

# ALLISON HYBRID

## 4TH GENERATION CONTROLS UPDATE



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Training

### 4th Generation Controls Update

## Introduction

- Effective with Model Year 2010, Allison 4th Generation Controls are available for H 40/50 EP models.
  - Primary visual differences include the TCM/VCM and shift selectors
  - 4th Generation Controls TCMs/VCMs and shift selectors are not interchangeable with previous control components
  - Pre-4th Generation controls TCMs/VCMs and shift selectors will be maintained for service



ESS



4th Gen TCM



4th Gen PBSS



Drive Unit



DPIM



View Graphic



View Graphic



View PDF



View PDF

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# ALLISON HYBRID

## RESOURCES: TCMs



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# ALLISON HYBRID TCMs H40/50EP



Pre-4<sup>th</sup> Generation  
Controls TCM/VCM



4<sup>th</sup> Generation  
Controls TCM/VCM

**NOTE:** The A54 12/24V 4<sup>th</sup> Gen controller is the only 4<sup>th</sup> Gen controller that is compatible with the H 40/50 EP System. If there is an attempt to load a SID into the wrong controller, TCM Reflash will display an error message.

RESOURCES

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# ALLISON HYBRID

## RESOURCES: Shift Selectors



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### Shift Selectors

#### Pre-4<sup>th</sup> Generation Controls Shift Selector



#### Allison 4<sup>th</sup> Generation Controls Shift Selectors



NOTE: The service indicator wrench icon on the 4<sup>th</sup> Gen shift selector will not be used on the EP 40/50 products. The EP 40/50 products do not have any prognostics capabilities. This feature is a carryover from the other Allison Transmission, Inc. products using these same shift selectors. The service indicator wrench should only light for a moment at TCM wakeup.

RESOURCES

1 of 1



# RESOURCES:

## 4th Generation Controls PBSS Operation

**NOTE:** This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.

SIL 20-EP-09, Rev. A  
June, 2010  
Product Code(s): 70, 71  
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### Pushbutton Shift Selectors (PBSS):

The E<sup>P</sup> 40/50 System will use the same PBSS currently used by other Allison 4<sup>th</sup> Gen products. The 4<sup>th</sup> Gen shift selectors have a two digit display and a seven wire connector. For the E<sup>P</sup> 40/50 Systems, only the left side of the display will be used to display range attained (Forward, Neutral, or Reverse) while in the normal operation mode. Both sides of the display will be used while in the fluid level and diagnostic modes. Allison 4<sup>th</sup> Gen shift selectors are J1939-based and no longer use serial and parallel data lines as the primary means of communication with the TCM. The 4<sup>th</sup> Gen PBSS exchanges digital messages with the Allison 4<sup>th</sup> Gen TCM via the vehicle's Controller Area Network (CAN) backbone. If CAN communication is lost, the shift selector can provide directional commands to the TCM on an analog "back up" wire. It generates a pulse width modulated signal to communicate range requests (Forward, Neutral, or Reverse). Allison 4<sup>th</sup> Gen controls shift selectors support the same functionality as the Pre-4<sup>th</sup> Gen shift selectors, including selected range, oil level, and diagnostic displays. The procedures for PBSS oil level checks and diagnostic code displays are different with the 4<sup>th</sup> Gen PBSS. These procedures are similar to other Allison products with 4<sup>th</sup> Gen controls and without prognostics.



**NOTE:** Refer to [Figure 6](#) for a display of the 4<sup>th</sup> Gen PBSS buttons.

### Normal Operation Mode:

During normal operation Forward, Neutral, or Reverse ranges can be selected by using the **D** (Forward), **N** (Neutral), or **R** (Reverse) buttons on the PBSS. Once a range has been attained **F** (Forward), **N** (Neutral), or **R** (Reverse) will be displayed on the left side of the PBSS display. While in forward range, pressing the **Down** ↓ arrow button increases the level of regen. Once the level of regen has been increased, **L** will be displayed on the left side of the PBSS display in the place of **F**. Pressing the **Up** ↑ arrow button will return the system to the normal regen level and **F** will once again be displayed on the left side of the PBSS display.

### Fluid Level Mode:

All E<sup>V</sup> Drive Units are equipped with an Oil Level Sensor (OLS). The oil level can be checked using the PBSS shift selector after certain criteria are met:

- Engine at idle (625-750 rpm)
- Sump fluid at operating temperature of 68°-176°F (20°-80°C)
- E<sup>V</sup> Drive Unit output shaft stopped
- E<sup>V</sup> Drive Unit is in neutral range
- OLS is functioning properly



**NOTE:** The vehicle should be parked on level ground prior to starting any oil level check.

To enter the fluid level mode and display fluid level information using the PBSS, simultaneously press and hold the PBSS **Up** ↑ and **Down** ↓ arrows for approximately five seconds. While in fluid level mode, both sides of the display will be used. A number of responses are possible once the PBSS has entered fluid level mode. These displays will indicate the fluid level or which conditions required to display fluid level are not met.



# ALLISON HYBRID

## 4TH GENERATION CONTROLS UPDATE



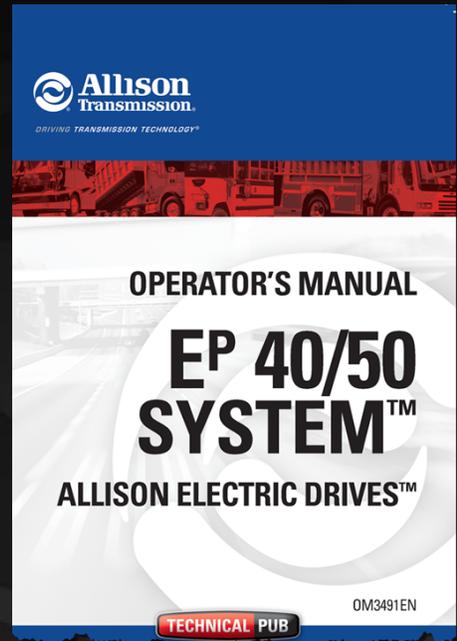
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### 4<sup>th</sup> Generation Controls Update

## Introduction (cont'd)

### 4<sup>th</sup> Generation Controls Publications

- *Operator's Manual – OM3491EN*
- *Troubleshooting Manual- TS3715EN*
- *Drive Unit Service Manual – SM3602EN*
- *ESS Service Manual – SM4162EN*
- *Announcement SIL – 20-EP-09*
- *H 40/50 EP 4<sup>th</sup> Generation Controls Tech Data on the Allison Extranet*



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# ALLISON HYBRID

## 4TH GENERATION CONTROLS UPDATE



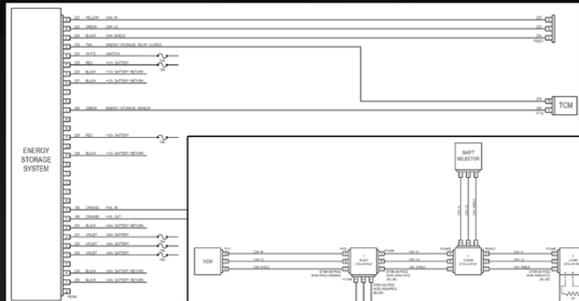
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Training

### 4th Generation Controls Update

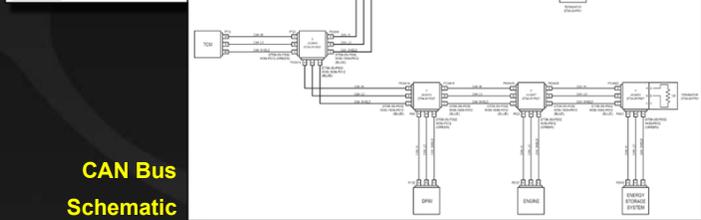
## 4th Generation Controls Wiring Harnesses

- 4th Generation Controls include the following updated wiring harnesses and schematics:

- TCM
- VCM
- ESS
- DPIM
- CAN
- High Voltage Connections



ESS  
Schematic



CAN Bus  
Schematic

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# ALLISON HYBRID

## 4TH GENERATION CONTROLS UPDATE

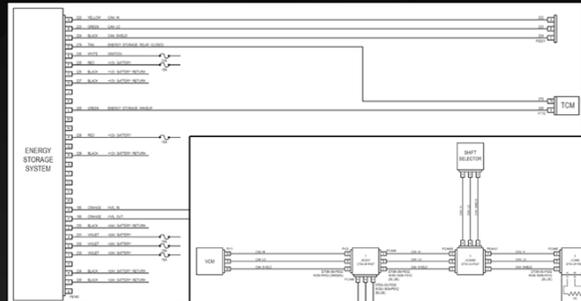


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Training

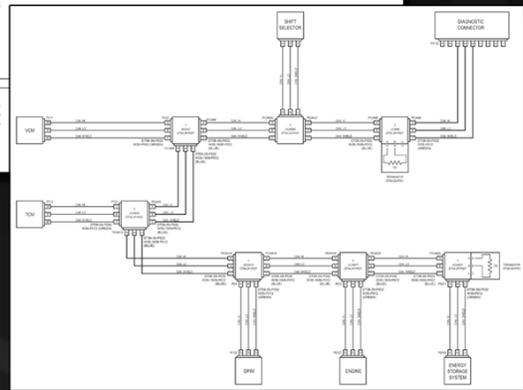
### 4th Generation Controls Update

## 4th Generation Controls Wiring Harnesses (cont'd)

- TCM/VCM connector parts, tools and repair procedures are included in the Troubleshooting Manual and SIL 19-TR-09.
- Power Adapter Harness J-50111 is available for 4th Generation Controls TCM, VCM, DPIM and ESS off-vehicle programming.
- 4th Generation Controls enable Check System and Stop System warning light interface and ESS cooling fan control via J1939 messaging.



ESS  
Schematic



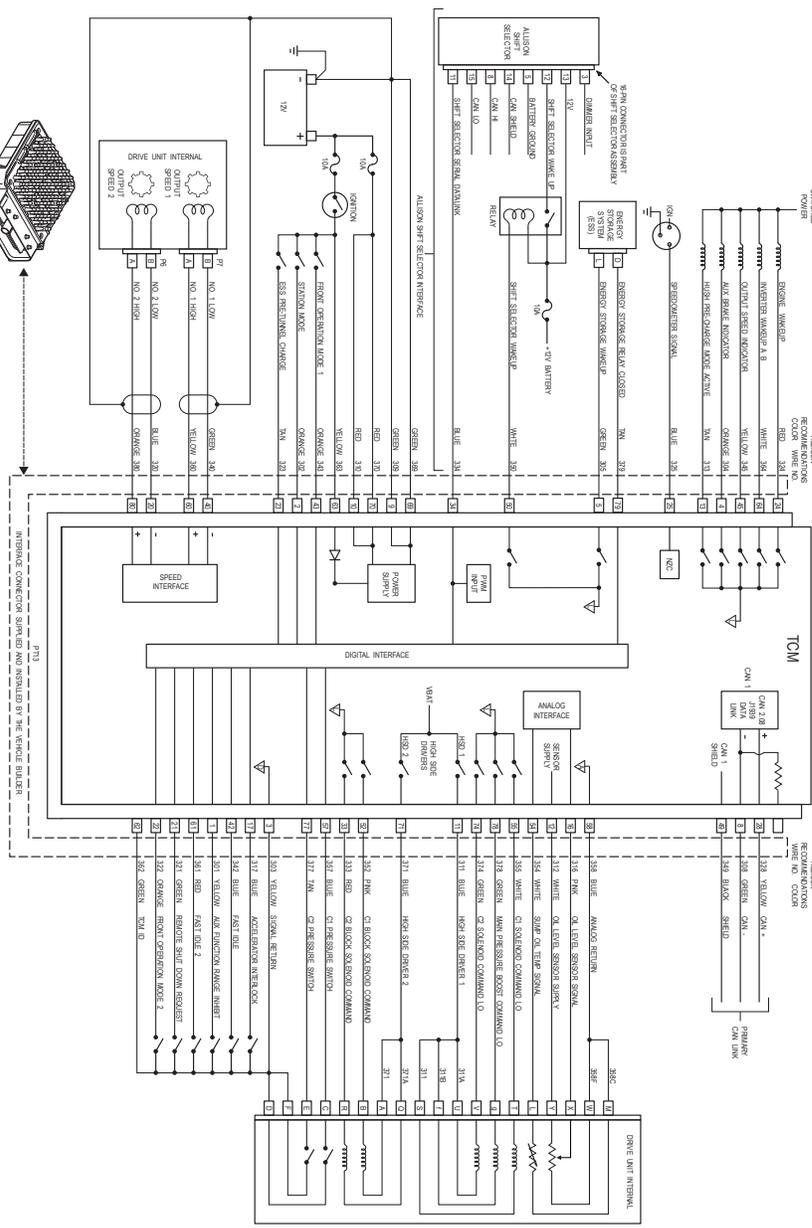
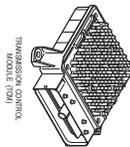
CAN Bus  
Schematic

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# ALLISON HYBRID

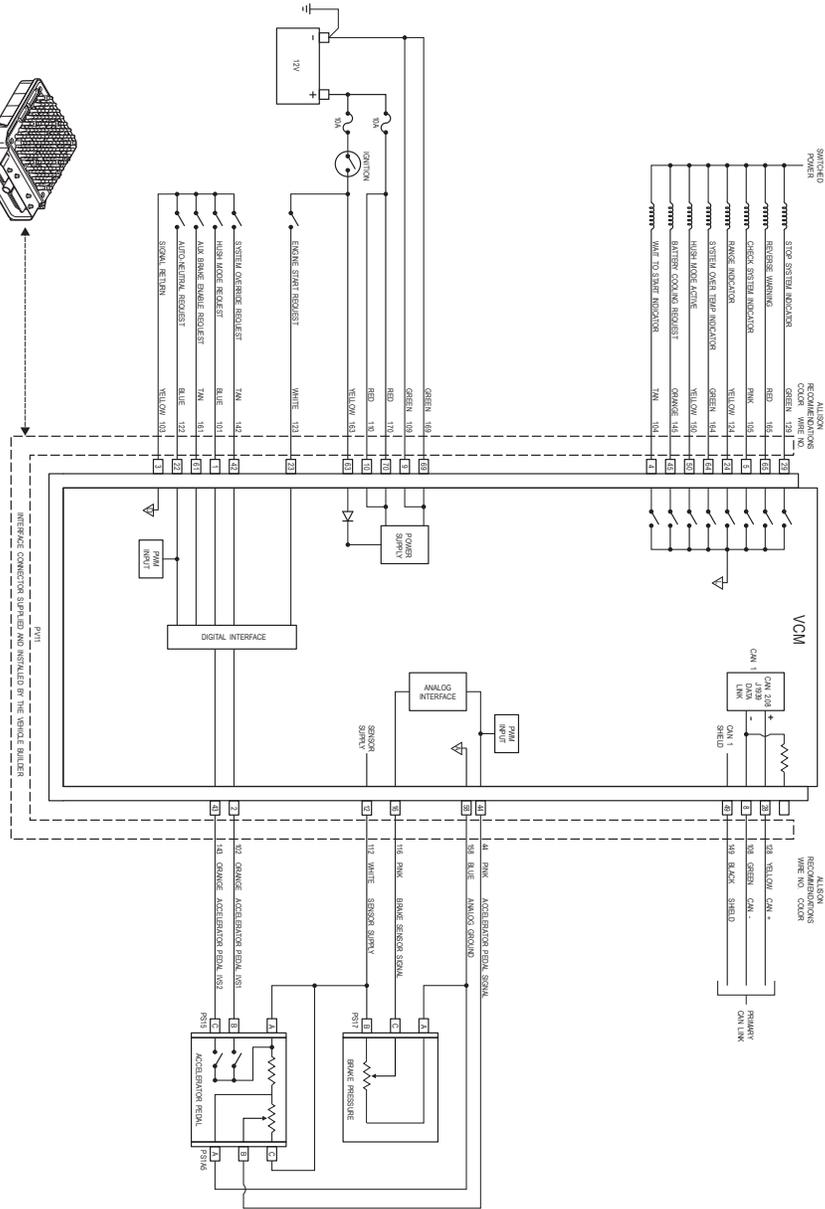
## RESOURCES: TCM Schematic



Pin	Wire No.	Color	Class*	Description	Pin No.	Pin No.	Wire No.
1	300	ORANGE	B	AXIS FUNCTION NUMBER	1	24	301
2	300	ORANGE	B	STATION LABEL	2	24	301
3	300	ORANGE	B	AXIS BRAKE INDICATOR	3	24	301
4	300	ORANGE	C	AXIS BRAKE INDICATOR	4	24	301
5	300	GREEN	C	ENERGY STORAGE WIRE UP	5	24	301
6	300	GREEN	C	ENERGY STORAGE WIRE UP	6	24	301
7	300	GREEN	E	DATA 1	7	24	301
8	300	GREEN	E	DATA 2	8	24	301
9	310	RED	F	+12V BATTERY	9	24	301
10	310	RED	F	+12V BATTERY	10	24	301
11	310	RED	F	ON LINE SENSER SIGNAL	11	24	301
12	310	RED	F	ON LINE SENSER SIGNAL	12	24	301
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99	310	RED	F	ON LINE SENSER SIGNAL	99	24	301
100	310	RED	F	ON LINE SENSER SIGNAL	100	24	301

# ALLISON HYBRID

## RESOURCES: VCM Schematic

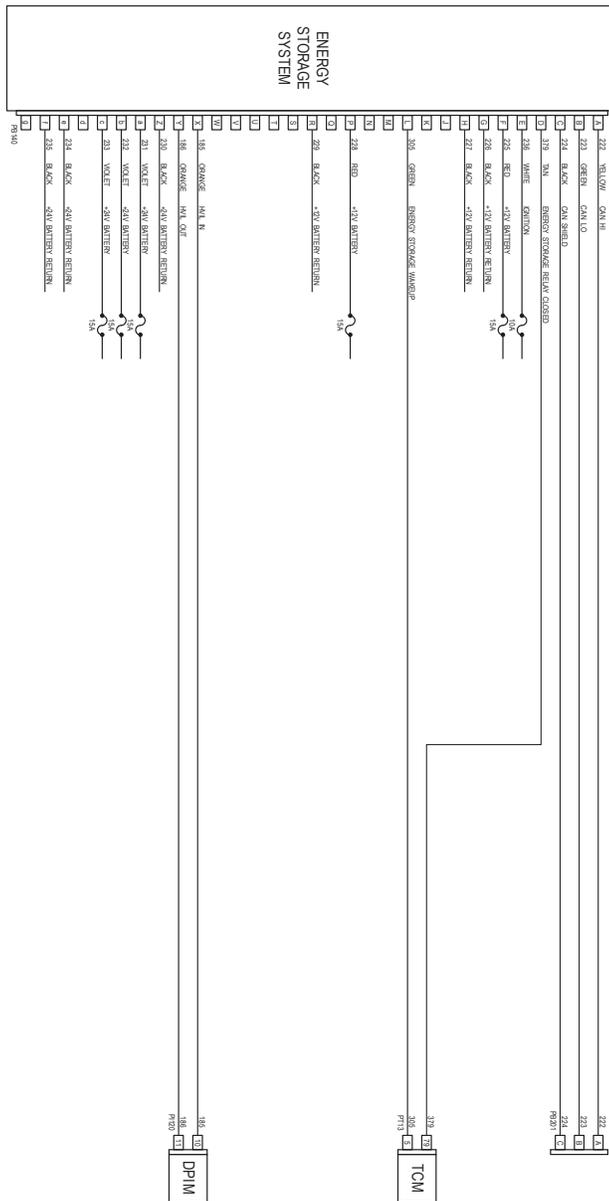


Pin	Wire No.	Color	Signal	Description	Pin No.	Pin No.
1	101	GREEN	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	1	101
2	102	ORANGE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	2	102
3	103	YELLOW	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	3	103
4	104	PINK	HIGH MODE ACTIVE	HIGH MODE ACTIVE	4	104
5	105	ORANGE	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	5	105
6	106	GREEN	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	6	106
7	107	YELLOW	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	7	107
8	108	ORANGE	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	8	108
9	109	GREEN	HIGH MODE ACTIVE	HIGH MODE ACTIVE	9	109
10	110	RED	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	10	110
11	111	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	11	111
12	112	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	12	112
13	113	WHITE	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	13	113
14	114	PINK	HIGH MODE ACTIVE	HIGH MODE ACTIVE	14	114
15	115	PINK	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	15	115
16	116	PINK	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	16	116
17	117	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	17	117
18	118	WHITE	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	18	118
19	119	WHITE	HIGH MODE ACTIVE	HIGH MODE ACTIVE	19	119
20	120	WHITE	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	20	120
21	121	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	21	121
22	122	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	22	122
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24	124	WHITE	HIGH MODE ACTIVE	HIGH MODE ACTIVE	24	124
25	125	WHITE	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	25	125
26	126	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	26	126
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30	130	WHITE	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	30	130
31	131	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	31	131
32	132	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	32	132
33	133	WHITE	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	33	133
34	134	WHITE	HIGH MODE ACTIVE	HIGH MODE ACTIVE	34	134
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37	137	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	37	137
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41	141	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	41	141
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44	144	WHITE	HIGH MODE ACTIVE	HIGH MODE ACTIVE	44	144
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46	146	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	46	146
47	147	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	47	147
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51	151	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	51	151
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53	153	WHITE	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	53	153
54	154	WHITE	HIGH MODE ACTIVE	HIGH MODE ACTIVE	54	154
55	155	WHITE	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	55	155
56	156	WHITE	STOP SYSTEM INDICATOR	STOP SYSTEM INDICATOR	56	156
57	157	WHITE	CRUISE SYSTEM INDICATOR	CRUISE SYSTEM INDICATOR	57	157
58	158	WHITE	SYSTEM OVER TEMP INDICATOR	SYSTEM OVER TEMP INDICATOR	58	158
59	159	WHITE	HIGH MODE ACTIVE	HIGH MODE ACTIVE	59	159
60	160	WHITE	BATTERY CHARGING REQUEST	BATTERY CHARGING REQUEST	60	160

VCM

# ALLISON HYBRID

## RESOURCES: ESS Schematic

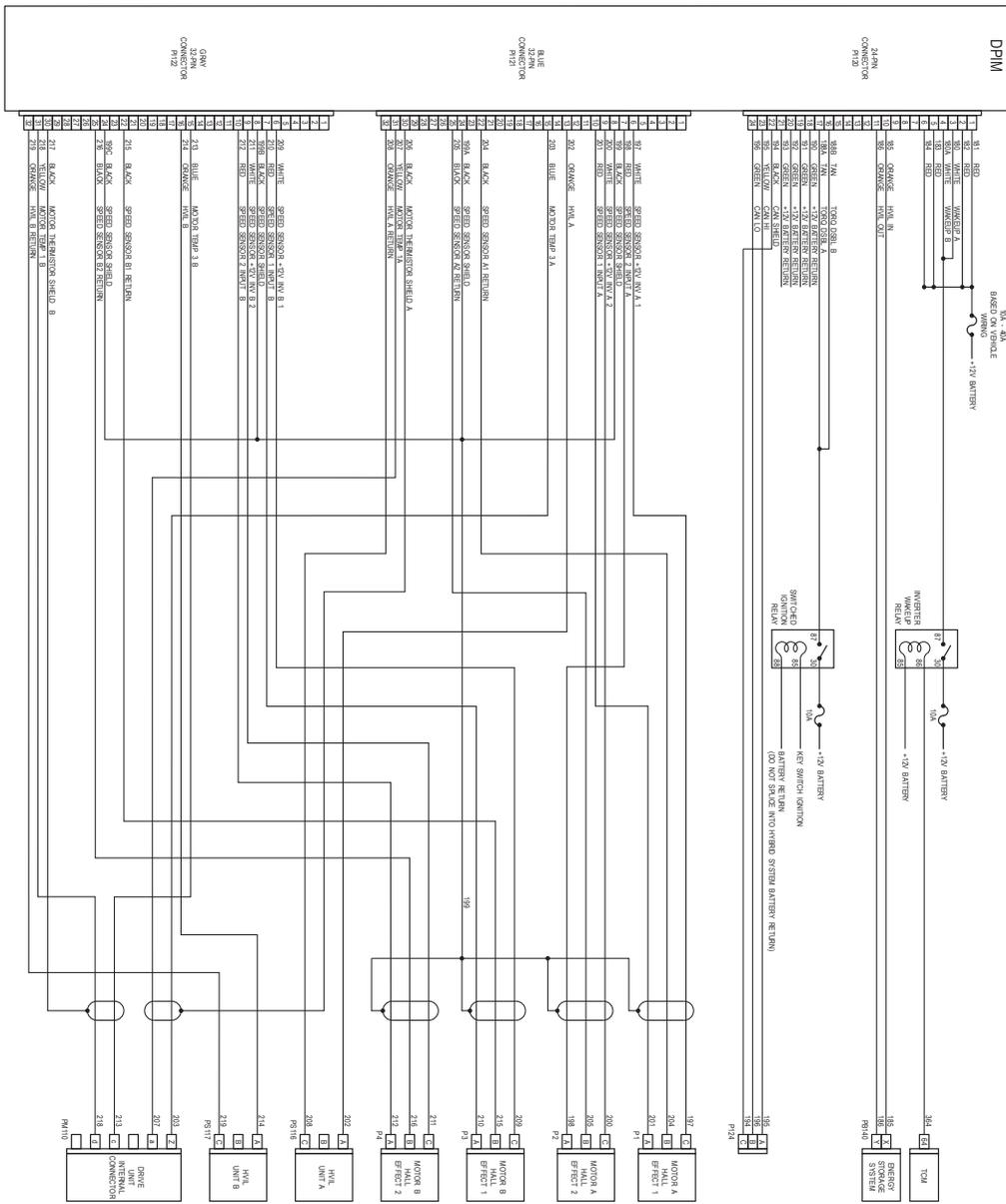


WIRE NO.	DESCRIPTION	CLASS	INSULATION	WIRE DIA. (IN)
221	YELLOW	A	42V BATTERY RETURN	0.031
222	GREEN	A	42V BATTERY RETURN	0.031
223	BLACK	A	42V BATTERY RETURN	0.031
224	BLACK	A	42V BATTERY RETURN	0.031
225	WHITE	C	42V BATTERY RETURN	0.031
226	RED	C	42V BATTERY RETURN	0.031
227	BLACK	E	42V BATTERY RETURN	0.031
228	GREEN	E	42V BATTERY RETURN	0.031
229	BLACK	E	42V BATTERY RETURN	0.031
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286	BLACK	E	42V BATTERY RETURN	0.031
287	BLACK	E	42V BATTERY RETURN	0.031
288	BLACK	E	42V BATTERY RETURN	0.031
289	BLACK	E	42V BATTERY RETURN	0.031
290	BLACK	E	42V BATTERY RETURN	0.031
291	BLACK	E	42V BATTERY RETURN	0.031
292	BLACK	E	42V BATTERY RETURN	0.031
293	BLACK	E	42V BATTERY RETURN	0.031
294	BLACK	E	42V BATTERY RETURN	0.031
295	BLACK	E	42V BATTERY RETURN	0.031
296	BLACK	E	42V BATTERY RETURN	0.031
297	BLACK	E	42V BATTERY RETURN	0.031
298	BLACK	E	42V BATTERY RETURN	0.031
299	BLACK	E	42V BATTERY RETURN	0.031
300	BLACK	E	42V BATTERY RETURN	0.031

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# ALLISON HYBRID

## RESOURCES: DPIM Schematic



COMP	PN	WIRE NO.	RECOMMENDED COLOR*	Q-DATE*	DESCRIPTION	WIRE NO.
24VDC CONNEXION P121	1	31	WHITE	C	SPEED SENSOR A - P121/A.1	106
	2	32	BLACK	C	SPEED SENSOR A - P121/B.1	107
	3	33	WHITE	C	SPEED SENSOR B - P121/A.2	108
	4	34	BLACK	C	SPEED SENSOR B - P121/B.2	109
	5	35	WHITE	C	SPEED SENSOR C - P121/A.3	110
	6	36	BLACK	C	SPEED SENSOR C - P121/B.3	111
	7	37	WHITE	C	SPEED SENSOR D - P121/A.4	112
	8	38	BLACK	C	SPEED SENSOR D - P121/B.4	113
	9	39	WHITE	C	SPEED SENSOR E - P121/A.5	114
	10	40	BLACK	C	SPEED SENSOR E - P121/B.5	115
24VDC CONNEXION P120	11	41	WHITE	C	SPEED SENSOR F - P120/A.6	116
	12	42	BLACK	C	SPEED SENSOR F - P120/B.6	117
	13	43	WHITE	C	SPEED SENSOR G - P120/A.7	118
	14	44	BLACK	C	SPEED SENSOR G - P120/B.7	119
	15	45	WHITE	C	SPEED SENSOR H - P120/A.8	120
	16	46	BLACK	C	SPEED SENSOR H - P120/B.8	121
	17	47	WHITE	C	SPEED SENSOR I - P120/A.9	122
	18	48	BLACK	C	SPEED SENSOR I - P120/B.9	123
	19	49	WHITE	C	SPEED SENSOR J - P120/A.10	124
	20	50	BLACK	C	SPEED SENSOR J - P120/B.10	125
24VDC CONNEXION P122	21	51	WHITE	C	SPEED SENSOR K - P122/A.11	126
	22	52	BLACK	C	SPEED SENSOR K - P122/B.11	127
	23	53	WHITE	C	SPEED SENSOR L - P122/A.12	128
	24	54	BLACK	C	SPEED SENSOR L - P122/B.12	129
	25	55	WHITE	C	SPEED SENSOR M - P122/A.13	130
	26	56	BLACK	C	SPEED SENSOR M - P122/B.13	131
	27	57	WHITE	C	SPEED SENSOR N - P122/A.14	132
	28	58	BLACK	C	SPEED SENSOR N - P122/B.14	133
	29	59	WHITE	C	SPEED SENSOR O - P122/A.15	134
	30	60	BLACK	C	SPEED SENSOR O - P122/B.15	135

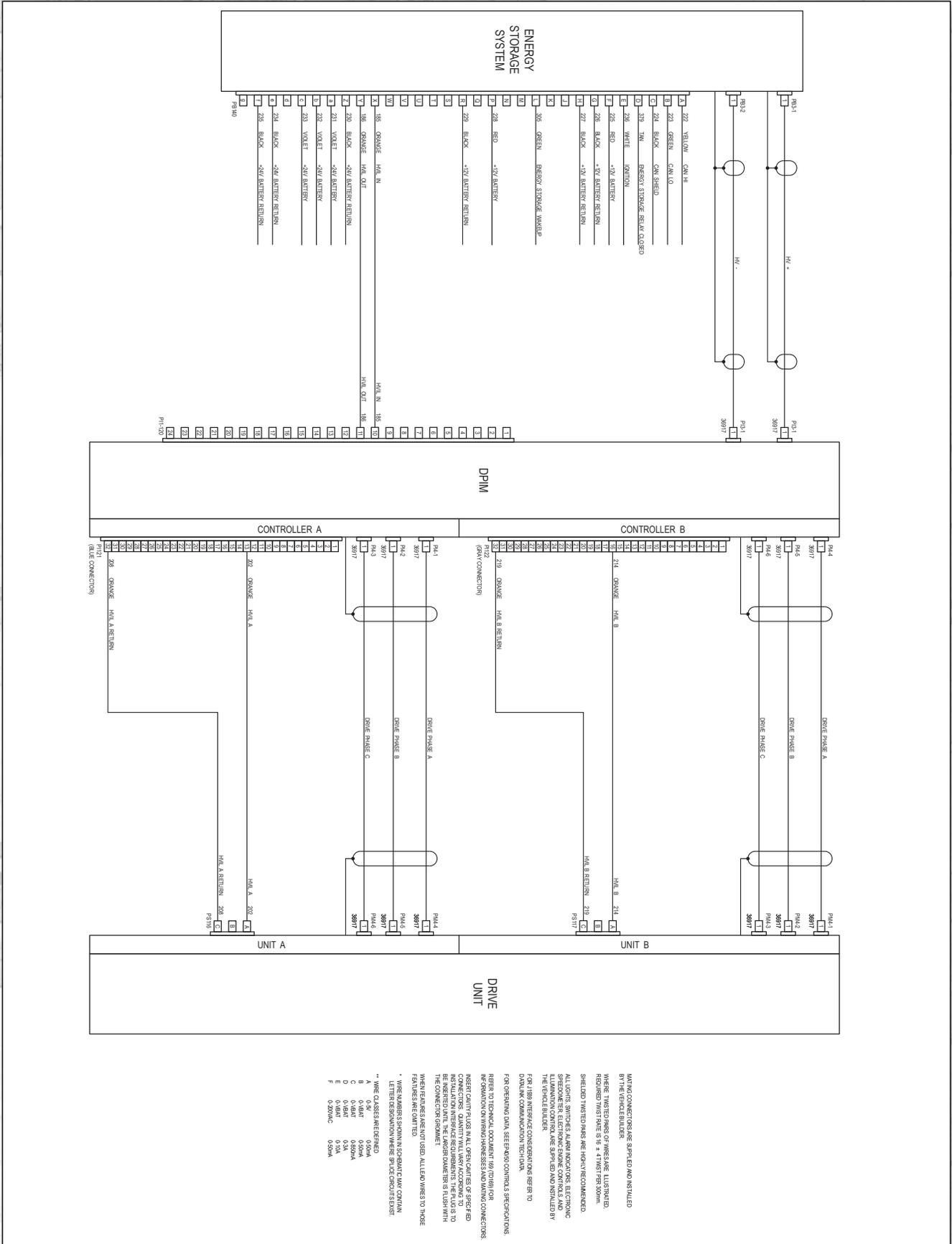
ALLISON HYBRID H 40/50 EP MAINTENANCE & OVERHAUL : INSTRUCTOR LED TRAINING

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# ALLISON HYBRID

## RESOURCES: HVIL Schematic



# ALLISON HYBRID

## 4TH GENERATION CONTROLS UPDATE



Instructor Led Training

### 4th Generation Controls Update

## 4th Generation Controls Diagnostics Update

- 4th Generation Controls DTCs are included in the Troubleshooting Manual and SIL 20-EP-09.
- Allison DOC™ for PC (H 40/50 EP) is compatible with 4th Generation Controls.
- 4th Generation Controls TCM Breakout harness is J-47275.
  - This is the same breakout harness used with Allison 1000, 2000, 3000 and 4000 4th Generation Controls.

ALLISON E<sup>+</sup> 40/50 System™

**DIAGNOSTIC TROUBLE CODES (DTC)**

DTC 73-35 Inverter A Primary Encoder Signal Lost (cont'd)

Step	Action
16	<ol style="list-style-type: none"> <li>Leave the ignition OFF.</li> <li>Leave the P1 encoder connector disconnected.</li> <li>Use J-39197, Jumper Wire Kit, to jumper pins A and C on the P1 encoder connector.</li> <li>Disconnect the red/blue DPIM 32-way connector from J-50165, DPIM2 Adapter Harness, leaving J-50165 mated to the red/blue OEM 32-way connector.</li> <li>At J-50165-3, DPIM2 Overlay, measure the resistance between pins 8 and 10 of the red/blue OEM 32-way connector.</li> </ol>
17	<ol style="list-style-type: none"> <li>Leave the r...</li> <li>Leav...</li> </ol>

**NOTE:** The vehicle OEM has responsibility for all external wiring harness repair. Harness repair is not covered by Allison Transmission warranty. Was the r...

TCM Breakout Harness

View PDF View PDF View Graphic

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# RESOURCES: 4th Generation Controls DTCs



**NOTE:** This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.

SIL 20-EP-09, Rev. A  
 June, 2010  
 Product Code(s): 70, 71  
 Page 10 of 135

## Appendix A. 4th Gen DTCs



**NOTE:** Should you encounter any Diagnostic Trouble Codes in a 4<sup>th</sup> Gen vehicle that are not included in this SIL, refer to TS3715EN, and use the wire conversion tables in [Appendix C](#).

**Table 3. Diagnostic Trouble Code (DTC) List**

DTC Code Description	Light	Restrictive Mode	Failure Record	Page Number
<a href="#">DTC 23-14 (PBSS PWM Input Fault (No Range Info from PWM))</a>	Check System	Disable Special Mode	Yes	12
<a href="#">DTC 23-15 (PBSS CAN Fault (No Range Info from CAN))</a>	Check System	Disable Special Mode	Yes	16
<a href="#">DTC 23-18 (PBSS Communication Fault (No Range Info from CAN or PWM))</a>	Check System	Disable Special Mode, Inhibit Neutral to Range Shifts	Yes	20
<a href="#">DTC 41-12 (Clutch 1 Block Solenoid Open)</a>	None	Disable Clutch Adaptive	Yes	24
<a href="#">DTC 41-16 (Clutch 2 Block Solenoid Open)</a>	None	Disable Clutch Adaptive	Yes	29
<a href="#">DTC 42-12 (Clutch 1 Block Solenoid Short to Power)</a>	None	Disable Clutch Adaptive	Yes	34
<a href="#">DTC 42-16 (Clutch 2 Block Solenoid Short to Power)</a>	None	Disable Clutch Adaptive	Yes	38
<a href="#">DTC 43-12 (Clutch 1 Block Solenoid Short to Ground)</a>	None	Disable Clutch Adaptive	Yes	42
<a href="#">DTC 43-16 (Clutch 2 Block Solenoid Short to Ground)</a>	None	Disable Clutch Adaptive	Yes	46
<a href="#">DTC 45-61 (Clutch 1 Solenoid Failed Open)</a>	Check System	Disable Clutch Adaptive	Yes	50
<a href="#">DTC 45-62 (Clutch 1 Solenoid Failed Short to Ground)</a>	Check System	Disable Clutch Adaptive	Yes	55
<a href="#">DTC 45-63 (Clutch 1 Solenoid Failed Short to Power)</a>	Check System	Disable Clutch Adaptive	Yes	59
<a href="#">DTC 45-64 (Clutch 2 Solenoid Failed Open)</a>	Check System	Disable Clutch Adaptive	Yes	63
<a href="#">DTC 45-65 (Clutch 2 Solenoid Failed Short to Ground)</a>	Check System	Disable Clutch Adaptive	Yes	68
<a href="#">DTC 45-66 (Clutch 2 Solenoid Failed Short to Power)</a>	Check System	Disable Clutch Adaptive	Yes	72
<a href="#">DTC 45-67 (Main Boost Solenoid Failed Open)</a>	Check System	Disable Clutch Adaptive	Yes	76
<a href="#">DTC 45-68 (Main Boost Solenoid Failed Short to Ground)</a>	Check System	Disable Clutch Adaptive, Limit output torque	Yes	81
<a href="#">DTC 45-69 (Main Boost Solenoid Failed Short to Power)</a>	Check System	Disable Clutch Adaptive	Yes	85
<a href="#">DTC 45-71 (Solenoid High Side Driver 1 Open)</a>	Check System	Disable Clutch Adaptive	Yes	89
<a href="#">DTC 45-72 (Solenoid High Side Driver 1 Short to Ground)</a>	Check System	Disable Clutch Adaptive	Yes	93
<a href="#">DTC 45-73 (Solenoid High Side Driver 1 Short to Power)</a>	None	Disable Clutch Adaptive	Yes	97
<a href="#">DTC 45-74 (Solenoid High Side Driver 2 Open)</a>	Check System	Disable Clutch Adaptive	Yes	104



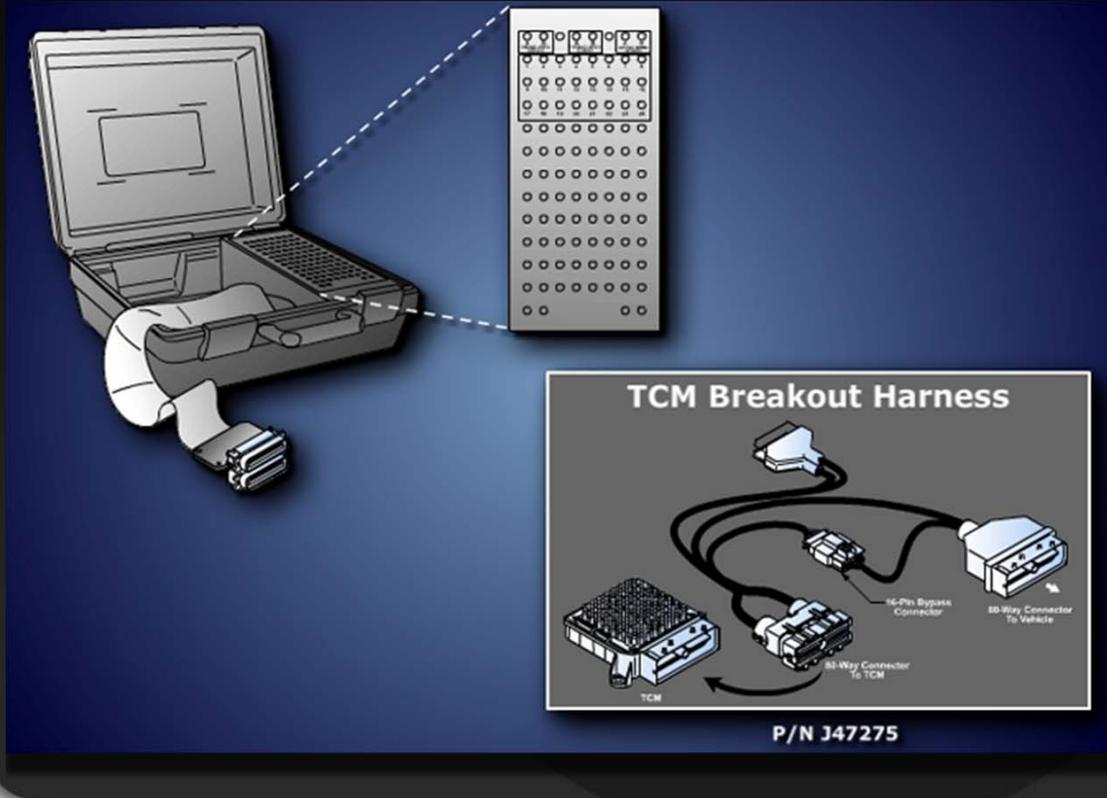
# ALLISON HYBRID

## RESOURCES: TCM Breakout Harness



Instructor  
Led  
Training

### TCM Breakout Harness



RESOURCES

1 of 1

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