DG Technologies Product Pinouts and Industry Connectors Reference Guide

Including the J1939 Type-2 Connector, CAN-bus Troubleshooting, and 2013+ Volvo J1962 Connector

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2. DPA 4 and DPA 5 Series

DPA variants up to and including the DPA 4 Plus were pinned out according to the printing on the DPA endplate (i.e. "/T", "/MH", etc). These tables provide a list of most of the DPA adapters that may still be in service. If you cannot find your adapter in this list, please do not hesitate to call DG technical support.

Signal	DPA5 Dual CAN/BT	DPA 5 Quad CAN	DPA 4/4 Plus	DPA 4 Dual CAN
Ground	6	6	6	6
Power (9-32vdc)	8	8	8	8
J1708-	14	14	14	14
J1708+	15	15	15	15
CAN1 Shield	7	7	7	7
CAN1 Lo	12	12	12	12
CAN1 Hi	13	13	13	13
CAN1 Term 1	3	3	3	3
CAN1 Term 2	4	4	4	4
CAN TX				
CAN RX				
SW CAN	10	10	10	10
ALDL/GM UART	16	16	1	1
ALDL RX				
9141 K Line	1	1		
9141 L Line	11	11		
J1850 Hi	5	5	5	5
J1850 Lo				
ATEC Data				
ATEC Diag				
Discrete In				
Discrete Out				11
CAN2 Term 1	20	20		20
CAN2 Term 2	21	21		21
CAN2 Shield	23	23		23
CAN2 Lo	22	22		22
CAN2 Hi	24	24		24
LIN				
HALDEX				
CAN3 Lo		2		
CAN3 Hi		17		
CAN3 Shield		18		
CAN4 Lo		19		
CAN4 Hi		9		
CAN4 Shield		25		

Signal	DPA5 Dual CAN/BT	DPA 5 Quad CAN	DPA 4/4 Plus	DPA 4 Dual CAN
Ground	6	6	6	6
Power (9-32vdc)	8	8	8	8
J1708-	14	14	14	14
J1708+	15	15	15	15
CAN1 Shield	7	7	7	7
CAN1 Lo	12	12	12	12
CAN1 Hi	13	13	13	13
CAN1 Term 1	3	3	3	3
CAN1 Term 2	4	4	4	4
CAN TX				
CAN RX				
SW CAN	10	10	10	10
ALDL/GM UART	16	16	1	1
ALDL RX				
9141 K Line	1	1		
9141 L Line	11	11		
J1850 Hi	5	5	5	5
J1850 Lo				
ATEC Data				
ATEC Diag				
Discrete In				
Discrete Out				11
CAN2 Term 1	20	20		20
CAN2 Term 2	21	21		21
CAN2 Shield	23	23		23
CAN2 Lo	22	22		22
CAN2 Hi	24	24		24
LIN	18			18
HALDEX				
CAN3 Lo		2		
CAN3 Hi		17		
CAN3 Shield		18		
CAN4 Lo		19		
CAN4 Hi		9		
CAN4 Shield		25		

3. DPA II and III Series, and other Legacy DPA Products

DPA variants up to and including the DPA 4 Plus were pinned out according to the printing on the DPA endplate (i.e. “/T”, “/MH”, etc). These tables provide a list of most of the DPA adapters that may still be in service. If you cannot find your adapter in this list, please do not hesitate to call our technical support department and we will provide you with the correct pinouts and the list of protocols your variant supports.

Signal	DPA II	DPA II /T	DPA II DDE	INLINE II	DPA III	DPA III+ /M	DPA III+ /MH	DPA III+ /MHSW	DPA III+ /T & /I	DPA III+ /TSW	DPA III+ /C	DPA III+ /SCP	DPA ISA	DPA PC/104
Ground	9	6	6	25	9	9	9	9	6	6	9	6	6	11
Power (9-32vdc)	10	8	8	23	10	10	10	10	8	8	10	8		
J1708 Lo	11	14	14	4	11	11	11	11	14	14	11	14	14	12
J1708 Hi	12	15	15	3	12	12	12	12	15	15	12	15	15	14
CAN Shield	13	7	7	7	13	13	13	13	7	7	13	7	7	13
CAN Lo	14	12	12	8	14	14	14	14	12	12	14	12	12	8
CAN Hi	15	13	13	6	15	15	15	15	13	13	15	13	13	10
CAN Term 1	7	3	3	19	7	3	3	3	3	3	7	3	3	5
CAN Term 2	8	4	4	20	8	4	4	4	4	4	8	4	4	7
CAN TX					3									
CAN RX					4									
SW CAN								6		10		10		
ALDL					1	1	1	1	1	1	1	1	1	1
ALDL RX							2	2						
Master/Slave 1					2	2			2	2	2	2	2	3
Master/Slave 2					6	6	6		10		6		10	4
9141 K Line											1			
9141 L Line											3			
J1850 Hi					5	5	5	5	5	5	5	5	5	9
J1850 Lo												9		
External Power													8	15
External Ground													9	2
ATEC Data						7	7	7						
ATEC Diag						8	8	8						
Discrete In									9	9	4			
Discrete Out									11	11		11		

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4. VSI-2534

Signal	VSI-2534	OBDII Cable
Single Wire CAN	1	1
SAE J1850 Hi	2	2
Not connected		3
Chassis Ground	4	4
Signal Ground	5	5
ISO15765-4/CAN 1 Hi SCI_A_ENGINE (Rx) Programming Voltage	6 & 24 *	6
ISO9141/ISO14230 K-Line SCI_A_ENGINE (Tx) SCI_A_TRANS (Tx) SCI_B_ENGINE (Tx)	7	7
Not connected		8
GM UART SCI_B_TRANS (Rx) Programming Voltage	9 & 20 *	9
SAE J1850 Lo	10	10
Programming Voltage	11	11
SCI_B_ENGINE (Rx) Programming Voltage	12	12
Programming Voltage	13	13
ISO15765-4/CAN 1 Lo Programming Voltage SCI_A_TRANS (Rx)	14 & 25 *	14
ISO9141/ISO14230 L-Line Short To Ground SCI_B_TRANS (Tx)	15	15
Unswitched Battery Voltage	16	16

* These pairs of pins are either connected together in the VSI-2534 tool or connected in the OBDII cable.

- Pins 6 and 24 are connected together within the VSI-2534 tool.
- Pins 9 and 20 are connected together within the OBDII cable.
- Pins 14 and 25 are connected together within the VSI-2534 tool.

Pins 3, 8, 17, 18, 19, 21, 22, 23 are not used.

5. Netbridge

Signal	Netbridge
Ground	6
Power (9-32vdc)	8
J1708-	14
J1708+	15
CAN1 Shield	7
CAN1 Lo	12
CAN1 Hi	13
CAN1 Term 1	3
CAN1 Term 2	4
SW CAN	10
ALDL/GM UART	16
9141 K Line	1
9141 L Line	11
J1850 Hi	5
CAN2 Term 1	20
CAN2 Term 2	21
CAN2 Shield	23
CAN2 Lo	22
CAN2 Hi	24
CAN3 Lo	2
CAN3 Hi	17
CAN3 Shield	18
CAN4 Lo	19
CAN4 Hi	9
CAN4 Shield	25

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6. d-briDGe

Signal	d-briDGe
Ground	4
Ground	5
Power	16
J1708/J1587 Lo	15
J1708/J1587 Hi	7
CAN1 Lo	14
CAN1 Hi	6
CAN2 Lo	11
CAN2 Hi	3
Single Wire CAN	24
ISO9141/ISO14230 K-Line	7
ISO9141/ISO14230 L-Line	15
SAE J1850 Hi	2
SAE J1850 Lo	N/C
VAUX	12
VIGN	24
STG	9

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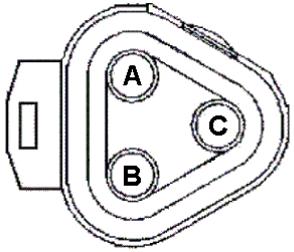
7. Deutsch Connectors (3/6/9-Pin)

NOTE: On the Deutsch 9-pin SAE Standard Heavy-Duty Truck Connector, pins H and J are labeled “OEM Specific”. Some truck OEMs have used these pins differently (i.e. PACCAR and ISO9141), however the most common use of these pins is for a second CAN channel (i.e. Freightliner Cascadia). It has been requested of all diagnostic adapter vendors by the TMC RP1210 task force to use blue colored sheathing on their vehicle-side cables that are wired for a second CAN channel (as per the Freightliner Cascadia model). DG uses blue colored sheathing on our DPA 5 cables that support a second CAN channel.

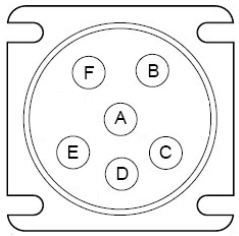
7.1. 3-Pin Deutsch - J1939 Backbone Connector

Pin	Value
A	CAN/J1939 Hi
B	CAN/J1939 Lo
C	CAN/J1939 Shield



7.2. 6-Pin Deutsch – Commonly Called the J1708/J1587 Heavy-Duty Truck Connector

Pin	Value
A	J1708/J1587 Hi
B	J1708/J1587 Lo
C	+12V
D	OEM Specific
E	Ground
F	OEM Specific



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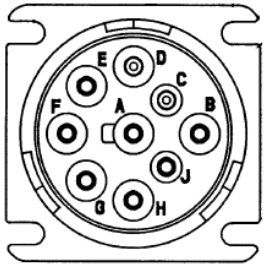
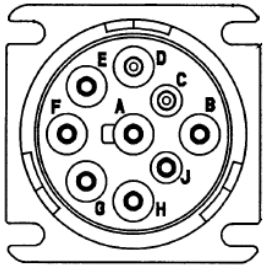
7.3. 9-Pin Deutsch – SAE Standard Heavy-Duty Truck Connector

Pin	Value
A	Ground
B	+12V
C	CAN/J1939 Hi
D	CAN/J1939 Lo
E	CAN/J1939 Shield
F	J1708/J1587 Hi
G	J1708/J1587 Lo
H	OEM Specific
J	OEM Specific



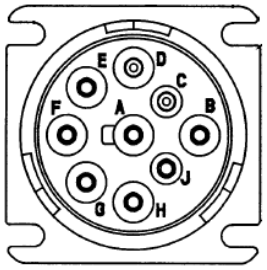
7.4. 9-Pin Deutsch – Freightliner Cascadia (H,J Used for Dual CAN)

Pin	Value
A	Ground
B	+12V
C	CAN/J1939 Hi
D	CAN/J1939 Lo
E	CAN/J1939 Shield
F	J1708/J1587 Hi
G	J1708/J1587 Lo
H	CAN 2 Hi
J	CAN 2 Lo



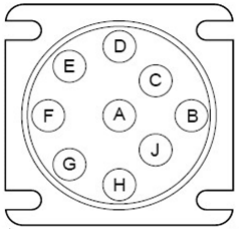
7.5. 9-Pin Deutsch – PACCAR (J Used for ISO9141 K-Line)

Pin	Value
A	Ground
B	+12V
C	CAN1/J1939 Hi
D	CAN1/J1939 Lo
E	CAN1/J1939 Shield
F	J1708/J1587 Hi
G	J1708/J1587 Lo
H	OEM Specific
J	ISO9141 K-Line



7.6. 9-Pin Deutsch – CAT Industrial Connector – (J1708/J1587, J1939, CAT Data Link)

Pin	Value
A	+12V
B	Ground
C	CAN Shield
D	CAT Data Link (CDL) Hi
E	CAT Data Link (CDL) Lo
F	CAN/J1939 Lo
G	CAN/J1939 Hi
H	ATA/J1587/J1708 Lo
J	ATA/J1587/J1708 Hi



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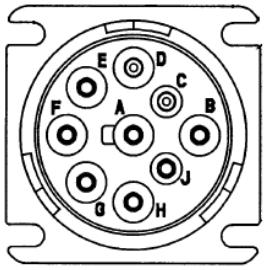
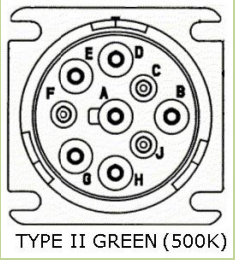
7.7. 9-Pin Deutsch – CNH (Dual CAN and E Used for ISO9141K-Line)

Pin	Value
A	Ground
B	+12V
C	CAN1/J1939 Hi
D	CAN1/J1939 Lo
E	ISO9141 K-Line
F	N/C
G	N/C
H	CAN2/J1939 Hi
J	CAN2/J1939 Lo



7.1. 9-Pin Deutsch – J1939 "Type 2" for J1939 @ 500k

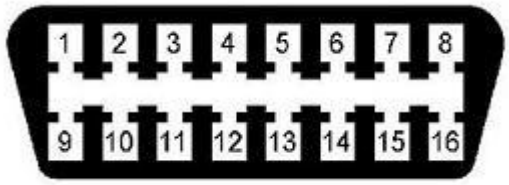
Pin #	Function
A	Battery Minus (Ground)
B	Battery Plus (+V)
C	CAN/J1939 High
D	CAN/J1939 Low
E	CAN/J1939 Shield
F	See Note 1 (Protocol "High" Line, i.e. CAN/J1708/J1939 High)
G	See Note 1 (Protocol "Low" Line, i.e. CAN/J1708/J1939 Low)
H	OEM Defined
J	OEM Defined



Note 1 – Tool (VDA) Manufacturers should multiplex pins F and G, if used by the tool. Multiplexing pins F and G is necessary to allow support of SAE J1708 or CAN protocol functionality on those pins. Per SAE J1939-13, the vehicle side networks on pins F and G are limited to SAE J1708 and CAN 1Mbps or lower.

8. SAE J1962 OBDII Connector

Pin	Value
1	N/C
2	J1850 +
3	Ford DCL(+) Argentina, Brasil (pre OBD-II) 1997-2000
4	Chassis Ground (GND)
5	Signal Ground
6	CAN High (ISO 15765-4 and SAE-J2284)
7	K line of ISO 9141-2 and ISO 14230-4
8	N/C
9	N/C
10	J1850 -
11	Ford DCL(-) Argentina, Brasil (pre OBD-II) 1997-2000
12	N/C
13	N/C
14	CAN Low (ISO 15765-4 and SAE-J2234)
15	ISO 9141-2 L Line
16	+V



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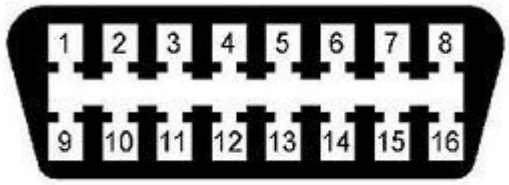
9. Volvo 2013 SAE J1962 OBDII Connector (2013 and Newer Volvo Chassis with Volvo Engine)

Pin	Function
1	
2	
3	J1939 +
4	
5	GND
6	ISO15765 +
7	
8	
9	
10	
11	J1939 -
12	J1708 +
13	J1708 -
14	ISO15765 -
15	
16	VBAT



Beginning in 2013, Volvo has introduced a new diagnostic connector for a Volvo chassis with a Volvo engine. It will be based on the SAE standard J1962 connector (above). It will have two separate CAN channels with ISO15765 on CAN channel 1 and J1939 on CAN channel 2. It will also have J1708 in the connector as well.

As of this writing, Volvo still plans on keeping the SAE standard J1939 9-pin Deutsch connector for a Volvo chassis with a Cummins engine.

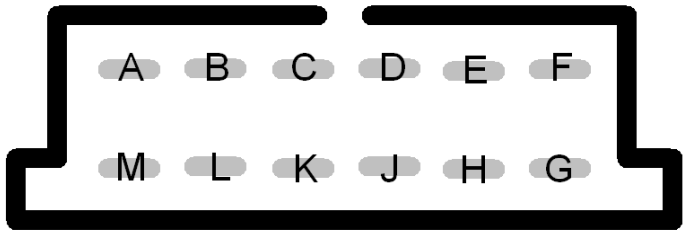
10. Heavy Duty OBDI Connector for J1708/J1587

This connector is commonly called an “ALDL connector” because of its origin within General Motors for use with their Assembly Line Data Link (ALDL) protocol running at 160 baud (later at 8192 baud). This connector appears in this document because it was adopted early on by several manufacturers in the heavy-duty world for J1708/J1587 communications. The J1708/J1587 protocol and this connector are still present on many transit buses outside of the United States.

The heavy-duty implementation for J1708/J1587 shown below (A, H, J, K) was not part of the original GM specifications. Caution should be taken to assure that the vehicle or equipment being connected to has the J1708/J1587 protocol on the correct pins (J, K) before connecting a DPA to this connector. Refer to the vehicle user or service manuals for more information.

Heavy-Duty J1708/J1587 Implementation with Automotive ALDL Signals marked in green and with the word (ALDL).

Signal	Value
A	Ground
B	10 k ohm - Mode Select Resistor (ALDL)
C	
D	
E	160 Baud Data Stream (ALDL)
F	
G	
H	+V
J	J1708/J1587+ (Hi)
K	J1708/J1587 – (Lo)
L	
M	8192 Baud Data Stream (ALDL)



ALDL 12-pin Plug

Example:
DG-DPA-OBD1-6-CABLE

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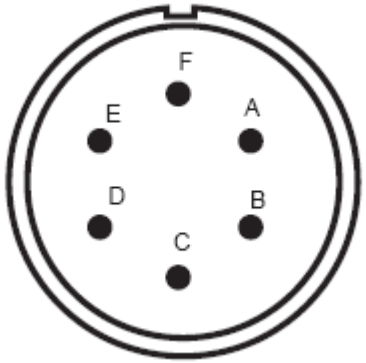
11. US Military HMMWV Connector for GM 4L80-E Transmission Control Module (GM UART)

This connector is the GM UART connector for many of the military HMMWV vehicles using the GM 4L80-E transmission control module.

Signal	Value
A	Ground
B	GM UART Data
C	
D	+V
E	
F	

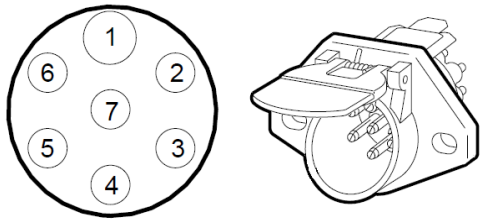


PEI-Genesis Part # CB6-18-12PS

12. SAE J560 Trailer Connector and the DG PLC TestCon

12.1. SAE J560 Trailer Connector Showing PLC4TRUCKS on Terminal 7 – Auxiliary Power

Terminal Number	Conductor Wire Color	Lamp and Signal Circuits
1	White	Ground return to towing vehicle
2	Black	Clearance, side marker, and identification lamps
3	Yellow	Left turn signal and hazard lamps
4	Red	Stop lamps and antilock devices
5	Green	Right turn signal and hazard lamps
6	Brown	Tail and license plate lamps
7	Blue	Auxiliary Power (PLC4TRUCKS)



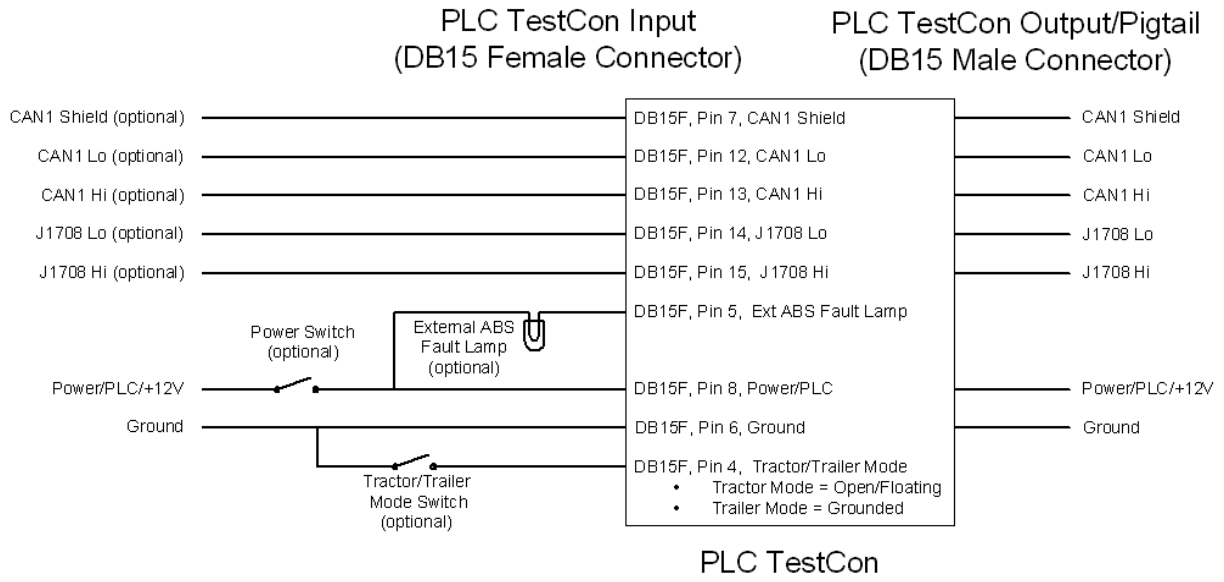
12.2. PLC TestCon Pinouts - Trailer/Tractor Side - (DB15 Female)

DB15F Pin	J560 Pin	Signal Name	Function
1	N/A	No Connection	Reserved
2	N/A	No Connection	Reserved
3	N/A	No Connection	Reserved
4	N/A	Tractor/Trailer Mode	If floating, Tractor Mode If grounded, Trailer Mode
5	N/A	External ABS Lamp Input	External 12V ABS Lamp (+12V side)
6	1 (White)	Ground (-VDC)	Ground
7	N/A	CAN Shield	Pass-through for CAN/J1939 Shield
8	7 (Blue)	Power (+VDC/PLC)	Power (9-16VDC)
9	N/A	No connection	Reserved
10	N/A	No connection	Reserved
11	N/A	No connection	Reserved
12	N/A	CAN Low (-)	Pass-through for CAN/J1939 Low
13	N/A	CAN High (+)	Pass-through for CAN/J1939 High
14	N/A	J1708 Low (-)	J1708/J1587 Low (-)
15	N/A	J1708 High (-)	J1708/J1587 High (-)

12.3. PLC TestCon Pinouts - Pigtail Side (To J1708 Adapter) - (DB15 Male)

DB15M Pin	Signal Name	Function
1	No Connection	No Connection
2	No Connection	No Connection
3	No Connection	No Connection
4	No Connection	No Connection
5	No Connection	No Connection
6	Ground (-VDC)	Ground
7	CAN/J1939 Shield	CAN/J1939 Shield
8	Power (+VDC/PLC)	Power (9-16VDC)
9	No connection	No Connection
10	No connection	No Connection
11	No connection	No Connection
12	CAN Low (-)	CAN/J1939 Low
13	CAN High (+)	CAN/J1939 High
14	J1708 Low (-)	J1708/J1587 Low (-)
15	J1708 High (-)	J1708/J1587 High (-)

12.4. PLC TestCon External Wiring Example



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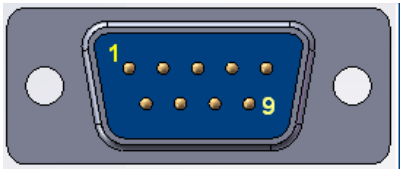
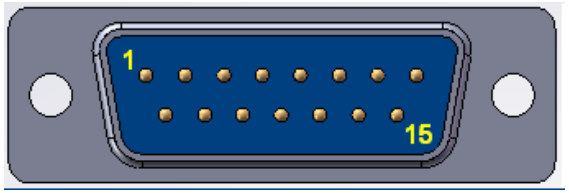
13. D-Sub 9, 15 and 25 Connectors



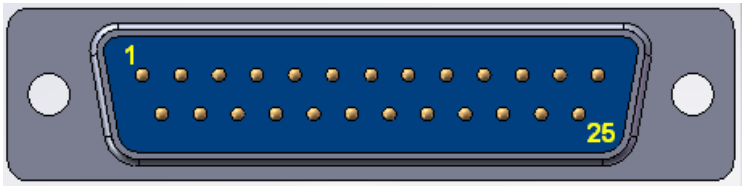
DB9 Male Connector

Serial (RS-232) variants of the DPA have a DB9 female connector that connects to the PC. The PC is considered to be a DTE (Data Terminal Equipment) device and the DPA is considered to be a DCE (Data Communications Equipment) device (like a modem). Therefore, "generic" DB9M to DB9F and DB9M to DB25F serial cables (commonly found at Walmart and Radio Shack) work for the DPA to PC connection. See the RS-232 table below for specific RS-232 signals.



DB15 Male Connetor

DPA variants (4 Plus and older) will have a DB15 female connector to connect to the vehicle network. Pinouts and signals for this connector are listed in the tables at the beginning of this document.



DB25 Male Connector

New to the DPA 5 is a DB25 female connector to connect to the vehicle network. Pinouts and signals for this connector are listed in the tables at the beginning of this document.

RS-232 DB9 Pinout Designations

Pin	Name	Notes/Description
1	DCD	Data Carrier Detect
2	RD	Receive Data (Rx)
3	TD	Transmit Data (Tx)
4	DTR	Data Terminal Ready
5	SGND	Ground
6	DSR	Data Set Ready.
7	RTS	Request To Send.
8	CTS	Clear To Send.
9	RI	Ring Indicator

14. USB Connectors Used with the DPA

The DPA variants that use USB as an adapter to PC communications method have a “USB Type A Male” (FIGURE 1 - right) to a “USB Type B Male” (FIGURE 1 - left) cable.

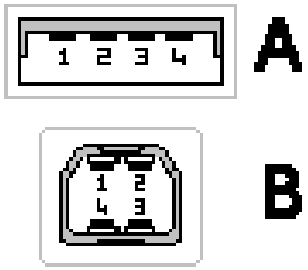
Newer DPA variants such as the DPA 4 Plus and DPA 5 have standoff screws allowing the new DG USB cable (FIGURE 2) to be screwed into the DPA enclosure, reducing the risk of damage to the USB connector on the DPA circuit board.

DG recommends using USB cables that have gold-plated connectors.

FIGURE 1 – Type B Male (left) to Type A Male (right)

FIGURE 2 – Type A Male (left) to Type B Male (right)

Pin	Name	Cable color	Description
1	VCC	Red	+5 VDC
2	D-	White	Data -
3	D+	Green	Data +
4	GND	Black	Ground



USB Male (Plug) Connectors

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15. Appendix A. SAE J1708 Connector and Part Numbers

HD10-6-12P
J1708 Cab Mounted Receptacle

HD16-6-12S
J1708 Mating Plug

15.1. SAE J1708 In-Cab Connector Part Number

Receptacle	HD10-6-12P
Pin Contact	0460-220-1231
Sealing Cap	HDC16-6

15.2. SAE J1708 Mating Plug Part Number

Plug	HD16-6-12S
Sockets	0462-210-1231
Strain Relief	HD18-006

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16. Appendix B. SAE J1939 “Type 1” Connector and Part Numbers (250k Baud Only)

HD10-9-1939P
Cab Mounted Receptacle

HD10-9-1939P-B022
Cab Mounted Receptacle (with jam nut mount)

HD17-9-1939S
Mating Plug

HD16-9-J1939SE
Mating Plug (with locking ring)

16.1. Type 1 SAE J1939 In-Cab Connector Part Numbers

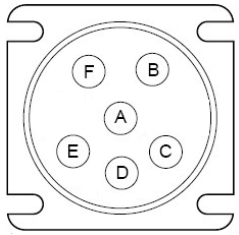
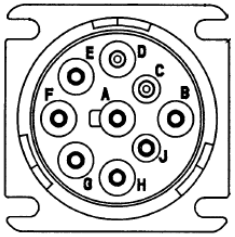
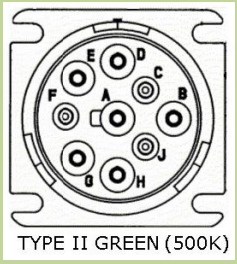
Receptacle	HD10-9-1939P	HD10-9-1939P-B022
Pin Contact	0460-202-1631	0460-202-1631
Sealing Cap	HDC16-9-E004	HDC16-9-E004

16.2. Type 1 SAE J1939 Mating Plug Part Numbers

Receptacle	HD17-9-1939S	HD17-9-1939SE
Sockets	0462-201-1631	0462-201-1631
Strain Relief	HD18-009	HD18-009

17. Appendix C. The New J1939 "Type 2" Connector (for J1939 @ 500k)

There will soon be three common diagnostic connectors:

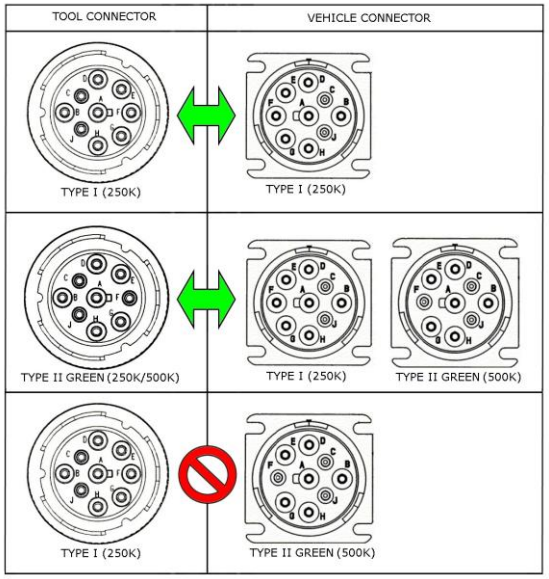
Connector Type	Connector Description	Picture
J1708 – 6-pin Deutsch	Older connector and mostly unused for new manufacture.	 Figure 9.1
J1939 "Type 1" – 9-pin Deutsch	Current model of connector used by OEMs.	 Figure 9.2
J1939 "Type 2" – 9-pin Deutsch	Estimated to be in 2013 or 2014 model year vehicles.	 Figure 9.3

17.1. Introducing the “Type 2” J1939 Connector

The current “standard” 9-pin Deutsch vehicle diagnostic connector is now being labeled by SAE as the “Type 1” J1939 connector (see Figure 9.2). It conveys both J1708 and J1939 information. The “Type 2” connector (see Figure 9.3) has been added to address the increase in J1939 data bus speed from 250k to 500k bits/second and has been designed with backward compatibility in mind. Where it is not backward compatible, it provides protection for datalink devices.

In short (for more detail, see SAE J1939-13):

- A “Type 1” cable originally designed for a J1939 speed of 250k will not physically connect to a “Type 2” vehicle designed for 500k. This protects a vehicle network from a VDA or handheld device that may not know about the move to 500k, which might take the 500k bus down.
- A “Type 2” cable will allow an offboard device to connect to BOTH a “Type 2” and a “Type 1” connector. This will work because the VDA devices and OEM software packages will be doing automatic baud detection so that when they connect, they do not disturb vehicle communications.
- The “Type 2” connector will be green in color to define that it is 500k J1939, and VDA cables will also be in green to designate that the VDA device is J1939 “500k-capable”.



From SAE J1939-13 [Figure 1 -8 – MATING COMBINATIONS AND KEYING]

17.2. Type 2 SAE J1939 Connector Pictures

HD10-9-1939P-P080
Cab Mounted Receptacle

HD10-9-1939P-BP03
Cab Mounted Receptacle
(with jam nut mount)

HD14-9-1939P-P080
In-Line Receptacle

HD17-9-1939S-P080
Mating Plug

HD16-9-1939S-P080
Mating Plug (with locking ring)

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17.3. Type 2 SAE J1939 Connector Pin Designations

Pin #	Function
A	Battery Minus (Ground)
B	Battery Plus (+V)
C	CAN/J1939 High
D	CAN/J1939 Low
E	CAN/J1939 Shield
F	See Note 1 (Protocol “High” Line, i.e. CAN/J1708/J1939 High)
G	See Note 1 (Protocol “Low” Line, i.e. CAN/J1708/J1939 Low)
H	OEM Defined
J	OEM Defined

- Note 1 – Tool Manufacturers should multiplex pins F and G, if used by the tool. Multiplexing pins F and G is necessary to allow support of SAE J1708 or CAN protocol functionality on those pins. The networks on pins F and G are limited to SAE J1708 and CAN 1Mbps or lower. Per SAE J1939-13, the vehicle side networks on pins F and G are limited to SAE J1708 and CAN 1Mbps or lower.

17.4. Type 2 SAE J1939 In-Cab Connector Part Numbers

Receptacle	HD10-9-1939P-P080	HD10-9-1939P-BP03
Pin Contact	0460-202-1631	0460-202-1631
Sealing Cap	HDC16-9-E004	HDC16-9-E004

17.5. Type 2 SAE J1939 Mating Plug Part Numbers

Receptacle	HD17-9-1939S-P080	HD16-9-1939S-P080
Sockets	0462-201-1631	0462-201-1631
Strain Relief	HD18-009	HD18-009

18. Appendix D. Testing and Troubleshooting of a CAN/J1939 Network

18.1. J1939 Network Types

There are two common standards that OEMs follow when designing their CAN/J1939 network, J1939-11 and J1939-15.

18.1.1. J1939-11

The J1939-11 standard calls for twisted-pair wire ***with*** a shield. The shield is typically grounded at the engine ECM or negative battery post and must only be grounded at one spot on the vehicle. This standard is not commonly implemented because of the added cost of the shielding. The main issues with this network are too many, or too few, termination resistors (see Figure D2) or breaks in wire and insulation due to kinks, and vibration. This standard calls for the external termination resistors shown in Figuree D2.

18.1.2. J1939-15

The J1939-15 standard calls for twisted-pair wire ***without*** a shield and is the most widely adopted. The main issues with this network are breaks in the wire and insulation due to kinks, vibration and rubbing, wire and connector corrosion, and too many, or too few, termination resistors. In the J1939-15 specification, termination resistors are commonly found inside of ECMs which are easily “activated” by shunting several pins at that ECMs connection to the vehicle wiring harness. This configuration makes it very easy to have a termination resistor problem and is much more difficult to diagnose.

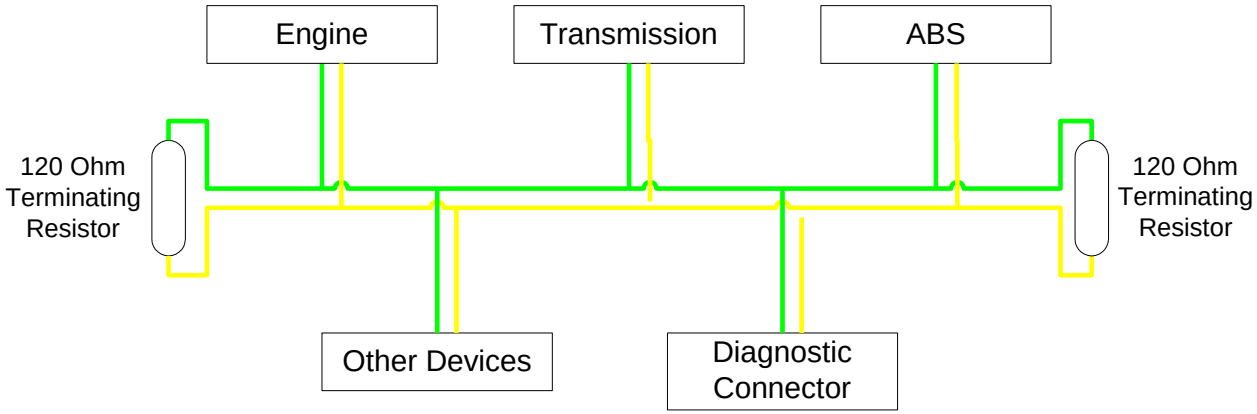
18.2. CAN/J1939 Termination Resistor

The following image shows a picture of a 120 Ohm resistor typically found within vehicle ECMs and an image of a J1939 termination resistor that is commonly found on J1939-11 networks.

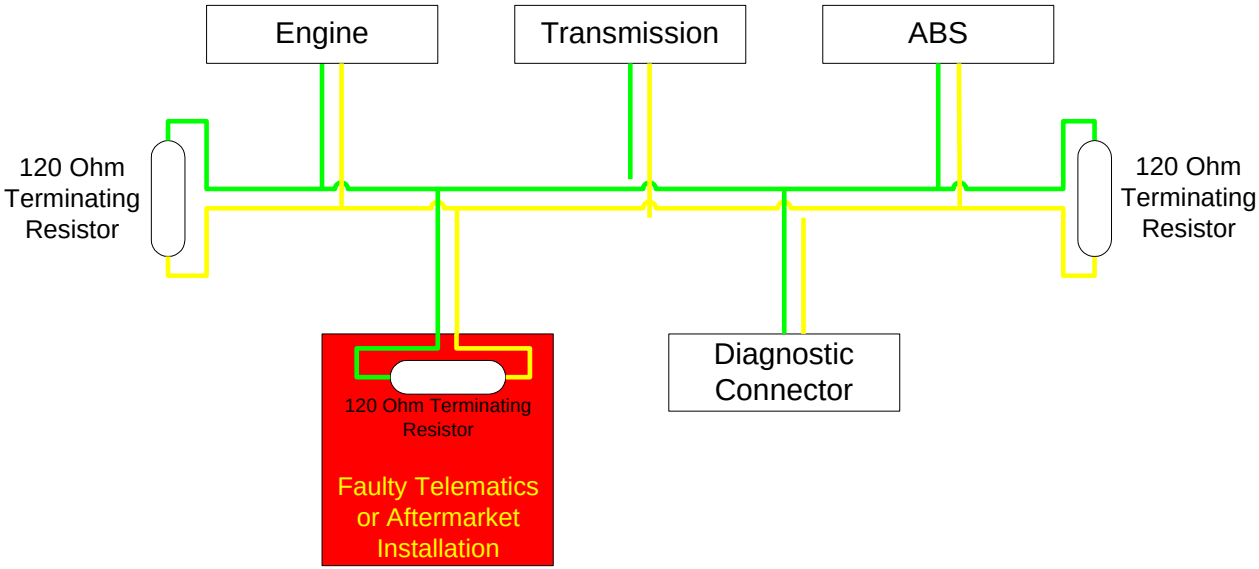
Figure D1
Image of a 120 Ohm resistor.
Brown, Red, Brown with +/- 5% tolerance (Gold)

Figure D2
Image of J1939 Terminating Resistor on J1939-11 Network (Twisted Shielded Pair)

18.3. A Properly Terminated J1939 Network (Termination Resistors at the Logical Network End Points)



18.4. Aftermarket Additions Improperly Installed Can Cause J1939 Network Issues



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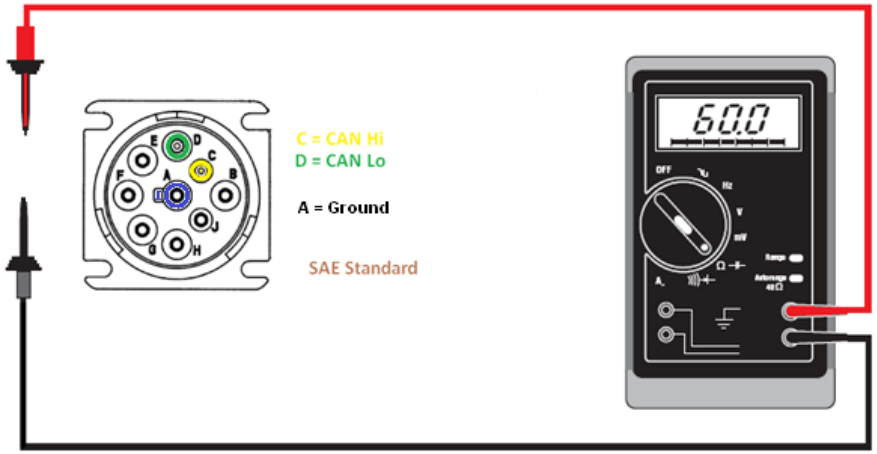
18.5. CAN/J1939 Network Testing Step 1 (Termination Resistance)

To test for proper CAN/J1939 network termination requires standard hand tools and a standard Volt/Ohm meter. Follow these steps:

1. Completely power down the vehicle. This is done at the battery disconnect, or by removing the positive terminal from the battery.
    a. This step cannot be bypassed as invalid values will affect the test outcome.
2. With Ohm meter, measure the resistance between pins C (CAN/J1939 High) and D (CAN/J1939 Low) on the 9-pin Deutsch diagnostic connector. If you are not working on a heavy-duty vehicle, read your vehicle/equipment literature as to where ***CAN High*** and ***CAN Low*** can be found.

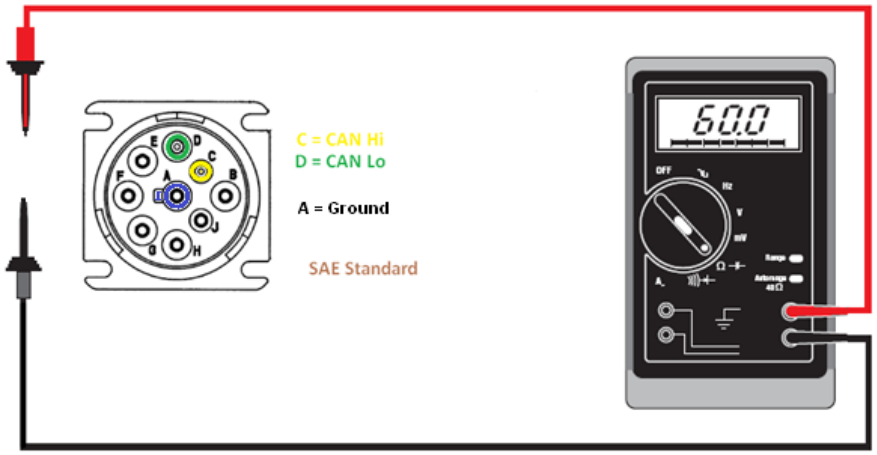


Value Obtained	Issue	Resolution
Between 54-66 Ohms	Properly terminated network.	Resistance Ok, try Step 2.
Greater than 120 Ohms	Open circuit or missing a terminating resistor.	Install a terminating resistor at the network end. See OEM literature for terminating resistor location and for further troubleshooting information.
Less than 44 Ohms	More than two terminating resistors or J1939 wires are shorted together somewhere.	Remove extraneous terminating resistors by reading OEM literature for where the two terminating resistors should have been installed.

18.6. CAN/J1939 Network Testing Step 2 (CAN/J1939 High and CAN/J1939 Low To Ground)

To test for CAN/J1939 wire shorts to ground requires standard hand tools and a standard Volt/Ohm meter. Follow these steps:

1. Completely power down the vehicle. This is done at the battery disconnect, or by removing the positive terminal from the battery.
    a. This step cannot be bypassed as invalid values will affect the test outcome.
2. With Ohm meter, measure the resistance between pins C (CAN/J1939 High) and A (Ground). Then measure the resistance between pins D (CAN/J1939 Low) and A (Ground). If you are not working on a heavy-duty vehicle, read your vehicle/equipment literature as to where ***CAN High, CAN Low*** and ***Ground*** can be found.

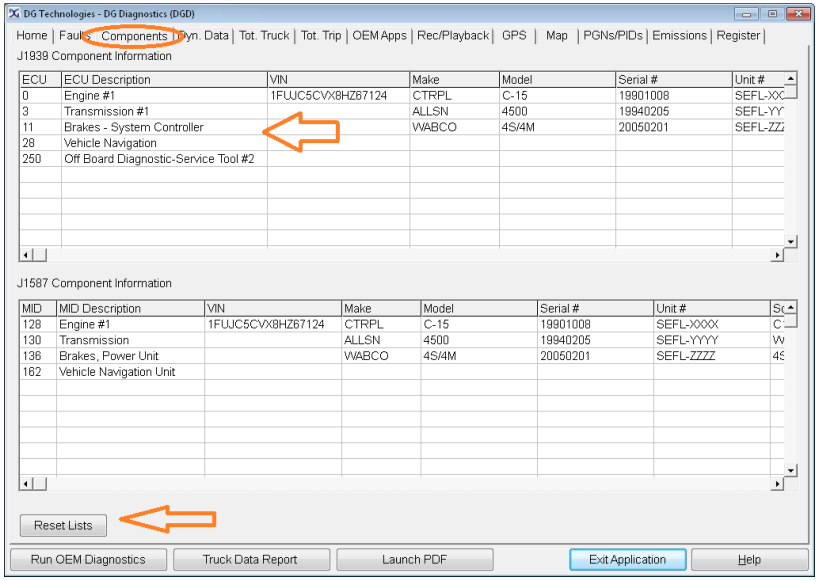


Value Obtained	Issue	Resolution
About 10k Ohms or Greater	No shorts to ground.	Try Step 3.
Less than 10k Ohms	Wire shorted to ground.	Repair or replace J1939 harness. See OEM literature for further testing of individual data bus wiring, and potential replacement of databus segments.

18.7. J1939 Network Testing Step 3 (Roll Call) – Only Applicable to J1939 Networks

To test for controllers transmitting on the databus (commonly called ***Roll Call***) and potentially leaving the databus because of an error condition (BUS_OFF) requires a Dearborn Group RP1210 device, a personal computer (PC) with drivers for that device installed, and a copy of DG Diagnostics software (free with purchase of a DG RP1210 device). For more information on DG Diagnostics see on of the RP1210 device's User Manual (available from the Start -> Programs menu).

1. Power up the vehicle and turn ignition switch on.
2. Connect DPA device to the vehicle/equipment diagnostic connector.
3. Start ***DG Diagnostics*** by using the shortcut icon on the desktop. On the ***Home*** tab, select the correct Device and click the ***Connect*** button.
4. Go to the ***Components*** tab. Wait for 30 seconds to ensure all ECMs that are supposed to be transmitting on J1939 are listed (top arrow).
    a. If a component is not transmitting that should be, refer to the OEM literature on how to diagnose that component.
5. Press the **Reset Lists** button and wait another 30 seconds. If a controller has disappeared, then that controller has went into a ***BUS_OFF*** state indicating something is wrong with that components ability to transmit on the CAN/J1939 data bus.
    a. Refer to the OEM literature on how to fully diagnose that component.



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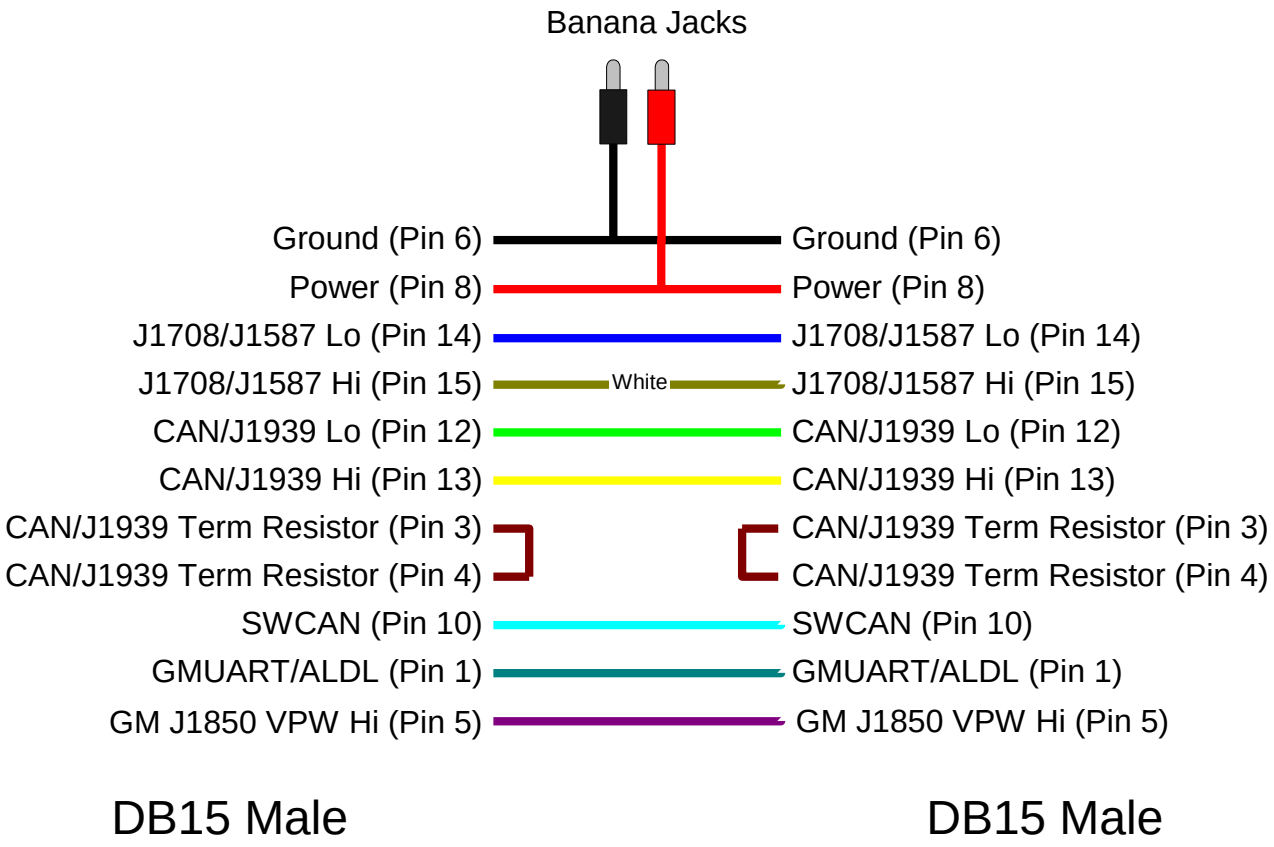
19. Appendix E. Commonly Requested Cable Drawings

19.1. DPA 4 Plus to DPA 4 Plus “Back-to-Back” Cable for Use with a Second PC Running a Simulator



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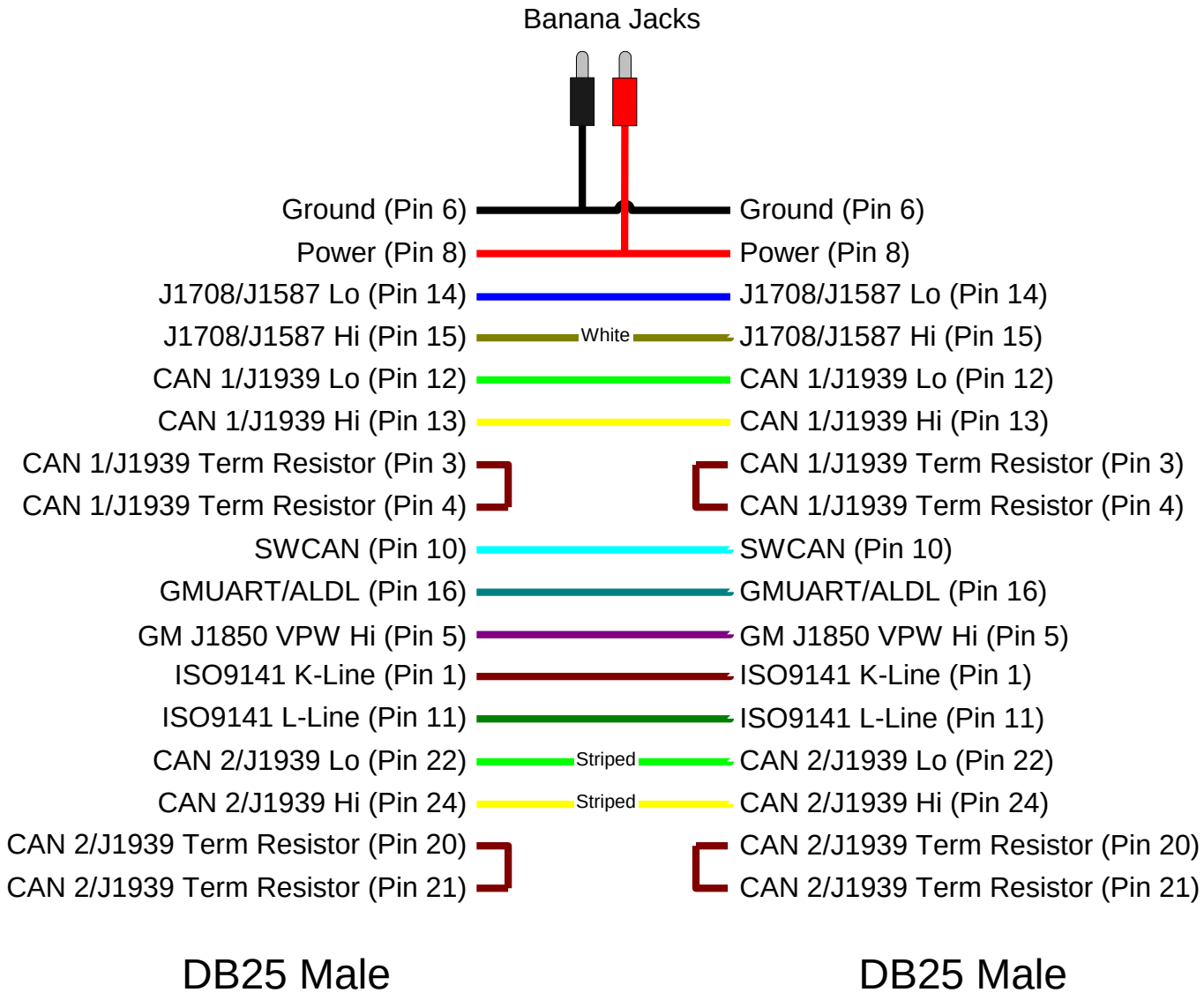
19.1. DPA 5 to DPA 5 “Back-to-Back” Cable for Use with a Second PC Running a Simulator



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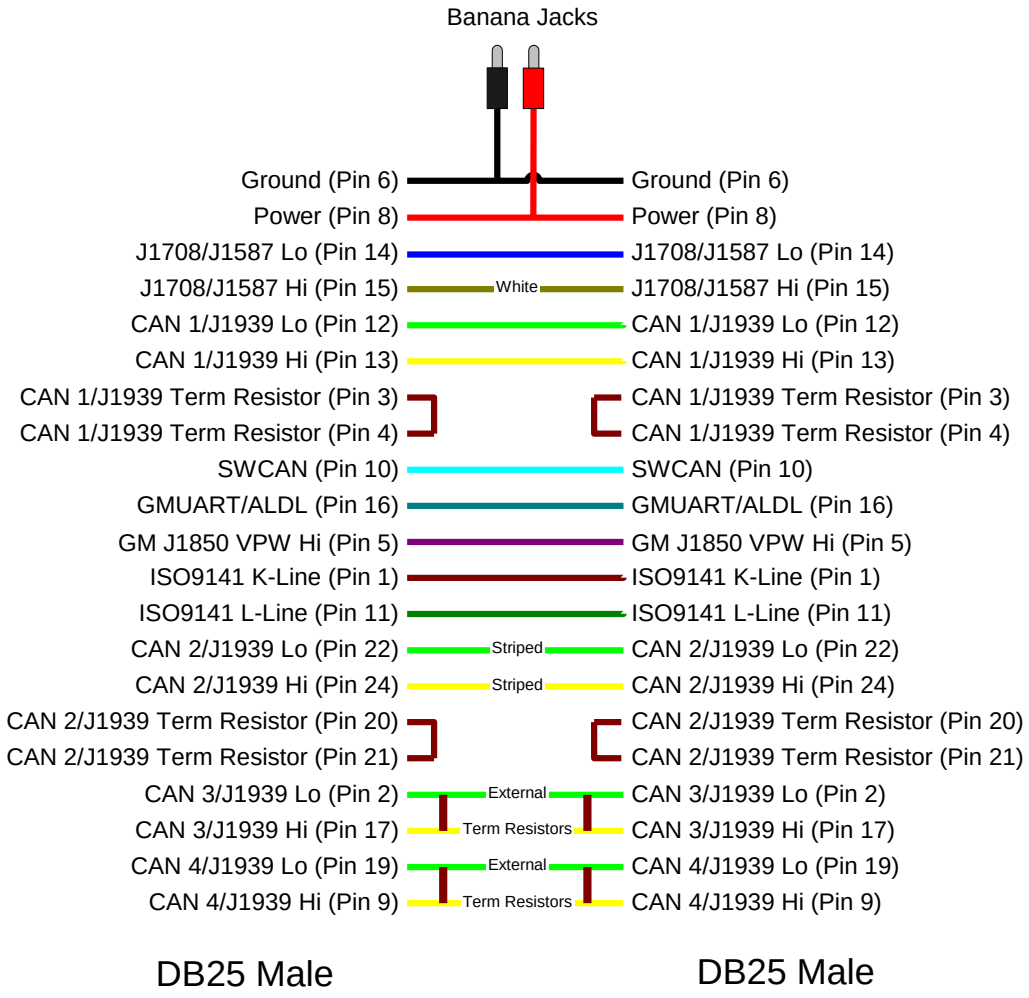
19.2. Netbridge to Netbridge “Back to Back” Cable for Use with a Second PC Running a Simulator

This cable is for use with a second PC running a simulator or other software. Note that for CAN1 and CAN2, you can shunt pins together to enable internal termination resistors. For CAN3 and CAN4, you will need to add them outside of the Netbridge.



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