



Shift By Wire (SBW)

Wiring Diagram 5 Speed and 6 Speed Allison Transmission 1000, 2000, 2400 Series

AES-126-C

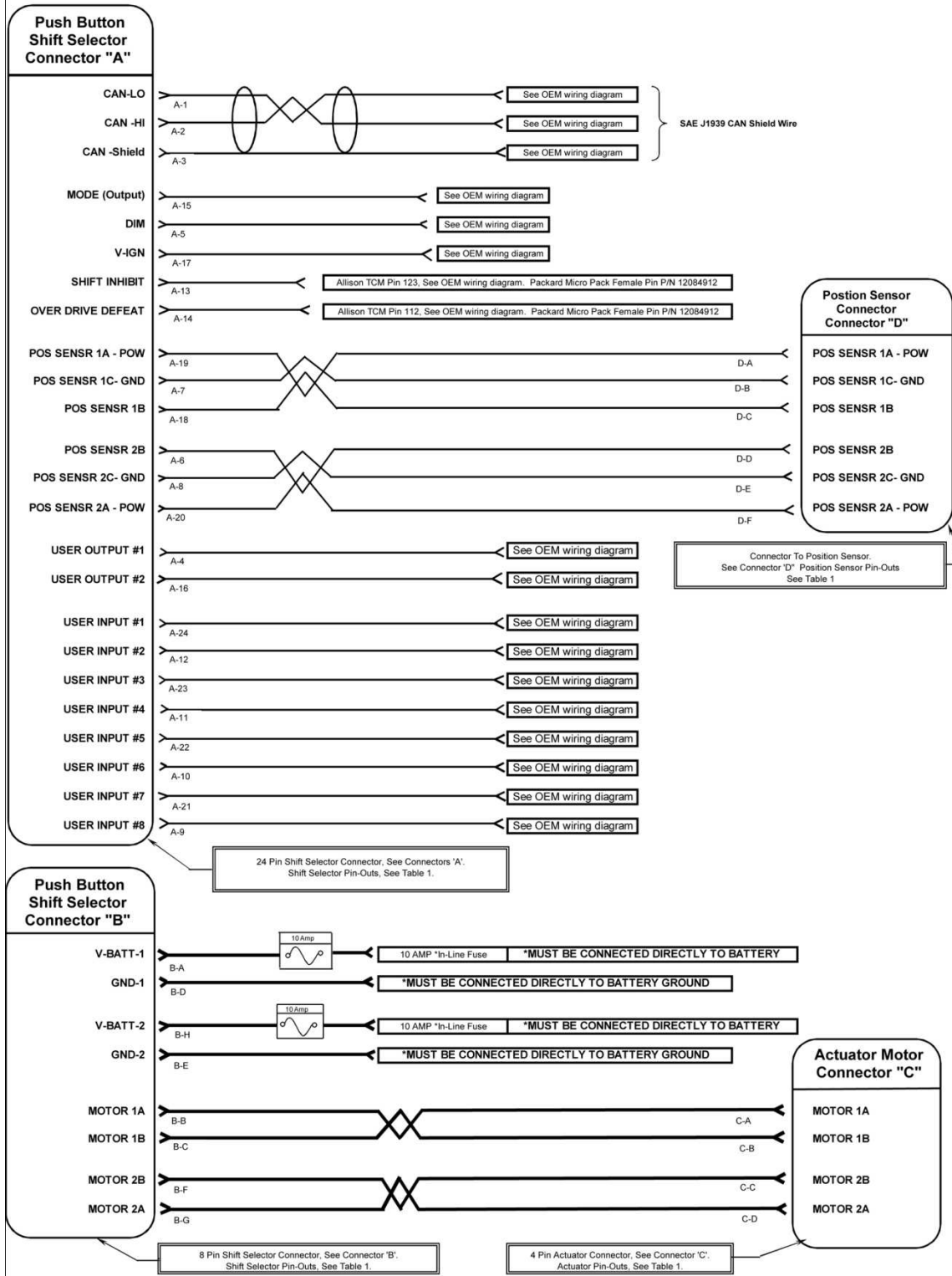
14355	D	Revised Logo, consolidated with AES-154-C	5/1/2012	Don Krueger
13008	C	Added Mutimeter Pin Out Check Table. Schematic revised and redrawn. Added Wiring Schematic Notes Page	10/28/2004	Brian Gelino Don Krueger/
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Table of Contents

<u>Section</u>	<u>Page</u>
Wiring Diagram - 5 Speed, Pre-Gen 4 and Gen 4 Allison Transmissions.....	2
Wiring Diagram – 6 Speed, Gen 4 Allison Transmissions	3
Notes for 5-Speed & 6-Speed Wiring Diagrams	4
Table 1, Input/Output Designation Guide.....	5
Connectors commonly used on the SBW System	6-11
Wire Harness Multimeter Check	12-13
Table 5, Worksheet	14

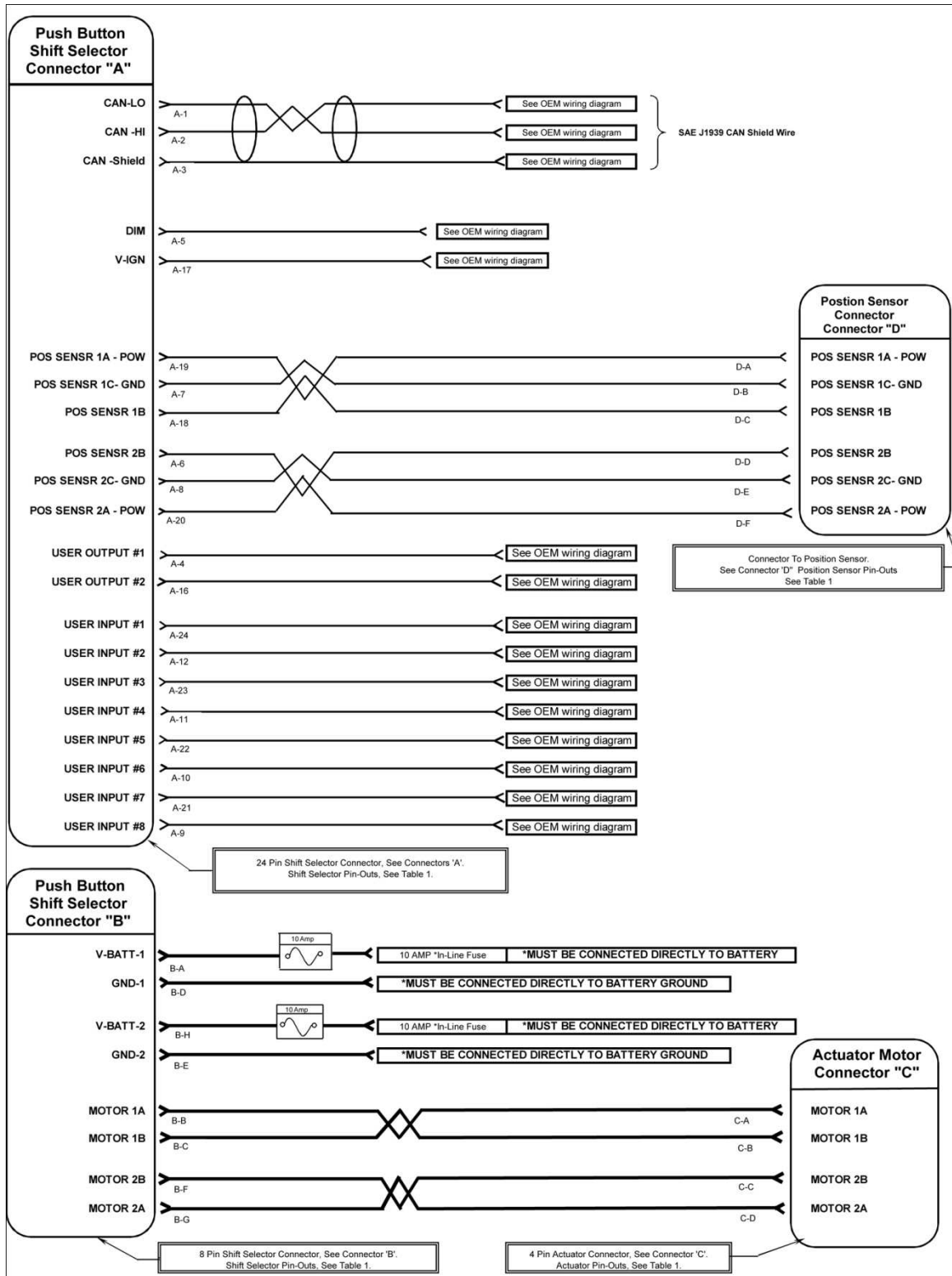
5 Speed Wiring Diagram for Pre-Gen 4 & Gen 4 Allison Transmissions.

Check the Wiring Diagram Notes on Page 4.



6-Speed Wiring Diagram for Gen 4 Allison Transmissions.

Check the Wiring Diagram Notes on Page 4. Mode (Transmission Mode 2), Shift Inhibit and Overdrive Defeat are supported by the J1939 CAN System.



Notes for 5-Speed and 6-Speed Wiring Diagrams

Field Technician Notes

1. User Inputs and Outputs (I/O) are determined by the Chassis Manufacturer and/or Body Builder. See OEM/Body Builder documentation for their use and connector information.
2. Wire lengths and any bulkhead connectors are specified by the Chassis Manufacturer and/or Body Builder.
3. If a Shift Inhibit light is part of the instrument cluster, pin A-13 may be disconnected to prevent nuisance calls of "the display goes blank during the Shift Inhibit condition". If Pin A-13 is disconnected, be sure to disconnect it in a fashion that it will not become shorted to Ground.
4. All SBW System Power and Ground leads must be disconnected when welding is to be done on the vehicle.

Chassis Manufacturer and/or Body Builder Notes

1. Both Powers and Grounds must be connected directly to the battery or dedicated terminal. No other electrical loads may be connected to the SBW (Shift By Wire) power circuits.
2. Each Power line must have its own 10 amp fuse (2 fuses). Fuses may not be shared with any other vehicle circuitry. Automatic reset-able fuses (for example: bimetal type) are not permitted. Use of automatic reset-able fuses will void warranty.
3. All relays and solenoids used on the vehicle installation must be suppressed. Large relays or solenoids have a 0.5 AMP continuous rating or greater must have a diode suppression circuit. Relays less than 0.5 AMPS can use a resistance suppression. All inductive loads that are switched using a vehicle interface module relay must be diode suppressed.
4. No Starter or Alternator currents are to be wired in series with the SBW (Shift By Wire) system.
5. Terminals and Bus Bars used for the SBW System must have no other systems wired to them.
6. Other than the battery and the Bus Bars, the cabling from the vehicle electrical system must not be run parallel to the SBW system electrical cables.
7. Any SBW System ground or return wire must not be used as a ground point for any other system.
8. All SBW System Power and Ground leads must be disconnected when welding is to be done on the vehicle.
9. Chassis may not be used as a ground.
10. All SBW System Power and Grounds terminations must be tight without multiple connection. Multiple connection may result in loose connections in time.
11. Minimum wire gauge to be used between Battery Power and Connector "B" and Battery Ground to Connector "B", SAE 10 gage GXL or TXL. See Table 2 for connector information
12. Minimum wire gauge to be used between Connector "B" and Connector "C", SAE 12 gage GXL or TXL. See Table 2 for connector information
13. Minimum wire gauge to be used for any wire connected to Connector "A" (e.g. Connector D, I/O's, MODE, Overdrive Defeat, Shift Inhibit, Etc.) must be, SAE 18 gage GXL or TXL. See Table 2 for connector information
14. All wire must be encased in protective Loom/Conduit
15. Wire lengths and any bulk-head connector to be specified by the Chassis Manufacturer and / or Body Builder.
16. If a Shift Inhibit light is part of the instrument cluster, do not connect A-13 line to TCM
17. Motor wire leads between Connector B and Connector C do not have to be twisted if they are not run in the same loom as the sensor leads (Wires between Connector A and Connector D) and if the Motor lead are not bundled with (run along side) the sensor leads.
18. If Pin A-13 is disconnected, be sure to disconnect it in a fashion that it will not become shorted to Ground.

Table 1, for 5-Speed & 6-Speed Transmissions

Input / Output Designations Guideline			
User Input / Output Number (See Wiring Diagram Sheet)	Connector "A" Pin Number	Designation Note #1) Frequent Uses Of Pin As Noted. Note #2) Pins May Have More Than One Use. Note #3) Not all uses are listed in this table. See PBSS Assembly Drawing For Actual Pin Use	Explanation and Examples of Possible Usages
Input 1	A-24	Key Pad Lock Out	When this Input is pulled low the keypad would be "locked out"; meaning that any gear selection by the operator, other than Park, would be ignored. This could be used for such options as a Wheelchair Lift. This must be a Park and Park Brake Equipped Vehicles for this option. Also see Output #1
Input 2	A-12	Not Used	
Input 3	A-23	Not Used	
Input 4	A-11	Not Used	
Input 5	A-22	Not Used	
Input 6	A-10	Not Used	
Input 7	A-21	Not Used	
Input 8	A-9	Not Used	
Output 1	A-4	Ground Signal that Vehicle is in PARK	This Output will be pulled low when the Operator selects "P" for Park and Park is attained. This could be used for such options as a Wheelchair Lift. This must be a Park and Park Brake Equipped Vehicles for this option. Also see Input #1
Output 2	A-16	Ground Signal that Vehicle is NOT in Neutral	This Output will be pulled low when the Operator selects any gear other than "N" for Neutral. This could be used for such options as a Neutral Alarm Used That is commonly used on RV Chassis's
Mode Output	A-15 or J1939 CAN	Transmission Mode 2 or User Defined	MODE is commonly used in conjunction with features offered on the Allison T.C.M. (Transmission Control Module). These options may consist of the following: Economy, PTO, Secondary Shift Schedule, Auxiliary Range Inhibit. See Allison Manual More Options and Wiring Diagrams.

CHASSIS MANUFACTURE AND / OR BODY BUILDER NOTE(s):			
#1	Contact Arens Engineering with your specific I/O needs.		

FIELD TECHNICIAN NOTE(s)	
#1	I/O use and connections are specified by the Chassis Manufacturer and / or Body Builder. Please refer to the appropriate OEM Schematic(s)

Connectors commonly used on the SBW System

ARENS CONFIDENTIAL- SBW CONNECTOR SYSTEM						
<p>NOTE: This information is stated here for convenience of our customers only. The Part Numbers, Component Related Data, and Catalog Page Numbers may be changed by Delphi without notice. Please refer to Delphi/Pioneer for the latest information.</p>						
VEHICLE HARNESS						
A	Harness connector for Shift Selector communication/signal connection		Delphi Micro-Pack 100W female, 24-way			Pioneer Catalog 2000/2001
	Connector	qty-1	Delphi 12129225	Color: natural. Material: PBT.	pg 188	
	Retainer (TPA)	qty-1	Delphi 12129183	Provides Terminal Position Assurance (TPA).	pg 188	
	Cable Seal	qty-1	OE Selected: Delphi 12110403, all holes open (need plugs) or Delphi 12160558, no holes open (OE must pierce)	-Validated for 0.80 to 0.50 (18 TXL to 20 GXL gage) cross-section cables. The seal can handle 1.67 mm dia to 2.12 mm dia cables. 18 gage recommended if wires are not bundled. -NOTE: 18 gage must be TXL to fit in seal. -NOTE: If seal 12110403 is used, then non-used holes must be plugged with cavity plug 12129557. -NOTE: OE can set up a custom special seal with Delphi, only the holes that are needed are punched.	pg 188	
	Strain Relief	qty-1	OE Selected (see note for options)	The strain relief is selected by the OE and depends on the application constraints. Examples: a) P/N 12129666, wires exit left. b) P/N 12110155, wires exit right. c) P/N 12160848, wires exit right at a different angle. Many other options exist, OE to contact Delphi-Packard.	pg 188	
	Terminal- female	TBD	OE to select terminal depending on harness wire gage: Delphi 12084912 for 18 gage (0.80 mm2 cable) thin wall TXL Delphi 12084913 for 20 gage (0.50 mm2)	-Phosphor bronze w/ gold/nickel plating (only option available, needed for light forces). -18 gage recommended if wires are not bundled. See Seal Notes for cable dia limitations.	pg 188	
	CPA	qty-1 optional as req'd	Delphi 12110299, optional, recommended by Arens	Connector Position Assurance.	pg 188	
	Cavity Plug	as req'd	Delphi 12129557	Used for plugging seal holes, if required. See "Cable Seal Notes" above.	pg 188	
B	Harness Connector for Shift Selector power connection		Delphi Metri-Pack 280, female, 8-way			-40C to 125C rating
	connector/seal assembly	qty-1	Delphi 12176335 (includes connector 12176334 and seal 12146444)	-Delphi Packard Drawing no. 1214 6510 TYPE 104. -Must use Tangless terminals	see drg	
	Terminals- female	qty-8	OE to select terminal depending on harness wire gage (to minimize voltage drop): Delphi 12110853 for 10/12 gage (5.0 to 3.0 mm2), tin plating or Delphi 12110845 for 12/14 gage (3.0 to 2.0 mm2), tin plating or Delphi 12110847 for 16/18 gage (1.0 to 0.80 mm2), tin plating	-Must use 280 Tangless female sealed. -Arens recommends 10 gage for rear engine vehicles, 14 gage for front engine vehicles. -NOTE: 10/12 gage terminal is not "Thin Stock" (not low insertion force). The other terminals are "thin stock" and have low insertion force. -Be-Cu with Silver/Nickel plating is available in 10 gage terminal 12176855 (only). -Tin plating acceptable because PBSS is in cab interior (low temperature). -Cable size must agree with Metri-Pack 4-way connected to the motor.	pg 84	
	TPA Secondary Terminal Lock	qty-1	Delphi 12146443	Terminal Position Assurance	see drg	
	CPA Secondary Terminal Lock	qty-1	Delphi 12129551, optional, recommended by Arens	Connector Position Assurance	see drg	
Cable Seal	qty-8	OE Selected, depends on cable diameter. See 280 Metri-Pack Cable Seals (page 84, Pioneer 2000/2001 catalog).	-NOTE: 10 gage is limited to TXL 3.80 mm dia., seal Delphi 12015193. -Other cable diameters use different seals. -Reel and Loose Part options available (different part numbers).	pg 84		
C	Harness Connector for Actuator power connection		Delphi Metri-Pack 280 female, 4-way			
	connector/seal assembly- female	qty-1	Delphi 12129565 (includes connector and seal)	Requires a tang terminal.	pg 88	
	Terminals- female	qty-4	OE to select terminal depending on harness wire gage (to minimize voltage drop): Delphi 12176387 for 10 gage (5.0 mm2) Be-Cu w/ Silver/Nickel plating Delphi 12176388 for 12/14 gage (3.0 to 2.0 mm2) Be-Cu w/ Silver/Nickel plating Delphi 12176389 for 16/18 gage (1.0 to 0.80 mm2) Be-Cu w/ Silver/Nickel plating	-Must use 280 terminals with Tangs. -Be-Cu with Silver/Nickel plating recommended because of potential for high application temperature combined with potential for high current (stall). However, tin plating would probably be acceptable because in-line connector not directly mounted to transmission. -Cable size must agree with Metri-Pack 8-way. Arens recommends 10 gage for rear engine vehicles and 14 gage for front engine vehicles.	pg 84	
	TPA	qty-1	Delphi 15300016	Connector Position Assurance. Recommended by Arens. OE option.	pg 88	
	CPA	qty-1	Delphi 12020833 Optional	Connector Position Assurance. Recommended by Arens. OE option.	pg 88	
Cable Seal	qty-4	OE Selected, depends on cable diameter. See 280 Metri-Pack Cable Seals (page 84, Pioneer 2000/2001 catalog).	-NOTE: 10 gage is limited to TXL 3.80 mm dia., seal Delphi 12015193. -Other cable diameters use different seals. -Reel and Loose Part options available (different part numbers).	pg 84		
D	Harness Connector for Position Sensor signal connection		Delphi GT-150 3.5mm centerline, female, 6-way (pull to set replacement)			
	connector/seal assembly- female	qty-1	Delphi 15336013 with shroud. (includes seal 12059226 and PLR 15336015)	Mates with Delphi Metri-Pack 150.2 male 6-way on Position Sensor, but allows the use of push-to-seat terminals.	pg 19	
	terminals- female	qty-6	OE selected depending on wire gage: Delphi 15305350 for 18 gage (0.80 mm2) tin plate Delphi 15305130 for 20 gage (0.50 mm2) tin plate	-Cable size must agree with PBSS 24-way Micro-Pack 100W. -Arens recommends 18 gage if wires are not bundled. -See Cable Seal notes for wire gage limitations. -Tin plating OK up to 125C continuous because of low current internal heating.	pg 18	
	Cable Seal	qty-6	OE selected, depends on cable diameter: Delphi 15305351, for cable dia 1.70 mm to 2.10 mm (18 gage TXL or 20 gage TXL)	Part number per print, not in catalog. 18 gage GXL measures 2.38 mm, 18 gage TXL = 1.9 mm. 20 gage GXL measures 2.11 mm, 20 gage TXL = 1.72 mm.	pg 18	
	CPA	qty-1	Delphi 15317832	Connector Position Assurance, specified on drawing 15336013.	see drg	

ARENS CONFIDENTIAL- SBW II CONNECTOR SYSTEM					
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SHIFT SELECTOR (molded in housing)					
F	Shift Selector communication/signal connection	Header-male	qty-1 header	Autosplice 21-1042N24PEAA5 male pin-header Delphi Micro-Pack 24 pin	2 by 12, SMT, 3mm centers, 0.99 square, Autopak, L= 11.0, H=14.5 30 micro-inch min gold end, 120 micro-inch min tin/lead base plating
G	Shift Selector power connection	Header-male	qty-1 header	Autosplice P/N TBD male 280 series vertical quick disconnect 0.031 thk	
ACTUATOR- MOTOR CONNECTOR (mounted on motor)					
H	Delphi Metri-Pack 280 male, 4-way				
	Connector	qty-1	Delphi 12129600	connector on 6 inch 14 gage wire leads	
	Terminals-male	qty-4	Delphi 12129497 for 12/14 gage (3.0 to 2.0 mm2) cable, tin plating	-male terminal -(note, only tin plating is available. Tin is good to 125C continuous, 150C for brief duration's. High temperatures are not expected on in-line connectors)	
	Cable Seal	qty-4	Delphi 12015323 green for 2.85 to 2.03 cable dia. (14 gage)	Reel and Loose Part options available (different part numbers).	
ACTUATOR- POSITION SENSOR (molded in sensor housing)					
J	Delphi Metri-Pack 150.2 male, 6-way				
	Connector-male	qty-1	6-way male Delphi Metri-Pack 150.2, tin plated.	Molded in the housing of the sensor. 3.5 mm terminal spacing.	

Wire Harness Multimeter Check (see wiring diagram for connector detail)	
Note: Pins in bold can only be measured while plugged in	
Connector A	
Pin 1 - CAN Low	60 Ohms across pins 1 and 2
Pin 2 - CAN High	
Pin 3 - CAN Shield	0 volts.
Shift Inhibit	Supported by J1939, or Pin 13.
Overdrive Defeat	Supported by J1939, or Pin 14
Mode Output	Supported by J1939, or Pin 15 (typically used for Transmission Mode 2)
Pin 4 - User Output 1	Gnd when vehicle in Park
Pin 5 - Dimmer input	Voltage should change as Dimmer is adjusted with Instrument lights on
Pin 6 - Sensor 2 Output	Voltage between 0.5 volts and 4.5 volts depending on actuator position
Pin 7 - Position Sensor 1 Gnd	0 volts (see also connector D pin b)
Pin 8 - Position Sensor 2 Gnd	0 volts (see also connector D pin e)
Pin 9 - User Input 8	Unused
Pin 10 - User Input 6	Unused
Pin 11 - User Input 4	Unused
Pin 12 - User Input 2	Unused
Pin 13 - Shift Inhibit	5 volts if no inhibit signal, Ground if inhibit signal
Pin 14 - Overdrive Defeat	Ground signal in 4th Gear (Overdrive defeat activated), 5 volts in Drive.
Pin 15 - Mode Output	Unused
Pin 16 - User Output 2	Gnd when vehicle in gear, Open when vehicle in Neutral
Pin 17 - Ignition	0 volts with key off, 12 volts with key on
Pin 18 - Sensor 1 Output	Voltage between 0.5 volts and 4.5 volts depending on actuator position
Pin 19 - Position 1 Power	5 volts (see also connector D pin a)
Pin 20 - Position 2 Power	5 volts (see also connector D pin f)
Pin 21 - User Input 7	Unused
Pin 22 - User Input 5	Unused
Pin 23 - User Input 3	Unused
Pin 24 - User Input 1	Brake signal for B.T.S.I. from vehicle if CAN not available via ABS

Connector B	
Pin A - Vbat 1	12 volts
Pin B - Motor 1A	+12 volts referenced to pin C when moving towards Park (Reverse if no Park), -12 volts when moving towards 1st gear (see also connector C pins a and b)
Pin C - Motor 1B	
Pin D - Gnd 1	0 volts
Pin E - Gnd 2	0 volts
Pin F - Motor 2B	+12 volts referenced to pin F when moving towards Park (Reverse if no Park), -12 volts when moving towards 1st gear (see also connector C pins c and d)
Pin G - Motor 2A	
Pin H - Vbat 2	12 volts

Connector C	
Pin A - Motor 1A	+12 volts referenced to pin B when moving towards Park (Reverse if no Park), -12 when moving towards 1st gear
Pin B - Motor 1B	
Pin C - Motor 2B	+12 volts referenced to pin C when moving towards Park (Reverse if no Park), -12 when moving towards 1st gear
Pin D - Motor 2A	

Connector D	
Pin A - Position 1 Power	+ 5 volts
Pin B - Position 1 Gnd	0 volts
Pin C - Position 1 Output	Voltage between 0.5 volts and 4.5 volts depending on actuator position
Pin D - Position 2 Output	Voltage between 0.5 volts and 4.5 volts depending on actuator position
Pin E - Position 2 Gnd	0 volts
Pin F - Position 2 Power	+ 5 volts

Worksheet, Table 5

	F	G	H	J
VBATT 1				
VBATT 2				
GND 1				
GND 2				
SHIELD				
CAN H				
CAN L				
VIGN				
USER INPUT 1				
USER INPUT 2				
USER INPUT 3				
USER INPUT 4				
USER OUTPUT 1				
USER OUTPUT 2				
SHIFT INHIBIT				
OVER DRIVE				
MODE OUT				
DIM				
POSITION 1B				
POSITION 2B				
POSITION 1C GND				
POSITION 2C GND				
POSITION 1A POWER				
POSITION 2A POWER				
MOTOR 1A				
MOTOR 1B				
MOTOR 2A				
MOTOR 2B				
USER INPUT 5				
USER INPUT 6				
USER INPUT 7				
USER INPUT 8				