

Component Procedures: Body Control Module

Table of Contents

1. Glossary of Terms (Article 2086512)
2. Airbag System (Article 2086180)
3. DRB III Error Messages and Blank Screen (Article 2086211)
4. Instrument Cluster (Article 2086224)
5. Sentry Key Immobilizer System (SKIS) (Article 2086214)
6. Vehicle Communication (Article 2086195)
7. Technician Safety Information (itype_15)
8. Vehicle Damage Warnings (itype_16)
9. Diagnostic Strategies (Article 2086431)
10. Scan Tool (DRB) Problems (Article 2086480)
11. Diagnosis By Symptom (Article 2085743)
12. Electrical / Mechanical Repair (itype_413)

Component Procedures: Body Control Module

Glossary of Terms (Article 2086512)

GLOSSARY OF TERMS

ACM

Airbag Control Module

AECM

Airbag

Electronic Control Module

Airbag Module

also called "squib" initiator. It is located inside the driver side airbag module assembly.

ASCM

Airbag System Diagnostic System

CCD

Chrysler Collision Detection

(vehicle

communication bus

)

DAB

Driver Airbag

PAB

Passenger Airbag

DLC

Data Link Connector

PCM

Powertrain Control Module

PDC

Power Distribution Center

SKIM

Sentry Key

Immobilizer Module

SKIS

Sentry Key Immobilizer System

Airbag System (Article 2086180)

AIRBAG SYSTEM

The airbag system is designed to provide increased driver and passenger protection if the vehicle is involved in a front-end collision. The system is designed to be used in conjunction with the seat belt system.

Currently, Chrysler Corporation uses two types of

Airbag Control Module

s

(

ACM

)

. The

ASDM

system is a mechanically-triggered system utilizing two front impact sensors and a sensor inside the module.

The

AECM

is an electronically-triggered system that uses only its own internal electronic sensor to trigger the airbags. The TJ Body uses only the AECM system.

Whenever the ignition key is turned to the RUN or START position, the Airbag

Control Module

(ACM) performs a lamp check by turning the AIRBAG

warning lamp

on. The lamp stays lit for

6

to

8 seconds

, then goes OFF. If the lamp remains OFF, it means the ACM has checked the system and found it to be free of

discernable malfunctions. The airbag system is monitored by the ACM.

The ACM monitors critical input and output circuits within the airbag system, making sure they are operating correctly. Some circuits are tested continuously; others are checked only under certain circumstances. The ACM provides diagnostic information about the airbag system to the technician through the DRB via the CCD bus

The AIRBAG warning lamp is the only point at which "symptoms" of a system malfunction can

be observed by the customer.

The deceleration or g-force resulting from the impact of a front-end collision causes the electronic sensor inside of the ACM to be triggered. This causes the inflators to be actuated, thus deploying the airbags. The total time between determining to deploy and deflation of the airbag is

1/10th

of a second.

1999 Wranglers will be equipped with a passenger airbag ON/OFF switch. This switch has an LED that will light when the switch is in the "OFF" position. While in the "OFF" position a circuit board inside the switch will simulate a passenger airbag to prevent the ACM from logging a DTC. However it is important that the ignition be in the OFF before moving the ON/OFF switch to the OFF or ON position, otherwise the ACM may log a DTC and turn on the airbag warning lamp due to a momentary open of the switch contacts.

Use the test procedures in this book to find the cause of any customer complaint regarding the AIRBAG warning lamp such as:

- warning lamp does not come on at all

- warning lamp stays ON

AIRBAG DIAGNOSTIC TROUBLE CODES

Airbag diagnostic trouble codes consist of active and stored codes. If more than one exists, diagnostic priority should be given to the active code(s).

Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of the trouble codes. It is necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRB. If more than one code exists, diagnostic priority should be given to the active code(s).

Active diagnostic trouble codes for the airbag system are not permanent and will change the moment the reason for the code is corrected. In certain test procedures, diagnostic trouble codes are used as a diagnostic tool.

Active Codes

An active trouble code indicates an on-going malfunction. This means that the defect is currently there every time the airbag control module checks that circuit/function. It is impossible to erase an active code; active codes automatically erase themselves when the reason for the code has been corrected.

With the exception of the warning lamp trouble codes or malfunctions, when a malfunction is detected, the AIRBAG lamp remains lit for a minimum of

12 seconds

or as long as the malfunction is present.

Stored Codes

Airbag codes are automatically stored in the ACM's memory when the ignition is turned OFF with the exception of the Loss of Ignition Run Only code, which is an active code only.

A "stored" code indicates there was an active code present at some time. However, the code currently may not be present as an active code, although another active code could be.

When a trouble code occurs, the AIRBAG warning lamp illuminates for minimum (even if the problem existed for less than

) minutes. The code is stored, along with the time

it was active, and the number of times the ignition has been cycled since the problem was last detected.

The minimum time shown for any code will be one minute, even if the code was actually present for less than one minute. Thus, the time shown for a code that was present for

two minutes

13 seconds

, for example, would be

three minutes

If a malfunction is not active while performing a diagnostic test procedure, the active code diagnostic test will not locate the source of the problem. In this case, the stored code can indicate an area to inspect.

If no obvious problems are found, erase stored codes, and with the ignition "ON", wiggle the wire harness and

connectors, rotate the steering wheel from stop to stop. Recheck for codes periodically as you work through the system. This procedure may uncover a malfunction that is difficult to locate.

Airbag Trouble Codes

The Airbag Control Module may report any of the following diagnostic trouble codes.

For the following ACTIVE OR STORED codes, replace the Airbag Control Module (ACM) even if set intermittently:

- AECM Accelerometer
- Internal Diagnostic 1
- AECM Output Driver
- AECM Stored Energy Logic
- AECM Stored Energy Driver
- AECM Stored Energy Passenger
- Internal Diagnostic 2
- Internal Diagnostic 3
- Internal Diagnostic 4
- Safing Sensor Shorted

For these codes, refer to the appropriate diagnostic procedure:

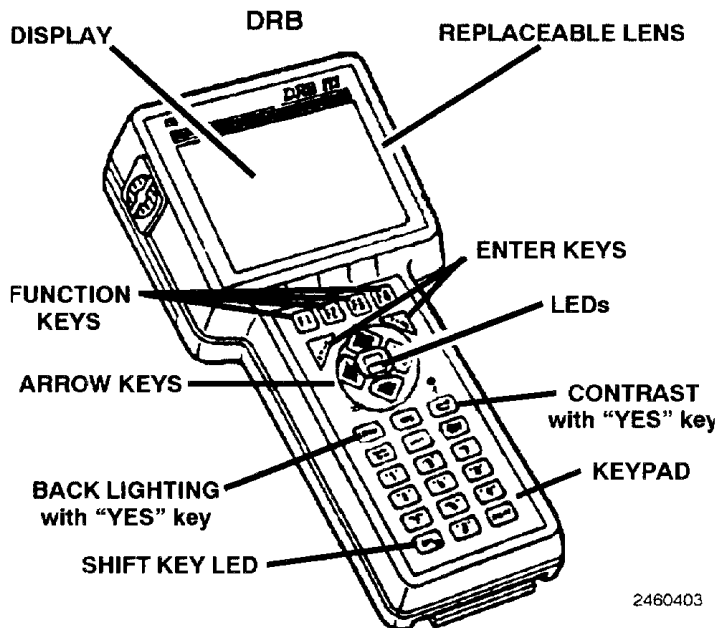
- Driver Squib Circuit Open
- Driver Squib Circuit Shorted
- Loss of Ignition Run Only
- Loss of Ignition to Run/Start
- No Cluster

CCD

Bus Message

- No CCD Communication
- Passenger Squib Circuit Shorted
- Passenger Squib Circuit Open
- Either Squib Term Shorted to Battery
- Either Squib Term Short to Ground
- Warning Lamp Circuit Open/Shorted

DRB III Error Messages and Blank Screen (Article 2086211)



Instrument Cluster (Article 2086224)

INSTRUMENT CLUSTER

The instrument cluster used in the Jeep Wrangler contains six gauges and eleven warning lamp

s. The gauges are positioned with information received by the cluster over the CCD bus from the

PCM

. Some of the lamps are hardwired and some are controlled by the cluster using

CCD

bus information. The vehicle chime function is contained on the cluster circuit board as well as the timer for the rear window defogger. There is a self test available for the cluster that will actuate all the gauges and place them at their calibration points. The test will not run if the cluster sees engine RPM or vehicle speed. This test will light all CCD controlled lamps for verification of lamp operation. It also forces the odometer vacuum fluorescent display

(VFD)

to count up from zero through nine. The self test routine

can

be entered by pushing and holding the trip reset button while rotating the ignition key from the "OFF" to the "ON" position.

The 1999 TJ cluster provides bus bias and the engine controller

provides termination. If either of these components are disconnected, the bus will not be operational.

Starting in 1998, the cluster also provides termination as a backup to the engine controller.

The cluster will be serviced as an assembly. There will be limited parts available, bulbs and sockets, the front lens, the trip odometer stem cover and the rear cover assembly. No internal parts of the cluster will be serviced.

Engine Temp Critical

- when gauge reaches the high end of the red zone.

Oil Pressure Low

- below

6 psi

and above

300 RPM

.

Volt Gauge Low

- when engine controller sets the "charge fail" DTC.

Volt Gauge High

- when engine controller sets the "voltage high" DTC.

Normal Operation:

At key ON, the cluster will light the low fuel, seat belt, check gauges, airbag and/or smart key immobilizer and upshift lamps (if equipped). As the key is turned farther towards the start position, the ABS (if equipped) and brake warning lamp will illuminate. The vacuum fluorescent (VF) display will indicate the last selected mode, odometer or trip. If there is a bus failure and the cluster cannot receive distance pulses from the PCM, the cluster will display the last mileage stored until the ignition is turned OFF. If the cluster is receiving bus messages but is unable to display odometer information because of an internal failure, the odometer will display dashes. VF dimming is handled by the potentiometer

that controls instrumentation illumination. The odometer will remain in the last mode selected, trip or vehicle mileage after each key cycle.

Rear Window Defogger

The timing circuit for the rear window defogger is contained in the cluster. The operation is as follows:

With ignition ON, the first push of the defogger button will start a

10 minute

timer. After

10 minutes

have elapsed, the defogger will be turned OFF. If the button is pushed a second time during the same ignition cycle, the timer will turn the defogger on for

5 minutes

. Every consecutive push will operate the defogger for

. When the defogger is ON, it can be turned OFF with a second push of the defogger button.

Chime

The chime function is a

1000 Hz

tone contained with in the cluster. The cluster will not generate more than one chime per condition in the same ignition cycle. If a problem occurs that requires a second chime while the first one is currently being generated, the second chime request will be ignored. The chime will sound for the following conditions:

Seat Belt Warning

-

6 seconds

after key on

Key In Ignition Warning

- door open with key in ignition

Engine Temp High

- when gauge enters red zone

Lamps (Hardwired)

The following lamps are hardwired in the cluster and are not part of the self-test.

Full Time 4WD (export only)

Part Time 4WD Full Time 4WD (export only)

Part Time 4WD

Brake WARNING (red)

ABS (amber)

High Beam

Left Turn Signal

Right Turn Signal

Master Illumination (export only)

Lamps (CCD)

The following lamps are controlled by the cluster via CCD messages. They are actuated during the self-test procedure.

Low Fuel Warning Airbag

Seat Belt

Upshift (if equipped)

Check Engine

Check Gauges

Smart Key Immobilizer (if equipped)

DIAGNOSTICS

Gauges

The instrument cluster will not store any DTCs. Because the engine controller gathers all the gauge information and sends it to the cluster via the bus, it is the PCM's responsibility to monitor these inputs and store DTC's for them. For this reason the first item to be checked regarding a gauge problem (except oil pressure) should be the PCM for any DTCs relating to the gauge in question.

There are DTCs associated with all the gauges except for the oil pressure gauge. When diagnosing gauges, the input that is used for the gauge message (fuel level sender for example) must be valid. Because of OBD II requirements, most of the information used for monitoring the OBD II system happens to be the same information used by the PCM to formulate the gauge bus messages. OBD II requirements state that the fuel level sender must be checked for rationality. This includes determining if the sending unit voltage is too high or too low or if the voltage hasn't changed over time. If the PCM has determined that the sender information isn't valid, it will set a diagnostic trouble code. The presence or absence of the fuel level sending code in the PCM is an important factor to determine whether a fuel gauge problem is in the sending unit or the cluster.

This same situation is used in all cluster diagnostics related to gauge operation with the exception of the oil pressure gauge. OBD II requirements do not include oil pressure monitoring. Therefore, oil pressure diagnostics would dictate that a mechanical oil pressure gauge be attached to the engine for absolute verification of oil pressure readings.

Hardwired Lamps

The cluster contains several hardwired lamps described earlier. These lamps are set up in two configurations. Either the lamp is supplied power by the cluster and the ground is supplied by the circuit being monitored or the lamp is supplied by the ground in the cluster and power comes from a module or other device. Refer to the schematic for the specific details on the lamp in question. Verification of the bulb filament may be required in all cases of an inoperative lamp. This will require removal of the cluster and the bulb in question.

CCD Controlled Lamps

The cluster contains several CCD controlled lamps as described earlier. These lamps are part of the diagnostic self-test. When entering the self-test mode, operation of these lamps can be observed. If the bulb fails to operate during the self-test and the bulb filament is good, the cluster assembly will need to be replaced.

Sentry Key Immobilizer System (SKIS) (Article 2086214)

Non Standards

- Sentry Key Immobilizer System Description (2086215)

Vehicle Communication (Article 2086195)

VEHICLE COMMUNICATION

The

Chrysler Collision Detection

multiplex

system (

CCD bus

) consists of a twisted pair of wires. These wires run from one module to another. They receive and deliver coded information between the modules. The information is coded to identify the message as well as the importance of the message. When there are multiple messages trying to access the CCD

bus at one time, the code determines the message that has higher priority, which is then allowed to access the bus first.

The two wires of the twisted pair that make up the CCD multiplex system are called "bus (+)" (bus plus) and "bus (-)" (bus minus) respectively. Each wire has a measureable voltage level of approximately 2.5 volts

. In order to maintain the

on each line and provide a means of transportation for the coded messages, there is a voltage divider network". This network consists of the Instrument Cluster module which supplies bias and the PCM

which supplies termination, Bias is the part of the voltage divider network that places both bus (+) and bus (-) at

. Termination in the circuitry is required to complete the voltage divider network and also provides some electromagnetic protection for the bus.

NOTE:

COMMUNICATION OVER THE BUS IS ESSENTIAL TO THE PROPER OPERATION OF THE VEHICLE'S ON-BOARD DIAGNOSTIC SYSTEM AND THE DRB. PROBLEMS WITH THE OPERATION OF THE BUS OR DRB MUST BE CORRECTED BEFORE PROCEEDING WITH DIAGNOSTIC TESTING. IF THERE IS A PROBLEM, REFER TO THE VEHICLE COMMUNICATION.

BUS FAILURE MESSAGES

Short to Battery

- Either or both of the bus wires are shorted to the battery potential.

Short to 5 Volts

- Either or both of the bus wires are shorted to a 5-volt potential.

Short to Ground

- Either or both of the bus wires are shorted to ground.

Bus (+) & Bus (-) Shorted Together

- The two bus wires are shorted together.

No Termination

- The bus system has not lost connection with its terminator.

Bus Bias Level Too Low

- Either or both of the bus wire potentials are significantly below their normal

.

Bus Bias Level Too High

- Either or both of the bus wire potentials are significantly above their normal

No Bus Bias

- The bus system has lost connection with the VTSS module which provides bias.

Bus (+) Open

- The bus (+) wire has lost connection with termination and/or bias.

Bus (-) Open

- The bus (-) wire has lost connection with termination and/or bias.

Not Receiving Bus Messages Correctly

- The DRB cannot communicate over the bus and does not know why.

Technician Safety Information (itype_15)

ROAD TESTING A COMPLAINT VEHICLE

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

CAUTION:

BEFORE ROAD TESTING A VEHICLE, BE SURE THAT ALL COMPONENTS ARE REASSEMBLED. DURING THE TEST DRIVE, DO NOT TR

TO READ THE DRB SCREEN WHILE IN MOTION. DO NOT HANG THE DRB FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRB.

Vehicle Damage Warnings (itype_16)

VEHICLE DAMAGE WARNINGS

Before disconnecting any control module

, make sure the ignition is "OFF". Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can

damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

When replacing a blown fuse, it is important to use only a fuse having the correct amperage rating. The use of a fuse with a rating other than indicated may result in a dangerous electrical system overload. If a properly rated fuse continues to blow, it indicates a problem in the circuit that must be corrected.

Service and general information labels about the airbag system can be found on the driver's sun visor, the glove box

door, and in the engine compartment.

To ensure that the airbag will be ready to deploy in a collision, have the system serviced by an authorized dealer.

Diagnostic Strategies (Article 2086431)

Non Standards

- Six-Step Troubleshooting Procedure (2086432)
- Road Testing A Complaint Vehicle (2086434)

Scan Tool (DRB) Problems (Article 2086480)

Non Standards

- DRB III Error Messages and Blank Screen (2086481)

Diagnosis By Symptom (Article 2085743)

Non Standards

- Instrument Cluster (2085746)

Electrical / Mechanical Repair (itype_413)

REQUIRED TOOLS AND EQUIPMENT

DRB (diagnostic read-out box)

jumper wires

ohmmeter

voltmeter