Technical Document

WIRING HARNESSES FOR TRANSMISSIONS WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS

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1.0 SCOPE

This document specifies design requirements for wiring harnesses used with transmissions utilizing Allison 4th, 5th, and 6th Generation Controls.

2.0 REFERENCED DOCUMENTS

Unless otherwise noted, all documents referenced in this document may be found in the Allison HUB website at https://hub.allisontransmission.com/login. To locate the referenced documents look for Tech Data under the Engineering heading on the Allison HUB home page. In this document, these references are identified by italic font. Contact your Allison Transmission representative if you do not have access to the Allison HUB. A list of all items referenced in this document can be found at the end of this document.

3.0 ALLISON TRANSMISSION WIRING HARNESS POLICY

Design, procurement, installation and support of the harness connecting Allison-supplied mechanical and electrical components are the responsibility of the vehicle manufacturer. One harness or multiple harnesses can be used depending on vehicle configuration, assembly sequence, service requirements, etc.

NOTE: Allison assumes NO responsibility for the following:

- **Design of the harness system**
- **Customer-supplied materials**
- **Customer-supplied components**
- **The assembly of the harness system.**
- **The serviceability of the harness system**

4.0 HARDWARE SUPPLIERS

Electrical connector parts for use on the customer-supplied transmission control system harness are listed in the following appendices:

Appendix I 1000/2000 and 2900 Product Families
Appendix II 3000/4000 Product Families

The connector manufacturers control the availability of the part numbers and their replacement part numbers. Allison believes the part numbers are accurate as of the publication date. Consult the connector manufacturer for the most recent information.

Harnesses, connectors and other harness components are available from commercial sources, but not through Allison. Appendix III lists sources of harnesses and connectors. Sources are believed to be accurate as of the publication date.

4.1 EUROPEAN TRANSMISSION COMPANION HARNESSES

Allison Transmission–Europe developed a harness which consolidates all external transmission-related connectors and wiring into one harness. This harness requires a single 37-way connector to interface with the vehicle harness. Several variations of this harness are available to match the various transmission models and options. Although developed primarily for the European market, availability of these harnesses through Allison Parts Distribution Center (PDC) is unrestricted. Contact Allison Sales for harnesses part numbers.

5.0 DESIGN REQUIREMENTS

The purpose of the harness design requirements in this document is to assure the proper performance, uninterrupted communication, and field serviceability of the Allison-supplied transmission system. Failure to meet these requirements may adversely affect the following:

- Transmission operation
- Transmission system troubleshooting and diagnosis
- Transmission system repair

Wiring harness assemblies must be designed and installed to last the life of the vehicle:

- Without routine maintenance of the harness
- Without reducing the standard transmission overhaul intervals
- Without generating codes in the Allison transmission diagnostic system

The vehicle manufacturer is responsible for installing and routing the transmission harness such that the harness provides uninterrupted communication between the following systems:

- The transmission
- The TCM
- The shift selector
- All other transmission controls components in the vehicle
- All vehicle systems that interface with the transmission controls

Interrupted communication in the transmission control system can cause the following problems:

- Transmission malfunction
- Intermittent diagnostic codes that are difficult to diagnose

In order to maintain uninterrupted communication, the transmission harness installation and routing must meet the following conditions throughout the life of the vehicle:

- The wiring system must meet Allison's electromagnetic compatibility requirements
- The wires in the harness must remain intact and must not incur any damage
- All of the connectors and all other connections must remain secure and intact

5.1 CIRCUIT SCHEMATICS

The Allison 4th, 5th, and 6th Generation Controls System Schematic Installation Drawings contain the electrical circuit requirements. Refer to the appropriate schematic for your transmission:

- *Allison 4th Generation Controls System Schematic Installation Drawings*
  - *AS07-421*, 1000/2000 Product Family,
  - *AS07-422*, 3000/4000 Product Families, 6-Speed Models
  - *AS07-423*, 3000 Product Family, 7-Speed Models
  - *AS07-424*, 4000 Product Family, 7-Speed Models
- *Allison 5th Generation Controls System Schematic Installation Drawings*
  - *AS07-521*, 1000/2000 Product Family,
  - *AS07-522*, 3000/4000 Product Families, 6-Speed Models
  - *AS07-523*, 3000 Product Family, 7-Speed Models
  - *AS07-524*, 4000 Product Family, 7-Speed Models
- *Allison 6th Generation Controls System Schematic Installation Drawings*
  - *AS07-621*, 1000/2000 Product Family
  - *AS07-628*, 2900 Product Family
  - *AS07-622*, 3000/4000 Product Families, 6-Speed Models
  - *AS07-624*, 4000 Product Family, 7-Speed Models

5.2 INTERFACE TO TRANSMISSION WIRING

The vehicle manufacturer is responsible for the electrical interface between the transmission system and the vehicle electrical systems. For the interface requirements, refer to *Section D: Vehicle Electrical System Interface* of the *Allison 4th Generation Controls Manual*, *Allison 5th Generation Controls Manual*, *or Allison 6th Generation Controls Manual*. *Section D* includes the following topics:

- Requirements for direct power and ground, and ignition power
- Requirements for suppression of inductive loads
- Use of relays and fuses to isolate the transmission system from the vehicle system

Additional requirements are shown on the System Schematic installation drawings listed in Section 5.1 above.

NOTE: The electrical circuits which are installed for control of the transmission must not be used for other purposes. DO NOT splice other vehicle electrical systems into the transmission control electrical system.

5.3 INTERMIXING OF WIRING SYSTEMS

Allison Transmission strongly recommends bundling the wiring for the transmission control system separately from the wiring for other vehicle systems. If the transmission wiring is bundled with wires for other vehicle systems, the induced electrical noise can cause transmission operational anomalies. The OEM or body builder must verify that the vehicle wiring does not adversely affect the transmission control system.

5.4 ELECTROMAGNETIC COMPATIBILITY

CAUTION: The vehicle wiring system and operating environment MUST NOT interfere with proper operation of the transmission system.

Induced electrical noise which is coupled into the transmission control system can cause transmission operational anomalies. The following conditions can generate induced electrical noise:

- Wires transmitting high frequency signals
- Wires transmitting high voltage signals
- Wires with inductive voltage transients
- High power wires capable of producing capacitive coupling and/or strong magnetic fields

Examples of vehicle wiring with the above types of signals include:

- Fluorescent lighting wires
- Solenoid drive wires
- Relay drive wires
- Ignition wires
- Fuel injector wires
- Starter motor wires

The installer can minimize the potential for electromagnetic interference with the transmission control system. When installing the types of wiring listed above, follow these recommendations:

- Separate the wiring from the transmission wiring harness.
- Avoid running the wiring parallel to and within 150 mm (6 inches) of the transmission wiring for more than 900 mm (3 feet).
- Keep the wiring separate from the following low current analog transmission wires:
  - Transmission speed sensor wires
  - Oil level sensor wires
  - Temperature sensor wires

- Retarder modulation request (RMR) wires
- Throttle position signal (TPS) wires

• Minimize wire lengths between system components. Make wires as short as possible without pulling the wires tight. Long interface wires are potential antennas capable of receiving electromagnetic interference (EMI).

If it is not possible to follow the above recommendations, the OEM or Body Builder must evaluate the installation. The OEM or body builder must verify that the vehicle wiring does not adversely affect the transmission control system. The OEM or Body Builder may contact Allison Transmission Customer Integration Engineering for help in this evaluation. In addition, the OEM or body builder must verify that the transmission control system does not adversely affect other vehicle systems.

5.5 WIRE

The vehicle manufacturer is responsible for meeting the following wire requirements:

- Meet or exceed Society of Automotive Engineers (SAE) Recommended Practice J1128 - Low Tension Primary Cable.
- Use wire with a minimum cross-section of 0.75 mm^2 and with a minimum of 16 strands.
- Use of wire larger than AWG 18 gauge TXL must be approved by the connector supplier(s).
- Insulation must be compatible with the temperatures and chemicals as appropriate for the environment.

NOTE: Unless otherwise noted, Allison-furnished connectors are designed for use with TXL type wire insulation.

- Use the proper size for all connectors, terminals and related harness components
- Connector seals and grommets must be compatible with the insulation size.
- Terminals must be compatible with both the wire gage and insulation diameter.
- Validate all wire-to-seal and wire-to-terminal interfaces.
- Crimp insulation properly in the terminals as approved or specified by the connector manufacturer.
- Wires identified as twisted pairs must be twisted at 16 ± 4 full (360°) twists per 300 mm (1.0 ft). The twists must extend the entire length of the wire. To provide proper entry to the connector, leave a maximum of only 50 mm (2.0 in) of untwisted wire. Wire pairs are identified on the System Schematic installation drawings listed in Section 6.1.
- Do not exceed the maximum allowable wire lengths specified in *Allison 4th Generation Controls System Data*, *Allison 5th Generation Controls System Data*, or *Allison 6th Generation Controls System Data* Allison defines maximum wire lengths in order to ensure that the resistance of the conducting components does not exceed system requirements.
- For any CAN link using a shield wire, splice the bare shield wire to an insulated wire before entering the TCM mating connector. This is to insure a proper seal. The insulated wire must be either AWG 18 gauge TXL or AWG 20 gauge GXL, or international equivalent. The O.D. of the wire, including insulation, must not exceed 2.4 mm.

5.5.1 EXCEPTION FOR J1939-11 CAN LINK RELATED WIRES

For J1939-11 CAN link related wires, refer to the SAE J1939 Recommended Practice. To meet the impedance level required by J1939-11, the use of AWG 20 gauge (0.5 mm2 cross-section) wire with GXL insulation, or the international equivalent, is acceptable for these wires. The O.D. of the wire, including insulation, must not exceed 2.4 mm.

5.6 SPARE WIRES

To aid harness repair, a minimum of one spare wire must be built into each harness length and branch that contains more than 5 wires.

5.7 IDENTIFICATION AND MARKING

Allison has established a common pattern for wire numbers and colors. Use of common wire markings aids in initial harness assembly and in field troubleshooting. The markings on wires in customer-furnished harnesses must meet the following requirements:

- Mark each wire with the applicable Allison circuit number as defined on the appropriate System Schematic Installation Drawing listed in Section 5.1.
- Place circuit numbers at intervals not to exceed 100 mm (4.0 in).
- Make characters complete and legible.
- Use a color which contrasts with the wire insulation.
- Wire numbers must remain legible under exposure and handling conditions consistent with the environment.
- Jacketed, twisted pairs are exempt from the wire numbering requirement if the individual wires are of differing and contrasting colors.
- If electrical circuit numbers elsewhere in the vehicle are identical to the Allison circuit numbers, use an “AT” or an “A” prefix on the Allison wires. This will distinguish between the two systems of numbering.

Allison recommends that customer-furnished harnesses use the Allison convention for wire insulation colors. Refer to the System Schematic Installation Drawings listed in Section 5.1.

5.8 HARNESS COVERING

A secondary covering must be used on all transmission harness wires.

The secondary covering must meet the following requirements:

- Protect the transmission wiring from the following:
  - Direct contact with abrasive surfaces
  - Chafing
  - Road hazards
  - Excessive temperatures
- Use convoluted tubing if the harness is susceptible to road debris and/or gravel bombardment.
- Cover all branches of the harness.
- Group and wrap all of the wires into a bundle within the secondary covering.
- Use a secondary covering that can be removed and then functionally restored to its original condition, after a wire repair is made in a vehicle.
- Provide localized shielding or insulation for sections of the harness that require additional protection from abrasion or temperature. The surface temperature of the wiring harness and connectors must not exceed the limit shown in *Allison 4th Generation Controls System Data*, *Allison 5th Generation Controls System Data*, or *Allison 6th Generation System Data*. Allison Transmission recommends the following methods for meeting harness and connector temperature limits:
  - Locate wiring harnesses away from radiant heat sources such as engine exhaust systems and manifolds, electronic device heat sinks, oil/water coolers.
  - Protect wiring harnesses from high temperature sources. Acceptable protection includes heat shields, heat-reflective tape, high temperature conduit (Tefzel or equivalent).
  - Use thermal shielding if the harness is within 200 mm (8 in.) of an exhaust manifold
  - Use thermal shielding if the harness is within 100 mm (4 in.) of the final section of a tail pipe
  - For harnesses which do not use convoluted tubing for the secondary cover, review any harness design and the factory installation process with Allison Customer Integration Engineering and Allison OEM Product Assurance.

When convoluted tubing is used to cover the transmission harness, follow the additional requirements below:

- Specify the appropriate type of convolute tubing for the vehicle environment.
- Group and wrap wires into an integral wire bundle at intervals not to exceed 300mm (1 foot).
- Use the appropriate size of convolute tubing to fit the diameter of the wire bundle and to fit the convolute capture feature of the connectors (refer to Section 5.9).

Allison Transmission strongly recommends convoluted tubing for the secondary harness covering.

Allison Transmission discourages the use of wrapped, braided or loomed coverings. Harnesses with wrapped, braided or loomed harness covering for a secondary cover are typically not as abrasion resistant as those utilizing convoluted tubing. In addition, wrapped, braided and loomed coverings may distort the enclosed wire bundle when the harness is moved or flexed.

5.9 HARNESS ROUTING AND SUPPORT

CAUTION: The vehicle wiring system and operating environment MUST NOT interfere with proper operation of the transmission system.

When installing harnesses, avoid the following hazards:

- Sharp surfaces
- Sharp edges
- Screws
- Bolt heads
- Brackets
- Cut edges of nylon conduit
- Pinch points such as tilt cab hinges and electrical access covers

If the above hazards cannot be avoided, use rubber edge guards, grommets, or portions of conduit to protect the harness where it passes near or through the hazard. Failure to protect wiring will result in chafed wires which may result in either short or open circuits.

Do not locate harnesses close to moving parts, including:

- Belts
- Fans
- Pulleys
- PTO shafts
- Transmission output shaft
- Park brake mechanisms and linkage
- Steering shafts
- Moving seat mechanisms
- Throttle pedal and linkage
- Doors
- Levers

Moving parts can pull connectors apart, resulting in intermittent electrical connections.

In addition, do not

- Bend the harness sharply
- Kink or pinch the harness
- Cut the harness
- Pull the harness too taut
- Coil the harness

If a harness is too long, wrap the harness back on itself, then tie down the harness to minimize relative movement.

Locate the harness away from road hazards and corrosive materials. Where necessary, protect the harness with conduit, tubes or shielding.

Route harnesses to connectors in such a way that liquids and moisture are not routed into the back of the connectors. For harnesses routed to connectors from above or horizontally, include drip-loops close to the connectors. This is particularly important when the connectors are mounted horizontally or nearly horizontally (see 5.9, Connectors).

Support each section of the transmission harness according the following requirements:

- Secure the harness every 200 to 400 mm (8 to 16 inches). Use closer attachment points for smaller diameter wire bundles.
- Secure the harness to the powerpack, the cab, and the vehicle frame or chassis rails.
- Do not attach the harness to hydraulic lines or water hoses.
- Use nylon cable ties, rubber-coated metal clamps, or plastic-coated metal clamps to secure the harness.
- Do not pull cable ties so tight that the convoluted tube or other harness covering is crushed or deformed.
- Size clamps to the outside diameter of the harness covering. Do not crush or deform the harness covering with the clamps.
- Provide strain relief at all connectors, including the transmission controls components and the speed sensors on the transmission.

There is relative motion between the powerpack, the chassis, and the cab. Observe the following practices when routing the transmission harness between the powerpack, the chassis, and the cab:

- Provide sufficient slack in the harness between fixed points. The slack must account for the relative movement without inducing tension at any of the connectors. Tension is considered to be any strain greater than the weight of the harness assembly itself. Fixed points are clips, clamps, connectors, tie-wraps and grommets.
- Secure the harness as close as possible to the connector of each transmission controls component.
- Attach the harness support that is closest to each transmission controls component to the same part of the vehicle as the controls component itself. This will prevent movement of the wires at the entrance to the controls component connector.

The transmission harness may rest on the transmission housing if the following conditions are met:

- The harness covering meets the requirements in TD-173
- The harness is not under tension
- The portion of the harness on the transmission experiences minimal movement relative to the transmission housing

NOTE: Each transmission housing includes several bosses or other provisions which are recommended for attaching brackets or clips to secure harnesses. See the illustrations in Appendix I for 1000 / 2000 transmission models. Additional information for these transmission models is illustrated on *Installation Drawing AS64-431*.
Refer to *Installation Drawings AS64-931 (2900 Product Family models)*, *Installation Drawings AS66-431 (3000 Product Family models)* and to *AS67-431 (4000 Product Family models)* for similar information relating to these product families.

5.10 CONNECTORS

Required connector part numbers are listed in the Appendices.

- Appendix I 1000/2000 and 2900 Product Family models
- Appendix II 3000 and 4000 Product Family models

Refer to the appropriate *Connector Information Installation Drawing, AS07-405 (4th Gen Controls), AS07-505 (5th Gen Controls)*, or *AS07-605 (6th Gen Controls)* for the following information:

- Part numbers of connectors on the transmission
- Part numbers of the connectors on the Allison controls components

• Terminal locations in the above connectors

Refer to the System Schematic Installation Drawings listed in section 5.1 for a cross-reference of wire numbers and connector terminal locations.

The vehicle manufacturer is responsible for specifying connectors which are not identified as required in Appendix I or Appendix II. Allison strongly recommends the use of the connectors recommended in the Appendices. In addition, the vehicle manufacturer is responsible for specifying any other interface or bulkhead connectors used in the transmission control system. Customer-specified connectors must meet the following requirements:

- Use connectors that include a convolute tubing capture feature whenever connectors with a convolute capture feature are available. Most of the connectors which interface directly to the transmission and the Allison controls components include the provision to lock the connector to the convoluted tubing.
- Specify the convolute capture feature as a part of the connector assembly if the convolute capture feature is not integral to the connector.
- Use the convolute capture feature for strain relief as defined in Section 6.9 below.
- Use connectors that are electrically and mechanically compatible with the Allison mating connectors.
- Use terminals that are electrically and mechanically compatible with the Allison mating terminals.
- Verify terminal plating compatibility with the connector manufacturer. For example, Allison Transmission Control Modules (TCMs) have gold plated terminals. The connector that mates to the TCM must also have gold plated terminals.
- Use terminals that are electrically and mechanically compatible with the connector.
- Use environmentally sealed connectors unless the connectors are located in a sealed compartment.
- Use unsealed connectors only in locations where they are not exposed to moisture or contamination.
- Specify connectors with electrical, mechanical, and strength properties that are appropriate for the surroundings.
- Provide strain relief as defined in section 5.10.
- Specify connectors with positive locking mechanisms to insure complete mating.
- Specify connectors with secondary locks whenever they are commercially available.
- Keep the number of interface connections in the transmission control system to a minimum. The greater the number of interface connections, the greater the potential for disconnects, terminal problems and connector problems.
- Review the proposed connectors with Allison Customer Integration Engineering or Allison OEM Product Assurance.

The following connector requirements apply to the assembly of the transmission harness:

- Assemble connectors and associated components according to the manufacturer's specifications and instructions.
- Do not use dielectric grease, silicone, or similar compounds in the connector interface area. Use of lubricants typically results in the accumulation of dirt and debris on the contacts.
- Do not spray the connectors with cleaning agents. Cleaning agents may degrade some plastic connector parts.
- Install sealing plugs in all open cavities of sealed connectors.
- Install the strain relief feature of the connector if available in the connector design.
- Install the secondary lock if it is available in the connector design.
- Seal unused connectors with a connector cover, or with a mating connector with sealing plugs in all of the cavities. Taping of the connector is not acceptable. Contact the connector manufacturer for connector seals and covers.

- Provide protection from contamination until the connectors are assembled with the mating connectors. Allison Transmission recommends the use of shipping covers.

NOTE: For applications with rear engine installations Allison has accepted the use of older style connectors that do not offer convolute capture or secondary locking mechanism features. Any time these connectors are used for the vehicle wiring harness the OEM is responsible for damage due to moisture or contamination ingress

5.11 STRAIN RELIEF

Strain relief must be provided at each harness connector. The strain relief must prevent movement of the wire at the entrance to the connector. Tables 1-5 describe acceptable methods of providing strain relief at the transmission harness connectors.

TABLE 1

Connector:	**has convolute capture feature**
Harness Covering:	**convolute tubing**
Compatibility:	**size of convolute matches capture feature**

- Allison Transmission strongly recommends use of this method whenever possible.
- The convolute capture feature must be used.
- Anchor each end of the convoluted tubing in each connector per the connector manufacturer's instructions.

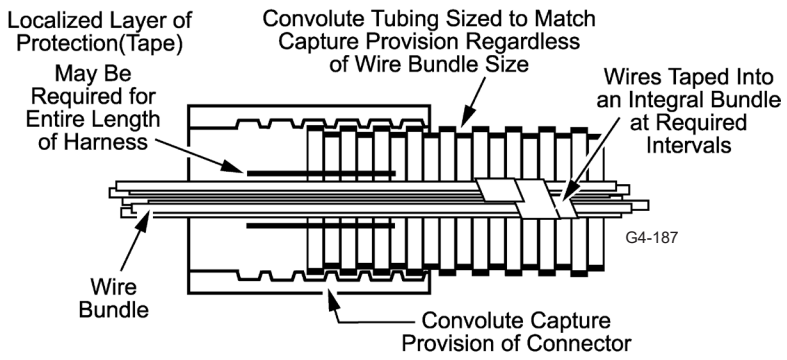


TABLE 2.1	
Connector:	**has convolute capture feature**
Harness Covering:	**convolute tubing**
Compatibility:	**size of convolute smaller than capture feature**

• Allison Transmission prefers this method when the convolute tubing is smaller than the connector capture feature.

• The convolute capture feature of the connector is used to provide strain relief at the connector.

• Install a section of convoluted tubing that matches the connector capture feature into the connector. This section of tubing should be at least 100 mm (4.0 inches) long.

• Install an additional layer of protection between the wire bundle and the convoluted tubing that covers the wire bundle. This will prevent abrasion of the wires by the cut end of the tubing.

• Insert the smaller convoluted tubing that is covering the harness into the section of larger tubing attached to the connector.

• Secure the smaller convoluted tubing to the larger tubing. Use tape or heat-shrink.

• Allison Customer Integration Engineering or Allison OEM Product Assurance must review this type of harness design.

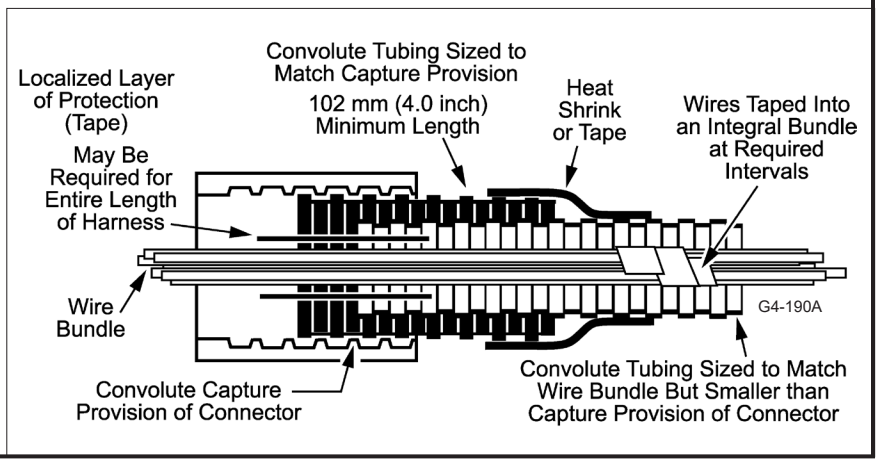


TABLE 2.2	
Connector:	**has convolute capture feature**
Harness Covering:	**convolute tubing**
Compatibility:	**size of convolute smaller than capture feature**

• Install a localized additional layer of protection between the wire bundle and each end of the convoluted tubing. This will prevent abrasion of the wires by the cut ends of the tubing.

• Insert the smaller convoluted tubing that is covering the harness into the larger convolute capture feature of the connector.

• Secure the smaller convoluted tubing to the connector capture feature. Use tape or heat-shrink.

• Allison Customer Integration Engineering or Allison OEM Product Assurance must review this type of harness design.

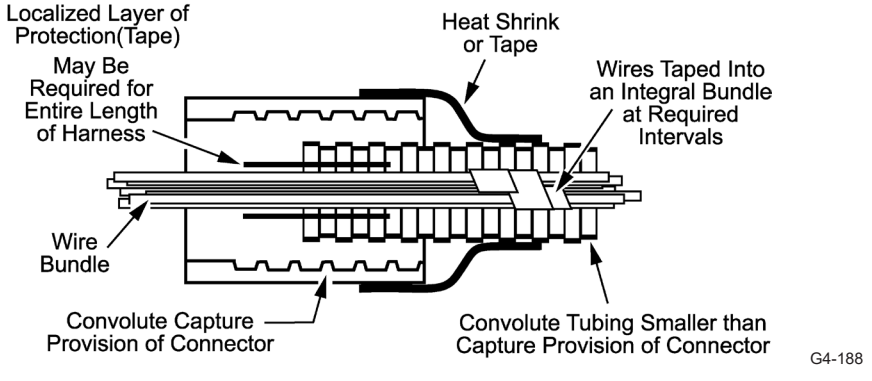


TABLE 2.3	
Connector:	**has convolute capture feature**
Harness Covering:	**convolute tubing**
Compatibility:	**size of convolute smaller than capture feature**

- Terminate each section of tubing within 25 mm (1.0 inch) of its associated connector.
- Install a localized additional layer of protection between the wire bundle and each end of the convoluted tubing. This will prevent abrasion of the wires by the cut ends of the tubing.
- Secure the tubing to prevent movement of the wires where they enter the connector. Anchor the tubing to the transmission with a clamp or nylon tie within 150 – 254 mm (6.0 – 10.0 inches) of the connector.
- Allison Customer Integration Engineering or Allison OEM Product Assurance must review this type of harness design.

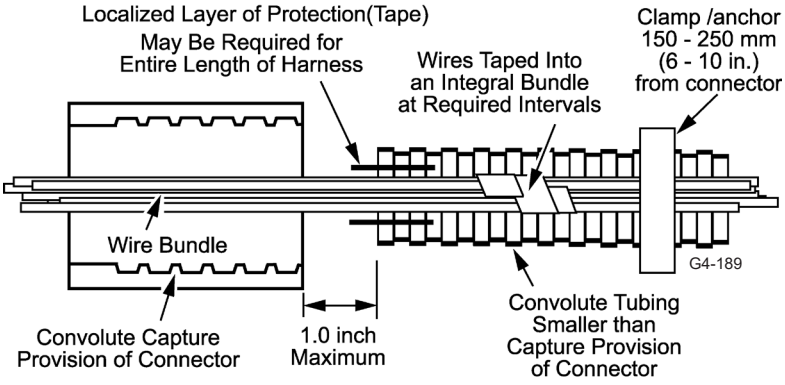


TABLE 3	
Connector:	**has convolute capture feature**
Harness Covering:	**wrapped, braided or loomed**

- The convolute capture feature of the connector must be used to provide strain relief at the connector.
- Attach a section of convoluted tubing, minimum length of 100 mm (4.0 inches), to cover the end of wire bundle.
- Install an additional layer of protection between the wire bundle and the convoluted tubing to prevent abrasion of the wires by the cut end of the tubing.
- Capture the convoluted tubing within the connector.
- Provide a smooth and secure transition between the convoluted tubing and the wrapped covering over the main section of the harness.
- Extend the wrapped covering over the convoluted tubing and secure it to the tubing.
- Allison Customer Integration Engineering or Allison OEM Product Assurance must review this type of harness design.

TABLE 4	
Connector:	**no convolute capture feature available**
Harness Covering:	**convoluted tubing**

- Terminate each section of tubing within 25 mm (1.0 inch) of its associated connector.
- Install a localized additional layer of protection between the wire bundle and each end of the convoluted tubing. This will prevent abrasion of the wires by the cut ends of the tubing.
- Secure the tubing to prevent movement of the wires where they enter the connector. Anchor the tubing to the transmission with a clamp or nylon tie within 150 – 254 mm (6.0 – 10.0 inches) of the connector.
- Allison Customer Integration Engineering or Allison OEM Product Assurance must review this type of harness design.

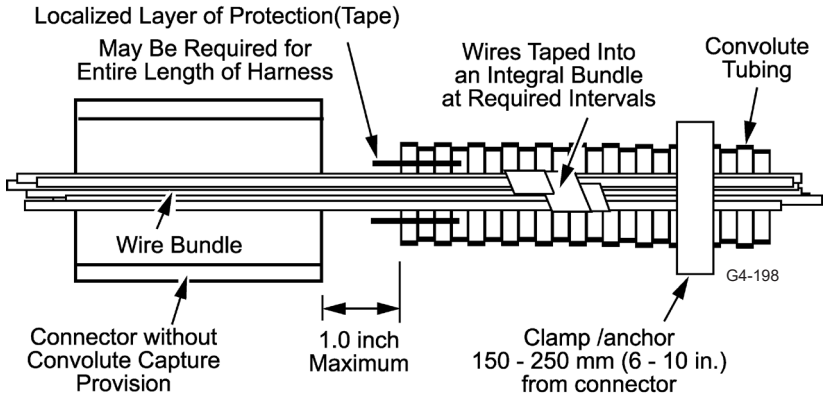


TABLE 5	
Connector:	**no convolute capture feature available**
Harness Covering:	**wrapped, braided or loomed**

- Terminate the harness covering near the connector in order to provide maximum protection for the wire bundle. Allison recommends within 25 mm (1.0 inch).
- Prevent relative motion between the wires and the connector by anchoring the harness covering. Locate the anchor point within 150 - 254 mm (6.0 – 10.0 inches) of the connector. The location of the anchor point may be slightly greater for larger wire bundles, due to their increased stiffness.
- Allison Engineering or Allison OEM Product Assurance must review this type of harness design.

5.12 BREAKOUTS

Protect breakouts by one of the following methods:

- Use adhesive taping
- Apply adhesive-lined, heat-shrinkable tubing
- Use another high quality method to protect the wire bundle

Although the components may vary on an individual transmission model, some have identical connector keys. Use one of the following methods to assure the connection of the correct harness component branch to the correct component:

- Design harness breakout points and branch lengths such that each component branch will attach to only one component .
- Properly and clearly label each of the component branches for the correct component.

Refer to the *Connector and Harness Attachment Provisions Installation Drawings* for locations of the components:

- *AS64-431 for the 1000 and 2000 Product Family models*
- *AS64-931 for the 2900 Product Family models*
- *AS66-431 for the 3000 Product Family models*
- *AS67-431 for the 4000 Product Family models*

5.13 WIRE STRIPPING

- Strip wires according to the terminal or splice manufacturer's specification.
- Strip the insulation to the appropriate length for the wire size, and for the terminal size or the splice size.
- Do not nick, break or otherwise damage wire strands during the stripping process.

5.14 CRIMPED TERMINATIONS

- Crimp all wires and terminals according to the connector manufacturers' specifications.
- Use the crimping tools specified by the manufacturers.
- Do not damage wire strands during the crimping process.
- Do not solder terminals or splices that are designed to be crimped.

5.15 SOLDERED TERMINATIONS

Soldering procedures used in the production of transmission harnesses must satisfy the following requirements:

- Soldering methods must produce consistent solder joints.
- Solder joints must last the life of the vehicle.
- All solder joints must be mechanically robust.
- All solder joints must be insulated and sealed.
- Select solder that is compatible with the vehicle installation environment.
- Apply the solder according to the manufacturers' specifications.
- Do not solder terminals or splices that are designed to be crimped.

5.16 FREE-HANGING TERMINALS

- Crimp or solder all free-hanging terminals according the manufacturer's instructions.
- Do not solder terminals that are designed to be crimped.
- Seal any terminals that are not protected in a sealed connector; for example, ring terminals and spade terminals.
- Application of the sealing material must not impinge on the electrical contact area.
- Use adhesive-lined shrink tubing or similar material.

5.17 SPLICES

- Size all splices correctly for the wire gage, stranding, and number of wires.
- Construct the splices according to the manufacturer's specifications.
- Use the manufacturer's specified tools.
- Locate all splices away from flexing and hinging areas in the harness.
- Splices must not have cut, missing, or loose strands of wire.
- Do not solder splices that are designed to be crimped.
- All splices must be insulated and sealed as appropriate for the intended environment.

5.18 ENVIRONMENTAL CRITERIA

The vehicle manufacturer is responsible to develop a validation plan which characterizes the operating and non-operating environment in which the harness will be used. Harnesses used with Allison transmissions must demonstrate conformance to these requirements and validation plan.

As a minimum, the following environments as determined by the vehicle manufacturer shall be characterized:

- **Temperature** – Limits must include typical minimum and maximum continuous temperature extremes commonly found within the vehicle environment. Temperature shock and transients must be included when evaluating this factor. The vehicle manufacturer is responsible for validating that the surface temperatures of the harness and connectors do not exceed their respective temperature limits.
- **Humidity**
- **Salt Fog**
- **Chemicals**
- **Sealing** – The wiring harness assembly must be immune to spillage, splash, or other liquid intrusion typical of the installation environment. This includes normal maintenance and cleaning of the vehicle interior and exterior; for example with high pressure washes or steam. For installations into vehicles with fording requirements, the section of the harness and those connectors located below the water line must remain sealed when completely immersed. Note that the remote-mounted TCM, the Allison shift selectors, and their connectors are sealed. However, these components are not immersible and are not able to withstand high pressure washes or steam cleaning.
- **Vibration and Mechanical Shock** – The wiring harness assembly must withstand vibration characteristics of the installed environment. The harness assembly must be functional and monitored before, during and after the vibration test. Intermittent circuits are not acceptable under any condition.
- **Ultraviolet (UV) Radiation** – The electrical components and connectors used with Allison Transmission products do not contain UV protective additives or coatings. The vehicle builder is responsible for providing protection from prolonged exposure to direct and indirect sources of UV.

6.0 INSTALLATION AND ROUTING REQUIREMENTS

Proper installation and routing of the harness in the vehicle is critical to the reliable operation of the transmission. Good harness design includes features to facilitate good harness routing and installation.

The harness installation must meet the following connector requirements:

- Mount connectors with the wire seal end pointing horizontal or downward, between 3:00 o'clock and 9:00 o'clock. This orientation prevents dirt and moisture from collecting on the wire seal end of the connector.
- If the connector includes wire combs, do not pull the wire at the connector such that the wire is in tension with the wire combs. Wire combs are the plastic pieces at the back of the connector that keep the wire bend from stretching the seals. Refer to Figure 1 and Figure 2.
- Locate connectors where they will be protected from bombardment by stones and dirt.
- Locate connectors where they will be protected from road splash and from cleaning spray.
- Follow each connector manufacturer's instructions for mating the two halves of the connector system.
- Do not use dielectric grease or similar compounds in the connector interface area. Use of lubricants typically results in the accumulation of dirt and debris on the contacts.
- Do not spray the connectors with cleaning agents. Cleaning agents may degrade some plastic connector parts.
- If the connector is designed to accommodate a secondary lock, the lock provision must be used and properly engaged.
- Assemble all connectors in the transmission controls system to their mating half before the vehicle or chassis is exposed to an outside environment.
- Connect all components in the transmission controls system to the transmission wiring harness before transporting partially completed chassis or vehicles.
- Do not force connectors together. If connectors are difficult to mate, check connectors for misaligned, damaged or bent terminals. Correct the problem before mating the connectors.
- Do not pull wires at the connector such that the seals are stretched or opened. See Figure C-4 for proper wiring harness installation practice. Figure C-5 illustrates installation practices to avoid.
- Locate the diagnostic tool connector in an area of the driver's compartment where a technician can easily access the connector.

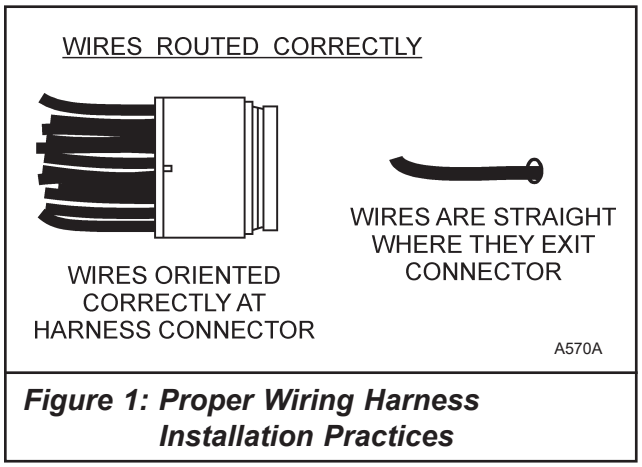


Figure 1: Proper Wiring Harness Installation Practices

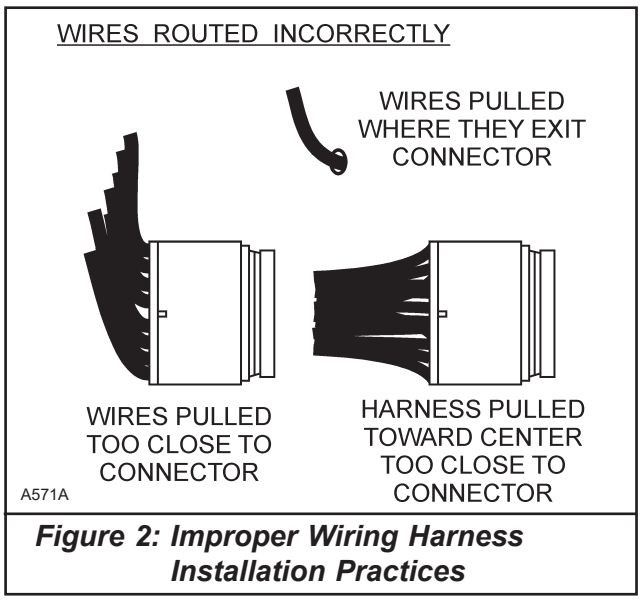


Figure 2: Improper Wiring Harness Installation Practices

7.0 SERVICE REQUIREMENTS

The vehicle manufacturer is responsible for each of the following:

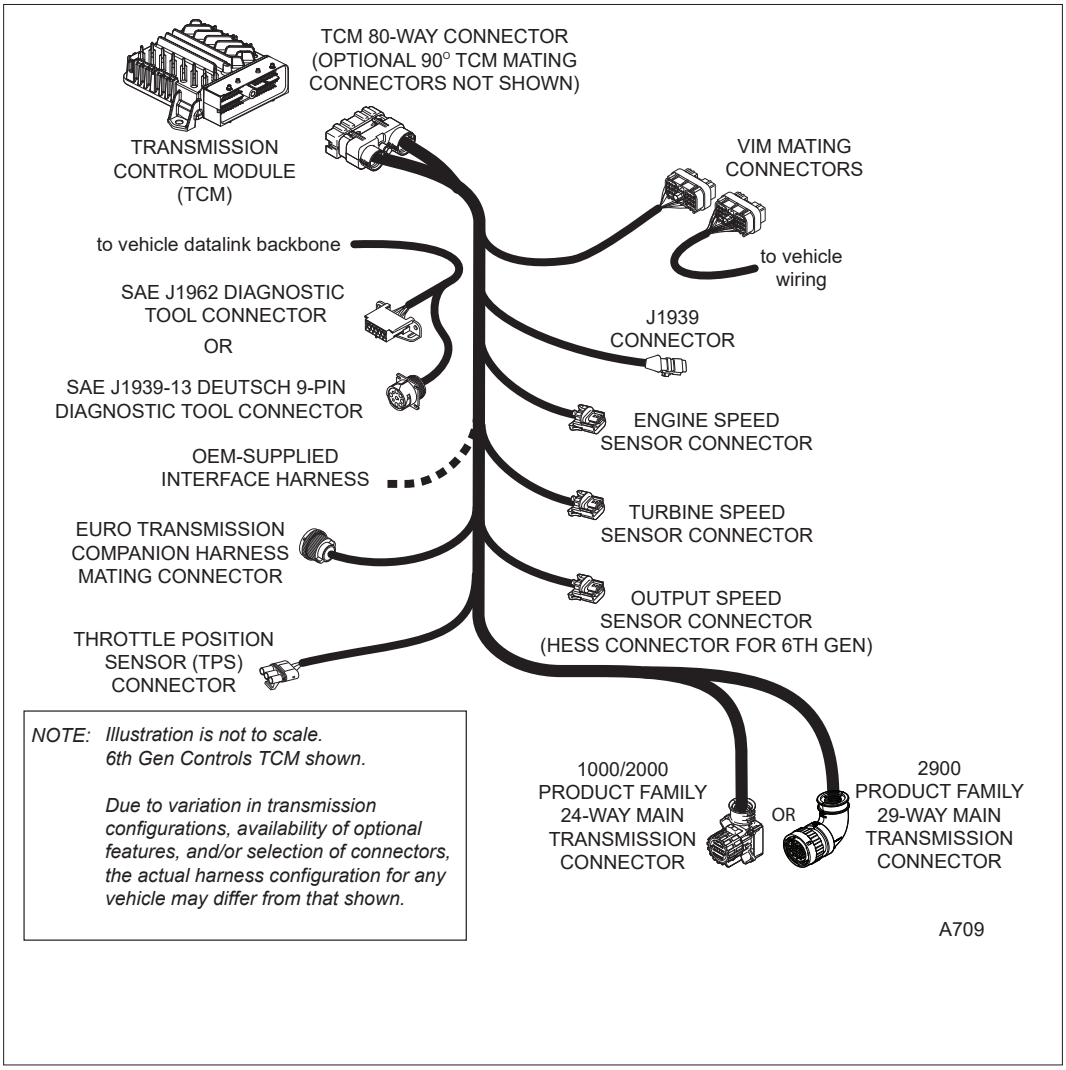
- Develop the necessary servicing procedures.
- Develop and publish wiring schematics, servicing, and troubleshooting manuals.
- Document, publicize, and verify availability of all special tools to their repair outlets.
- Supply training and appropriate service documentation to the repair outlets.
- Develop and publish parts catalog, identifying the part numbers for the serviceable parts within the harnesses.
- Release of all harness and associated part numbers into the service system.
- Identify and supply all items determined to be required for harness repair.
- Provide information directly to body builders.
- Supply the Allison account manager with the service and repair documentation.

The Allison Transmission Service Department has established maximum removal and replacement (R&R) requirements for Allison transmissions and related components. For R&R information which relates to components discussed in this document, refer to *Technical Document (TD) 176, Service Requirements – Removal and Replacement Times for Allison Transmissions*.

APPENDIX I — ELECTRICAL CONNECTOR PARTS FOR 1000, 2000. AND 2900 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS

The electrical connectors on the transmission and control components are defined on *Installation Drawing AS07-405 (4th Gen Controls)*, *AS07-505 (5th Gen Controls)*, and *AS07-605 (6th Gen Controls)* The vehicle manufacturer is responsible for the design and manufacture of electrical harnesses which mate to these connectors. Allison Transmission does not supply harnesses or harness component parts. Known sources for harnesses and harness components are listed in *Appendix III* of this document, in *Allison 4th Generation Controls Manual Section F: Support Equipment*, *Allison 5th Generation Controls Section F: Support Equipment*, and *Allison 6th Generation Controls Section F: Support Equipment*

The connector parts listed on the following pages properly interface with the transmission and control components as of the revision date of this document. The availability of these parts and their replacements are under the design control of the manufacturer. Some of the part numbers may no longer be available. This list may be used to determine the availability of parts or as a reference for the replacement of part numbers which are no longer available.



— continued —

APPENDIX I — ELECTRICAL CONNECTOR PARTS FOR 1000, 2000, AND 2900 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
TRANSMISSION CONTROL MODULE (TCM) MATING CONNECTOR (80-way, bolt assist)				
	R-61991-001	CONNECTOR ASSEMBLY, 80F BOLT	AEES/EPC	1
	E-4542	GROMMET COVER, 80-WAY	AEES/EPC	1
	E-4550	WIRE DRESS, UPPER HALF (22 mm and 25 mm)@	AEES/EPC	1
	E-4551	WIRE DRESS, LOWER HALF (22 mm and 25 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
OPTIONAL TRANSMISSION CONTROL MODULE (TCM) MATING CONNECTOR (80-way, bolt assist, 90º direction A)				
(Direction A is to the right when facing the connector end of the TCM with the feet side down)				
	R-61991-001	CONNECTOR ASSEMBLY, 80F BOLT	AEES/EPC	1
	E-4542	GROMMET COVER, 80-WAY	AEES/EPC	1
	E-6206-002	BACKSHELL – 90º WIRE DRESS, DIRECTION A (25 mm)@	AEES/EPC	1
	E-4555	WIRE DRESS, LOWER 80-WAY 90º (25 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
OPTIONAL TRANSMISSION CONTROL MODULE (TCM) MATING CONNECTOR (80-way, bolt assist, 90º direction B)				
(Direction B is to the left when facing the connector end of the TCM with the feet side down)				
	R-61991-001	CONNECTOR ASSEMBLY, 80F BOLT	AEES/EPC	1
	E-4542	GROMMET COVER, 80-WAY	AEES/EPC	1
	E-6206-001	BACKSHELL – 90º WIRE DRESS, DIRECTION B (25 mm)@	AEES/EPC	1
	E-4555	WIRE DRESS, LOWER 80-WAY 90º (25 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
1000/2000 MAIN TRANSMISSION MATING CONNECTOR (24-way, twist-lock)				
	R-62001-001	CONNECTOR ASSEMBLY, 24F TWIST-LOCK	AEES/EPC	1
	E-4582	GROMMET COVER, 24-WAY	AEES/EPC	1
	E-4586	WIRE DRESS, 24-WAY (19 mm)@	AEES/EPC	1
	E-4570	CONVOLUTE CAPTURE FOR WIRE DRESS (19 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
1000/2000 OPTIONAL MAIN TRANSMISSION MATING CONNECTOR				
(24-way, twist-lock; notched wire dress for sensor clearance)				
	R-62001-001	CONNECTOR ASSEMBLY, 24F TWIST-LOCK	AEES/EPC	1
	E-4582	GROMMET COVER, 24-WAY	AEES/EPC	1
	R-63725-001	WIRE DRESS, 24-WAY, w/ SENSOR CLEARANCE (19 mm)@	AEES/EPC	1
	E-4570	CONVOLUTE CAPTURE FOR WIRE DRESS (19 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R

@ = Convolute capture designed for APTIV-DELPHI convolute of stated size(s)

APPENDIX I — ELECTRICAL CONNECTOR PARTS FOR 1000, 2000, AND 2900 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
2900 MAIN TRANSMISSION MATING CONNECTOR (29-way, twist-lock)				
	15544895	CONNECTOR ASSEMBLY, 29-WAY TWIST-LOCK	APTIV/DELPHI	1
	13711549	TERMINAL-SOCKET 1.0 mm (SIZE 20)	APTIV/DELPHI	Max 6
	13697417	TERMINAL-SOCKET 1.6 mm (SIZE 16)	APTIV/DELPHI	Max 19
	13783299	TERMINAL-SOCKET 2.4 mm (SIZE 12)	APTIV/DELPHI	Max 4
	13756464	PLUG, CAVITY SEAL 1.0 mm & 1.6 mm	APTIV/DELPHI	Max 25
	13756465	PLUG, CAVITY SEAL 2.4 mm	APTIV/DELPHI	Max4
	13767802	WIRE DRESS STRAIGHT 19 mm CONDUIT	APTIV/DELPHI	1
	13767803	WIRE DRESS STRAIGHT 22 mm CONDUIT	APTIV/DELPHI	1
	13667839	WIRE DRESS STRAIGHT 25 mm CONDUIT	APTIV/DELPHI	1
	13767805	WIRE DRESS RIGHT ANGLE 19 mm CONDUIT	APTIV/DELPHI	1
	13767806	WIRE DRESS RIGHT ANGLE 22 mm CONDUIT		
	13766840	WIRE DRESS RIGHT ANGLE 25 mm CONDUIT		
OPTIONAL EUROPEAN TRANSMISSION COMPANION HARNESS MATING CONNECTOR				
	121583-0058	CONNECTOR, 37-WAY APD-1BS37	ITT, CANNON	1
	044-8597-000	END BELL	ITT, CANNON	1
	121668-0268	SOCKET, GOLD-PLATED APK-SA16g15-002-C	ITT, CANNON	A/R
	121667-0023	WIRE SEAL, INDIVIDUAL 10YE3940	ITT, CANNON	A/R
	121667-0025	WIRE FILLER, 10WH3940	ITT, CANNON	A/R
Convolute adapters with PG21 thread are available from:			HARNESSFLEX or SCHLEMMER	
SPEED SENSOR MATING CONNECTORS				
ENGINE	13520101 #	CONNECTOR ASSY, 2F GT150 HALF SHROUD	APTIV-DELPHI	1
SPEED	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
SENSOR	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1
TURBINE	13520101 #	CONNECTOR ASSY, 2F GT150 HALF SHROUD	APTIV-DELPHI	1
SPEED	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
SENSOR	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1
OUTPUT SPEED	13520104	CONNECTOR ASSY, 2F GT150 HALF SHROUD (6TH GENERATION CONTROLS)	APTIV-DELPHI	1
SENSOR	13520101 #	CONNECTOR ASSY, 2F GT150 HALF SHROUD (4TH & 5TH GENERATION CONTROLS)	APTIV-DELPHI	1
	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1

@ = Convolute capture designed for APTIV-DELPHI convolute of stated size

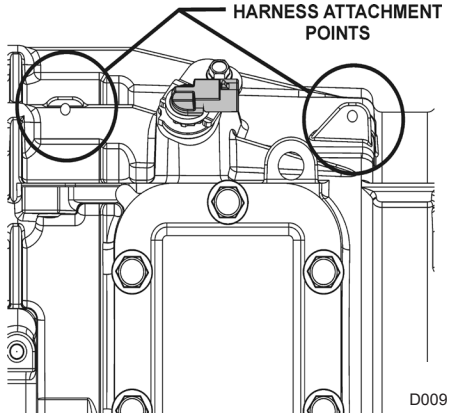
***** = A single CPA lock is required. Either part number listed is acceptable.

= Replaces APTIV-DELPHI part 15490464.

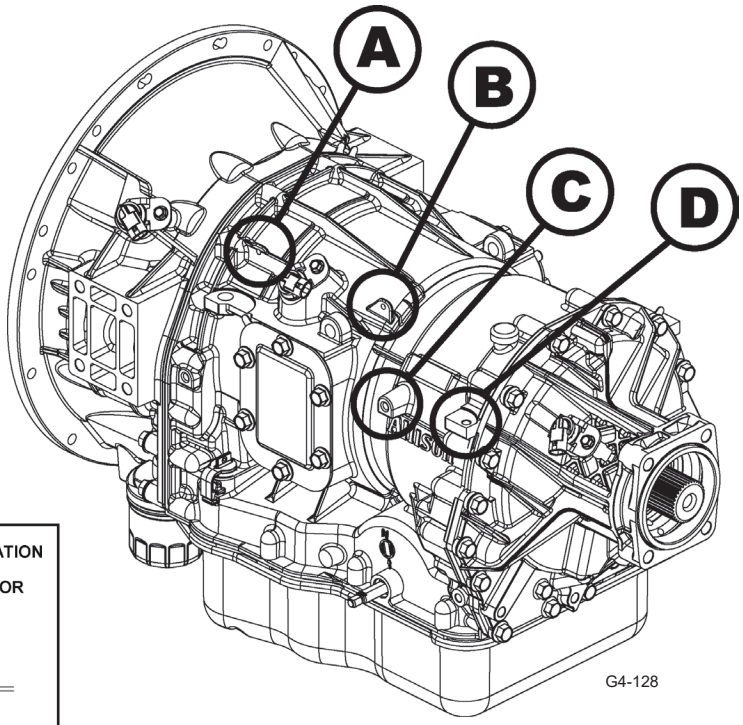
APPENDIX I — ELECTRICAL CONNECTOR PARTS FOR 1000, 2000, AND 2900 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

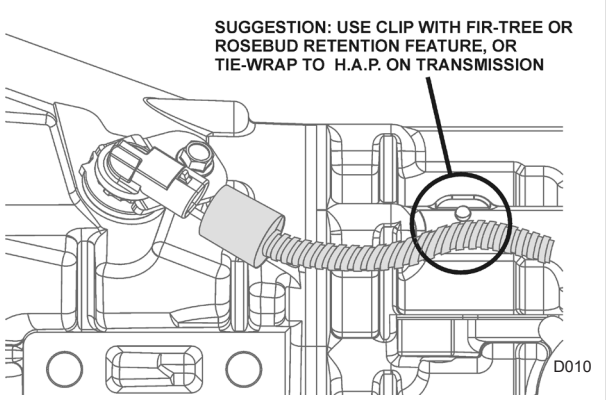
CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
OPTIONAL THROTTLE POSITION SENSOR (TPS) MATING CONNECTOR				
	12015793	CONNECTOR ASSY, 3-WAY W/P TWR BLACK	APTIV-DELPHI	1
	12089040	TERMINAL, M W/P PIN	APTIV-DELPHI	3
	15338470	SEAL ASSY, CABLE 1-WAY W/P PPL	APTIV-DELPHI	3
DIAGNOSTIC TOOL INTERFACE CONNECTOR (CAN1 for 4th Gen; CAN1 or CAN2 for 5th & 6th Gen)				
SAE J1939-13	HD10-9-1939P	CONNECTOR, REC., 9-WAY	TE - DEUTSCH	1
DIAGNOSTIC	0460-202-1631	CONTACT, PIN	TE - DEUTSCH	5
CONNECTOR	114017	SEALING PLUG	TE - DEUTSCH	4
	HD18-009	STRAIN RELIEF	TE - DEUTSCH	1
	HDC16-9	CAP, CONNECTOR	TE - DEUTSCH	1
OPTIONAL DIAGNOSTIC TOOL INTERFACE CONNECTOR (CAN2 for 4th Gen; CAN1 or CAN2 for 5th & 6th Gen)				
SAE J1962 Type A		16-PIN TRAPEZOIDAL CONNECTOR	REFERENCE SAE J1962	
OPTIONAL VEHICLE INTERFACE MODULE (VIM) MATING CONNECTORS				
18-WAY	12040920	CONNECTOR, BODY, 18-WAY	APTIV-DELPHI	1
CONNECTOR	12040936	SEAL, 9-WAY, GREEN	APTIV-DELPHI	2
	12110545	STRAIN RELIEF, 18-WAY	APTIV-DELPHI	1
	15492602	BOLT, 7mm HEAD EXT.	APTIV-DELPHI	1
	15492535	RETAINER CLIP, BOLT	APTIV-DELPHI	1
	12103881	TERMINAL, 150F	APTIV-DELPHI	A/R
	12034413	CAVITY PLUG, M/P	APTIV-DELPHI	A/R
30-WAY	12034397	CONNECTOR, BODY, 30-WAY	APTIV-DELPHI	1
CONNECTOR	12040879	SEAL, 15-WAY, GREEN	APTIV-DELPHI	2
	12110546	STRAIN RELIEF, 30-WAY	APTIV-DELPHI	1
	15492602	BOLT, 7mm HEAD, EXT.	APTIV-DELPHI	1
	15492535	RETAINER CLIP, BOLT	APTIV-DELPHI	1
	12103881	TERMINAL, 150F SERIES	APTIV-DELPHI	A/R
	12034413	CAVITY PLUG, M/P	APTIV-DELPHI	A/R

APPENDIX I:
RECOMMENDED ATTACHMENT POINTS FOR WIRING HARNESS
1000/2000 PRODUCT FAMILY

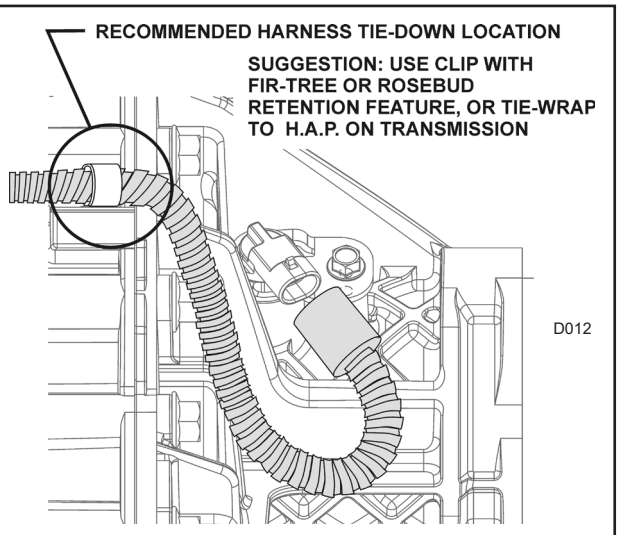


Close-Up: Locations A and B

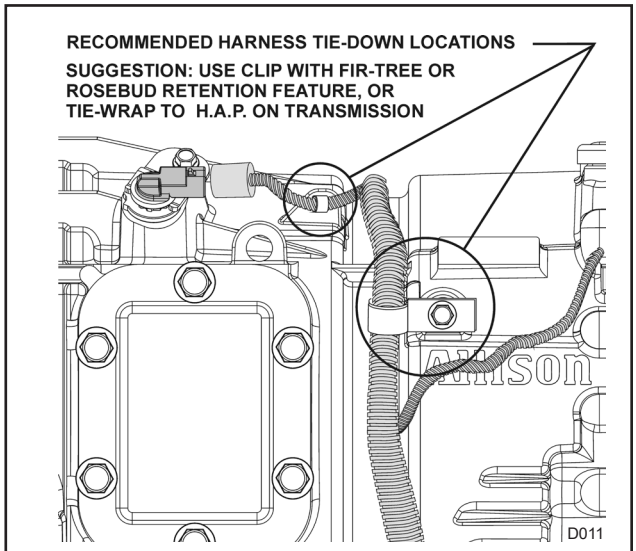




Close-Up: Harness Attachment at Location A



Close-Up: Harness Attachment at Location D



Close-Up: Harness Attachment at Locations B and C

APPENDIX II — ELECTRICAL CONNECTOR PARTS FOR 3000 AND 4000 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS

The electrical connectors on the transmission and control components are defined on *Installation Drawing AS07-405 (4th Gen Controls)*, *AS07-505 (5th Gen Controls)*, and *AS07-605 (6th Gen Controls)*. The vehicle manufacturer is responsible for the design and manufacture of electrical harnesses which mate to these connectors. Allison Transmission does not supply harnesses or harness component parts. Known sources for harnesses and harness components are listed in *Appendix III* of this document and in *Allison 4th Generation Controls Manual Section F: Support Equipment*, *Allison 5th Generation Controls Section F: Support Equipment*, and *Allison 6th Generation Controls Section F: Support Equipment*

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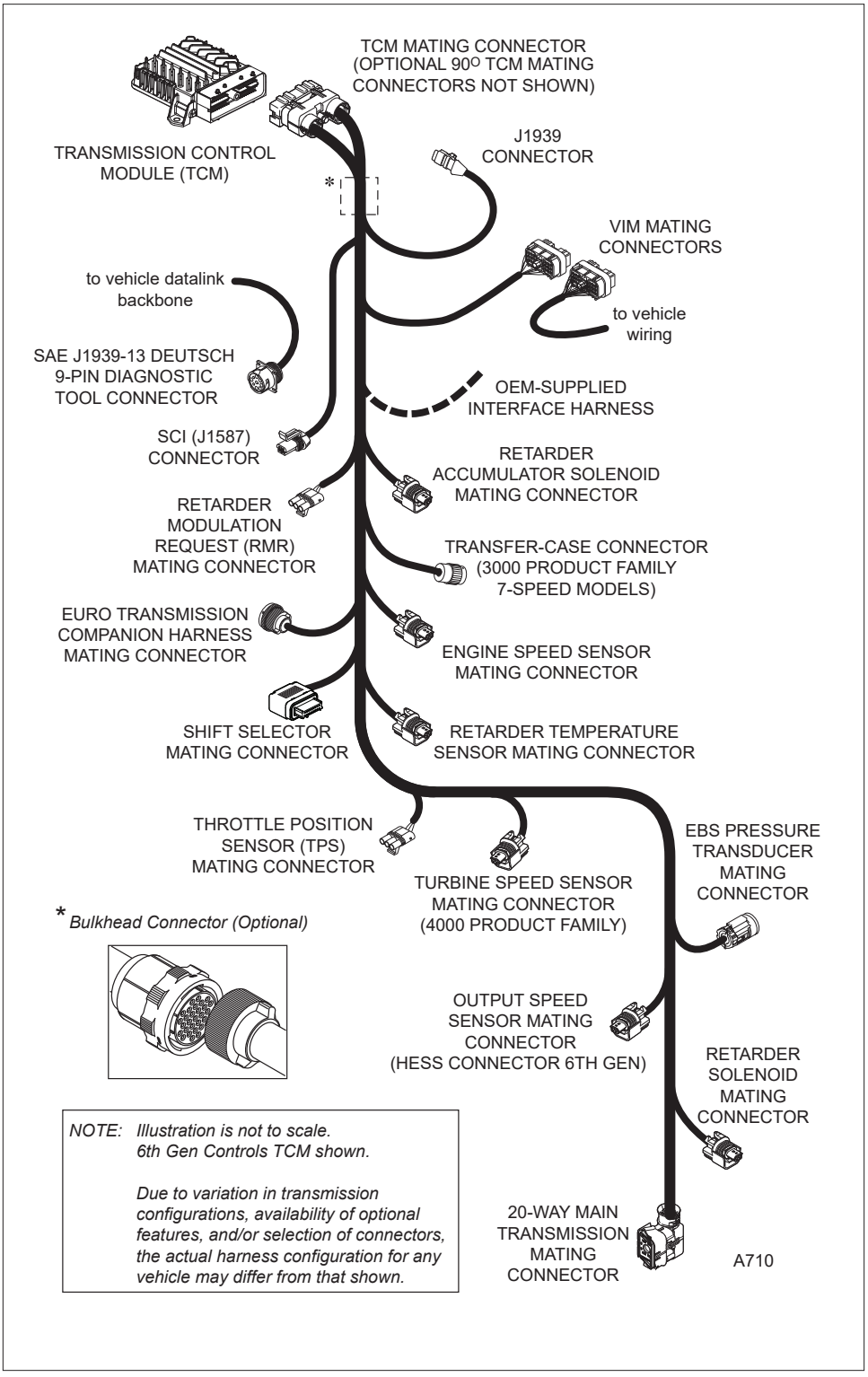

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APPENDIX II — ELECTRICAL CONNECTOR PARTS FOR 3000 AND 4000 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
TRANSMISSION CONTROL MODULE (TCM) MATING CONNECTOR (80-way, bolt assist)				
	R-61991-001	CONNECTOR ASSEMBLY, 80F BOLT	AEES/EPC	1
	E-4542	GROMMET COVER, 80-WAY	AEES/EPC	1
	E-4550	WIRE DRESS, UPPER HALF (22 mm and 25 mm)@	AEES/EPC	1
	E-4551	WIRE DRESS, LOWER HALF (22 mm and 25 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
OPTIONAL TRANSMISSION CONTROL MODULE (TCM) MATING CONNECTOR (80-way, bolt assist, 90º direction A)				
(Direction A is to the right when facing the connector end of the TCM with the feet side down. Ref: Installation Drawing AS07-412)				
	R-61991-001	CONNECTOR ASSEMBLY, 80F BOLT	AEES/EPC	1
	E-4542	GROMMET COVER, 80-WAY	AEES/EPC	1
	E-6206-002	BACKSHELL – 90º WIRE DRESS, DIRECTION A (25 mm)@	AEES/EPC	1
	E-4555	WIRE DRESS, LOWER 80-WAY 90º (25 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
OPTIONAL TRANSMISSION CONTROL MODULE (TCM) MATING CONNECTOR (80-way, bolt assist, 90º direction B)				
(Direction B is to the left when facing the connector end of the TCM with the feet side down. Ref: Installation Drawing AS07-412)				
	R-61991-001	CONNECTOR ASSEMBLY, 80F BOLT	AEES/EPC	1
	E-4542	GROMMET COVER, 80-WAY	AEES/EPC	1
	E-6206-001	BACKSHELL – 90º WIRE DRESS, DIRECTION B (25 mm)@	AEES/EPC	1
	E-4555	WIRE DRESS, LOWER 80-WAY 90º (25 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
MAIN TRANSMISSION MATING CONNECTOR				
20-WAY	R-62183-001	CONNECTOR ASSEMBLY, 20F BOLT	AEES/EPC	1
(bolt assist)	E-4566	GROMMET COVER, 20-WAY	AEES/EPC	1
(3000 and	E-4569	WIRE DRESS, 20-WAY (19 mm)@	AEES/EPC	1
4000 models)	E-4570	CONVOLUTE CAPTURE FOR WIRE DRESS (19 mm)@	AEES/EPC	1
	12034413	PLUG, CAVITY SEAL	APTIV-DELPHI	A/R
	33001-2004	TERMINAL, RECEPTACLE - RIGHT PAYOFF	MOLEX	A/R
	or 33001-3004	TERMINAL, RECEPTACLE - LEFT PAYOFF	MOLEX	A/R
OPTIONAL EUROPEAN TRANSMISSION COMPANION HARNESS MATING CONNECTOR				
	121583-0058	CONNECTOR, 37-WAY APD-1BS37	ITT, CANNON	1
	044-8597-000	END BELL	ITT, CANNON	1
	121668-0268	SOCKET, GOLD-PLATED APK-SA16g15-002-C	ITT, CANNON	A/R
	121667-0023	WIRE SEAL, INDIVIDUAL 10YE3940	ITT, CANNON	A/R
	121667-0025	WIRE FILLER, 10WH3940	ITT, CANNON	A/R
Convolute adapters with PG21 thread are available from:			HARNESSFLEX or SCHLEMMER	

@ = Convolute capture designed for APTIV-DELPHI convolute of stated size(s)

& = Convolute in this size is not available from APTIV-DELPHI.

APPENDIX II — ELECTRICAL CONNECTOR PARTS FOR 3000 AND 4000 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
SHIFT SELECTOR MATING CONNECTORS				
PRIMARY	12191065	CONNECTOR, 16F	APTIV-DELPHI	1
SHIFT	12191066	SEAL, 16-WAY CONNECTOR, ORANGE	APTIV-DELPHI	1
SELECTOR	12191067	TPA RETAINER, 16F	APTIV-DELPHI	1
(90-degree	12191068	STRAIN RELIEF, 16F 90-DEGREE(12 mm)@,&	APTIV-DELPHI	1
mating	12084912	TERMINAL, 0.8MM WIRE	APTIV-DELPHI	A/R
connector)	12129557	CAVITY PLUG	APTIV-DELPHI	A/R
	12110299	CPA LOCK, MICRO-PACK SERIES, RED W/O STRAP	APTIV-DELPHI	1
PRIMARY	12191065	CONNECTOR, 16F	APTIV-DELPHI	1
SHIFT	12191066	SEAL, 16-WAY CONNECTOR, ORANGE	APTIV-DELPHI	1
SELECTOR	12191067	TPA RETAINER, 16F	APTIV-DELPHI	1
(180-degree	15460298	STRAIN RELIEF, 16F 180-DEGREE(13 mm)@	APTIV-DELPHI	1
mating	12084912	TERMINAL, 0.8MM WIRE	APTIV-DELPHI	A/R
connector)	12129557	CAVITY PLUG	APTIV-DELPHI	A/R
	12177289	CPA LOCK, MICRO-PACK SERIES, RED WITH STRAP	APTIV-DELPHI	1
SPEED SENSOR MATING CONNECTORS				
ENGINE	13520101 #	CONNECTOR ASSY, 2F GT150 HALF SHROUD	APTIV-DELPHI	1
SPEED	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
SENSOR	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1
TURBINE	13520101 #	CONNECTOR ASSY, 2F GT150 HALF SHROUD	APTIV-DELPHI	1
SPEED	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
SENSOR	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
(4000 Product	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
Family models	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
only)	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1
OUTPUT SPEED	13520104	CONNECTOR ASSY, 2F GT150 HALF SHROUD (6TH GENERATION CONTROLS)	APTIV-DELPHI	1
SENSOR	13520101 #	CONNECTOR ASSY, 2F GT150 HALF SHROUD (4TH & 5TH GENERATION CONTROLS)	APTIV-DELPHI	1
	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1
OPTIONAL THROTTLE POSITION SENSOR (TPS) MATING CONNECTOR				
	12015793	CONNECTOR ASSY, 3-WAY W/P TWR BLACK	APTIV-DELPHI	1
	12089040	TERMINAL, M W/P PIN	APTIV-DELPHI	3
	15338470	SEAL ASSY, CABLE 1-WAY W/P PPL	APTIV-DELPHI	3

@ = Convolute capture designed for APTIV-DELPHI convolute of stated size

Replaces APTIV-DELPHI part 15490464.

***** A single CPA lock is required. Either part number listed is acceptable.

APPENDIX II — ELECTRICAL CONNECTOR PARTS FOR 3000 AND 4000 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
OPTIONAL VEHICLE INTERFACE MODULE (VIM) MATING CONNECTORS				
18-WAY CONNECTOR	12040920	CONNECTOR, BODY, 18-WAY	APTIV-DELPHI	1
	12040936	SEAL, 9-WAY, GREEN	APTIV-DELPHI	2
	12110545	STRAIN RELIEF, 18-WAY	APTIV-DELPHI	1
	15492602	BOLT, 7mm HEAD EXT.	APTIV-DELPHI	1
	15492535	RETAINER CLIP, BOLT	APTIV-DELPHI	1
	12103881	TERMINAL, 150F	APTIV-DELPHI	A/R
	12034413	CAVITY PLUG, M/P	APTIV-DELPHI	A/R
30-WAY CONNECTOR	12034397	CONNECTOR, BODY, 30-WAY	APTIV-DELPHI	1
	12040879	SEAL, 15-WAY, GREEN	APTIV-DELPHI	2
	12110546	STRAIN RELIEF, 30-WAY	APTIV-DELPHI	1
	15492602	BOLT, 7mm HEAD, EXT.	APTIV-DELPHI	1
	15492535	RETAINER CLIP, BOLT	APTIV-DELPHI	1
	12103881	TERMINAL, 150F SERIES	APTIV-DELPHI	A/R
	12034413	CAVITY PLUG, M/P	APTIV-DELPHI	A/R
OPTIONAL ENGINE, TURBINE (4000 PRODUCT FAMILY MODELS ONLY), OUTPUT (4TH & 5TH GEN ONLY) SPEED SENSORS MATING CONNECTOR FOR REAR MOUNTED TRANSMISSIONS ONLY AND OPTIONAL ENGINE WATER TEMPERATURE SENSOR				
	12162193	CONNECTOR ASSY, 2F M/P 150.2 (Black)	APTIV-DELPHI	1
	12124075	TERMINAL, F M/P 150.2	APTIV-DELPHI	2
OPTIONAL OUTPUT SPEED SENSOR (6TH GEN ONLY) AND RETARDER ACCUMULATOR SOLENOID CONNECTOR FOR REAR MOUNTED TRANSMISSIONS ONLY				
	15326143	CONNECTOR ASSY, 2F M/P 150.2 (Black)	APTIV-DELPHI	1
	12124075	TERMINAL, F M/P 150.2	APTIV-DELPHI	2
OPTIONAL RETARDER SOLENOID MATING CONNECTOR FOR REAR MOUNTED TRANSMISSIONS ONLY				
	12162197	CONNECTOR ASSY, 2F M/P 150.2 (Gray)	APTIV-DELPHI	1
	12124075	TERMINAL, F M/P 150.2	APTIV-DELPHI	2
RETARDER ACCUMULATOR SOLENOID MATING CONNECTOR				
	13520104	CONNECTOR ASSY, GT150 HALF-SHROUD, BLACK	APTIV-DELPHI	1
	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1
RETARDER SOLENOID MATING CONNECTOR				
	13523048	CONNECTOR ASSY, 2F GT150 HALF-SHROUD, GRAY	APTIV-DELPHI	1
	15496486 *	CPA LOCK, BEIGE / NATURAL	APTIV-DELPHI	1
	15317832 *	CPA LOCK, GRAY	APTIV-DELPHI	1
	15326267	TERMINAL, F GT150	APTIV-DELPHI	2
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	2
	15358890	CONVOLUTE CAPTURE / TPA LOCK, BLACK (6 mm)@	APTIV-DELPHI	1

***** A single CPA lock is required. Either part number listed is acceptable.

****** Either style of convolute capture is acceptable. Both styles can be added to an existing harness. Both styles are sized for NC08 conduit. Contact the manufacturer for assembly instructions.

APPENDIX II — ELECTRICAL CONNECTOR PARTS FOR 3000 AND 4000 PRODUCT FAMILIES WITH ALLISON 4TH, 5TH, AND 6TH GENERATION CONTROLS — CONTINUED —

CONNECTOR	MFG. P/N	PART NAME	MANUFACTURER	QTY
RETARDER TEMPERATURE SENSOR MATING CONNECTOR				
	12162852	CONNECTOR ASSY, 2F M/P 150.2, BLACK	APTIV-DELPHI	1
	12124075	TERMINAL, F M/P 150.2	APTIV-DELPHI	2
	CI08-MMP2 **	CONVOLUTE CAPTURE, STRAIGHT (NW7.5 / NC08)%	HARNESSFLEX	1
	CI08-90-MMP2 **	CONVOLUTE CAPTURE w/ 90º SWIVEL (NW7.5 / NC08)%	HARNESSFLEX	1
RETARDER MODULATION REQUEST (RMR) MATING CONNECTOR				
	12015795	CONNECTOR ASSY, 3-WAY W/P TOWER, RED	APTIV-DELPHI	1
	12089040	TERMINAL, M W/P PIN	APTIV-DELPHI	3
	15338470	SEAL ASSY, CABLE 1-WAY W/P, PURPLE	APTIV-DELPHI	3
OPTIONAL BRAKE PRESSURE SWITCH MATING CONNECTOR FOR RETARDER CONTROL				
	15300027	CONNECTOR ASSY, 2-WAY METRI-PACK	APTIV-DELPHI	1
	12077411	TERMINAL, F	APTIV-DELPHI	2
	15324982	SEAL ASSY, CABLE 1-WAY, GREEN, for 2.85-2.03mm OD	APTIV-DELPHI	2
OPTIONAL EBS PRESSURE TRANSDUCER MATING CONNECTOR				
	15336121	CONNECTOR ASSY, 3F GT150	APTIV-DELPHI	1
	15317832	CPA LOCK, GRAY	APTIV-DELPHI	1
	15305351	SEAL ASSY, CABLE 1-WAY, YELLOW	APTIV-DELPHI	3
	15326267	TERMINAL, F GT150	APTIV-DELPHI	3
	15373418	TPA LOCK, BLACK	APTIV-DELPHI	1
	CI08-GT153 **	CONVOLUTE CAPTURE, STRAIGHT (NW7.5 / NC08)%	HARNESSFLEX	1
	CI08-90-GT153 **	CONVOLUTE CAPTURE w/ 90º SWIVEL (NW7.5 / NC08)%	HARNESSFLEX	1
TRANSFER CASE CONNECTOR (3000 Product Family, Seven-Speed Models, only 4th & 5th Gen)				
	KPSE06E10-6S	CONNECTOR ASSY, PLUG 6-WAY	ITT CANNON	1
DIAGNOSTIC TOOL INTERFACE CONNECTOR (CAN1 for 4th Gen; CAN1 or CAN2 for 5th & 6th Gen)				
SAE J1939-13	HD10-9-1939P	CONNECTOR, REC., 9-WAY	TE - DEUTSCH	1
DIAGNOSTIC	0460-202-1631	CONTACT, PIN	TE - DEUTSCH	5
CONNECTOR	114017	SEALING PLUG	TE - DEUTSCH	4
	HD18-009	STRAIN RELIEF	TE - DEUTSCH	1
	HDC16-9	CAP, CONNECTOR	TE - DEUTSCH	1
DIAGNOSTIC TOOL INTERFACE CONNECTOR (CAN2 for 4th Gen; CAN1 or CAN2 for 5th & 6th Gen)				
SAE J1962 Type A		16-PIN TRAPEZOIDAL CONNECTOR	REFERENCE SAE J1962	
SERIAL COMMUNICATION INTERFACE CONNECTOR – J1587/J1708 (Available only with 4th Gen Controls)				
	15300027	CONNECTOR, 2-WAY	APTIV-DELPHI	1
	12077411	TERMINAL, SOCKET	APTIV-DELPHI	1
	15338470	SEAL, WIRE-TYPE, SILICONE	APTIV-DELPHI	2
	15300014	LOCK, SECONDARY	APTIV-DELPHI	1

@ = Convolute capture designed for APTIV-DELPHI convolute of stated size

% = Convolute capture designed for Harnessflex convolute of stated size(s)

& = Convolute in this size is not available from APTIV-DELPHI.

***** A single CPA lock is required. Either part number listed is acceptable.

****** Either style of convolute capture is acceptable. Both styles can be added to an existing harness. Both styles are sized for NC08 conduit. Contact the manufacturer for assembly instructions.

APPENDIX III
SOURCES OF WIRING HARNESSES AND CONNECTORS

HARNESSES and HARNESS COMPONENT PARTS

St. Clair Technologies
55 Garnet Street
Wallaceburg, Ontario N8A 4L8
Phone: (519) 627-1673
Fax: (519) 627-4227
www.stclairtech.com

AEES Inc.

EPC Brand / AEES Inc. / PKC Group / Motherson
www.aeesinc.com
www.pkcgroup.com
www.pkcgroup/products/components/connection-systems
TTI Component Distributor (for EPC Connectors)
www.tti.com

APTIV-DELPHI PARTS

Power and Signal Group
6675 Parkland Blv.
Solon, Ohio 44139
Phone: (800) 722-5273
Fax: (216) 378-6668
www.powerandsignal.com

HARNESSFLEX PARTS

Harnessflex Limited
Station Road
Coleshill
Birmingham B46 1HT
United Kingdom
Phone: 44-1675-468222
Fax: 44-1675-464930
www.harnessflex.com

NTI, LLC
3120 Solon Road, Suite 1
Solon, Ohio 44139
Phone: 440-349-5862
Fax: 440-349-5867
www.nticonnect.com

ITT, CANNON PARTS

ITT, Cannon GmbH
Cannonstrassse 1
71384 Weinstradt
Germany
Phone: 49-7151-699-0
Fax: 49-7151-699-217
www.ittcannon.com

ITT, Cannon USA-Headquarters
56 Technology Drive
Irvine, CA 92618
Phone: 1-800-854-3028
Fax: 1-714-628-2148

MOLEX PARTS

Molex
2222 Wellington Court
Lisle, IL 60532-1682
Phone: (800) 786-6539
Outside USA 1-630-969-4550
www.molex.com

QUALTRONICS PARTS

Qualtronics, LLC
4775 Progress Drive
Columbus, IN 47201
Phone: (888) 375-8881
Fax: (812) 375-8882
www.qualtronics.net

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SCHLEMMER PARTS

Schlemmer GmbH
Gruber Road 48
D-85586 Poing
Phone: 49-8121-804-0
Fax: 49-8121-804-113
www.schlemmer.com

TE-DEUTSCH PARTS

TE Connectivity Ltd.
Phone: 1-800-522-6752
LADD Distribution LLC
4849 Hempstead Station Drive
Kettering, OH 45429
Phone: 1-800-223-1236
Phone: (937) 438-2646
Fax: (937) 438-9755
www.te.com/deutsch
www.laddinc.com

LIST OF REFERENCED DOCUMENTS

Allison 4th Generation Controls Manual

- *Section C: Controls Components Installation*
- *Section D: Vehicle Electrical System Interface*
- *Section F: Controls Support Equipment*

Allison 5th Generation Controls Manual

- *Section C: Controls Components Installation*
- *Section D: Vehicle Electrical System Interface*
- *Section F: Controls Support Equipment*

Allison 6th Generation Controls Manual

- *Section C: Controls Components Installation*
- *Section D: Vehicle Electrical System Interface*
- *Section F: Controls Support Equipment*

Allison 4th Generation Controls System Data

Allison 5th Generation Controls System Data

Allison 6th Generation Controls System Data

Allison 4th Generation Controls Installation Drawings

- *AS07-405, Connector Information*
- *AS07-421, System Schematic*, 1000/2000 Product Family, A41/A51, A42/A52, A43/A53 TCMs
- *AS07-422, System Schematic*, 3000/4000 Product Families, 6-Speed Models
- *AS07-423, System Schematic*, 3000 Product Family, 7-Speed Models
- *AS07-424, System Schematic*, 4000 Product Family, 7-Speed Models

Allison 5th Generation Controls Installation Drawings

- *AS07-505, Connector Information*
- *AS07-521, System Schematic*, 1000/2000 Product Family
- *AS07-522, System Schematic*, 3000/4000 Product Families, 6-Speed Models
- *AS07-523, System Schematic*, 3000 Product Family, 7-Speed Models
- *AS07-524, System Schematic*, 4000 Product Family, 7-Speed Models

Allison 6th Generation Controls Installation Drawings

- *AS07-605, Connector Information*
- *AS07-621, System Schematic*, 1000/2000 Product Family
- *AS07-628, System Schematic*, 2900 Product Family
- *AS07-622, System Schematic*, 3000/4000 Product Families, 6-Speed Models
- *AS07-623, System Schematic*, 3000 Product Family, 7-Speed Models
- *AS07-624, System Schematic*, 4000 Product Family, 7-Speed Models

1000/2000 Product Family Installation Drawings

- *AS64-431, Connector and Harness Attachment Provisions*, 1000 and 2000 Product Families

2900 Product Family Installation Drawings

- *AS64-931, Connector and Harness Attachment Provisions*, 2900 Product Families

3000 Product Family Installation Drawings

- *AS66-431, Connector and Harness Attachment Provisions*, 3000 Product Family

4000 Product Family Installation Drawings

- *AS67-431, Connector and Harness Attachment Provisions*, 4000 Product Family

Technical Documents (TDs)

- *TD176, Service Requirements - Removal & Replacement Times for Allison Transmissions*

REVISION HISTORY

Revision Y; January 3, 2023
- In Appendix II, replaced Optional Brake Pressure Switch Mating Connector for Retarder Control, Seal Assembly part number 15324983 with 15324982.

Revision X; April 22, 2022
- In Appendix I, added 2900 Product Family 29-way Main Transmission Connector parts and supplier.

Revision W; January 27, 2022
- In Appendix III, updated AEES-EPC contact information by adding parent companies PKC Group and Motherson Group.
- In Appendix III, updated hyperlinks to sources

Revision V; October 29, 2020
- Added 6th Gen specific connectors
- Added 6th Gen hyperlinks
- Corrected addresses

Revision U; August 22, 2019
- Replaced, “Extranet” with, “Allison HUB”
- Replaced, “Application” with, “Customer Integration”
- Replaced, “Deutsch” with, “TE-Deutsch”
- Replaced, “AFL/EPC” with, “AEES/EPC”
- Replaced, “Delphi” with, “Aptiv-Delphi”
- Added and replaced various connector part numbers
- Replaced harness graphic
- Corrected address for Qualtronics

Revision T; June 28, 2017
- In 6.6, add “silicone” to the statement “Do not use dielectric grease, silicone, or similar compounds in the connector ...”

Revision S; August 13, 2014
- In 6.16, Environmental Criteria, added requirement for protection from ultraviolet radiation.

Revision R; October 29, 2012
- In 6.16, Environmental Criteria, clarified that the TCM, Allison shift selectors, and their connectors are not able to withstand high pressure washes or steam cleaning.
- In Appendix II, corrected RMR seal part number to 15324985; was 12089444.
- Updated references in preparation for Extranet.

Revision R Preliminary; March 20, 2012
- Updated TD to include Allison 5th Generation Controls
- In the Appendices, replaced AFL/EPC Automotive with AEES
- Removed *AS07-420, System Schematic for the A50 TCM*, which is no longer available
- In Appendix II, added Optional Brake Pressure Switch Mating Connector for Retarder Control
- In Appendix III, updated street address for St. Clair Technologies

Revision Q; September 17, 2008
- In the figures associated with Appendices I and II, added views of additional connectors (part numbers were already included in parts lists).