Component Procedures: Computers and Control Systems

Table of Contents

1. Parts and Labor (itype_189)
2. Functional Operation (Article 2074114)
3. General System Description (Article 2074181)
4. On-Board Diagnostic System (Article 2074041)
5. Complete System Diagram (Article 2073093)
6. Technician Safety Information (itype_15)
7. DRB III Safety Information (Article 2073089)
8. Vehicle Damage Cautions (Article 2073076)
9. Vehicle Preparation For Testing (Article 2073082)
10. Servicing Sub-Assemblies (Article 2073083)
11. All Technical Service Bulletins (itype_100)
12. Customer Interest Bulletins (itype_109)
13. Repair Tips (itype_110)
14. Description of On-Board Diagnostics (Article 2054054)
15. Diagnostic Strategies (Article 2055383)
16. Supported Test PIDs For Mode $06 (Article 2073954)
17. OBD II Monitor Enabling Criteria (Article 2077158)
18. High and Low Limits (Article 2077162)
19. Load Value Specifications (Article 2077163)
20. DRB Scan Tool Error Messages and Blank Screen (Article 2077027)
21. No Start Test (Article 2053201)
22. Electrical / Mechanical Repair (itype_413)
23. False instrument warning light/gauges (itype_136)
24. No shift/Incorrect gear engagement (itype_154)
25. Tools and Equipment (itype_113)

Component Procedures: Computers and Control Systems

Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Diagnose/Test	Diagnostic Circuit, Inspect	B	0.5	0.0
Diagnose/Test	Diagnostic Circuit, Inspect > NOTE > To RE-Te?	B	0.3	0.0
Diagnose/Test	Pinpoint, Test	B	0.4	0.0

Functional Operation (Article 2074114)

Non Standards
- Powertrain Control Module (2074238)
- Control of Other Systems (2074322)
- High and Low Limits (2074275)
- Load Value (2074283)
- Modes of Operation (2074170)

General System Description (Article 2074181)

Non Standards
- Fuel Control (2074329)
- Transmission Control (2074330)

On-Board Diagnostic System (Article 2074041)

Non Standards
- About Diagnostic Trouble Codes (2074256)
- Global Good Trip Counter (2074262)
- Monitors, Trips and/or Drive Cycles (2074294)
- Non-Monitored Circuits (2074183)
- System Description (2074194)

Complete System Diagram (Article 2073093)

See
Powertrain Management
/Diagrams/Electrical.
See: Powertrain Management > Electrical

Technician Safety Information (itype_15)

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND
CAN
LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICL
EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.
Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important
to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.
When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or
bracelets that might make an inadvertent electrical contact.
When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable.
Following these procedures is very important to the safety of individuals performing diagnostic tests.

DRB III Safety Information (Article 2073089)

WARNING: EXCEEDING THE LIMITS OF THE DRB MULTIMETER IS DANGEROUS. IT
CAN
EXPOSE YOU TO SERIOUS INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.
Follow the vehicle manufacturer's service specifications at all times.
^ Do not use the DRB if it has been damaged.
^ Do not use the test leads if the insulation is damaged or if metal is exposed.
^ To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
^ Choose the proper range and function for the measurement. Do not try voltage or current measurements that

may exceed the rated capacity.
^ Do not exceed the limits shown in the table below:
FUNCTION
INPUT LIMIT
Volts
0-500 peak volts AC
0-500 volts DC
Ohms (resistance)*
0-1.12 megohms
Frequency Measured
0-10kHz
Frequency Generated
Temperature
-58 - 1100°F
-50 - 600°C
*Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.
^ Voltage between any terminal and ground must not exceed
500v
DC or
peak AC.
^ Use caution when measuring voltage above
25v
AC.
^ The circuit being tested must be protected by a
10A
fuse or circuit breaker.
^ Use the low current shunt to measure circuits up to
. Use the high current clamp to measure circuits exceeding
.
^ When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
^ When measuring current, connect the meter in series with the load.
^ Disconnect the live test lead before disconnecting the common test lead.
^ When using the meter function, keep the DRB away from
spark plug
or coil wires to avoid measuring error from outside interference.

Vehicle Damage Cautions (Article 2073076)

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.

Vehicle Preparation For Testing (Article 2073082)

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

Servicing Sub-Assemblies (Article 2073083)

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures should be serviced.

All Technical Service Bulletins (itype_100)

Tsbs

- Engine Controls - Flash Programming Failure Recovery (18-037-05, 2005/10/20)
- DTC's - Caused By Open Fuses (18-09-99, 1999/05/21)
- Auto Computers - Y2K Effects (08-36-98, 1998/07/24)
- Generic Scan Tool - Reference Information (18-012-01, 2001/05/25)
- Engine Controls - Co-Pilot Support/Correct Cable Usage (18-029-05, 2005/06/30)
- Engine Control - PCM Initialization Procedure (08-030-06A, 2006/08/25)
- TCM - MIL ON/DTC P1763 Set (21-04-00, 2000/06/30)
- Leak Detection Pump - Monitor Test (18-12-99, 1999/06/18)
- PCM - False Mil ON, DTC P0443 Set (18-35-98, 1998/12/18)

Customer Interest Bulletins (itype_109)

Tsbs

- TCM - MIL ON/DTC P1763 Set (21-04-00, 2000/06/30)
- PCM - False Mil ON, DTC P0443 Set (18-35-98, 1998/12/18)

Repair Tips (itype_110)

Tsbs

- Engine Controls - Flash Programming Failure Recovery (18-037-05, 2005/10/20)
- DTC's - Caused By Open Fuses (18-09-99, 1999/05/21)
- Auto Computers - Y2K Effects (08-36-98, 1998/07/24)
- Generic Scan Tool - Reference Information (18-012-01, 2001/05/25)
- Engine Controls - Co-Pilot Support/Correct Cable Usage (18-029-05, 2005/06/30)
- Engine Control - PCM Initialization Procedure (08-030-06A, 2006/08/25)
- Leak Detection Pump - Monitor Test (18-12-99, 1999/06/18)

Description of On-Board Diagnostics (Article 2054054)

Non Standards

- Description of On-Board Diagnostics (2073986)

Diagnostic Strategies (Article 2055383)

Non Standards

- Six-Step Troubleshooting Procedure (2073972)

Supported Test PIDs For Mode $06 (Article 2073954)

DAIMLERCHRYSLER SUPPORTED TEST PIDS FOR MODE $06 FOR 1999 MODEL YEAR VEHICLES.

Mode $06 Supported Test PIDs - The following table lists the supported test PIDs for SBEC Passenger Car/Minivan engine applications and JTEC Jeep/Truck/Viper engine applications:

PID	PID Description	SBEC Application			JTEC Application		
		Supported	Comp ID	Scaling (bit wt.)	Supported	Comp ID	Scaling (bit wt.)
00	Test PIDs Supported ($01 - $20)	X	FF	---	X	FF	---
20	Test PIDs Supported ($21 - $40)	X	FF	---	X	FF	---
40	Test PIDs Supported ($41 - $60)	X	FF	---	X	FF	---
60	Test PIDs Supported ($61 - $80)	X	FF	---	X	FF	---
O2 SENSOR MONITOR							
11	O2 Sensor 1/1 Half-Cycle Counter	X	80	1 count per bit	X	81	1 count per bit
13	O2 Sensor 1/1 Big-Slope Counter	X	80	1 count per bit	X	81	1 count per bit
16	O2 Sensor 1/2 High Voltage	X	80	20 mv per bit	X	81	20 mv per bit
17	O2 Sensor 1/2 Low Voltage	X	00	20 mv per bit	X	01	20 mv per bit
1D	O2 Sensor 1/3 Low Voltage	---	---	---	X	01	20 mv per bit
1E	O2 Sensor 1/3 High Voltage	---	---	---	X	81	20 mv per bit
31	O2 Sensor 2/1 Half-Cycle Counter	Dual-bank	80	1 count per bit	Dual-bank	81	1 count per bit
33	O2 Sensor 2/1 Big-Slope Counter	Dual-bank	80	1 count per bit	Dual-bank	81	1 count per bit
36	O2 Sensor 2/2 High Voltage	Dual-bank	80	20 mv per bit	Dual-bank	81	20 mv per bit
37	O2 Sensor 2/2 Low Voltage	Dual-bank	00	20 mv per bit	Dual-bank	01	20 mv per bit
O2 HEATER MONITOR							
19	O_2 Heater 1/1 Hot Trend Counter	X	80	1 count/bit	---	---	---
"	O_2 Heater 1/1 Time to Reach Voltage	---	---	---	X	01	11 ms/bit
1A	O_2 Heater 1/2 Hot Trend Counter	X	80	1 count/bit	---	---	---
"	O_2 Heater 1/2 Time to Reach Voltage	---	---	---	X	01	11 ms/bit
1B	O_2 Heater 1/1 Δ Voltage	X	80	20 mv/bit	---	---	---
"	O_2 Heater 1/2 Time (JTEC, MD 8.0L truck)	---	---	---	O	01	11 ms/bit
1C	O_2 Heater 1/2 Δ Voltage	X	80	20 mv/bit	---	---	---
"	O_2 Heater 1/3 Time (JTEC, MD 8.0L truck)	---	---	---	O	01	11 ms/bit
39	O_2 Heater 2/1 Hot Trend Counter	O	80	1 count/bit	---	---	---
"	O_2 Heater 2/1 Time to Reach Voltage	---	---	---	O	01	11 ms/bit
3A	O_2 Heater 2/2 Hot Trend Counter	O	80	1 count/bit	---	---	---
"	O_2 Heater 2/2 Time to Reach Voltage	---	---	---	O	01	11 ms/bit
3B	O_2 Heater 2/1 Δ Voltage	O	80	20 mv/bit	---	---	---
3C	O_2 Heater 2/2 Δ Voltage	O	80	20 mv/bit	---	---	---
CATALYST SYSTEM MONITOR							
15	Catalyst Slow O_2 1/1 Response Counter	X	80	1 count/bit	---	---	---
"	Catalyst 1/1 Phase Response Counter	---	---	---	X	81	1 count/bit
21	Catalyst 1/1 Switch Frequency Ratio	X	00	0.39% per bit	X	01	0.39% per bit
22	Catalyst 2/1 Switch Frequency Ratio	Dual-bank	00	0.39% per bit	Dual-bank	01	0.39% per bit
35	Catalyst Slow O_2 2/1 Response Counter	X	80	1 count/bit	---	---	---
EGR SYSTEM MONITOR							
41	EGR Monitor Δ Adaptive Fuel Shift	X	80	0.19%/bit	---	---	---
"	EGR Monitor Fail Counter	---	---	---	X	01	1 count/bit

NOTE: An 'X' in the column for SBEC, or JTEC, Engine applications indicates that this PID is supported for all unleaded gasoline engine applications. An 'O' indicates that this PID is application-specific and applies only to certain packages such as dual-bank O_2 systems, dual-bank catalyst systems, etc. A '---' indicates that this PID is not supported by this application. The component ID of $00 for SBEC, or $01 for JTEC represents a maximum test limit. For a minimum test limit, the component ID will be either $80 for SBEC, or the component ID will be $81 for JTEC.

DAIMLERCHRYSLER SUPPORTED TEST PIDS FOR MODE $06 – 1999 (CON'T)

PURGE FLOW SYSTEM MONITOR							
51	Purge Monitor Δ IAC Shift	X	80	1 step per bit	X	81	1 step per bit
52	Purge Monitor Δ Adaptive Fuel Shift	X	80	0.19% per bit	X	81	0.39% per bit (use LSB only)
53	Purge Monitor Δ RPM Shift	X	80	1/8 RPM per bit	X	81	1/8 RPM per bit
EVAPORATIVE SYSTEM MONITOR							
61	0.040" Leak Detection Pump Period	X	80	100 ms per bit	X	81	11 ms per bit

NOTE: An 'X' in the column for SBEC, or JTEC, Engine applications indicates that this PID is supported for all unleaded gasoline engine applications. An 'O' indicates that this PID is application-specific and applies only to certain packages such as dual-bank O_2 systems, dual-bank catalyst systems, etc. A '---' indicates that this PID is not supported by this application. The component ID of $00 for SBEC, or $01 for JTEC represents a maximum test limit. For a minimum test limit, the component ID will be either $80 for SBEC, or the component ID will be $81 for JTEC.

OBD II Monitor Enabling Criteria (Article 2077158)

Non Standards
- 95-99 FWD/AWD SBEC PCM Equipped Vehicles (2077159)
- 95-99 RWD/4WD JTEC PCM Equipped Vehicles (2077160)

High and Low Limits (Article 2077162)

HIGH AND LOW LIMITS
The
PCM
compares input signal voltages from each input device with established high and low limits for the device. if the input voltage is not within limits and other criteria are met, the PCM stores a diagnostic trouble code in memory. Other diagnostic trouble code criteria might include engine RPM limits or input voltages from other sensors or switches that must be present before verifying a diagnostic trouble code condition.

Load Value Specifications (Article 2077163)

LOAD VALUE
Idle / Neutral = 2% to 8% of Maximum Load
2500 rpm / Neutral = 9% to 17% of Maximum Load

DRB Scan Tool Error Messages and Blank Screen (Article 2077027)

Non Standards
- Display Is Not Visible (2077102)
- DRB III Does Not Power Up (2077065)
- Error Messages (2077028)

No Start Test (Article 2053201)

Non Standards
- No Start (NS) Tests (2053060)

Electrical / Mechanical Repair (itype_413)

DRB III (diagnostic read-out box) scan tool
Evaporative System Diagnostic Kit # 6917
fuel filler adapter # 6922
fuel pressure
adapter (C-6631) or # 6539
fuel pressure kit (C-4799-B) or # 5069
fuel release hose (C-4799-1)
min air flow fitting # 6714
jumper wires
ohmmeter
oscilloscope
vacuum gauge
voltmeter
12 volt

test light minimum
25 ohms
resistance with probe # 6801
CAUTION:
A
12 VOLT
TEST LIGHT SHOULD NOT BE USED FOR THE FOLLOWING CIRCUITS, DAMAGE TO THE POWERTRAIN CONTROLLER WILL OCCUR.
^
5 Volt
Supply
8 Volt
^ J1850
PCI Bus
CCD Bus
CKP Sensor
Signal
CMP Sensor
^ Vehicle
Speed Sensor
^ O2 Sensor Signal

False instrument warning light/gauges (itype_136)

Tsbs
- PCM - False Mil ON, DTC P0443 Set (18-35-98, 1998/12/18)

No shift/Incorrect gear engagement (itype_154)

Tsbs
- TCM - MIL ON/DTC P1763 Set (21-04-00, 2000/06/30)

Tools and Equipment (itype_113)

Tsbs
- Generic Scan Tool - Reference Information (18-012-01, 2001/05/25)