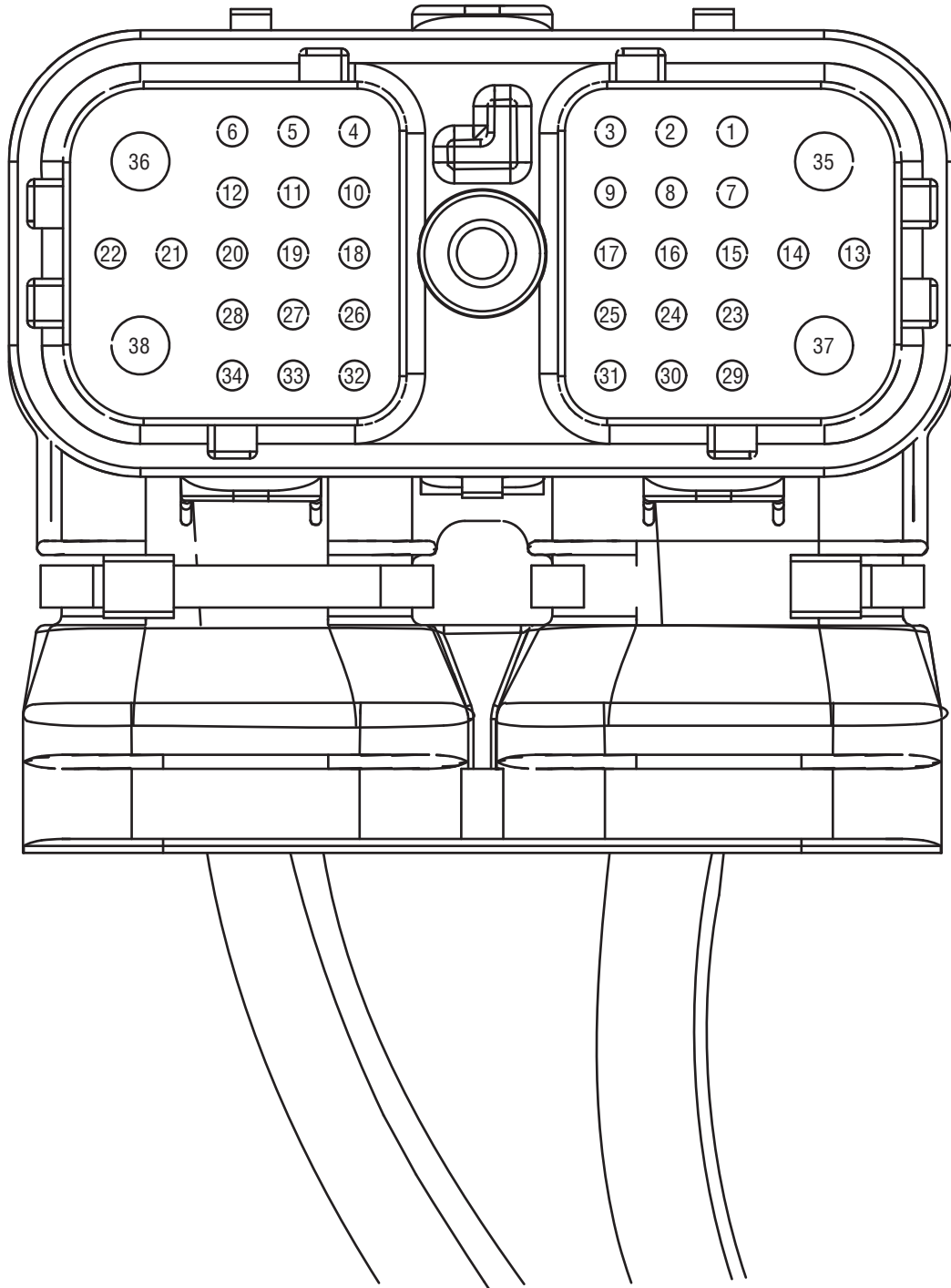


Connector Pin Descriptions

Note: This section is intended as a quick reference. For specific instructions, see the UltraShift *PLUS* Installation Guide TRIG1110.

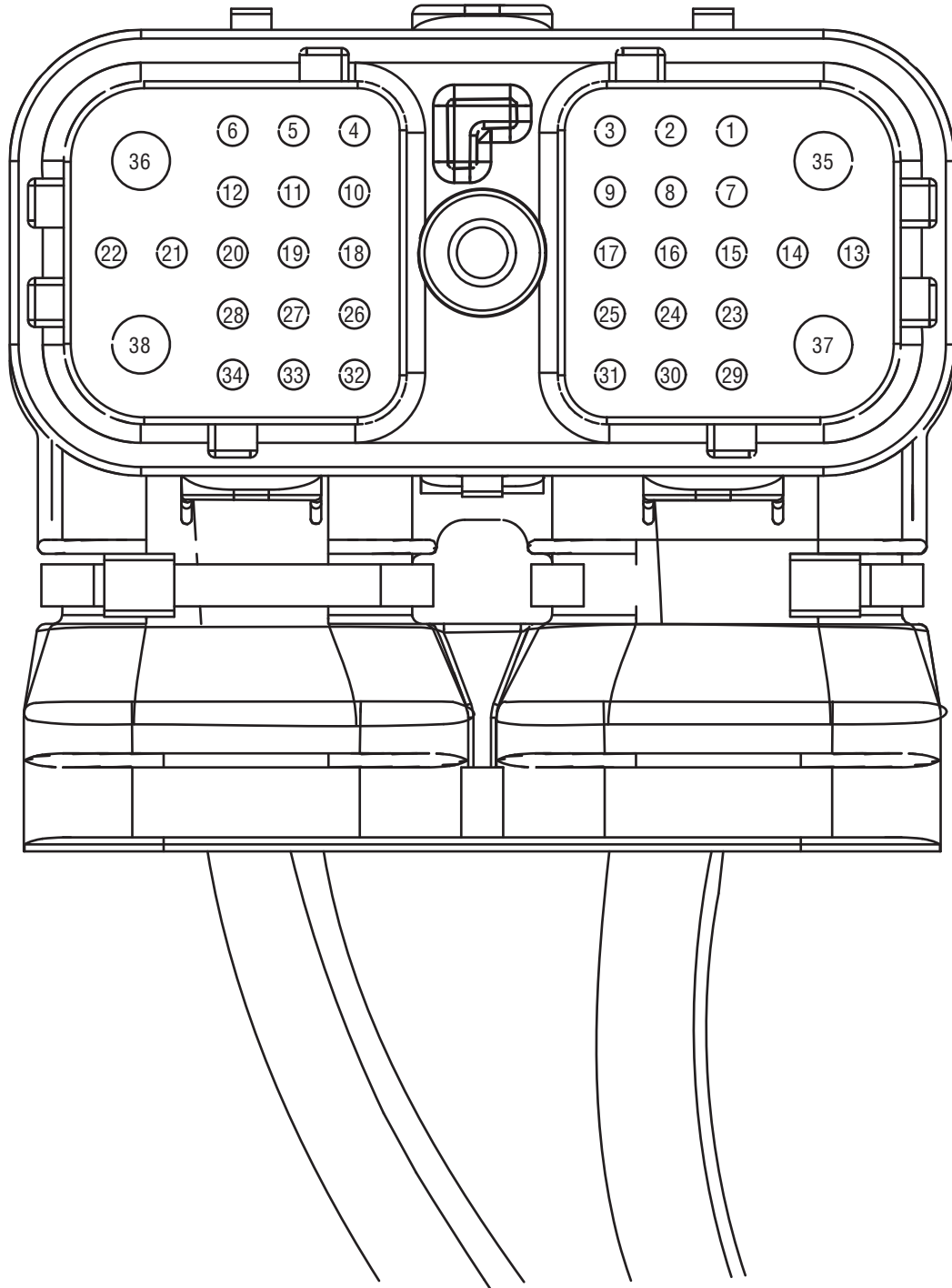
38-Way Vehicle Harness Connector



38-Way Pin	Description	Wire
1	J1939 Shield	18 TXL
2	J1939 Low (-)	18 TXL
3	J1939 High (+)	18 TXL
4	Start Enable Relay Driver Common	18 TXL
5	Not Used	Plug
6	Not Used	Plug
7	Not Used	Plug
8	Not Used	Plug
9	Not Used	Plug
10	J1587 High (+)	18 TXL
11	J1587 Low (-)	18 TXL
12	ISO9141 K Line	18 TXL
13	Not Used	Plug
14	Shift Control Input Common 2 (-)	18 TXL
15	Shift Control Input Auto Mode Signal (+)	18 TXL
16	Shift Control Input Manual Mode Signal (+)	18 TXL
17	Shift Control Input Common 1 (-)	18 TXL
18	PTO Switch Input	18 TXL
19	Auto Neutral Switch Input	18 TXL

38-Way	Description	Wire
20	Not Used	Plug
21	Not Used	Plug
22	Not Used	Plug
23	Service Light Supply	18 TXL
24	Remote Throttle Switch Input	18 TXL
25	Shift Control Protected Battery Negative (-)	18 TXL
26	Start Enable Latch Return Signal	18 TXL
27	HIL Low (-)	18 TXL
28	HIL High (+)	18 TXL
29	Not Used	Plug
30	Not Used	Plug
31	Shift Control Protected Battery Positive (+)	18 TXL
32	Start Enable Relay Driver High	18 TXL
33	Auto Neutral Signal Common	18 TXL
34	PTO Switch Input Common	18 TXL
35	Ignition	12 GXL or 14SXL
36	Battery Negative (-)	12 GXL
37	Not Used	Plug
38	Battery Positive (+)	12 GXL

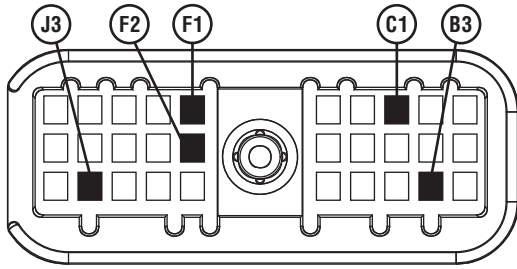
38-Way Heavy-Duty Transmission Harness Connector



38-Way Pin	Description	Wire
1	Not Used	Plug
2	Not Used	Plug
3	Not Used	Plug
4	Splitter Solenoid Valve Driver Common *	18 GXL
5	Not Used	Plug
6	Range Solenoid Valve Driver Common	18 GXL
7	Input Shaft Speed Signal High (+)	18 GXL
8	Input Shaft Speed Signal Low (-)	18 GXL
9	Not Used	Plug
10	X-Y Gear Position Sensor Power Source (5V)	18 GXL
11	X-Y Gear Position Sensor Signal Return	18 GXL
12	X-Y Gear Position Sensor Ground	18 GXL
13	Ignition Supply to ECA	18 GXL
14	Not Used	Plug
15	Main Shaft Speed Signal High (+)	18 GXL
16	Main Shaft Speed Signal Low (-)	18 GXL
17	Service Battery Positive (+)	18 GXL
18	X-Y Rail Position Sensor Power Source (5V)	18 GXL
19	X-Y Rail Position Sensor Signal Return	18 GXL

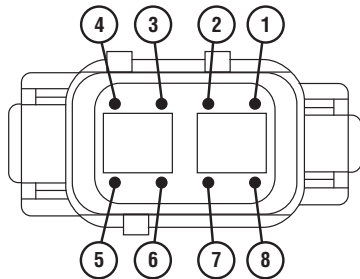
38-Way	Description	Wire
20	X-Y Rail Position Sensor Ground	18 GXL
21	Output Shaft Speed Sensor (Hall Effect) Signal Low (-)	18 GXL
22	Output Shaft Speed Sensor (Hall Effect) Signal High (+)	18 GXL
23	Not Used	Plug
24	Not Used	Plug
25	Service Ignition	18 GXL
26	Splitter Solenoid Valve Driver Indirect *	18 GXL
27	Not Used	Plug
28	Range Solenoid Valve Driver High	18 GXL
29	HIL Low (-)	18 GXL
30	HIL High (+)	18 GXL
31	Service Battery Negative (-)	18 GXL
32	Splitter Solenoid Valve Driver Direct *	18 GXL
33	Not Used	Plug
34	Range Solenoid Valve Driver Low	18 GXL
35	X-Y Rail Motor Positive (+)	14SXL
36	X-Y Gear Motor Positive (+)	14SXL
37	X-Y Rail Motor Negative (-)	14SXL
38	X-Y Gear Motor Negative (-)	14SXL

30-Way Push Button Shift Control Device (PBSC) Connector



30-Way Pin	Description	Wire	38-Way Vehicle Harness Connector Pin
C1	Shift Control Protected Battery Positive (+)	16 TXL	31
B3	Dimmer Control	16 TXL	N/A
F1	HIL High (+)	16 TXL	28
F2	HIL Low (-)	16 TXL	27
J3	Shift Control Protected Battery Negative (-)	16 TXL	25

8-Way Vehicle Harness Shift Lever Connector



8-Way Pin	Description	Wire	38-Way Vehicle Harness Connector Pin
1	Auto Mode Signal (+)	16 TXL	15
2	Shift Control Common 1 (-)	16 TXL	17
3	Shift Control Protected Battery Negative (-) 1	16 TXL	25
4	Shift Control Protected Battery Positive (+)	16 TXL	31
5	Dash Lights	16 TXL	N/A
6	Service Light Supply	16 TXL	23
7	Shift Control Protected Battery Negative (-) 2	16 TXL	14
8	Shift Control Manual Mode Signal (+)	16 TXL	16

3-Way OEM Analog Shift Lever Connector

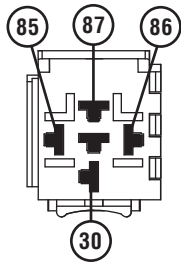
3-Way Pin	Description	Wire	38-Way Vehicle Harness Connector Pin
A	Shift Control Manual Mode Signal (+)	16 TXL	16
B	Auto Mode Signal (+)	16 TXL	15
C	Shift Control Common 1 (-)	16 TXL	17
	Service Lamp	16 TXL	23

2-Way Power Take Off (PTO) Switch

Description	Wire	38-Way Vehicle Harness Connector Pin
PTO Switch Input	16 TXL	18
PTO Switch Input Common	16 TXL	34

2-Way Auto Neutral Park Brake Pressure Switch

Description	Wire	38-Way Vehicle Harness Connector Pin
Auto Neutral Signal	16 TXL	19
Auto Neutral Return	16 TXL	33



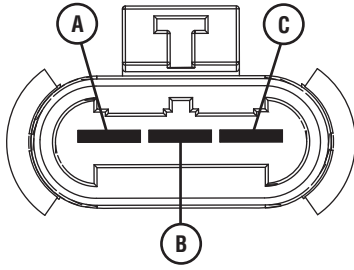
5-Way OEM Start Enable Relay Connector

5-Way Pin	Description	Wire	38-Way Vehicle Harness Connector Pin
30	Ignition	16 TXL	N/A
85	Start Enable Relay Driver Common	16 TXL	4
86	Start Enable Relay Driver High	16 TXL	32
87	Start Enable Latch Return Signal	16 TXL	26 (and Vehicle Starter)
87A	Not Used		N/A

5-Way OEM Remote Throttle Enable Relay Connector

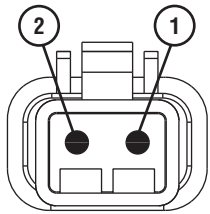
5-Way Pin	Description	Wire	38-Way Vehicle Harness Connector Pin
30	Set/Resume Switch	16 TXL	N/A
85	Chassis Ground	16 TXL	N/A
86	Remote Throttle Switch Input	16 TXL	24
87	Cruise Control Switch	16 TXL	N/A
87A	Not Used		N/A

3-Way Electronic Clutch Actuator (ECA) Power Connector Gen1 ECA



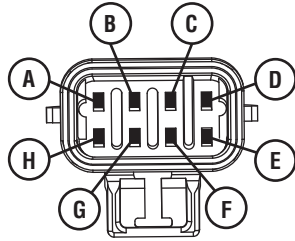
3-Way Pin	Description	Wire
A	Not Used	Plug
B	Battery Negative (-)	10 SXL
C	Battery Positive (+)	10 SXL

2-Way Electronic Clutch Actuator (ECA) Power Connector Gen2 ECA



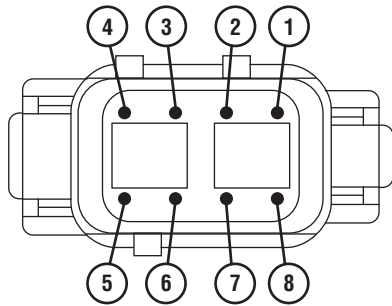
2-Way Pin	Description
1	Battery Negative (-)
2	Battery Positive (+)

8-Way Electronic Clutch Actuator (ECA) Connector Gen1 ECA



8-Way Pin	Description	Wire	38-Way Vehicle Harness Connector Pin
A	HIL High (+)	18 GXL	30
B	HIL Low (-)	18 GXL	29
C	HIL Low (-) Resistor Pigtail	18 GXL	N/A
D	Not Used	Plug	N/A
E	HIL High (+) Resistor Pigtail	18 GXL	N/A
F	ECA Speed Sensor (+)	18 GXL	N/A
G	ECA Speed Sensor (-)	18 GXL	N/A
H	Ignition Supply to ECA	18 GXL	13

8-Way Electronic Clutch Actuator (ECA) Connector Gen2 ECA

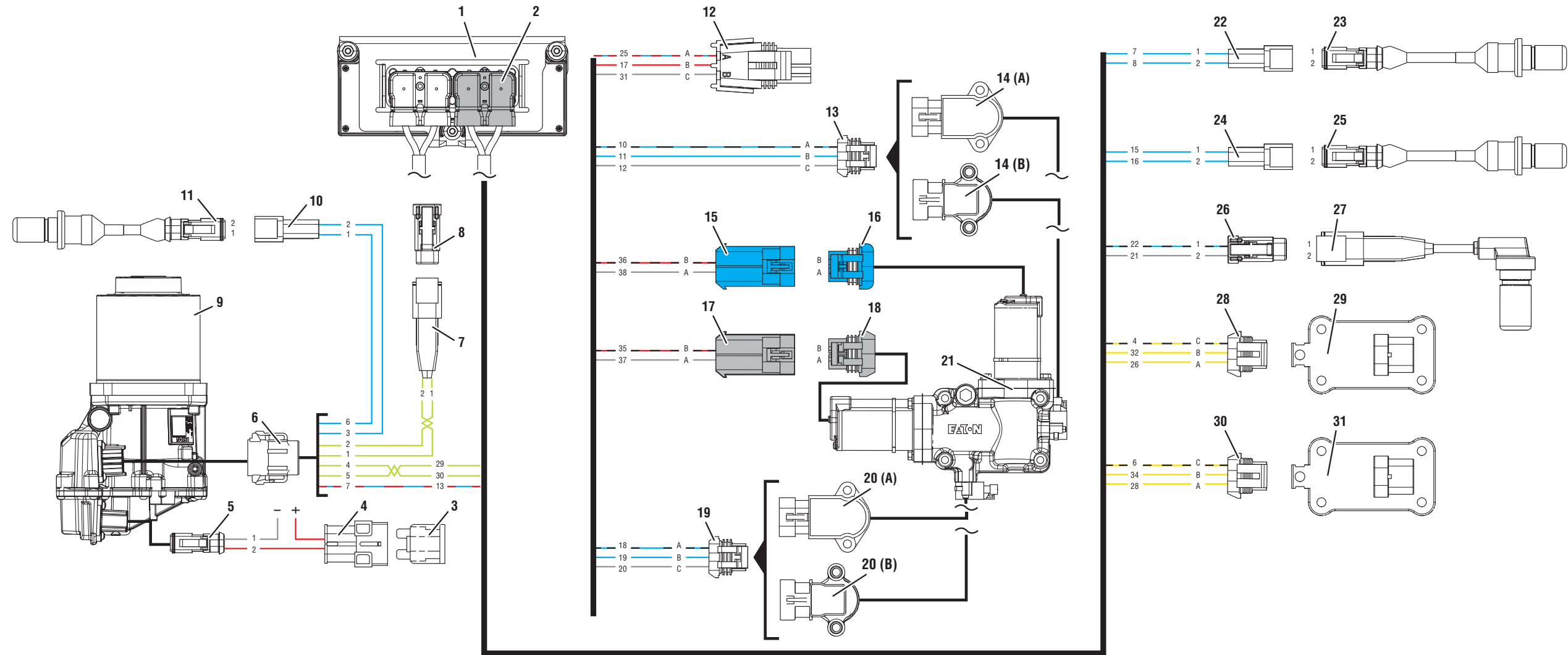


8-Way Pin	Description
1	HIL Low (-) Resistor Pigtail
2	HIL High (+) Resistor Pigtail
3	ECA Speed Sensor (-)
4	HIL Low (-)

8-Way Pin	Description
5	HIL High (+)
6	ECA Speed Sensor (+)
7	Ignition Supply (+) to ECA
8	Not Used

Wiring Diagrams

Transmission Harness Connections



- 1. Transmission Electronic Control Unit (TECU)
- 2. 38-Way Transmission Harness Connector
- 3. 40-amp Fuse
- 4. In-line Fuse Holder
- 5. 2-Way ECA Connector
- 6. 8-Way ECA Connector
- 7. 2-Way Terminating Resistor Connector Body
- 8. 2-Way High Integrity Link (HIL) Terminating Resistor

- 9. Electronic Clutch Actuator (ECA)
- 10. 2-Way ECA Speed Sensor Connector Body
- 11. 2-Way ECA Speed Sensor
- 12. 4-Way Diagnostic Connector
- 13. 3-Way Gear Position Sensor Connector
- 14. 3-Way Gear Position Sensor
- 15. 2-Way Gear Motor Connector Body (blue)
- 16. 2-Way Gear Motor Connector (blue)

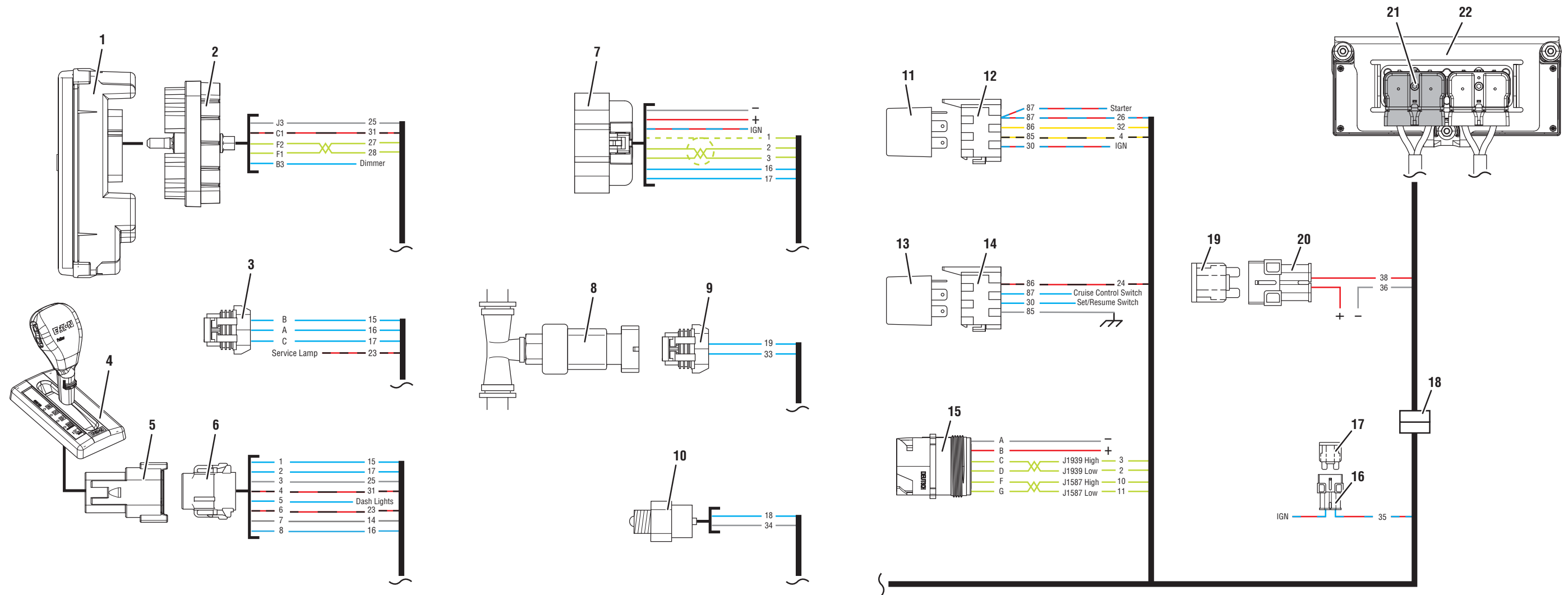
- 17. 2-Way Rail Motor Connector Body (black)
- 18. 2-Way Rail Motor Connector (black)
- 19. 3-Way Rail Position Sensor Connector
- 20. 3-Way Rail Position Sensor
- 21. X-Y Shifter
- 22. 2-Way Input Shaft Speed Sensor Connector Body
- 23. 2-Way Input Shaft Speed Sensor
- 24. 2-Way Main Shaft Speed Sensor Connector Body

- 25. 2-Way Main Shaft Speed Sensor
- 26. 2-Way Output Shaft Speed Sensor Connector
- 27. 2-Way Output Shaft Speed Sensor
- 28. 3-Way Splitter Solenoid Valve Connector
- 29. 3-Way Splitter Solenoid Valve
- 30. 3-Way Range Solenoid Valve Connector
- 31. 3-Way Range Solenoid Valve



Vehicle Harness Connections

Note: Refer to OEM guidelines for wiring details.



- 1. Eaton Push Button Shift Control Device (PBSC)
- 2. 30-Way Push Button Shift Control Device (PBSC) Connector
- 3. 3-Way OEM Analog Shift Lever Connector
- 4. Cobra Shift Lever
- 5. 8-Way Cobra Shift Lever Connector
- 6. 8-Way Vehicle Harness Shift Lever Connector

- 7. OEM J1939 Shift Control Connector
- 8. 2-Way AutoNeutral Park Brake Pressure Switch
- 9. 2-Way AutoNeutral Park Brake Connector
- 10. 2-Way Power Take-Off (PTO) Switch
- 11. 5-Way Start Enable Relay
- 12. 5-Way Start Enable Relay Socket

- 13. 5-Way Remote Throttle Enable Relay
- 14. 5-Way Remote Throttle Enable Relay Socket
- 15. 9-Way Diagnostic Connector (in cab)
- 16. In-line Fuse Holder
- 17. 10-amp Fuse
- 18. Bulkhead Connector

- 19. 30-amp Fuse
- 20. In-line Fuse Holder
- 21. 38-Way Vehicle Harness Connector
- 22. Transmission Electronic Control Unit (TECU)



Change Log

Date	Description
April 2019	Updated Fault Codes: FC19Gen2, FC27, FC71, FC72, FC73
March 2019	Update Fault Codes 16, 19, 23, 35, 43, 46, 51, 52, 61, 63, 64, 65, 66, 67, and 71 Updated Diagnostic Procedure Updated Electronic Clutch Actuator (ECA) Identification Overview Updated Power-Up Sequence Added Transmission Service Light Status Test Added Fault Codes 16 (Gen2), 19 (Gen2), 64 (Gen2), 65 (Gen2), 66 (Gen2), and 67 (Gen2) Removed Fault Codes 86, 89, 94, 95, 96, and 97 Removed Power-Up Sequence Gen2 Updated Wiring Diagrams