Speed from the PCM and Audio System status information from the Audio Head Unit. For further information regarding the serial data bus and normal mode message, refer **1.2 Serial Data Communication** in Section 12J BODY CONTROL MODULE in this Service Information.

If the telematics module receives a "Remote Unlock" message from the Holden Assist Centre, the telematics module will request the BCM (via the serial data circuit) to unlock the doors. For further information regarding the BCM door lock operation, refer **Section 12J-1 BODY CONTROL MODULE, Central Door Locking Systems** in this Service Information.

If the telematics module receives a "Immobilise" message from the Holden Assist Centre, the telematics module will then turn off the fuel pump relay cutting off the supply of fuel to the engine and request the BCM (via the serial data circuit) to flash the indicators. For further information regarding the BCM indicator operation, refer to **Section 12J BODY CONTROL MODULE, Theft Deterrent System** in this Service Information.

CONDITIONS FOR SETTING THE DTC

- The telematics module does not receive any instrument serial data for more than ten second.

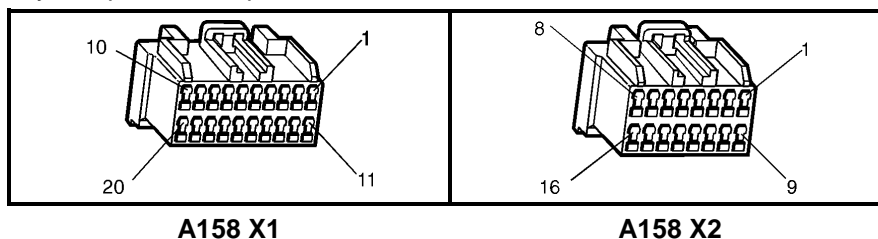
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. If "No Data" is displayed next to Instrument DTC Status, then there is no communication between TECH 2 and the Instrument. If TECH 2 can communicate with the instruments the secondary serial data circuit 1061 and the instrument are OK.
3. If DTC 2 is intermittent check for an open or short to ground or voltage in circuit 1061.
4. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 2 - NO SERIAL DATA FROM INSTRUMENT

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 System Select Menu select F5: Vehicle DTC Check, Ignition On and follow screen instructions. Does TECH 2 Display "Instrument DTC Status", "No Data"?		Refer Instrument Serial Data Communication diagnostics in Section 12C INSTRUMENTS in this Service Information.	Go to Step 3
3.	1. With TECH 2 still connected, switch Ignition On engine Off. 2. From the Telematics menu Select F0: Diagnostic Trouble Codes / F1: Clear DTC Information and clear the Telematics Module DTCs. 3. Ignition on for at least ten seconds. Is DTC 2 No Serial Data from Instrument set?		Go to Step 4.	DTC 2 is intermittent, Refer to Test Step.
4.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 3 - NO SERIAL DATA FROM SDM (SENSING DIAGNOSTIC MODULE)



Figure 12K-73

CIRCUIT DESCRIPTION

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM (Sensing Diagnostic Module), Vehicle Speed from the PCM and Audio System status information from the Audio Head Unit. For further information regarding the serial data bus and normal mode message, refer [1.2 Serial Data Communication](#) in Section 12J-1 BODY CONTROL MODULE in this Service Information. On receiving an Airbag Deployed this Ignition Cycle from the SRS SDM the telematics module will send a "Airbag Activation Alert" to the National Emergency Response Centre refer [2.2 Airbag Activation Alert](#) in this Section.

CONDITIONS FOR SETTING THE DTC

- The telematics module does not receive any SDM serial data for more than ten seconds.

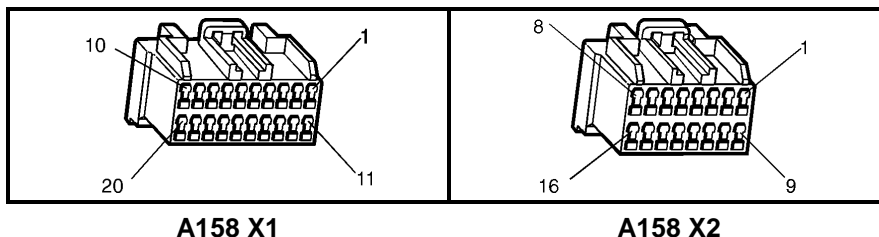
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

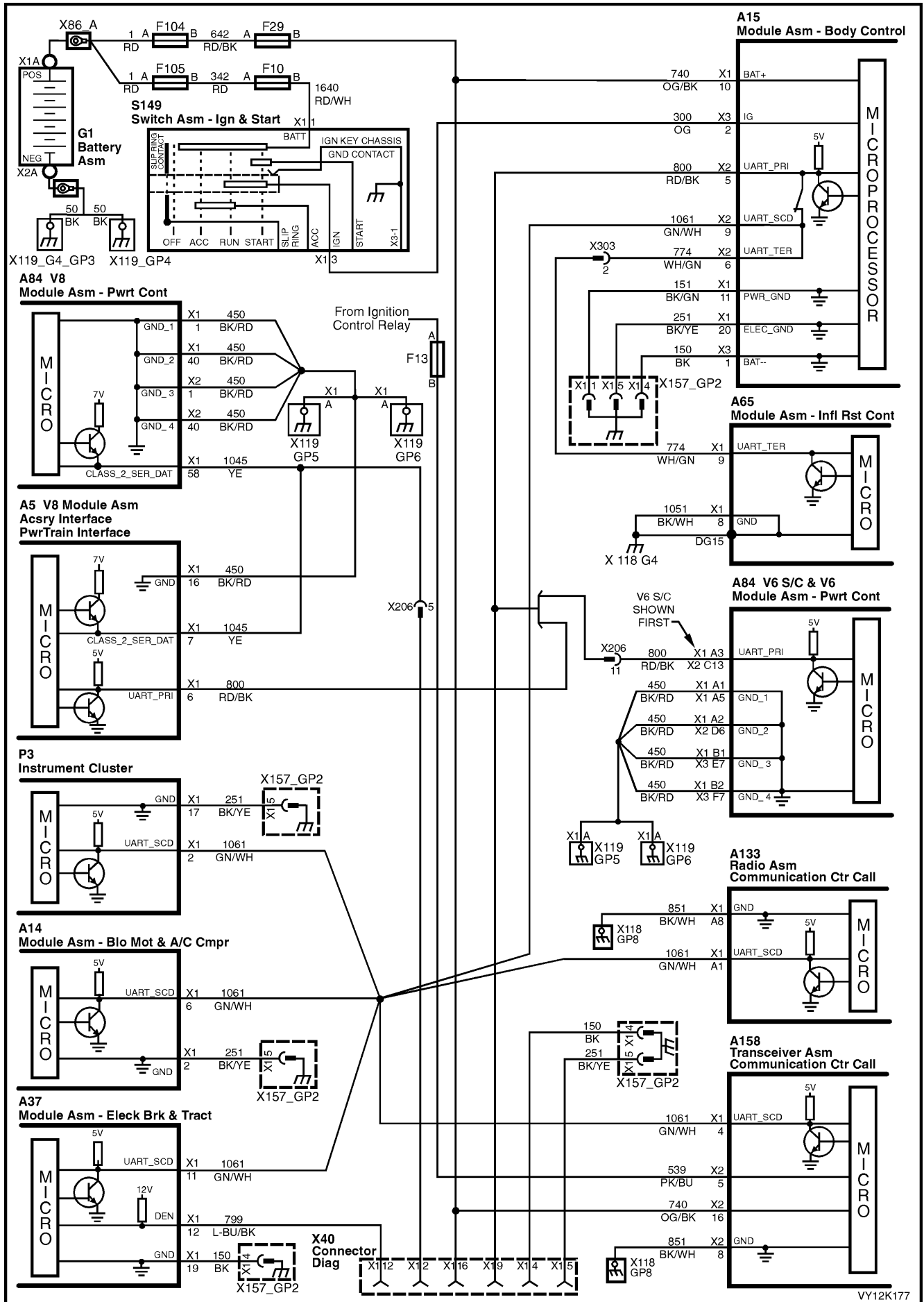
- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- If "No Data" is displayed next to SDM DTC Status, then there is no communication between TECH 2 and the SDM. If TECH 2 can communicate with the SDM the secondary circuit 1061 and tertiary serial data circuit 774 and the SDM are OK.
- If DTC 3 is intermittent check for an open or short to ground or voltage in circuits 1061 and 774.
- This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 3 - NO SERIAL DATA FROM SDM

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 System Select Menu select F5: Vehicle DTC Check, Ignition On and follow screen instructions. Does TECH 2 Display "SDM DTC Status", "No Data"?		Refer SDM Serial Data Communication diagnostics in Section 12M Occupant Protection System in this Service Information.	Go to Step 3
3.	1. With TECH 2 still connected, switch Ignition On engine Off. 2. From the Telematics menu Select F0: Diagnostic Trouble Codes / F1: Clear DTC Information and clear the Telematics Module DTCs. 3. Ignition on for at least ten seconds. Is DTC 2 No Serial Data from Instrument set?		Go to Step 4.	DTC 2 is intermittent, Refer Test Step Description.
4.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 4 - NO SERIAL DATA FROM AUDIO SYSTEM



CIRCUIT DESCRIPTION

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM, Vehicle Speed from the PCM and Audio System status information from the Audio System. For further information regarding the serial data bus and normal mode message, refer [1.2 Serial Data Communication](#) in Section 12J-1 BODY CONTROL MODULE in this Service Information.

CONDITIONS FOR SETTING THE DTC

- The telematics module does not receive any audio system serial data for more than ten second.

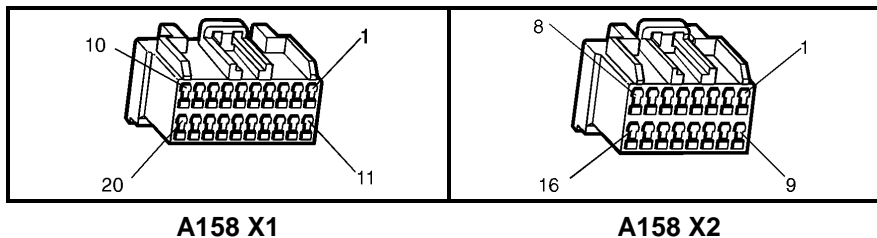
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- If "No Data" is displayed next to Audio System DTC Status, then there is no communication between TECH 2 and the Audio System.
- If DTC 4 is intermittent check for an open or short to ground or voltage in circuit 1061.
- This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 4 - NO SERIAL DATA FROM AUDIO SYSTEM

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Go to Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 System Select Menu select F5: Vehicle DTC Check, Ignition On and follow screen instructions. Does TECH 2 Display "Audio System DTC Status" No Data?		Refer AHU Serial Data Communication diagnostics in Section 12D Entertainment System in this Service Information.	Go to Step 3.
3.	1. With TECH 2 still connected, switch Ignition On engine Off. 2. From the Telematics Menu Select F0: Diagnostic Trouble Codes / F1: Clear DTC Information and clear the Telematics Module DTCs. 3. Ignition on for at least ten seconds. Is DTC 4 No Serial Data from Audio System set?		Go to Step 4.	DTC 4 is intermittent, Refer Test Step Description.
4.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 5 – NO SERIAL DATA

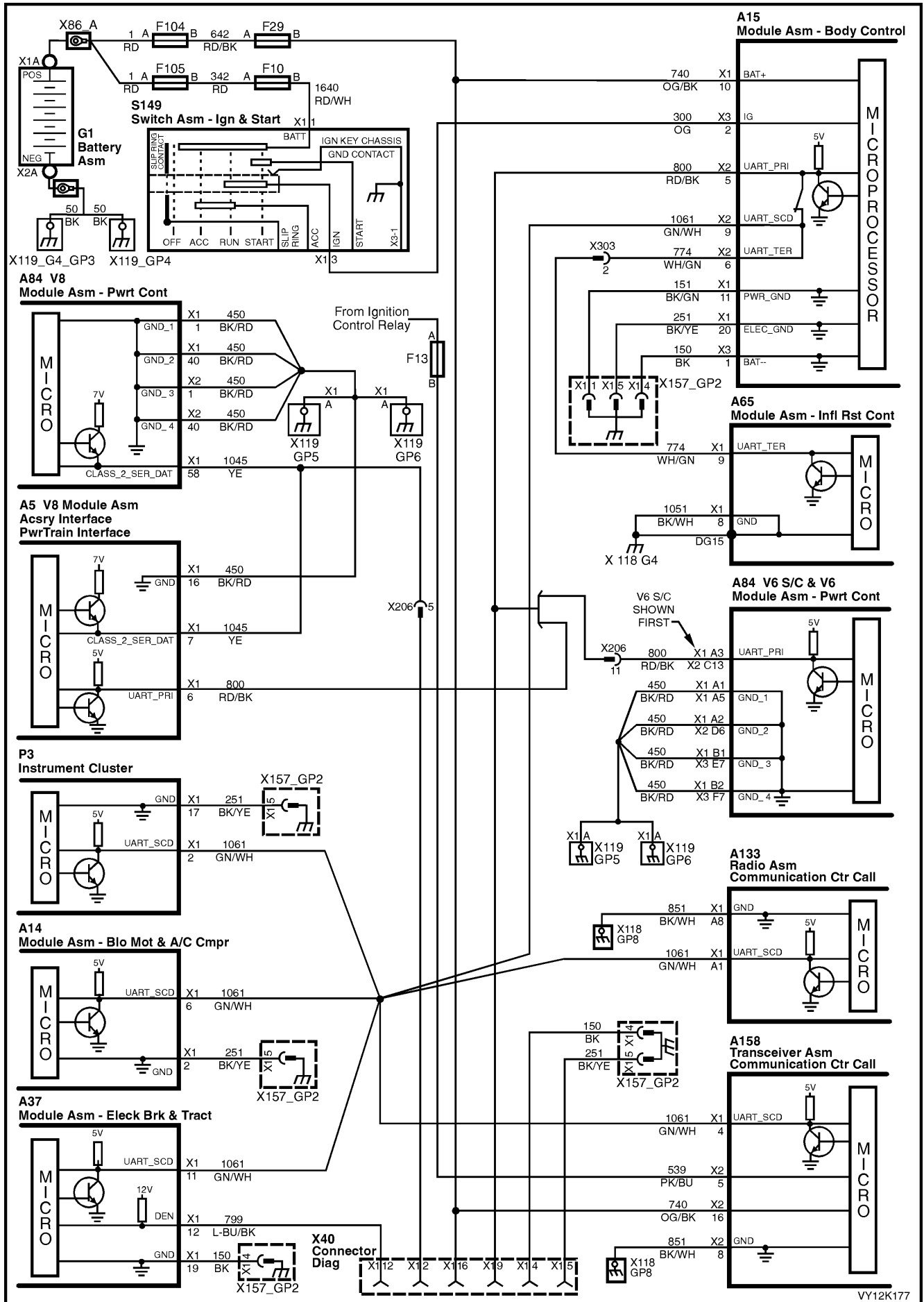


Figure 12K-75

VY12K177

CIRCUIT DESCRIPTION

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM, Vehicle Speed from the PCM and Audio System status information from the Audio System. For further information regarding the serial data bus and normal mode message, refer [1.2 Serial Data Communication](#) in Section 12J-1 BODY CONTROL MODULE in this Service Information.

If the telematics module receives a "Remote Unlock" message from the Holden Assist Centre, the telematics module will request the BCM (via the serial data circuit) to unlock the doors. For further information regarding the BCM door lock operation, refer to [Section 12J-1 BODY CONTROL MODULE, Central Door Locking Systems](#) in this Service Information.

If the telematics module receives a "Immobilise" message from the Holden Assist Centre, the telematics module will then turn off the fuel pump relay cutting off the supply of fuel to the engine and request the BCM (via the serial data circuit) to flash the indicators. For further information regarding the BCM indicator operation, refer to [Section 12J-1 BODY CONTROL MODULE, Theft Deterrent System](#) in this Service Information.

CONDITIONS FOR SETTING THE DTC

- The telematics module does not receive any serial data for more than ten second.

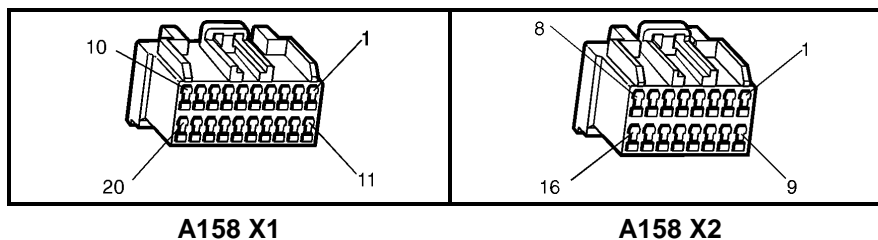
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test step determines if TECH 2 is able communicate with the BCM.
3. If DTC 5 is intermittent check for an open or short to ground or voltage in circuits 774, 800 and 1061.
4. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 5 – NO SERIAL DATA

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	<p>1. From the TECH 2 System Select Menu select F5: Vehicle DTC Check, Ignition On and follow screen instructions.</p> <p>2. Does TECH 2 Display “NO Communication with Vehicle” or “BCM DTC Status, No Data”?</p> <p>NOTE: If “No Data” is displayed next to BCM DTC Status, then there is no communication between TECH 2 and the BCM.</p>		Refer BCM Serial Data Communication diagnostics in Section 12J BCM in this Service Information.	Go to Step 3.
3.	<p>1. With TECH 2 still connected, switch Ignition On engine Off.</p> <p>2. From the Telematics Menu Select F0: Diagnostic Trouble Codes / F1: Clear DTC Information and clear the Telematics Module DTCs.</p> <p>3. Ignition on for at least ten seconds.</p> <p>Is DTC 5 No Serial Data set?</p>		Go to Step 4.	DTC 5 is intermittent, Refer to Test Step.
4.	<p>1. Check telematics module connectors A158 X1 and X2 terminal retention.</p> <p>Is the terminal retention OK?</p>		Replace telematics module. Refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 7 – GPS MODULE FAILURE

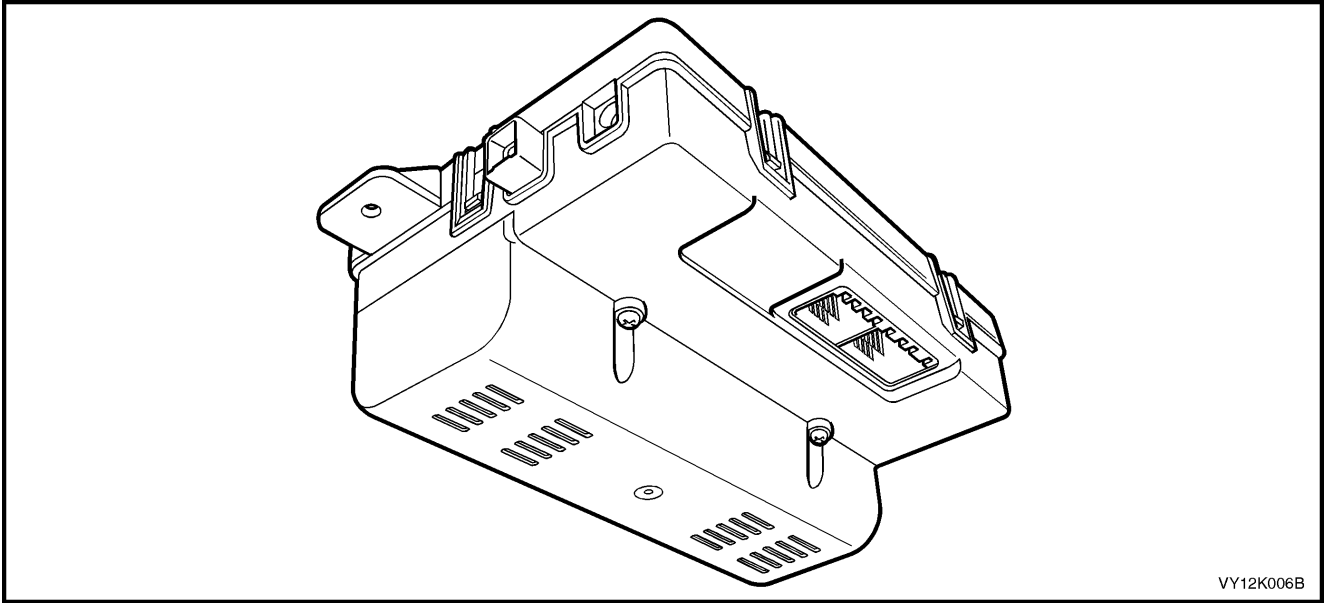


Figure 12K-76

CONDITIONS FOR SETTING THE DTC

- This DTC will set if the telematics module detects a GPS module failure.

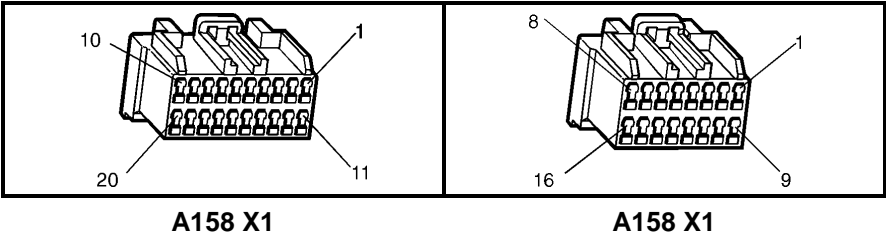
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

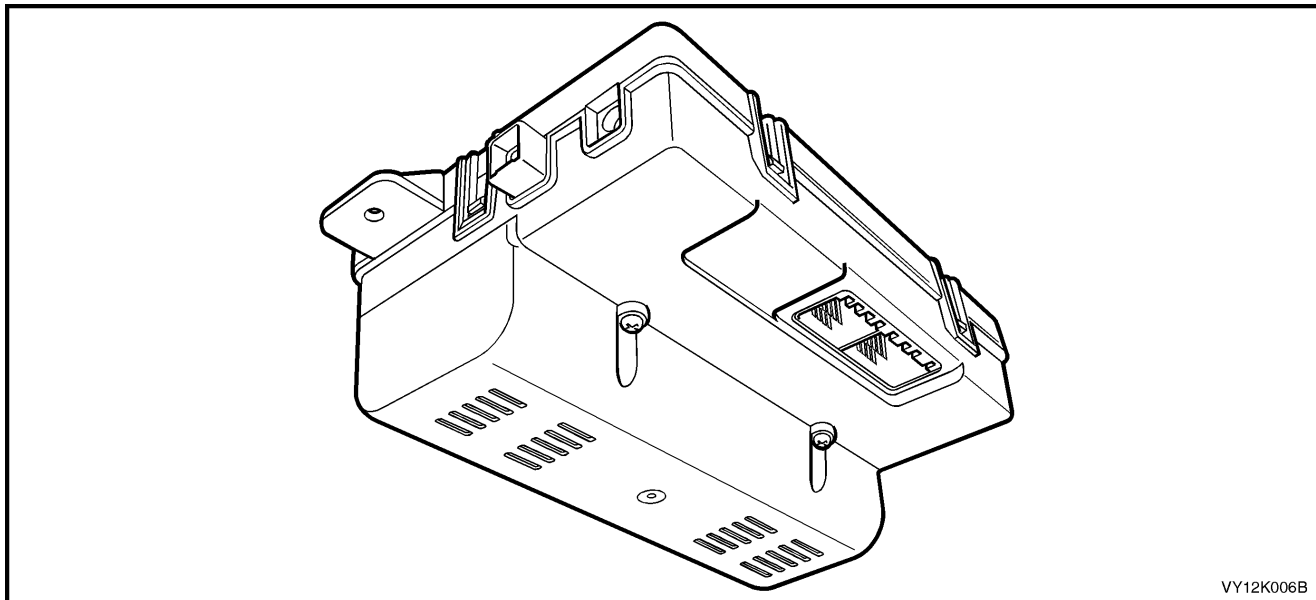
1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed. If an incorrect vehicle identification number is detected the telematics module should be replaced.



DTC 7 – GPS MODULE FIALURE

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 8 - SIM MISMATCH



VY12K006B

Figure 12K-77

CONDITIONS FOR SETTING THE DTC

- During the telematics module self test a faulty or incorrect SIM is detected.

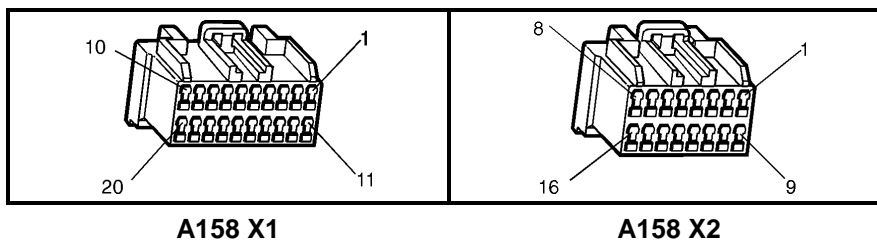
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed. If the SIM is faulty or an incorrect SIM is detected the telematics module should be replaced.



A158 X1

A158 X2

DTC 8 – SIM MISMATCH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F4: Additional Functions / F3: SIM Reset and perform a SIM Reset. Does TECH 2 display SIM Reset Not Required?		Go to Step 4	Go to Step 3
3.	In Test Step 2 was the SIM Reset Successful?		Complete Telematics On-Board Diagnostic System <i>Check</i> . Refer Telematics On-Board Diagnostic System <i>Check</i> chart in this Section.	Go to Step 4
4.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 9 - VEHICLE BATTERY VOLTAGE TOO HIGH

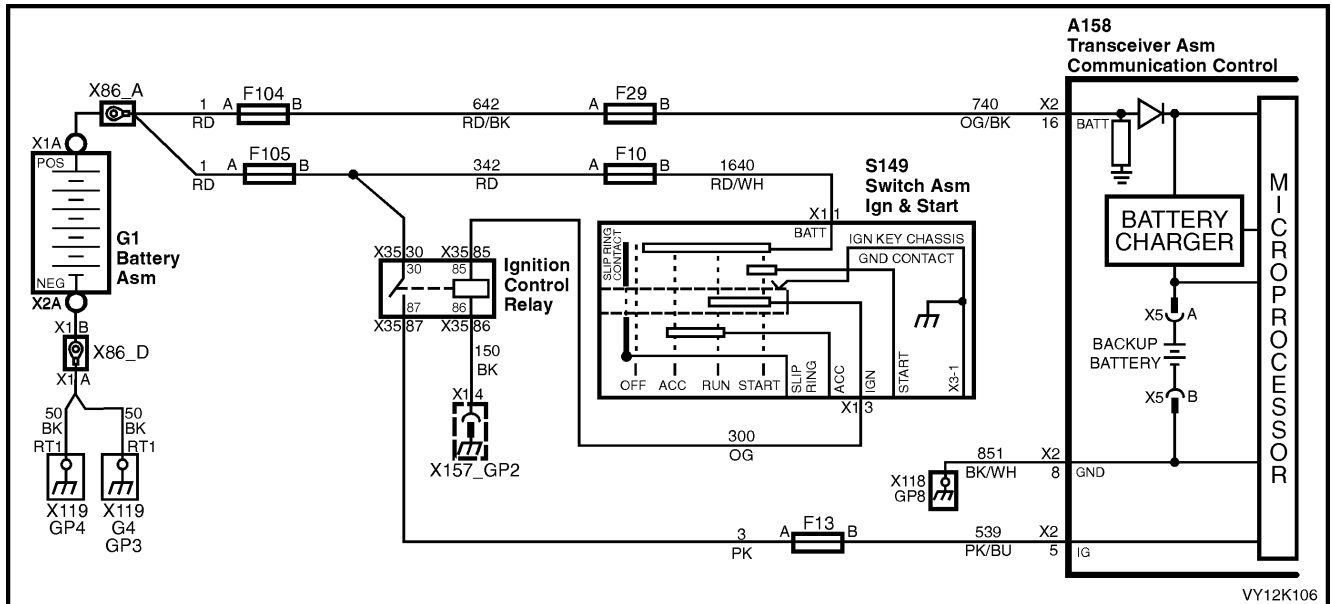


Figure 12K-78

CIRCUIT DESCRIPTION

Battery voltage is applied to the telematics module terminal X2-16 at all times via circuit 740 (Orange/Black wire), fuse F29 and fusible link F104.

CONDITIONS FOR SETTING THE DTC

- The voltage at the telematics module terminal A158 X2-16 is greater than 16 Volts for more than one second.

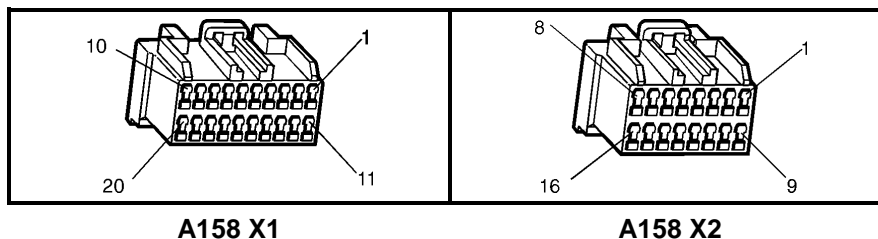
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- This step determines if the DTC is current. If the DTC is not current the vehicle charging system should be checked, refer to [Section 12A BATTERY AND CABLES, 3. Diagnosis](#) in this Service Information.
- This step determines if there is a current fault with the charging system.
- This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



A158 X1

A158 X2

DTC 9 - VEHICLE BATTERY VOLTAGE TOO HIGH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and increase engine RPM to 1000 for one minute. Does DTC 9 Vehicle Battery Voltage Too High Set?		Go to Step 3	DTC 9 is intermittent Refer Test Step Description.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs and scroll to Battery Voltage. 2. Start engine and increase engine RPM to 1000 for at least one minute, while observing TECH 2 battery Voltage display. Does TECH 2 display the battery voltage greater than the specified value?	16 Volts	Refer Section 12A BATTERY AND CABLES, 3. DIAGNOSIS in this Service Information.	Go to Step 4
4.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 10 - VEHICLE BATTERY VOLTAGE TOO LOW

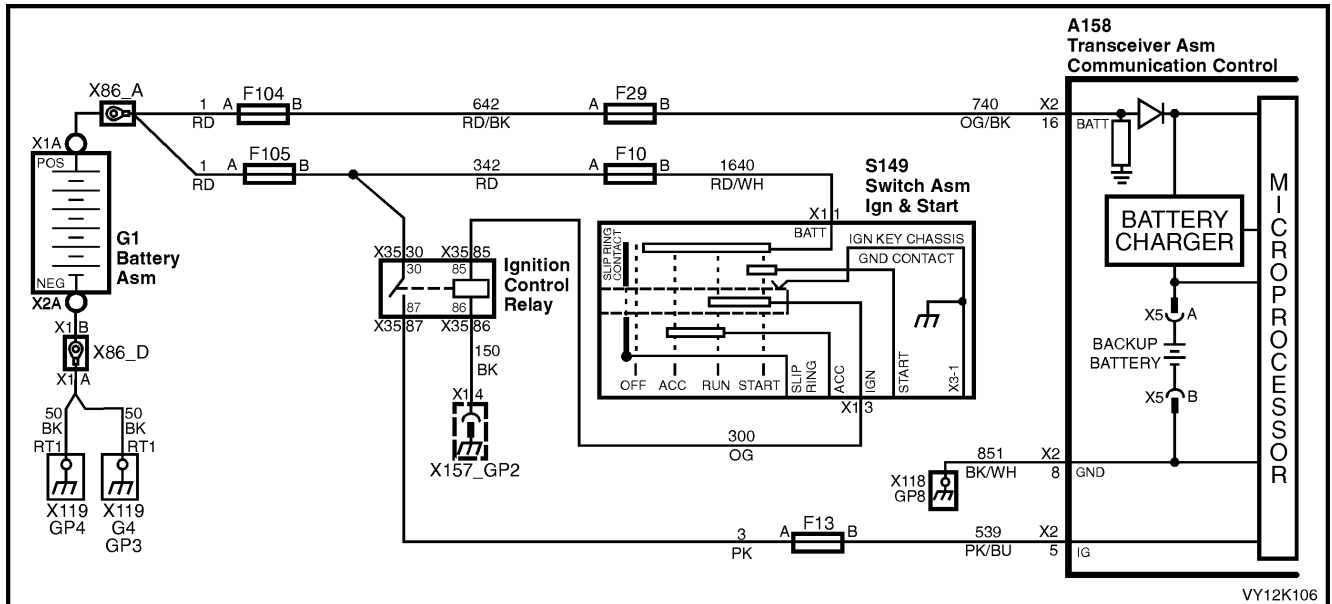


Figure 12K-79

CIRCUIT DESCRIPTION

Battery voltage is applied to the telematics module terminal X2-16 at all times via circuit 740 (Orange/Black wire), fuse F29 and fusible link F104.

CONDITIONS FOR SETTING THE DTC

- The battery voltage at the telematics module terminal A158 X2-16 is less than:
Ten Volts for three minutes or
Nine Volts for one minute
Six Volts for ten seconds.

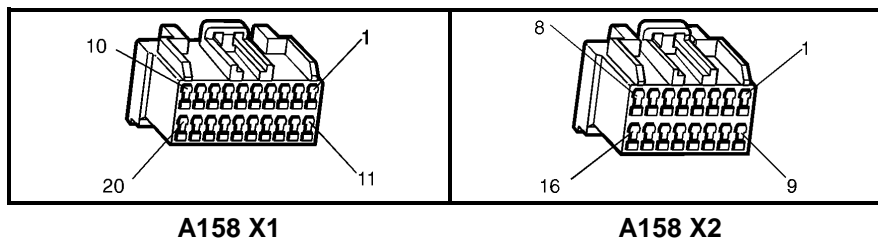
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- This step determines if the DTC is current. If the DTC is not current the vehicle charging system should be checked. Circuit 740 and 851 should also be checked for an intermittent open.
- This test step determines the voltage the telematics module is reading from terminal A158 X2-16.
- The test step check the actual voltage at terminal A158 X2-16.
- This test step checks for a voltage drop in the battery supply circuit 740.
- This test step checks for a voltage drop in the ground circuit 851.
- This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 10 - VEHICLE BATTERY VOLTAGE TOO LOW

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and increase engine RPM to 1000 for at least three minute. Does DTC 10 Vehicle Battery Voltage Too Low Set?		Go to Step 3.	DTC 10 is intermittent Refer Test Step Description.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs and scroll to Battery Voltage. 2. Start engine and increase engine RPM to 1000 for three minute, while observing TECH 2 battery Voltage display. Does TECH 2 display the battery voltage less than the specified value?	Less than 10 Volts for 3 Minutes Less than 9 Volts for 1 Minutes Less than 6 Volts for 10 Seconds	Go to Step 4.	Go to Step 5.
4.	1. Using a DMM check the voltage at the telematics module connector A158 X2-16 circuit 740, (red/white wire) and a known good ground. Is voltage less than the specified value.	Less than 10 Volts for 3 Minutes Less than 9 Volts for 1 Minutes Less than 6 Volts for 10 Seconds	Go to Step 5.	Go to Step 7.
5.	1. Check for voltage drop in circuit 740, (Red/White wire) between the battery and the telematics module. Is voltage greater than specified value.	200 mV	Repair cause of excessive voltage drop in circuit 740.	Go to Step 6.
6.	1. Check for voltage drop in ground circuit 851, (Black/White wire) between the battery and the telematics module. Is voltage greater than specified value.	200 mV	Repair cause of excessive voltage drop in circuit 851.	Refer Section 12A BATTERY AND CABLES, 3. DIAGNOSIS in this Service Information.
7.	1. Check telematics module connector A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 11 - RAM ERROR

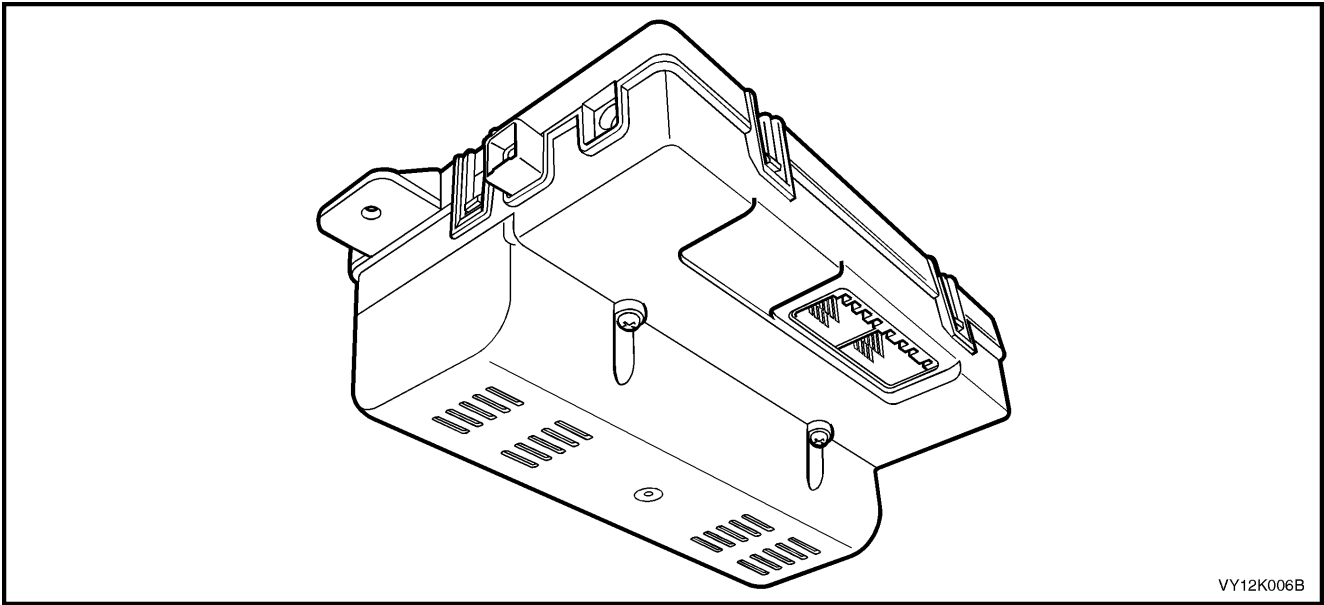


Figure 12K-80

CONDITIONS FOR SETTING THE DTC

- DTC 11 RAM Error is set if the telematics module detects a fault with the internal memory (RAM) during the telematics module self test.

ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed. If the a RAM Error is detected the telematics module should be replaced.

DTC 11 – RAM ERROR

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Refer Telematics On-Board Diagnostic System Check chart in this Section.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 12 - EEPROM ERROR

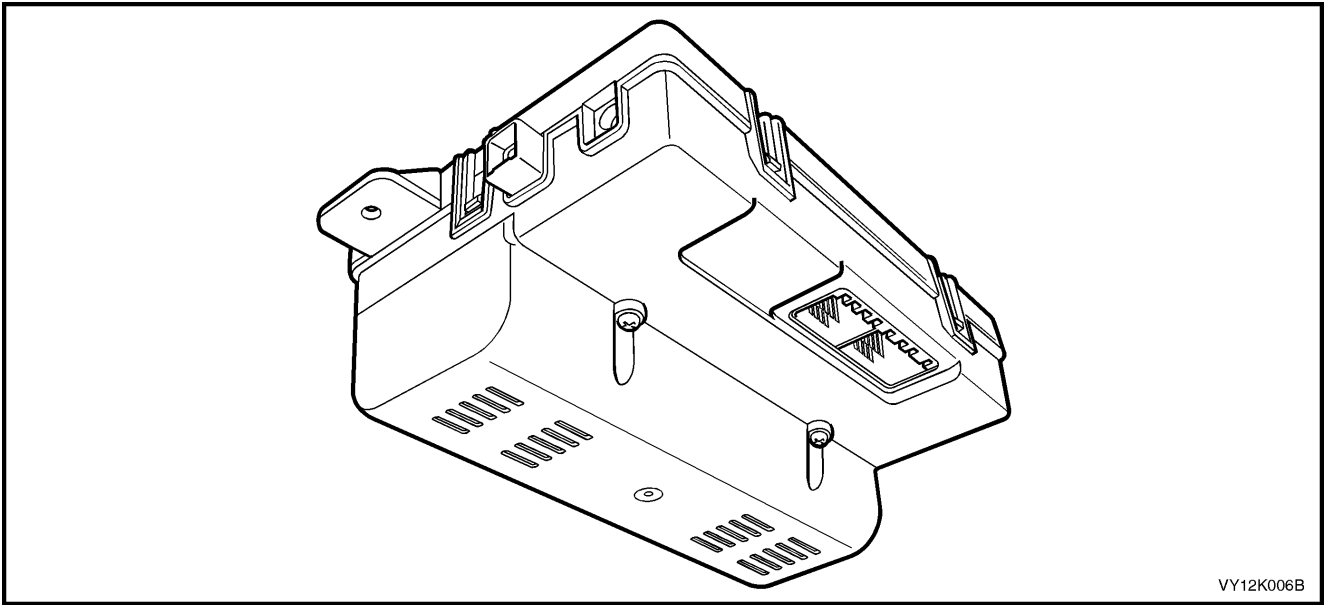


Figure 12K-81

CONDITIONS FOR SETTING THE DTC

- DTC 11 EEPROM Error is set if the telematics module detects a fault with the EEPROM during the telematics module self test.

ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed. If the a EEPROM Error is detected the telematics module should be replaced.

DTC 12- EEPROM ERROR

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Refer Telematics On-Board Diagnostic System Check chart in this Section.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 13 - BACKUP BATTERY TIMER EXPIRED

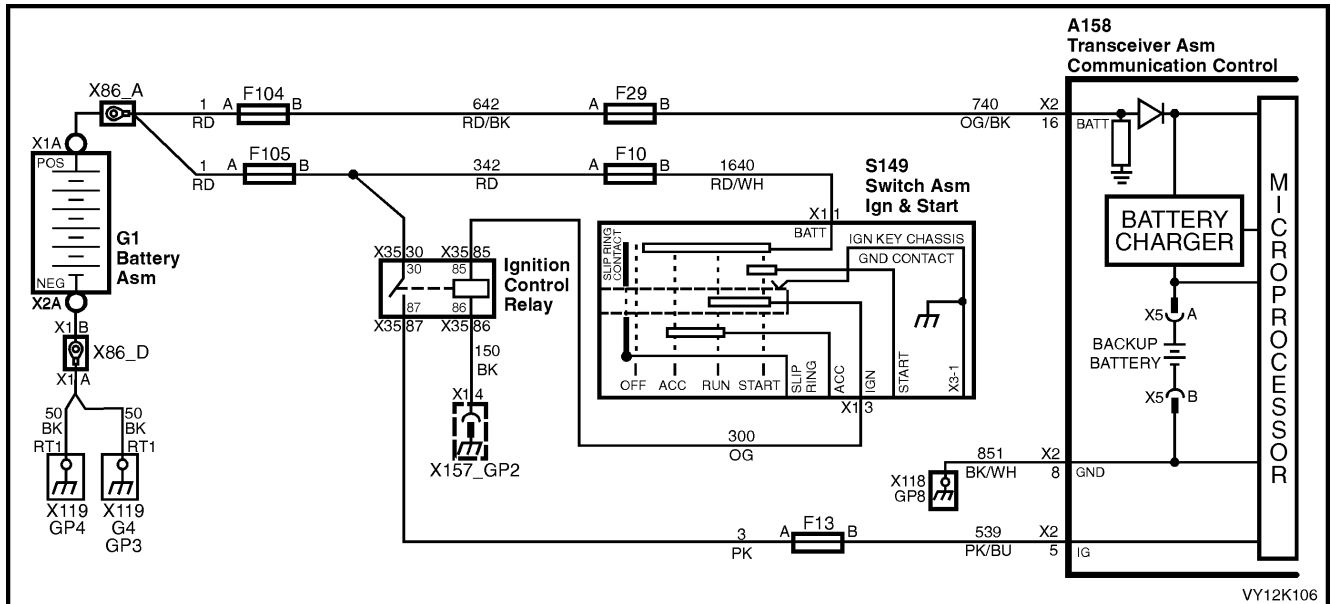


Figure 12K-82

CIRCUIT DESCRIPTION

The backup battery is housed in the battery compartment of the telematics module. The backup battery will provide power to the telematics module for at least 30 minutes in the event of the vehicle battery being discharged or disconnected. The telematics module has a backup battery charging circuit that maintains the backup battery state of charge. This circuit also includes an over current protection device. After the back up battery has been in the vehicle for 5 years (43680 hours) it has reached the end of its useful life, (internal deterioration causing low charge acceptance) DTC 13 will be set and the red status LED will be illuminated.

CONDITIONS FOR SETTING THE DTC

- DTC 13 is set if the backup battery timer in the telematics module has exceeded 5 years (43680 hours). At this time the backup battery has reached the end of its useful life (internal deterioration causing low charge acceptance).

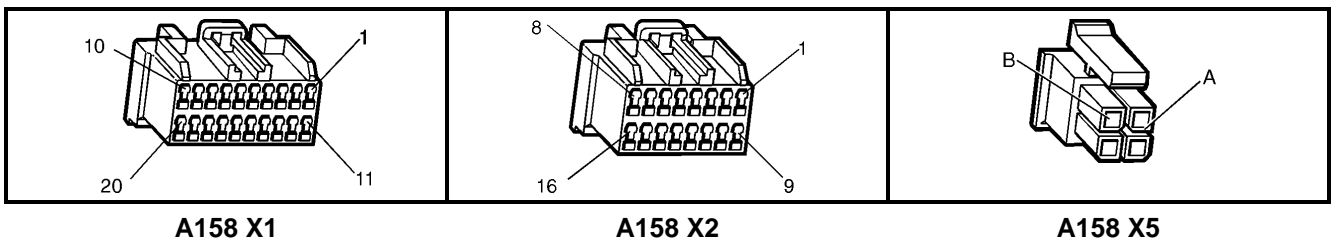
ACTION TAKEN WHEN THE DTC SETS

- When the backup battery timer exceeds 5 years the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- If the a backup battery timer has exceeded 5 years (43680 hours) the backup battery will need to be replaced.
- Once the backup battery has been replaced the backup battery timer must be reset with TECH 2. TIS approval will be required to perform the TECH 2 function.
- This test step checks that the DTC has been cleared and that a fault in the telematics module is not causing the DTC to set.
- This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



A158 X1

A158 X2

A158 X5

DTC 13 – BACKUP BATTERY TIMER EXPIRED

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Replace telematics module backup battery. (refer 3.2 BACKUP BATTERY in this Section). Has telematics module backup battery been replaced?		Go to Step 3.	Replace telematics module backup battery.
3.	1. Reset telematics module backup battery timer. Refer 4.3 TECH 2 TEST MODES F4: Additional Functions, F1: Backup Battery Timer Reset in this Section. Has telematics module backup battery timer been reset?		Go to Step 4.	Reset telematics module backup battery timer.
4.	1. With TECH 2 still connected, switch Ignition On engine Off. 2. From the Telematics Menu Select F0: Diagnostic Trouble Codes / F1: Clear DTC Information and clear the Telematics Module DTCs. 3. Ignition on for at least ten seconds. Is DTC 13 Backup Battery Timer Expired set?		Go to Step 5.	Complete Telematics On-Board Diagnostic System.
5.	1. Check telematics module connectors A158 X1, X2 & X5 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 14 - BACKUP BATTERY VOLTAGE TOO HIGH

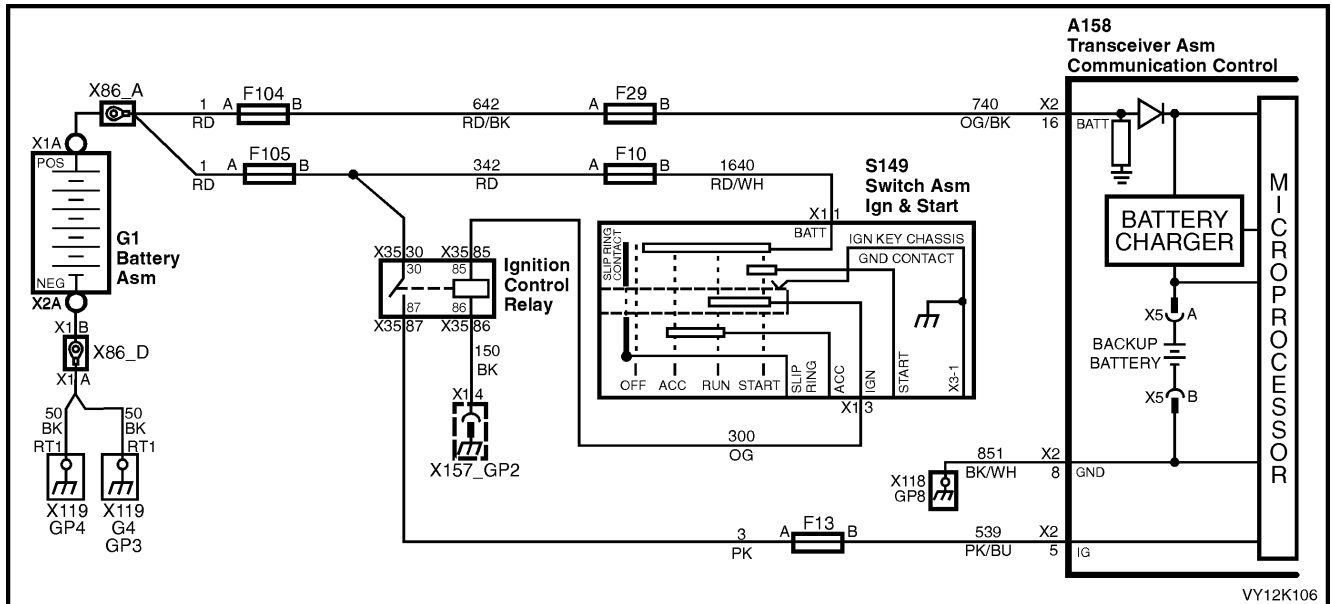


Figure 12K-83

CIRCUIT DESCRIPTION

The backup battery is housed in the battery compartment of the telematics module. The backup battery will provide power to the telematics module for at least 30 minutes in the event of the vehicle battery being discharged or disconnected. The telematics module has a backup battery charging circuit that maintains the backup battery state of charge. This circuit also includes an over current protection device.

CONDITIONS FOR SETTING THE DTC

- DTC 14 is set if the backup battery voltage is greater than 9.8 Volts for more that one second.

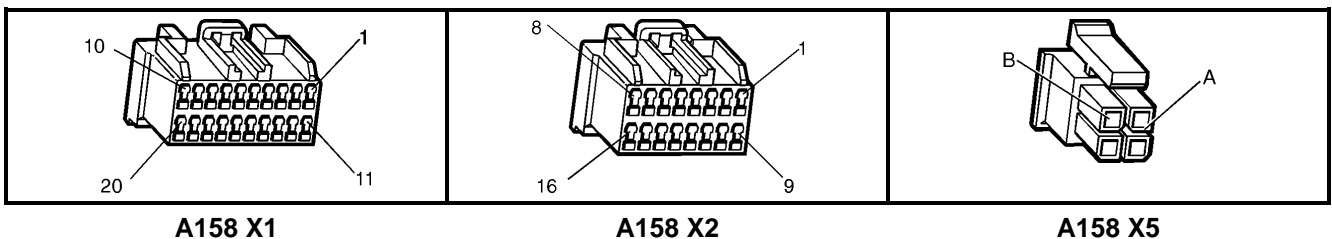
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- If DTC 14 Backup Battery Voltage Too High does not set then the DTC is intermittent.
- This test step checks the backup battery voltage, if the backup battery voltage is less than the specified value and the DTC is being set then the telematics module should be replaced.
- This test step checks the open circuit voltage of the backup battery. If the backup battery is greater than the specified value then the backup battery should be replaced.
- This test step confirms that the backup battery connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.
- This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



A158 X1

A158 X2

A158 X5

DTC 14 – BACKUP BATTERY VOLTAGE TOO HIGH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and increase engine RPM to 1000 for at least five minutes. Does DTC 14 Backup Battery Voltage Too High Set?		Go to Step 3.	DTC 14 is intermittent. Refer Test Step Description.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs and scroll to Backup Battery Voltage. 2. Start engine and increase engine RPM to 1000 for five minutes, while observing TECH 2 Backup Battery Voltage display. Does TECH 2 display the battery voltage greater than the specified value?	Greater than 7.5 Volts.	Go to Step 4.	Go to Step 6.
4.	1. Disconnect the backup battery from the telematics module connector A158 X5. 2. Using a DMM check the backup voltage at the backup battery connector A158 X5-A and X5-B. Is the backup battery voltage greater than the specified value.	Greater than 7.5 Volts.	Go to Step 5.	Go to Step 6.
5.	1. Check telematics module connectors A158 X1, X2 & X5 terminal retention. Is the terminal retention OK?		Replace backup battery refer 3.2 Backup Battery in this Section	Repair connector terminal retention.
6.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 15 - BACKUP BATTERY VOLTAGE TOO LOW

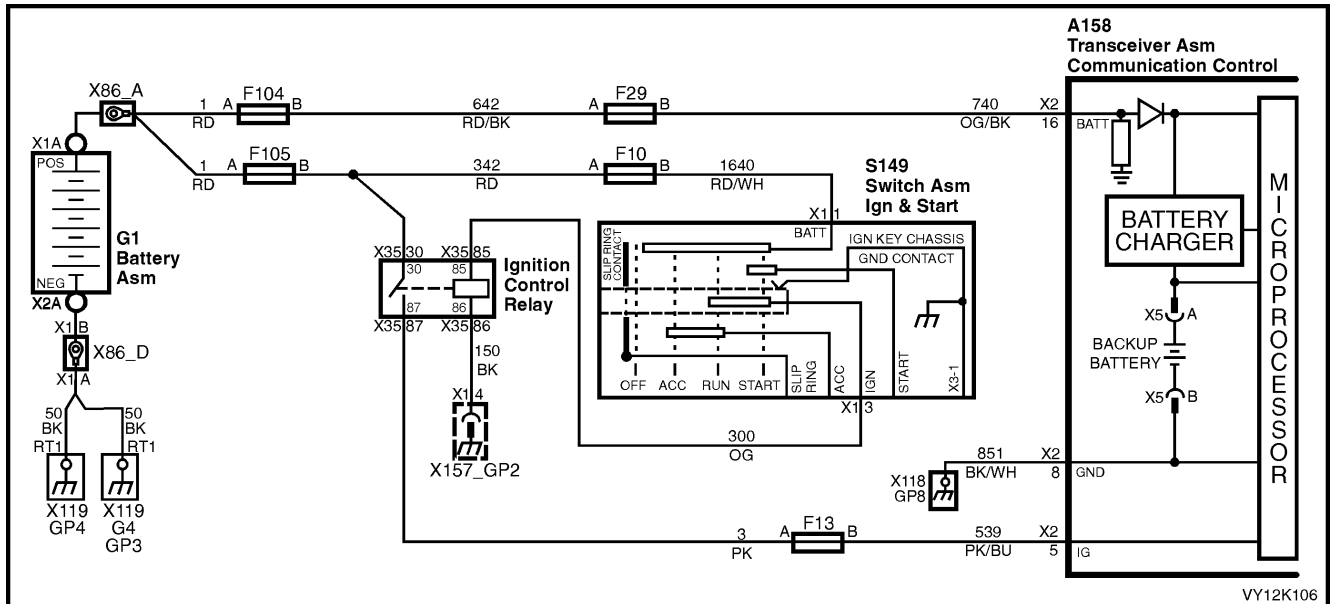


Figure 12K-84

CIRCUIT DESCRIPTION

The backup battery is housed in the battery compartment of the telematics module. The backup battery will provide power to the telematics module for at least 30 minutes in the event of the vehicle battery being discharged or disconnected. The telematics module has a backup battery charging circuit that maintains the backup battery state of charge. This circuit also includes an over current protection device.

CONDITIONS FOR SETTING THE DTC

- DTC 15 is set if the backup battery voltage is less than 5.5 Volts for more than three minutes.

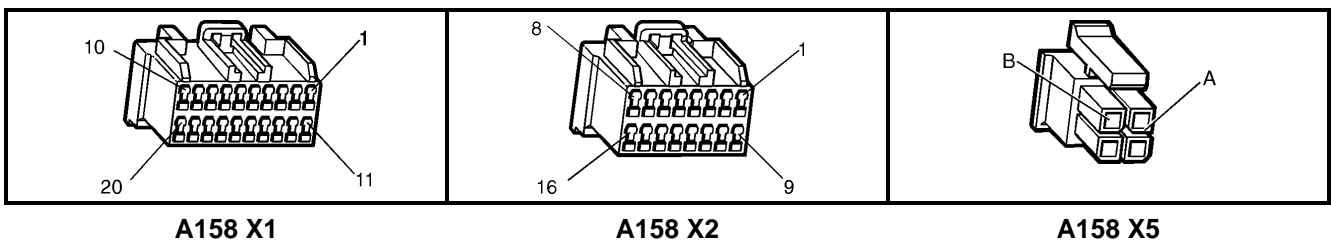
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. If DTC 15 Backup Battery Voltage Too Low does not set then the DTC is intermittent. Check backup battery open circuit voltage refer step 4.
3. This test step checks the backup battery voltage, if the backup battery voltage is less than the specified value go to step 4, if the backup battery voltage is greater than the specified value and the DTC is being set then the telematics module should be replaced.
4. This test step checks the open circuit voltage of the backup battery. If the backup battery is less than the specified value then the backup battery should be replaced.
5. This test step confirms that the backup battery connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.
6. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 15 – BACKUP BATTERY VOLTAGE TOO LOW

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and increase engine RPM to 1000 for at least five minutes. Does DTC 15 Backup Battery Voltage Too Low Set?		Go to Step 3.	DTC 15 is intermittent. Refer Test Step Description.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs and scroll to Backup Battery Voltage. 2. Start engine and increase engine RPM to 1000 for five minutes, while observing TECH 2 Backup Battery Voltage display. Does TECH 2 display the backup battery voltage less than the specified value?	Less than 5.5 Volts.	Go to Step 4.	Go to Step 6.
4.	1. Disconnect the backup battery from the telematics module connector A158 X5. 2. Using a DMM check the backup battery voltage at the backup battery connector terminals A158 X5-A and X5-B. Is the backup battery voltage less than the specified value.	Less than 5.5 Volts.	Go to Step 5.	Go to Step 6.
5.	1. Check telematics module connectors A158 X1, X2 & X5 terminal retention. Is the terminal retention OK?		Replace backup battery refer 3.2 Backup Battery in this Section	Repair connector terminal retention.
6.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 16 - BACKUP BATTERY NOT DETECTED

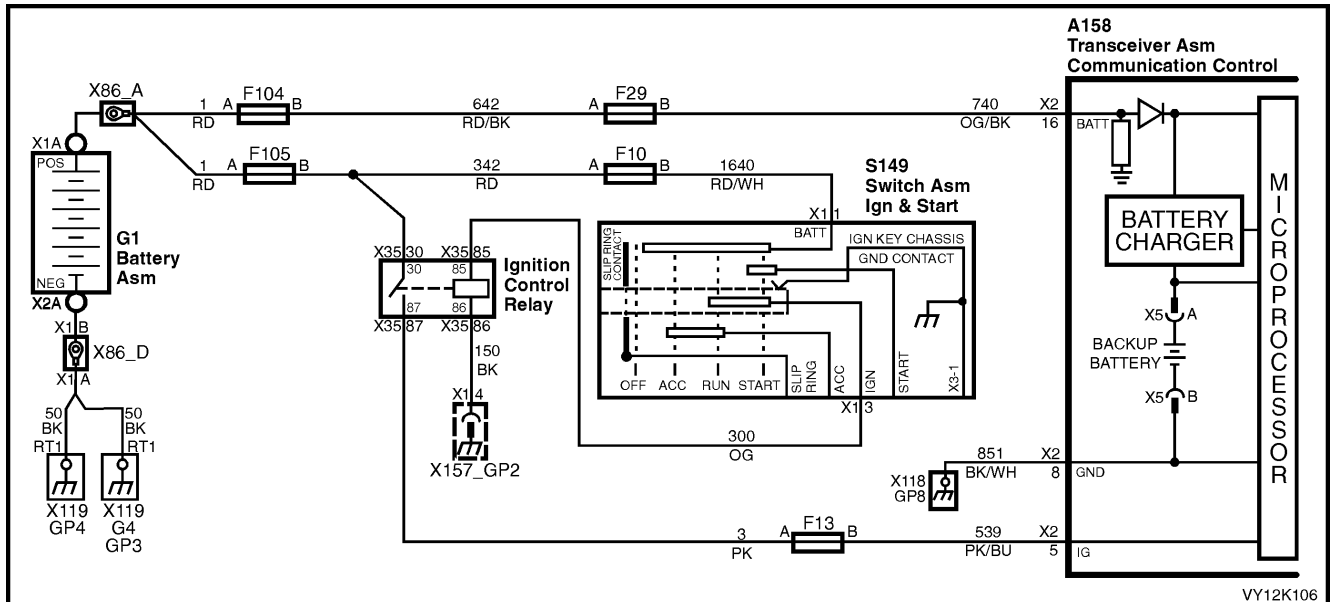


Figure 12K-85

CIRCUIT DESCRIPTION

The backup battery is housed in the battery compartment of the telematics module. The backup battery will provide power to the telematics module for at least 30 minutes in the event of the vehicle battery being discharged or disconnected. The telematics module has a backup battery charging circuit that maintains the backup battery state of charge. This circuit also includes an over current protection device.

CONDITIONS FOR SETTING THE DTC

- DTC 16 is set if the backup battery voltage is less than one volt.

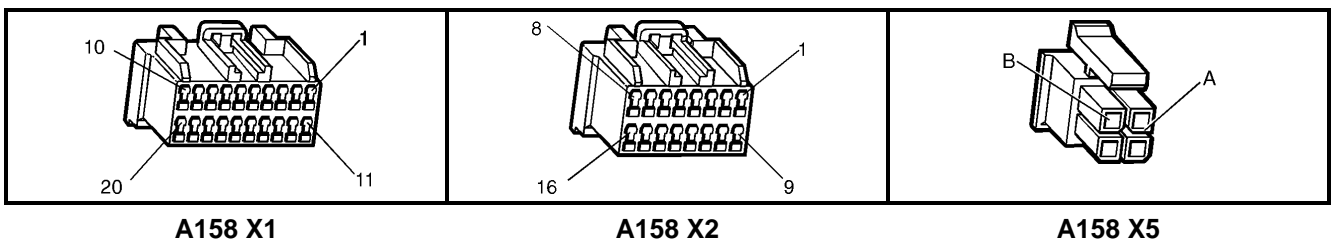
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. If DTC 16 Backup Battery Not Detected does not set then the DTC is intermittent. Check backup battery open circuit voltage refer step 4.
3. This test step checks the backup battery voltage, if the backup battery voltage is less than the specified value go to step four, if the backup battery voltage is greater than the specified value and the DTC is being set then the telematics module should be replaced.
4. This test step checks the open circuit voltage of the backup battery. If the backup battery is less than the specified value then the backup battery should be replaced.
5. This test step confirms that the backup battery connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.
6. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DTC 16 – BACKUP BATTERY NOT DETECTED

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and increase engine RPM to 1000 for at least five minutes. Does DTC 16 Backup Battery Not Detected Set?		Go to Step 3.	DTC 16 is intermittent. Refer Test Step Description.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs and scroll to Backup Battery Voltage. 2. Start engine and increase engine RPM to 1000 for five minutes, while observing TECH 2 Backup Battery Voltage display. Does TECH 2 display the backup battery voltage less than the specified value?	Less than 1.0 volt.	Go to Step 4.	Go to Step 6.
4.	1. Disconnect the backup battery from the telematics module connector A158 X5. 2. Using a DMM check the backup voltage at the backup battery connector terminals A158 X5-A and X5-B. Is the backup battery voltage less than the specified value.	Less than 1.0 volt.	Go to Step 5.	Go to Step 6.
5.	1. Check telematics module connectors A158 X1, X2 & X5 terminal retention. Is the terminal retention OK?		Replace backup battery refer 3.2 Backup Battery in this Section	Repair connector terminal retention.
6.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 17 - MICROPHONE NOT DETECTED

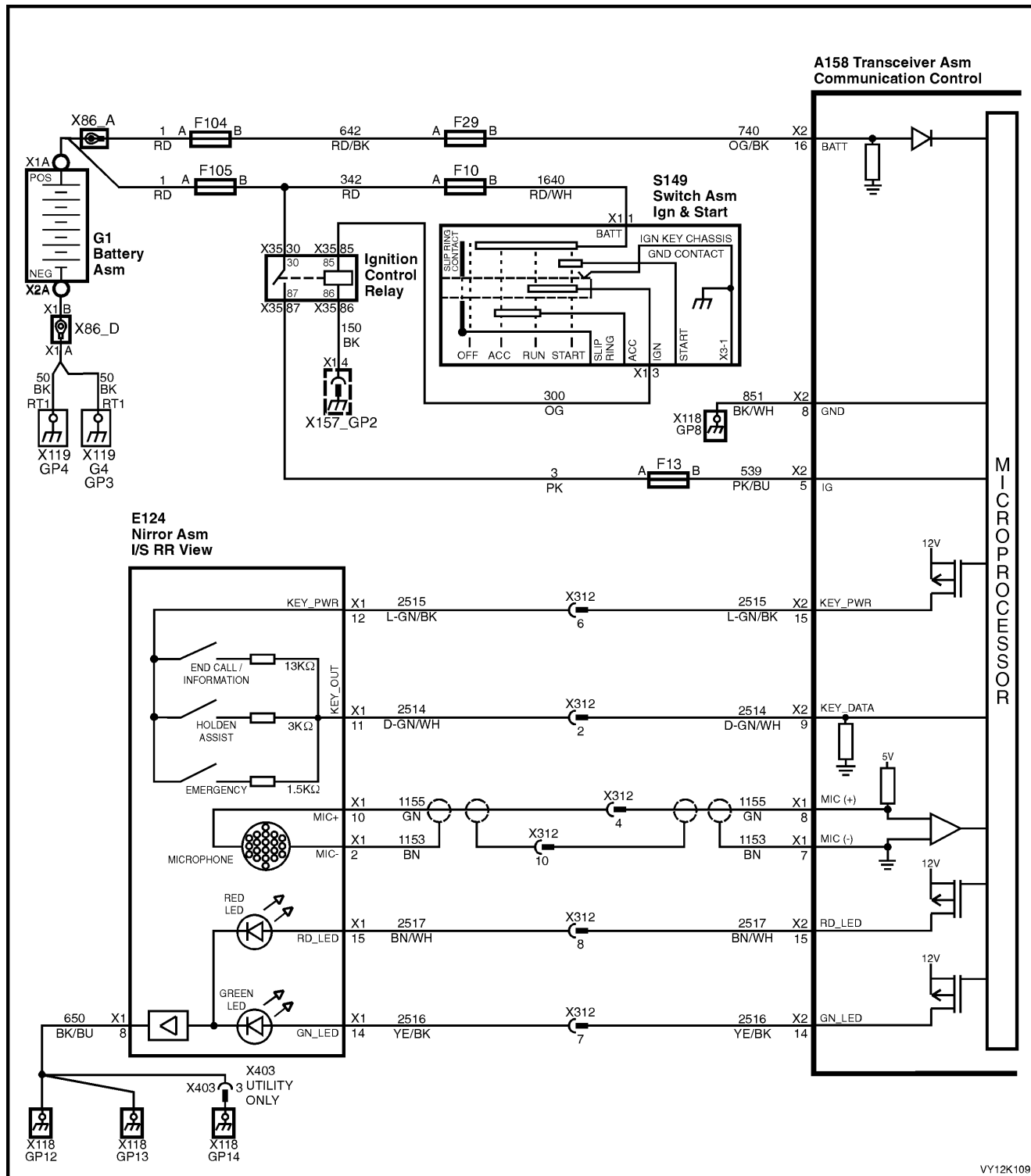


Figure 12K-86

CIRCUIT DESCRIPTION

The active microphone in the interior rear view mirror provides a means for two way voice communication between the vehicle occupants and Holden Assist Centre. During the system self test the microphone and circuit are tested to determine if there is a microphone or microphone circuit malfunction.

CONDITIONS FOR SETTING THE DTC

- DTC 17 is set if the microphone circuit (1155) input voltage is greater than 2.5 Volts.

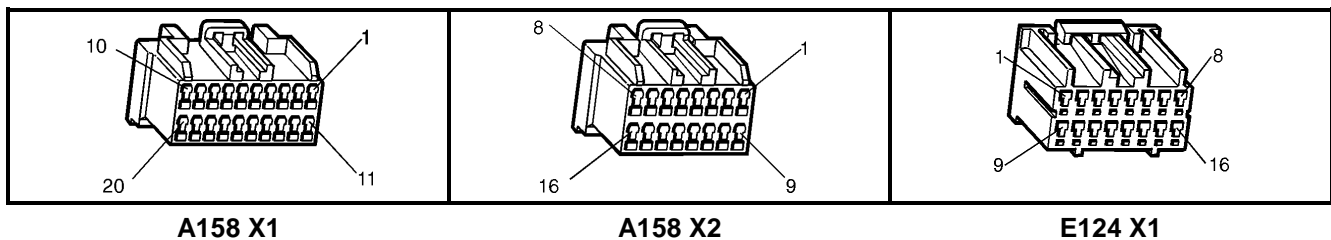
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test step determines if DTC 17 is intermittent. If DTC 17 is intermittent check for an intermittent open, or a short to ground or voltage in the microphone circuit 1155 and 1153.
3. Checks that the telematics module is supplying five Volts to the microphone.
4. If the voltage is greater than five Volts then circuit 1155 is shorted to voltage.
5. If the voltage is less than five Volts then circuit 1155 is shorted to ground.
6. Checks if the telematics module is supplying five Volts to circuit 1155.
7. This test determines if circuit 1153 has continuity.
8. Before the mirror is replaced the retention of the interior mirror connector E124 X1 terminals should be checked.
9. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 17 - MICROPHONE NOT DETECTED

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Switch Ignition off then On again for at least 1 minute. Does DTC 17 Microphone Not Detected Set?		Go to Step 3.	DTC 17 is intermittent. Refer Test Step Description.
3.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM, check the voltage at the interior rear view mirror connector terminal E124 X1-10 circuit 1155 (Green wire). Is the voltage as specified?	5 Volts.	Go to Step 7.	Go to Step 4.
4.	In step 3 was the voltage greater than specified?	5 Volts.	Repair short to voltage in circuit 1155.	Go to Step 5.
5.	In step 3 was the voltage less than specified?	5 Volts.	Go to Step 6.	Go to Step 7.
6.	1. Ignition on. 2. Interior rear view mirror connector E124 X1 still disconnected. 3. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-8 circuit 1155 (Green wire). Is voltage as specified?	5 Volts.	Repair open or short to ground in circuit 1155.	Go to Step 9.
7.	1. Using a DMM, measure continuity of circuit 1153 (Brown wire) between the telematics module connector terminal A158 X1-7 and the interior rear view mirror connector terminal E124 X1-2. Is there continuity?		Repair open circuit 1153.	Go to Step 8.
8.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace interior rear view mirror. Refer 3.5 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
9.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

DTC 18 - MICROPHONE CIRCUIT VOLTAGE TOO LOW

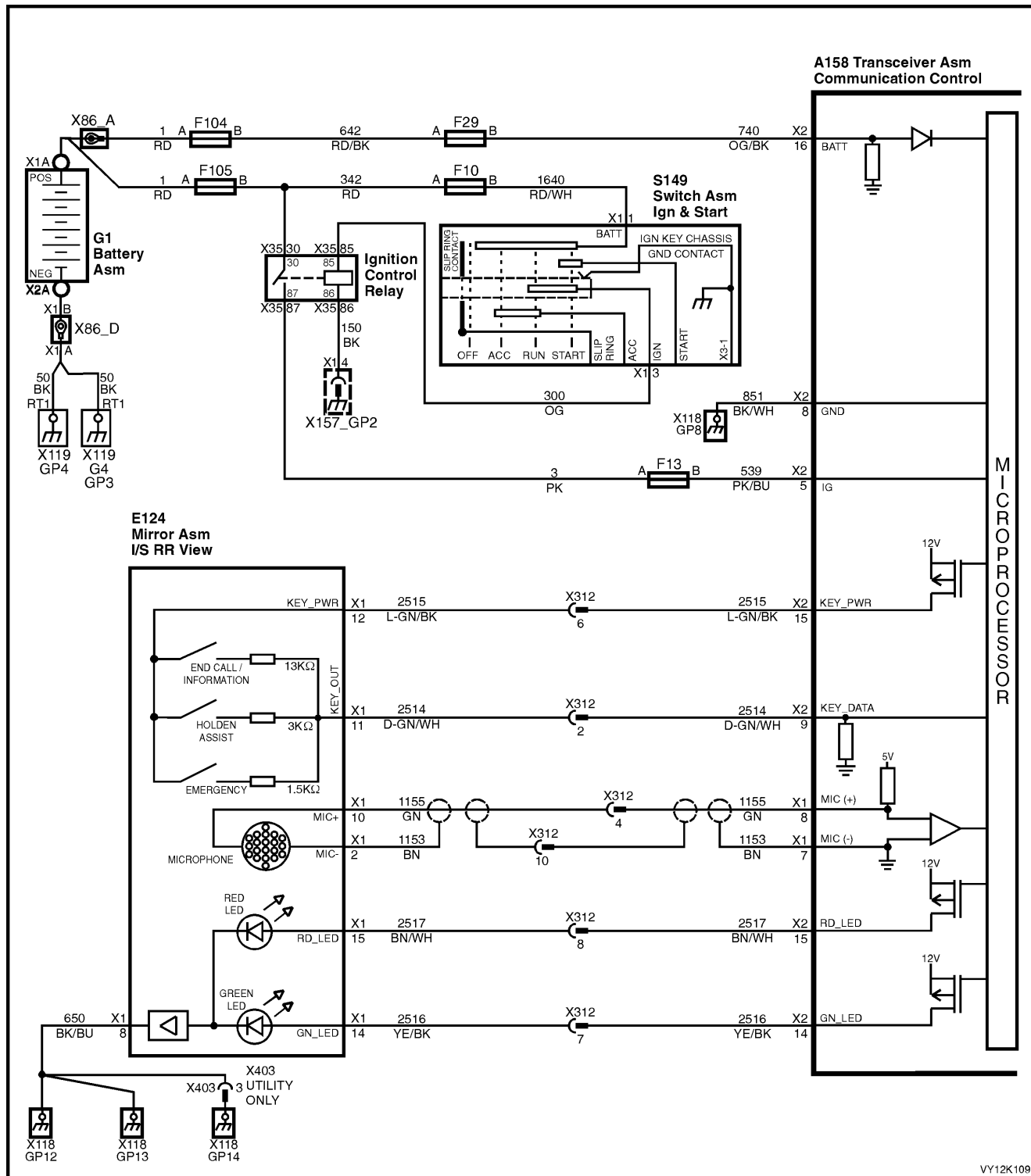


Figure 12K-87

VY12K109

CIRCUIT DESCRIPTION

The active microphone in the interior rear view mirror provides a means for two way voice communication between the vehicle occupants and Holden Assist Centre. During the system self test the microphone and circuit are tested to determine if there is a microphone or microphone circuit malfunction.

CONDITIONS FOR SETTING THE DTC

- DTC 18 is set if the telematics module detect that the microphone circuit (1155) input voltage is less than 1.8 Volts.

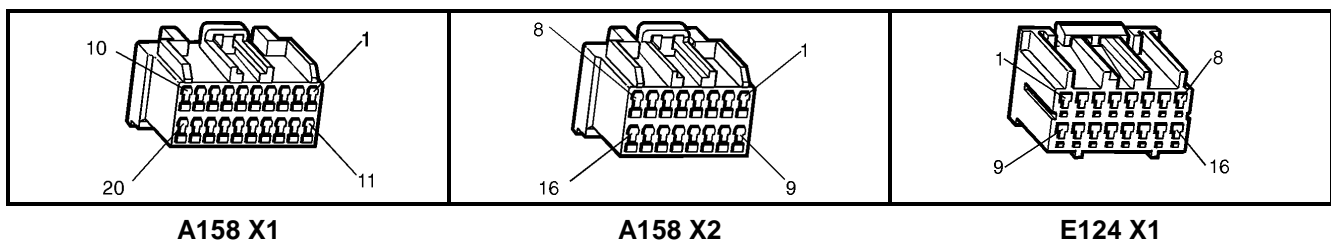
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test step determines if DTC 18 is intermittent. If DTC 18 is intermittent, check for an intermittent open, or a short to ground or voltage in the microphone circuit 1155 and 1153.
3. Checks that the telematics module is supplying five Volts to the microphone.
4. If the voltage is greater than five Volts then circuit 1155 is shorted to voltage.
5. If the voltage is less than five Volts then circuit 1155 is shorted to ground.
6. Checks if the telematics module is supplying five Volts to circuit 1155.
7. This test determines if circuit 1153 has continuity.
8. Before the mirror is replaced the retention of the interior mirror connector E124 X1 terminals should be checked.
9. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 18 - MICROPHONE CIRCUIT VOLTAGE TOO LOW

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Switch Ignition off then On again for at least 1 minute. Does DTC 18 Microphone Circuit Voltage Too Low Set?		Go to Step 3.	DTC 18 is intermittent. Refer Test Step Description.
3.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM, check the voltage at the interior rear view mirror connector terminal E124 X1-10 circuit 1155 (Green wire). Is the voltage as specified?	5 Volts.	Go to Step 7.	Go to Step 4.
4.	In step 3 was the voltage greater than specified?	5 Volts.	Repair short to voltage in circuit 1155.	Go to Step 5.
5.	In step 3 was the voltage less than specified?	5 Volts.	Go to Step 6.	Go to Step 7.
6.	1. Ignition on. 2. Interior rear view mirror connector E124 X1 still disconnected. 3. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-8 circuit 1155 (Green wire). Is voltage as specified?	5 Volts.	Repair open or short to ground in circuit 1155.	Go to Step 9.
7.	1. Using a DMM, measure continuity of circuit 1153 (Brown wire) between the telematics module connector terminal A158 X1-7 and the interior rear view mirror connector terminal E124 X1-2. Is there continuity?		Go to Step 8.	Repair open circuit 1153.
8.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace interior rear view mirror. Refer 3.5 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
9.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

DTC 19 - MICROPHONE CIRCUIT VOLTAGE TOO HIGH

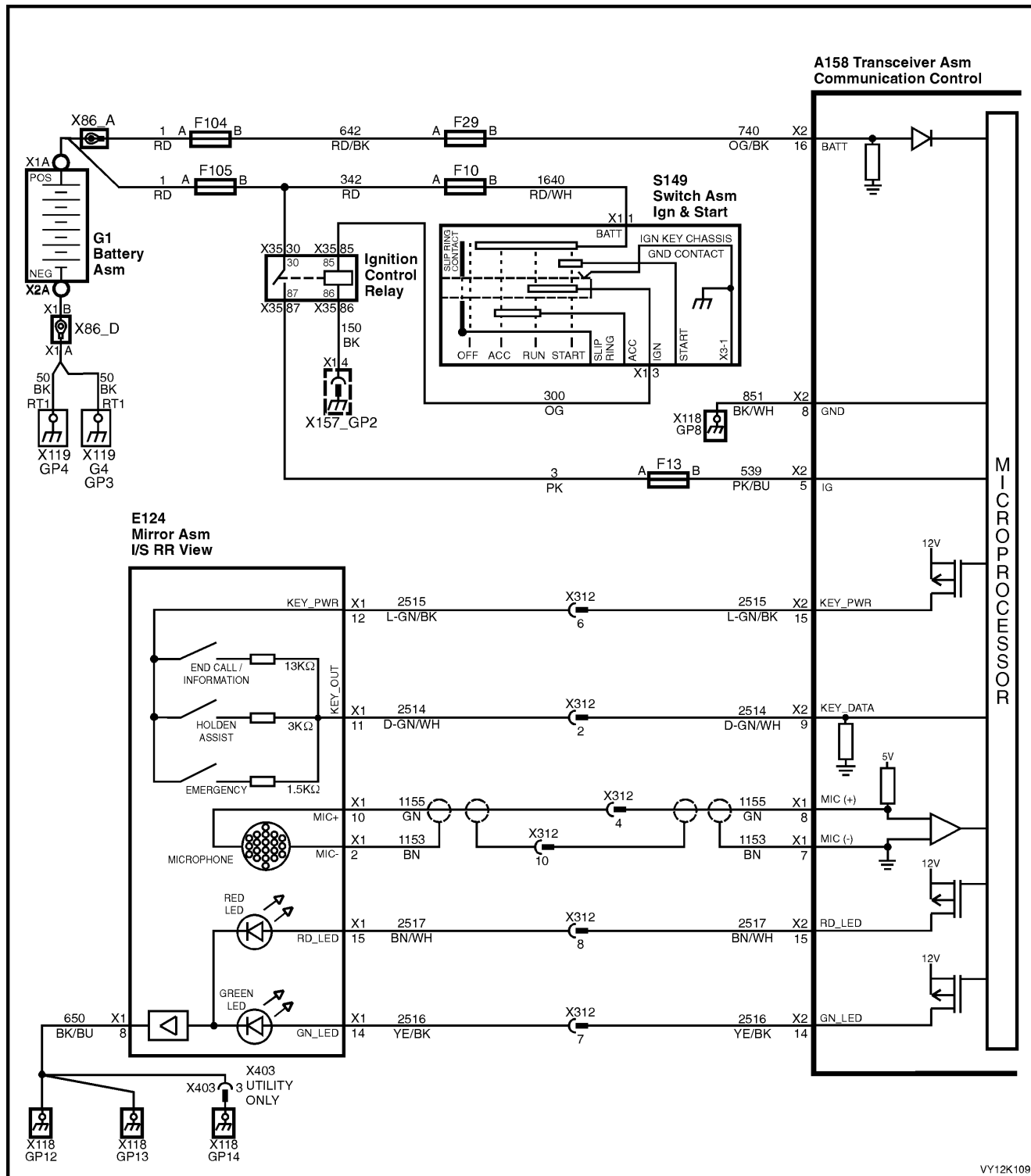


Figure 12K-88

CIRCUIT DESCRIPTION

The active microphone in the interior rear view mirror provides a means for two way voice communication between the vehicle occupants and Holden Assist Centre. During the system self test the microphone and circuit are tested to determine if there is a microphone or microphone circuit malfunction.

CONDITIONS FOR SETTING THE DTC

- DTC 19 is set if the telematics module detect that the microphone circuit (1155) input voltage is greater than 4.8 Volts.

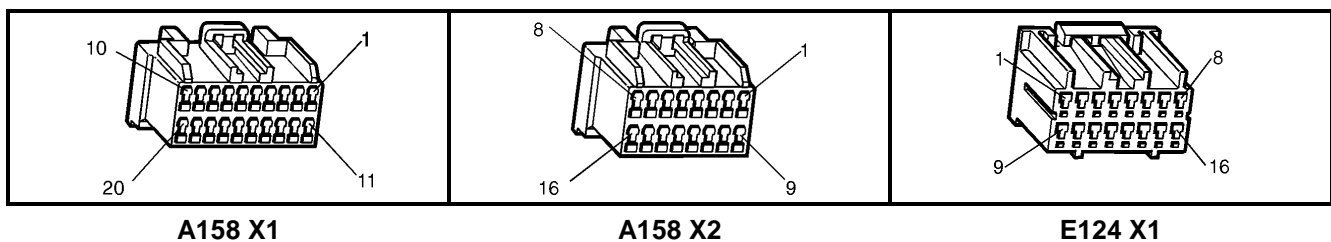
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test step determines if DTC 19 is intermittent. If DTC 19 is intermittent, check for an intermittent open, or a short to ground or voltage in the microphone circuit 1155 and 1153.
3. Checks that the telematics module is supplying five Volts to the microphone.
4. If the voltage is greater than five Volts then circuit 1155 is shorted to voltage.
5. If the voltage is less than five Volts then circuit 1155 is shorted to ground.
6. Checks if the telematics module is supplying five Volts to circuit 1155.
7. This test determines if circuit 1153 has continuity.
8. Before the mirror is replaced the retention of the interior mirror connector E124 X1 terminals should be checked.
9. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 19 - MICROPHONE CIRCUIT VOLTAGE TOO HIGH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Switch Ignition off then On again for at least 1 minute. Does DTC 19 Microphone Circuit Voltage Too High Set?		Go to Step 3.	DTC 19 is intermittent. Refer Test Step Description.
3.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM, check the voltage at the interior rear view mirror connector terminal E124 X1-10 circuit 1155 (Green wire). Is the voltage as specified?	5 Volts.	Go to Step 7.	Go to Step 4.
4.	In step 3 was the voltage greater than specified?	5 Volts.	Repair short to voltage in circuit 1155.	Go to Step 5.
5.	In step 3 was the voltage less than specified?	5 Volts.	Go to Step 6.	Go to Step 7.
6.	1. Ignition on. 2. Interior rear view mirror connector E124 X1 still disconnected. 3. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-8 circuit 1155 (Green wire). Is voltage as specified?	5 Volts.	Repair open or short to ground in circuit 1155.	Go to Step 9.
7.	1. Using a DMM, measure continuity of circuit 1153 (Brown wire) between the telematics module connector terminal A158 X1-7 and the interior rear view mirror connector terminal E124 X1-2. Is there continuity?		Go to Step 8.	Repair open circuit 1153.
8.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace interior rear view mirror. Refer 3.5 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
9.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

DTC 21 - SPEAKER CIRCUIT VOLTAGE TOO LOW

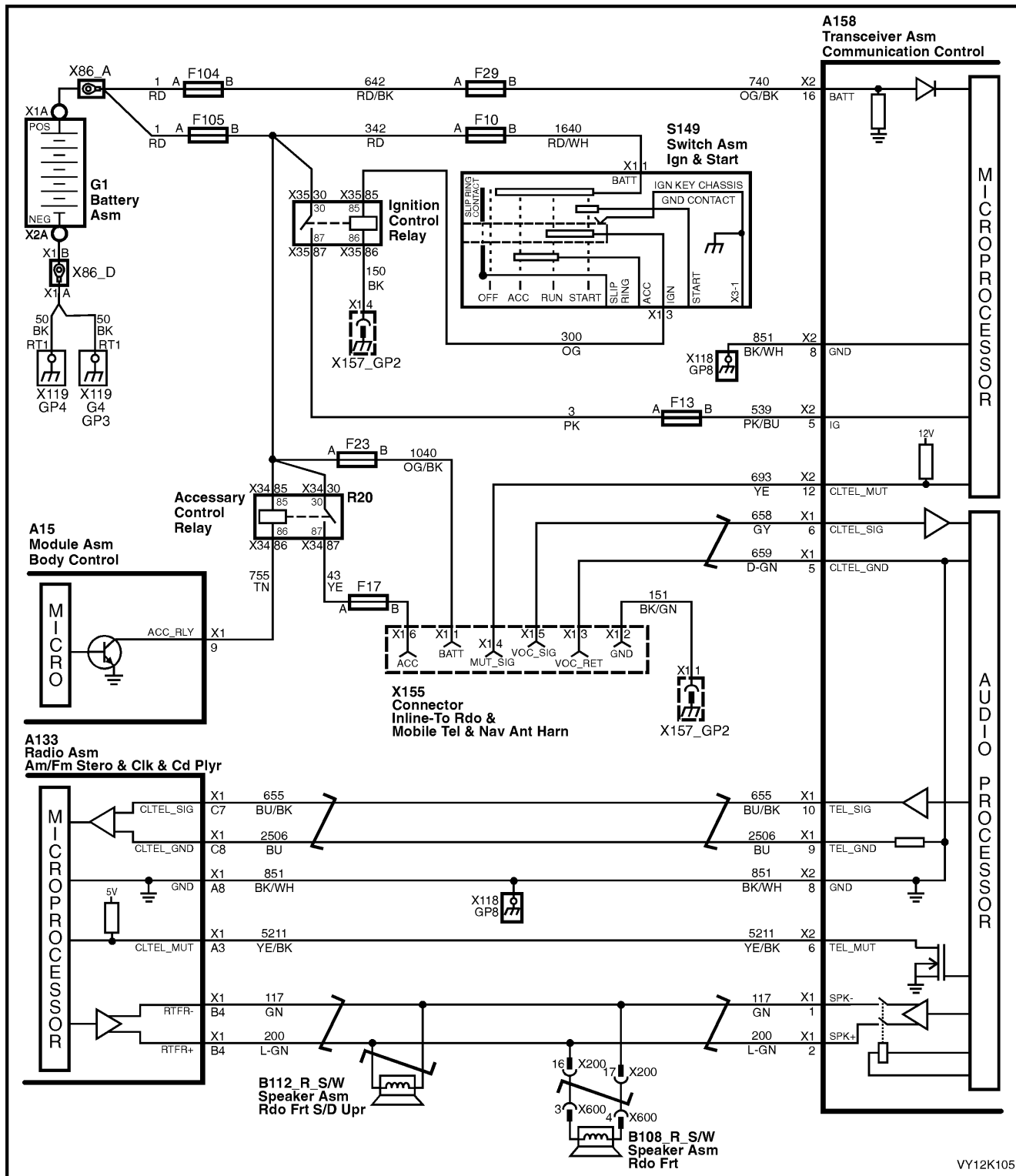


Figure 12K-89

CIRCUIT DESCRIPTION

The telematics system uses the vehicle audio system to provide a means for voice communication from the Holden Assist call centre. The telematics module also has the ability to detect if the audio system is not operational, and will switch from the vehicle audio system to the RHF speakers, if it detects that the audio system is not operational. Audible tones are also provided to indicate the system status and are broadcast via the speaker to alert the customer to certain operating conditions.

Whenever the telematics audio is activated the radio mute signal is also activated and the telematics module grounds the radio mute circuit 5211 (Yellow/Black wire) causing the circuit voltage to be pulled low, less than two Volts. This low voltage is detected by the radio as a mute request and when received, the audio system will mute.

Whilst the telematics system is not on a call the audio and mute request from the cellular telephone connector will be passed through the telematics module to the audio system. When a Holden Assist call is active, the telematics module will ignore the phone audio and transmit the telematics audio to the audio system.

Tone	Operating Condition
Five Tones	<ul style="list-style-type: none">Attempting to make call when vehicle is not within GSM network range, or if the five tones occur after the ignition is turned off, the vehicle is not within GSM network range.Warning that Service Mode is active or a system malfunction has been detected and a Diagnostic Trouble Code has been stored in the telematics module.

CONDITIONS FOR SETTING THE DTC

- The output voltage of the audio amplifier circuit is measured to detect if the speaker is shorted to ground. This test is performed whenever the ignition is turned on and only if the audio system is off, the emergency speakers are switched in and the telematics audio output is muted.
- DTC 21 will set if the emergency speaker circuit voltage is less than 1.8 Volts.

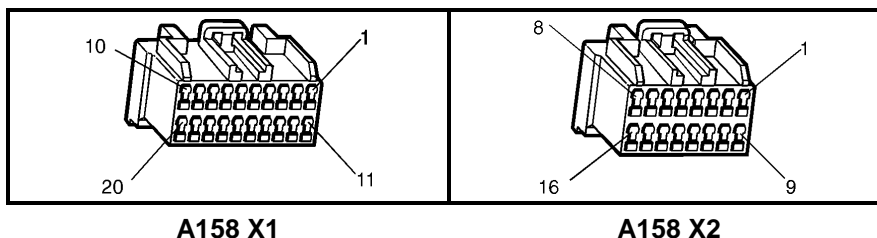
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- This test step determines if DTC 21 is intermittent. If DTC 21 is intermittent check for an intermittent open, or a short to ground or voltage in the speaker circuits 117 and 200.
- The test step checks for a short to ground in circuit 117, If circuit 117 is not shorted to ground, and DTC 21 still sets the telematics module should be replaced.
- This test step checks for a short to ground in circuit 200. Disconnect all speakers to isolate circuit 200.
- This test step checks for a short to ground in circuit 117.
- In this test step you should check if the either RHF door speaker and the RHF tweeter is shorted to ground.
- This test step checks if there is an internal fault in the telematics module (speaker connection X1.2)
- This test step checks if there is an internal fault in the telematics module (speaker connection X1.1)
- Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 21 - SPEAKER CIRCUIT VOLTAGE TOO LOW

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section..
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Ignition on engine off, turn off audio system (radio). 3. Press the End Call/Information button. Does DTC 21 Speaker Circuit Voltage Low Set?		Go to Step 3.	DTC 21 is intermittent Refer Test Step Description.
3.	1. Disconnect the telematics connector A158 X1 and the radio connector A133 X1. 2. Using a DMM measure the resistance between terminal X1-1 circuit 117 and ground. Is the resistance as specified?	Open circuit (greater than 1 MOhm)	Go to step 4.	Go to Step 9.
4.	1. Disconnect all speakers connected to circuits 200 (light green wire) and to circuits 117 (green wire). 2. Using a DMM measure the resistance between circuit 200 (light green wire) and ground. Is the resistance as specified?	Open circuit (greater than 1 MOhm)	Go to step 5.	Repair short to ground in circuit 200.
5.	1. Using a DMM measure the resistance between circuit 117 (green wire) and ground. Is the resistance as specified?	Open circuit (greater than 1 MOhm)	Go to step 6.	Repair short to ground in circuit 117.
6.	1. Using a DMM measure the resistance between the speaker(s) terminals and ground. Is the resistance as specified?	Open circuit (greater than 1 MOhm)	Go to step 7.	Replace speaker that is shorted to ground.
7.	1. Using a DMM measure the resistance between the telematics module terminal A158 X1-2 and ground. Is the resistance as specified?	Open circuit (greater than 1 MOhm)	Go to step 8.	Go to Step 9.
8.	1. Measure the resistance between the telematics module terminal A 158X1-1 and ground. Is the resistance as specified?	Open circuit (greater than 1 MOhm)	Refer to audio system diagnostics in Section 12D in this Section.	Go to Step 9.
9.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 22 - SPEAKER CIRCUIT VOLTAGE TOO HIGH



Figure 12K-90

CIRCUIT DESCRIPTION

The telematics system uses the vehicle audio system to provide a means for voice communication from the Holden Assist call centre. The telematics module also has the ability to detect if the audio system is not operational, and will switch from the vehicle audio system to the RHF speakers, if it detects that the audio system is not operational. Audible tones are also provided to indicate the system status and are broadcast via the speaker to alert the customer to certain operating conditions.

Whenever the telematics audio is activated the radio mute signal is also activated and the telematics module grounds the radio mute circuit 5211 (Yellow/Black wire) causing the circuit voltage to be pulled low, less than two Volts. This low voltage is detected by the radio as a mute request and when received, the audio system will mute.

Whilst the telematics system is not on a call the audio and mute request from the cellular telephone connector will be passed through the telematics module to the audio system. When a Holden Assist call is active, the telematics module will ignore the phone audio and transmit the telematics audio to the audio system.

Tone	Operating Condition
Five Tones	<ul style="list-style-type: none">Attempting to make call when vehicle is not within GSM network range, or if the five tones occur after the ignition is turned off, the vehicle is not within GSM network range.Warning that Service Mode is active or a system malfunction has been detected and a Diagnostic Trouble Code has been stored in the telematics module.

CONDITIONS FOR SETTING THE DTC

- The output voltage of the audio amplifier circuit is measured to detect if the speaker is shorted to ground. This test is performed whenever the ignition is turned on and only if the audio system is off, the emergency speakers are switched in and the telematics audio output is muted.
- DTC 22 will set if the emergency speaker circuit voltage is greater than 2.5 Volts.

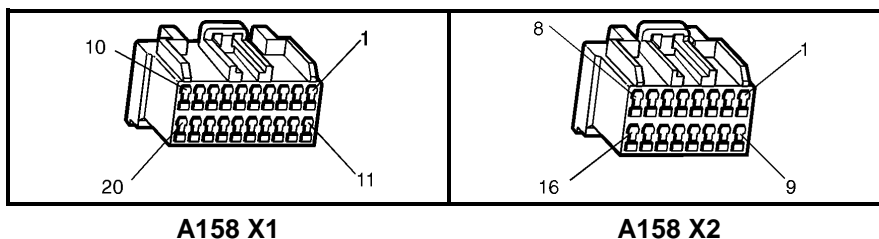
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- The test step checks for a short to voltage in circuit 117 and circuit 200. If circuit 117 or 200 is not shorted to voltage then DTC 22 is intermittent, check for an intermittent open short ground, or voltage on circuit 117 and 200.
- This test step checks for a short to voltage in circuit 117 and circuit 200. If circuit 117 or 200 is not shorted to voltage and DTC 22 still sets then the telematics is should be replaced.
- This test steps check if the audio system (radio) is causing the short to voltage.
- This test steps check if the telematics module is causing the short to voltage.
- Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 22 - SPEAKER CIRCUIT VOLTAGE TOO HIGH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Ignition on engine off, turn off audio system (radio). 3. Press the End Call/Information button. Does DTC 22 Speaker Circuit Voltage High Set?		Go to Step 3.	DTC 22 is intermittent Refer Test Step Description.
3.	1. Ignition on engine off. 2. Using a DMM measure the voltage on circuit 117 between terminal A158 X1-1 and ground and the voltage on circuit 200 between A158 X1-2 and ground. Is either or both voltages greater than the specified value?	2.5 Volts	Go to step 4.	Go To Step6.
4.	1. Ignition off, disconnect the audio system (radio) connector A133 X1. 2. Ignition on engine off. 3. Using a DMM measure the voltage on circuit 117 between terminal A158 X1-1 and ground and the voltage on circuit 200 between A158 X1-2 and ground. Is either or both voltages greater than the specified value?	2.5 Volts	Go to step 5.	Replace Radio (AHU). Refer 12D Entertainment Systems in this Service Information.
5.	1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). 2. Ignition Off, disconnect the telematics module connectors A158 X1 and X2. 3. Ignition on, engine off. 4. Using a DMM measure the voltage on circuit 117 between terminal A158 X1.1 and ground and the voltage on circuit 200 between A158 X1-2 and ground. Is either or both voltages greater than the specified value?	2.5 Volts	Repair short to voltage in the circuit that was greater than 2.5 Volts.	Go to Step 6.
6.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 30 - KEYPAD CIRCUIT VOLTAGE TOO HIGH

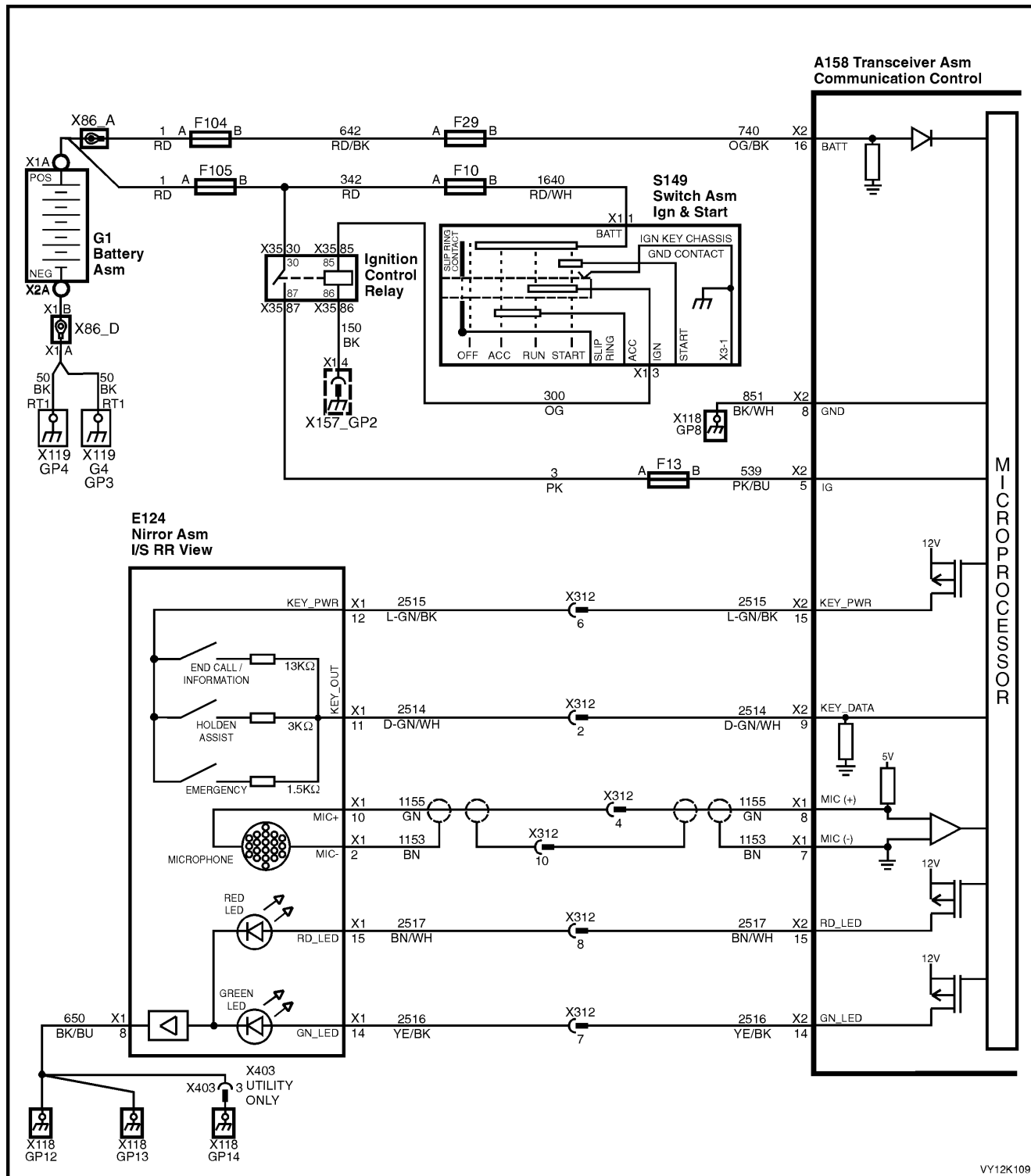


Figure 12K-91

VY12K109

CIRCUIT DESCRIPTION

When the emergency button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 3.8 Volts. The telematics module determines this voltage at terminal X2-9 as an emergency button press. The telematics module will initiate a voice call to an operator at the National Emergency Response Centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

If the emergency button is pressed while a Holden Assist call is in progress then the status of the call shall be upgraded to an emergency call, and the telematics module will not be permitted to terminate the call by pressing the "end call / information" button.

If the emergency button is pressed while the vehicle is outside GSM network range, the telematics module will enter "Emergency Call Mode" where by the emergency call request will be retained. When contact is re-established with the GSM network, the emergency call will be placed immediately.

CONDITIONS FOR SETTING THE DTC

- During the telematics module self test, the keypad circuit voltage is measured to detect if the circuit voltage is too high. This self test is only performed once whenever the telematics is powered up, at this time the power to the keypad is off.
- DTC 30 will set if the keypad circuit voltage is high (logic 1) during the self test.

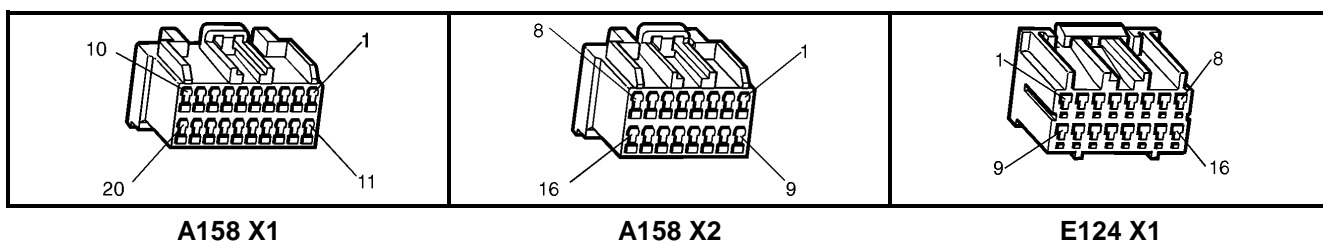
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- The test step checks for a short to voltage in circuit 2515.
- This test step checks if the telematics module can turn off the power supply to circuit 2515. If the voltage is less than 0.2 Volts when the keypad voltage is commanded off the DTC 30 is intermittent. If DTC 30 is intermittent, check for an open, or a short to ground or voltage in circuit 2515.
- This test step checks if the interior rear view mirror is causing the short to voltage.
- Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 30 - KEYPAD CIRCUIT VOLTAGE TOO HIGH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	<p>1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed).</p> <p>2. Ignition off, disconnect the telematics module connectors A158 X1 and X2.</p> <p>3. Ignition on, engine off.</p> <p>4. Using a DMM measure the voltage on circuit 2515 (Light Green/Black wire) between terminal A158 X2-15 and ground.</p> <p>Is voltage greater than the specified value?</p>	0.2 Volts	Go to step 4.	Go to step 3.
3.	<p>1. Reconnect the telematics module connectors A158 X1 and X2.</p> <p>2. From the Telematics Application Menu, Select F3: Miscellaneous Tests \ F3: Keypad Supply Voltage.</p> <p>3. Using a DMM measure the voltage on circuit 2515 (Light Green/Black wire) between terminal A158 X2-15 and ground while commanding the keypad supply voltage off.</p> <p>Is the voltage greater than the specified value when the keypad supply voltage is commanded off.</p>	0.2 Volts	Go to Step 5.	DTC 30 is intermittent. Refer Test Step Description.
4.	<p>1. Disconnect the interior rear view mirror connector E124 X1.</p> <p>1. Ignition on engine off.</p> <p>2. Using a DMM measure the voltage on circuit 2515 (Light Green/Black wire) between terminal A158 X2-15 and ground.</p> <p>Is voltage greater than the specified value?</p>	0.2 Volts	Repair short to voltage in circuit 2515.	Replace the Interior Rear View Mirror. Refer 3.4 Interior Rear View Mirror in this Section.
5.	<p>1. Check telematics module connectors A158 X1 and X2 terminal retention.</p> <p>Is the terminal retention OK?</p>		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION

DTC 35 - GPS ANTENNA CIRCUIT VOLTAGE TOO LOW

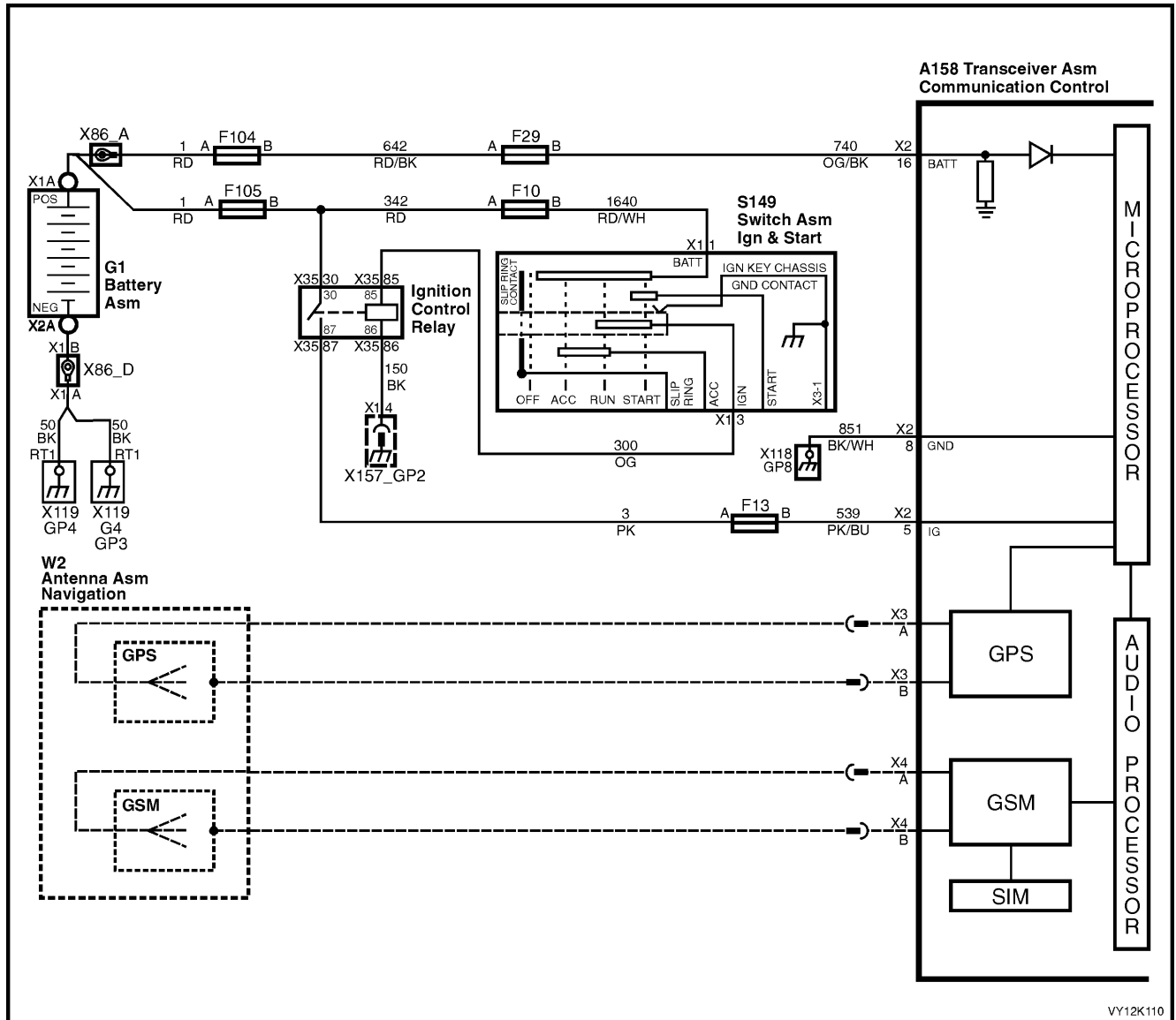


Figure 12K-92

CIRCUIT DESCRIPTION

The telematics antenna contains both the GPS and GSM antennas in one unit, and is located under the instrument panel. The antenna has two leads, one for the GPS antenna and the other for the GSM antenna. The GPS antenna receives signals from satellites orbiting the earth and transmits these to the telematics module to determine the vehicle's position. Signals from at least three GPS satellites must be received to accurately determine the vehicle's two dimensional (2D) position. Signals from at least four GPS satellites must be received to accurately determine the vehicle's three dimensional (3D) position. If signals from only three satellites are received, the telematics module cannot determine the vehicle's altitude. The GPS antenna must not be obscured by any objects, such as underground car parks, tunnels, bridges or buildings, as any of these may affect GPS reception. The GPS antenna is connected to the telematics module by a push on type connector. To determine the vehicles position this GPS information is transmitted via SMS to the Holden Assist Centre whenever a call is made to the Holden Assist Centre. The Holden Assist Centre is also able to track the vehicle using this GPS information.

CONDITIONS FOR SETTING THE DTC

- DTC 35 will set if the GPS module is active and detects a low voltage in the GPS antenna or circuit for more than 10 seconds.

Note: This DTC is only applicable on telematics module with software version 001.000.010 or later.

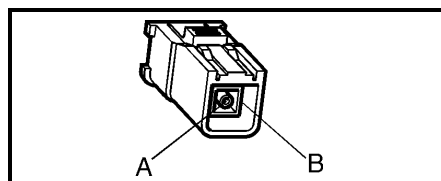
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. If DTC is intermittent, check for loose or damaged GPS Antenna connector or lead.



A158 X3

DTC 35 - GPS ANTENNA CIRCUIT VOLTAGE TOO LOW

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. Does DTC 35, GPS Antenna Circuit Voltage Too Low Set?		Go to Step 3.	DTC 35 is intermittent Refer Test Step Description.
3.	1. Disconnect GPS connector, A158 X3. 2. Using a DMM measure the resistance between terminals 'A' and 'B' (Antenna Side). For Terminal 'A' a 0.6 mm or less test probe must be used. Is the resistance as specified?	Between 80 and 110 Ohms	Replace telematics antenna. Refer 3.3 Telematics Antenna in this Section.	Replace telematics module. Refer 3.1 Telematics Module in this Section..
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

DTC 39 - TELEPHONE NUMBER ERROR

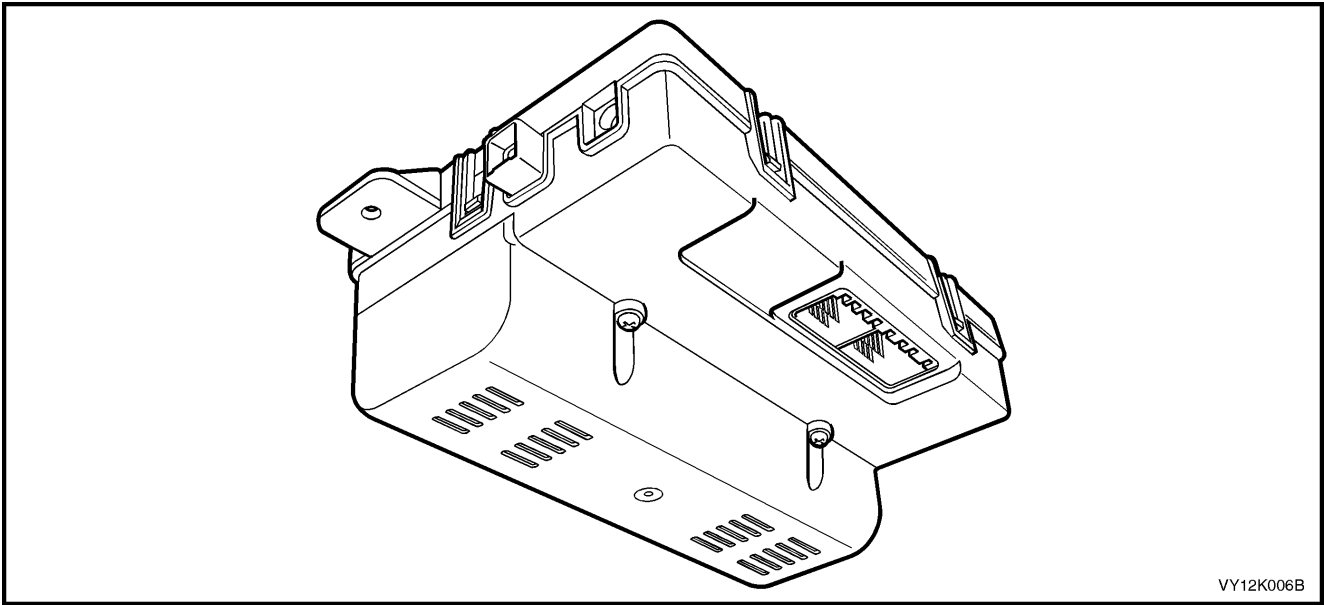


Figure 12K-93

CONDITIONS FOR SETTING THE DTC

- During the telematics module self test an incorrect phone number is detected.

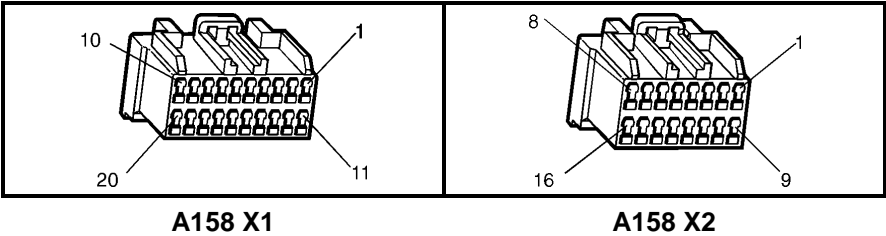
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed. If an incorrect phone number is detected the telematics module should be replaced.



DTC 39 – TELEPHONE NUMBER ERROR

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 40 - VEHICLE IDENTIFICATION NUMBER MISMATCH

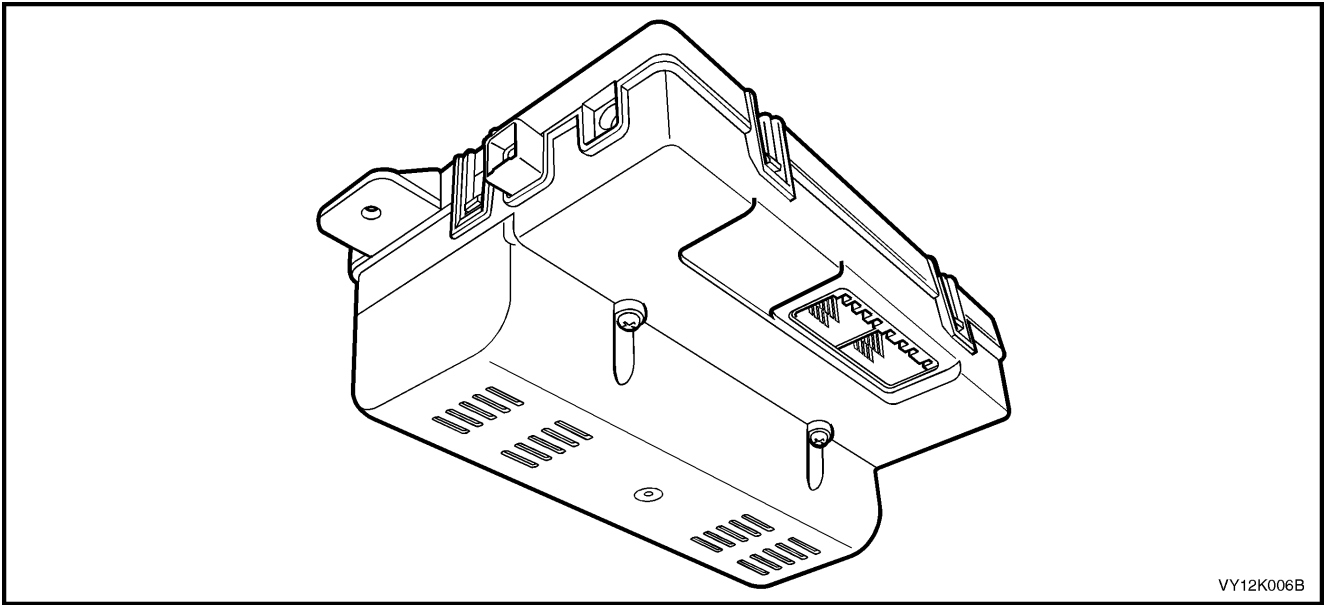


Figure 12K-94

CONDITIONS FOR SETTING THE DTC

- During the telematics module self test an incorrect vehicle identification number is detected.

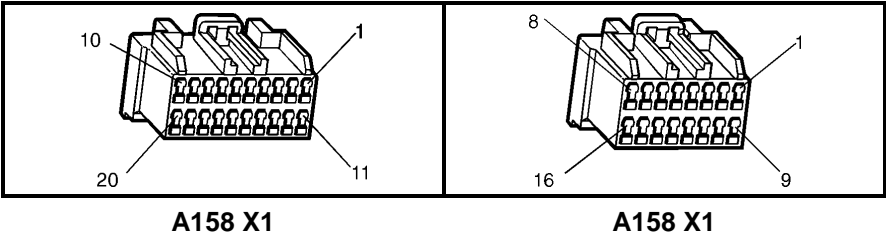
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed. If an incorrect vehicle identification number is detected the telematics module should be replaced.



DTC 40 - VEHICLE IDENTIFICATION NUMBER MISMATCH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 42 - FUEL PUMP CIRCUIT VOLTAGE TOO LOW

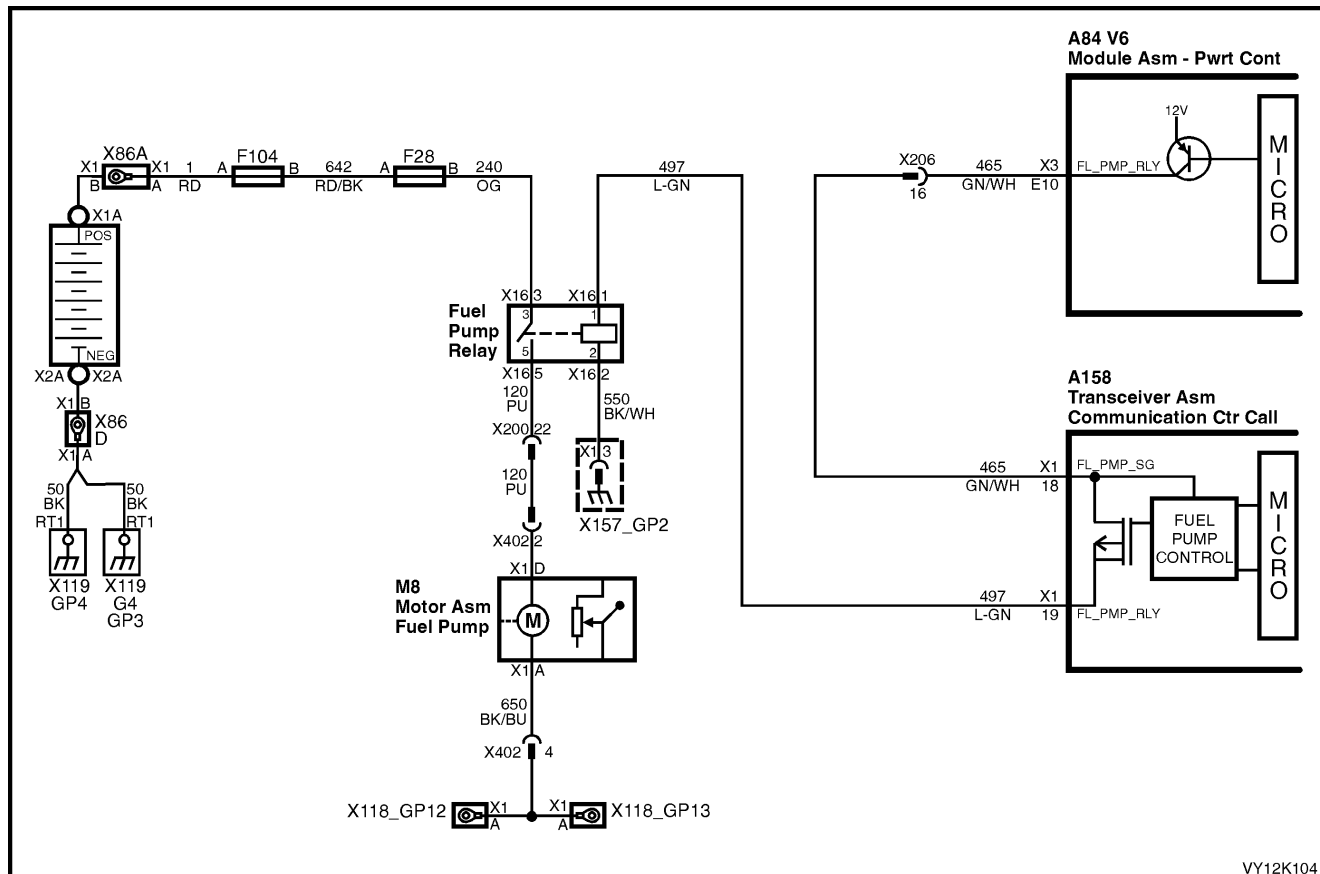


Figure 12K-95 V6 Fuel Pump Circuit

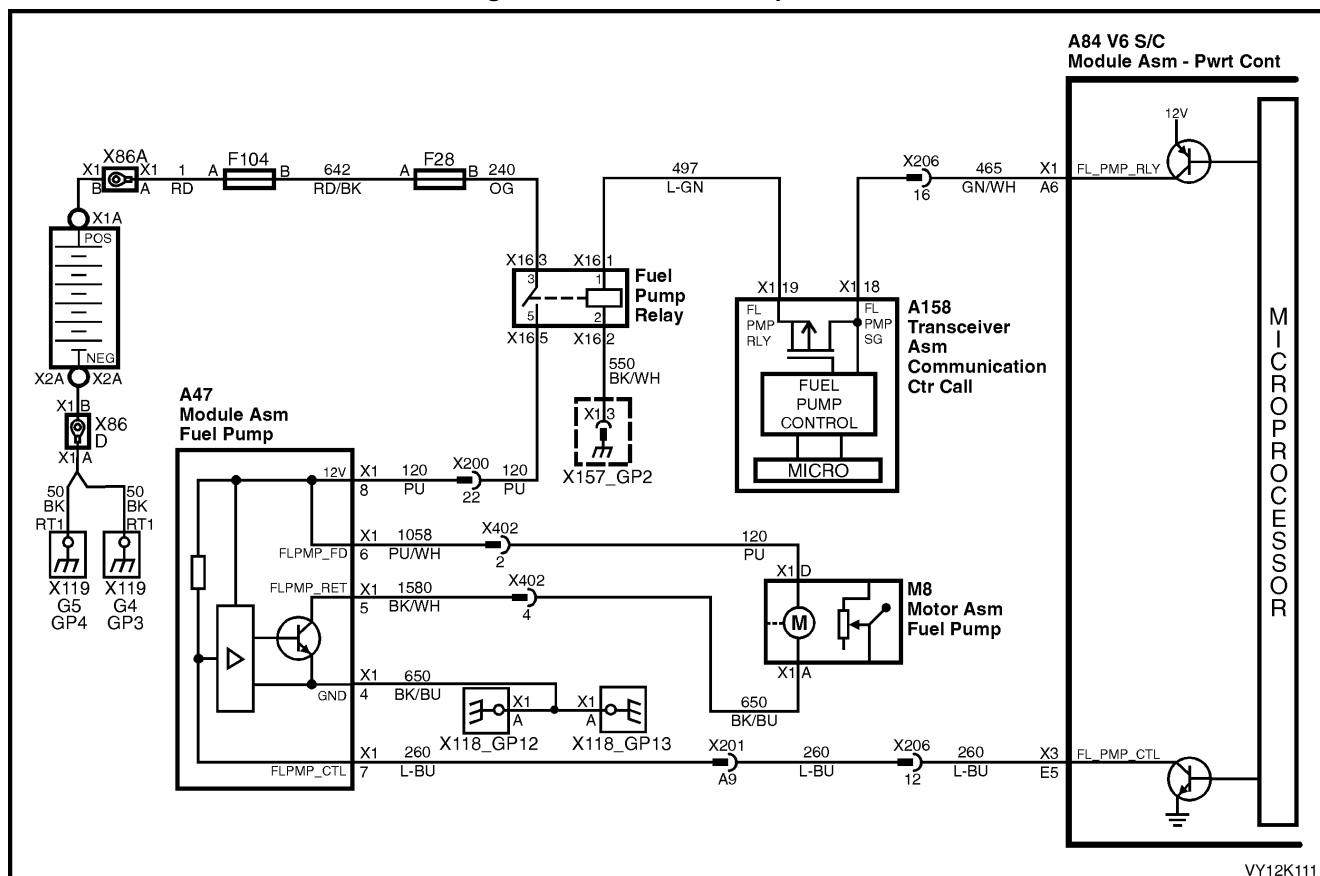


Figure 12K-96 V6 S/C Fuel Pump Circuit

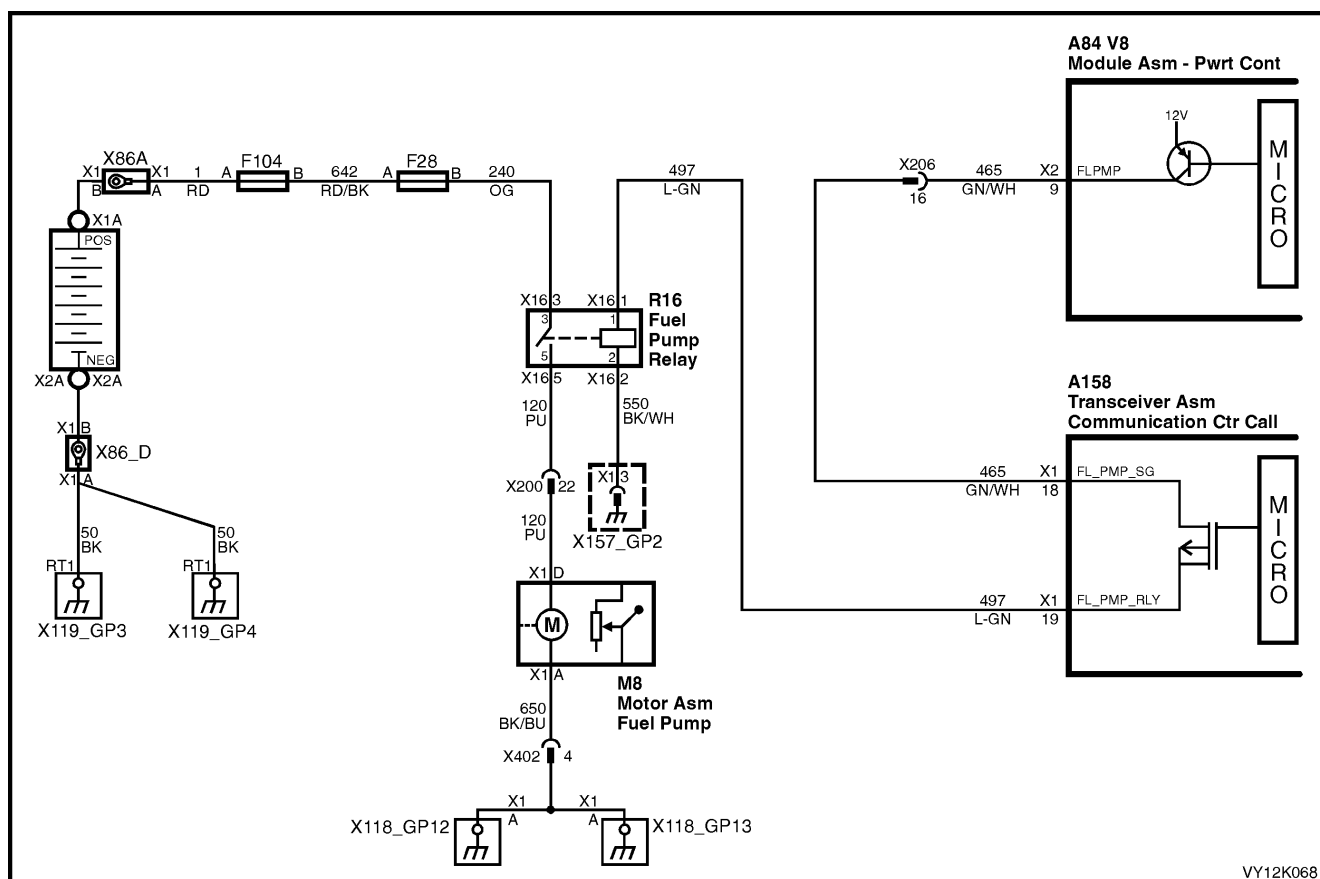


Figure 12K-97 V8 Fuel Pump Circuit

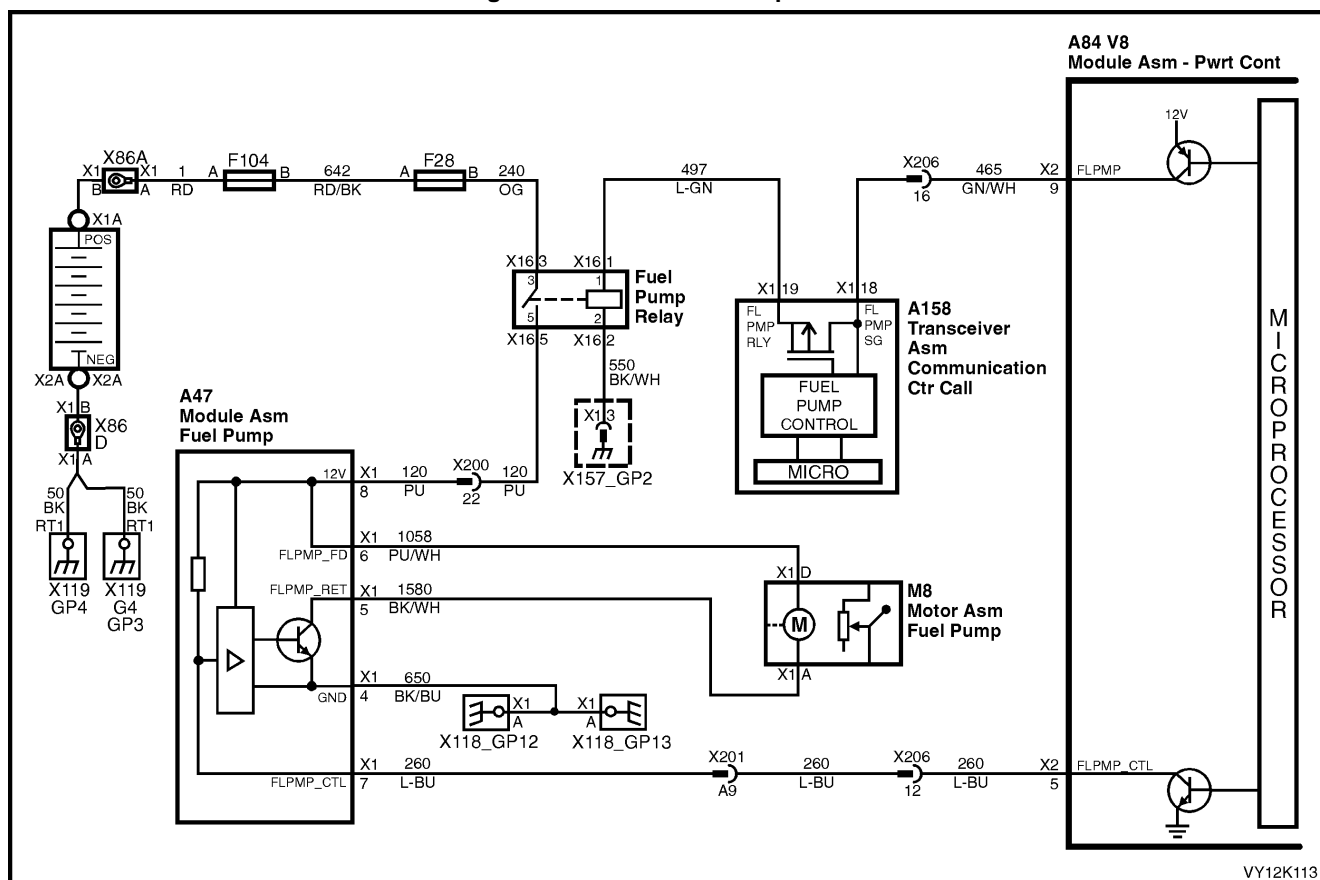


Figure 12K-98 V8 Utility Fuel Pump Circuit

CIRCUIT DESCRIPTION

The PCM energises the fuel pump relay drive circuit via circuit 465 (Green/White wire) the telematics module terminals X1-18 and X1-19, circuit 497 (Light/Green wire). The fuel pump relay drive circuit is grounded through circuit 550 (Black/White wire) at ground location X157_GP2. The telematics module can immobilise the vehicle by opening the fuel pump relay drive circuit, causing the fuel pump to stop operating. This function can only be activated by the National Emergency Response Centre (NERC™) under instruction from the Police.

CONDITIONS FOR SETTING THE DTC

- During the telematics module self test the fuel pump relay drive circuit voltage is measured to detect if the circuit voltage is too low.
- DTC 42 will set if the fuel pump relay circuit voltage is low (logic 0) during the self test.

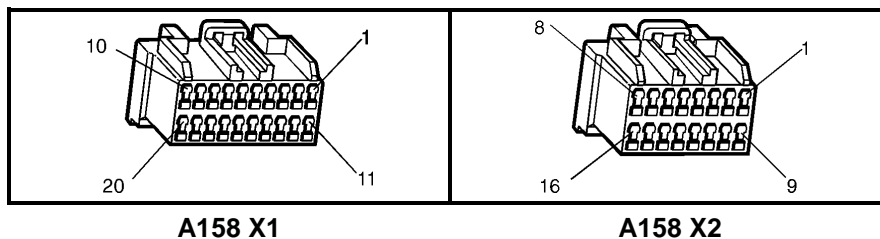
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This step confirms that the DTC is current or intermittent. If DTC 42 is intermittent check the fuel pump relay drive circuit for an intermittent open, or a short to ground or voltage.
3. This step checks if circuit 465 is shorted to ground.
4. This step determines if the fuel pump relay is causing the short to ground.
5. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 42 - FUEL PUMP CIRCUIT VOLTAGE TOO LOW

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and allow to idle for one minute. Does DTC 42 Fuel Pump Circuit Voltage Too Low Set?		Go to Step 3.	DTC 42 is intermittent. Refer Test Step Description.
3.	1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). 2. Ignition off, disconnect the telematics module connectors A158 X1 and X2. 3. Using a DMM measure the resistance between circuit 465 (green/white wire) and ground. Is the resistance less than the specified value?	Less than 1 Ohm	Go to step 4.	Go to step 5.
4.	1. Remove the fuel pump relay. 2. Using a DMM measure the resistance between circuit 465 (green/white wire) and ground. Is the resistance less than the specified value?	Less than 1 Ohm	Repair short to ground in circuit 465.	Replace fuel pump relay.
5.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 43 - FUEL PUMP CIRCUIT VOLTAGE TOO HIGH

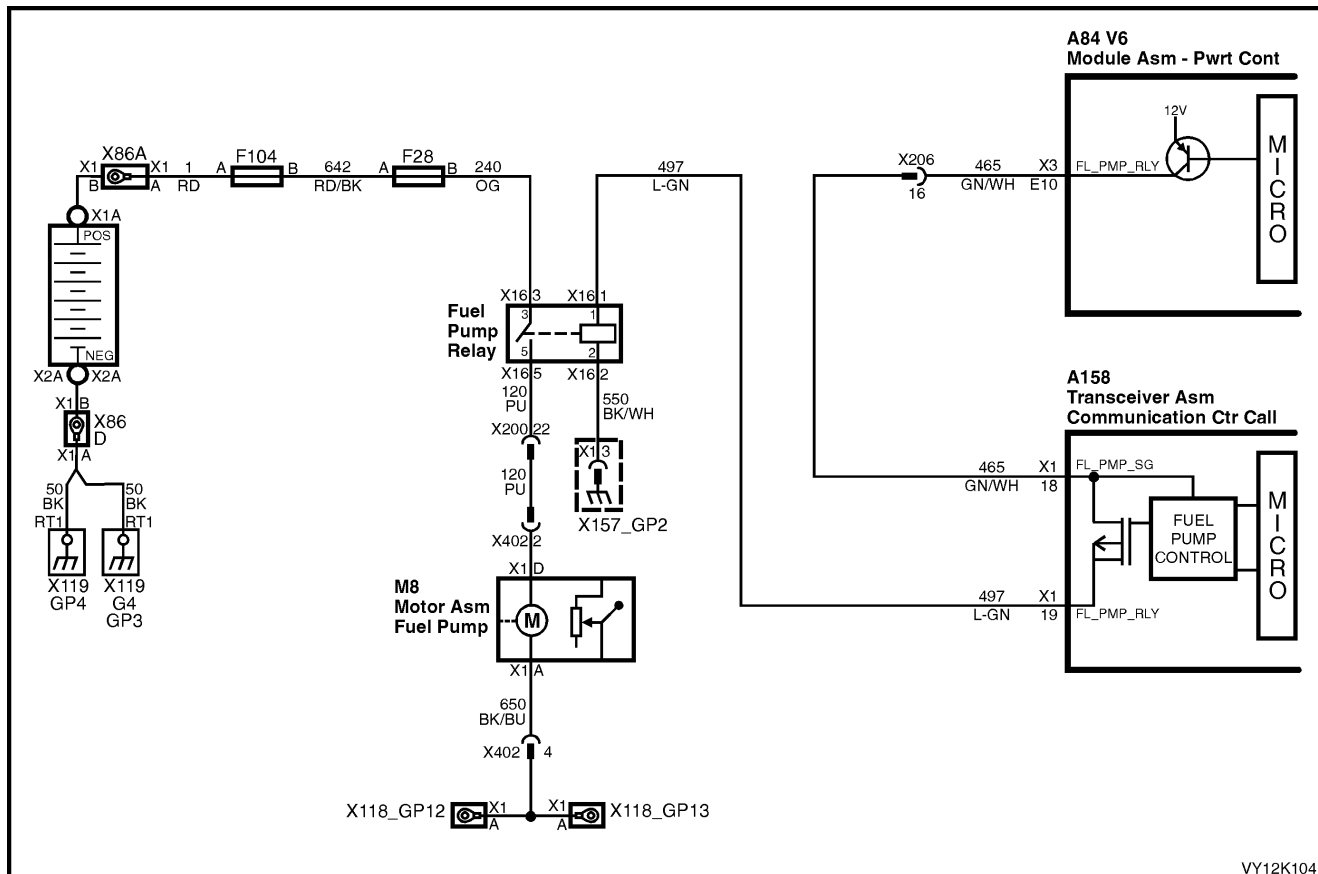


Figure 12K-99 V6 Fuel Pump Circuit

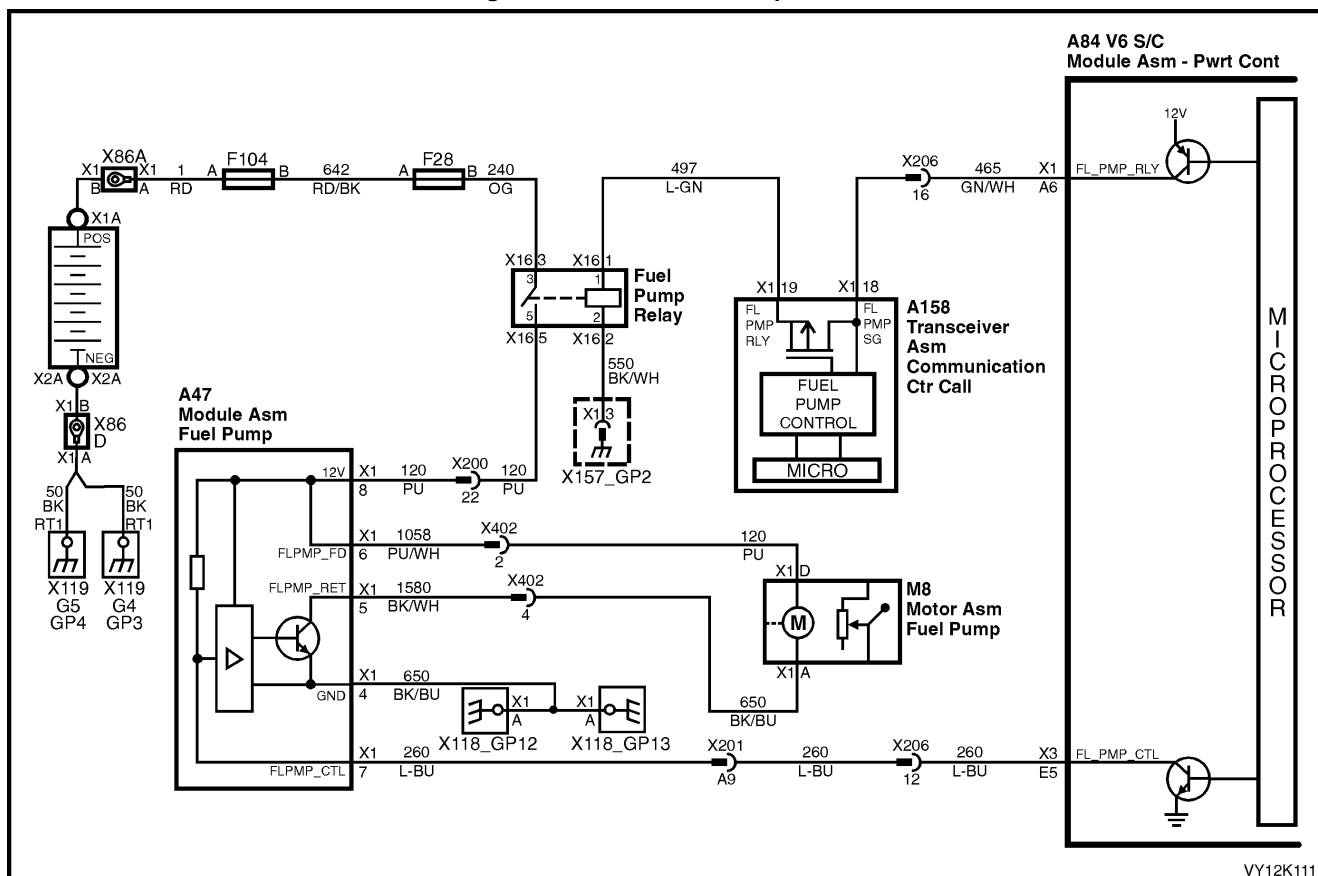


Figure 12K-100 V6 S/C Fuel Pump Circuit

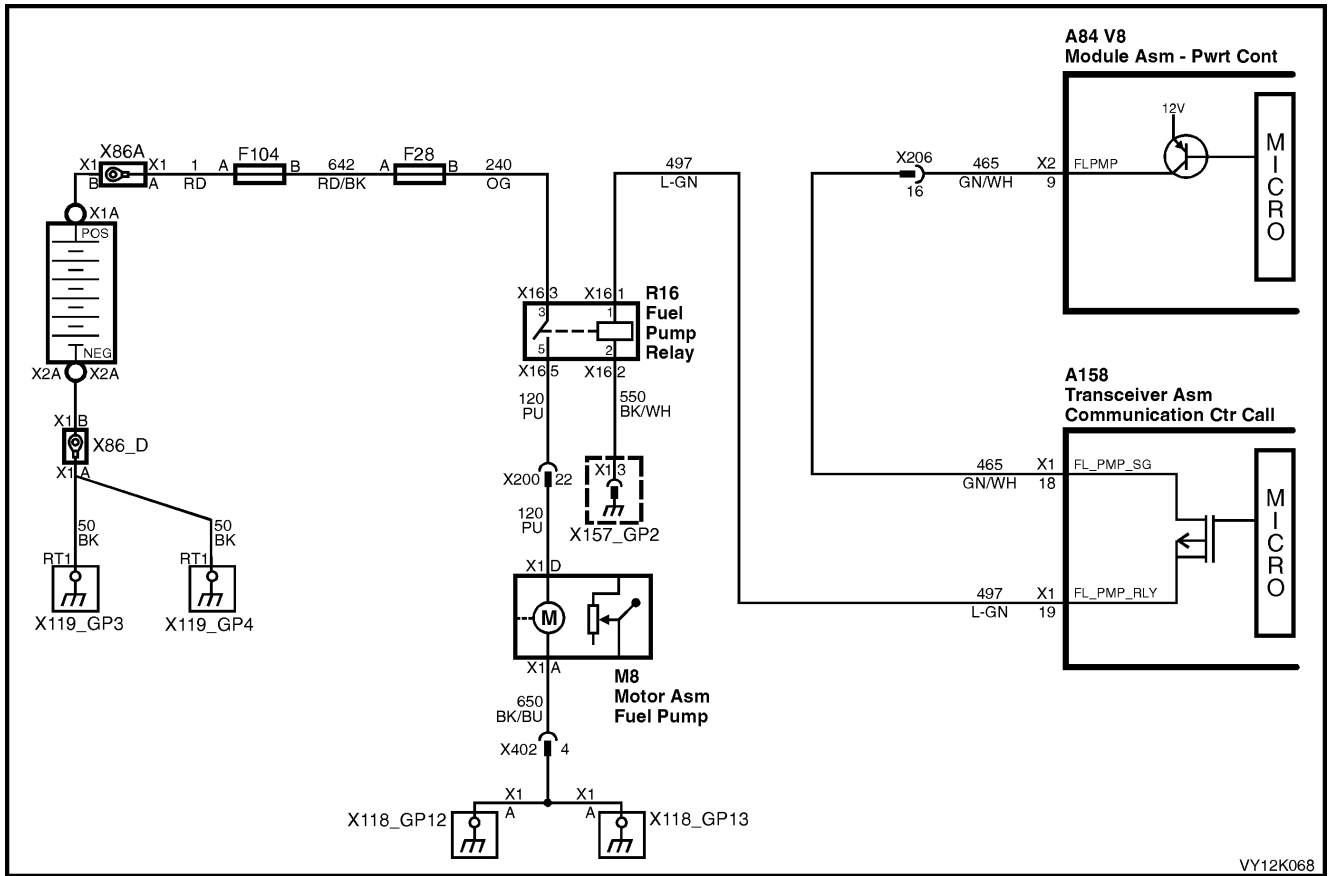


Figure 12K-101 V8 Fuel Pump Circuit

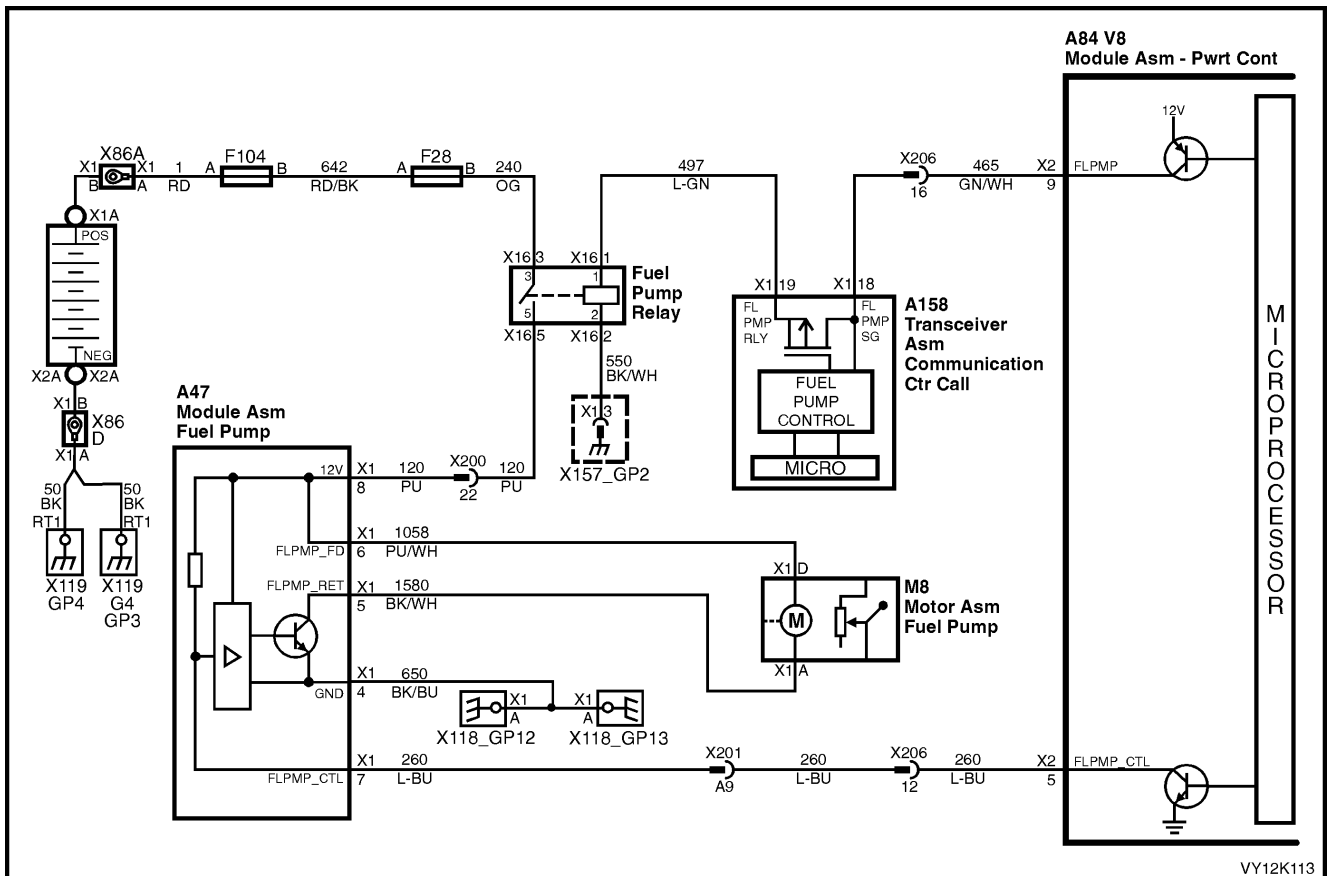


Figure 12K-102 V8 Utility Fuel Pump Circuit

CIRCUIT DESCRIPTION

The PCM energises the fuel pump relay drive circuit via circuit 465 (Green/White wire) the telematics module terminals X1-18 and X1-19, circuit 497 (Light/Green wire). The fuel pump relay drive circuit is grounded through circuit 550 (Black/White wire) at ground location X157_GP2. The telematics module can immobilise the vehicle by opening the fuel pump relay drive circuit, causing the fuel pump to stop operating. This function can only be activated by the National Emergency Response Centre (NERC™) under instruction from the Police.

CONDITIONS FOR SETTING THE DTC

- During the telematics module self test the fuel pump relay drive circuit voltage is measured to detect if the circuit voltage is too high.
- DTC 43 will set if the fuel pump relay circuit voltage is high (logic 1) during the self test.

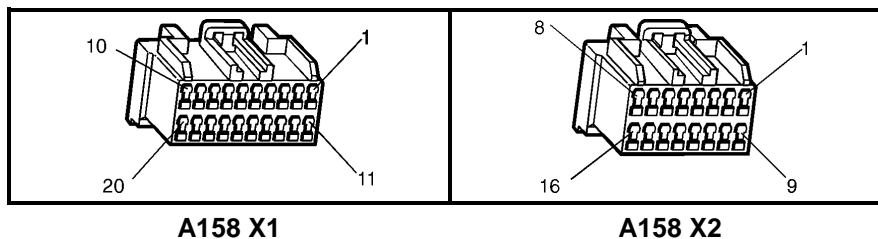
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This step confirms that DTC 43 is current and not intermittent. If DTC 43 is intermittent, check circuit 465 for an intermittent open, or a short to ground or voltage.
3. This step checks if circuit 465 is shorted to B+.
4. This step determines if the fuel pump relay is causing the short to B+.
5. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 43 - FUEL PUMP CIRCUIT VOLTAGE TOO HIGH

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Start engine and allow to idle for one minute. Does DTC 43 Fuel Pump Circuit Voltage Too High Set?		Go to Step 3.	DTC 43 is intermittent. Refer Test Step Description.
3.	1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). 2. Ignition off, disconnect the telematics module connectors A158 X1 and X2. 2. Disconnect the battery negative terminal. 2. Using a DMM measure the resistance between circuit 465 (green/white wire) and battery B+ terminal. Is the resistance less than the specified value?	Less than 1 Ohm	Go to step 4.	Go to step 5.
4.	1. Remove the fuel pump relay. 2. Using a DMM measure the resistance between circuit 465 (green/white wire) and battery B+ terminal. Is the resistance less than the specified value?	Less than 1 Ohm	Repair short to B+ in circuit 465.	Replace fuel pump relay.
5.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 44 - GSM NOT LOGGED WITH SIGNAL STRENGTH PRESENT

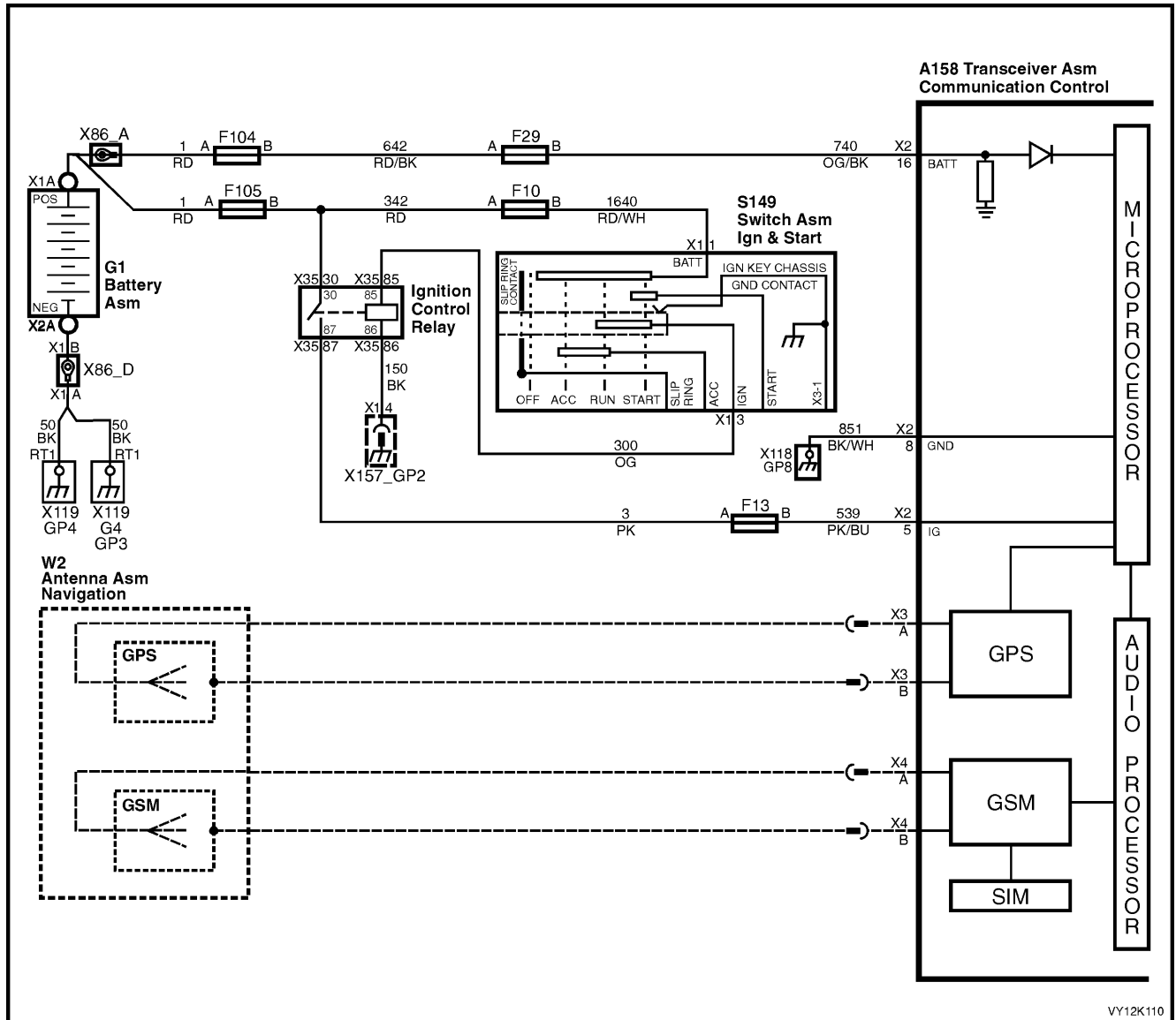


Figure 12K-103

CIRCUIT DESCRIPTION

The telematics antenna contains both the GPS and GSM antennas in one unit, and is under the instrument panel. The antenna has two leads, one for the GPS antenna and the other for the GSM antenna. The GSM antenna is capable of transmitting and receiving both voice and data signals via the GSM network. The telematics module uses the GSM network to transmit and receive voice and data. Signal strength may be affected in locations like basement car parks or tunnels. However, in most cases, as the vehicle emerges from the obstruction or re-enters the digital phone network area the signal will be available again and any stored data will be transmitted. The GSM antenna is connected to the telematics module by a push on type connector.

CONDITIONS FOR SETTING THE DTC

- This DTC will set if the GSM has a valid GSM signal (of any signal strength), and the GSM module is active, but unable to gain GSM registration for five minutes.

Possible causes are:

SIM card not valid (not registered).

SIM card faulty.

GSM module is faulty.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- If the SIM card is registered then the telematics module will have to be replaced. If the SIM card is not registered then Australian Arrow will arrange to have the SIM card registered.

DTC 44 - GSM NOT LOGGED WITH SIGNAL STRENGTH PRESENT

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Call Australian Arrow Customer Service. (03 97850792) Does Australian Arrow advise that you replace the telematics module?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Australian Arrow will arrange SIM card registration.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

DTC 45 – END CALL / INFORMATION BUTTON STUCK

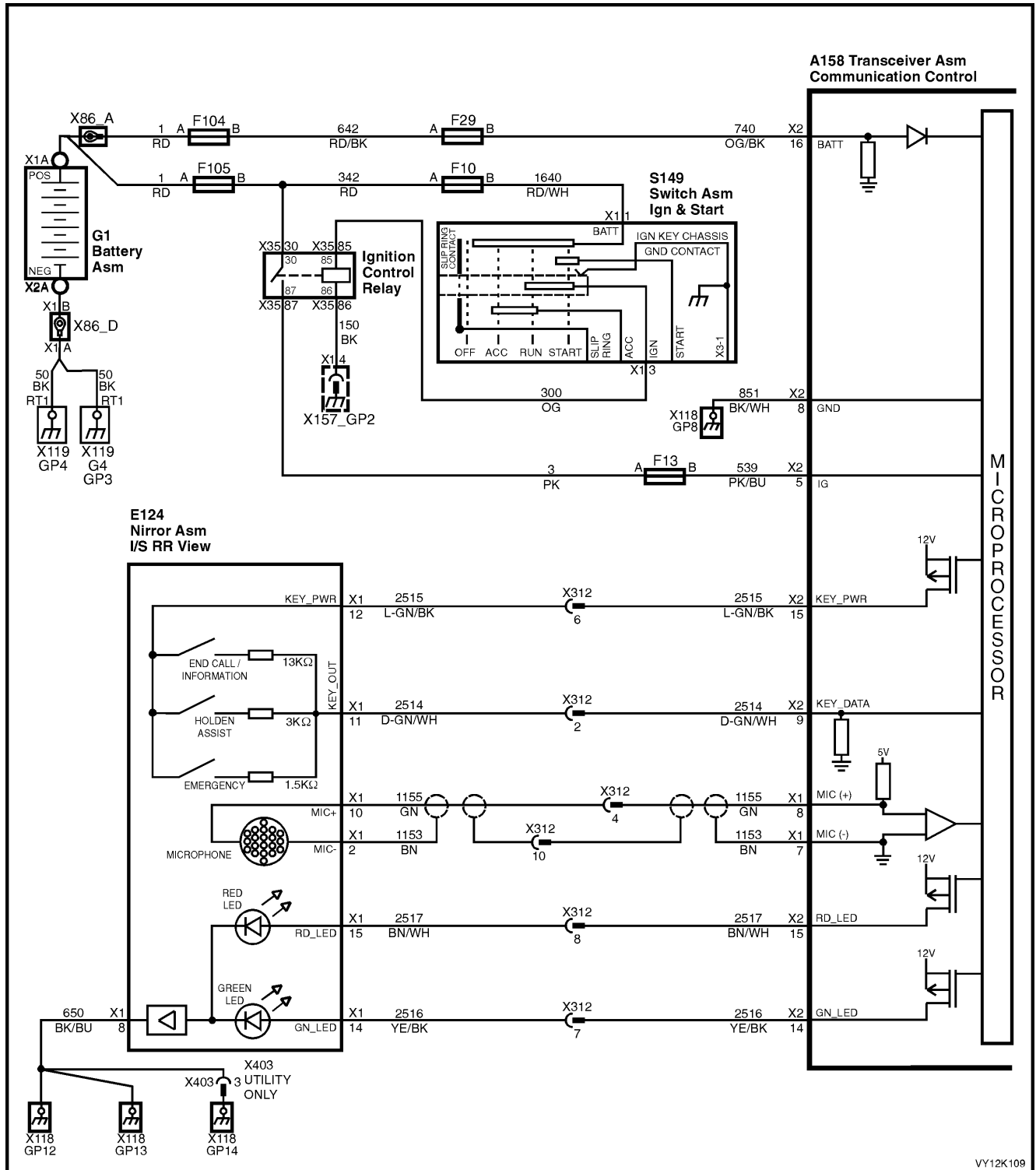


Figure 12K-104

CIRCUIT DESCRIPTION

The telematics button pad is a resistor encoded switch, which means that each button has a separate and different value resistor connected to it. The telematics module uses a voltage divider circuit to determine which button has been pressed. The telematics module supplies a 12 volt signal voltage to terminal X1-12 of the rear view mirror connector circuit 2515 (Light Green/Black wire). Whenever a button is pressed the corresponding switch is closed and circuit 2514 (Dark Green/White wire) is connected to ground through a resistor, each switch having a different value resistor. The telematics module monitors the voltage on circuit 2514 (Dark Green/White wire) at terminal X2-9, which will change when any of the buttons are pressed.

When the end call / information button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 0.7 Volts. The telematics module determines this voltage at terminal X2-9 as an end call / information button press. If end call / information button is pressed to make a call, you will be connected to Holden Assist information services. Pressing this button while a call is connected will disconnect the call. It however will not disconnect a call while the call is ringing the information service number or the Holden Assist number. It is not

possible for this button to disconnect an emergency call or a Holden Assist call that has been upgraded to emergency call status.

CONDITIONS FOR SETTING THE DTC

- DTC 45 will set if the keypad circuit voltage is at 0.7 Volts for greater than ten seconds.

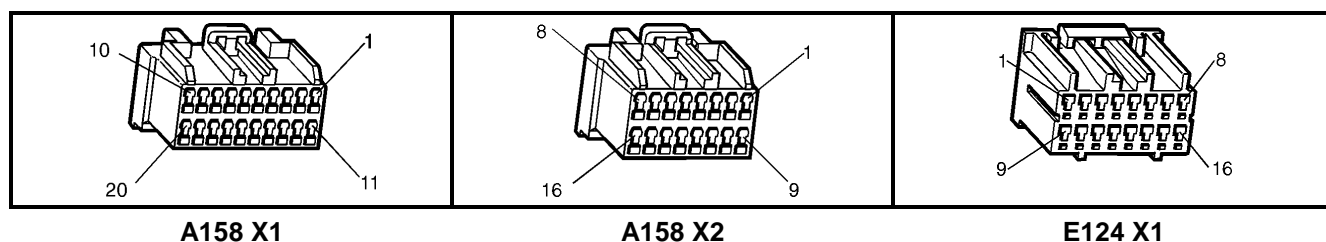
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- This test step determines if DTC 45 is intermittent. If DTC 45 is intermittent, check for an intermittent open, or a short to voltage or ground on circuit 2514, or an intermittent internal short in the interior rear view mirror.
- The test step checks the actual voltage on circuit 2514.
- This test step checks if the interior rear view mirror is causing DTC 45 to set.
- Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 45 – END CALL / INFORMATION BUTTON STUCK

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Ignition on for at least one minute. Does DTC 45 End Call / Information Button Stuck set?		Go to Step 3.	DTC 45 is intermittent Refer Test Step Description.
3.	1. Ignition on. 2. Using a DMM measure the voltage between the interior rear view mirror connector E124 X1-11 circuit 2514 (Dark Green/White wire) and ground. Is the voltage at the specified value?	0.7 Volts	Go to step 4.	Go to step 5.
4.	1. Ignition off, disconnect the interior rear view mirror connector E124 X1. 2. Ignition on. 2. Using a DMM measure the voltage between the interior rear view mirror connector E124 X1-11 circuit 2514 (Dark Green/White wire) and ground. Is the voltage at the specified value?	0.7 Volts	Go to step 5.	Replace interior rear view mirror. Refer 3.4 Interior Rear View Mirror in this Section.
5.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 46 - HOLDEN ASSIST BUTTON STUCK

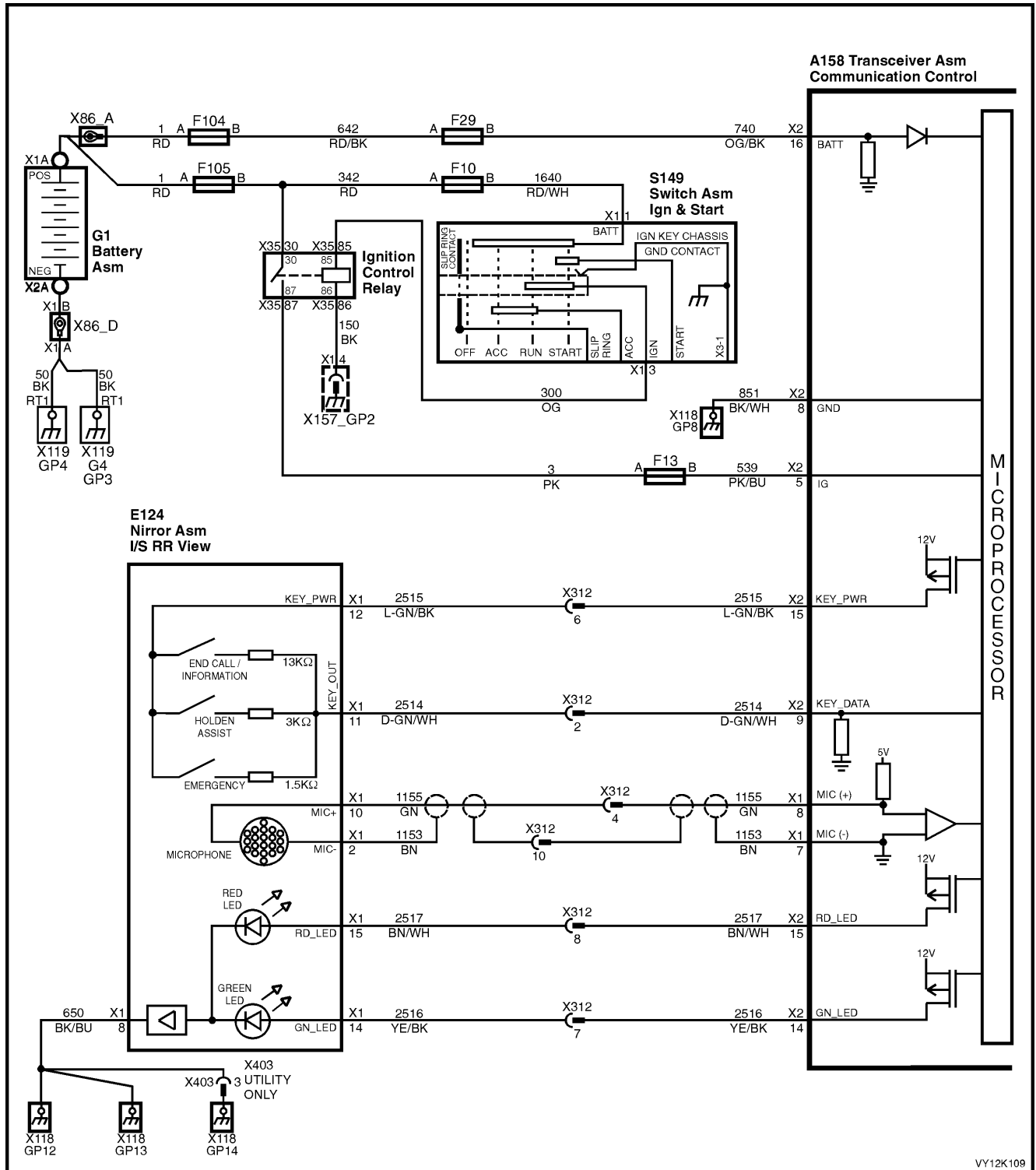


Figure 12K-105

CIRCUIT DESCRIPTION

The telematics button pad is a resistor encoded switch, which means that each button has a separate and different value resistor connected to it. The telematics module uses a voltage divider circuit to determine which button has been pressed. The telematics module supplies a 12 volt signal voltage to terminal X1-12 of the rear view mirror connector circuit 2515 (Light Green/Black wire). Whenever a button is pressed the corresponding switch is closed and circuit 2514 (Dark Green/White wire) is connected to ground through a resistor, each switch having a different value resistor. The telematics module monitors the voltage on circuit 2514 (Dark Green/White wire) at terminal X2-9, which will change when any of the buttons are pressed.

When the Holden Assist button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 2.3 Volts. The telematics module determines this voltage at terminal X2-9 as an Holden Assist Button press. The telematics module will initiate a voice call to the call centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-

attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

CONDITIONS FOR SETTING THE DTC

- DTC 46 will set if the keypad circuit voltage is at 2.3 Volts for greater than ten seconds.

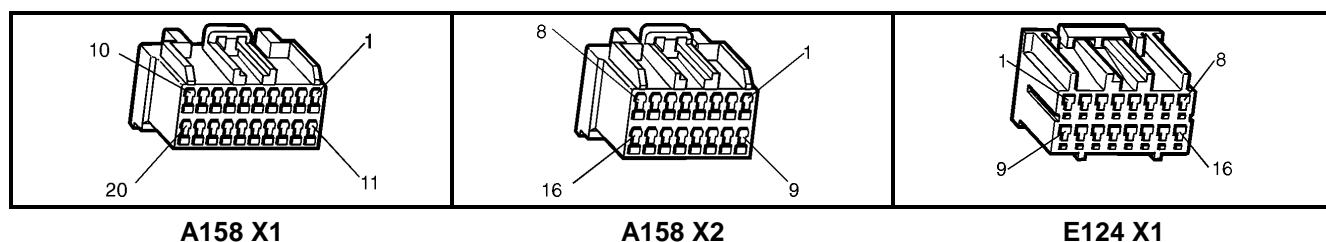
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

- Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
- This test step determines if DTC 46 is intermittent. If DTC 46 is intermittent, check for an intermittent open, or a short to voltage or ground on circuit 2514, or an intermittent internal short in the interior rear view mirror.
- The test step checks the actual voltage on circuit 2514.
- This test step checks if the interior rear view mirror is causing DTC 46 to set.
- Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 46 - HOLDEN ASSIST BUTTON STUCK

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Ignition on for at least one minute. Does DTC 46 Holden Assist Button Stuck set?		Go to Step 3.	DTC 46 is intermittent Refer Test Step Description.
3.	1. Ignition on. 2. Using a DMM measure the voltage between the interior rear view mirror connector E124 X1-11 circuit 2514 (Dark Green/White wire) and ground. Is the voltage at the specified value?	2.3 Volts	Go to step 4.	Go to step 5.
4.	1. Ignition off, disconnect the interior rear view mirror connector. 2. Ignition on. 2. Using a DMM measure the voltage between the interior rear view mirror connector E124 X1-11 circuit 2514 (Dark Green/White wire) and ground. Is the voltage at the specified value?	2.3 Volts	Go to step 5.	Replace Interior Rear View Mirror. Refer 3.4 Interior Rear View Mirror in this Section.
5.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

DTC 47 - EMERGENCY BUTTON STUCK

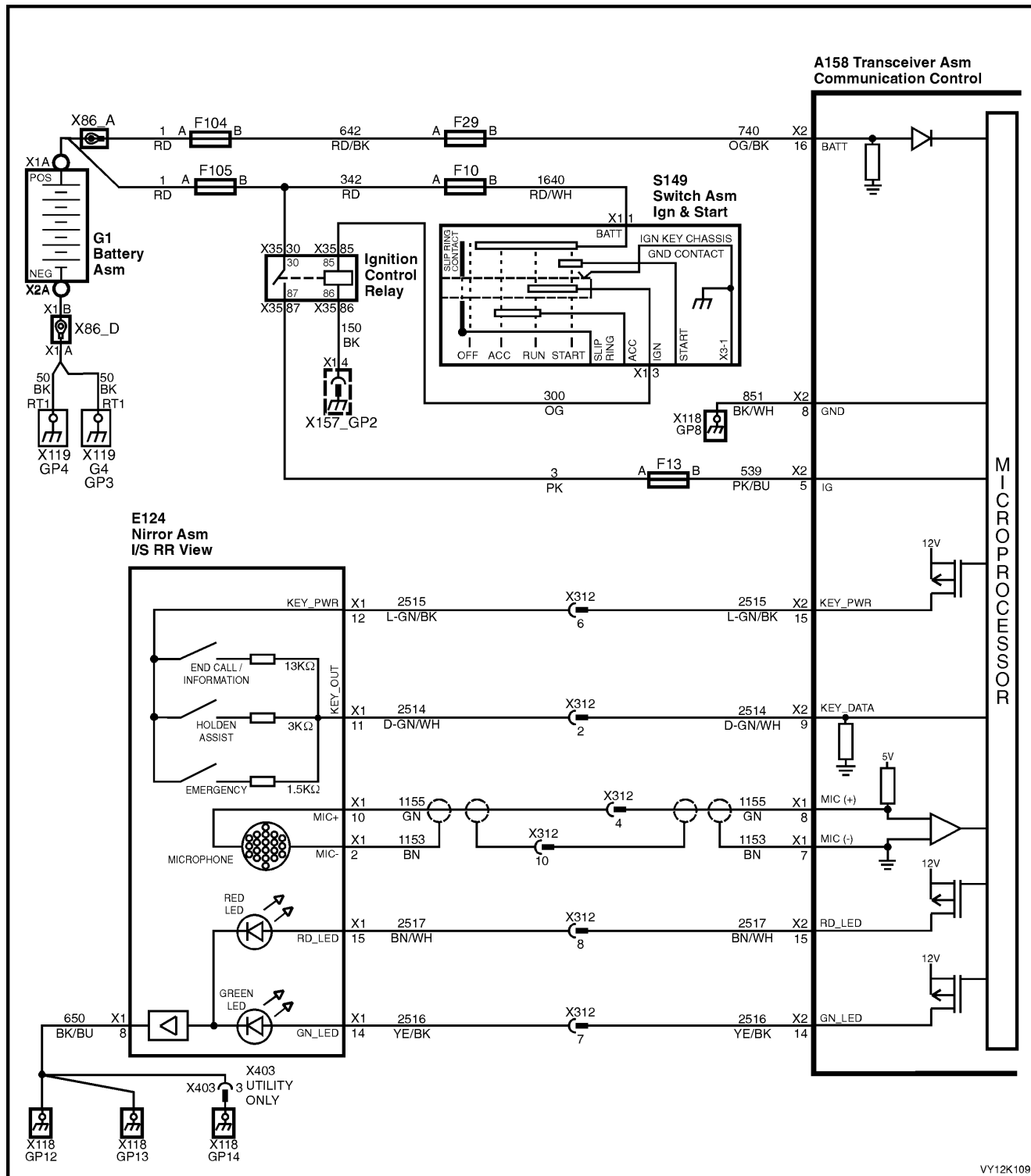


Figure 12K-106

VY12K109

CIRCUIT DESCRIPTION

The telematics button pad is a resistor encoded switch, which means that each button has a separate and different value resistor connected to it. The telematics module uses a voltage divider circuit to determine which button has been pressed. The telematics module supplies a 12 Volt signal voltage to terminal X1-12 of the rear view mirror connector circuit 2515 (Light Green/Black wire). Whenever a button is pressed the corresponding switch is closed and circuit 2514 (Dark Green/White wire) is connected to ground through a resistor, each switch having a different value resistor. The telematics module monitors the voltage on circuit 2514 (Dark Green/White wire) at terminal X2-9, which will change when any of the buttons are pressed.

When the emergency button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 3.8 Volts. The telematics module determines this voltage at terminal X2-9 as an emergency button press. The telematics module will initiate a voice call to an operator at the National Emergency Response Centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

If the emergency button is pressed while a Holden Assist call is in progress then the status of the call shall be upgraded to an emergency call, and the telematics module will not be permitted to terminate the call by pressing the End Call/Information button.

If the emergency button is pressed while the vehicle is outside GSM network range, the telematics module will enter "Emergency Call Mode" where by the emergency call request will be retained. When contact is re-established with the GSM network, the emergency call will be placed immediately.

CONDITIONS FOR SETTING THE DTC

- DTC 47 will set if the keypad circuit voltage is at 3.8 Volts for greater than ten seconds.

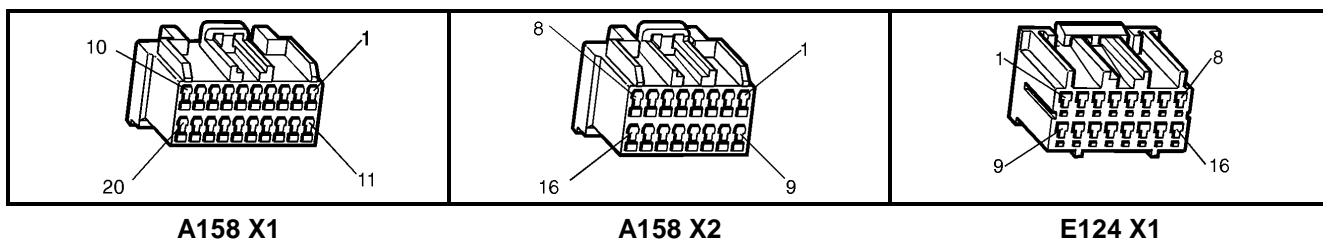
ACTION TAKEN WHEN THE DTC SETS

- When the diagnostic runs and fails, the telematics module stores the DTC into memory as a current DTC and activates the red status LED.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

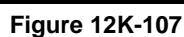
1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test step determines if DTC 47 is intermittent. If DTC 47 is intermittent, check for an intermittent open, or a short to voltage or ground on circuit 2514, or an intermittent internal short in the interior rear view mirror.
3. The test step checks the actual voltage on circuit 2514.
4. This test step checks if the interior rear view mirror is causing DTC 47 to set.
5. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



DTC 47 - EMERGENCY BUTTON STUCK

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F0: Diagnostic Trouble Codes / F0: Clear DTCs and clear all DTCs. 2. Ignition on for at least one minute. Does DTC 47 Emergency Button Stuck set?		Go to Step 3.	DTC 47 is intermittent Refer Test Step Description.
3.	1. Ignition on. 2. Using a DMM measure the voltage between the interior rear view mirror connector E124 X1-11 circuit 2514 (Dark Green/White wire) and ground. Is the voltage at the specified value?	3.8 Volts	Go to step 4.	Go to step 5.
4.	1. Ignition off, disconnect the interior rear view mirror connector. 2. Ignition on. 2. Using a DMM measure the voltage between the interior rear view mirror connector E124 X1-11 circuit 2514 (Dark Green/White wire) and ground. Is the voltage at the specified value?	3.8 Volts	Go to step 5.	Replace interior rear view mirror. Refer 3.4 Interior Rear View Mirror in this Section.
5.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

NO SERIAL DATA



VY12K177

CIRCUIT DESCRIPTION

The telematics module monitors the auxiliary serial data circuit 1061 (Green/White wire) normal mode message for the following information: Airbag Deployed this Ignition Cycle from the SRS SDM, Vehicle Speed from the PCM and Audio System status information from the Audio Head Unit. For further information regarding the serial data bus and normal mode message, refer to [Section 1.2 Serial Data Communication](#) in Section 12J BODY CONTROL MODULE in this Service Information.

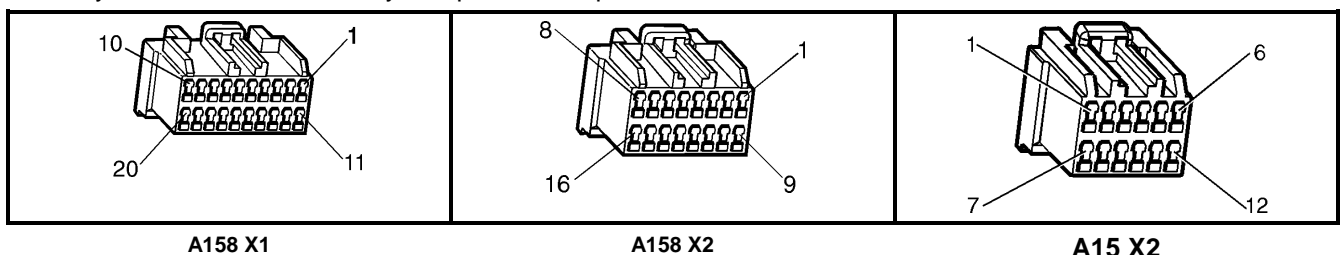
If the telematics module receives a "Remote Unlock" message from the Holden Assist Centre, the telematics module will request the BCM (via the serial data circuit) to unlock the doors. For further information regarding the BCM door lock operation, refer to [Section 12J BODY CONTROL MODULE, Central Door Locking Systems](#) in this Service Information.

If the telematics module receives a "Immobilise" message from the Holden Assist Centre, the telematics module will then turn off the fuel pump relay cutting off the supply of fuel to the engine and request the BCM (via the serial data circuit) to flash the indicators. For further information regarding the BCM indicator operation, refer to [Section 12J BODY CONTROL MODULE, Theft Deterrent System](#) in this Service Information.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test step determines if TECH 2 is able communicate with the BCM. If "No communication with Vehicle" is displayed next to BCM DTC Status, then there is no communication between TECH 2 and the BCM.
3. This test step determines if TECH 2 is able to communicate with other control modules that are on the secondary serial data circuit.
4. This test step checks the voltage at the on the secondary data circuit at the telematics module connector. The voltage should be vary between three to five Volts.
5. If the secondary serial data circuit voltage is steady or greater than five Volts then there is a short to voltage on this circuit.
6. Each control module on the serial data circuit should be disconnected to determine if that module is the cause of the short to voltage.
7. This test step checks the continuity of circuit 1061.
8. This test step checks for an open circuit in the BCM data bus isolator. If the data bus isolator is open then the BCM will have to be replaced.
9. This test step check for a short to ground on circuit 1061. Each control module on the serial data circuit should be disconnected to determine if that module is the cause of the short to ground.
10. This test step check for battery voltage at the telematics module.
11. This test step check for ignition voltage at the telematics module.
12. This test step checks the telematics module ground circuit.
13. This test step confirms that the telematics module connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



NO SERIAL DATA

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 System Select Menu select F5: Vehicle DTC Check, Ignition On and follow screen instructions. 2. Does TECH 2 Display "NO Communication with Vehicle" or "BCM DTC Status, No Data"? NOTE: If "No Data" is displayed next to BCM DTC Status, then there is no communication between TECH 2 and the BCM.		Refer BCM Serial Data Communication diagnostics in Section 12J BCM in this Service Information.	Go to Step 3.
3.	In step 2 did TECH 2 display "No Data" for the all of the following control modules? INS DTC Status No Data. ABS DTC Status No Data. OCC DTC Status No Data. Audio System No Data.		Go to Step 4.	Go to Step 7.
4.	1. Ignition on. 2. Disconnect telematics module connectors A158 X1 and X2. 3. Using a DMM, check the voltage at the telematics module connector A158 X1-4 circuit 1061 (Green/White wire). Is the voltage varying between specified value?	3 – 5 Volts	Go to step 9.	Go to step 5.
5.	In step 4 is voltage steady or above specified value?		Go to step 6.	Go to step 7.
6.	1. Repair for short to voltage in circuit 1061. NOTE: Disconnect each control module connected to circuit 1061 one at a time to isolate the fault in the circuit or to identify the control module causing the fault. Is action complete.		Verify Repair.	Complete Action.
7.	1. Using a DMM, check continuity of circuit 1061(Green/White wire) between the telematics module connector terminal A158 X1-4 and the BCM connector A15 X2-9. Does continuity exist?		Go to Step 8.	Repair open in circuit 1061.
8.	1. Using a DMM, check for continuity through the BCM from circuit 1061 (Green/White wire) to circuit 800 (Red/Black wire) between BCM connector terminals A15 X2-5 and X2-9. Does continuity exist?		Go to Step 9.	Refer Section 12J BCM in this Service Information. Refer test step.
9.	1. Check for short to ground in circuit 1061. NOTE: Disconnect each control module connected to circuit 1061 one at a time to isolate the fault in the circuit or to identify the control module causing the fault. Is circuit 1061 shorted to ground.		Repair short to ground in circuit 1061.	Go to Step 10.
10.	1. Using a DMM, check the voltage at the telematics module terminal A158 X2-16 circuit 740 (Orange/Black wire). Is the voltage at the specified value?	B+	Go to Step 11.	Repair open in circuit 740.

STEP	ACTION	VALUE	YES	NO
11.	1. Ignition On. 2. Using a DMM, check the voltage at the telematics module terminal A158 X2-5 circuit 539 (Pink/Blue wire). Is the voltage at the specified value?	B+	Go to Step 12.	Repair open in circuit 539.
12.	1. Check the integrity of the telematics module ground circuit 851, by performing a voltage drop on circuit 851 (Black/White wire) between telematics module connector, terminal A158 X2-8 and a known good ground. With connector A158 X1 & X2 connected to the telematics module and the ignition on, is voltage less than the specified value?	0.15 Volts	Go to Step 13.	Repair ground circuit as necessary.
13.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

STATUS INDICATOR LEDS DO NOT ILLUMINATE

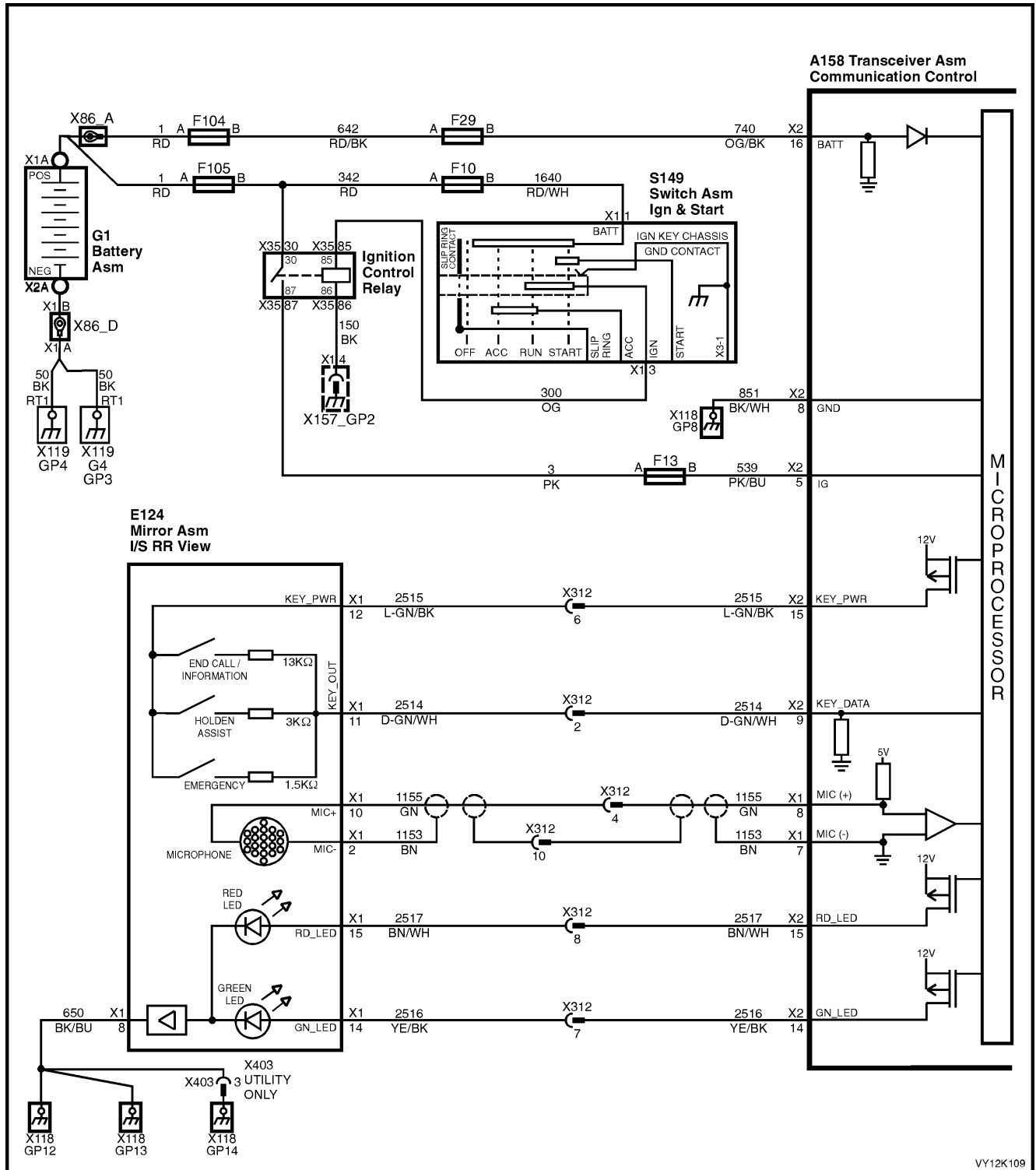


Figure 12K-108

CIRCUIT DESCRIPTION

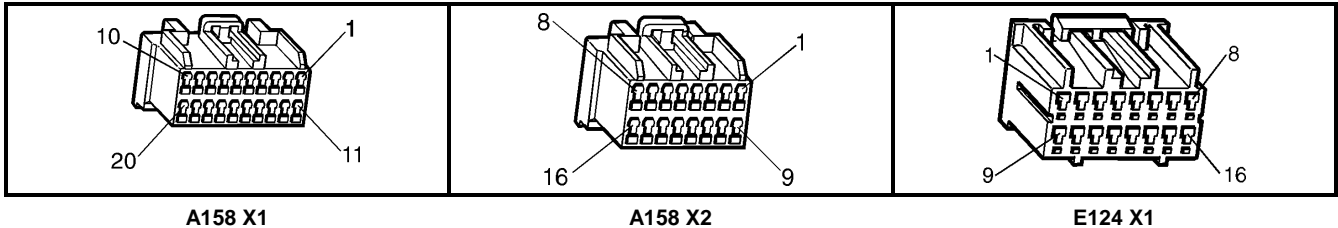
The red and green status indicator LEDs in the interior rear view mirror indicate the current status of the telematics system. The telematics module activates the LEDs by switching a 12 volt power supply to each LED on or off. The brightness of the LEDs is controlled by the interior rear view mirror electronics, which will vary the brightness of the LEDs depending on the ambient light and the ignition switch position. If the ambient light is low the brightness of the LEDs will be decreased when the ignition is on. If the ambient light is high there will be no change to the brightness of the LEDs when the ignition is turned on.

The colour of the LED indicates the status of the system. If there is a system fault during a call the LED will flash red. If there are no system faults, then the LED will flash green.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. If the telematics module is in pre delivery mode then the status LEDs will not illuminate.
3. If TECH 2 is capable of commanding the red status LED on and off the LED and circuit are OK.
4. Checks red status LED supply voltage on circuit 2517 (Brown/White wire).
5. Checks that the telematics module can command the red status LED supply on and off.
6. If TECH 2 is capable of commanding the green status LED on and off the LED and circuit are OK.
7. Checks green status LED supply voltage on circuit 2516 (Yellow/Black).
8. Checks that the telematics module can command the green status LED supply on and off.
9. Checks integrity of the interior rear view mirror ground circuit 156.
10. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



STATUS INDICATOR LEDS DO NOT ILLUMINATE

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs. 2. Scroll to Operating Mode. Does TECH 2 display Operating Mode "Active"?		Go to Step 3.	Program the Telematics into Active Mode. Refer F4: Program/ Operating Mode in this Section.
3.	1. From the TECH 2 Telematics Application Menu, Select F3: Miscellaneous Tests / F1: Red Status LED. 2. Command the LED on and off. Did the Red Status LED turn on?		Red status LED is OK. Go to Step 6.	Go to Step 4.
4.	1. Using a DMM, check the voltage at the rear view mirror connector terminal E124 X1-15 circuit 2517 (Brown/White wire). 2. Command the red LED on, as in step 2. Is voltage as specified?	12 Volts	Go to Step 9.	Go to Step 5.
5.	1. Using a DMM, check the voltage at the telematics module connector terminal E124 X1-15 circuit 2517 (Brown/White wire). 2. Command the red LED on, as in Step 2. Is voltage as specified?	12 Volts	Repair open circuit 2517.	Go to Step 10.
6.	1. From the Telematics Application Menu, Select F3: Miscellaneous Tests / F2: Green Status LED. 2. Command the green LED on and off. Did the Green Status LED turn off and on?		Green status LED is OK.	Go to Step 7.

STEP	ACTION	VALUE	YES	NO
7.	1. Using a DMM, check the voltage at the rear view mirror connector terminal E124 X1-14 circuit 2516 (Yellow/Black wire). 2. Command the green LED on, as in Step 5. Is voltage as specified?	12 Volts	Go to Step 9	Go to Step 8.
8.	1. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-14 circuit 2516 (Yellow/Black wire). 2. Command the green LED on, as in step 5. Is voltage as specified?	12 Volts	Repair open circuit 2516.	Go to Step 10.
9.	1. Using a DMM, measure the continuity of circuit 650 (Black/Blue wire) between the rear view mirror connector terminal E124 X1-8 and a known good ground. Is there continuity?	Less than 1 Ohm.	Replace rear view Mirror. Refer 3.4 Interior Rear View Mirror in this Section.	Repair open circuit 650 between the rear view mirror E124 connector and ground X118_GP13.
10.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

VEHICLE BATTERY VOLTAGE

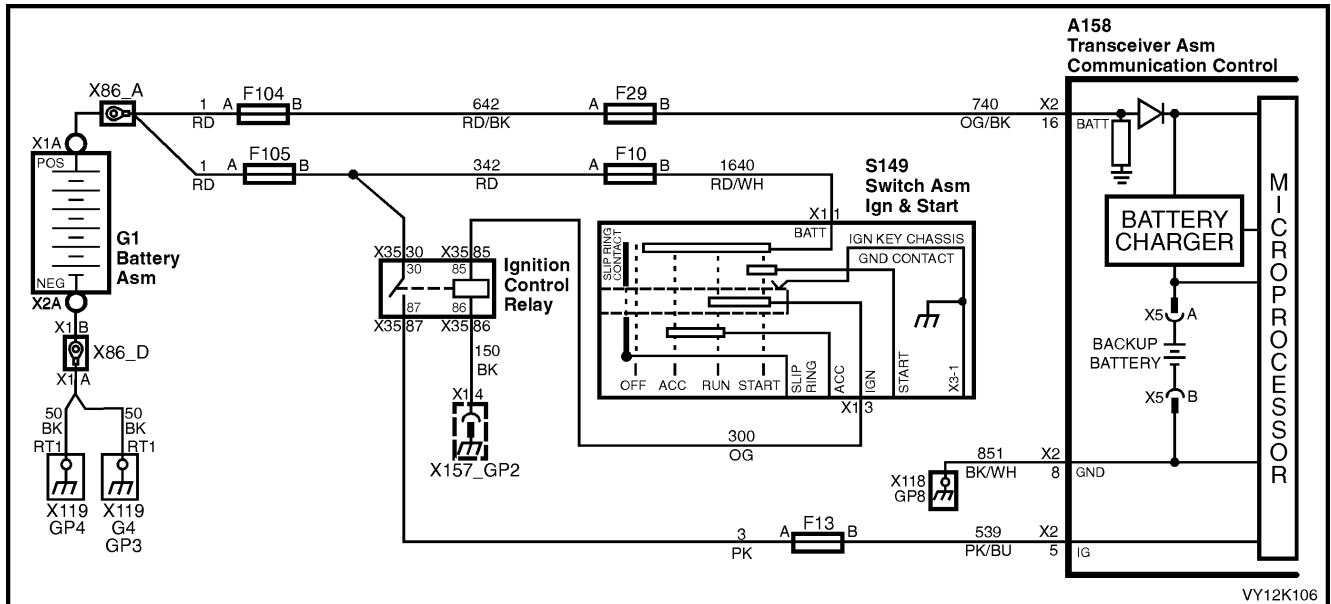


Figure 12K-109

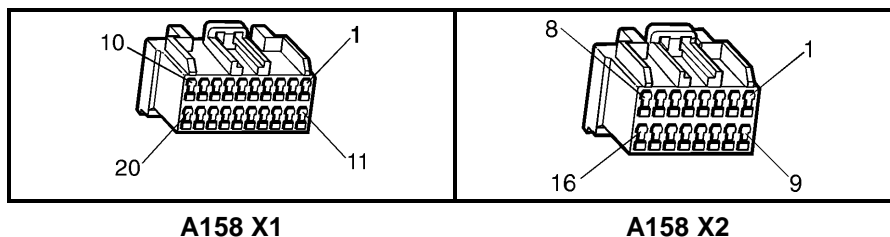
CIRCUIT DESCRIPTION

Battery voltage is applied to the telematics module terminal X2-16 at all times via circuit 740 (Orange/Black wire), fuse F29 and fusible link F104. If the battery voltage fails below a preset voltage for longer than 30 minutes, the telematics module will transmit a Low Battery Alert to the Holden Assist Centre. Refer [2.2 ALERTS, Low Battery Voltage Alert](#) in this Section for further information. If the battery is removed the telematics module will transmit a Battery Removal Alert to the Holden Assist Centre. Refer [2.2 ALERTS, Battery Removal Alert](#) in this Section for further information.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. Checks the open circuit voltage of the vehicle battery.
3. The displayed battery voltage should be within 0.5 Volts of the battery open circuit voltage in step 2.
4. This test step measures that actual voltage at the telematics module connector A158 X2-16.
5. This test step checks the continuity of circuit 740.
6. This test step checks the continuity of circuit 1151.
7. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



A158 X1

A158 X2

VEHICLE BATTERY VOLTAGE

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Using a DMM measure the vehicle battery voltage. Refer SECTION 12A BATTERY AND CABLES, 3. DIAGNOSIS in this Service Information. Is the vehicle battery open circuit voltage as specified?	Greater than 12.4 Volts.	Go to Step 3	Refer 12A BATTERY AND CABLES, 3. DIAGNOSIS in this Service Information
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Input and Outputs. 2. Scroll to Battery Voltage. Is the voltage as specified?	B+	Vehicle battery voltage OK.	Go to Step 4.
4.	1. Using a DMM measure the voltage at the telematics module connector terminal A158 X2-16 circuit 740 (Orange/Black wire) and a known good ground. Is the voltage as specified?	B+	Go to Step 6.	Go to Step 5.
5.	1. Using a DMM measure the resistance of circuit 740 (Orange/Black wire) between fuse F29 and terminal A158 X2-16 of the telematics module connector. Is resistance as specified?	Less than 1 Ohm.	Go to Step 6.	Repair cause of high resistance in circuit 740.
6.	1. Using a DMM measure the resistance of circuit 851 (Black/white wire) between telematics module connector terminal A158 X2-8 and a known good ground. Is resistance as specified?	Less than 1 Ohm.	Go to Step 7.	Repair cause of high resistance in circuit 851.
7.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

BACKUP BATTERY

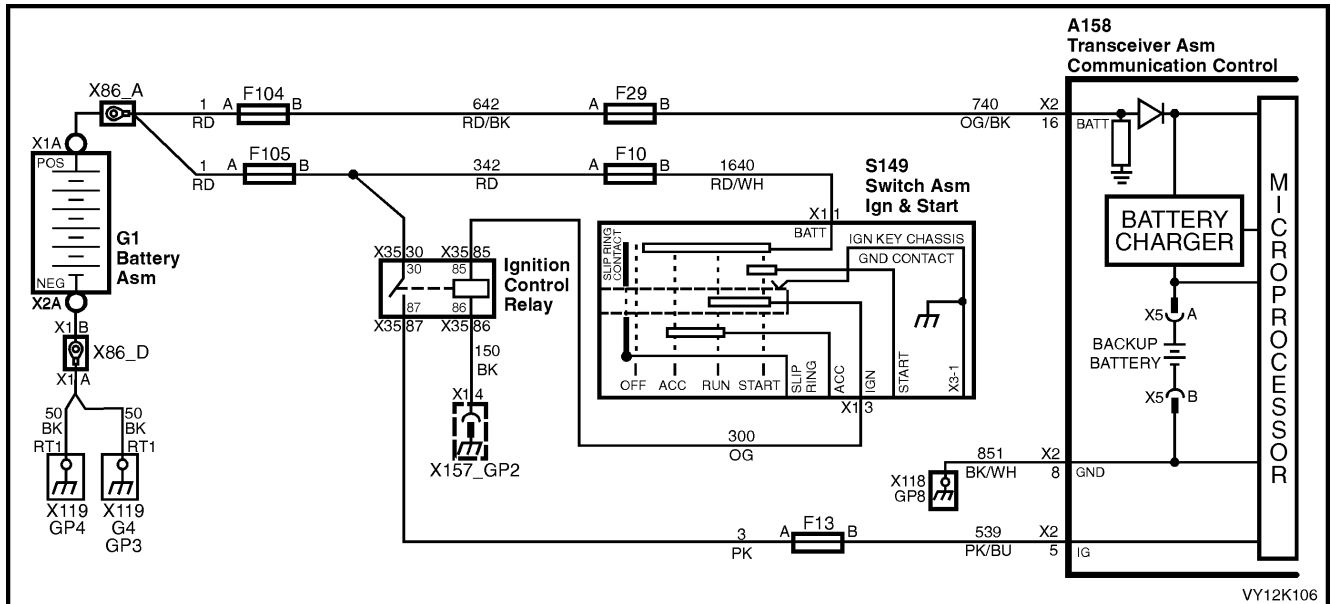


Figure 12K-110

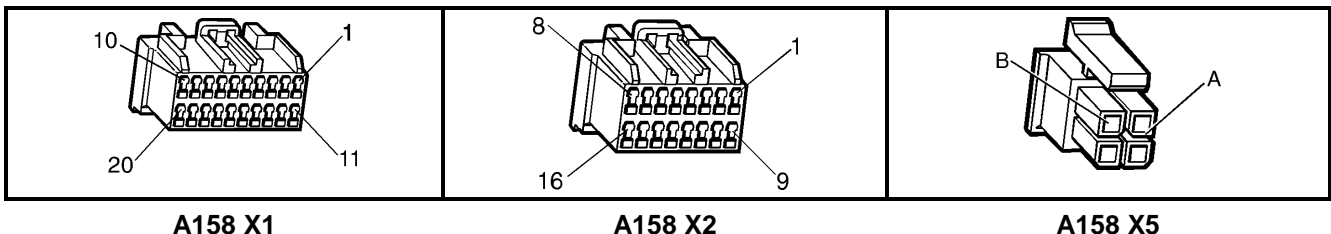
CIRCUIT DESCRIPTION

The backup battery (1) is housed in the battery compartment of the telematics module. The backup battery will provide power to the telematics module for at least 30 minutes in the event of the vehicle battery being discharged or disconnected. The telematics module has a backup battery charging circuit that maintains the backup battery state of charge. This circuit also includes an over current protection device.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. Check vehicle battery voltage. If the vehicle battery voltage the actual vehicle battery voltage should be checked.
3. Checks backup battery voltage via TECH 2.
4. Checks battery charger status via TECH 2. The backup battery charger should be able to be switched from "Active" to "Inactive".
5. Checks that the backup battery charger is functioning, the backup battery should display active when the ignition is on and the backup battery voltage is less than 7.5 Volts.
6. Checks backup battery voltage using TECH 2.
7. Checks the actual backup battery terminal voltage using a DMM.
8. This test step confirms that the back up battery connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.
9. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



BACKUP BATTERY

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F1: Data Display/F0: Input and Outputs. 2. Scroll to Battery Voltage. Is the Battery Voltage as specified?	Greater than 12.4 Volts.	Go to Step 3.	Refer to Vehicle Battery Voltage Diagnostic chart in this Section.
3.	1. Scroll to Backup Battery Voltage. Is the backup battery voltage as specified?	Greater than 7.5 Volts.	Go to Step 4.	Go to Step 7.
4.	1. From the Telematics Application Menu, Select F2: Miscellaneous Tests \ F5: Backup Battery Charger. 2. Carry out a Backup Battery Charger test. Does Backup Battery Charger switch from "Active" to "Inactive" when commanded?		Go to Step 6.	Go to Step 5.
5.	1. Start engine and increase the engine speed to 2000 RPM. Does Backup Battery Charger display "Active"?		Go to Step 6.	Go to Step 7.
6.	1. Scroll to Backup Battery Voltage. Turn ignition On engine off. Is backup battery voltage within specified limits?	Greater than 7.5 Volts.	Backup battery and charging circuit OK.	Go to Step 7.
7.	1. Remove the telematics module refer 3.1 TELEMATICS MODULE. 2. Remove the telematics module backup battery refer 3.2 BACKUP BATTERY. 3. Using a DMM measure the backup battery voltage at the backup battery connector terminal A158 X5-A and X5-B. Is the voltage as specified?	Greater than 7.5 Volts.	Go to step 9.	Go to Step 8.
8.	1. Check terminal retention of the telematics module backup battery connectors terminals A158 X5-A and X5-B.YB55. Is the terminal retention OK?		Replace backup battery. Refer 3.2 Backup Battery in this Section.	Repair connector terminal retention.
9.	1. Check telematics module connector A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

NO GPS SIGNAL

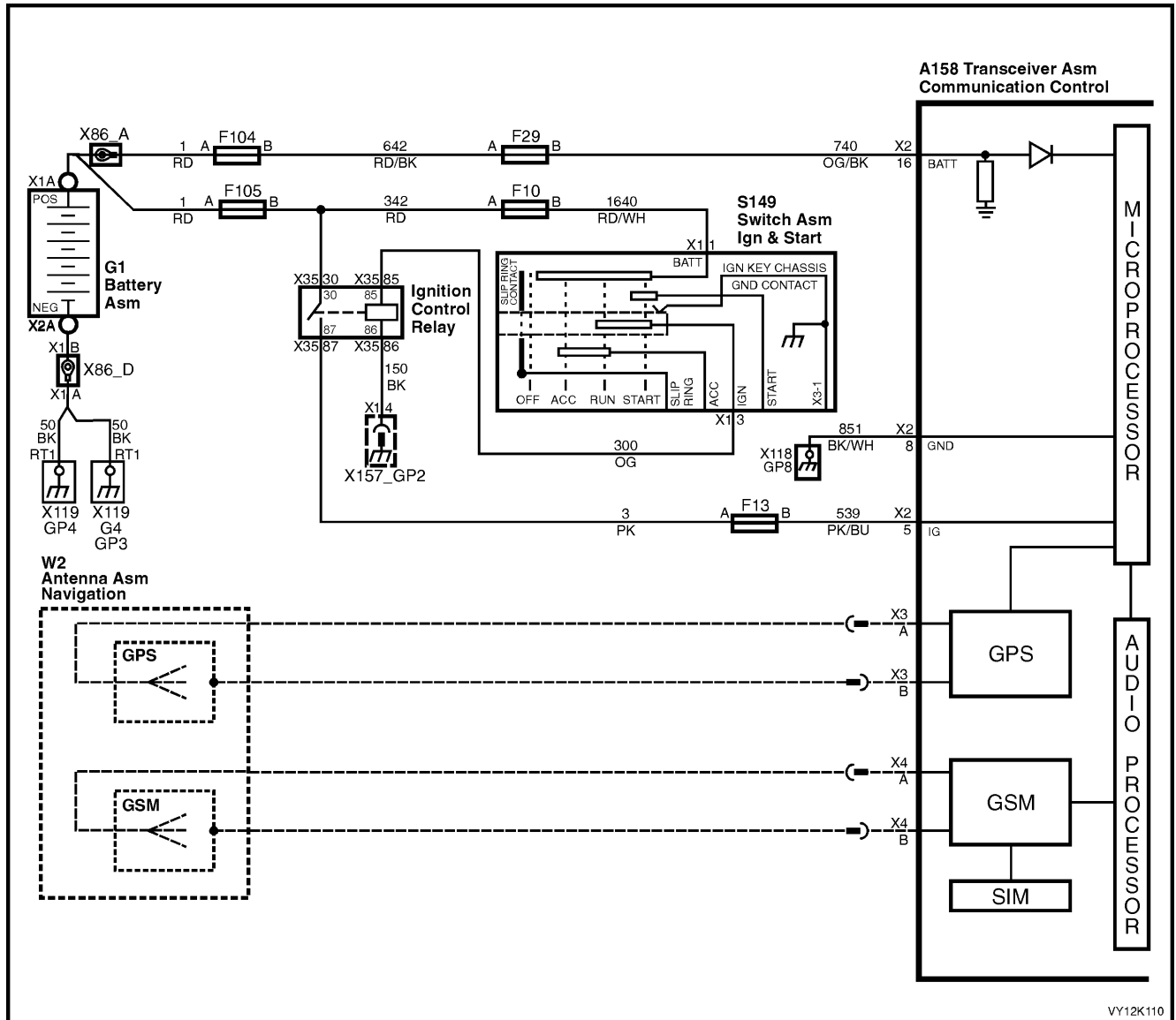


Figure 12K-111

CIRCUIT DESCRIPTION

The telematics antenna contains both the GPS and GSM antennas in one unit, and is located under the instrument panel. The antenna has two leads, one for the GPS antenna and the other for the GSM antenna. The GPS antenna receives signals from satellites orbiting the earth and transmits these to the telematics module to determine the vehicle's position. Signals from at least three GPS satellites must be received to accurately determine the vehicle's two dimensional (2D) position. Signals from at least four GPS satellites must be received to accurately determine the vehicle's three dimensional (3D) position. If signals from only three satellites are received, the telematics module cannot determine the vehicle's altitude. The GPS antenna must not be obscured by any objects, such as underground car parks, tunnels, bridges or buildings, any of these may affect GPS reception. The GPS antenna is connected to the telematics module by a push on type connector. To determine the vehicle's position this GPS information is transmitted via SMS to the Holden Assist Centre whenever a call is made to the Holden Assist Centre. The Holden Assist Centre is also able to track the vehicle using this GPS information.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

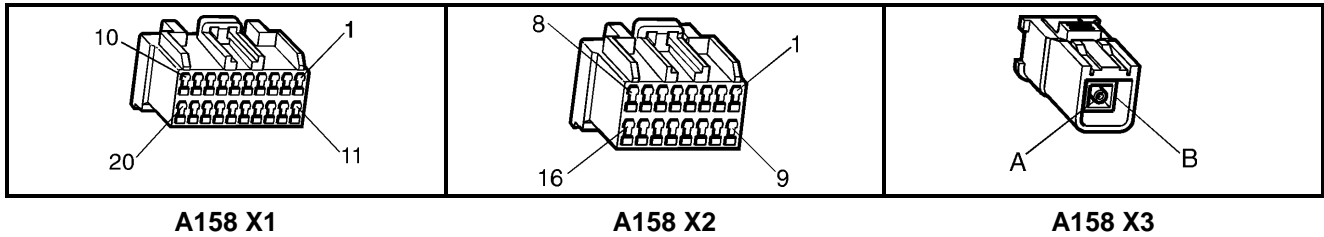
1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. The GPS module should be active at all times.
3. The position of the vehicle will affect the GPS signal. The vehicle should be moved to a location where there is an unobstructed view of the sky. There may be times during the day that there are actually no satellites visible. If possible the GPS information should be confirmed with a know good vehicle. If the Time of Last Known GPS Fix data list parameter is incrementing, then the telematics module is receiving information from GPS satellites.

NOTE: Aftermarket window tinting may also affect the antenna operation.

4. Installing a known good antenna will confirm if the problem is being caused by the telematics antenna or the telematics module.

NOTE: It may take at lease 120 minutes to obtain a GPS fix.

5. This test step confirms that the antenna is causing the problem, before it is replaced.
6. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



NO GPS SIGNAL

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F1: Data Display/F1: Global Positioning System. 2. Scroll to GPS Module. Does TECH 2 display GPS Module "Active"?		Go to Step 3.	Go to Step 6.
3.	1. Scroll to Time of Last Known GPS Fix. Is the Time of Last Known GPS Fix display incrementing?		GPS Antenna OK.	Go to Step 4.
4.	1. Check telematics module GPS antenna connector A158 X3 for correct installation and terminal retention. Is the GPS antenna installation and terminal retention OK?		Go to Step 5.	Repair connector installation or terminal retention.
5.	1. Temporally install a known good GPS antenna. 2. Scroll to Time of Last Known GPS Fix. NOTE: It may take at lease 120 minutes to obtain a GPS fix. Is the Time of Last Known GPS Fix display incrementing?		Replace telematics antenna. Refer 3.4 Telematics Antenna in this Section.	Go to Step 6.
6.	1. Check telematics module connectors A158 X1 & X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

NO GSM SIGNAL

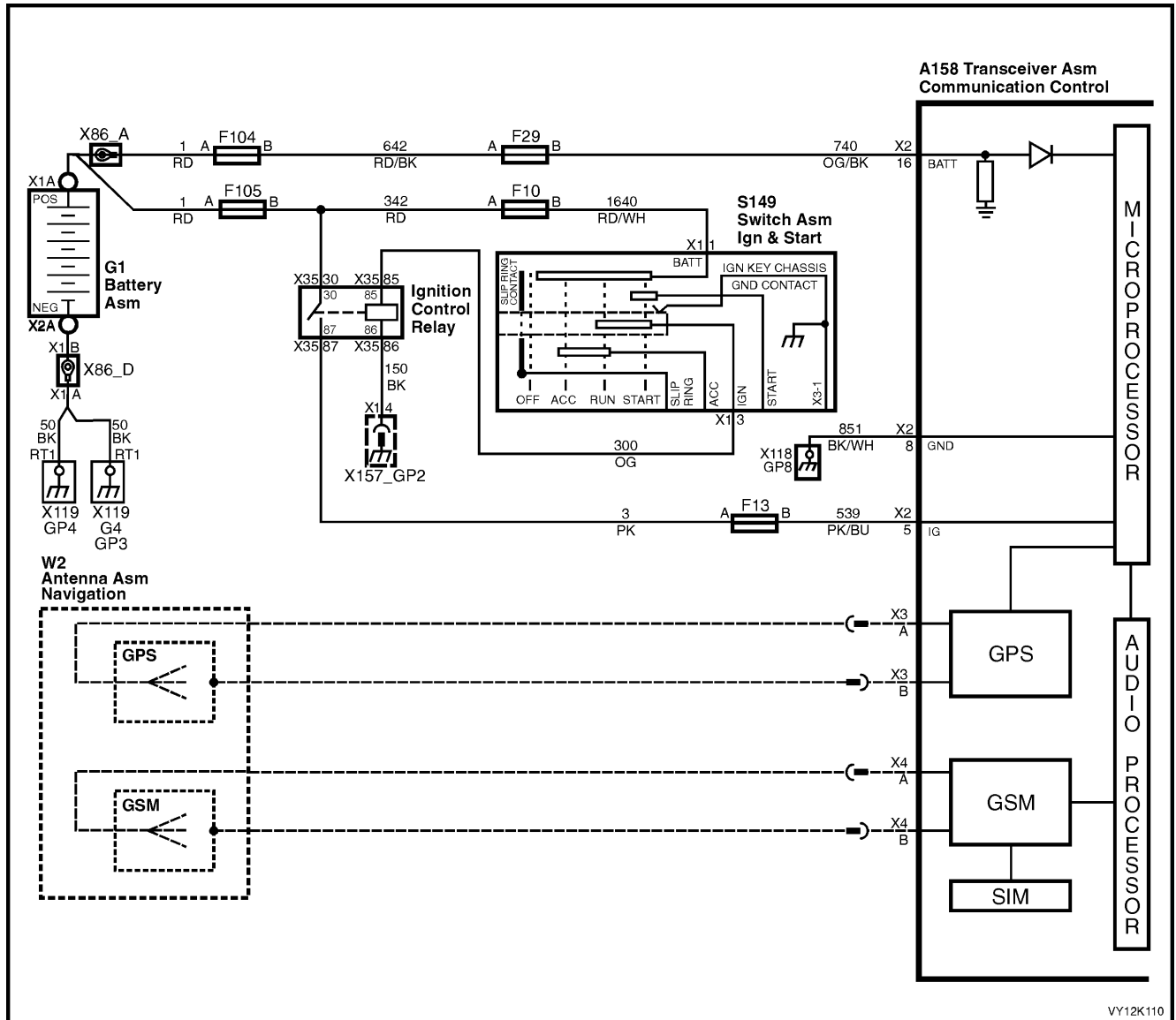


Figure 12K-112

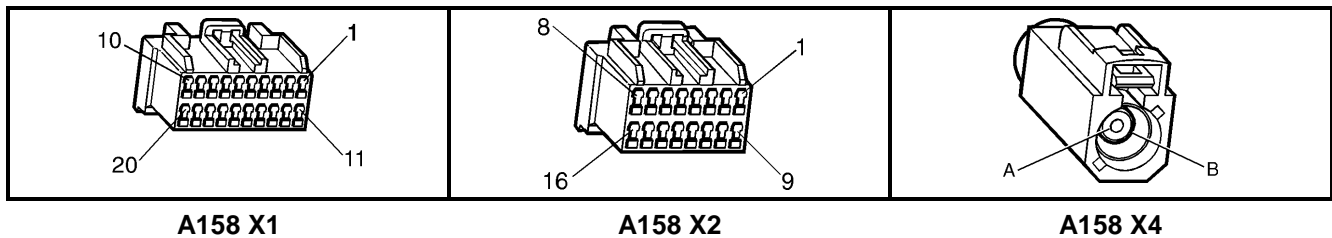
CIRCUIT DESCRIPTION

The telematics antenna contains both the GPS and GSM antennas in one unit, and is under the instrument panel. The antenna has two leads, one for the GPS antenna and the other for the GSM antenna. The GSM antenna is capable of transmitting and receiving both voice and data signals via the GSM network. The telematics module uses the GSM network to transmit and receive voice and data. Signal strength may be affected in locations like basement car parks or tunnels. However, in most cases, as the vehicle emerges from the obstruction or re-enters the digital phone network area the signal will be available again and any stored data will be transmitted. The GSM antenna is connected to the telematics module by a push on type connector.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. The GSM module should be active at all times.
3. If there is no GSM signal then either the telematics antenna or telematics module are faulty. The GSM signal strength can vary from -113 (poor Signal) to -50 dBm (good signal), as low signal strength could cause call dropout. The vehicle should be moved to a location that has a better GSM signal and the signal strength checked again.
3. The GSM antenna connector should be checked to ensure the connector is correctly installed and the terminal retention is OK.
4. Once the antenna is replaced and the signal strength still displays "No Signal" or "Invalid" the telematics module is faulty.
5. This test step confirms that the connector terminal retention is OK. Terminal retention should always be checked before any component is replaced.



NO GSM SIGNAL

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F1: Data Display/F2: GSM. 2. Scroll to GSM Module. Does TECH 2 display GSM Module "Active"?		Go to Step 3.	Go to Step 6.
3.	1. Scroll to GSM Signal Strength. Does TECH 2 display GSM Signal Strength "No Signal" or "Invalid"?		Go to Step 4.	GSM Antenna OK.
4.	1. Check telematics module GPS antenna connector A158 X4 for correct installation and terminal retention. Is the GSM antenna connector installation and terminal tension OK?		Go to Step 5.	Repair connector installation or terminal retention.
5.	1. Replace Telematics Antenna. Does TECH 2 display GSM Signal Strength "No Signal" or "Invalid"?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	GSM Antenna OK.
6.	1. Check telematics module GSM antenna connector A158 X4 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

EMERGENCY BUTTON

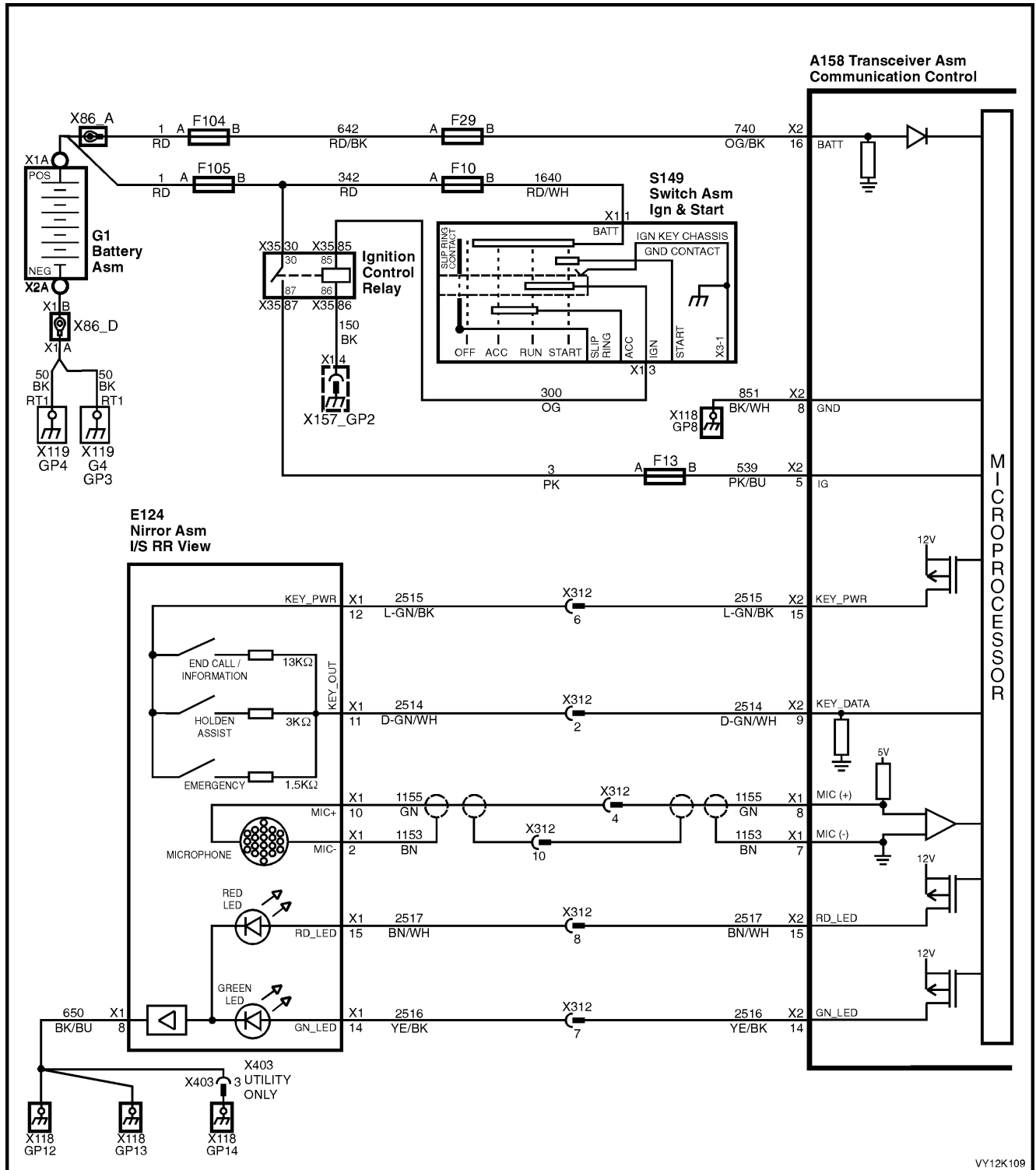


Figure 12K-113

CIRCUIT DESCRIPTION

When the emergency button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 3.8 Volts, the telematics module determines this voltage at terminal X2-9 as an emergency button press. The telematics module will initiate a voice call to an operator at the National Emergency Response Centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

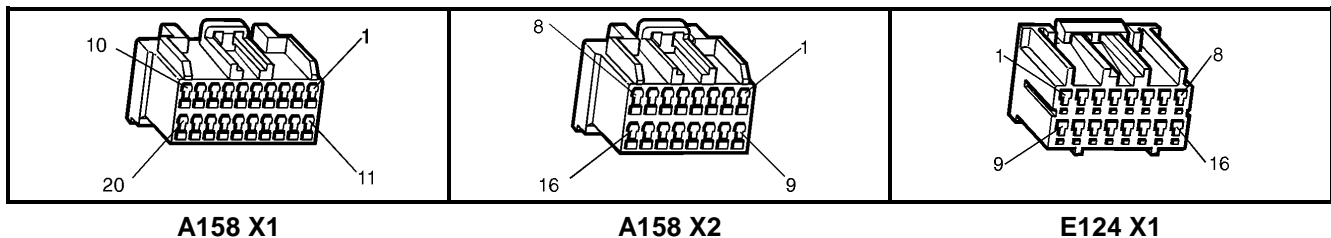
If the emergency button is pressed while a Holden Assist call is in progress then the status of the call shall be upgraded to an emergency call, and the telematics module will not be permitted to terminate the call by pressing the "end call / information" button.

If the emergency button is pressed while the vehicle is outside GSM network range, the telematics module will enter "Emergency Call Mode" where by the emergency call request will be retained. When contact is re-established with the GSM network, the emergency call will be placed immediately.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. Confirms that the telematics module is powering up the keypad.
3. Confirms that the telematics module has commanded the keypad supply voltage on.
4. The keypad signal voltage should display 0.0 Volts when there is no key being pressed.
5. Service mode should be enabled so that the telematics module does not call NERC™ when the emergency button is pressed. The service mode should be enable until this diagnostic chart is completed.
6. When circuits 2414 and 2415 are jumped together TECH 2 should display a keypad signal voltage of 12.0 Volts.
7. This test step confirms that the telematics module is supplying battery voltage to circuit 2515 at the telematics module connector A158 X2-15.
8. This test step confirms that the telematics module is supplying battery voltage to circuit 2515 at the telematics rear view mirror connector E124 X1-12.
9. This test step check that the rear view mirror ground is OK
10. This test step check the complete emergency button and circuits.
11. This test step check the resistance of the rear view mirror emergency button.
12. This test step confirms that the rear view mirror connector E124 X1 terminal retention is OK. Terminal retention should always be checked before any component is replaced.
13. This test step confirms that the telematics module connectors A158 X1 and X2 terminal retention is OK. Terminal retention should always be checked before any component is replaced.



EMERGENCY BUTTON

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Ignition On. Does the keypad back lighting illuminate.		Go to Step 5.	Go to Step 3.
3.	1. From the TECH 2 Telematics Application Menu, Select F1: Data display/F0: Inputs and Outputs. 2. Scroll to Keypad Supply Voltage. Does TECH 2 display Keypad Supply Voltage "On"?		Go to Step 4.	Go to Step 13.
4.	1. From the TECH 2 Telematics Application Menu, Select F1: Data Display / F0: Data List. 2. Scroll to Keypad Signal Voltage. Does TECH 2 display the specified Keypad Signal Voltage?	0.0 Volts.	Go to step 5.	Go to Step 6.
5.	1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). 2. Press the emergency button. Does TECH 2 display the specified Keypad Signal Voltage?	3.8 Volts.	Emergency Button OK. Check for intermittent open or short to voltage or ground in circuit 2514.	Go to Step 6.

STEP	ACTION	VALUE	YES	NO
6.	1. Disconnect the rear view mirror connector E124 X-1. 2. Ignition on. Jumper the rear view mirror connectors E124 X1-11 (Green/White wire) circuit 2514 and terminal E124 X1-12 (Light Green/Black wire) circuit 2515 together. Does TECH 2 display the specified Keypad Signal voltage?	12.0 Volts.	Go to Step 11.	Go to Step 7.
7.	1. Ignition on. Using a DMM measure the voltage at the telematics module connector terminal A158 X2-15 circuit 2515 (Light Green/Black wire) and a known good ground. Is the voltage as specified?	B+	Go to Step 8.	Go to Step 13.
8.	1. Disconnect the rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM measure the voltage between circuit 2515 (Light Green/Black wire) of the rear view mirror connector E124 X1-12 and a known good ground. Is the voltage as specified?	B+	Go to Step 9.	Repair open in circuit 2515.
9.	1. Disconnect the battery negative terminal. 2. Disconnect the rear view mirror connector E124 X1. 3. Using a DMM measure the resistance of circuit 650 (Black/Blue wire) between the rear view mirror connector terminal E124 X1-8 and a known good ground. Is the resistance as specified?	Less than 1 Ohm.	Go to Step 10.	Repair open in circuit 650.
10.	1. Reconnect the interior rear view mirror connector YB186 and disconnect the telematics module connectors A158 X1 and X2. 2. Using a DMM measure the resistance between the telematics module connector terminal A158 X2-15 circuit 2515 (Light Green/Black wire) and terminal A158 x2-9 circuit 2414 (Green/White wire). Is the resistance as specified when the Emergency Button is pressed?	1.5 K Ohms.	Go to Step 13.	Go to Step 11.
11.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Using a DMM measure the resistance between the interior rear view mirror terminals X1-12 and terminal X1-11 of the interior rear view mirror. Is the resistance as specified when the Emergency Button is pressed?	1.5 K Ohms.	Repair open in circuit 2514.	Replace interior rear view mirror Refer 3.1 Interior Rear View Mirror in this Section..
12.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace interior rear view mirror Refer 3.1 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
13.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

HOLDEN ASSIST BUTTON

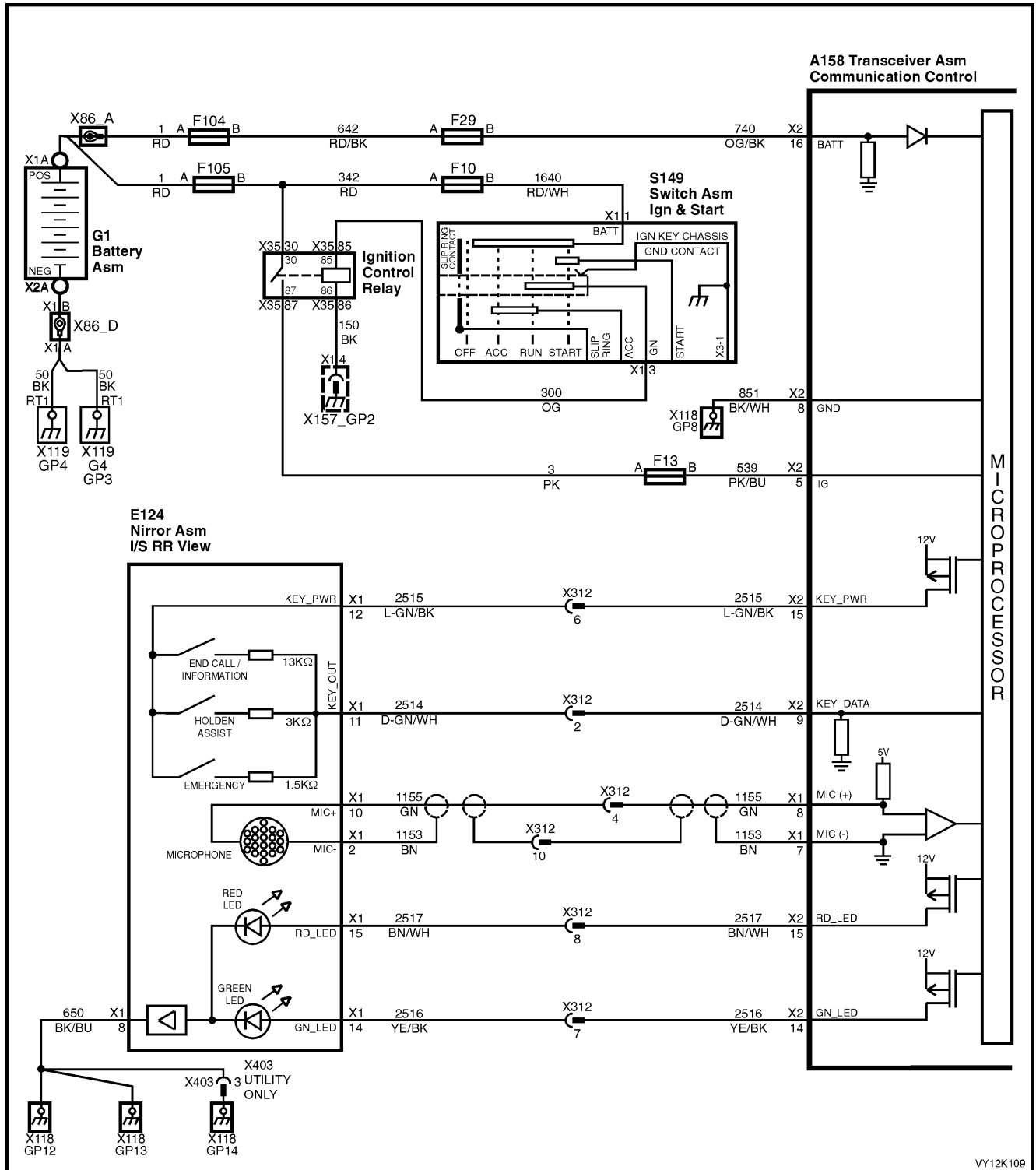


Figure 12K-114

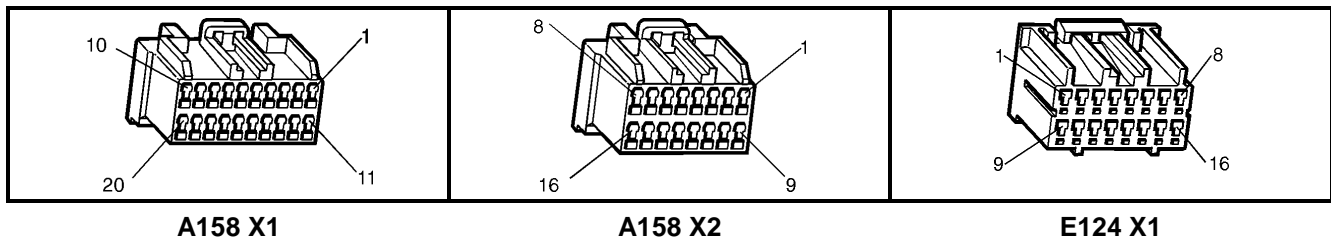
CIRCUIT DESCRIPTION

When the Holden Assist button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 2.3 Volts, the telematics module determines this voltage at terminal X2-9 as an Holden Assist Button press. The telematics module will initiate a voice call to the call centre and then send an SMS message containing status and location data. If the call can not be connected, the telematics module will immediately re-attempt to connect the call a second time. If the second attempt also fails, the unit shall wait for 60 seconds and make a third and final attempt.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. Confirms that the telematics module is powering up the keypad.
3. Confirms that the telematics module has commanded the keypad supply voltage on.
4. The keypad signal should display on whenever the telematics module is in active mode.
5. The GSM antenna should be enabled during this test so that the telematics module does not call Holden Assist when the Holden Assist button is pressed. The GSM antenna should remain disconnected until this diagnostic chart is completed.
6. When circuits 2414 and 2415 are jumped together TECH 2 should display a keypad signal voltage of 12.0 Volts.
7. This test step confirms that the telematics module is supplying battery voltage to circuit 2515 at the telematics module connector A158 X2-15.
8. This test step confirms that the telematics module is supplying battery voltage to circuit 2515 at the telematics rear view mirror connector E124 X1-12.
9. This test step check that the rear view mirror ground circuit 650 is OK
10. This test step check the complete Holden Assist button and circuits.
11. This test step check the resistance of the rear view mirror Holden Assist button.
12. This test step confirms that the rear view mirror connector E124 X1 terminal retention is OK. Terminal retention should always be checked before any component is replaced.
13. This test step confirms that the telematics module connectors A158 X1 and X2 terminal retention is OK. Terminal retention should always be checked before any component is replaced.



HOLDEN ASSIST BUTTON

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Go Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Ignition On. Does the keypad back lighting illuminate.		Go to Step 5.	Go to Step 3.
3.	1. From the TECH 2 Telematics Application Menu, Select F1: Data Display/F0: Inputs and Outputs. 2. Scroll to Keypad Supply Voltage. Does TECH 2 display Keypad Supply voltage "On"?		Go to Step 4.	Go to Step 13.
4.	1. From the Telematics Application Menu, Select F1: Data Display/F0: Inputs and Outputs. 2. Scroll to Keypad Signal Voltage. Does TECH 2 display the specified Keypad Signal voltage?	0.0 Volts.	Go to step 5.	Go to Step 6.
5.	1. Disconnect the GSM Antenna. (The GSM Antenna should remain disconnected until this diagnostics chart is completed). 2. Press the Holden Assist button. Does TECH 2 display the specified Keypad Signal Voltage?	2.3 Volts.	Holden Assist Button OK. Check for intermittent open short to voltage or grounding in circuit 2514.	Go to Step 6.

STEP	ACTION	VALUE	YES	NO
6.	1. Disconnect the rear view mirror connector E124 X1. 2. Ignition on. 3. Jumper the interior rear view mirror connector terminals E124 X1-11 (Green/White wire) circuit 2514 and terminal E124 X1-12 (Light Green/Black wire) circuit 2515 together. Does TECH 2 display the specified Keypad Signal Voltage?	12.0 Volts.	Go to Step 11.	Go to Step 7.
7.	1. Ignition on. 2. Using a DMM measure the voltage at the telematics module connector terminal A158 X2-15 circuit 2515 (Light Green/Black wire) and a known good ground. Is the voltage as specified?	B+	Go to Step 8.	Go to Step 13.
8.	1. Disconnect the rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM measure the voltage between circuit 2515 (Light Green/Black wire) of the interior rear view mirror connector terminal E124 X1-12 and a known good ground. Is the voltage as specified?	B+	Go to Step 9.	Repair open in circuit 2515.
9.	1. Disconnect the battery negative terminal. 2. Disconnect the rear view mirror connector E124 X1. 3. Using a DMM measure the resistance of circuit 650 (Black/Blue wire) between the rear view mirror connector E124 X1-8 and a known good ground. Is the resistance as specified?	Less than 1 Ohm.	Go to Step 10.	Repair open in circuit 650.
10.	1. Reconnect the rear view mirror connector E124 X1 and disconnect the telematics module connectors A158 X1 and X2. Using a DMM measure the resistance between the telematics module connector terminal A158 X2-15 circuit 2515 (Light Green/Black wire) and terminal X2-9 circuit 2414 (Green/White wire). Is the resistance as specified when the Holden Assist Button is pressed?	3 K Ohms.	Go to Step 13.	Go to Step 11.
11.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Using a DMM measure the resistance between the interior rear view mirror terminals X1-12 and terminal X1-11 of the rear view mirror. Is the resistance as specified when the Holden Assist Button is pressed?	3 K Ohms.	Repair open in circuit 2514.	Replace interior rear view mirror Refer 3.1 Interior Rear View Mirror in this Section.
12.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace interior rear view mirror Refer 3.1 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
13.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

END CALL / INFORMATION BUTTON

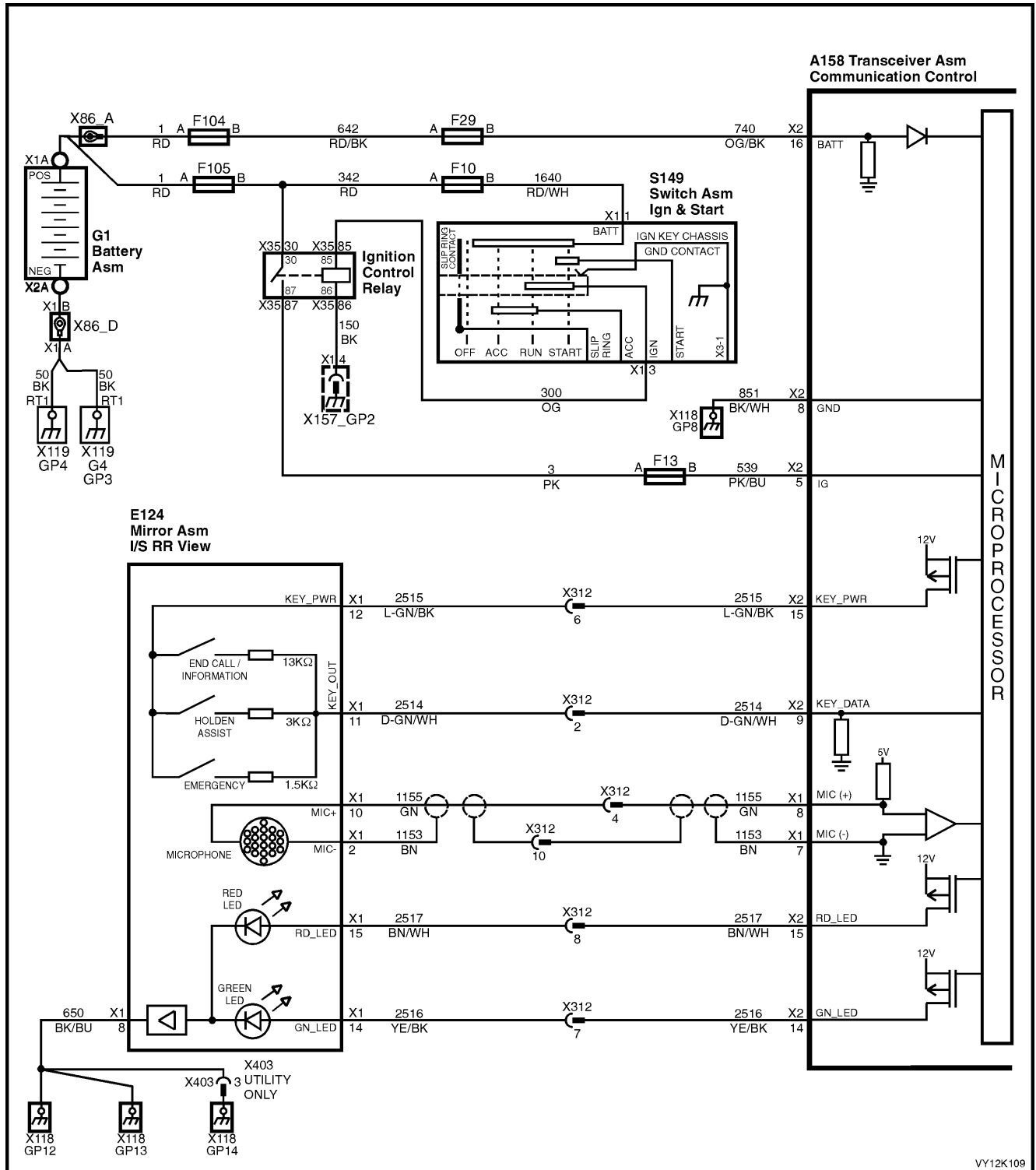


Figure 12K-115

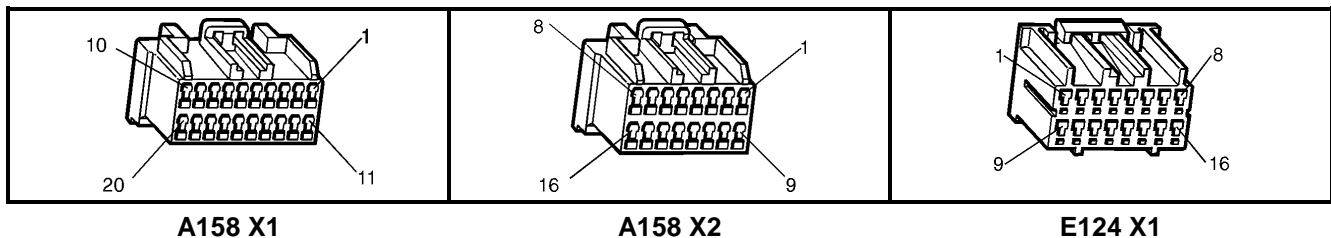
CIRCUIT DESCRIPTION

When the end call / information button is pressed, the voltage at terminal X2-9 of the telematics module will be approximately 0.7 Volts. The telematics module determines this voltage at terminal X2-9 as an end call / information button press. If end call / information button is pressed to make a call, you will be connected to Holden Assist information services. Pressing this button while a call is connected will disconnect the call. It however will not disconnect a call while the call is ringing the information service number or the Holden Assist number. It is not possible for this button to disconnect an emergency call or a Holden Assist call that has been upgraded to emergency call status.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. Confirms that the telematics module is powering up the keypad.
3. Confirms that the telematics module has commanded the keypad supply voltage on.
4. The keypad signal should display on whenever the telematics module is in active mode.
5. Service mode should be enabled so that the telematics module does not make call when the end call / information button is pressed. The service mode should be enable until this diagnostic chart is completed.
6. When circuits 2414 and 2415 are jumped together TECH 2 should display a keypad signal voltage of 12.0 Volts.
7. This test step confirms that the telematics module is supplying battery voltage to circuit 2515 at the telematics module connector A158 X2-15.
8. This test step confirms that the telematics module is supplying battery voltage to circuit 2515 at the telematics rear view mirror connector E124 X1-12.
9. This test step check that the rear view mirror ground is OK
10. This test step checks the complete end call / information button and circuits.
11. This test step checks the resistance of the rear view mirror end call / information button.
12. This test step confirms that the rear view mirror connector E124 X1 terminal retention is OK. Terminal retention should always be checked before any component is replaced.
13. This test step confirms that the telematics module connectors A158 X1 and X2 terminal retention is OK. Terminal retention should always be checked before any component is replaced.



END CALL / INFORMATION BUTTON

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	Ignition On. Does the keypad back lighting illuminate.		Go to Step 5.	Go to Step 3.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs. 2. Scroll to Keypad Supply Voltage. Does TECH 2 display "Keypad Supply Voltage On"?		Go to Step 4.	Go to Step 13.
4.	1. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs. 2. Scroll to Keypad Signal Voltage. Does TECH 2 display the specified "Keypad Signal Voltage"?	0.0 Volts.	Go to step 5.	Go to step 6.
5.	1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). 2. Press the end call / information button. Does TECH 2 display the specified Keypad Signal voltage?	0.7 Volts.	End Call / Information Button OK. Check for intermittent in circuit 2514.	Go to step 6.

STEP	ACTION	VALUE	YES	NO
6.	Disconnect the rear view mirror connector E124 X1. 1. Ignition on. 2. Jumper the interior rear view mirror connector terminals E124 X1-11 (Dark Green/White wire) circuit 2514 and terminal E124 X1-12 (Light Green/Black wire) circuit 2515. Does TECH 2 display the specified Keypad Signal Voltage?	12.0 Volts.	Go to Step 11.	Go to Step 7.
7.	1. Ignition on. 2. Using a DMM measure the voltage at the telematics module connector terminal A158 X2-15 circuit 2515 (Light Green/Black wire) and a known good ground. Is the Voltage as specified?	B+	Go to Step 8.	Go to Step 13.
8.	1. Disconnect the rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM measure the voltage between circuit 2515 (Light Green/Black wire) of the interior rear view mirror connector terminal E124 X1-12 and a known good ground. Is the Voltage as specified?	B+	Go to Step 9.	Repair open in circuit 2515.
9.	1. Disconnect the battery negative terminal. 2. Disconnect the rear view mirror connector E124 X1. 3. Using a DMM measure the resistance of circuit 650 (Black/Blue wire) between the rear view mirror connector E124 X1-8 and a known good ground. Is the resistance as specified?	Less than 1 Ohm.	Go to Step 10.	Repair open in circuit 156.
10.	1. Reconnect the rear view mirror connector E124 X1 and disconnect the telematics module connectors A158 X1 and X2. 2. Using a DMM measure the resistance between the telematics module connector terminal A158 X2-15 circuit 2515 (Light Green/Black wire) and terminal X2-9 circuit 2414 (Green/White wire). Is the resistance as specified when the End Call / Information Button is pressed?	13 K Ohms.	Go to Step 13.	Go to Step 11.
11.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Using a DMM measure the resistance between the interior rear view mirror terminals X1-12 and terminal X1-11 of the rear view mirror. Is the resistance as specified when the End Call / Information Button is pressed?	13 K Ohms.	Repair open in circuit 2514.	Replace interior rear view mirror Refer 3.1 Interior Rear View Mirror in this Section.
12.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace interior rear view mirror Refer 3.1 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
13.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

THEFT DETERRENT HORN CIRCUIT

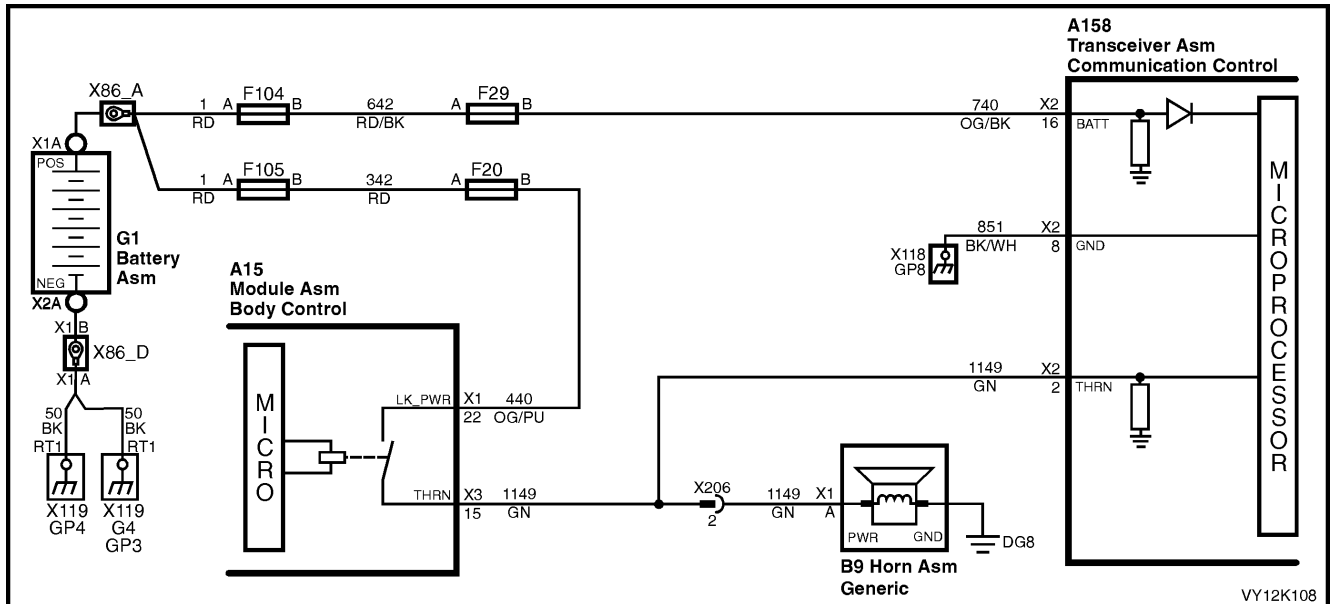


Figure 12K-116

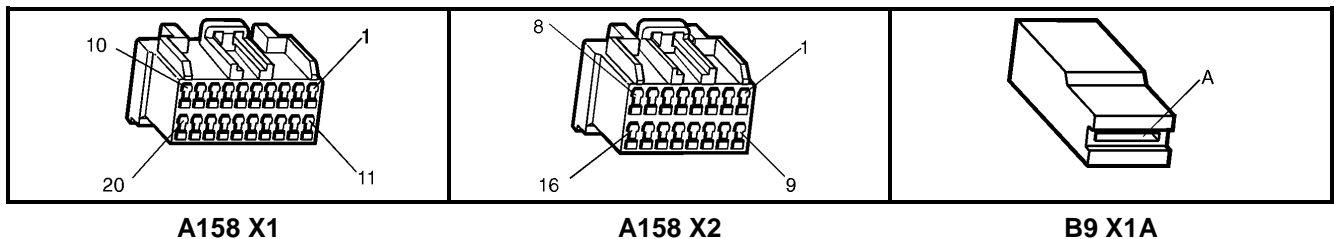
CIRCUIT DESCRIPTION

The telematics module monitors the theft deterrent horn circuit to determine if the alarm has been triggered. If the alarm has been triggered, the BCM pulses the vehicles horns at a rate of once per second. To pulse the theft deterrent horn the BCM supplies 12 Volts to the theft deterrent horn circuit 1149 (Green wire). When the theft deterrent horn circuit is activated, the voltage at terminal X2-2 of the telematics module is pulled high. The telematics module determines this high voltage at terminal X2-2 as the theft deterrent system having been triggered. If the vehicle theft deterrent system is triggered for longer than 20 seconds, the telematics module will transmit an "Unauthorised Entry Alert" message to the Holden Assist Centre. For further information regarding the unauthorised entry alert, refer to the Holden Assist Handbook Supplement.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test confirms that the telematics module is receiving a theft deterrent horn signal. If the alarm does not trigger in this step refer to [Section 12J BCM](#) in this Service Information.
3. The test step confirms that the telematics module is applying 12 Volts to circuit 1128.
4. The test step confirms that circuit 1128 is OK.
5. This test step confirms that the telematics module connectors A158 X1 and X2 terminal retention is OK. Terminal retention should always be checked before any component is replaced.



A158 X1

A158 X2

B9 X1A

THEFT DETERRENT HORN CIRCUIT

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	<ol style="list-style-type: none"> Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). Open the driver's Window. Shut all doors. Enable the Theft Deterrent System by pressing the lock button the remote key once. From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs. Scroll to Theft Deterrent Horn. Trigger the theft deterrent system by lifting the driver's door lock snip and opening the driver's door. Does TECH 2 display the Theft Deterrent Horn ON and OFF in time with theft deterrent horn? 		<p>Disarm theft deterrent system by pressing the unlock button on the remote key.</p> <p>Theft deterrent horn circuit is OK.</p> <p>Check for intermittent in circuit 1149.</p>	<p>Disarm theft deterrent system by pressing the unlock button on the remote key.</p> <p>Go to Step 3.</p>
3.	In test Step 2 did the theft deterrent horn sound when the alarm was triggered.		Go to step 4.	Refer to Section 12J BCM Diagnostics In this Service Information
4.	<ol style="list-style-type: none"> Using a DMM, measure continuity of circuit 1149 (Green wire) between the telematics module connector A158 X2-2 and the BCM connector terminal A15 X3-15. <p>Is there continuity?</p>		Go to step 5.	Repair open in circuit 1149.
5.	<ol style="list-style-type: none"> Check telematics module connectors A158 X1 and X2 terminal retention. <p>Is the terminal retention OK?</p>		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

DRIVER'S DOOR AJAR SWITCH CIRCUIT

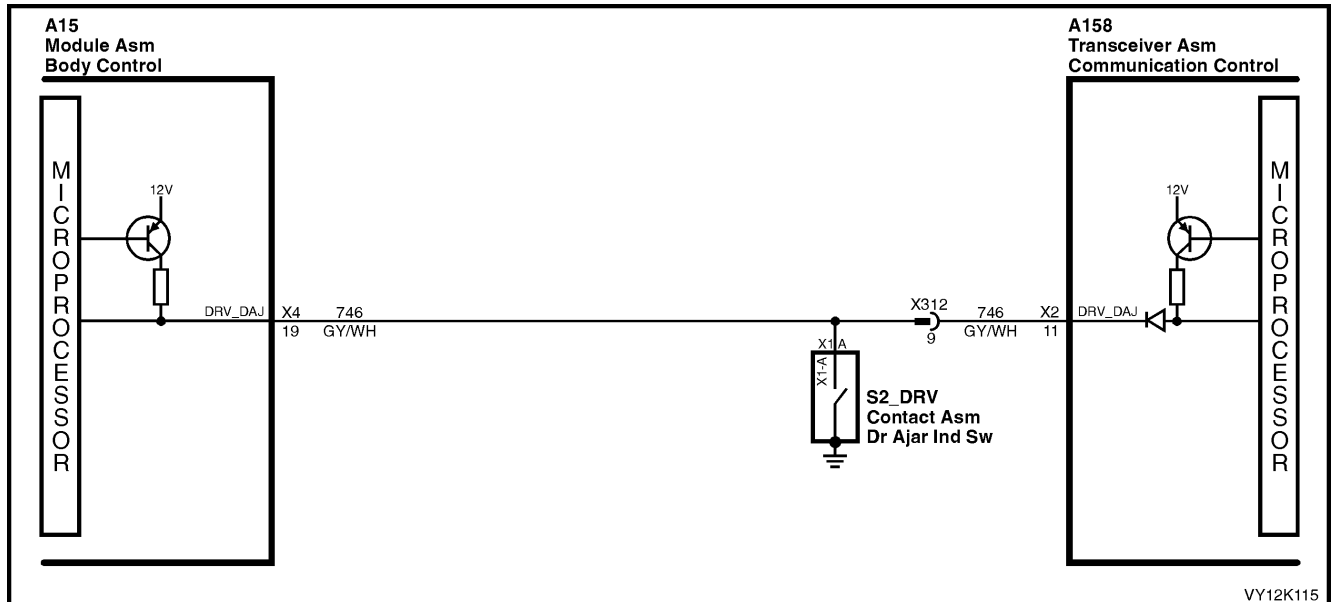


Figure 12K-117

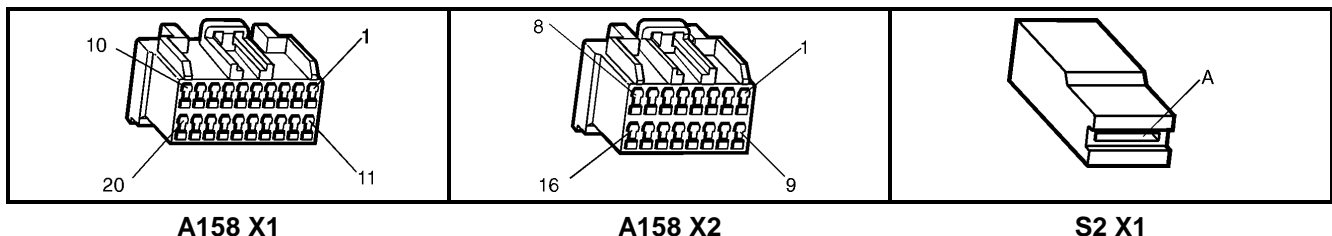
CIRCUIT DESCRIPTION

The telematics module uses this input signal to determine if the driver's front door is opened or closed. When the door is opened, the door ajar switch ground's terminal A158 X2-11 via circuit 746 (Grey/White wire). This causes the voltage at terminal X2-11 to be pulled low, less than 0.2 Volts (driver's door open). The telematics module determines this low voltage at terminal X2-11 as the driver's door open input signal. When a driver's door open input signal is received, the telematics module will switch from its current operating mode to active mode.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test uses TECH 2 determine that the driver's door ajar switch is operating correctly.
3. This test uses TECH 2 to determine if the BCM is receiving the correct drivers door ajar switch information. If the BCM is not receiving the correct information refer to the appropriate BCM diagnostics chart in [Section 12J BCM](#) of this Service Information.
4. If TECH 2 displays "Driver's Door Closed" when the door is open then circuit 746 may be shorted to ground.
5. If TECH 2 displays "Driver's Door Open" when the door is closed then circuit 746 may be open or shorted to voltage.
6. This test step checks if circuit 746 is shorted to ground.
7. This test step checks if circuit 746 is open or shorted to voltage.
8. This test step determines if the pulsed pull up in the telematics module is OK.
9. This test step confirms that the telematics module connectors A158 X1 and X2 terminal retention is OK. Terminal retention should always be checked before any component is replaced.



DRIVER'S DOOR AJAR SWITCH CIRCUIT

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs. 2. Scroll to Driver's Door. Does TECH 2 display the "Driver's Door "Open" when the driver's door is open, and "Driver's Door Closed" when the driver's door is closed.		Driver's door ajar switch and circuit is operating correctly.	Go to Step 3.
3.	1. From the TECH 2 Body Control Module Application Menu select F2: Data Display / F0: Inputs and Outputs. 2. Scroll to Driver's Door. 3. Does TECH 2 display the "Driver's Door Open" when the driver's door is open and "Driver's Door Closed" when the driver's door is closed.		Go to Step 4.	Refer to Section 12J BCM Diagnostics in this Service Information
4.	1. In test step 2 did TECH 2 display "Driver's Door Open" when the driver's door is closed.		Go to Step 6.	Go to Step 5.
5.	In test Step 2 did TECH 2 display "Driver's Door Closed" when the driver's door is open.		Go to Step 7.	Go to Step 8.
6.	Check for short to ground in circuit 746. Is circuit 746 shorted to ground?		Repair short to ground in circuit 746.	Go to Step 8.
7.	Check for open or short to voltage in circuit 746. Is circuit 126 open or shorted to voltage?		Repair open or short to voltage in circuit 746.	Go to Step 8.
8.	1. Disconnect the BCM connectors. 2. Ignition on and driver's door closed. 3. Using a DMM measure the voltage at the telematics module connector terminal A158 X2-11, circuit 746 (Grey/White wire). Is the voltage as specified?	Greater than 5.0 Volts.	Check for an intermittent open or short to voltage or ground in circuit 746.	Go to Step 9.
9.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

PASSENGERS DOOR AJAR SWITCHES

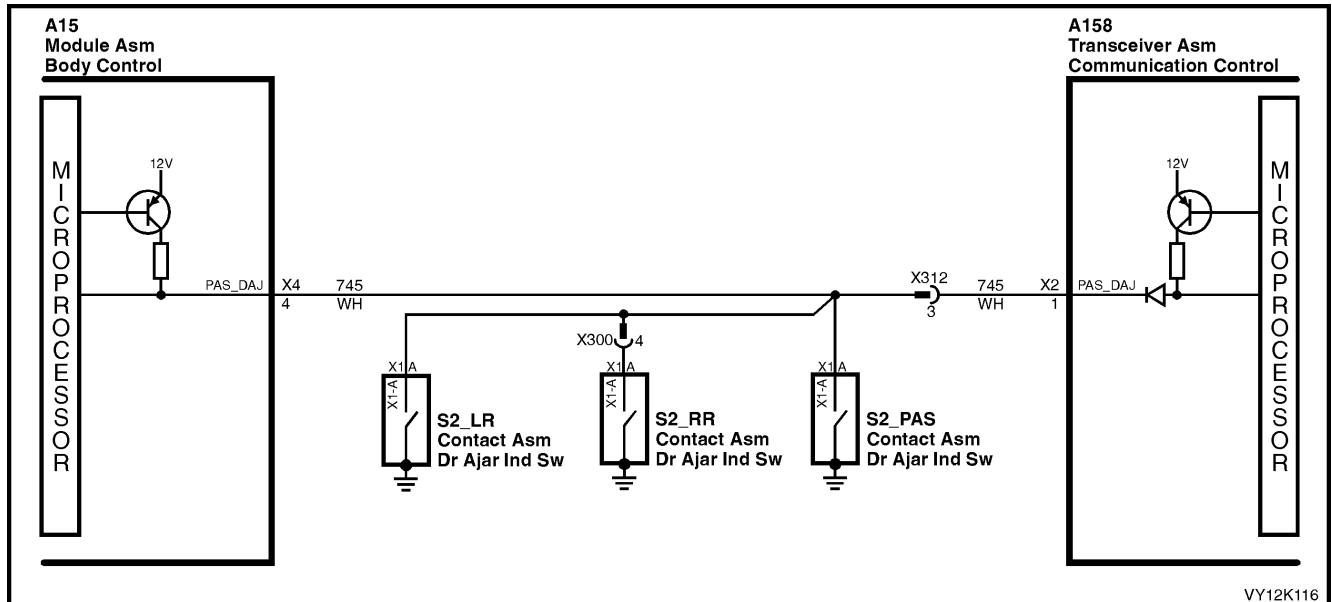


Figure 12K-118

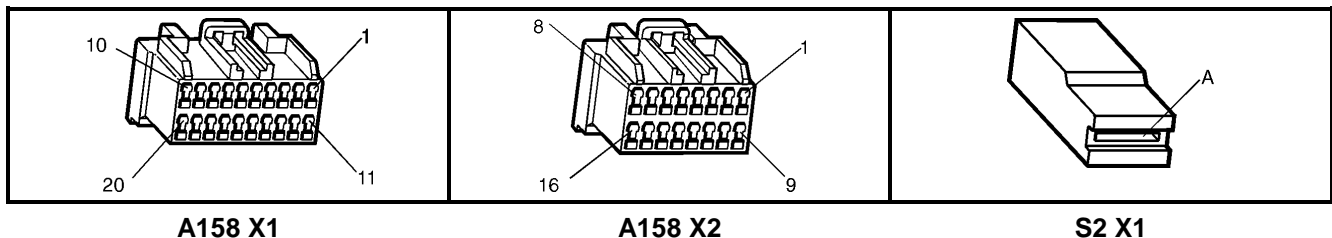
CIRCUIT DESCRIPTION

The telematics module uses this input signal to determine if any of the passenger doors are opened or if all passenger doors are closed. If the right hand rear, left hand front or left hand rear door is open, the telematics module terminal A158 X2-1 is grounded through circuit 745 (White wire). This causes the voltage at the telematics module terminal A158 X2-1 to be pulled low, less than 0.2 Volts (if any one of the passenger doors is opened). The telematics module determines this low voltage at terminal A158 X2-1 as the passengers door open input signal. When a passengers door open input signal is received, the telematics module will switch from its current operating mode to active mode.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This test uses TECH 2 determine that the Passengers door ajar switch is operating correctly.
3. This test uses TECH 2 to determine if the BCM is receiving the correct drivers door ajar switch information. If the BCM is not receiving the correct information refer to the appropriate BCM diagnostics chart in [Section 12J BCM](#) of this Service Information..
4. If TECH 2 displays "Passengers Door Closed" when the door is open then circuit 745 may be shorted to ground.
5. If TECH 2 displays "Passengers Door Open" when the door is closed then circuit 745 may be open or shorted to voltage.
6. This test step checks if circuit 745 is shorted to ground.
7. This test step checks if circuit 745 is open or shorted to voltage.
8. This test step determines if the pulsed pull up in the telematics module is OK.
9. This test step confirms that the telematics module connectors A158 X1 and X2 terminal retention is OK. Terminal retention should always be checked before any component is replaced.



PASSENGERS DOOR AJAR SWITCHES

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the Telematics Application Menu, Select F1: Data Display, F0: Inputs and Outputs. 2. Scroll to Passenger Door. 3. Does TECH 2 display the "Passenger Door Open" when any passenger door is open? Does TECH 2 display the "Passenger Door Closed" when the all the passenger doors are closed?		Passenger door ajar switches are operating correctly.	Go to Step 3.
3.	1. From the Body Application Menu select Body Control Module then select F1: Data Display F0: Inputs and Outputs. 2. Scroll to Passenger Door. 3. Does TECH 2 display the "Passenger Door Open" when any passenger door is open? Does TECH 2 display "Passenger Door Closed" when all the passenger doors are closed?		Go to Step 4.	Refer 12J BCM Diagnostics in this Service Information.
4.	In test Step 2 did TECH 2 display "Passenger Door Open" when the passenger door is closed?		Go to Step 6.	Go to Step 5.
5.	In test Step 2 did TECH 2 display "Passenger Door closed" when the passenger door is open.		Go to Step 7.	Go to Step 8.
6.	1. Check for short to ground in circuit 745. Is circuit 745 shorted to ground?		Repair short to ground in circuit 745.	Go to Step 8.
7.	1. Check for open or short to voltage in circuit 745. Is circuit 745 open or shorted to voltage?		Repair open or short to voltage in circuit 745.	Go to Step 8.
8.	1. Disconnect the BCM connectors. 2. Ignition on all doors door closed. 3. Using a DMM measure the voltage at the telematics module connector terminal A158 X2-1, circuit 745 (White wire). Is the voltage as specified?	Greater than 5 Volts.	Check for an intermittent on circuit 745.	Go to Step 9.
9.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

MICROPHONE

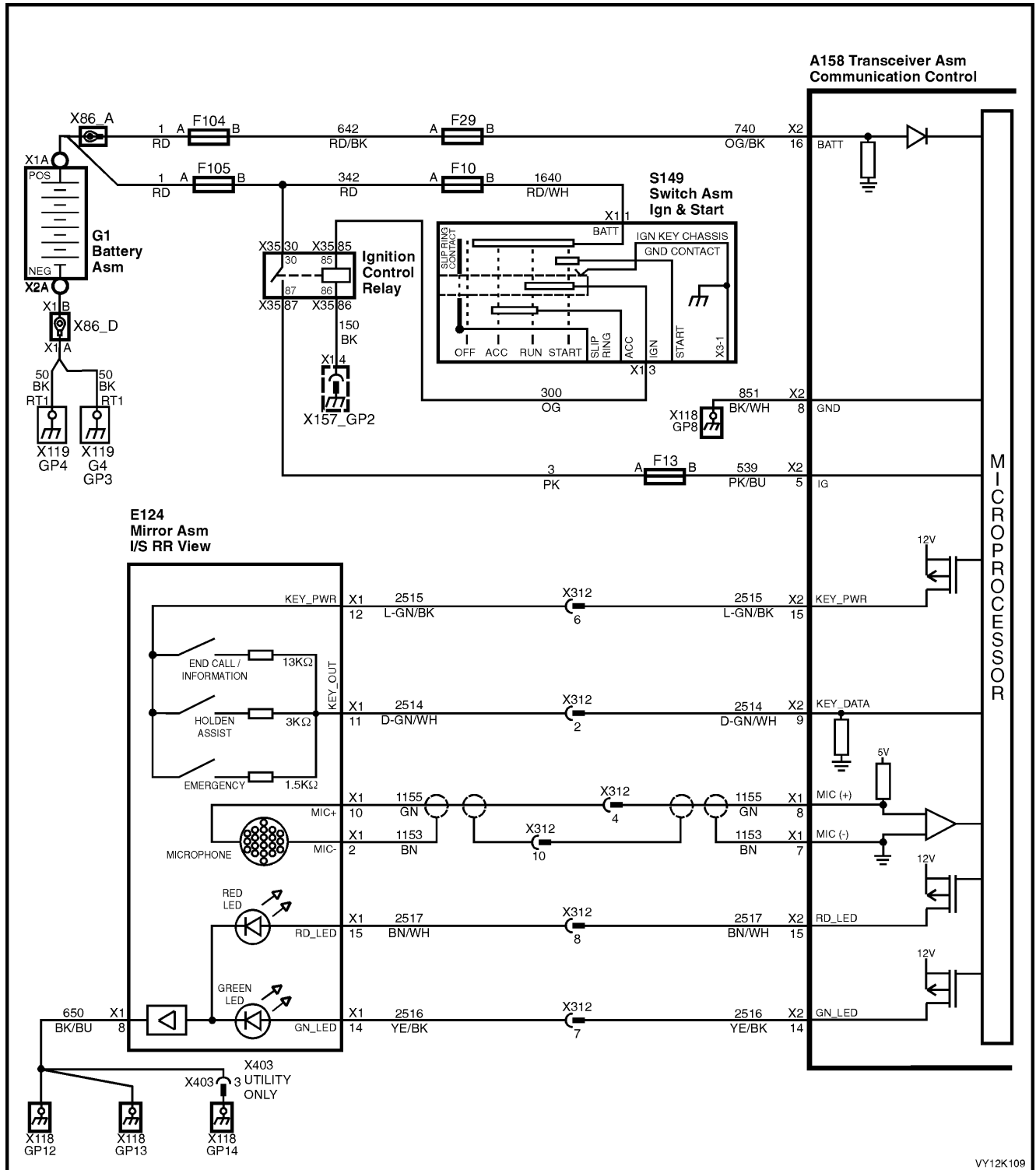


Figure 12K-119

CIRCUIT DESCRIPTION

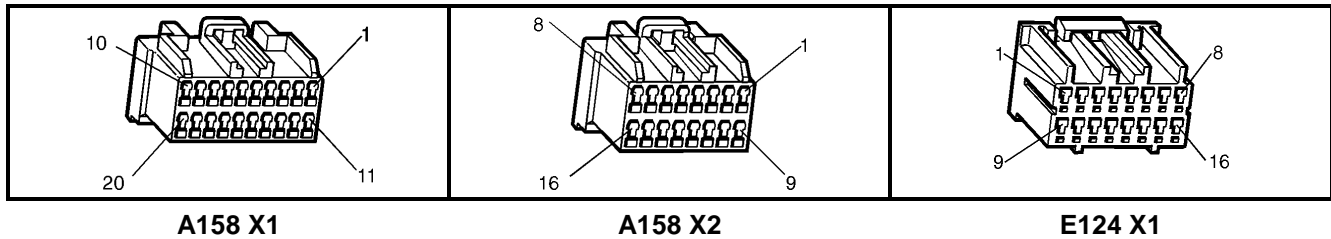
The active microphone in the interior rear view mirror provides a means for two way voice communication between the vehicle occupants and Holden Assist Centre..

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. Confirmation that the telematics function test has been completed.
3. Checks that the telematics module is supplying five Volts to the microphone.
4. If the voltage is greater than five Volts then circuit 1155 is shorted to voltage.
5. If the voltage is less than five Volts then circuit 1155 is shorted to ground or open.
6. Checks if the telematics module is supplying eight Volts to circuit 1155.

7. This test determines if circuit 1153 has continuity.
8. Before the mirror is replaced the retention of the interior mirror connector E124 X1 terminals should be checked.
9. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



MICROPHONE

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Disconnect the interior rear view mirror connector E124 X1. 2. Ignition on. 3. Using a DMM, check the voltage at the interior rear view mirror connector terminal E124 X1-10 circuit 1155 (Green wire). Is the voltage as specified?	5 Volts.	Go to Step 4.	Go to Step 3.
3.	In Step 3 was the voltage greater than specified?	5 Volts.	Repair short to voltage in circuit 1155.	Go to Step 4.
4.	In Step 3 was the voltage less than specified?	5 Volts.	Go to Step 5.	Go to Step 6.
5.	1. Ignition on. 2. With the interior rear view mirror connector E124 X1 still disconnected. 3. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-8 circuit 1155 (Green wire). Is voltage as specified?	5 Volts.	Repair open or short to ground in circuit 1155.	Go to Step 8.
6.	1. Using a DMM, measure continuity of circuit 1153 (Brown wire) between the telematics module connector terminal A158 X1-7 the interior rear view mirror connector terminal E124 X1-2. Is there continuity?		Go to Step 7.	Repair open circuit 1153.
7.	1. Check interior rear view mirror connector E124 X1 terminal retention. Is the terminal retention OK?		Replace Rear view Mirror. Refer 3.5 Interior Rear View Mirror in this Section.	Repair connector terminal retention.
8.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

FUEL PUMP RELAY DRIVE CIRCUIT

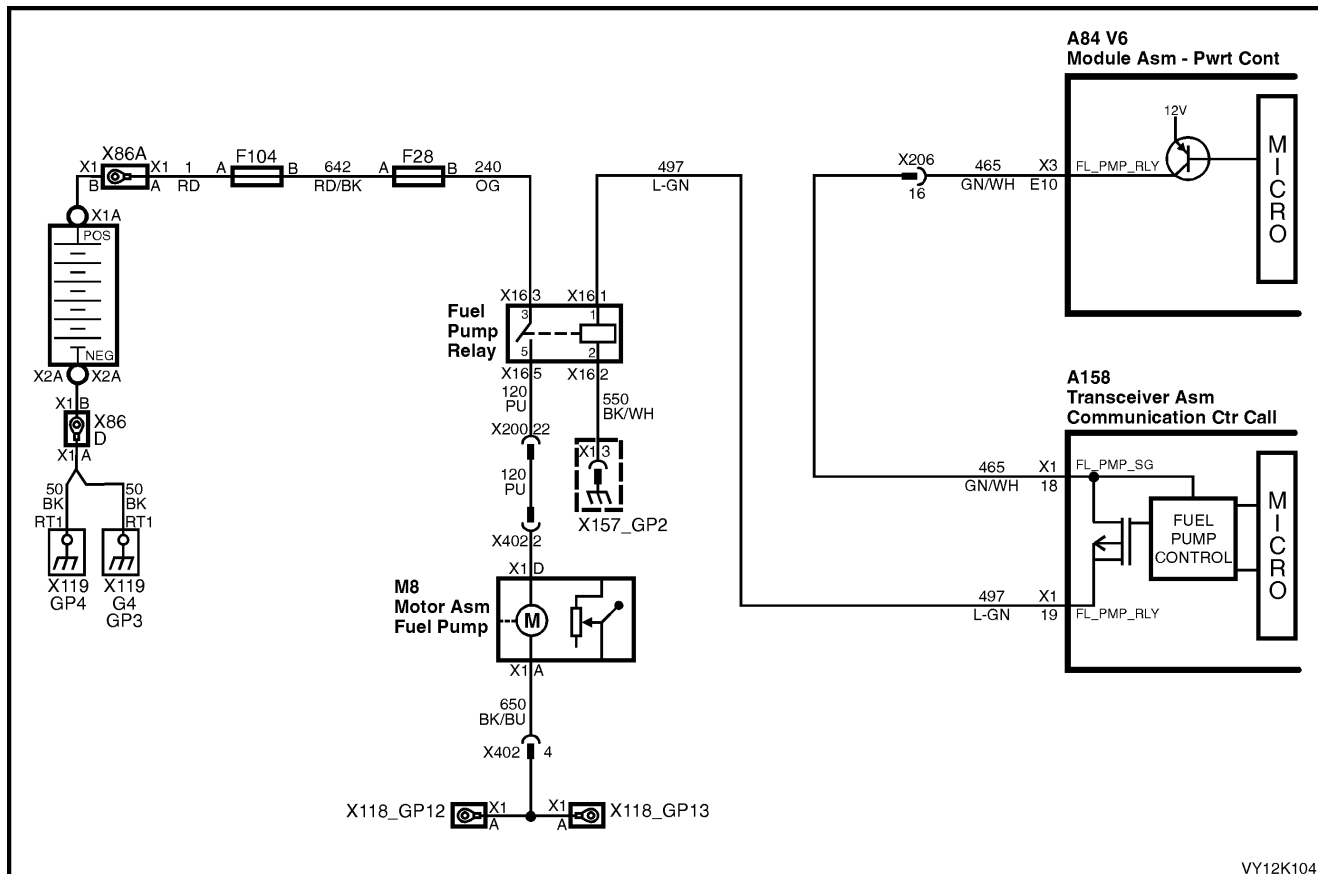


Figure 12K-120 V6 Fuel Pump Circuit

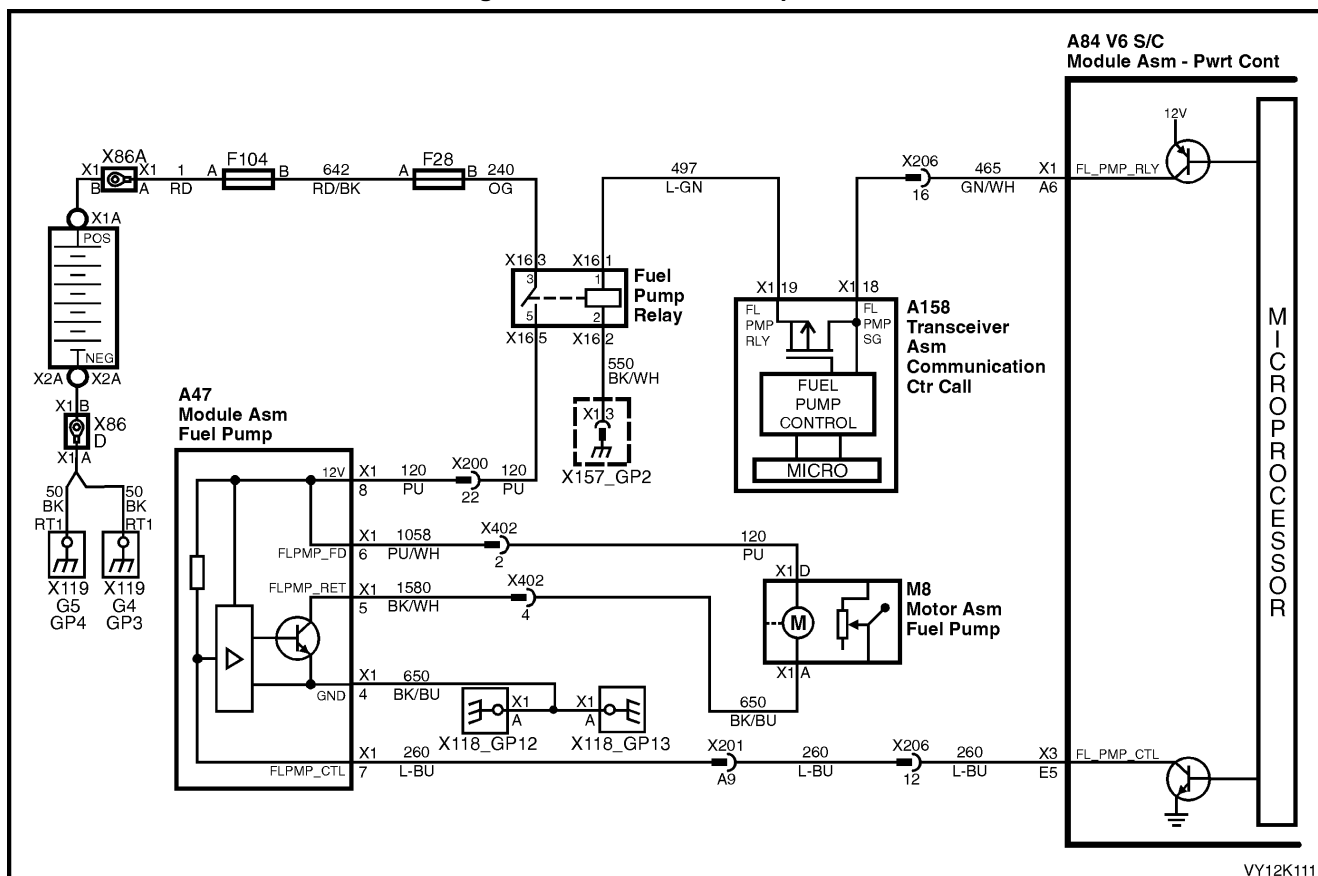


Figure 12K-121 V6 S/C Fuel Pump Circuit

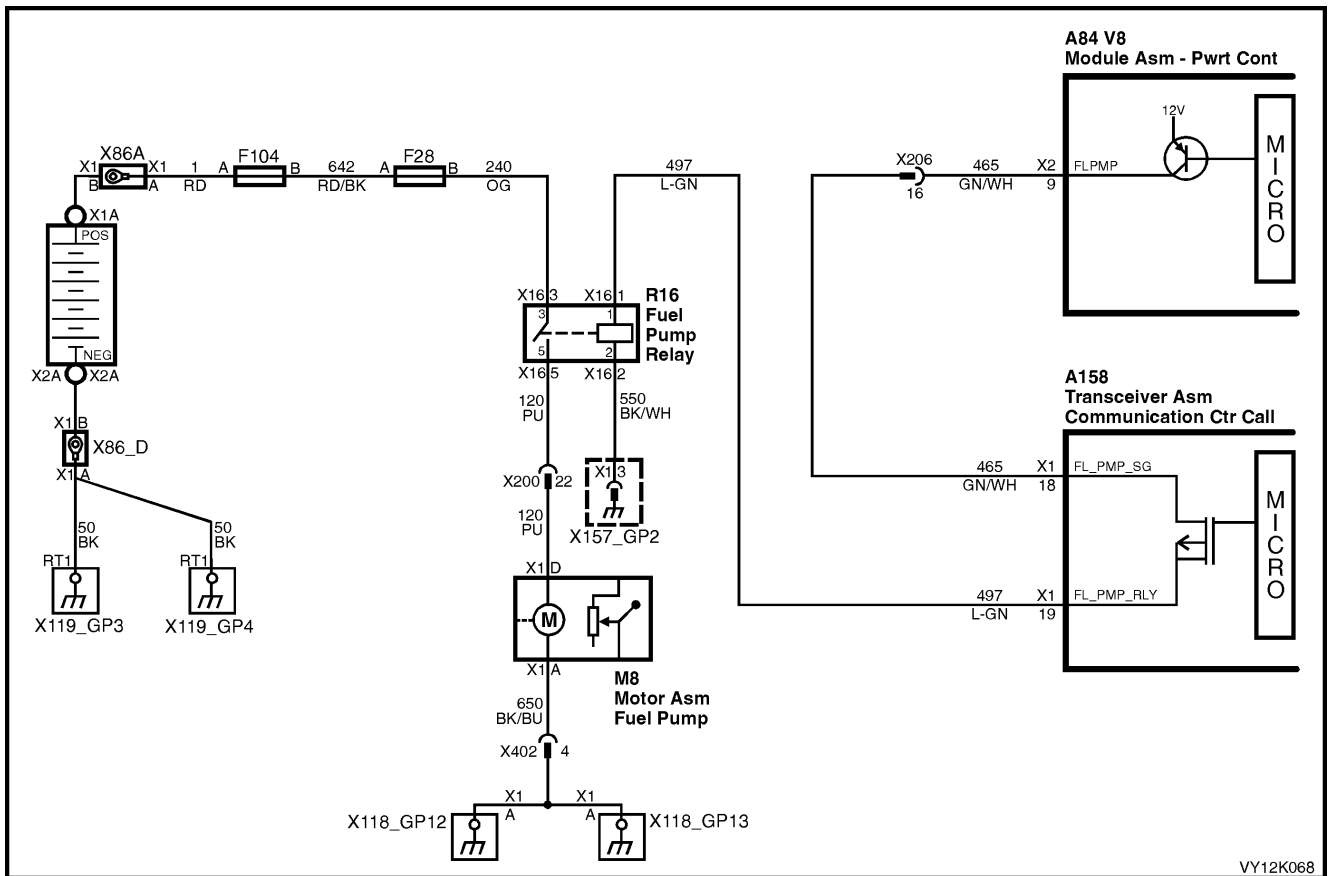


Figure 12K-122 V8 Fuel Pump Circuit

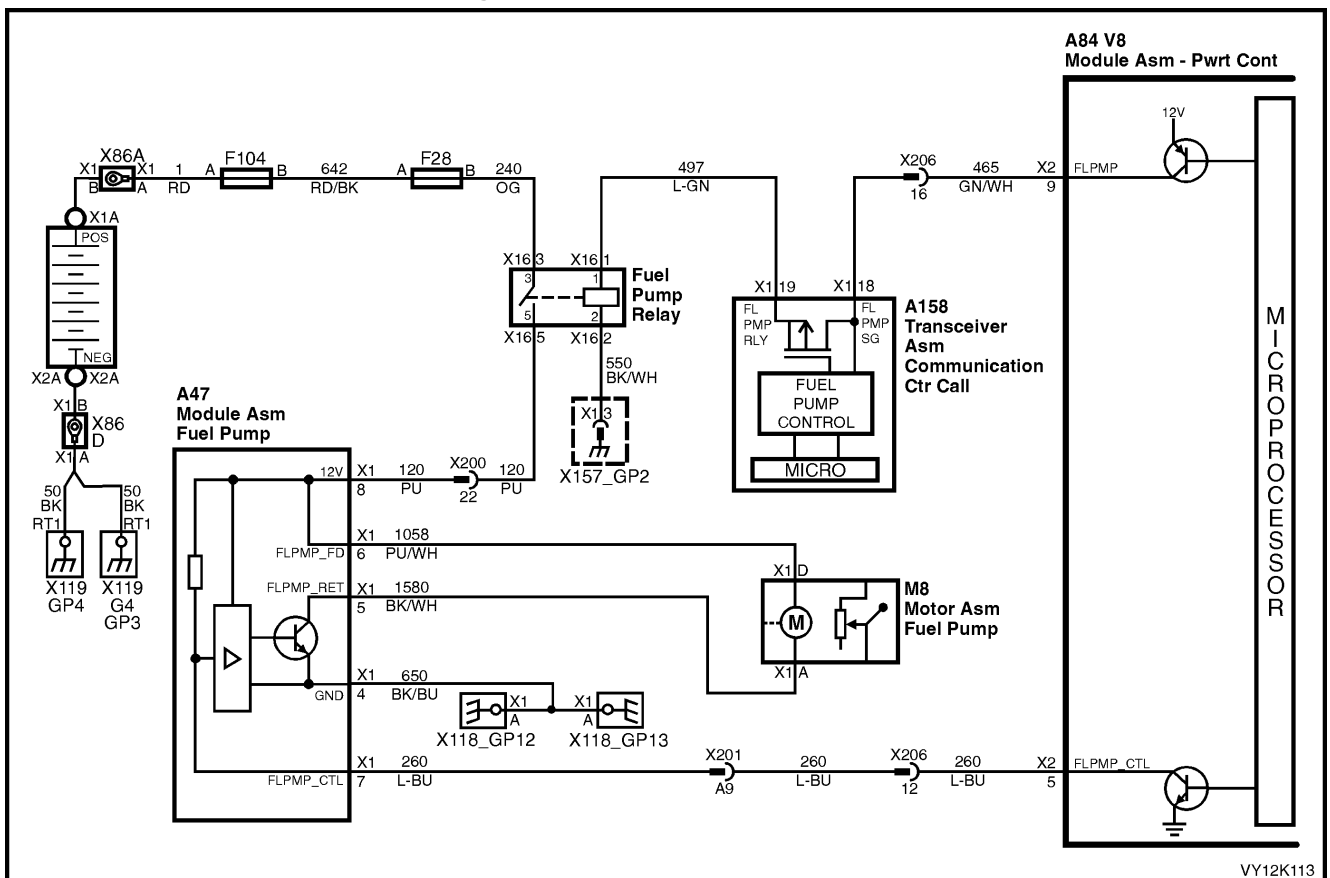


Figure 12K-123 V8 Utility Fuel Pump Circuit

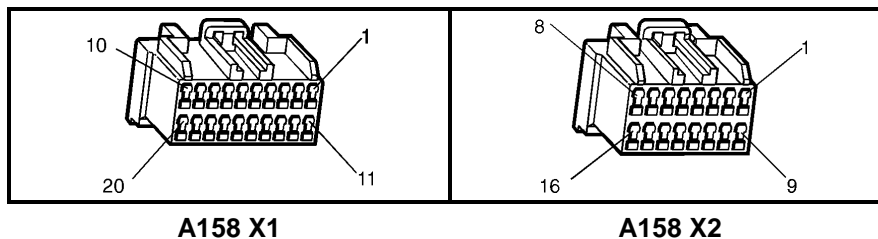
CIRCUIT DESCRIPTION

The PCM energises the fuel pump relay drive circuit via circuit 465 (Green/White wire) the telematics module terminals X1-18 and X1-19, circuit 497 (Light/Green wire). The fuel pump relay drive circuit is grounded through circuit 550 (Black/White wire) at ground location X157_GP2. The telematics module can immobilise the vehicle by opening the fuel pump relay drive circuit, causing the fuel pump to stop operating. This function can only be activated by the National Emergency Response Centre (NERC™) under instruction from the Police.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. This step confirms that the fuel pump relay drive circuit within the telematics module is active.
3. This step confirms that battery voltage is being applied to the telematics module fuel pump relay drive circuit from the PCM. If the PCM is not applying voltage to this circuit you should refer to the On-Board Diagnostic System Check in [Section 6C1 V6 Engine](#), [Section 6C2 V6 Supercharged Engine](#) or [Section 6C3 V8 GEN III Engine](#) in this Service Information.
4. This step confirms that the fuel pump relay drive circuit in the telematics module is OK and applying voltage to circuit 497. If the telematics module is applying voltage to this circuit then you should refer to the On-Board Diagnostic System Check in [Section 6C1 V6 Engine](#), [Section 6C2 V6 Supercharged Engine](#) and [Section 6C3 V8 GEN III Engine](#). If the telematics module is not applying voltage to circuit 497 then you should replace the telematics module, refer step 5 in this diagnostic chart.
5. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



FUEL PUMP RELAY DRIVE CIRCUIT

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 Telematics Application Menu, Select F1: Data Display/F0: Inputs and Outputs. 2. Scroll to Fuel Pump Relay Drive Circuit. Does TECH 2 display Fuel Pump Relay Drive Circuit "Active"?		Go to Step 3.	Go to Step 5.
3.	1. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-19 circuit 465 (Dark Green/White wire). 2. Ignition off for at least 20 seconds. Is the voltage as specified for at least two seconds when the ignition is turned from off to on?	B+	Go to step 4.	Refer to PCM On-Board Diagnostic System Check 6C1 V6 Engine, 6C2 V6 Supercharged Engine OR 6C3 V8 GEN III Engine in this Service Information.
4.	1. Using a DMM, check the voltage at the telematics module connector terminal A158 X1-18 circuit 497 (Light Green wire). 2. Ignition off for at least 20 seconds. Is the voltage as specified for at least two seconds when the ignition is turned from off to on?	B+	Refer to PCM On-Board Diagnostic System Check 6C1 V6 Engine, 6C2 V6 Supercharged Engine OR 6C3 V8 GEN III Engine in this Service Information..	Go to Step 5.
5.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

AUDIO MUTE CIRCUIT

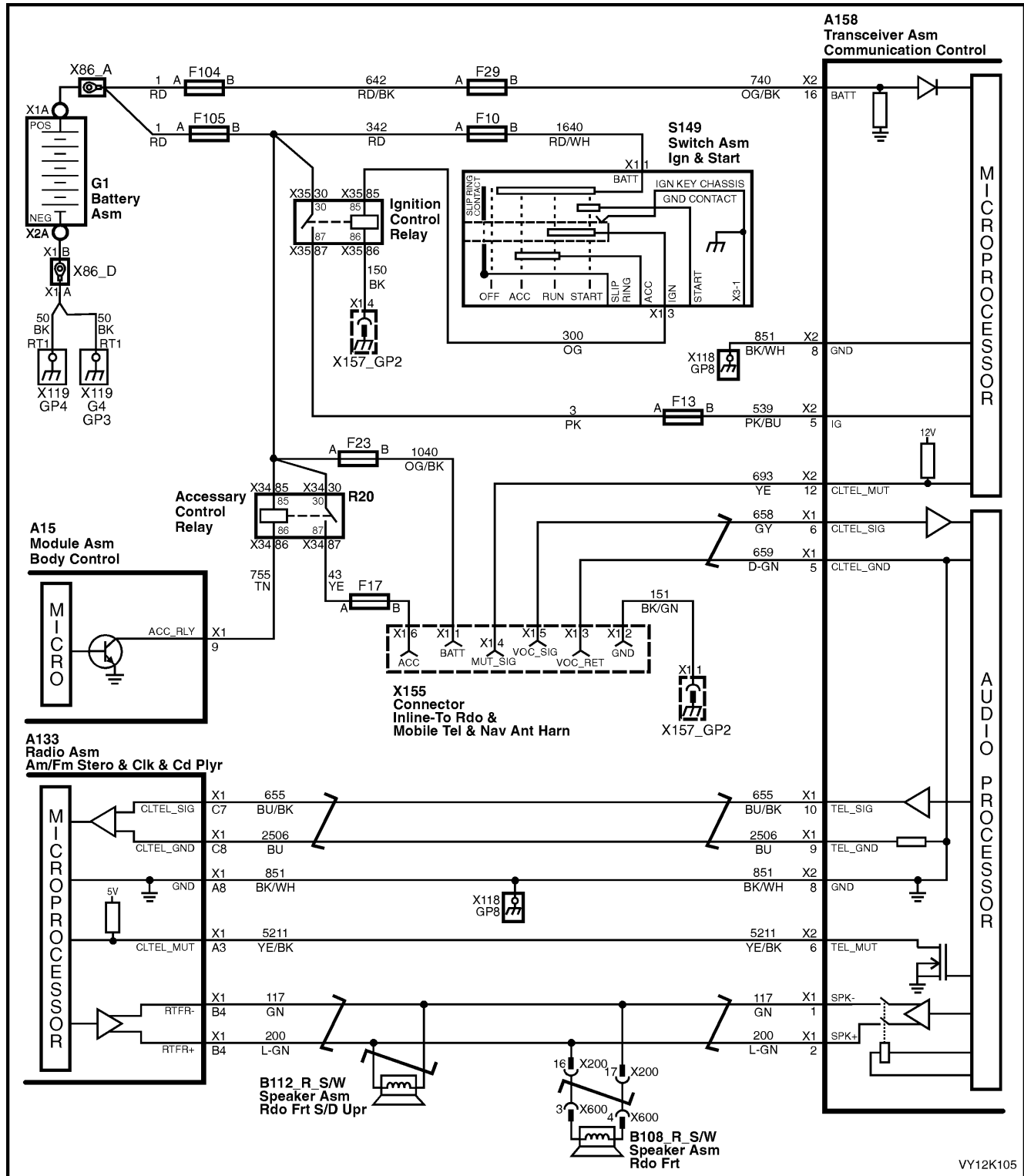


Figure 12K-124

CIRCUIT DESCRIPTION

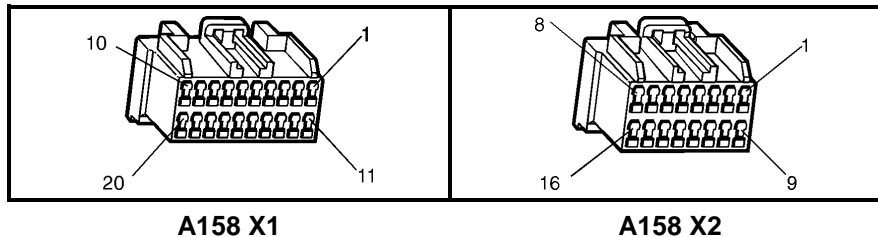
Whenever the telematics speaker is activated the audio system (radio) mute signal is also activated and the telematics module grounds the audio system mute circuit 656 (Yellow/Black wire) causing the circuit voltage to be pulled low, less than 0.2 Volts. This low voltage is detected by the audio system as a radio mute request. When received, the radio will mute.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. The audio system should only display "Audio Source / External Source" when the telematics module is telephone signal line is active.

3. This test step determines if the telematics module can command the radio to mute when the mobile phone connector mute signal line is grounded.
4. This test determines if the telematics module is able to switch the audio system mute active circuit on and off.
5. If the radio mutes when commanded the radio mute is working correctly.
6. This test step confirms that the radio is applying five Volts to circuit 5211.
7. If the radio mutes when circuit 656 is grounded then circuit 656 and the audio system are OK.
8. This test step checks for an open in circuit 656.
9. This test step checks for an open or short in circuit 693.
10. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.



AUDIO MUTE CIRCUIT

STEP	ACTION	VALUE	YES	NO
1.	1. Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Turn the audio system (radio) on. 2. From the TECH 2 Audio System Application Menu, Select F1: Data Display / F0 Inputs and Outputs. 3. Scroll to Audio Source. Does TECH 2 display the "Audio Source / External Source"?		Go to Step 8.	Go to Step 3.
3.	1. Turn the audio system (radio) on. 2. Using a fused jumper wire, jumper the mobile phone connector mute signal input circuit 693 terminal A158 X1-4 to ground. 3. Scroll to Audio Source. Does TECH 2 display the "Audio Source / External Source"?		Go to Step 5.	Go to Step 4.
4.	1. Turn the audio system (radio) on. 2. From the Telematics Application Menu, Select F3: Miscellaneous Test, F4: Audio System Mute. Does TECH 2 display "Audio System Mute Active" and "Audio System Mute Inactive" when commanded?		Go to step 5.	Go to Step 9.
5.	In test step 3 did the audio system mute when the TECH 2 displayed "Audio System Mute Active"?		Audio System Mute OK.	Go to Step 6.
6.	1. Turn the audio system (radio) on. 2. Disconnect the telematics module connectors X158 X1 and X2. 3. Using a DMM, check the voltage at the telematics module connector terminal X158 X2-6 circuit 5211 (Yellow/Black wire). Is the voltage as specified?	5 Volts	Go to Step 7.	Go to Step 8.

STEP	ACTION	VALUE	YES	NO
7.	1. Turn the audio system (radio) on. 2. Using a fused jumper wire, jumper circuit 656 (Yellow/Black) to ground. Did the audio system (radio) mute?		Go to Step 8.	Replace Audio System AHU. Refer to Section 12D Entertainment System in this Service Information.
8.	1. Disconnect the telematics module connectors X158 X1 and X2. 2. Turn the audio system (radio) on. 3. From the TECH 2 Audio System Application Menu, Select F1: Data Display / F0 Inputs and Outputs. 4. Scroll to Audio Source. Does TECH 2 display the "Audio Source / External Source"?		Repair short to ground in circuit 5211.	Go to Step 9.
9.	1. Using a DMM check for open or short to ground in circuit 693 (Yellow wire). Is circuit 693 (Yellow wire) open or shorted to ground?		Repair open or short to Ground in circuit 693.	Go to Step 10.
10.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, VERIFY CORRECT OPERATION				

AUDIO SYSTEM INTERFACE

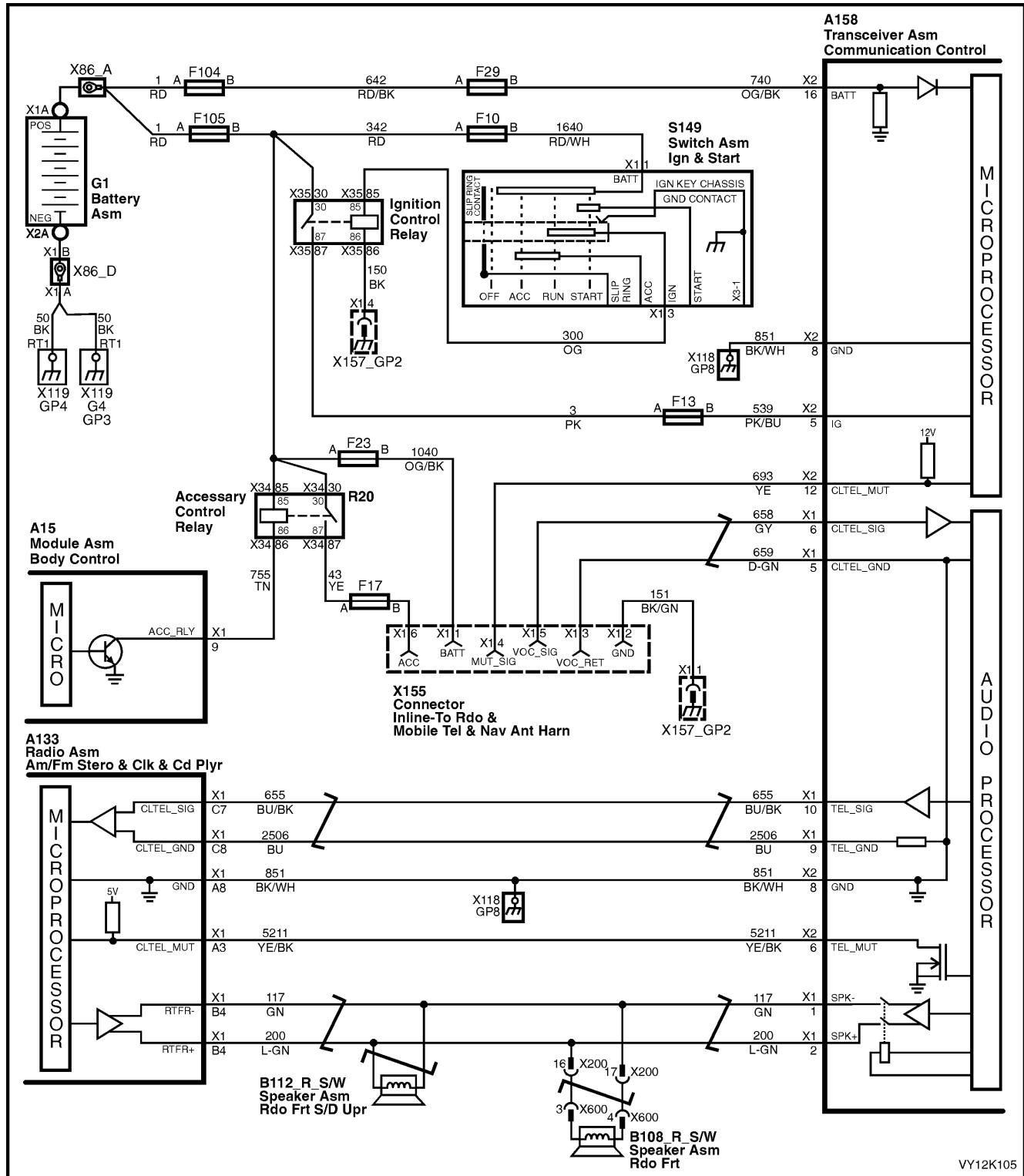


Figure 12K-125

CIRCUIT DESCRIPTION

The telematics system uses the vehicle audio system to provide a means for voice communication from the Holden Assist call centre. The telematics module also has the ability to detect if the audio system is not operational, and will switch from the vehicle audio system to the RHF speakers, if it detects that the audio system is not operational.

Whenever the telematics audio is activated the radio mute signal is also activated and the telematics module grounds the radio mute circuit 5211 (Yellow/Black wire) causing the circuit voltage to be pulled low, less than two Volts. This low voltage is detected by the radio as a mute request and when received, the audio system will mute.

Whilst the telematics system is not on a call the audio and mute request from the cellular telephone connector will be passed through the telematics module to the audio system. When a Holden Assist call is active, the telematics module will ignore the phone audio and transmit the telematics audio to the audio system.

Audible tones are also provided to indicate the system status and are broadcast via the speaker to alert the customer to certain operating conditions.

TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. The test step determines if the telematics module or mobile phone circuit is causing the audio system to mute.
3. This test step determines audio system (radio) mutes when the mobile phone connector mute signal line is grounded.
4. This test step uses the TECH 2 audio output miscellaneous test to determine if the audio interface is operating correctly.
5. To confirm correct operation of the audio interface, you will need to connect a mobile phone hands free kit to the mobile phone connector.
6. This test step checks for a short to voltage or short to ground in circuits 655 and 2506.
7. The service mode should be enabled, so that the telematics module does not send out a Unauthorised Entry Alert (UEA) when the telematics module is disconnected.
Disconnecting the telematics module determines if the short to voltage or ground in circuits 655 and 2506 is being caused by the telematics module.
8. Removing the audio system (radio) Audio Head Unit (AHU) determines if the short to voltage or ground in circuits 655 and 2506 is being caused by the audio system AHU.
9. This test step checks for an open in circuits 655 and 2506.
10. This test step checks for a short to voltage or short to ground in circuits 658 and 659.
11. This test step determines if the telematics module is causing the short to voltage or short to ground in circuits 658 and 659.
12. This test step checks for an open in circuits 658 and 659.
13. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 terminals should be checked.

AUDIO SYSTEM INTERFACE

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. Switch the audio system (radio) on and set the volume and tune the radio so that the audio can be clearly heard. Is the audio output OK? Not muted.		Go to Step 3.	Refer Audio Mute Circuit chart in this Section.
3.	1. Ensure the audio system (radio) is still on and set the volume and tune the radio so that the audio can be clearly heard. 2. Using a fused jumper wire, jumper the mobile phone connector X155 terminal X1-4 to ground. Does the audio system (radio) mute?		Go to Step 4.	Refer Audio Mute Circuit chart in this Section.
4.	1. Remove the fused jumper wire from the mobile phone connector X155. 2. Ensure the audio system (radio) is still on. 3. From the TECH 2 Telematics System Application Menu, Select F3: Miscellaneous Tests / F8 Audio Output. Refer 4.3 TECH 2 TEST MODES F3: Miscellaneous Tests F8: Audio Output in this Section. Was the Audio Output Test successful?		Go to Step 5.	Go to Step 6.
5.	1. Connect a mobile phone hands free kit to the mobile phone connector. 2. With the mobile phone installed into the hands free kit, make a call. Does the audio system (radio) mute and allow a call to conducted, i.e. can the caller communicate through the audio system.		System OK.	Go to Step 6.

STEP	ACTION	VALUE	YES	NO
6.	1. Using a DMM check for a short to ground or voltage on circuits 655 (Blue/Black wire) or 2506 (Blue wire). Is either circuit shorted to ground or voltage.		Go to Step 7.	Go to Step 9.
7.	1. Using TECH 2, enable the telematics module service mode. Refer to 4.3 TECH 2 TEST MODES F5: Program, F1: Operating Mode, in this Section. (The telematics module should remain in service mode until this diagnostics chart is completed). 2. Ignition off, disconnect the telematics module connectors A158 X1 and X2. 3. Ignition on engine off. 4. Using a DMM check for a short to ground or voltage on circuits 655 (Blue/Black wire) or 2506 (Blue wire). Is either circuit shorted to ground or voltage.		Go to Step 8.	Go to Step 13.
8.	1. With the telematics module connectors A158 X1 and X2 still disconnected. 2. Remove the audio system (radio) Audio Head Unit (AHU). 3. Using a DMM check for a short to ground or voltage on circuits 655 (Blue/Black wire) or 2506 (Blue wire). Is either circuit still shorted to ground or voltage.		Repair cause of short to voltage or ground.	Replace Audio System AHU. Refer Section 12D Entertainment System in this Service Information
9.	1. Using a DMM measure continuity of circuits 655 (Blue/Black wire) or 2506 (Blue wire). Is there continuity.		Go to Step 10.	Repair open circuit.
10.	1. Using a DMM check for a short to ground or voltage on circuits 658 (Grey wire) or 659 (Dark Green wire). Is either circuit shorted to ground or voltage.		Repair cause of short to voltage or ground.	Go to Step 11.
11.	1. Reconnect the telematics module connectors A158 X1 and X2. 2. Using a DMM check for a short to ground or voltage on circuits 658 (Grey wire) or 659 (Dark Green wire). Is either circuit shorted to ground or voltage.		Go to Step 13.	Go to Step 12.
12.	1. Using a DMM measure continuity of circuits 658 (Grey wire) or 659 (Dark Green wire). Is there continuity.		Go to Step 13.	Repair open circuit.
13.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

UNABLE TO MAKE OR RECEIVE A CALL

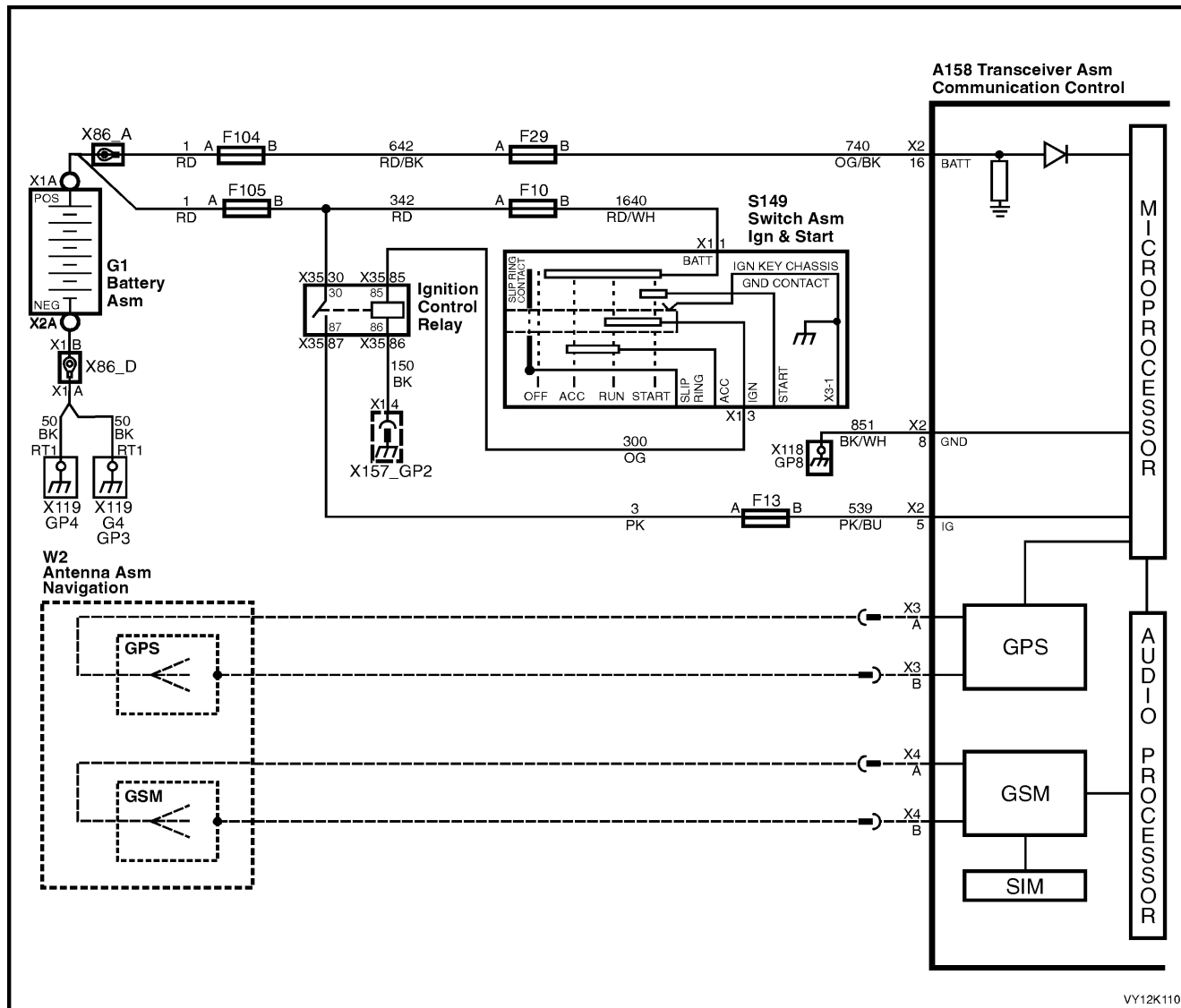


Figure 12K-126

CIRCUIT DESCRIPTION

The link between the vehicle and the Holden Assist Centre or NERC™ uses GPS for vehicle location and tracking and the Australian digital mobile phone network to transmit and receive voice and SMS (Short Message Service) data. If the vehicle is outside network coverage, the link to and from the vehicle will not be available and no services can be provided. Signal strength may be affected in locations like basement car parks or tunnels. However, in most cases, as the vehicle emerges from the obstruction or re-enters the digital phone network area the signal will be available again.

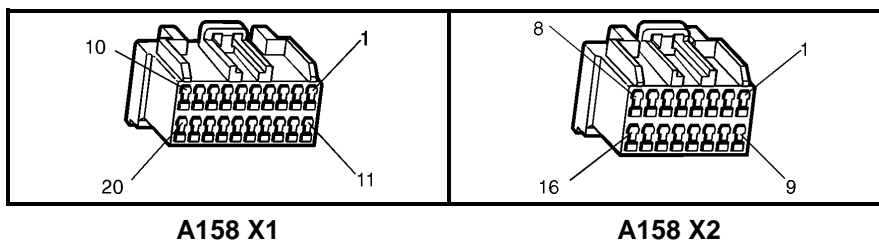
TEST DESCRIPTION

Number(s) below refer to step number(s) on the diagnostic chart.

1. Confirmation that the Telematics On-Board Diagnostic System Check has been performed.
2. For the telematics system to operate correctly the Vehicle Identification Number (VIN) displayed by TECH 2 must match the actual VIN.
3. For the telematics module to make or receive any calls the GSM must be active.
4. During this test step the telematics module must be reprogrammed with the correct code index. By reprogramming the module this will ensure that the correct phone numbers are reprogrammed into the module. Refer Code Index Programming in this Section.
5. Five beeps when attempting a make call is an indication of no GSM signal. You should refer to the **No GSM Signal** Diagnostic Chart in this Section.
6. If the telematics module makes a call but is continually connected to a recorded message, this means that the module can make a call, but the number being called is not allowed. The module was reprogrammed during test step 4, which should have reprogrammed the module with the correct phone numbers, therefore the module should be replaced.
7. Before the telematics module is replaced the retention of the telematics module connectors A158 X1 and X2 should be checked.

CODE INDEX

Model	Code Index
Executive, Acclaim, S & SS	001
Berlina & Calais	002



UNABLE TO MAKE OR RECEIVE A CALL

STEP	ACTION	VALUE	YES	NO
1.	Has a Telematics On-Board Diagnosis System Check been performed?		Go to Step 2.	Refer Telematics On-Board Diagnostic System Check chart in this Section.
2.	1. From the TECH 2 Body Application Menu select Telematics Module and follow screen instructions. At the Telematics Module System Identification screen does the VIN displayed match the actual vehicle VIN?		Go to Step 3.	Go to Step 7.
3.	1. From the Telematics Application Menu, Select F1: Data Display / F2: GSM Data. 2. Scroll to GSM Module. Does TECH 2 display the "GSM Module Active"?		Go to Step 4.	Go to Step 7.
4.	1. From the TECH 2 Telematics Module Application Menu select F5: Program / F1: Program Code Index. 2. Reprogram the code index to the correct number. (Refer 4.3 TECH 2 TEST MODES, F4: Program/F1: Program Code Index in this Section). Has problem been rectified?		Complete Telematics On-Board Diagnostic System Check in this section.	Go to Step 5.
5.	Did you hear five beeps when a keypad button is pressed? or Is the red status LED on all the time when the ignition is on?		Refer No GSM Signal Diagnostic Chart in this Section.	Go to Step 6.
6.	When making a call does the telematics module connect to the network but only to recorded message saying that the number is not available from this service?		Go to step 7.	Complete Telematics On-Board Diagnostic System Check in this Section
7.	1. Check telematics module connectors A158 X1 and X2 terminal retention. Is the terminal retention OK?		Replace telematics module. Refer 3.1 Telematics Module in this Section.	Repair connector terminal retention.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTCS AND VERIFY CORRECT OPERATION				

HOLDEN ASSIST TELEMATICS SYSTEM TEST

This Holden Assist Telematics System Test should only be carried out as the final steps in the Telematics On-Board Diagnostic System Check. All other steps in the On-Board Diagnostic System Check must be completed and have been successful before performing this Holden Assist Telematics System Test.

1. Ignition on.
2. From the TECH 2 Telematics Application Menu, Select F1: Data Display / F1: Global Positioning System, scroll to GPS 2D or 3D Fix and note the current Time of Last Known GPS Fix.
3. Select F1: Data Display / F2: GSM, scroll to GSM Signal strength and note the current GSM signal strength.
4. Position the vehicle where the Time of Last Known GPS Fix display is updating and the GSM Signal Strength is greater than -90 dbm. You may need to switch between the data list using the Next List and Previous List Soft Keys.
5. Program the telematics module into Active Mode (refer **F5: Program / Operating Mode** in this Section). Disconnect the TECH 2 from the vehicle.
6. Press the Holden Assist Button.
7. When the call is answered, identify yourself and your retail outlet and request a Holden Assist Telematics System Test.
(ie "Hello, this is Robert Smith from Jonestown Holden, could you please carry out a Holden Telematics System Test").
9. The Holden Assist operator will then carry out a Holden Telematics System Test. During the test the operator will inform you that you pressed the Holden Assist button and they have received a vehicle location.
9. Depending on the current Holden Assist telematics system status the operator will be able to either remotely unlock the doors or enable the telematics module service mode. The operator will inform which function they are going to perform. If they are going to perform a Remote unlock go to step 8A, if they are going to enable service mode go to step 8B.
- 9A. Lower the driver's window.
Shut and lock all doors.
The operator will then send a remote unlock request, the doors should then unlock within 30 seconds (this time to unlock will vary depending on SMS traffic).
On receiving a verification message that the doors have unlocked, the operator will inform you that the system has passed the Holden Assist Telematics Test.
Thank the Holden Assist operator.
Press the End Call / Information button to end the call.
- 9B. The operator will send a remote request to enable service mode.
On receiving a verification message that the service mode has been enabled, the operator will inform you that that the system has passed the Holden Assist Telematics Test.
Thank the Holden Assist operator.
Press the End Call / Information button to end the call.
From the Telematics Application Menu, Select F1: Data Display / F0: Inputs and Outputs, Scroll to Operating mode. The operating mode should display Service.
Program the telematics module into Active Mode (refer **F5: Program / F1:Operating Mode** in this Section).
10. Press the Emergency Button.
11. When the call is answered, identify yourself and your retail outlet and request a Holden Telematics System Test.
(ie "Hello, this is Robert Smith from Jonestown Holden, could you please carry out a Holden Telematics System Test").
12. The NERC™ will then carry out a Holden Telematics System Test. During the test the operator will inform you that you pressed the emergency button and they have received a vehicle location. The operator will then end the call.
13. If all the above steps have been completed successfully the system has passed the Holden Telematics System Test.

6. TORQUE WRENCH SPECIFICATIONS

	Nm
Telematics module assembly retaining screws.....	1 – 3
Telematics backup battery cover retaining screws	1 – 3
Interior rear view mirror retaining screw	2.5 – 4.5