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Viewed:	51017		

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Title: 1939 Data Link Troubleshooting

Applies To: All models

Change Log

Dealers: Please refer to the change log text box below for recent changes to this article:

06/06/2014 - New information of a possible failure found through the case file system has shown us a pontential failure location. Refer to the new "Service Information" section

Description

There are a few things that you need to understand before troubleshooting the 1939 data link.

1. First, the drivetrain J1939 data link, J1939 body builder data link, and J1939 engine data link are three completely separate data links.
2. They work the same way, but they are not connected.
3. The troubleshooting below is geared towards the drive train J1939 data link, but the same principles apply to the body builder and engine data link.
4. The J1939 data link consists of a twisted pair of yellow and green wires that all the modules on the truck use to communicate with each other.
5. Two 120 ohm terminating resistors are wired in parallel on the data link. Total resistance on a properly working data link is 60 ohms.
6. When you are checking the data link, if the problem is not present, the data link will show good.
7. The J1939 data link may be referred to as data bus, or CAN as well.
8. A module is capable of being connected to the public and private data link, but the information remains separate.
    - Example: The Body Controller communicates on the drivetrain data link, but also has the body builder data link wired to it.
    - Example: The EIM communicates on the drivetrain data link, but also communicates with the ECM and ACM on the engine private data link.

- The drivetrain data link is a Public data link which consists of any module that is present on the data link when you plug into the ATA diagnostic connector.
- Examples:

ECM	Body Controller
TCM	Instrument Cluster
ABS	Collision Avoidance System (Wingman, OnGuard)

- The Body Builder data link is a Private data link which consists of modules communicating to each other. You cannot use a diagnostic tool to communicate with them.
- Examples:

RPM
Sleeper HVAC
Remote Radio

- The Engine data link is a Private data link which consists of engine related modules communicating to each other. You cannot use a diagnostic tool to communicate with them.
- Examples:

EPA07 MaxxForce 11 / 13	EPA10 N13 SCR
ECM	ECM

EIM	ACM
ACM	

For Post-2007 vehicle 1939 troubleshooting, click on the appropriate link below:

- The troubleshooting cards give a good overview of the data link. This will help show you the backbone of the data link (main data link wiring between 1st terminating resistor to 2nd terminating resistor) and the legs of the data link (wiring from the backbone to each possible module)
- The J1939 Splice Adapters (1024, 1025, 1026) are part of the backbone of the datalink (The backbone will come in on 2 terminals and leave on 2 different termials). The wiring from the connector to each module is a leg.
    - HPV (medium duty) 1939 Troubleshooting Card
    - CE / BE Bus 1939 Troubleshooting Card
    - ProStar 1939 Troubleshooting Card

NOTE:

These cards are 11" x 17" so they may not print well on regular size paper.

If you wish to order the above cards, you can order them through the publications website and the part numbers are:

- ProStar Card - S00153
- DuraStar, TranStar & WorkStar Card - S00155
- CE / BE Bus Card - S00154

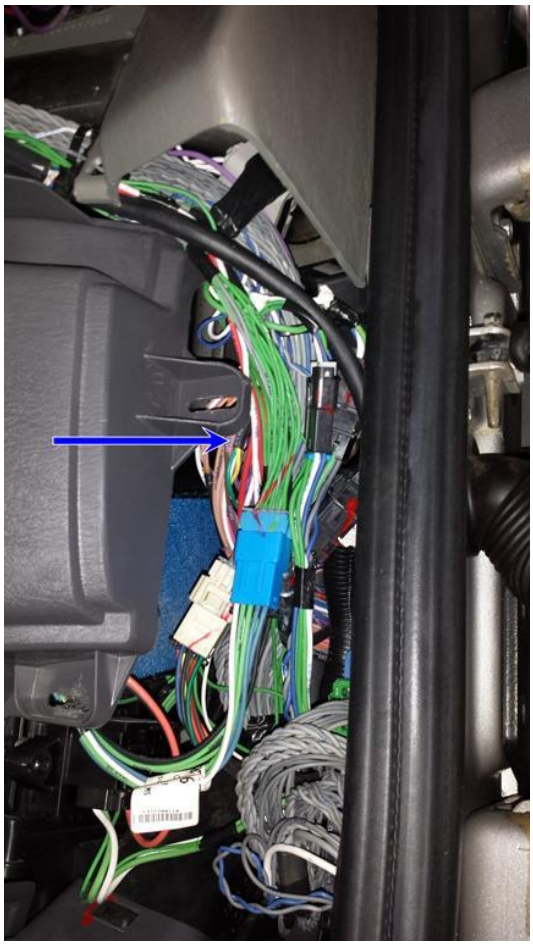
Service Information - Potential failure location based on case file information

- 6/9/2014 - Recent information from the field has shown a potential failure location
- A poor connection on the splice the ties the ABS module into the Back-bone of the data link was found on multiple units
    - This splice is in the cab, and the harness is common between mutiple chassis and engine platforms
    - At this time (6/9/2014) the earliest build date affected is 09/23/2013
    - **Possible DTCs**

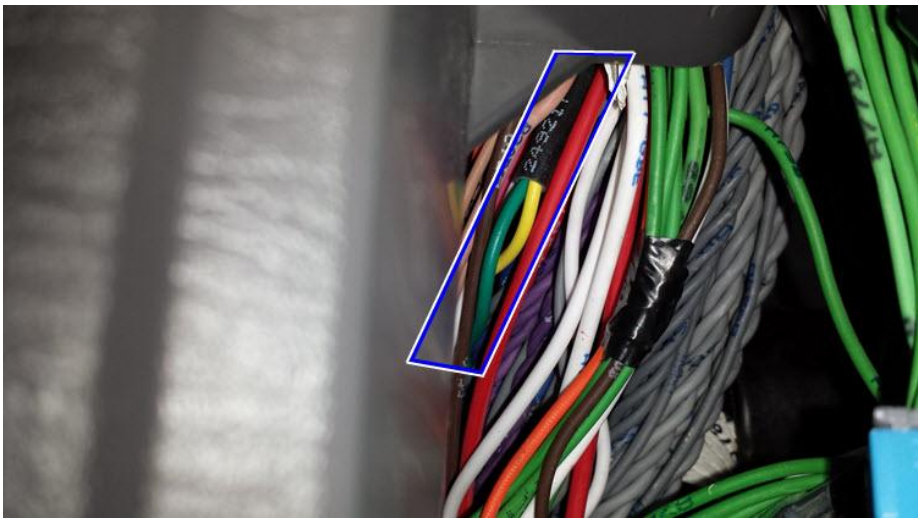
SPN	FMI	Module	Description
639	9	ECM	Drivetrain Message Timeout
639	9	Body Controller	J1939 Drivetrain Data Link Lost
2011	9	Body Controller	ABS Data Link Comm. Failure
2000	9	Body Controller	ECM Data Link Comm. Failure
2023	9	Body Controller	EGC Data Link Comm. Failure
2003	9	Body Controller	TCM Data Link Comm Failure
2000	19	Body Controller	PTC1 (PGN 64892) not received from Engine
2000	9	Instrument Cluster	Loss of Data Link from Engine Controller
2011	9	Instrument Cluster	Loss of Data Link from ABS Controller
2003	9	Instrument Cluster	Loss of Data Link from the Transmission Controller
2033	9	Instrument Cluster	Loss of Data Link from the ESC

- If you have these faults and the vehicle build date is near August 2013 or Newer you will need to troubleshoot this splice in the data link if no obvious failures are found
- Follow the harness from the ABS module to the Data Link Backbone. Once you locate the splice, wiggle test that connection (also twist the spice in your fingers) while monitoring the data link resistance. (If a resistance check does not show any fault, repeat this test monitoring data link voltage as well)
- Cab temperature was effecting the data link behavior in one of the vehicles found to have this issue

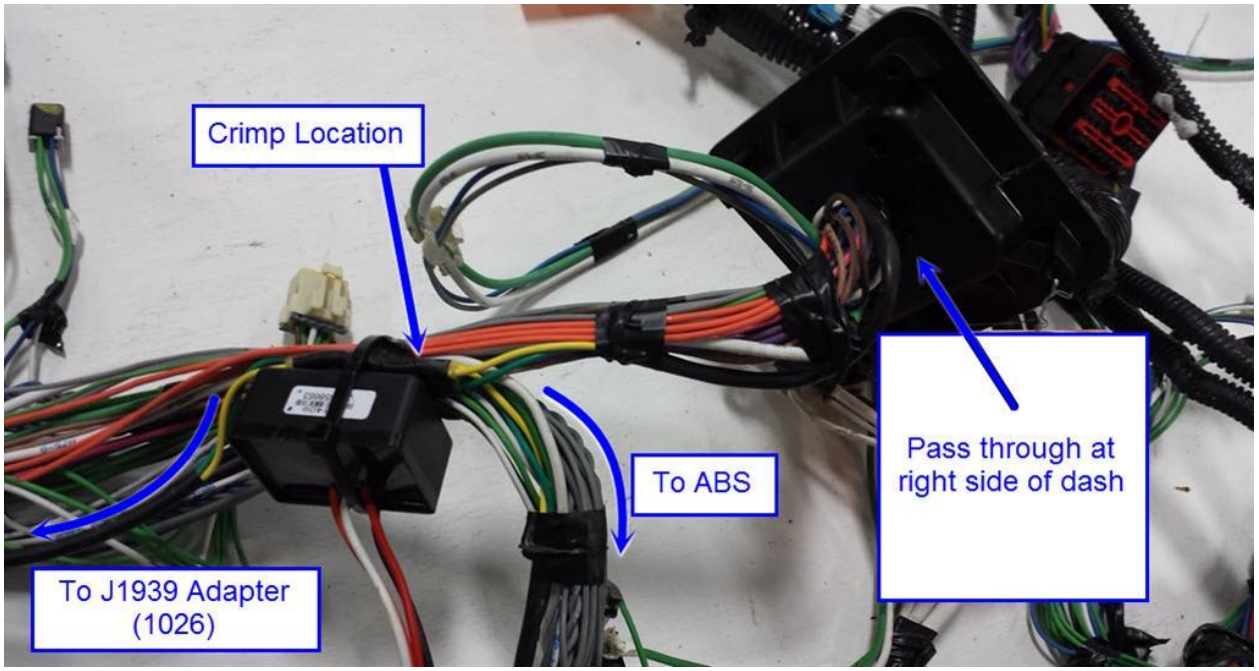
Crimp location: Right side of cab above the ABS module, next to the HVAC box. The condensation module (if installed) will be zip tied to or near the splice.



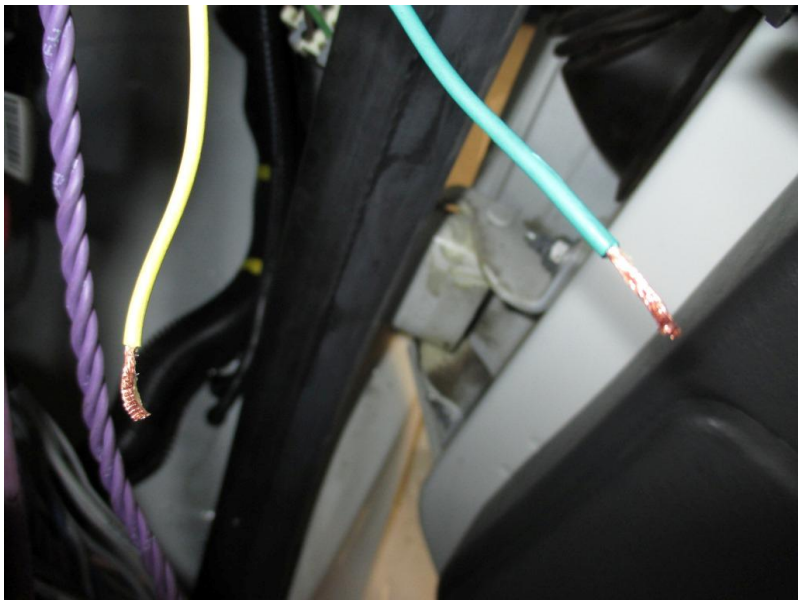
Close view of crimp location



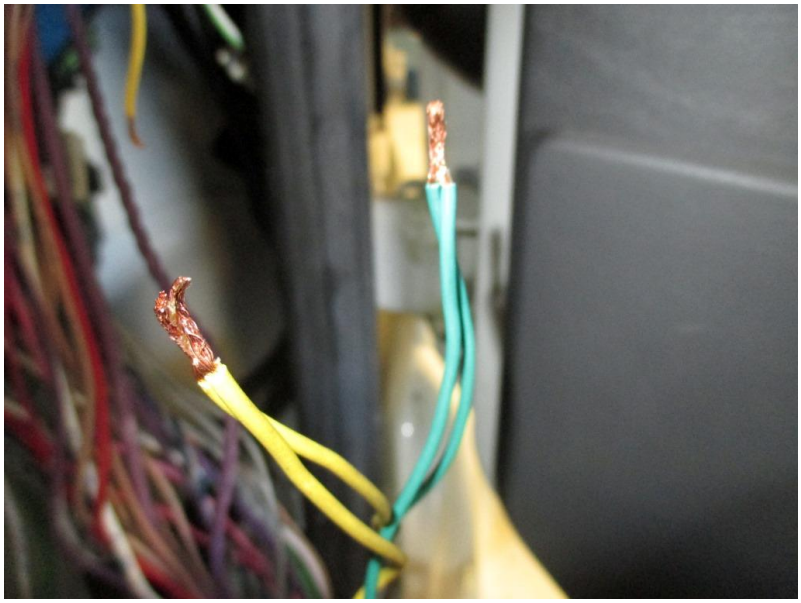
Harness removed from truck for identification



Wire condition at crimp to ABS module



Wire condition at crimp to ABS module (2nd photo)



Parts Information

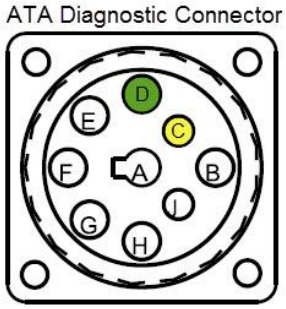
Description	Part Number
Bulk Data Link Cable	3519281C2
Terminating Resistor	3519178C91

Service Procedure

NOTE:

- The problem must be present when taking these readings!!
- If the problem is NOT present, the reading will be within spec every time!!

1. Check for DTC's
    - The ESC will log a code when it loses communication from other modules. So even if you're not having problems with the ESC you still need to check the codes in the ESC.
    - You also need to check the other modules for codes.
    - If you can't get codes from anything, go on to step 2.
2. Hook up with INTUNE diagnostic software and run the "Sniffer" with the key on. Wiggle areas of the harness while watching to see if anything falls off of the sniffer. You will need to get the unit up to temp. Sometimes the bad spots in the data link splices do not show up when the unit is cold. If you cannot find Intune, go to the start button, programs, vehicle diagnostics, and then select Intune. **Do not** use the sniffer in Master Diagnostics. The sniffer in Master Diagnostics only checks the 1708 data link.
    - This will open a box and list every module with its source address that is communicating on the 1939 data link.
    - If a module is not listed then it is not communicating on the 1939 data link.
    - If only one module is missing in the "Sniffer" that module might not be powered up. You need to check the powers (battery and ignition) and grounds to that module. Start by checking the fuses.
    - If you are only missing one module and that module is powered up, you need to make checks 3 and 4 at that module. For example, if the Body Controller does not show up in the "Sniffer", then you need to make your checks at pins 34 and 35 of the 1600 connector at the Body Controller. Refer to the appropriate circuit diagram or the chart at the bottom this article for pin and connector numbers.
    - If nothing shows up or you can't get connected (nothing is communicating), then you need to go to steps 3 thru 5.
    - It is also normal for some modules like the compass module source address 28 to show up on the data link then fall off. Some modules don't update fast enough and the "Sniffer" thinks it went back to sleep. If you see this issue, do not troubleshoot, you can de pin the module and remove it from the data link so it won't show up and go away.
    - For newer models 2010 and up, use the Helios sniffer to see what is on the data link. However when you using Helios once an item has populated the window if it loses power or drops off the only way to tell is if the counter continues to advance. Please pay attention to that when monitoring. The INTUNE sniffer will still work on the newer models as well.
3. Check voltage from pin C to ground and from pin D to ground at the ATA diagnostic connector with the key on.



C - J1939 CAN (High) Yellow
D - J1939 CAN (Low) Green

4. You should have approximately 5 volts total when you add the voltages from each wire together. For expamle 2.7v on C and 2.3v on D.
5. The CAN High should have a higher voltage than the CAN Low. This may help identify if a terminal has been pinned improperly.
6. The voltage on the wires should not match. If they do, you might have the 2 wires shorted together. Check the resistance between the 2 wires in Step 4 to be sure.
7. If you get 0v or close to it on either wire, you probably have a short to ground on that wire. Step 6 will help you narrow down whether it's inside the cab or outside the cab.

8. Check the resistance between pins C and D at the ATA diagnostic connector with the key off. It may be necessary to disconnect the batteries to insure there is no voltage on the data link.

    - You should have approximately 60 ohms.
    - There are two 120 ohm resistors wired in parallel on the data link.
    - If you get close to 0 ohms, indicating low resistance, then you have a short between the 2 wires.
    - If you get 120 ohms, you have an open somewhere in the data link or you're missing one of the resistors. Step 6 will help you narrow down whether it's inside the cab or outside the cab.

9. Check the resistance from pin C to ground and from pin D to ground at the diagnostic connector with the key off.

    - Resistance should be greater than 1,000 ohms.
    - If resistance is less than 1,000 ohms, then you have a short to ground.
    - Step 6 will help you narrow down whether it's inside the cab or outside the cab.

10. If none of the modules are communicating and they are powered up, you probably have a short to ground, short to power, or a short between the 2 wires.

    - Make checks 3 thru 5 at the 1702 connector (where the chassis harness comes through the cab bulkhead on the right side) on both sides of the connector. This will narrow your problem down to either inside the cab or outside the cab. Use the appropriate circuit diagram to find the pin numbers and connector numbers for your truck.

11. If you still can't find the problem, write down your codes and measurements from the steps above and contact Tech Service.

    - Include the specific voltages for each data link wire and which connector and terminal location you measured at. (This will help verify the high and low wires are in the proper terminal location)
    - Include the specific resistance you measured pin to pin on the data link and which connector and terminal location you measured at.
    - Include the specific resistance to ground you measured for each data link wire, and which connector and terminal location you measured at.

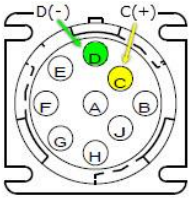
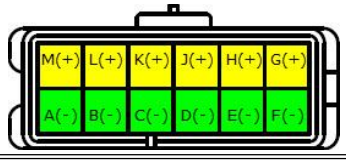
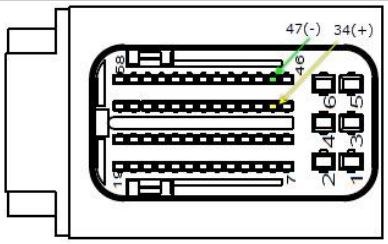
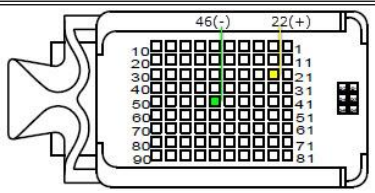
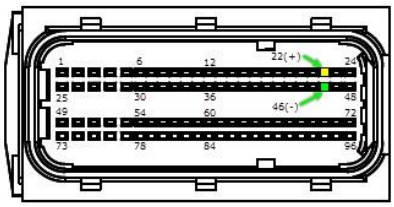
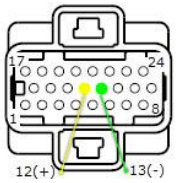
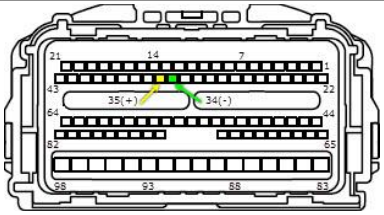
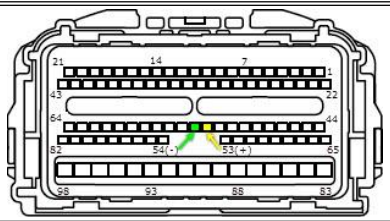
Additional Resources

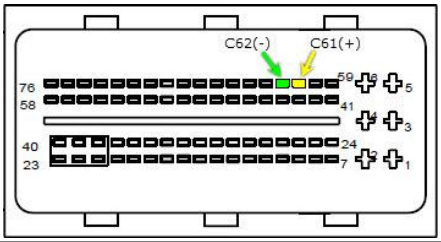
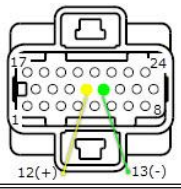
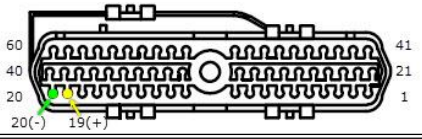
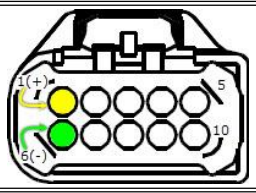
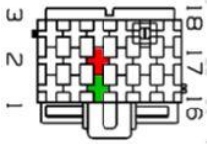
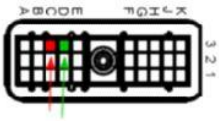
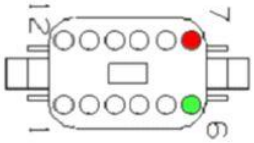
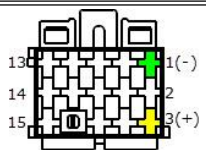
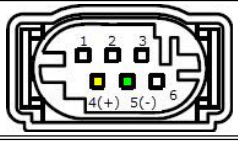
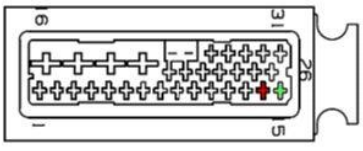
- SFN 02-94 - J1939 Troubleshooting
- Advanced Electrical Guide
- Master Service Information Page

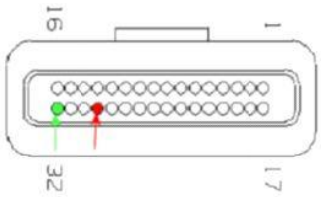
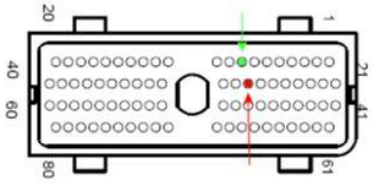
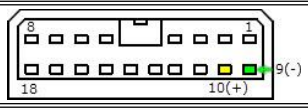
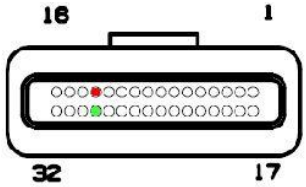
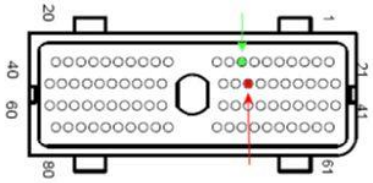
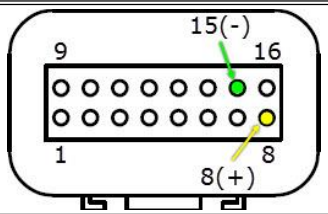
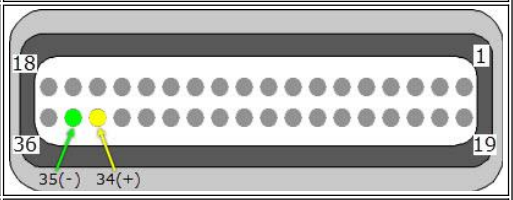
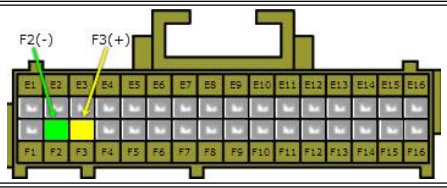
Connector Views

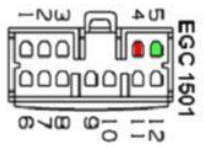
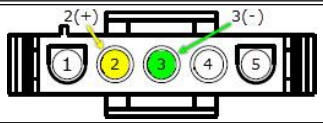
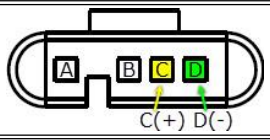
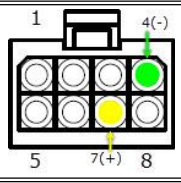
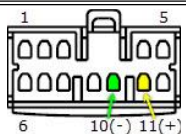
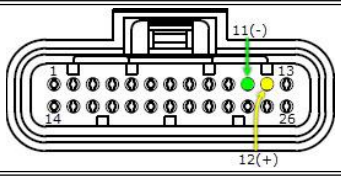
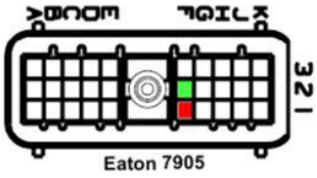
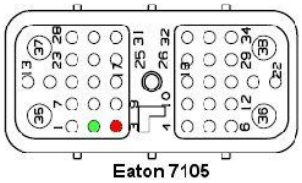
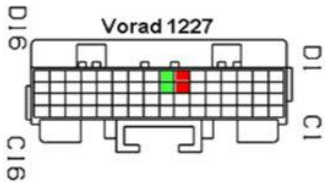
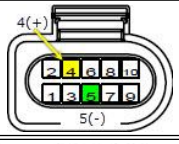
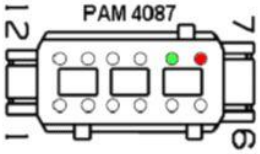
- Always refer to the wiring schematic book for the vehicle you are working on
- Verify which specific engine you are working with. This will help ensure you are viewing the correct schematic with the correct terminal locations on the ECM connector

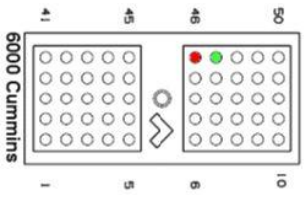
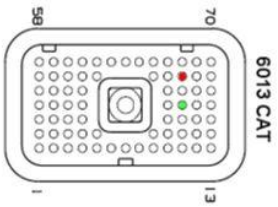
J1939 Data Link (CAN) Pin out at major connectors (Public Data Link Only)			J1939 Pins		Connector View

Module	Connector	Location	Pin (+)	Pin (-)	
Diagnostic Connector	1650	Dash panel left of steering wheel (Bus-under dash right of steering wheel)	C(+)	D(-)	
J1939 Splice Adapter	1024 1025 1026	Center of dash panel	G→M	A→F	
ECM ◦ N13 ◦ MaxxForce 15 ◦ MaxxForce 13 / 11 (EPA 10)	6018	Engine ECM	34(+)	47(-)	
ECM - ISX 15L	6000	Engine ECM	22(+)	46(-)	
ECM - ISB	6000	Engine ECM	22(+)	46(-)	
EIM - MaxxForce 11 / 13 (EPA 07) (Engine Interface Module)	6020	Left side of engine	12(+)	13(-)	
ECM - N9 / N10	6020M	Right side of engine	35(+)	34(-)	
ECM - MaxxForce 7 (EPA 10)	6020M	Right side of engine Mounted on air filter bracket	53(+)	54(-)	
ECM	6020M	Left side of engine 76 Pin Chassis connector (Grey)	C61 (+)	C62(-)	

◦ MaxxForce DT / 9 / 10 (EPA 07 / EPA 10) ◦ MaxxForce 7 (EPA 07) ◦ MaxxForce 5 (EPA 07)					
DLCII Engine ECM	X3 - 6020	Left side of engine above starter (I6) Top of left valve cover (V8)	12(+)	13(-)	
DLC NavPak Engine ECM	6007	Engine ECM - Black	19(+)	20(-)	
Collision Avoidance - Bendix Wingman	8903	Front bumper	1(+)	6(-)	
ABS - Bendix Air EC60	1400	In cab - Right kick panel	8(+)	7(-)	
ABS - Bendix Air EC30	4024	Brake ECU	C3(+)	D3(-)	
ABS - Wabco Air	9513	Wabco ECU Grey	7(+)	6(-)	
ABS - Wabco Air	1420	In cab - Right kick panel	3(+)	1(-)	
Collision Avoidance - Wabco OnGuard	8902	Front bumper	4(+)	5(-)	
Wabco Hydraulic Full Power Brakes	9511	ECU is mounted on HCU Left Frame Rail	14(+)	15(-)	
Allison LCT TCM	7305	TCM Grey	29(+)	32(-)	

					
TCM - Allison LCT Gen 4	7150 7151	Under cab	28(+)	8(-)	
TCM - Allison	1503	In cab	10(+)	9(-)	
Allison MD / HD 3000	7204F	TCM Black	13(+)	29(-)	
Allison MD / HD 3000 Gen 4	7151	TCM	28(+)	8(-)	
Allison TC10 Shift Selector	1852		8(+)	15(-)	
ESC - Electrical System Controller	1600	In cab - Left kick panel	34(+)	35(-)	
BC - Body Controller	1602 (J5)	In cab - Left kick panel	F3(+)	F2(-)	
EGC Gauge Cluster	1500	Left side of dash	4(+)	5(-)	
EGC Gauge Cluster	1501	Left side of dash	12(+)	11(-)	

					
Compass	1912	Behind fuse panel (HPV) Center of headliner (5000/9000)	2(+)	3(-)	
SART Module	1610	In dash - behind EGC	C(+)	D(-)	
SIC (Secondary Instrument Cluster)	1502	Center dash	7(+)	4(-)	
AGSP (Aux Gauge Switch Pack)	1512	Right side dash	11(+)	10(-)	
TPMS (Tire pressure monitor system)	8993F	Near radiator crossmember	12(+)	11(-)	
Eaton Autoshift / Ultrashift DM2	7905	At Gear Shift Selector	G2(+)	G3(-)	
Eaton Autoshift / Ultrashift DM3	7105 7909	TCM	3(+)	2(-)	
Eaton Vorad	1227		D7(+)	D8(-)	
Eaton Vorad VS-400	8901	Center of bumper support bracket	4(+)	5(-)	
PAM Pyro - AMP Meter Module	4087	Cowl	7(+)	8(-)	

Cummins ISM Engine ECM	6000 6014	Engine ECM	46(+)	47(-)	
CAT Engine ECM	6013	Engine ECM	50(+)	34(-)	
Meritor Freedomline Trans TCM	7103	TCM	A(+)	B(-)	

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