iE^2 Series EECS Engine Wiring Harness

Inspection and Repair Manual

January 2026

Part No. IRM-iE^2

IE^2 Series EECS Engine Wiring Harness Inspection and Repair Manual

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RECORD OF REVISIONS

Revision	Revision Date	Revision Description
Original	January 2026	Original Release of IRM-iE²

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SERVICE DOCUMENT LIST

NOTICE: The following is a list of service documents referenced in or incorporated into the information in this manual. Always refer to the latest revision of any service document (including any supplements) for changes or additional information. Supplements to a service document contain information relevant to the service document but not yet added to the service document.

The latest revision of all service documents in this list can be downloaded from our website https://www.lycoming.com/contact/knowledge-base/publications.

To narrow the search parameters and limit the number of returns, enter only the numerical portion of the service document number in the **Search** box on the website.

Number	Incorporation Date	Subject

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ABBREVIATIONS AND ACRONYMS

A	
ANSI	American National Standards Institute
APU	Alternate Power Unit
ASM	Advanced Semiconductor Materials
ATA	Air Transportation Association
AWG	American Wire Guage
C	
C	Celsius
CHT	Cylinder Head Temperature
cm	Centimeter
CPA	Connector Position Assurance
E	
ECU	Engine Control Unit
EGT	Exhaust Gas Temperature
F	
F	Fahrenheit
FAA	Federal Aviation Administration
I	
ID	Identification; Inside/Inner Diameter
in.	Inch, inches
J	
JPT	Junior Power Timer
M	
MIL	Military
mm	Millimeter
N	
NAS	National Aerospace Standard
P	
PLR	Primary Lock Reinforcement
PMA	Permanent Magnet Alternator
R	
RTV	Room Temperature Vulcanizing

ABBREVIATIONS AND ACRONYMS (CONT.)

S	
SA	Special Advisory
SB	Service Bulletin
SEIDRS	Side Entry Insulation Damage Repair Sleeve
SI	Service Instruction
SL	Service Letter
T	
TE	Tyco Electronics
TIT	Turbine Inlet Temperature
TPA	Terminal Position Assurance

INTRODUCTION

NOTICE: It is the user's responsibility for using aircraft approved installation methods and materials to ensure correct and safe operation of the engine and aircraft. **Information in this manual DOES NOT supersede any published airframe manufacture's publication. Conflicting information should be directed to Lycoming, Attn: Manager Technical Publications.**

Environmental Compliance

Lycoming Engines recommends that engine owners and engine service personnel be in compliance with all federal, state, and local environmental regulations when solvents, paint, fuel, oil, chemicals, or other consumables are used in engine service.

Warnings, Cautions, and Notices

Be sure to read and obey the Warnings, Cautions, and Notices in this manual and in service documents. Although Lycoming Engines cannot know all possible hazards or damages, it makes a reasonable effort to supply the best known guidance and recommended practices for safe operation and maintenance of its engines.

The table below defines the four types of safety advisory messages used in this manual as per the American National Standard and ANSI Z535-6-2006.

Safety Advisory Conventions	
Advisory Word	**Definition**
DANGER:	Indicates a hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It also can be used without the safety alert symbol as an alternative to **"NOTICE."**
NOTICE:	The preferred signal word to address practices not related to personal injury.

NOTICE: In this manual, the word "recommend" refers to "best practices."

Service Bulletins, Service Instructions, and Service Letters

As advancements in harness maintenance and repair technologies continue, Lycoming will make future revisions to this manual. However, if more timely distribution is necessary, Lycoming supplies up-to-date Service Bulletins (SBs), Service Instructions (SIs) and Service Letters (which are abbreviated with a capital “L” followed by the number, example L180). Special Advisories (SAs) are supplied as necessary.

For additional publication information, look on Lycoming’s website (Lycoming.com) or speak to Lycoming Engines by telephone: U.S. and Canada toll free: +1(800) 258-3279; or Direct: +1 (570) 323-6181.

Applicable information from Lycoming Engines' Service Bulletins, Service Instructions, and Service Letters are included in this manual at the time of publication. Any new service information will be included in the next update of the manual.

Reminder: Unless otherwise specified, Lycoming Engines' service documents (which are dated after this manual's release date) that pertain to the engine model in this manual supersede procedures in this manual.

For reference, the Service Document List at the front of this manual shows the service documents referenced or included in this manual.

List of Publications

Refer to the latest revision of Service Letter No. L114 for a list of Lycoming Engines' publications.

Simplified Technical English

The text in the manual is written in the form of Simplified Technical English in compliance with FAA requirements and to make translation into other languages easier.

Format

Chapters in this manual are identified in Air Transport Association (ATA) format.

Figures

Figures in this manual are for illustration purposes only. Figures always start as Figure 1 in each chapter.

Tables and Checklists

Tables in this manual are used to display detailed information in an organized format. Tables always start as Table 1 in each chapter. Checklists are used to display a list of tasks to be completed as part of a specific procedure. Checklists are not numbered because they are used as a reference tool contained within the procedure.

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Feedback

To supply comments, suggestions, or corrections to this manual, either email or contact Lycoming Engines Technical Support at the email or phone number in the front of this manual or use the Lycoming.com website.

Manual Revisions

Lycoming Engines constantly examines our manuals to provide our customers the most complete and up-to-date information for operating and maintaining our engines. Revisions to this manual will be published as necessary.

1. Purpose

This manual gives airworthiness limitations for wear, acceptable damage and repair procedures for iE² Electronic Engine Control System (EECS) engine harnesses.

The manual is organized in 8 sections. They are:

1. Purpose
2. Harness Inspection
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   - B. Corrective Action
3. Harness Damage Limits and Repairable Damage
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       - (b) Parts
       - (c) Procedure
     - (2) Metri-Pack 150 Push-to-Seat
       - (a) Tooling
       - (b) Parts
       - (c) Replacement
     - (3) Metri-Pack 150 Pull-to-Seat
       - (a) Tooling
       - (b) Parts
       - (c) Procedure
     - (4) Bosch Low-Way
       - (a) Tooling
       - (b) Parts
       - (c) Procedure
     - (5) Tyco Electronics JPT
       - (a) Tooling
       - (b) Parts
       - (c) Procedure
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       - (a) Tooling
       - (b) Parts
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   (3) Single and Multi-Conductor Shielded Cable Splicing Using Splice Kit
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D. Halar® and Copper Shield Braid Repair
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F. Heat Shrink Repair/Replacement
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G. Terminal Lug Replacement
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5. Label Replacement and Installation
   A. Tooling
   B. Parts
   C. Procedure
6. Harness Illustrated Parts
7. Wiring Harness Parts List
8. Wiring Harness Repair Kits

2. Harness Inspection and Corrective Action

A. Inspect harness as follows:

1. Examine the wiring harness for correct routing, security, clamping, deterioration, damage, wear, fraying, chafing or breaks in accordance with this manual, the latest revision of the applicable engine maintenance manual, and the airframe manufacturer's instructions. Wiring harness installation instructions are found in Chapter 72-70 in the latest revision of the applicable maintenance manual.
2. Look for heat damage on the wiring and on the engine. Although a visual inspection of the wiring harness can identify heat damage, burnt wire, vibration damage, or chafing, a more detailed inspection is necessary to identify cracked insulation, arcing, and worn insulation. Identify and correct the cause of any heat damage.
3. Complete visual inspection of the harness for the following:
   A. Plastic Connectors
      (1) Broken or damaged (scraped, melted, warped, missing lock tabs, cracked, etc.)
      (2) Broken or damaged contacts.
      (3) Contacts not locked in connector body.
      (4) Broken or damaged wire at the connector (cracked/broken/missing insulation, damaged or broken conductor)
      (5) Damaged or missing connector seals.
      (6) Damaged or missing wire seals.
      (7) Any other damage not previously listed.
   B. Metal Connectors
      (1) Cracked, gouged, broken connector body.
      (2) Cracked, gouged, broken connector lock ring.
      (3) Cracked, gouged, pitted connector face
      (4) Loose or bent contacts.
   C. Wire and Cable (not covered by Halar® Braid)
      (1) Cut, cracked, broken, missing insulation.
      (2) Cut, broken, frayed conductor/conductor strands
      (3) Any other damage not previously listed.
   D. Halar® Over Braid
      (1) Cut, ripped, melted, frayed or torn.
      (2) Unwoven or any loosening of braid resulting in bulges or large gaps in braid.
      (3) Any other damage not previously listed.
   E. Heat Shrink
      (1) Cut, ripped, melted, frayed, torn or missing.
      (2) Any other damage not previously listed.

F. Fire/Heat Sleeves

(1) Cuts, rips, tears in the silicone outer sleeve and fiberglass braid underneath.

(2) Burned or Charred

(3) Any other damage not previously listed.

G. Connector/Cable Identification

(1) Cut, ripped, melted, frayed, torn or missing (all connectors and main harness). It may be necessary to move heat sleeve to verify.

(2) Smeared, run or faded.

(3) Legible

(4) Any other damage not previously listed.

B. Corrective Action

If the engine harness has been inspected in accordance with the applicable engine maintenance manual and contamination or damage has been found, refer to the Table of Corrective Actions.

Component	Discrepancy	Corrective Action
Connectors	Fluid Saturation	**WARNING** ALCOHOL AND SOME ELECTRICAL CONTACT CLEANERS ARE FLAMMABLE. DO NOT USE AROUND OPEN FLAME OR WHEN ENGINE IS HOT, AS A FLASH FIRE OR EXPLOSION COULD OCCUR RESULTING IN INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT. Thoroughly clean connector using isopropyl alcohol or electrical contact cleaner. Use a clean, lint free cloth to remove fluid and cleaner. **CAUTION** ALWAYS USE APPROPRIATE PPE WHEN USING COMPRESSED AIR. Use low pressure (5-10psi), moisture free air to remove fluid and cleaner from areas in connector that cannot be cleaned with cloth.
Harness Wiring	Fluid Saturation	To determine if the harness is 'saturated' with fluid, grasp the suspect area and squeeze. If fluid rapidly drips or runs from the harness, then it is saturated and will need to be replaced. If there are only small amounts of fluid, use a clean cloth wrapped around the harness area affected and gently squeeze the harness to remove the liquid.
	All damage noted during scheduled or unscheduled maintenance	Reference Section 3 for Corrective Action

3. Harness Damage Limits and Repairable Damage

The following section details repairable and non-repairable damage to the iE² harness in order to maintain the harness airworthiness. If damage to the harness is found either during scheduled or unscheduled maintenance, it can be repaired only if the damage is within the limits in this section. If any damage is not within the limits stated in this section, or is not detailed in this section, the harness must be replaced in accordance with the engine maintenance manual.

A. Plastic Connectors

The following damage requires the replacement of the connector shell and/or contact(s):

(1) Broken or missing lock tab(s).

(2) Cracks in connector housing that compromise the sealing or fitment of connector shell.

(3) Melted connector shell. Heat damage must not be present in wire or cable.

(4) Broken or damaged contacts, contacts that will not lock in connector shell.

(5) Wire seals that are damage and would allow fluid to enter connector.

(6) Missing wire seals.

(7) Missing connector seal. (Requires replacement of seal only.)

B. Metal Connectors

The following damage is allowable and does not require any action:

(1) Scuff marks that do not expose basis metal, as shown below.

(2) Key or keyways are not distorted but do show signs of normal wear, as shown in Figure 1.

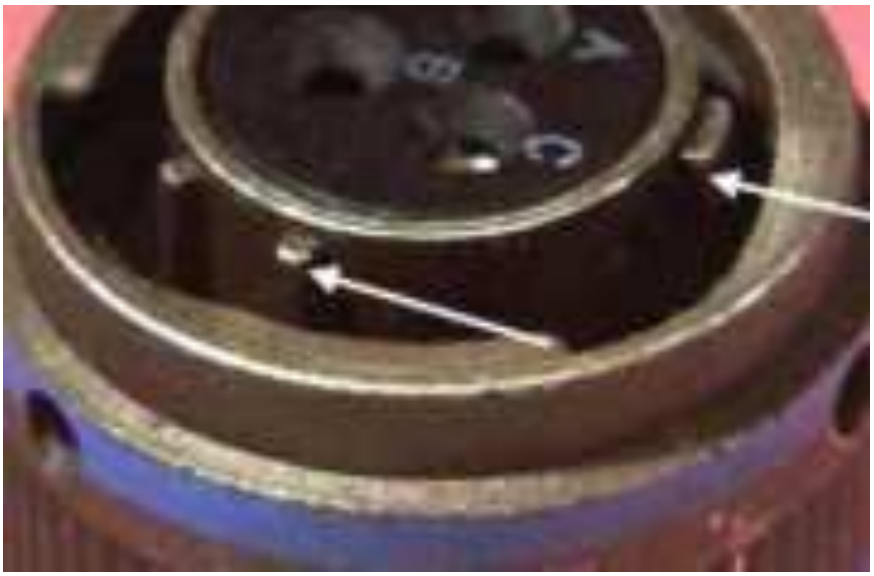

Figure 1
Normal Wear of Keys and Keyways

(3) Material is missing with no damage to dielectric between cups (see A in Figure 2).

(4) Cut, fracture or tear that does not extend beyond cup diameter (see B in Figure 2).

(5) Cut, fracture or tear in dielectric face does not extend into the cup area (see C in Figure 2).

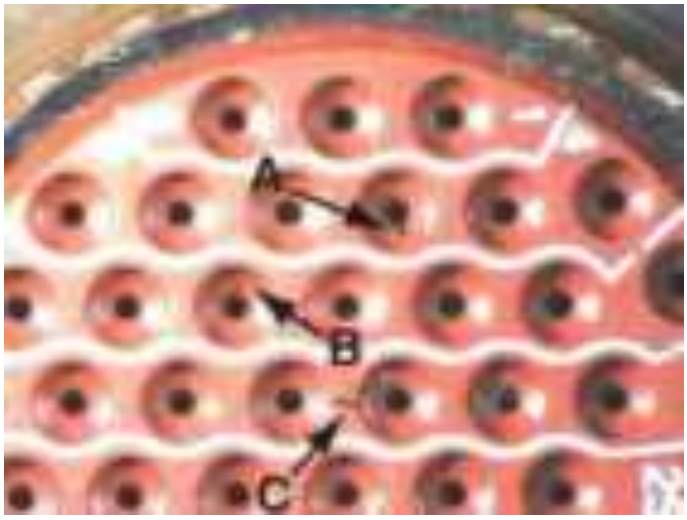

Figure 2
Connector Inspection Points

The following damage requires the replacement of the connector or contact(s):

(1) Connector shell or body is cracked, fractured or otherwise damaged.

(2) Connector lock ring is cracked, fractured or otherwise damaged.

(3) Damage such as scratches or burrs (see A in Figure 3) that exposes basis metal.

(4) Deformed or distorted inner or outer ring (out-of-round condition) (see B in Figure 3).

(5) Key width or height has been reduced (see C in Figure 3).

Figure 3
Connector Inspection Points

(6) Key is mispositioned.

(7) Cut, fractured, or torn connector face, where cut, fracture or tear is in both the dielectric face and the cup diameter, as shown in Figure 4.

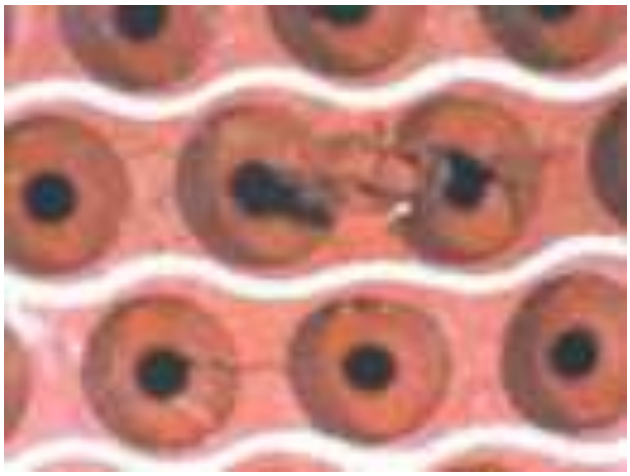

Figure 4
Fractured Connector Face

(8) Damaged contact.

(9) Contact is bent more than one pin diameter, as shown in Figure 5.

Figure 5
Bent Contact Pin

(10) Basis metal exposed.

(11) Contact lock(s) broken.

C. Wire and Cable

There is no allowable damage to wire or cable. The following is damage that cannot be repaired, and the harness must be replaced:

(1) Any wire with heat damage that includes melted insulation, discolored conductor (conductor that is not shiny or has a blackened or rainbow color).

(2) More than 4 wires in the same harness leg that have been cut, broken, or separated.

The following damage is repairable:

(1) Cracked or broken insulation. If conductor is exposed, there shall be no damage to the conductor, and the exposed conductor shall be no longer than .25 inch along the length of the wire or in the longest length from an edge of the damage to the other side. The amount of insulation damage at the widest point shall be less than 55% of wire or cable circumference, as shown in Figure 6.

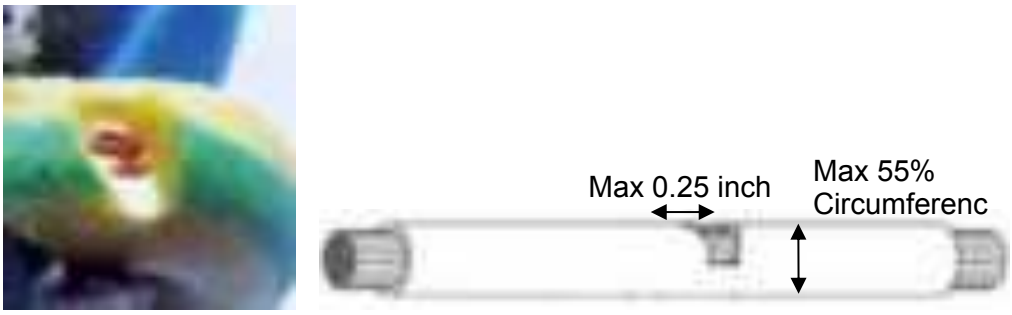

Figure 6
Repairable Insulation Damage

Broken conductors can be spliced, provided the splicing meets the requirements of the splicing section of this manual.

NOTICE: If it is found that a connector lead will be too short to reach its opposite connection as a result of repair/replacement, it is acceptable to splice additional wire to the cable to allow connection. The amount of wire to be spliced should not exceed the original length as measured from the face of the connector to the cable first break out. Use the procedure for splicing in this manual.

D. Halar® and Copper Over Braid

The following is allowable damage that must be repaired:

(1) Cut, ripped, frayed, or torn as shown in Figure 7.

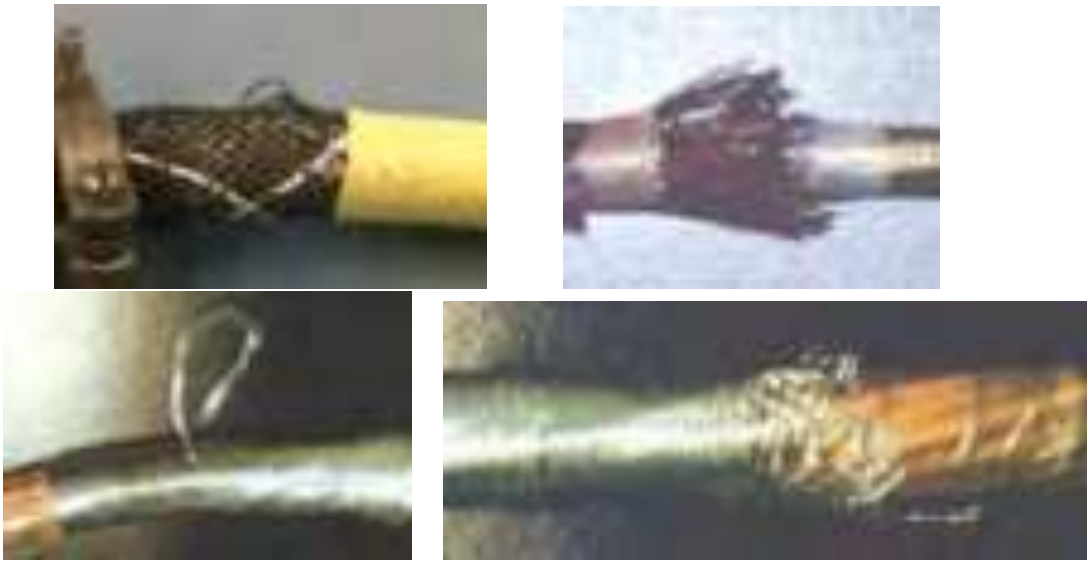

Figure 7
Allowable Damage to Halar® and Copper Over Braid

(2) Unwoven or any loosening of braid resulting in bulges or large gaps in braid.

(3) Melted or heat damaged braid only as shown in Figure 8. The heat damage of Halar® braid cannot extend into anything below the braid Figure 8. Copper braid cannot be melted, and heat damage is only allowable if damage does not extend into wires.

Figure 8
Melted or Heat Damaged Braid

E. Heat Shrink

The following is allowable damage that must be repaired:

(1) Cut, ripped, frayed, torn, or missing.

(2) Burned, melted, or charred. Heat damage cannot extend into anything below heat shrink, except the Halar® braid.

F. Fire/Heat Sleeves

The following damage is not allowable, and the harness must be replaced:

(1) Any areas that are burned or charred.

(2) Cuts, rips, tears in fiberglass braid that expose the harness underneath.

The following is allowable damage that must be repaired:

(1) Cuts, rips, tears in the silicone outer sleeve not exceeding 2” in diameter.

(2) Cuts rips, tears in fiberglass braid not exceeding 2” in diameter that do not expose harness underneath.

G. Connector/Cable Identification

The following damage is allowable and does not require repair:

(1) Smeared, run, or faded, as long as still legible.

(2) Cuts or tears that are less than 10% of the overall label in size.

The following is allowable damage that must be repaired:

(1) Cut, ripped, melted, frayed, torn, or missing.

(2) Burned or charred. Heat damage cannot extend into anything below heat shrink, except the Halar® braid.

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4. Repair

Before proceeding with maintenance, repair, or installation, become familiar with the following warnings, cautions and notes, as each of these are pertinent throughout this section.

WARNING **ASSURE ALL POWER IS DISCONNECTED PRIOR TO COMPLETEING ANY WIRING SYSTEM REPAIR.**

WARNING **DO NOT COMPLETE WIRE REPAIR WHILE USING EXPLOSIVE SOLVENT/PAINT PRODUCTS ON THE AIRCRAFT.**

WARNING **DO NOT USE MOTORIZED HEAT GUNS ON AIRCRAFT WITH ANY OPEN FUEL LINES, FUEL TANKS OR REMOVED FUEL SYSTEM COMPONENTS. COMPRESSED AIR OR INFRARED HEAT GUNS SHOULD BE THE ONLY ONES USED IN AREAS THAT CONTAIN FUEL VAPOR.**

WARNING **HOT AIR TOOLS CAN CAUSE SEVERE BURNS. DO NOT ALLOW SKIN TO CONTACT THE HOT SURFACES OF THE TOOL OR THE HOT AIR STREAM. FOLLOW THE TOOL MANUFACTURER'S INSTRUCTIONS FOR PROPER TOOL OPERATION.**

WARNING **ISOPROPYL ALCOHOL IS HIGHLY FLAMMABLE. AVOID STATIC GENERATION. DO NOT USE NEAR FLAMES OR HEAT. DO NOT LET IT STAY ON YOUR SKIN. USE ONLY WITH ADEQUATE VENTILATION. AVOID PROLONGED BREATHING OF VAPORS OR CONTACT WITH YOUR SKIN, EYES, AND LUNGS. ENSURE YOU ARE USING SAFETY GOGGLES, NITRILE GLOVES AND KNOW THE LOCATION OF THE NEAREST EYEWASH STATION.**

WARNING **UNWIRED CONTACT CAVITIES MUST HAVE CONTACT AND SEALING PLUGS INSTALLED.**

WARNING **METAL TOOL TIPS ARE SHARP AND CAN CAUSE INJURY TO PERSONNEL AND/OR DAMAGE TO THE CONNECTOR.**

CAUTION **ALL CRIMPING TOOLS MUST BE PROPERLY CALIBRATED IN ACCORDANCE WITH MANUFACTURES INSTRUCTIONS.**

CAUTION **BE CAREFUL IF USING, METAL M81969 TOOLS. THESE TOOLS CAN DAMAGE THE WIRE SEALING GROMMET IN THE CONNECTOR IF NOT USED PROPERLY. PLASTIC TOOLS ARE PREFERRED WHEN AVAILABLE.**

CAUTION **INSPECT TOOL TIPS FOR DAMAGE OR DISTORTION BEFORE EACH USE. DAMAGE TO THE CONNECTOR WIRE SEALING GROMMET CAN OCCUR.**

CAUTION **AVOID USING METAL TOOLING, TO REMOVE AND INSTALL BACK SHELLS. THESE TOOLS CAN DAMAGE THE BACK SHELL AND CONNECTOR. NON-METALLIC TOOLS ARE DESIGNED TO WEAR BEFORE DAMAGING CONNECTOR OR BACK SHELL.**

CAUTION **ENSURE HEAT IS NOT APPLIED FOR MORE THAN 5-6 SECONDS TO HALAR® BRAIDING, AS DAMAGE TO THE BRAIDING WILL OCCUR.**

A. Connector Replacement

The connectors on the iE2 engine harness are identified using a reference designator that is unique to each connector. This reference designator corresponds with the reference designator of the equipment that the connector is mated. Each connector section lists the connectors that are applicable to the repair/replacement by the reference designator. A complete diagram of the harness with connectors and reference designators can be found in Section 6 of this manual.

1. MIL Circular, Crimp Contact, Rear Release Connectors

The procedures in this section are for the repair and or replacement of the following connectors:

ECU-Reference Designator A001
A001-P1, A001-P2, A001-P3, A001-P4

APU – Reference Designator A002
A002-P1, A002-P2

Airframe Interface Connectors
Reference Designators AF-P1 and AF-P2

Permanent Magnet Alternator (PMA)- Reference Designator A110
A110-P

FUEL-P	FPP	OIL-P	MAP
A013-P	A014-P	A025-P	A040-P

(a) Tooling

The table below lists tooling required for disassembly and reassembly of all MIL-DTL-38999 Series III, MIL-C-5015 connectors using MIL-C-39029 contacts. Only tools that are equivalent to the tools in the list may be used as substitute.

Part Number	Description	Where Used
M22520/3−01	Go No-Go Calibration Tool	All Crimp Tools
M81969/14-01	Insertion/Extraction Tool	ECU – ALL, APU – ALL, AF-P1
M22520/2-01	Crimp Tool, Contact	ECU – ALL, APU – ALL, AF-P1
M22520/2-07	Positioner, Contact Locator	ECU – ALL, APU – ALL, AF-P1
M81969/14-10	Insertion/Extraction Tool	A013-P, A014-P, A025-P, A040-P
M22520/1-01	Crimp Tool, Contact	A013-P, A014-P, A025-P, A040-P
M22520/1-04	Positioner, Contact Locator	A013-P, A014-P, A025-P, A040-P
OR		
M22520/2-01	Crimp Tool, Contact	A013-P, A014-P, A025-P, A040-P
M22520/2-10	Positioner, Contact Locator	A013-P, A014-P, A025-P, A040-P
M81969/8-209	Insertion/Extraction Tool	AF-P2, A110-P
OR		
M81969/8-210	Insertion/Extraction Tool	AF-P2, A110-P
OR		
M81969/14-04	Insertion/Extraction Tool	AF-P2, A110-P
M22520/1-01	Crimp Tool, Contact	AF-P2, A110-P
M22520/1-02	Positioner, Contact Locator	AF-P2, A110-P

Part Number	Description	Where Used	Manufacturer
600-006-08	Wrench, Circular Backshell	A013-P, A014-P, A025-P, A040-P	Glenair
600-006-14	Wrench, Circular Backshell	A001-P3, A001-P4, AF-P1	Glenair
600-006-16	Wrench, Circular Backshell	A002-P1, A002-P2, A110-P	Glenair
600-006-18	Wrench, Circular Backshell	AF-P2	Glenair
600-006-22	Wrench, Circular Backshell	A001-P1, A001-P2	Glenair
600H005-9PN	Plug Holder	A013-P, A014-P, A025-P, A040-P	Glenair
600H005-23PN	Plug Holder	A001-P1	Glenair
600H005-23PA	Plug Holder	A001-P2	Glenair
600H005-15PN	Plug Holder	A001-P3	Glenair
600H005-15PA	Plug Holder	A001-P4	Glenair
600H005-17PN	Plug Holder	A002-P1	Glenair
600H005-17PA	Plug Holder	A002-P2	Glenair
600H005-15PB	Plug Holder	AF-P1	Glenair
600B005-16P	Plug Holder	A110-P	Glenair
600B005-18P	Plug Holder	AF-P2	Glenair
TG69*	Pliers, Soft Jaw	ALL	Glenair
TG70-18*	Strap Wrench, ½" X 18" Strap	ALL	Glenair
M81306/1A	Banding Tool	ECU – ALL, APU – ALL, A110-P	
OR			
J02069	POK-IT II TOOL	ECU – ALL, APU – ALL, A110-P	Band-It
OR			
600-058	Banding Tool	ECU – ALL, APU – ALL, A110-P	Glenair
OR			
DBS-2100	Banding Tool	ECU – ALL, APU – ALL, A110-P	Daniels Manufacturing

*TG69 Soft Jaw Pliers or TG70-18 Strap Wrench may be used in place of Circular Backshell Wrenches

(b) Parts

Parts, connector, and contact information can be found in Section 7 – Wiring Harness Parts List.

NOTICE: For Permanent Magnet Alternator (PMA), A110, Connector P/N MS3459L16-10P must be used with Backshell P/N M85049/82-16N02 or Connector P/N MS3459W16-10P must be used with Backshell P/N M85049/82-16W02.

Refer to the table in Section 7 - Wiring Harness Parts List for the parts needed to repair or replace 8 MIL Circular, Crimp Contact, Rear Release Connectors. The right-hand column in the table in Section 7 identifies applicable kit part number(s), which can be found in Section 8 - Wiring Harness Repair Kits.

(c) Procedure

NOTICE: If repairing or replacing connectors A013-P, A014-P, A025-P, A040-P, skip Step (1) and continue to Step (2).

(1) Gain access to connector back shell band by cutting and removing heat shrink and pulling Halar overbraid back. If braid must be cut, tie off with string 4 to 6 inches back from connector to prevent Halar from unravelling.

(2) Remove saddle clamp from backshell for connectors A013-P, A014-P, A025-P, and A040-P. For all others, remove white and yellow (polyimide) tape from backshell.

(3) Cut connector shield band from backshell of connector. Note that AF-P1 and AF-P2 do not have shield bands.

(4) Remove backshell from connector using appropriate plug holder and wrench from the Tooling table and slide backshell, and copper overbraid on harness far enough to access connector.

NOTICE: If difficulty is had removing and installing contacts, it may be necessary to lubricate the extraction tool by dipping it in isopropyl alcohol.

NOTICE: Be sure to mark wires with position to ensure proper installation.

(5) Remove contacts necessary for repair or replacement of connector as follows:

a. With the rear of the connector facing you, lay the wire of the contact along the slot of the tool, leaving about 1/2" from the end of the tool to the rear of the connector. Squeeze the wire firmly into the tool between the thumb and forefinger about 1/2" from the tip and quickly pull the tool away from the connector (Figure 1).

Figure 1
Pull the Tool Away from the Connector

b. The wire will now have snapped into place. Slide the tool down along the wire and into the rear cavity and slowly into the connector until a positive resistance is felt. At this time, the contact retaining mechanism is in the unlocked position.

Figure 2
Slide the Tool into the Rear Cavity

CAUTION IN THE NEXT STEP, WHEN USING MINIMUM DIAMETER WIRE, THE TOOL MAY HAVE A TENDENCY TO STOP AGAINST THE REAR OF THE CONTACT CRIMP BARREL. IF THIS SHOULD OCCUR, CAREFUL MANIPULATION OF THE TOOL WILL HELP PERMIT IT TO RIDE OVER THE CRIMP BARREL AND INTO THE PROPER POSITION TO UNLOCK THE CONTACT.

a. Press the wire of the contact against the serrations of the plastic tool and pull both the tool and the contact/wire assembly out of the connector.

Figure 3
Pull the Tool and Contact/Wire Assembly out of the Connector

(6) If doing repair and any wire is broken from contact, remove contact using the following steps:

a. Slide tool into connector until it is seated around contact.

Figure 4
Slide the Tool into the Connector

b. Insert a hat pin or small diameter wire into the contact opening on the face of the connector.

Figure 5
Insert a Hat Pin

c. Push the hat pin or wire into the face until the contact is visible on the back side of the connector.

Figure 6
Push the Hat Pin or Wire into the Face

d. Remove tool from contact.

e. Grab contact with needle nose pliers or equivalent tool and remove contact from connector.

⚠ **CAUTION** DO NOT CRIMP THE GO, NO-GO GAGE. FAILURE TO COMPLY WILL RESULT IN DAMAGE TO THE GAUGE AND RENDER IT UNUSABLE.

(7) Set the dial of the crimp to the proper setting as noted on the GO, NO-GO gage.

Figure 7
Go/No-Go Gage

(8) Squeeze the handles of the tool together until they are fully closed. DO NOT force beyond initial contact.

(9) Insert GO element into the die opening; but do not force it. The GO element must pass through the length of the die opening as shown in Figure 8.

(10) In the same manner, try to insert the NO-GO element into the die opening. The NO-GO element may enter partially but must not pass completely through the length of the die opening as shown in Figure 8.

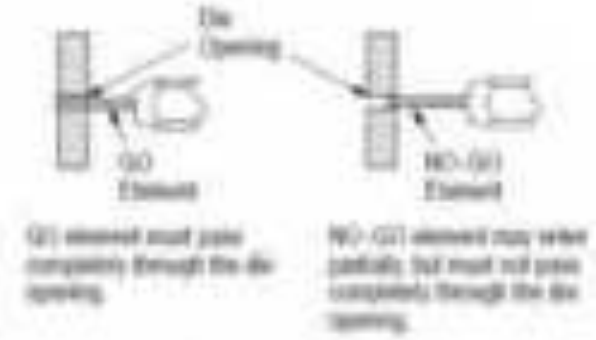


Figure 8
Using the GO/NO-GO Gage

(11) If the die opening conforms to the gage inspection, the tool may be considered dimensionally correct and can be used.

(12) If the die opening does NOT conform to the gage inspection, the tool must not be used.

⚠ **CAUTION** THE TOOL HANDLES MUST BE FULLY OPENED WHEN INSTALLING THE POSITIONER; OTHERWISE, DAMAGE TO THE TOOL WILL OCCUR.

(13) Select contact locator positioner from Tooling table in beginning of this section and install to crimp tool as follows:

a. M22520/1-01 (Figure 9)

(1) Depress the turret trigger to release the turret from the index position (the turret should be extended).

(2) Place the back of the turret head over the retainer ring on the back of the tool. Make sure that the turret head is seated, then tighten the two socket head cap screws of the turret head.

(3) Rotate the turret until the positioner marked with the desired contact size is aligned with the index mark.

(4) Press the turret until it is in the locked position.

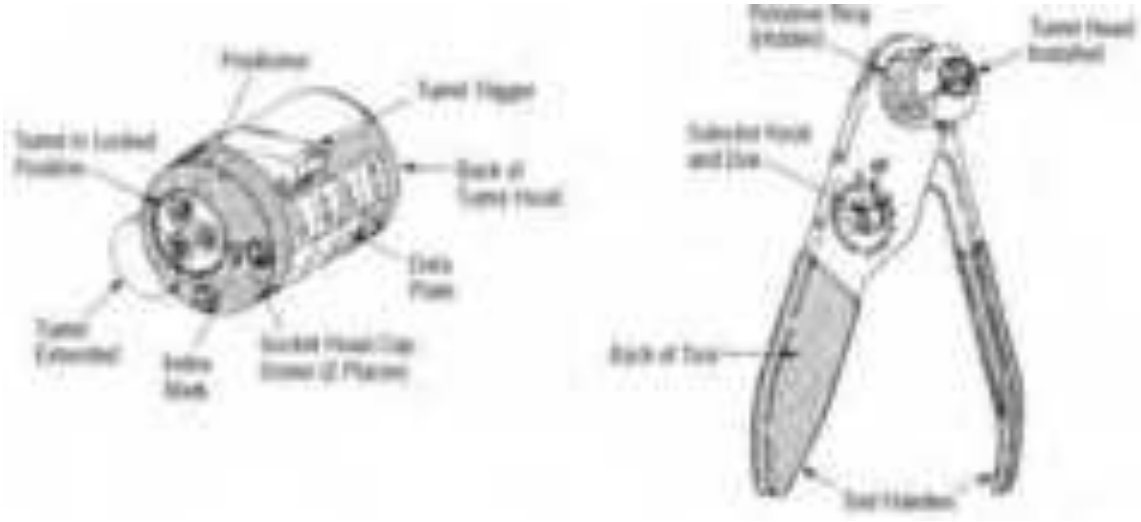


Figure 9
Crimp Tool M22520/1-01

b. M2520/2-01 (Figure 10)

(1) Squeeze the tool handles together, then allow the handles to FULLY open.

(2) Insert the post of the positioner into the hole in the back of the tool. Make sure the bayonet pin enters the slot in the retainer ring of the tool.

(3) Firmly grip the outer rim of the positioner and push until the spring inside the positioner is depressed, then rotate the positioner clockwise until it stops.

(4) Insert the tool safety clip into the retainer ring to lock the positioner in place.

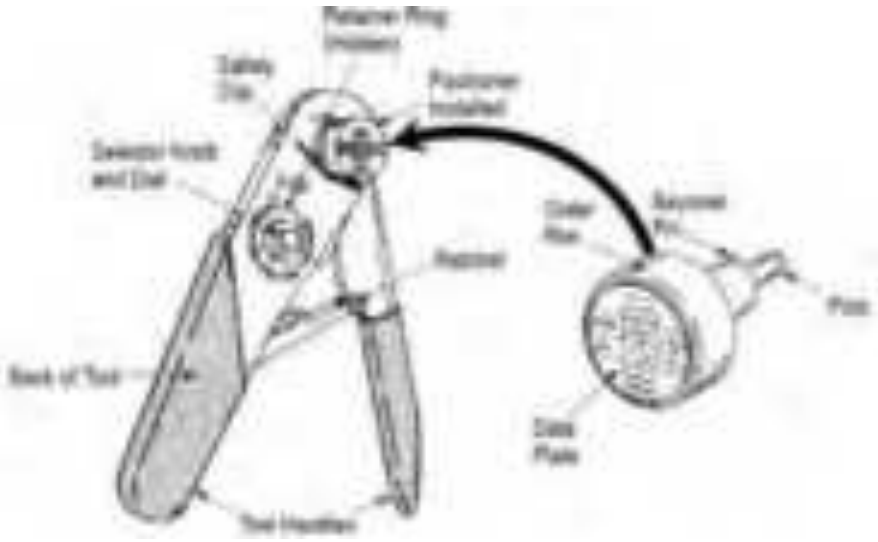


Figure 10
Crip Tool M2520/2-01

(14) Strip wires to proper length using the chart below for the contact being installed.

Contact P/N	Where Used	Strip Length	
		(Inches)	(Millimeters)
M39029/56-348	A001-P1, A001-P2, A001-P3, A001-P4, A002-P1, A002-P2, AF-P1	0.160 to 0.190	4.06 to 4.83
M39029/56-351	A013-P, A014-P, A025-P, A040-P	0.230 to 0.260	5.84 to 6.60
M39029/29-213	AF-P1, A110-P	0.219 to 0.250	5.56 to 6.35

(15) Inspect wire strands as follows:

a. Broken, nicked, or cut strands as listed below and shown in Figure 11.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

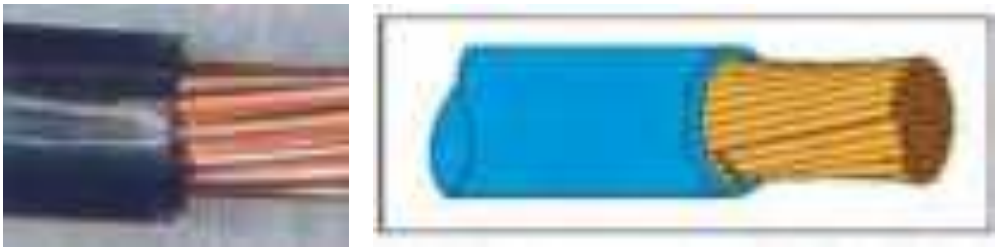


Figure 11
Examples of Unacceptable Wire Strands

(16) Inspect the wire insulation jacket for the following:

a. Properly cut as shown in Figure 12.

Figure 12
Properly Cut Insulation Jacket

b. Any uneven, ragged pieces (frays, tails, tags) (Figure 13) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

Figure 13
Example of Unacceptable Insulation Jacket

c. Inter-tape or frayed insulation exposure-"L" (Figure 14) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 14
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 15.

Figure 15
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 16.

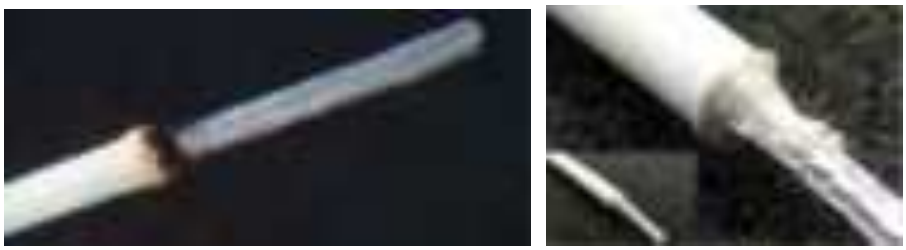


Figure 16
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks or splits in the insulation.

(17) Set the dial of the crimp tool (Figure 17) to the proper setting for wire gage and contact as noted on the contact position locator by lifting and rotating the selector knob. Ensure that the proper locator is used. See tooling table in the beginning of this section for tool and locator.

Figure 17
Set the Dial of the Crimp Tool

(18) Insert stripped wire into contact conductor barrel. Ensure all wire strands are inside contact conductor barrel and the conductor is completely visible in contact inspection hole (Figure 18).

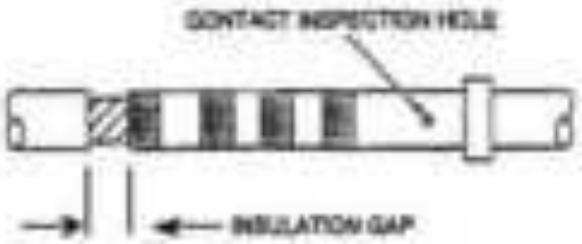


Figure 18
Contact Inspection Hole

a. If insulation is greater than shown in table below for contact and wire being crimped, trim conductor as required.

Contact Size	Wire AWG	Maximum Insulation Gap	
		(Inches)	(Millimeters)
22D	26-22	0.016	0.406
20	22-20		
16	16-20	0.031	0.787
12	14-12		
8	10-8		

b. If insulation gap is too small, trim insulation as required.

(19) Insert contact with wire into the crimping tool (Figure 19).

Figure 19
Insert Contact with Wire into Crimping Tool

(20) Squeeze the handles of the tool together. The crimping tool will not release until the full crimping cycle has been performed.

(21) Remove the crimped contact and wire from the tool.

(22) Inspect crimp as follows (Figure 20):

- Two series of 4 indents grip the wire and secure the contact to the wire.
- Wire is visible in the contact inspection hole and no wire strands extend out of inspection hole.
- Insulation does not extend into inspection hole.

Figure 20
Inspection Points

- There are no loose or nicked wire strands.
- Contact is not nicked, bent or distorted.
- End of contact conductor barrel is not flared.

(23) Insert contacts into connector as follows:

a. Hold the insertion half of the tool between the thumb and forefinger and lay the wire against the slot of the tool, then snap the wire into the slot (Figure 21).

Figure 21
Snap the Wire into the Slot

b. After the wire snaps into the tool, seat the retention shoulder against the tip of the tool (Figure 22).

c. Holding the connector with the rear grommet facing you, slowly push the contact straight into the grommet cavity (Figure 23). Do not twist the tool.

Figure 22
Seat the Retention Shoulder Against the Tip of the Tool

Figure 23
Push the Contact Straight into the Grommet Cavity

(24) Perform continuity test using the harness schematic in the applicable Engine Maintenance Manual.

(25) Slide backshell into position and tighten to connector.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(26) For connectors A013-P, A014-P, A025-P and A040-P, install saddle clamp (Figure 24) as follows:

a. Apply one small drop of Loctite® 2422 or equivalent to the bottom three threads of the screw.

b. Install the screw half-way.

c. Repeat Steps a and b for the second screw.

d. Ensure the harness cable and braiding is under saddle clamp and tighten the screws until the washer makes contact with clamp.

e. Torque screws to 6 ± 0.5 in/lb. (0.7 ± 0.06 Nm).

Figure 24
Saddle Clamp Screws and Saddle Plates

(27) Pull copper braid over the back of the backshell so it completely covers the cross-hatched area (Figure 25) on the back of the backshell. For AF-P1 and AF-P2 only, secure copper braid under backshell saddle clamp and tighten clamp.

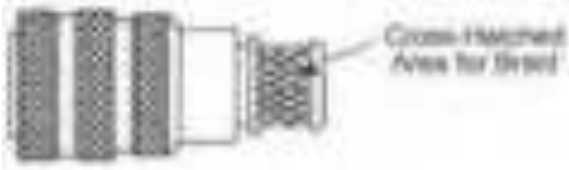


Figure 25
Cross Hatched Area

(28) Secure braid to backshell using band clamp and tool (Figure 26) specified in the Tooling and Parts lists in the front of this section and band clamp as specified in Section 7 - Wiring Harness Parts List, as follows:

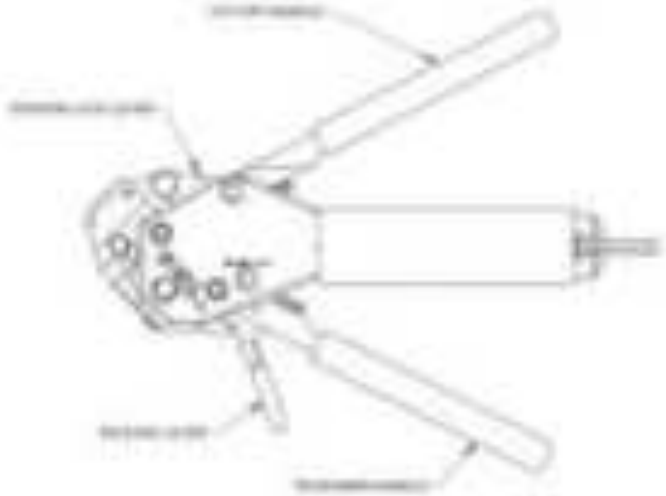


Figure 26
Band Clamp Tool

NOTICE: Due to connector circumference, it may be necessary to double-coil the band in place around the retention area.

a. Feed the end of the band through the narrow slot on the buckle twice until the indicator mark is within approximately 0.250 inch (6.35 mm) of the buckle slot. This will create a double looped band (Figure 27).

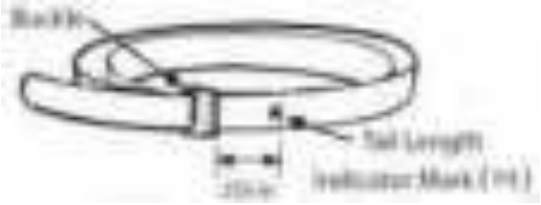


Figure 27
Double-Looped Band

b. Squeeze the release lever and insert the end of the band into the nose of the tool (Figure 28). Ensure the orientation of the band matches the graphic on the body of the tool.

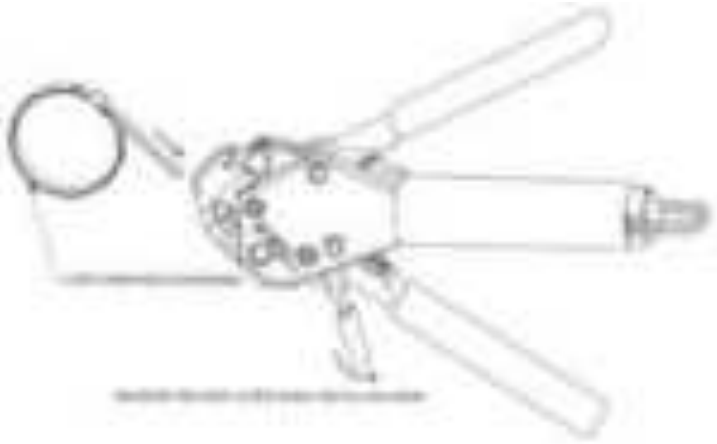


Figure 28
Insert the End of the Band into the Nose of the Tool

c. Repeatedly squeeze tensioner handle until the band starts to tighten (Figure 29) around the assembly. As the band tightens with each stroke of the tensioner handle, use abbreviated strokes (half strokes) until the band is tight against the braided cable.

Figure 29
Tighten the Band

Figure 30
Close the Tensioner Handle

NOTICE: If it is necessary to loosen or remove the looped band, it must be done prior to locking the tensioner handle. Release the band by squeezing the release lever and pulling the looped band away from the nose of the tool.

d. Release the tensioner handle and allow it to open fully. Confirm that the band is positioned flat over the braid on the connector accessory, and with one final stroke, close the tensioner handle (Figure 30) until it locks against the tool body.

e. Once the tensioner handle is locked in place, squeeze the cut-off handle to finish the termination process (Figure 31).

Figure 31
Finish the Termination Process

f. Remove excess band material from tool by squeezing the release lever and pulling the excess band material until it is free of the tool.

(29) Finish cable using Sections B and D.

Connector Installation and Check

(a) Complete continuity check using harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

2. Metri-Pack 150 Push-to-Seat

The procedures in this section are for the repair and or replacement of the following connectors:

Fuel Injector
A005-P, A006-P, A007-P, A008-P, A009-P, A010-P

MAT-P	DECK-P-S	CIP-P	CIP-S	DECK-T	MAT-S	DECK-P-P
A035-P	A036-P	A037-P	A038-P	A041-P	A042-P	A045-P

(a) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description	Manufacturer
12155975*	Hand Tool, Crimp	Aptiv
12094429*	Tool, Extraction	Aptiv
10803527*	Removal Tool, PLR (Lock Retainer)	Aptiv
10804886*	Removal Tool, Secondary TPA Lock	Aptiv
10764100*	Assembly Tool, PLR	Aptiv

*An equivalent tool may be substituted, if available.

(b) Parts

The parts list below contains additional parts that may be required for the repair and/or replacement of connectors and/or contacts. The parts and quantities required is determined by the repair/replacement being completed. Connector and contact information can be found in Section 7 – Wiring Harness Parts List. The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	05K31727 05K31730 05K31728 05K31731 05K31729 05K31732
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	05K31729 05K31734 05K31730 05K31735 05K31731 05K31736 05K31732 05K31737 05K31733 05K31738
AA52084-C-2-BLK	Lacing Tape, Nomex, Synthetic Elastomer Finish, Black	N/A

(c) Replacement

The connector shown in the figures of this procedure is a representation of the connector type and may not be the exact connector.

(1) Connector Removal

A tab on the terminal locks (Figure 32) into a tab molded into the plastic connector to retain the cable assembly. Remove terminals using the following instructions:

Figure 32
Terminal Lock

1. Cut and remove the heat shrink from the back of the connector, if installed.
2. Remove the connector ID label if required.
3. Remove the rear cable lock, if installed.
4. Remove the terminal position assurance and connector position assurance locks as follows, if installed:
   a. Remove the Primary Lock Reinforcement (PLR) completely using removal tool 10803527 (or equivalent) as shown in Figure 33.

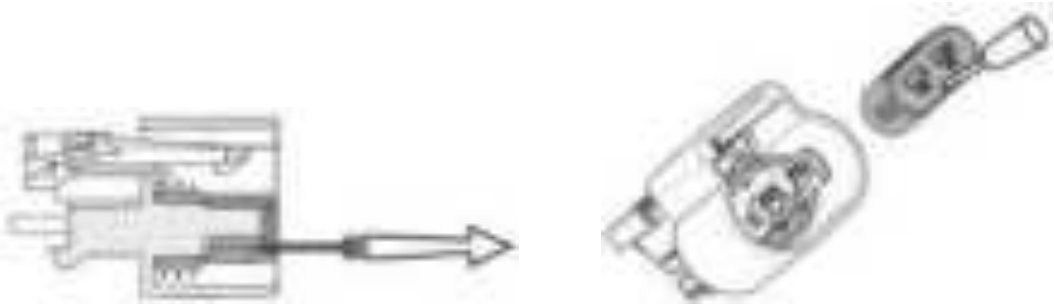


Figure 33
Remove the PLR

   b. As illustrated in Figure 34, unlock (arrow 1) and remove (arrow 2) Terminal Position Assurance (TPA) completely using removal tool 10804886 (or equivalent).

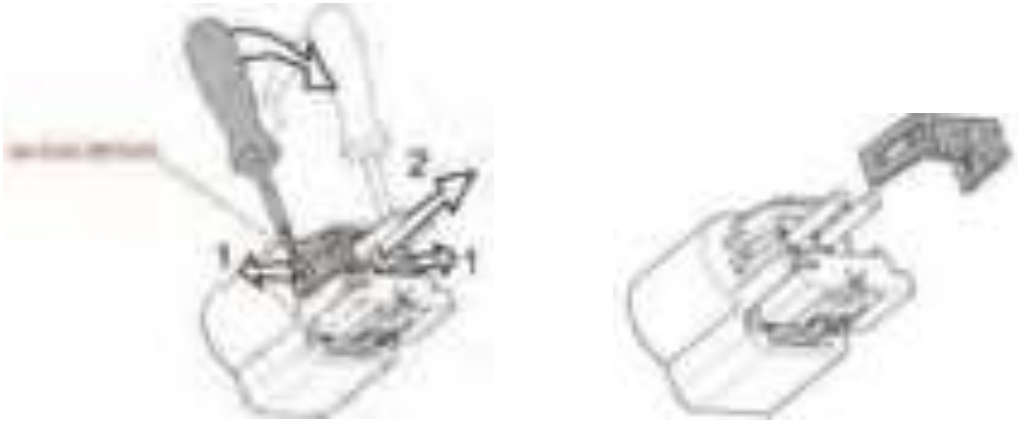


Figure 34
Unlock and Remove the TPA

5. Remove contacts from connector body by inserting the tool (Figure 35) into the cavity of the connector, placing the tip of the tool between the locking tang of the terminal and the wall of the cavity as shown in Figure 36.

Figure 35
Removal Tool

Figure 36
Press the Tang of the Terminal

6. Press the tang of the terminal (Figure 36) to release it from the connector.
7. Pull the wire aft until the contact is free of the housing.
8. While holding the removed contacts with one hand, pull the Halar® braid as far from the wire ends as possible with 2 inches (5.08cm) minimum.
9. Complete this step only if 2 inches (5.08cm) or more of wire cannot be exposed in step 8.
    a. Tie off the Halar® braid 6 to 8 inches (15.24 to 20.32cm) behind the connector using tie string.
    b. Using a razor blade or equivalent cutting tool, cut the Halar® braid open along the length of the cable from the connector to within ¼in. (6.35mm) of where it is tied off to expose wires.
    c. Fold Halar® braid back to facilitate repair/removal of connector.
10. If Halar® braid was not cut, pull Halar® braid towards wires and flatten it to facilitate installation of heat shrink.
11. Install an 8 inch (20.32cm) length of heat shrink P/N M23053/5-108-0 and position far enough onto cable to allow wrap to be pulled back. If Halar® braid was cut, slide heat shrink past the tie off point and pull the cut portion out from under the heat shrink. Do not shrink at this point. This will be used to repair the Halar® braid during re-assembly and cover connector (if previously covered).
12. After heat shrink installation, if wrap was not cut, pull Halar® braid back to expose wires.
13. Cut the wire immediately behind the damaged terminal(s) and seal(s). Ensure that the wire end is blunt after it is cut.

(2) Connector Installation

(a) Insert cable seal over wire as shown in Figure 37.

Figure 37
Insert Cable Seal Over Wire

(b) Using a suitable wire stripper, strip 0.125 ± 0.03 inch (3.2 ± 0.254mm) of insulation from the end of each wire as shown in Figure 378

Figure 38
Strip Insulation

(c) Inspect wire strands as follows:

1. Broken, nicked, or cut strands as listed below and shown in Figure 39.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

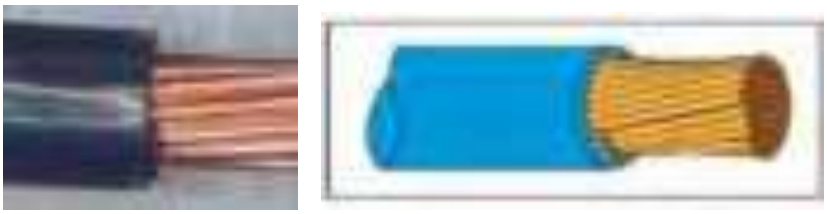


Figure 39
Examples of Unacceptable Wire Strands

(d) Inspect the wire insulation jacket for the following:

1. Properly cut as shown in Figure 40.

Figure 40
Properly Cut Insulation Jacket

2. Any uneven, ragged pieces (frays, tails, tags) (Figure 41) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

Figure 41
Example of Unacceptable Insulation Jacket

3. Inter-tape or frayed insulation exposure-"L" (Figure 42) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 42
Inter-Tape or Frayed Insulation Exposure

4. Un−stranded, splayed, or Bird cage strands as shown in Figure 43.

Figure 43
Example of Unacceptable Wire Strands

5. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 44.

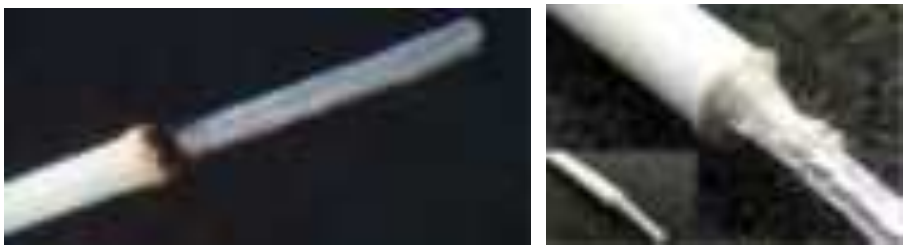


Figure 44
Examples of Burned and Melted Insulation

6. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

(e) Slide the wire seal so the end of the seal is flush with the insulation on the end of each wire as shown in Figure 45.

Figure 45
Slide Wire Seal to Flush with Insulation

(f) Insert the terminal into the crimper and gently close the jaws to hold the terminal in place as shown in Figure 46.

Figure 46
Insert the Terminal into the Crimper

(g) Insert stripped wire into terminal until the seal is flush with the end of the terminal as shown in Figure 47. The smooth portion of the seal should overlap the terminal to the end seal crimp.

Figure 47
Insert Wire into Terminal

(h) Completely close the jaws to crimp the terminal to the wire.

(i) Repeat steps (f) and (h) for seal crimp.

(j) Remove the terminal from the crimper and complete a hand pull test to ensure terminal and seal are secure as shown in Figure 48.

Figure 48
Ensure Terminal and Seal are Secure

(k) Inspect crimp and terminal for the following, using Figure 49:

- Not over/under crimped, bent or deformed.
- Wire seal is completely under crimp and extends past crimp.
- Wire seal and insulation do extend into conductor crimp.

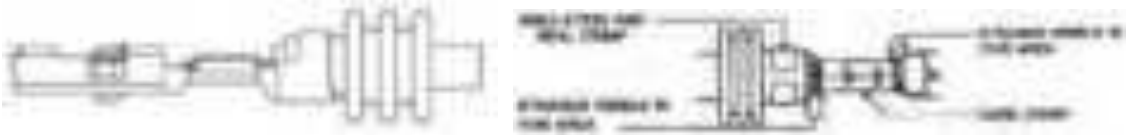


Figure 49
Inspect Crimp and Terminal

(l) Insert the terminal into the connector until a click is heard.

(m) Once all wires are terminated and installed in the connector, if an end cap was removed, install the end cap by inserting the wires into the slots on the cap, and sliding onto the connector until it mates and 'snaps' into place as shown in Figure 50.

Figure 50
Connector with Cap Installed

(n) If terminal position assurance and connector position assurance locks were removed, reinstall as follows:

1. Insert CPA until it is locked in pre-assembled position, as shown in Figure 51.

Figure 51
Insert CPA

(o) Insert PLR until it is correctly closed in pre-position windows, as shown in Figure 52.

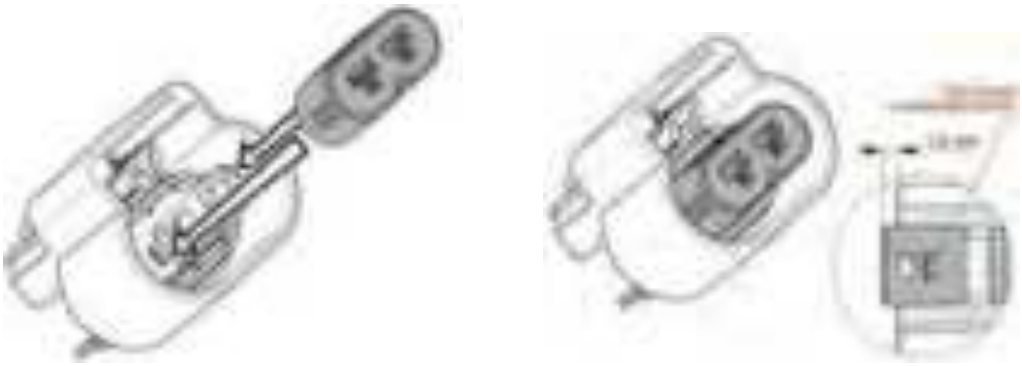


Figure 52
Insert the PLR

1. Complete continuity test before finishing heat shrink.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

2. After successful continuity test, if Halar® braid was not cut, pull Halar® braid towards connector until it doesn't stretch any more or touches the back of the connector.
3. Cover Halar® braid from connector aft end and shrink.
4. If Halar® braid was cut, pull cut portion over wires and tie off to so there are no areas where the wrap is bunched up, and wires are covered.
5. Cover Halar® braid and string with heat shrink from connector aft end and shrink.
6. Complete the procedure in Section 5 - Label Replacement and Installation to create and install new connector label.

Connector Installation and Check

(a) Complete continuity check using harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

3. Metri-Pack 150 Pull-to-Seat

The procedures in this section are for the repair and or replacement of the following connectors:

A011-P WGC	A039-P DPS	A043-P TPS	A065-P COIL 1-T	A066-P COIL 1-B	A067-P COIL 3-T
A0068-P COIL 3-B	A069-P COIL 5-T	A070-P COIL 5-B	A071-P COIL 2-B	A072-P COIL 2-T	A073-P COIL 4-B
A074-P COIL 4-T	A075-P COIL 6-B	A076-P COIL 6-T			

A. Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description
12094429	Extraction Tool, Contact
12039500	Crimping Tool, Contact

B. Parts

The parts list below contains additional parts that may be required for the repair and/or replacement of connectors and/or contacts. The parts and quantities required is determined by the repair/replacement being completed. Connector and contact information can be found in Section 7 – Wiring Harness Parts List. The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	05K31733 05K31736 05K31734 05K31737 05K31735 05K31738
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	05K31729 05K31734 05K31730 05K31735 05K31731 05K31736 05K31732 05K31737 05K31733 05K31738
AA52084-C-2-BLK	Lacing Tape, Nomex, Synthetic Elastomer Finish, Black	N/A

C. Procedure

The connector shown in the figures of this procedure is a representation of the connector type and may not be the exact connector.

(1) Connector Removal

A tab on the terminal locks into a tab molded into the plastic connector to retain the cable assembly. Remove terminals using the following instructions:

a. Remove the connector ID label if required.

b. Cut and remove the heat shrink from the back of the connector.

c. While holding the connector with one hand, pull the Halar® braid as far from the connector as possible with 4 in. (10.16cm) minimum.

d. Complete this step only if 4 in. (10.16cm) or more of wire cannot be exposed in step c.
   (1) Tie off the Halar® braid 6 to 8 inches (15.24 to 20.32cm) behind the connector using tie string.
   (2) Using a razor blade or equivalent cutting tool, cut the Halar® braid open along the length of the cable from the connector to within ¼in. (6.35mm) of where it is tied off to expose wires.
   (3) Fold Halar® braid back to facilitate repair/removal of connector.

e. Remove contacts from connector body by inserting the tool (Figure 53) into the cavity of the connector, placing the tip of the tool between the locking tang of the terminal and the wall of the cavity.

f. Press the tang of the terminal to release it from the connector.

g. Push the wire forward through the connector until the complete crimp is exposed.

h. Cut the wire immediately behind the damaged terminal(s). Ensure that the wire end is blunt after it is cut.

i. If Halar® braid was not cut in step d, pull Halar® braid towards wires and flatten it to facilitate installation of heat shrink.

j. Install an 8 inch length of M23053/5-108-0 heat shrink and position far enough onto cable to allow wrap to be pulled back. If Halar® braid was cut in step d, slide heat shrink past the tie off point and pull the cut portion out from under the heat shrink. Do not shrink at this point. This will be used to repair the Halar® braid during re-assembly.

k. After heat shrink installation, if wrap was not cut, pull Halar® braid back to expose wires as in step 'c'.

Figure 53
Delphi Removal Tool

(2) Connector Installation

a. Get connector assembly and hold and install cable seal into back of connector.

b. Hold connector so the cable seal is facing you. See Figure 54.

NOTICE: Ensure leads are blunt cut for the next step.

c. Take each blunt cut wire and start through cable seal as shown in Figure 54.

Figure 54
Wire Insertion

d. Push all wires through cable seal and out the other side of the connector as shown in Figure 55.

e. From the blunt cut end of each wire, pull all wires through the connector as far as possible for ease of stripping and terminating.

f. For A011-P, A039-P and A043-P only, install M23053/5-104-0 heat shrink over each wire and position at the face of the connector as shown in Figure 55. Do not shrink it in this step.

g. Strip 0.125 ± 0.01in. (3.16 ± 0.25mm) of insulation from the end of each wire as shown in Figure 56.

Figure 55
Install Heat Shrink

Figure 56
Strip Insulation

h. Inspect wire strands as follows:

(1) Broken, nicked, or cut strands as listed below and shown in Figure 57.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

Figure 57
Examples of Unacceptable Wire Strands

i. Inspect the wire insulation jacket for the following:

(1) Properly cut as shown in Figure 58.

Figure 58
Properly Cut Insulation Jacket

(2) Any uneven, ragged pieces (frays, tails, tags) (Figure 59) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

Figure 59
Example of Unacceptable Insulation Jacket

(3) Inter-tape or frayed insulation exposure-"L" (Figure 60) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

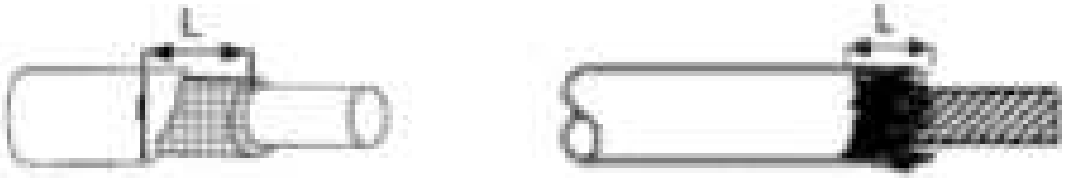


Figure 60
Inter-Tape or Frayed Insulation Exposure

(4) Un−stranded, splayed, or Bird cage strands as shown in Figure 61.

Figure 61
Example of Unacceptable Wire Strands

(5) If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 62.

Figure 62
Examples of Burned and Melted Insulation

(6) Ensure there are no cuts, breaks, cracks, or splits in the insulation.

j. Crimp a contact onto the stripped end of each wire as shown in Figure 63.

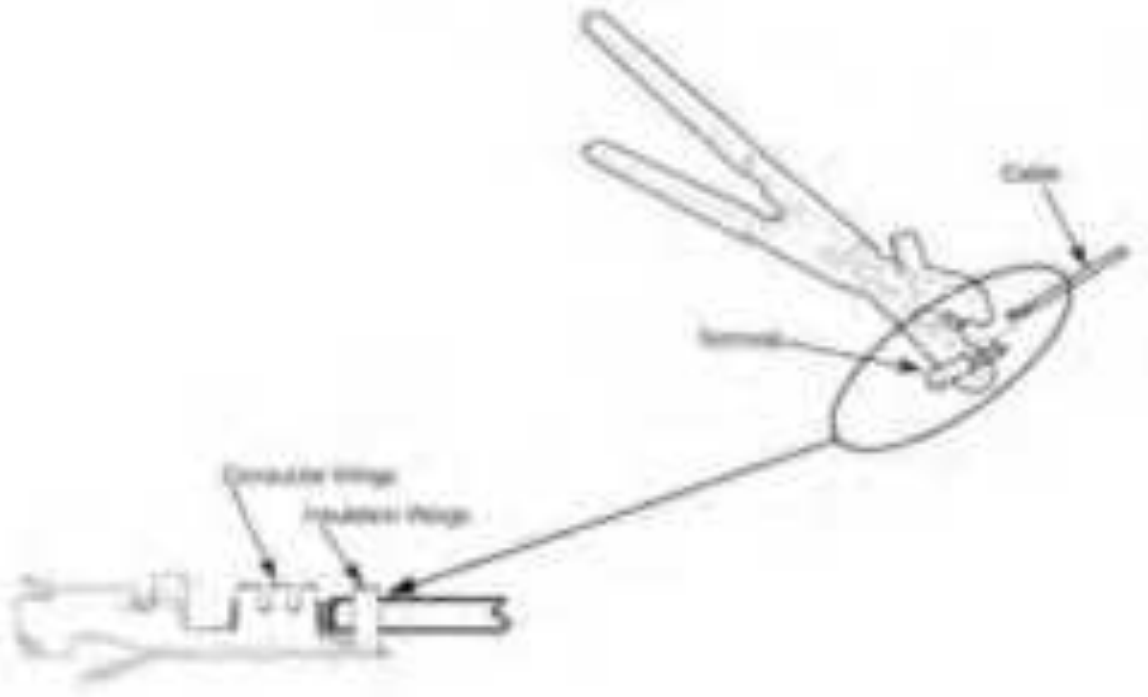


Figure 63
Crimp Contact onto Wire

k. Inspect crimp and terminal for the following:
- Not over/under crimped, bent or deformed.
- Wire insulation is completely under crimp and extends past crimp.
- Wire insulation does extend into conductor crimp.

l. Position heat shrink, if installed in Step f, behind contacts installed in previous step and shrink using a heat gun as shown in Figure 64.

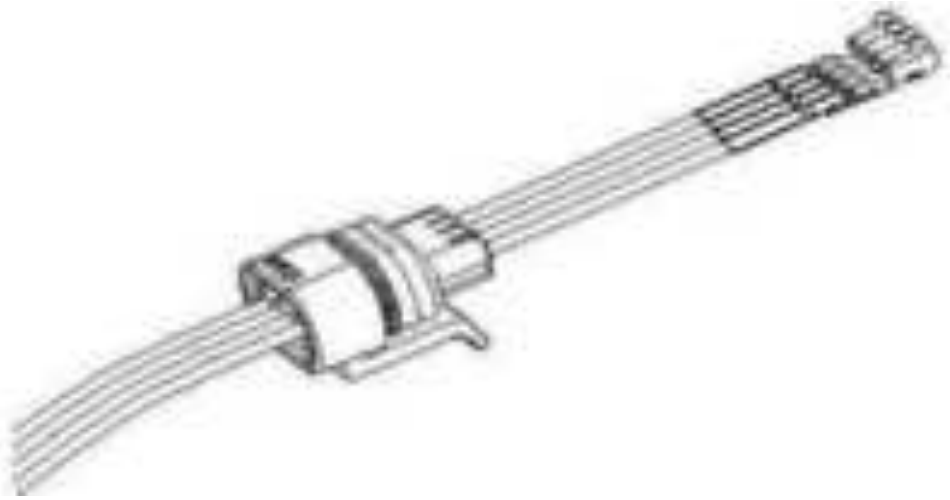


Figure 64
Position and Shrink the Heat Shrink

m. Pull terminated wires back through connector assembly as shown in Figure 65 to the fully seated position. Ensure that the terminal is in the correct orientation as it moves into the terminal cavity. Verify the terminal has been fully seated by listening for the audible click of the locking tab.

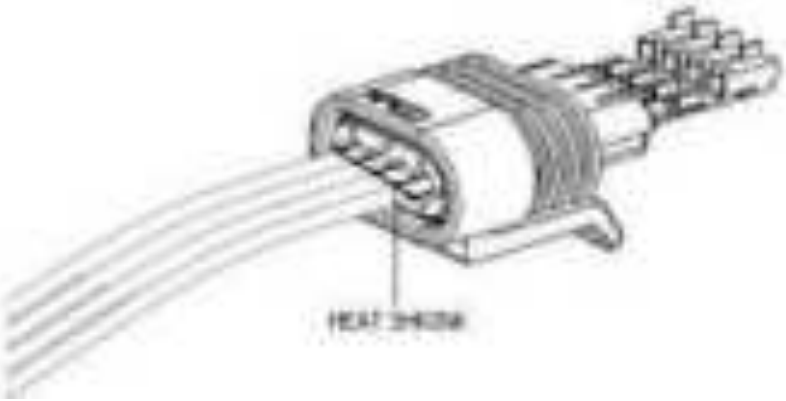


Figure 65
Pull Terminated Wires Back Through Connector

n. Visually verify the terminals are fully seated in the connector housing. The contacts should be recessed in the connector housing and shown in Figure 66.

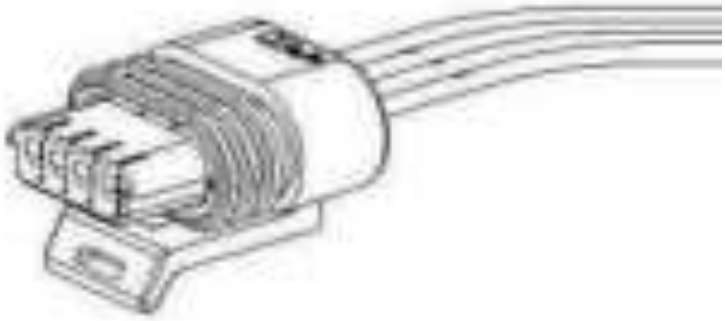


Figure 66
Contacts Recessed in the Connector Housing

o. If the cable seal pulls out of the connector body during terminal seating, carefully push the seal back into the connector assembly as shown in Figure 67.

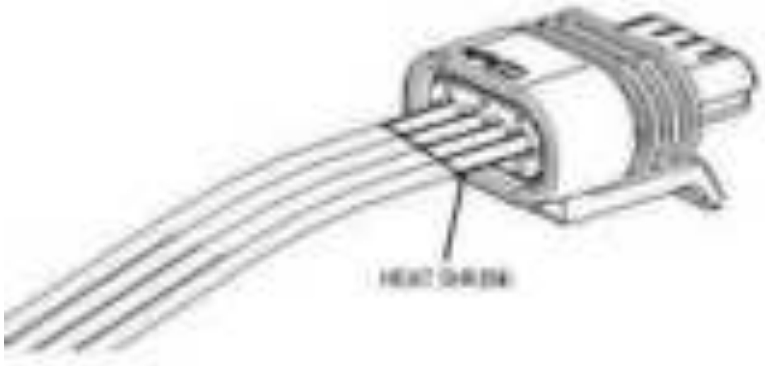


Figure 67
Push Seal into Connector Assembly

p. Complete continuity test before finishing heat shrink.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

q. After successful continuity test, if Halar® braid was not cut, pull Halar® braid towards connector until it doesn't stretch any more or touches the back of the connector.

r. Cover Halar® braid from connector aft end and shrink.

s. If Halar® braid was cut, pull cut portion over wires and tie off to so there are no areas where the wrap is bunched up, and wires are covered.

t. Cover Halar® braid and string with heat shrink from connector aft end and shrink.

u. Complete the procedure in Section 5 - Label Replacement and Installation to create and install new connector label.

Connector Installation and Check

(a) Complete continuity check using harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

4. Bosch Low-Way

The procedures in this section are for the repair and or replacement of the following connectors: Detonation sensors

A015-P	A016-P	A017-P	A018-P	A019-P	A020-P
Knock 2	Knock 1	Knock 6	Knock 3	Knock 4	Knock 5

(a) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description	Manufacturer
1 928 498 161	Crimping pliers for 0,50 / 0,75 / 1,00 mm²	Bosch
1 928 498 167	Disassembly tool	Bosch
1 928 498 168	Spare part for disassembly tool	Bosch

(b) Parts

The parts list below contains additional parts that may be required for the repair and/or replacement of connectors and/or contacts. The parts and quantities required is determined by the repair/replacement being completed. Connector and contact information can be found in Section 7 – Wiring Harness Parts List. The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
60P31549-CT	Label, Cable Marker, 0.25in.	05K31721 05K31722
60P31550-CT	Label, Cable Marker, 0.50in.	05K31721 05K31722
MS3367-5	Cable Tie, 0.14in. X 5.50in.	05K31721 05K31722

(c) Procedure

Connector Disassembly

Connector Preparation

(1) Gain access to the engine and connector using the steps outlined in the aircraft maintenance manual.

(2) Disconnect connector from detonation sensor. Refer to Chapter 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(3) With the connector free of the sensor, release the 90° black protective boot from the connector by lifting the boot over the lip of the connector end clip. See Figure 68.

Figure 68
Protective Boot Release

CAUTION USE CARE WHEN COMPLETING STEP (4) TO PREVENT TEARING OR DAMAGING THE PROTECTIVE BOOT. WHEN APPLYING, DO NOT OVER TIGHTEN.

(4) Move the protective boot away from the connector as far as possible by grabbing the inside lip of the boot and rolling it out and away from the connector as shown in Figure 69 to expose as much wire as possible.

Figure 69
Protective Boot Away from Connector

NOTICE: Once boot is pulled back to its furthest extent, it may be necessary to prevent it from slipping by securing it in place with a plastic tie or string. Do not overtighten to prevent damage to the boot and/or wire.

Connector Contact Removal

(1) Remove end clip, shown in Figures 68 and 69 from connector.

(2) Position the connector as shown in Figure 70.

(3) To release the contacts, the locking spring (tang) has to be pressed down by the pins of the disassembly tool. Insert Bosch disassembly tool 1 928 498 167 (Figure 71) into connector release openings as shown in Figure 72.

Figure 70
Connector

Figure 71
Bosch Disassembly Tool 1 928 498 167

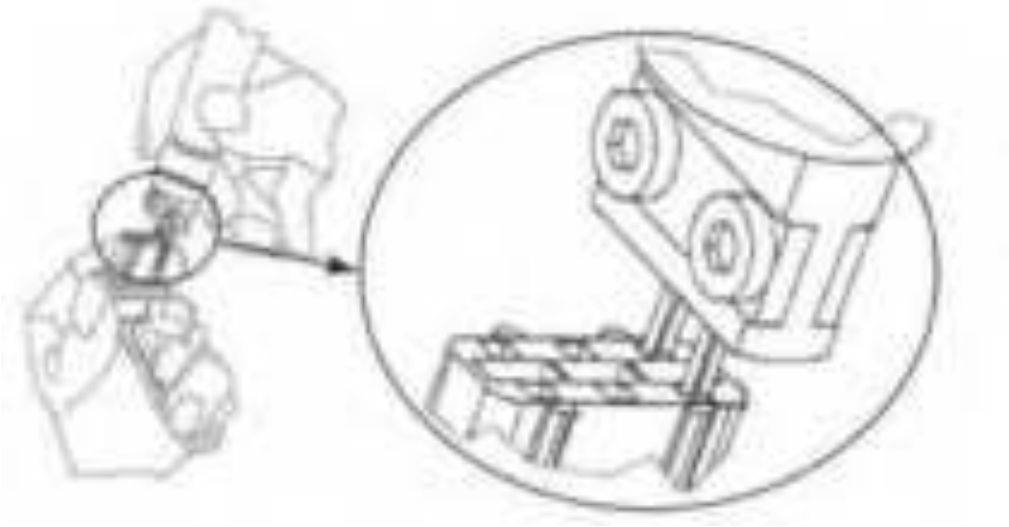


Figure 72
Bosch Disassembly Tool Inserted into Connector Release Openings

(4) Push contact on wire briefly towards disassembly tool and then pull out carefully. If wire is not connected to contact, use tweezers or small forceps/pliers to grasp the blue silicone wire seal to remove the contact.

NOTICE: If both contacts and or connector body is being replaced, repeat steps 2 and 3 to remove remaining contact.

Inspection

(1) Contacts

Check disassembled contacts for damage:

- Locking bars out of shape
- Connection area damaged
- Contact bent on disassembly
- Other visible damage

If damage is found on contact, cut off contact and replace with a new one. If wire length between contacts cannot be maintained, all other wires of the same connector must be shortened to the same extent by replacing contacts.

(2) Connector

Check connector for damage:

- Plastic chips found on contact disassembly.
- Other physical damage to the connector

If connector damage is found, it must be replaced with a new one.

Contact Assembly

(1) Wire Preparation

Prepare the wire for contact using the following steps.

NOTICE: Care must be taken not to damage or sever individual cores when stripping. The stripping operation must not eliminate the process-related twisting, any re-twisting is not permitted. The wire insulation must not be damaged or permanently deformed by the stripping process. The insulation material must be free of any dirt or residue.

(a) Ensure the end of the wire being terminated is flush and does not have any ragged insulation by using a wire cutter (flush or diagonal) to remove frayed ends.

(b) Insert blue wire seal over wire and position far enough up wire to allow wire to be stripped (Figure 73).

(c) Using wire strippers, strip insulation from wire to obtain the strip length of 0.157in. ±0.01in. (4.0mm ±0.3mm) as shown in Figure 74.

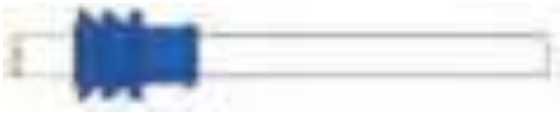


Figure 73
Blue Wire Seal Positioned on Wire

Figure 74
Strip Insulation from Wire

(2) Inspect wire strands as follows:

(a) Broken, nicked, or cut strands as listed below and shown in Figure 75.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

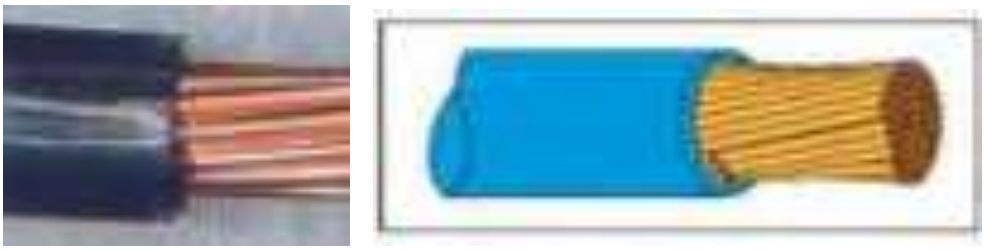


Figure 75
Examples of Unacceptable Wire Strands

(3) Inspect the wire insulation jacket for the following:

(a) Properly cut as shown in Figure 76.

Figure 76
Properly Cut Insulation Jacket

Figure 77
Example of Unacceptable Insulation Jacket

(b) Any uneven, ragged pieces (frays, tails, tags) (Figure 77) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

(c) Inter-tape or frayed insulation exposure-"L" (Figure 78) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 78
Inter-Tape or Frayed Insulation Exposure

(d) Un−stranded, splayed, or Bird cage strands as shown in Figure 79.

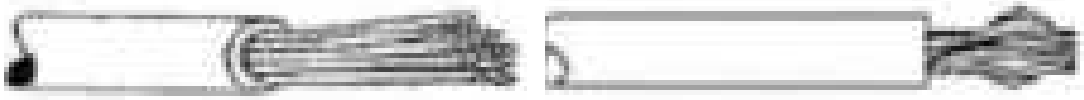


Figure 79
Example of Unacceptable Wire Strands

(e) If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 80.

Figure 80
Examples of Burned and Melted Insulation

(f) Ensure there are no cuts, breaks, cracks, or splits in the insulation.

Contact Crimping

Using Bosch crimp tool 1 928 498 161 (Figure 81) with the steps below, complete contact crimping.

Figure 81
Bosch Crimp Tool 1 928 498 161

(1) Insert contact to be crimped into the pliers as shown in Figure 82.

Figure 82
Insert Contact to be Crimped into the Pliers

Figure 83
Position Stripped Wire and Wire Seal

(2) Place the stripped wire in correct position in crimping area with a fitted single-wire-seal as shown in Figure 83.

NOTICE: The insulation crimp must be fitted in a way that the single-wire seal is neither damaged, scratched nor cracked. Pressure marks are only permitted if there is no danger for leaking.

(3) Press plier handles together up to stop (Figure 84).

NOTICE: An automatic locking mechanism prevents early opening of the pliers. To ensure a high crimp quality, press the crimping plier handles together up to the stop.

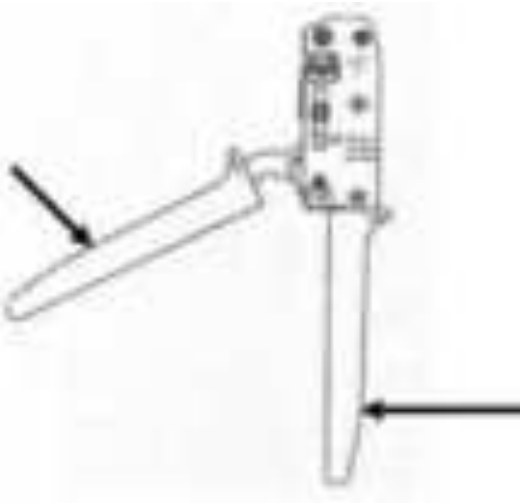


Figure 84
Press Plier Handles Together

(4) Carefully pull out the crimped contact and attached wire (Figure 85).

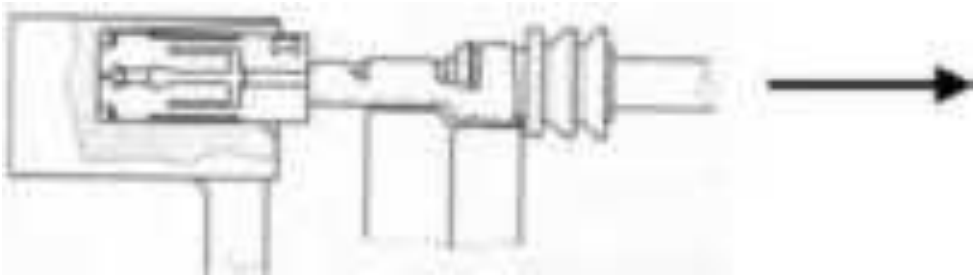


Figure 85
Pull Out the Crimped Contact and Attached Wire

NOTICE: Repeat steps (1)-(4) for any remaining contacts to be replaced.

Conductor and Insulation Crimp Inspection

Inspect the wire conductor for proper crimping.

Visual Inspection

Complete a visual inspection of the crimped wire and contact for the following:

- All individual wires must be enclosed by the conductor crimp.
- Individual wires must not be damaged.
- The base of the crimp claw must exhibit a distinct change in shape.
- The crimp claws must be closed and rest against one another.
- The contact geometry must not be altered by the crimping operation. Particular attention is to be paid to bending or deformation of locking spring, cantilever spring and contact body.

Symmetry (Figure 86)

The width of the insulation crimp must be within a symmetry tolerance of 0.008in. (0.2 mm) with respect to the body of the contact.

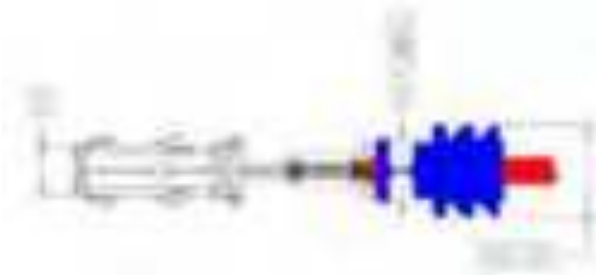


Figure 86
Width of Insulation Crimp

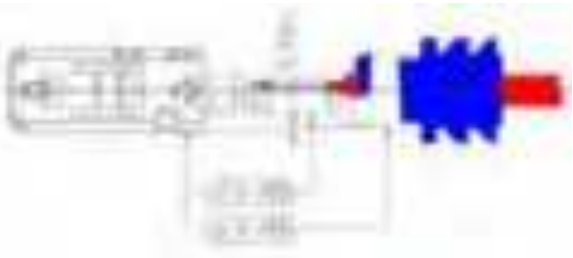


Figure 87
Parallelism of Insulation Crimp

Parallelism (Figure 87)

The base of the wire and insulation crimp must be within a tolerance of parallelism 0.008in. (0.2 mm) with respect to the contact.

NOTICE: In cases of doubt an assembly test can be completed. If the contacts scratch or if they have to be bent or strained to allow insertion, the deviation from the longitudinal axis of the contact is excessive. The tool settings have to be corrected accordingly.

- The conductor insulation must reveal any pressure marks or cracks in the area of individual–core seal, as could result for example from stripping.
- After crimping, the single-wire seal must not reveal any scratches of cracks. Particular attention is to be paid to the area between and next to the insulation crimp tabs. The collar of the single-wire seal is centered in the window of the crimp base.
- Inspect for crimp faults shown below. If any of these are found, contact is not acceptable and must be removed and replaced.

- Stripped length too long.

- Stripped length too short.

- Insulation extends into crimping area.

- Single wire seal incorrectly positioned.

- Single-wire seal incorrectly positioned damage to front sealing lip by separator ridge (opposite).

- Scratches on single wire seal between insulation crimp tabs.

- Scratches on single wire seal on side of insulation crimp tab.

- Individual wires not crimped.

Connector Assembly

When contacts have been satisfactorily assembled, complete the following to assemble the connector:

CAUTION **ENSURE CONTACT IS ORIENTED CORRECTLY BEFORE INSERTING INTO CONNECTOR BODY. FAILURE TO COMPLY COULD DAMAGE CONTACT AND/OR CONNECTOR BODY.**

NOTICE: Ensure wires are inserted into correct positions in connector body. Refer to Schematic the harness schematic in Appendix B of the applicable engine maintenance manual for proper connection.

Connector contact position numbering is shown in Figure 88:

(1) Orient contact as shown in Figure 89, then insert contact into connector body and push until an audible 'click' is heard.

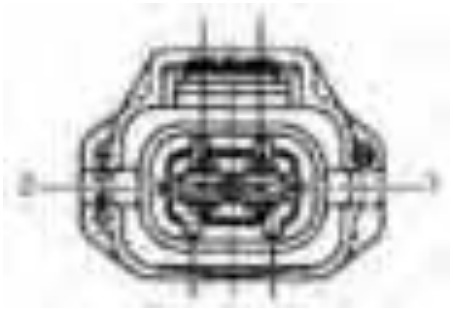


Figure 88
Connector Contact Position Numbering

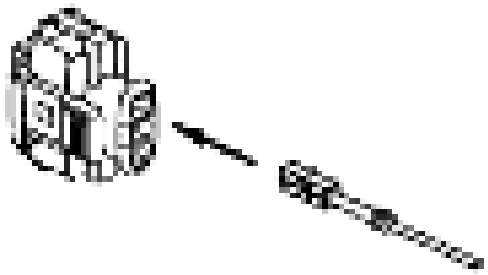


Figure 89
Orient Contact

(2) After contact insertion, lightly pull on wire to ensure contact is locked into connector body.

(3) Repeat steps 1 and 2 for remaining contacts.

(4) Install end clip on back of connector body.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(5) Remove tie or string from protective boot, if used, and roll boot down to connector body and push lip of boot over end clip.

Connector Installation and Check

(a) Complete continuity check using harness schematic LE-4787 in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

5. Tyco Electronics JPT

The procedures in this section are for the repair and or replacement of the following connectors:

CRANK	CAM
A003-P	A004-P

(a) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description	Manufacturer
2031991-1*	Hand Tool, Crimper w/Die	TE Connectivity
539635-1*	Hand Tool, Ergocrimp**	TE Connectivity
539737-2*	Die Set, Junior Power Timer, Ergocrimp**	TE Connectivity
1-1579007-6*	Tool, Contact Extraction	TE Connectivity
5-1579018-6*	Tool, Contact Insertion***	TE Connectivity

*An equivalent tool may be substituted, if available.

**Alternate for 2031991-1.

** Optional tool that may be used if necessary.

(b) Parts

Parts can be found in Section 7 – Wiring Harness Parts List. Refer to Section 8 - Wiring Harness Repair Kits for kits containing parts to repair or replace Tyco Electronics JPT connectors.

(c) Procedure

This procedure is for the removal and replacement of the Tyco Electronics (TE) JPT connector series used on the iE2 engine harness. Since the ERGOCRIMP Hand Tool has been designed to accommodate different crimp die sets and is used on other applications in this manual, the beginning steps are for removing and installing die sets.

Die Installation and Removal

The ERGOCRIMP Hand Tool (Figure 90) consists of two crimping jaws, an adjustable ratchet, spring-actuated handles, two die retaining screws, and an emergency ratchet release. The slotted design of the crimping jaws permits easy installation and removal of crimping dies. The adjustable ratchet allows handle pressure to be set for optimum crimping die performance.

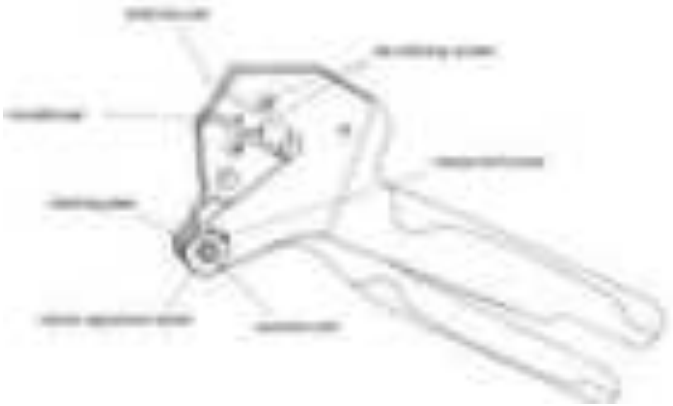


Figure 90
ERGOCRIMP Hand Tool

Die – Installation

Use the following diagram (Figure 91) when completing die installation and removal.

NOTICE: This is a general explanation of the procedure. For specific information, refer to the instruction sheet packaged with the die assembly or the latest revision of TE Connectivity Document number 411-18191.

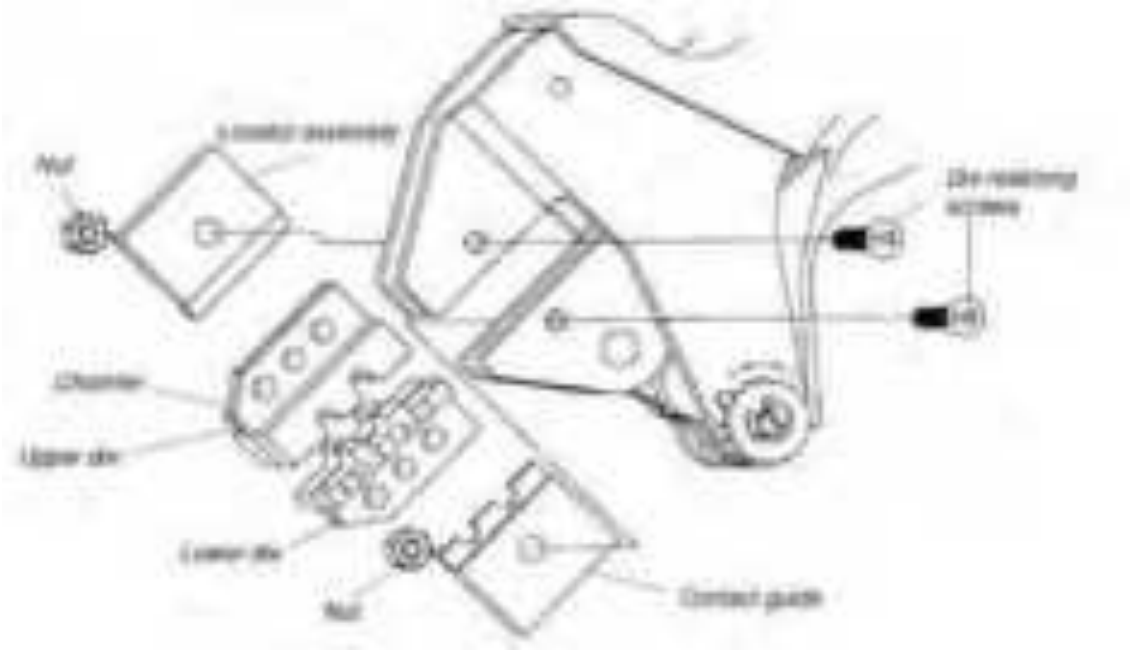


Figure 91
Die Installation and Removal

(1) Open the tool handles and remove the two die retaining screws from the tool jaws.

(2) Move the wire and insulation crimper dies (PN 539635-1), with the chamfers facing the front of the stationary jaws.

(3) Insert a die retention screw through the jaw and die and tighten the screw so that the die is held in place, but do not tighten the screw completely at this point.

(4) Place the lower die in the moving jaw of the tool frame. Install a die retention screw through the jaw and die and tighten the screw so that the die is held in place, but do not tighten the screw completely at this point.

NOTICE: The ERGOCRIMP tool ratchet has detents that are audible as seven "clicks" as the handles are closed. The ratchet releases on the sixth "click".

(5) Slowly close the tool handles, allowing the dies to mate and/or align. Continue closing the tool handles until the ratchet makes the fifth "click", then tighten both die retention screws until snug.

(6) Install the locator assembly on the stationary jaw and tighten the hex nut.

(7) Install the contact locator on the movable jaw and tighten hex nut.

(8) Check the crimp heights. If necessary, adjust as follows:

a. Crimp a contact onto a properly- prepared wire of the correct size.

b. If the crimp height is greater than recommended, open the plier and remove the screwed stop pin (Figure 92) with a screwdriver. Rotate the adjustment wheel COUNTERCLOCKWISE (+). If a looser crimp is required, rotate the adjustment wheel CLOCKWISE (-).

c. Replace the screwed stop pin (Figure 92).

Figure 92
Screwed Stop Pin

d. Make a sample crimp and measure the crimp height. If the dimension is acceptable, replace and secure the screwed stop pin. If the dimension is unacceptable, continue to adjust the ratchet, and again measure a sample crimp.

Die – Removal

(1) Close the tool handles until the ratchet releases and allow the handles to open fully. Loosen and remove the die retention screws and slide the dies out of the tool jaws.

Replace Connector as follows:

Extract contacts as follows:

⚠ **CAUTION** USE CARE WHEN EXTRACTING CONTACT USING THE EXTRACTION TOOL. DO NOT APPLY EXCESS FORCE, AS DAMAGE TO THE CONNECTOR HOUSING LOCKING MECHANISM CAN OCCUR.

a. Using a small screwdriver, open the secondary lock on the rear of the connector as shown in Figure 93.

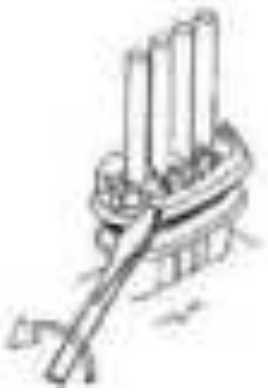


Figure 93
Open the Secondary Lock

b. Using contact extraction tool (Figure 94), carefully remove contacts from connector.

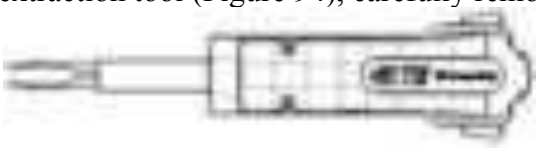


Figure 94
Contact Extraction Tool

c. Hold mating face of connector toward you and determine location of latching mechanism in the appropriate connector cavity as shown in Figure 95.

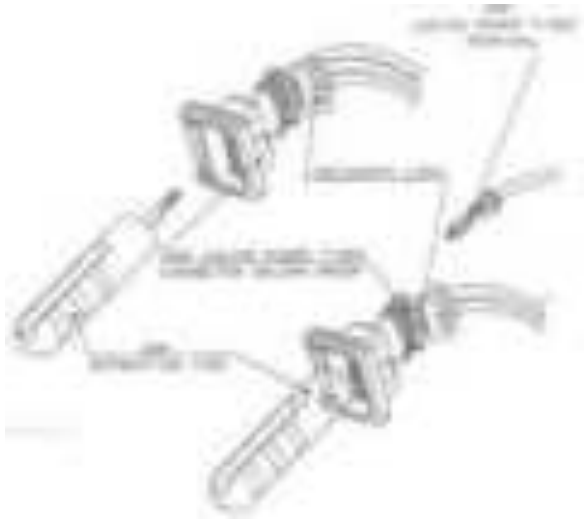


Figure 95
Determine Location of Latching Mechanism

d. Orient extraction tool so that the fork is positioned toward the latching mechanism as shown above.

e. Holding wire assembly with the other hand, gently insert extraction blade into cavity until the fork shifts the latching system as shown in Figure 96.

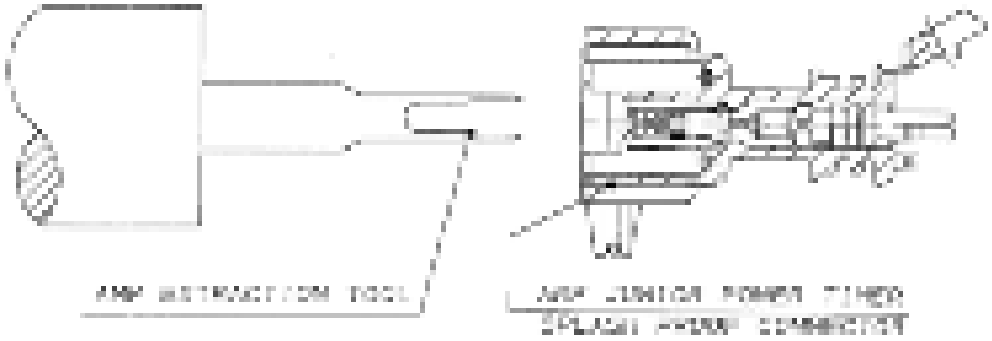


Figure 96
Insert Extraction Blade

f. To release latching mechanism, pull extraction tool holding housing connector into cavity with a hand. When latch is properly released, pull back on wire assembly to remove terminal from connector. If wire is not in terminal, use tweezers or small forceps to remove terminal.

Install new contacts as follows:

Wire Preparation

(1) Fit new wire seals on wires, including solder shield drain lead, as shown in Figure 97.

Figure 97
Fit Wire Seals on Wires

(2) Use a wire stripper, strip 0.17in. ± 0.01in. (4.2 ± 0.3mm) of insulation from the wire on the seal end (Figure 98).

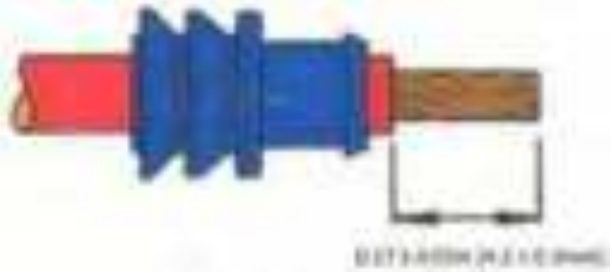


Figure 98
Strip Insulation from the Wire

(3) Inspect wire strands as follows:

a. Broken, nicked, or cut strands as listed below and shown in Figure 99.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

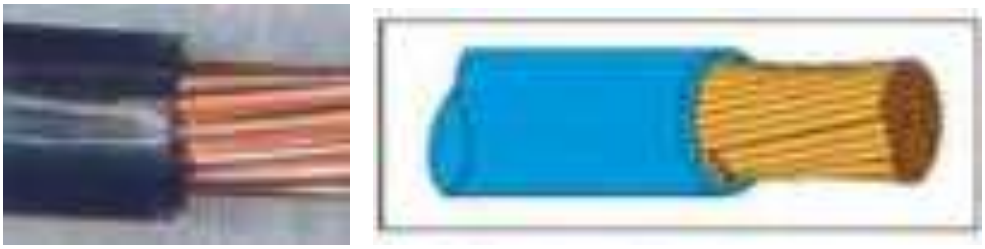


Figure 99
Examples of Unacceptable Wire Strands

(4) Inspect the wire insulation jacket for the following:

a. Properly cut as shown in Figure 100.

Figure 100
Properly Cut Insulation Jacket

Figure 101
Example of Unacceptable Insulation Jacket

b. Any uneven, ragged pieces (frays, tails, tags) (Figure 101) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

c. Inter-tape or frayed insulation exposure-"L" (Figure 102) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 102
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 103.

Figure 103
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 104.

Figure 104
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

(5) Hold the tool so that the back (wire side) is facing you (Figure 105). Squeeze the tool handles together and allow them to open fully.

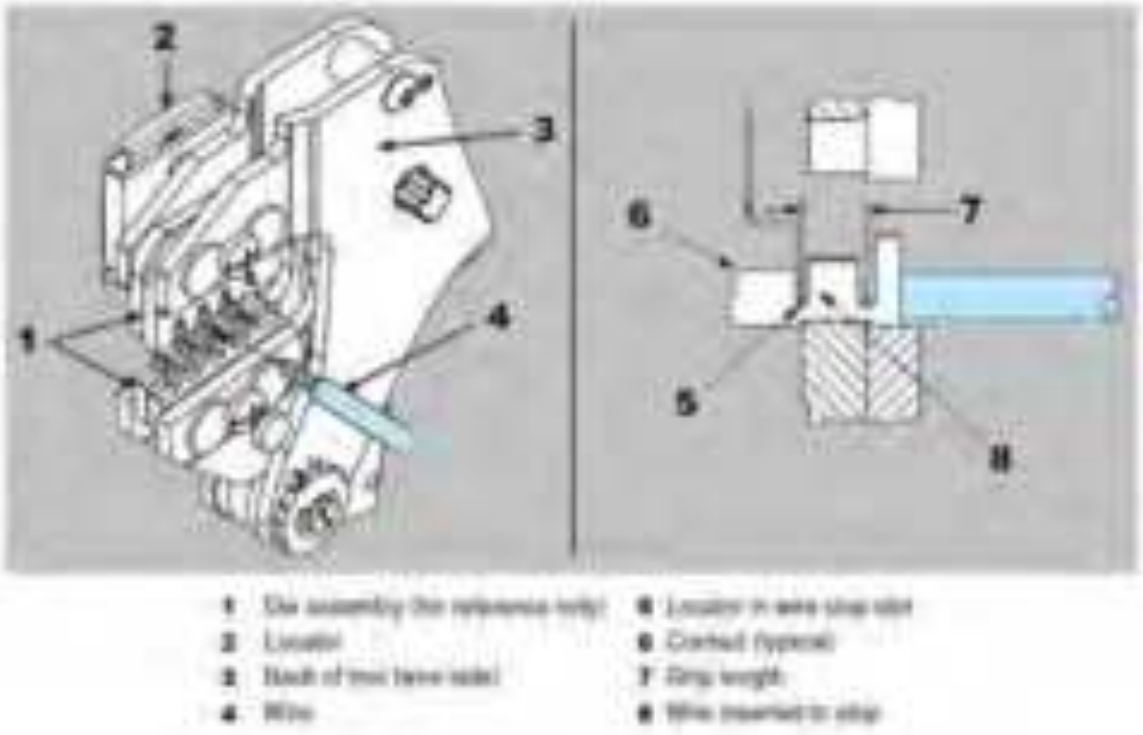


Figure 105
Installing the Contact on the Wire

(4) While holding the contact by the mating end, insert the contact through the front of the tool and into the appropriate crimp section.

(5) Position the contact so that the U of the wire barrel faces the top of the tool.

(6) Insert the contact up into the nest so that the wire barrel is against the spring-loaded locator.

⚠ **CAUTION** MAKE SURE THAT BOTH SIDES OF THE WIRE BARREL ARE STARTED EVENLY INTO THE CRIMPING SECTION. **DO NOT** ATTEMPT TO CRIMP AN IMPROPERLY POSITIONED CONTACT.

(7) Close the handles of the tool until the contact is lightly held by the die set but is not deformed to the point where the wire cannot enter freely.

(8) Insert the wire into the crimp barrel of the contact until it butts against the spring-loaded locator.

(9) While holding the wire in place, fully cycle the tool until the ratchet releases and allows the handle to open.

(10) Carefully remove the contact and attached wire from the crimper.

(11) Repeat steps (1) through (9) for additional contacts.

Contact Crimp Inspection

Inspect contact and seal crimp using Figures 106 and 107 as follows:

Parallelism (Figure 106):

The bottom of the wire crimp or of the crimp for the single-wire-seal must be parallel with the contact body, with a tolerance of 0.012in. (0.3mm).

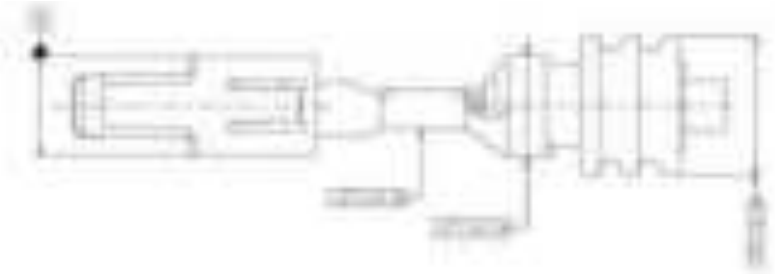


Figure 106
Parallelism

Symmetry (Figure 107):

The width of the crimp of the single-wire-seal must be symmetrical with the longitudinal axis of the contact, with a tolerance of 0.012in. (0.3mm). The single-wire-seal must be symmetrical in both directions with the longitudinal axis of the contact, with a tolerance of 0.04in. (1.0mm).

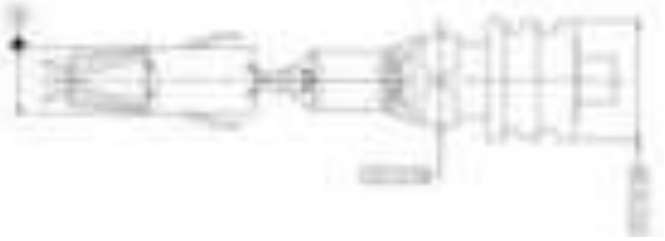


Figure 107
Symmetry

Install Contacts:

(1) Locate the drain wire.

(2) Position contact at position 3 so locking tabs is aligned with locking mechanism in connector housing (Figure 108).

Figure 108
Connector Housing

(3) With contact aligned, push until a 'click' is felt and heard. Ensure wire seal is flush with the back of the connector housing.

(4) Repeat b and c with other two wires as shown in Figure 109.

(5) Close secondary lock as shown in Figure 110.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

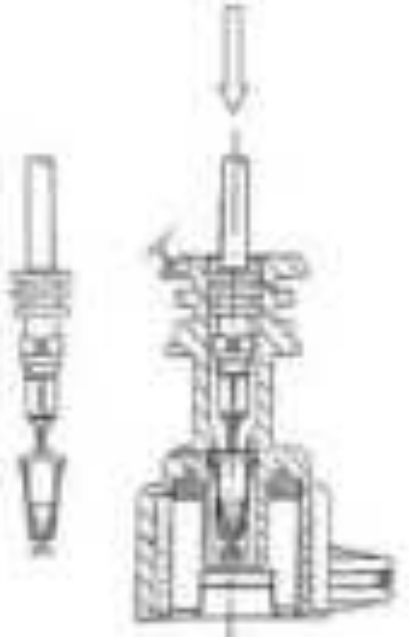


Figure 109
Install Wire in Connector Housing

Figure 110
Close the Secondary Lock

Connector Installation and Check

(a) Complete a continuity check using the harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to Chapter 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

6. Tyco Electronics Micro-Quadlok

The procedures in this section are for the repair and or replacement of the following connectors:

FUEL-T	OIL-T
A012-P	A026-P

(a) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description	Manufacturer
539635-1	Hand Tool, Ergocrimp	TE Connectivity
539685-2	Die Set, Ergocrimp	TE Connectivity

(b) Parts

The parts and quantities required is determined by the repair/replacement being completed. Connector and contact information can be found in Section 7 – Wiring Harness Parts List.

Refer to the table in Section 7 - Wiring Harness Parts List for the parts needed to repair or replace Tyco Electronics Micro-Quadlok Connectors. The table in Section 7 identifies the applicable kit part number(s), which can be found in Section 8 - Wiring Harness Repair Kits.

(c) Procedure

This procedure is for the removal and replacement of the Tyco Electronics (TE) Micro-Quadlok connector series used on the iE2 engine harness. Since the ERGOCRIMP Hand Tool has been designed to accommodate different crimp die sets and is used on other applications in this manual, the beginning steps are for removing and installing die sets.

Die Installation and Removal

The ERGOCRIMP Hand Tool (Figure 111) consists of two crimping jaws, an adjustable ratchet, spring-actuated handles, two die retaining screws, and an emergency ratchet release. The slotted design of the crimping jaws permits easy installation and removal of crimping dies. The adjustable ratchet allows handle pressure to be set for optimum crimping die performance.

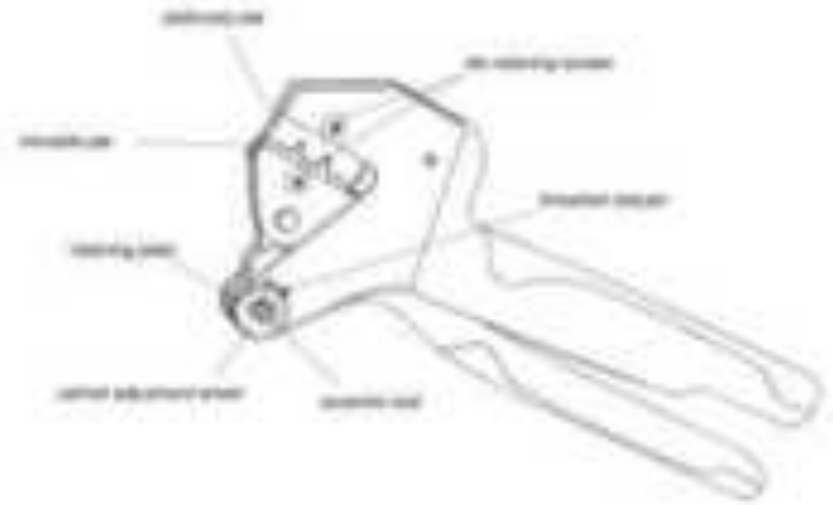


Figure 111
ERGOCRIMP Hand Tool

Die – Installation

Use the following diagram (Figure 112) when completing die installation and removal.

NOTICE: This is a general explanation of the procedure. For specific information, refer to the instruction sheet packaged with the die assembly or the latest revision of TE Connectivity document number 411-18132.

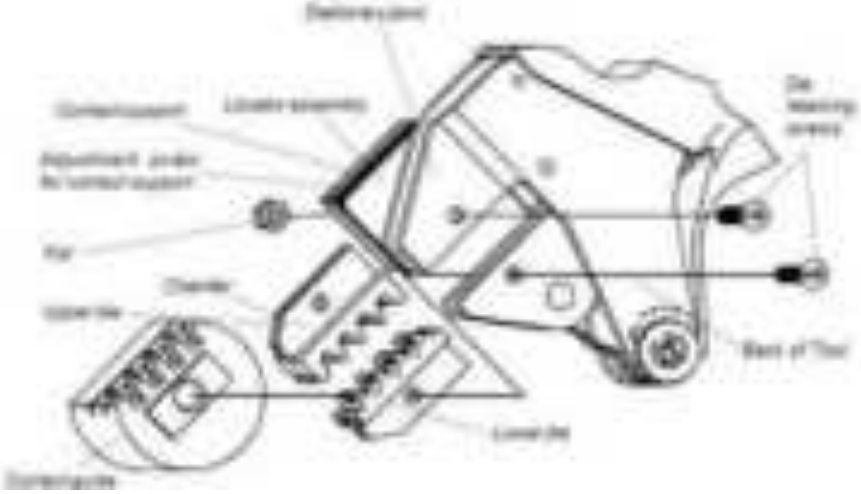


Figure 112
Die Installation and Removal

(1) Open the tool handles and remove the two die retaining screws from the tool jaws.

(2) Move the wire and insulation crimper dies (PN 539685-2), with the chamfers facing the front of the stationary jaws.

(3) Insert a die retention screw through the jaw and die and tighten the screw so that the die is held in place, but do not tighten the screw completely at this point.

(4) Place the lower die in the moving jaw of the tool frame. Install a die retention screw through the jaw and die and tighten the screw so that the die is held in place, but do not tighten the screw completely at this point.

NOTICE: The ERGOCRIMP tool ratchet has detents that are audible as seven "clicks" as the handles are closed. The ratchet releases on the sixth "click".

(5) Slowly close the tool handles, allowing the dies to mate and/or align. Continue closing the tool handles until the ratchet makes the fifth "click", then tighten both die retention screws until snug.

(6) Install the locator assembly on the stationary jaw and tighten the hex nut.

(7) Install the contact locator on the movable jaw and tighten hex nut.

(8) Check the crimp heights. If necessary, adjust as follows:

a. Crimp a contact onto a properly- prepared wire of the correct size.

b. If the crimp height is greater than recommended, open the plier and remove the threaded stop pin with a screwdriver. Rotate the adjustment wheel COUNTERCLOCKWISE (+). If a looser crimp is required, rotate the adjustment wheel CLOCKWISE (-) (Figure 113).

c. Replace the threaded stop pin (Figure 113).

Figure 113
Threaded Stop Pin

d. Make a sample crimp and measure the crimp height. If the dimension is acceptable, replace and secure the threaded stop pin. If the dimension is unacceptable, continue to adjust the ratchet, and again measure a sample crimp.

Die – Removal

(1) Close the tool handles until the ratchet releases and allow the handles to open fully. Loosen and remove the die retention screws and slide the dies out of the tool jaws.

Replace connector as follows:

Extract contacts:

CAUTION **USE CARE WHEN EXTRACTING CONTACT USING THE EXTRACTION TOOL. DO NOT APPLY EXCESS FORCE, AS DAMAGE TO THE CONNECTOR HOUSING LOCKING MECHANISM AND CONTACTS CAN OCCUR.**

The Micro-Quadlok two contact connector uses two contact retainers to secure to contacts in the connector housing. The first retainer is located on the contact and the second retainer is located on the front portion of the connector body, as shown in Figures 114 and 115.

Figure 114
First Contact Retainer

Figure 115
Second Contact Retainer

(1) Using the blade of a small screwdriver, lift the second contact retainer on the side where the locking latch is located as shown in Figure 116.

Figure 116
Locking Latch

(2) Slide the second contact retainer back to its pre-locking position (Figure 117). The pre-locking position can be verified by ensuring there is a gap between the lock and the face of the connector and that the lock clip is in the pre-lock position (Figure 118).

Figure 117
Slide the Second Contact Retainer

Figure 118
Locked and Pre-Locked Positions

(3) Release each socket contact by carefully pressing the locking lance (First Contact Retainer) of each contact down with a small screwdriver as shown in Figure 120. Once depressed, pull wire to remove contact from connector body. Holes for access to the locking lance are provided in the socket housing and in the second contact retainer (Figure 119).

Figure 119
Locking Lance Access

Figure 120
Depress Locking Lance

(4) If contacts are being replaced, cut wire behind the end of the contact conductor crimp and remove the remaining portion of the contact and wire seal from the wire (Figure 121).

Figure 121
Cut Wire and Remove Contact and Wire Seal

Install new contacts as follows:

(1) Ensure end of wire is cut flush, then install new wire seal onto wire and move far enough onto wire to allow wire stripping, as shown in Figure 122.

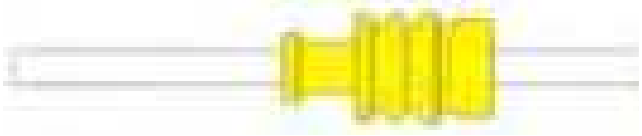


Figure 122
Install New Wire Seal

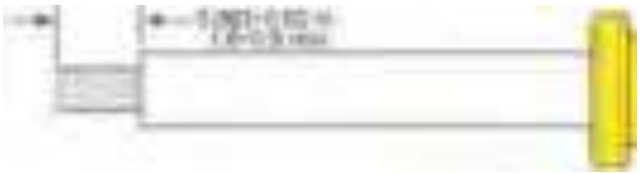


Figure 123
Strip Insulation

(2) Strip 0.063 ± 0.02 inches (1.6 ± 0.5 mm) of insulation from wire (Figure 123).

(3) Inspect wire strands as follows:

a. Broken, nicked, or cut strands as listed below and shown in Figure 124.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

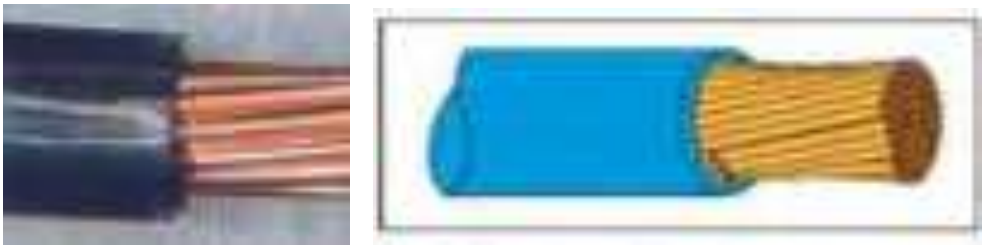


Figure 124
Examples of Unacceptable Wire Strands

(4) Inspect the wire insulation jacket for the following:

a. Properly cut as shown in Figure 125.

Figure 125
Properly Cut Insulation Jacket

Figure 126
Example of Unacceptable Insulation Jacket

b. Any uneven, ragged pieces (frays, tails, tags) (Figure 126) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

c. Inter-tape or frayed insulation exposure-"L" (Figure 127) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 127
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 128.

Figure 128
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 129.

Figure 129
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

(5) Position the wire seal 0.017 ± 0.01 (0.43 ± 0.25 mm) inches from end of insulation (Figure 130).

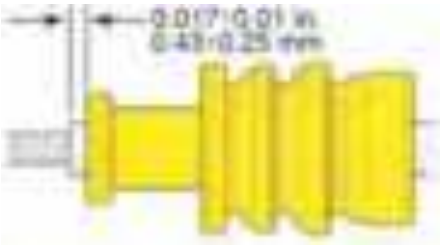


Figure 130
Position Wire Seal

(6) Hold the tool so that the back (wire side) is facing you (Figure 131). Squeeze the tool handles together and allow them to open fully.

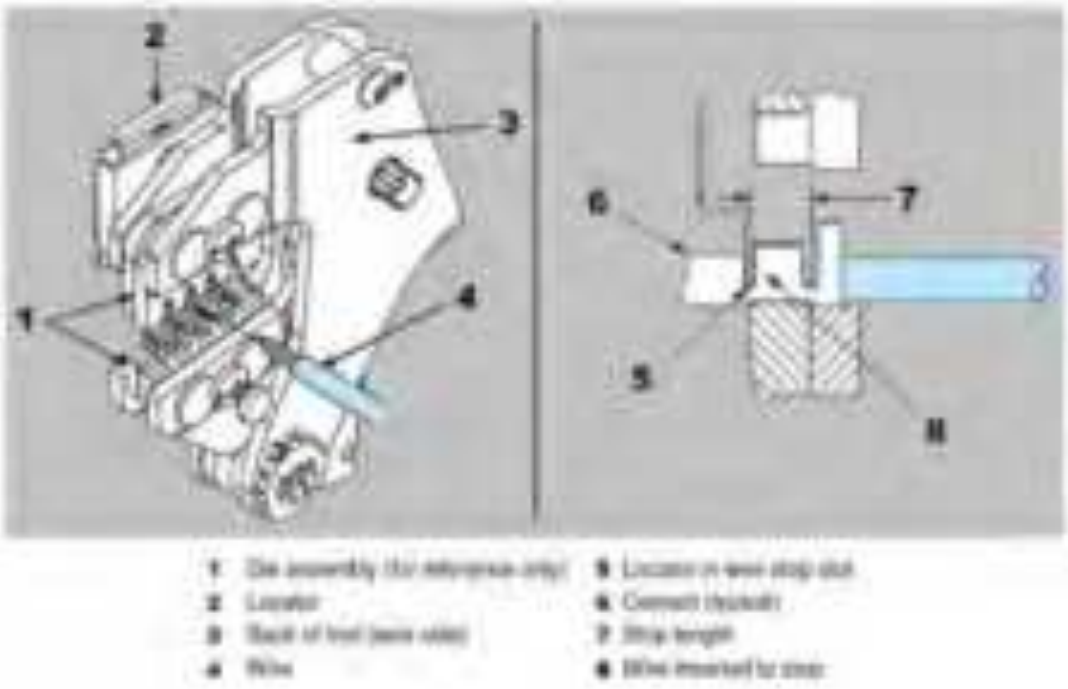


Figure 131
Installing the Contact on the Wire

(7) While holding the contact by the mating end, insert the contact through the front of the tool and into the appropriate crimp section.

(8) Position the contact so that the U of the wire barrel faces the top of the tool.

(9) Insert the contact up into the nest so that the wire barrel is against the spring-loaded locator.

⚠ **CAUTION** MAKE SURE THAT BOTH SIDES OF THE WIRE BARREL ARE STARTED EVENLY INTO THE CRIMPING SECTION. **DO NOT** ATTEMPT TO CRIMP AN IMPROPERLY POSITIONED CONTACT.

(10) Close the handles of the tool until the contact is lightly held by the die set but is not deformed to the point where the wire cannot enter freely.

(11) Insert the wire and wire seal into the crimp barrel of the contact until it butts against the spring-loaded locator. Ensure the wire and wire seal are positioned correctly in the contact (Figure 132). Contact not shown in crimper for clarity.

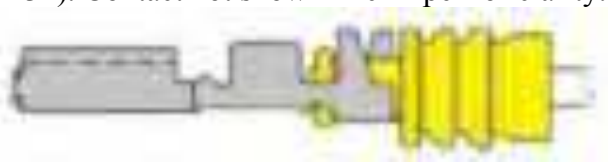


Figure 132
Correctly Positioned Wire and Wire Seal

(12) While holding the wire in place, fully cycle the tool until the ratchet releases and allows the handle to open.

(13) Carefully remove the contact and attached wire from the crimper.

(14) Repeat steps (1) through (11) for other contact.

Contact Crimp Inspection

Inspect contact and seal crimp as follows using Figure 133:

Parallelism (A):

The base of the wire crimp or of the crimp for the single-wire seal must be parallel to the base of the contact body within a tolerance of 0.01 inch (0.25 mm).

Symmetry (B):

The lateral offset or deviation of the wire crimp and the crimp for single wire seal must be within a tolerance of 0.008 inch (0.20 mm) symmetrical to the contact body.

The single wire seal itself has a symmetry tolerance of 0.02 inch (0.50 mm) laterally and upwards and downwards.

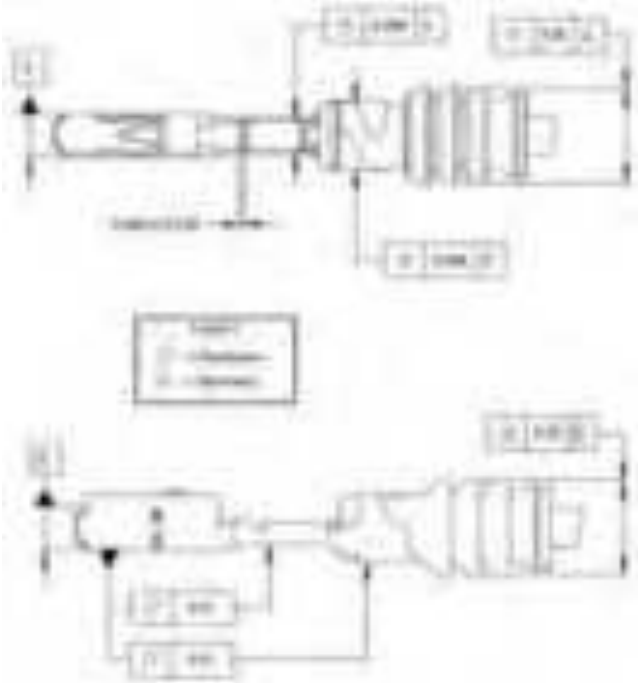


Figure 133
Contact and Seal Inspection

Install Contacts in Connector Body as follows:

(1) Orient connector body so locking lance access holes are facing up (Figure 134).

Figure 134
Connector Body Orientation

(2) If wires were not marked with connector position before removal, use schematic the harness schematic in the latest revision of the applicable Engine Maintenance Manual to ensure wires are inserted into correct positions.

(3) Insert contact into appropriate position in connector body until contact locking lance is seated and visible in locking lance access holes. An audible 'click' should be heard. The wire seals should be seated (Figure 135) and not protrude from the back of the connector.

Figure 135
Wire Seals Seated

(4) Close the second contact retainer by using the blade of a small screwdriver to lift the second contact retainer on the side where the locking latch is located (Figure 136).

Figure 136
Locking Latch

(5) Slide the second contact retainer back to its locked position (Figure 137). The locked position can be verified by ensuring there is no gap between the lock and the face of the connector and that the lock clip is in the lock position (Figure 138).

Figure 137
Slide the Second Contact Retainer

Figure 138
Locked Position

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

Connector Installation and Check

(a) Complete continuity check using harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

7. EGT/CHT/TIT Connectors

(a) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description	Manufacturer
SMP-CC-TOOL*	Assembly Tool, SMP-CC Series Thermocouple Connectors	Omega™

*Optional

(b) Parts

Connector information can be found in Section 7 – Wiring Harness Parts List. Refer to Section 8 - Wiring Harness Repair Kits for kits containing parts to repair or replace EGT/CHT/TIT Connectors.

(c) Procedure

This procedure is in two parts. Part 1 is connector replacement only. Part 2 is used to prepare wire for connector installation, if needed. Complete the Section(s) that is/are applicable to the required repair. The parts of the connector that are referenced in this procedure are shown in Figure 139.

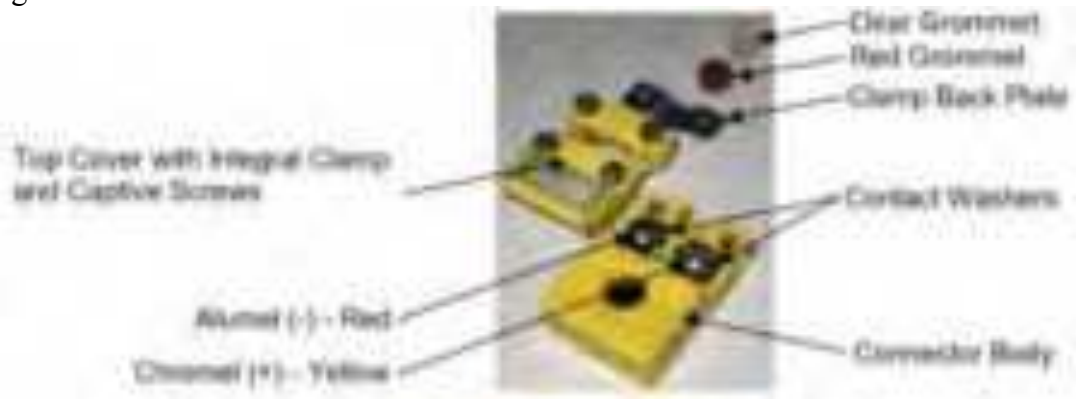


Figure 139
Connector

Part 1 - Connector Replacement

This Section is for the replacement of the connector only. If wire(s) conductor requires preparation, complete Part 2 before proceeding.

(1) If assembly tool SMP-CC-TOOL is used, place connector in tool as shown in Figure 140 (Connector with blade contacts is shown, but use is identical for connectors with socket contacts.). If tool is not used, continue to step 2.

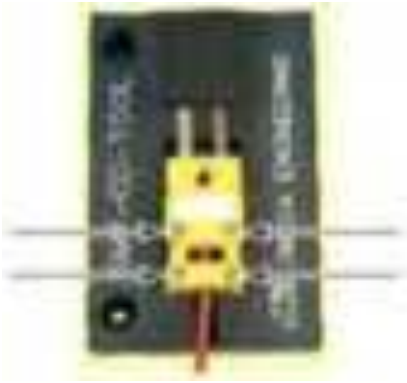


Figure 140
Assembly Tool and Connector Screws

(2) With the #2 Phillips screwdriver, remove the four screws, highlighted by the arrows in Figure 140, from the connector body and discard.

(3) Remove top cover with integral clamp and discard.

(4) Loosen the two screws that secure the wires, shown in Figure 141, two full turns. This will be enough to allow the wires to be removed.

Figure 141
Wire Screws and Contact Washers

(5) Remove the wires from under the contact washers and metal clamp back plate. Discard all pieces of connector.

(6) Carefully straighten the wires, if bent, then remove the red and clear grommets from the cable and discard.

(7) Install new red and clear grommet on cable as shown in Figure 142.

Figure 142
Red and Clear Grommet Installation

(8) Position red grommet so it is flush with end of cable insulation as shown in Figure 143.

Figure 143
Red Grommet Positioning

(9) If using the assembly tool, place the new connector body and metal clamp back plate as shown in Figure 144. If not, continue to step (10).

Figure 144
Connector Seating in Assembly Tool

(10) Place wires in new connector under the contact washers with the wire with yellow insulation under the Chromel (+) contact washer and the wire with red insulation under the Alumel (-) contact washer as shown in Figure 145. Ensure wire insulation does not protrude under contact washer.

(11) Seat red grommet into grommet recess in connector body shown in Figure 145.

Figure 145
Red Grommet Seating

(12) Tighten contact washer screws until wires are secure. Do not over tightened, as damage to wire can occur.

(13) Install top cover, ensuring red grommet seats into recess in cover as shown in Figure 146.

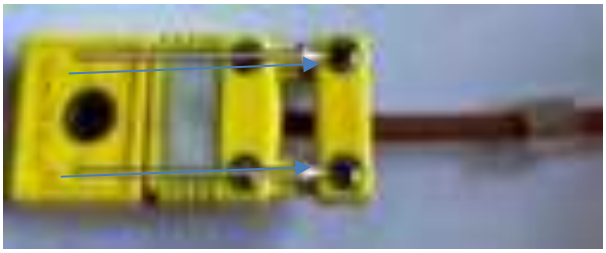


Figure 146
Top Cover Installation

(14) Tighten the two screws that secure the cover, indicated by the arrows in Figure 146.

(15) Align the clear grommet with the recess in top cover clamp section as shown in Figure 147.

Figure 147
Clear Grommet Alignment

(16) Install the metal clamp back plate, secure with the two screws and tighten as shown in Figure 148.

Figure 148
Clamp Back Plate Installation

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

Connector Installation and Check

(a) Complete a continuity check using the harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

Part 2 - Cable Preparation

If cable or wire(s) is/are damaged, complete this Part to prepare the wire.

(1) Remove connector using instruction in Part 1 - Connector Replacement, Steps (1) - (5). If connector is to be re-used, do not discard components after removal.

(2) Using diagonal cutters, cut thermocouple cable flush as shown in Figure 149.

Figure 149
Cable Preparation

(3) Using wire strippers or equivalent, carefully strip 0.300 ± 0.010in. (7.62 ± 0.254mm) of cable outer jacket as shown in Figure 150.

(4) Using wire strippers or equivalent, carefully strip 0.1875 ± 0.0025in. (4.76 ± 0.0635mm) of wire insulation as shown in Figure 150.

Figure 150
Insulation Removal

(5) Inspect wire strands as follows:

a. Broken, nicked, or cut strands as listed below and shown in Figure 151.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

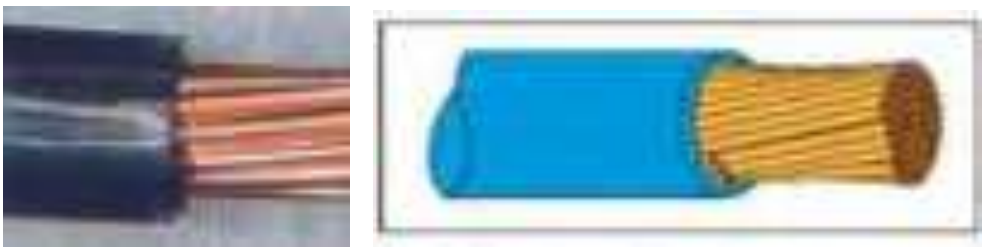


Figure 151
Examples of Unacceptable Wire Strands

(6) Inspect the wire insulation jacket for the following:

a. Properly cut as shown in Figure 152.

Figure 152
Properly Cut Insulation Jacket

Figure 153
Example of Unacceptable Insulation Jacket

b. Any uneven, ragged pieces (frays, tails, tags) (Figure 153) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

c. Inter-tape or frayed insulation exposure-"L" (Figure 154) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 154
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 155.

Figure 155
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 156.

Figure 156
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

(7) To complete connector installation, go to Part 1 - Connector Replacement, Step (7) and continue to end.

Wire/Cable Insulation Repair

This procedure is for the installation of the Side Entry Insulation Damage Repair Sleeve (SEIDRS) and can only be completed for insulation damage as specified in Section 3C, Repairable Damage.

(1) Tooling

Some common hand tools and supplies may be required during this procedure.

The following tools and supplies will be required to complete this repair:

Part Number	Description
M81969/8-08	Removal Tool, Rear Release Contacts (for 60N31500-CT and 60N31501-CT)
M81969/8-10	Removal Tool, Rear Release Contacts (for 60N31502-CT and 60N31503-CT)
	Isopropyl Alcohol
	Lint Free Cloth or Disposable wipes
	Emery Cloth or Scotch-Brite™, 240 Grit
	Gloves, Solvent Resistant
	Heat Gun - Temperature Setting of 120°F to 1100°F with Solder Sleeve Reflector

(2) Parts

The parts list below contains additional parts that may be required for the repair and/or replacement of connectors and/or contacts. The parts and quantities required is determined by the repair/replacement being completed. Connector and contact information can be found in Section 7 – Wiring Harness Parts List. The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
60N31500-CT	Side Entry Repair Sleeve, Immersion Resistant, 150° C, Green	05K31743 05K31744
60N31501-CT	Side Entry Repair Sleeve, Immersion Resistant, 150° C, Red	05K31743 05K31744
60N31502-CT	Side Entry Repair Sleeve, Immersion Resistant, 150° C, Blue	05K31743 05K31744
60N31503-CT	Side Entry Repair Sleeve, Immersion Resistant, 150° C, Yellow	05K31743 05K31744

(3) Procedures

PART SELECTION

The following steps are to be used for the repair of single wire and multiwire cable (shielded and unshielded) insulation.

(a) Select the appropriate part number and MIL Spec tool. Unless otherwise specified. Dimensions are in inches (millimeters are in parenthesis).

Part Number	Color	Wire Jacket OD Range		AWG (Single Wire Only)
		Minimum	Maximum	
60N31500-CT	Green	.032 (0.80)	.043 (1.10)	24-26
60N31501-CT	Red	.043 (1.10)	.059 (1.50)	20-22
60N31502-CT	Blue	.059 (1.50)	.091 (2.30)	16-18
60N31503-CT	Yellow	.091 (2.30)	.110 (2.80)	12-14

(b) Cable preparation

WARNING ISOPROPYL ALCOHOL IS HIGHLY FLAMMABLE. AVOID STATIC GENERATION. DO NOT USE NEAR FLAMES OR HEAT. DO NOT LET IT STAY ON YOUR SKIN. USE ONLY WITH ADEQUATE VENTILATION. AVOID PROLONGED BREATHING OF VAPORS OR CONTACT WITH YOUR SKIN, EYES, AND LUNGS. ENSURE YOU ARE USING SAFETY GOGGLES, NITRILE GLOVES AND KNOW THE LOCATION OF THE NEAREST EYEWASH STATION.

1. Clean the wire jacket using isopropyl alcohol and a lint free cloth or disposable wipe.
2. Dry the jacket with a lint free cloth or disposable wipe.
3. Abrade the wire jacket thoroughly in the damage area with 240 grit emery cloth or Scotch-Brite™ as shown in Figure 157. The length of the abraded area shall not be longer than 0.590 inches (15 mm) centered on damage insulation area. The whole surface of the damage area should be abraded. Remove loose particles from the abraded area using a dry lint free cloth or disposable wipe.

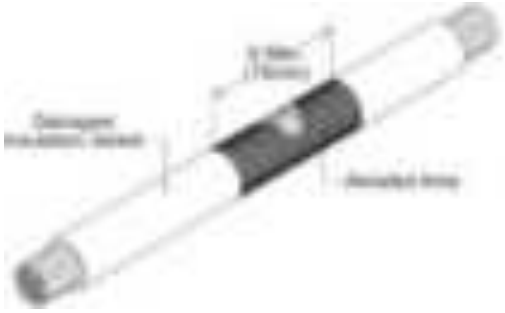


Figure 157
Wire Insulation Jacket Preparation

(c) Adhesive sleeve installation

1. Clip the adhesive sleeve onto the wire covering the entire damage area as shown in Figure 157. The insulation damage area should be facing opposite to the opening of the C-Wrap. For radial crack damage on the wire insulation, C-Wrap must cover the whole diameter of the damage wire. Center the adhesive sleeve over the damaged area as shown in Figure 158.

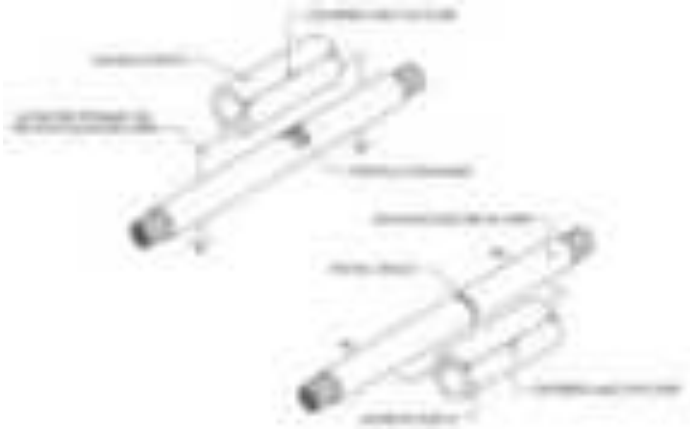


Figure 158
Adhesive Sleeve Installation

(d) Insulation sleeve installation.

1. Clip the insulation over the adhesive sleeve. Center the insulation over the adhesive sleeve. Align the slit of the adhesive with the slit of the insulation as shown in Figure 159.

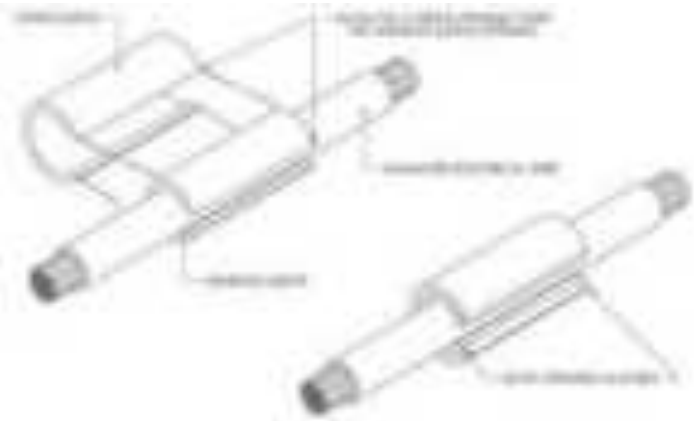


Figure 159
Insulation Sleeve Installation

(e) Sleeve Recovery (Heating Procedure)

WARNING HOT AIR TOOLS CAN CAUSE SEVERE BURNS. DO NOT ALLOW SKIN TO CONTACT THE HOT SURFACES OF THE TOOL OR THE HOT AIR STREAM. FOLLOW THE TOOL MANUFACTURER'S INSTRUCTIONS FOR PROPER TOOL OPERATION.

CAUTION ENSURE HEAT IS NOT APPLIED FOR MORE THAN 5-6 SECONDS TO HALAR® BRAIDING, AS DAMAGE TO THE BRAIDING WILL OCCUR.

1. Turn on heating tool and warm up for one minute. Typical temperature setting (HL2010 E) 550° F ± 50° F (290° C ± 30°C). Fan speed: Low. It is permissible to adjust heat tool setting as necessary based on the application environment provided the inspection requirements of Step (f) are met.
2. Center the sleeve in the reflector (Figure 160). Apply heat until the insulation tubing shrinks and the adhesive sleeve has melted and flowed. Continue heating for 3-5 seconds before terminating the heating.

Figure 160
Sleeve Recovery

3. Apply light hand pressure on the SEIDRS insulation sleeve using the appropriate Mil spec installation tool, while the sleeve is still hot as shown in Figure 161. Allow a minimum 10 seconds before removing the installation tool.

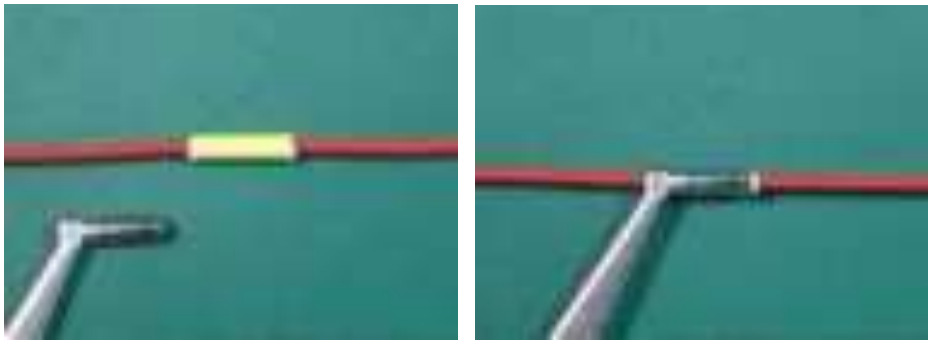


Figure 161
Application of Mil Spec Tool

(f) Inspection

Inspect for the following:

- The installed sleeve shall be fully shrunk onto the wire.
- The adhesive shall have melted and flowed and filled the slit of the insulation sleeve.
- The damaged wire jacket shall be completely covered by the repair sleeve.
- Installed repair sleeve or the wire jacket shall not show any evidence of overheating (burning, browning or severe darkening) or damage.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(g) Rework

If installation of SEIDRS did not meet the inspection criteria in step (e), it must be replaced, or if a SEIDRS that has been previously installed is damaged or defective.

1. Remove outer sleeve and adhesive as follows:
   - Set up heating tools as specified in step (d),1 to 5 – 10 seconds.
   - Reheat sleeve until it softens and then grasp it with small needle-nose pliers on the side opposite of the seam and pull gently off the wire/cable.
   - Clean the adhesive residue using isopropyl alcohol and a disposable wipe.
2. Re-Installation/Replacement of SEIDRS
   - If newly installed SEIDRS has been removed, inspect the wire/cable insulation for further damage. If no further damage is found, re-install the SEIDRS repeating the procedure in steps (b) through (e).
   - If SEIDRS removed is from a previous repair, inspect the wire/cable insulation and wire conductor for damage that exceeds the limits of this repair. If damage is still within the limits of this repair, install a new SEIDRS starting at step (a).
   - If damage is found on the wire/cable insulation or center conductor, in either re-installation or replacement, that is beyond the scope of this repair, go to Section C, Wire/Cable Splicing.

Wire/Cable Splicing

This section includes the repair of wire and various types of cable that fall within the limits of repair in Section 3C of this manual. The wire and cable types acceptable for use in repairs that require the use of additional wire/cable, is as follows:

- Single Conductor, Unshielded Wire – M22759/43-X-9 (X = Conductor size in American Wire Gauge (AWG)
- Jacket/Shielded Cable – M27500-XXSPXS23 (XX = Conductor size in AWG X = Number of Conductors)
- Wire, Thermocouple, Chromel/Alumel, Duplex Insulated - 60N29761-CT

Determining the wire type and size can be done using schematic the harness schematic in the applicable Engine Maintenance Manual. The wires/cables are identified with unique numbers that identify the wire/cable and then referenced to the list of acceptable wire and cable listed above. Below are examples of the wire numbers and their meaning.

Figure 162
Single Conductor, Unshielded Wire (M22759/43-X-9)

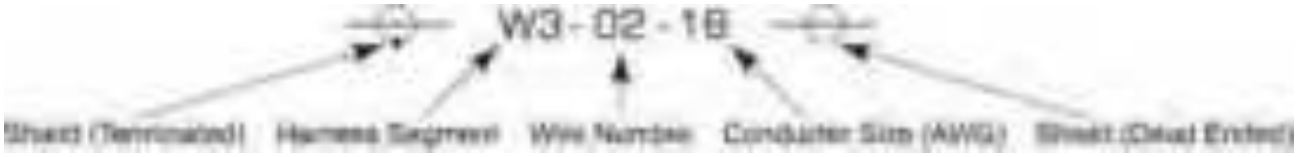


Figure 163
Single Conductor, Shielded Cable (M27500-XXSP1S23

Multi-Conductor, Shielded Cable (M27500-XXSPXS23) (Figures 163 and 164)

Figure 164
Shielded Twisted Pair Conductor (M27500-XXSP2S23)

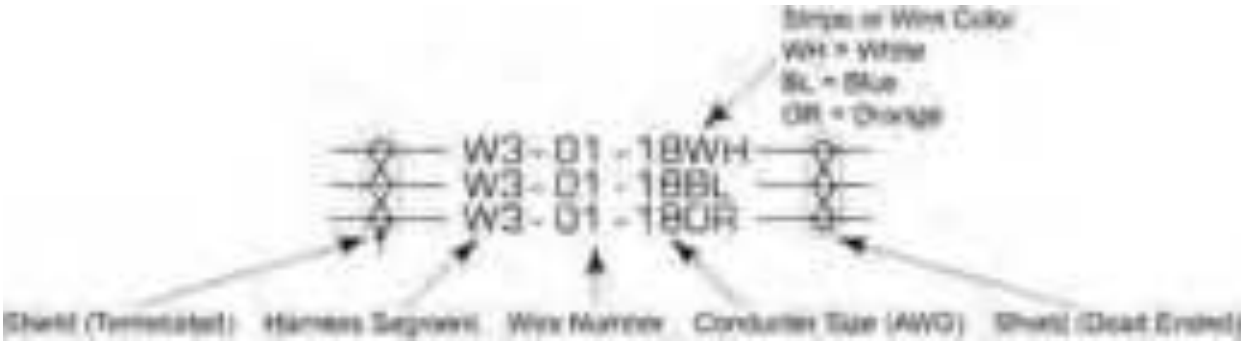


Figure 165
Shielded Twisted Triple Conductor (M27500-XXSP3S23)

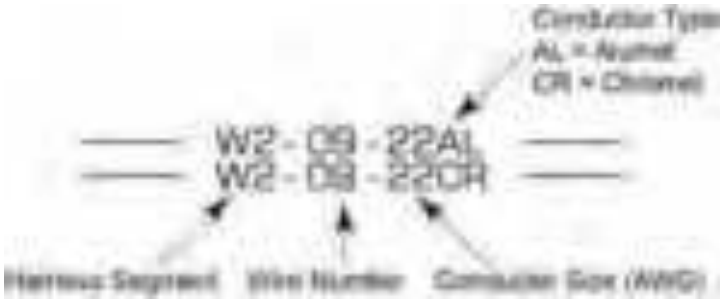


Figure 166
Thermocouple Cable (60N29761-CT)

This section details the acceptable splices and methods for splicing of wire and cable used in the iE2 engine harness. The methods and splices are listed below and detailed in sub-sections. Complete sub-section for wire and splice type to be applied.

(1) Splicing with M81824 Environmental Splice

(2) Splicing with NAS1744 solder splice.

(3) Single and multi-conductor shielded cable splicing using cable splice kit.

(4) Thermocouple cable splicing using chromel/alumel splices.

Before completing any splicing, review the splicing restrictions below. If any of the restrictions apply, contact Lycoming Product Support for further instructions.

Splicing Restrictions

Splices are subject to the following restrictions:

(a) There shall not be more than one splice in any one wire segment between any two connectors or other disconnect points, except as allowed by (e), and (f), below.

(b) Installation of splices in bundles shall not increase the size of the bundle so as to prevent the bundle from fitting in its designated space or cause congestion which will adversely affect maintenance.

(c) Splices shall not be used to salvage scrap lengths of wire.

(d) Splices shall not be used within 6 inches of a metal termination device, and 3 inches of a plastic termination device.

(e) When splicing to extend wire/cable to remove damage and allow wire/cable to reach termination point, added wire/cable does not result in finished length being more than original wire/cable length as measured to face of terminating device.

(f) All wire/cable added must be the same size and type of wire/cable splicing.

(g) Splices may be used to secure multiple wires to a single wire when attaching to the same gauge wire.

(h) Conductor splices shall not be used on wiring in areas in which flexing may occur during operations or maintenance.

(i) Splices shall not be used within 2 inches of any cable bend radius.

(j) Splices shall not be located under clamps.

(1) Splicing with M81824 Environmental Splice

(a) Tooling

Part Number	Description	Manufacturer
AD-1377	Crimp Tool, Splice, 26 – 12 AWG (Red, Blue, Yellow)	TE Connectivity
OR		
M22520/5-01	Crimp Tool, Handle	
M22520/5-102	Crimp Die, 12-16 AWG (Use with M22520/5-01 Crimp Handle)	
M22520/5-103	Crimp Die, 26 -16 AWG (Use with M22520/5-01 Crimp Handle)	
OR		
M22520/10-01	Crimp Tool, Handle	
M22520/10-103	Crimp Die, 12-16 AWG (Use with M22520/10-01 Crimp Handle)	
M22520/10-103	Crimp Die, 26 -16 AWG (Use with M22520/10-01 Crimp Handle)	
	Wire Strippers for Wire Insulation	
	Ruler Readable to 0.025” (0.50mm)	
*	Heat Gun - Temperature Setting of 750°F to 850°F with Reflector	*

*The following heat guns or equivalent alternate may be used:

- Thermogun Model 500B with TG-135 Reflector
- Mini-Gun 1 with MG-1 reflector
- Steinel HL1910E with PR-25 reflector

(b) Parts

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Wire Gauge	Color Band	Kit Part Number(s)
M81824/1-1	26, 24, 22, 20	Red	05K31745
M81824/1-2	20, 18, 16	Blue	05K31745
M81824/1-3	16, 14, 12	Yellow	05K31745

(c) Procedure

If a harness wire is damaged at a single point and there is sufficient slack in the wire, the damaged wire should be repaired with a single splice. If a wire is damaged along its length, the damaged segment must be cut out and replaced with a jumper wire and two splices, unless it is damaged within 6 inches of a connector. If damaged within 6 inches of a connector, replace connector contact and wire, then splice to remaining wire. Refer to manual section for connector contact being replaced for instructions.

NOTICE: If splicing multiple wires, ensure they are properly staggered as shown in Figure 167.

Figure 167
Properly Staggered Splices

NOTICE: This procedure may be used for thermocouple wire only in areas where splice would not be exposed to temperature changes. If splice repair will be exposed to temperature changes, use procedure for thermocouple wire repair using Chromel/Alumel splices.

Carry out repair as follows:

1. Open cable and remove cable clamps as required to access wire damage.
2. Work damaged wires to outside of wire bundle. Pull slack in wire toward damaged area to prevent strain on splice.
3. If more than one wire is to be spliced tag wires before proceeding.
4. Cut out the segment of wire with conductor or insulation damage. If a jumper wire is required, cut out at least 6 inches of the damaged wire to allow room for splicing.
5. If more than one jumper wire is to be installed, stagger splice positions by varying lengths of sections that are cut out of the damaged wires.
6. Determine type and gauge of wire to be replaced from wiring diagram the harness schematic in the applicable Engine Maintenance Manual and wire identification code examples shown in the beginning of this Section.
7. Cut replacement wire 5 inches longer than removed segment.
8. From Parts section, select applicable splice for wire being repaired/replaced.
9. Slide splice heat sleeve (Figure 168) onto the longer of the wire segments, ensure the narrowest opening of the sleeve goes first (away from splice area).

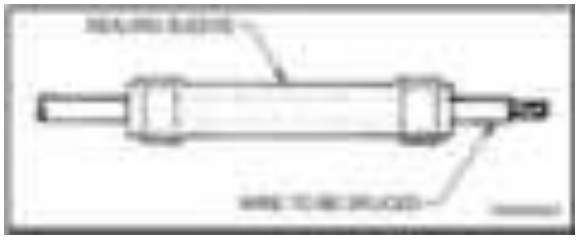


Figure 168
Splicing Area

10. Strip the insulation appropriate length for selected splice from the Table (Figure 169).

Wire Size	Color	Strip Length (L)	
		in.	mm
20 – 26	Red	0.25 – 0.29	6.35 – 7.36
16 – 18	Blue	0.28 – 0.32	7.11 – 8.13
12 - 14	Yellow	0.28 – 0.32	7.11 – 8.13

Figure 169
Strip Length

11. Inspect wire strands as follows:

a. Broken, nicked, or cut strands as listed below and shown in Figure 170.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

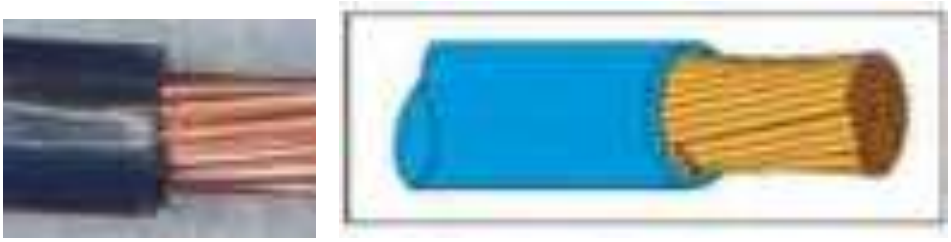


Figure 170
Examples of Unacceptable Wire Strands

12. Inspect the wire insulation jacket for the following:

a. Properly cut as shown in Figure 171.

Figure 171
Properly Cut Insulation Jacket

Figure 172
Example of Unacceptable Insulation Jacket

b. Any uneven, ragged pieces (frays, tails, tags) (Figure 172) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

c. Inter-tape or frayed insulation exposure-"L" (Figure 173) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 173
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 174.

Figure 174
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 175.

Figure 175
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

13. Insert wire into barrel of crimp splice. Ensure wire is fully seated in barrel and wire is visible in inspection window as shown in Figure 176.

Figure 176
Inspection Window

14. Using one of the crimp tools listed in the front of this section, insert splice into tool and close crimp handle until clicking sound stops, then release handle and remove splice.

15. Repeat steps 12 and 13 for opposite side.

16. Inspect splice and crimps for the following:
    a. Double sided crimp splice is not cracked.
    b. Wire insulation does not extend into the wire crimp barrel (see Figure A of Figure 177).
    c. Crimp indent is not off the end of the splice (see Figure B of Figure 177).
    d. Wire end(s) are visible through the inspection window(s) (see Figure C of Figure 177).
    e. Wire insulation gap is not greater than 2 wire diameters including insulation (see Figure D of Figure 177).

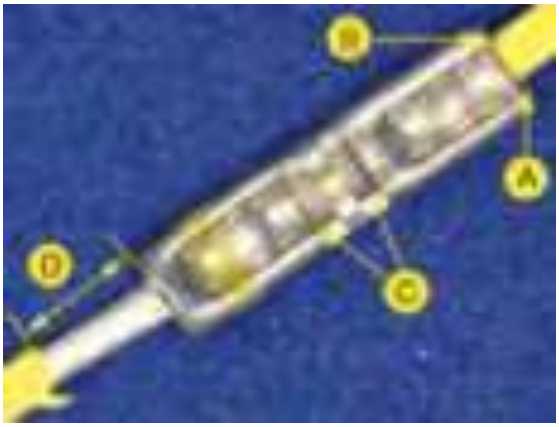


Figure 177
Splice and Crimp Inspection

17. Wire strands do not extend out of inspection window (Figure 178).

Figure 178
Inspection Window

18. Center primary wire heat sleeve over splice as shown in Figure 179.

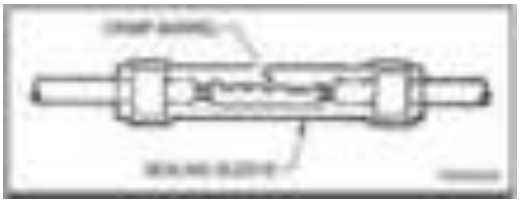


Figure 179
Wire Heat Sleeve Centered Over Splice

WARNING **DO NOT USE OPEN FLAME OR ANY ELECTRIC MOTOR OPERATED HEAT GUN WITH NON-SEALED BRUSHES ON ANY AREA OF AN AIRCRAFT WHERE THERE IS FUEL OR FUEL VAPOR PRESENT. USE ONLY HOT AIR GUN M83521/5-01 OR EQUIVALENT.**

19. Shrink sealing sleeve using hot air gun with small termination reflector. Shrink middle first and move heat towards one end until sealant melts and begins to flow out of sleeve as shown in Figure 180.

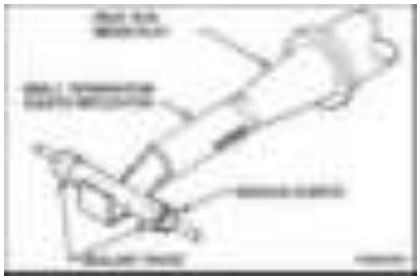


Figure 180
Shrink Sealing Sleeve

20. Inspect sealing sleeve to ensure it is properly centered and shrunk as shown in Figure 181.

Figure 181
Properly Centered and Shrunk Sealing Sleeve

21. If harness coverings were disturbed to facilitate repair, repair, or replace coverings using procedures in Section D.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(2) Splicing with NAS1744 Solder Splice

(a) Tooling

Part Number	Description
	Wire Strippers for Wire Insulation
	Ruler Readable to 0.025" (0.50mm)
*	Heat Gun - Temperature Setting of 750°F to 850°F with Reflector

*The following heat guns or equivalent alternate may be used:

- Thermogun Model 500B with TG-135 Reflector
- Mini-Gun 1 with MG-1 reflector
- Steinel HL1910E with PR-25 reflector

(b) Parts

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Lycoming Part Number	MIL Part Number	Wire Size (AWG)	Kit Part Number(s)
60N31504-CT	NAS1744-1	22	05K31746 05K31746
60N31505-CT	NAS1744-2	20 - 18	05K31746 05K31746
60N31506-CT	NAS1744-3	16 - 14	05K31746 05K31746
60N31507-CT	NAS1744-4	12	05K31746 05K31746

(c) Procedure

If a harness wire is damaged at a single point and there is sufficient slack in the wire, the damaged wire can be repaired with a single splice. If a wire is damaged along its length, the damaged segment must be cut out and replaced with a jumper wire and two splices, unless it is damaged within 6 inches of a connector. If damaged within 6 inches of a connector, replace connector contact and wire, then splice to remaining wire. Refer to manual section for connector contact being replaced for instructions.

Carry out repair as follows:

1. Open cable and remove cable clamps as required to access wire damage.
2. Work damaged wires to outside of wire bundle. Pull slack in wire toward damaged area to prevent strain on splice.
3. If more than one wire is to be spliced tag wires before proceeding.
4. Cut out the segment of wire with conductor or insulation damage. If a jumper wire is required, cut out at least 6 inches of the damaged wire to allow room for splicing.
5. If more than one jumper wire is to be installed, stagger splice positions by varying lengths of sections that are cut out of the damaged wires.
6. Determine type and gauge of wire to be replaced from wiring diagram the harness schematic in the applicable Engine Maintenance Manual and wire identification code examples shown in the beginning of this Section.
7. Cut replacement wire 5 inches longer than removed segment.
8. From Parts section, select applicable splice for wire being repaired/replaced.
9. Strip to 0.472” ± 0.040” (12.0 ±1.0mm) of insulation from each wire segment as shown in Figure 182. Remove the pre-stripped insulation just before installation, in order to avoid damage or conductor oxidation.

Figure 182
Strip Insulation

10. Remove cut insulation.
11. Inspect wire strands and ensure they are not damaged or oxidized as shown in Figure 183.

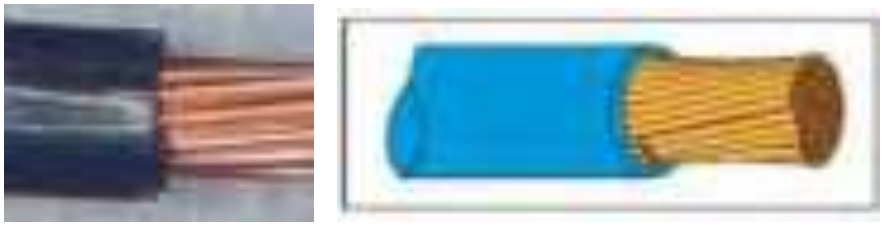


Figure 183
Inspect the Wire Strands

12. Inspect the wire insulation jacket for the following:
    a. Properly cut as shown in Figure 184.

Figure 184
Inspect for Proper Cut

b. Any uneven or ragged pieces (frays, tails, tags) are no greater than 50% of the wire diameter or 0.039" (1mm), whichever is greater.

Figure 185
Inspect for Uneven or Ragged Pieces

c. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 186.

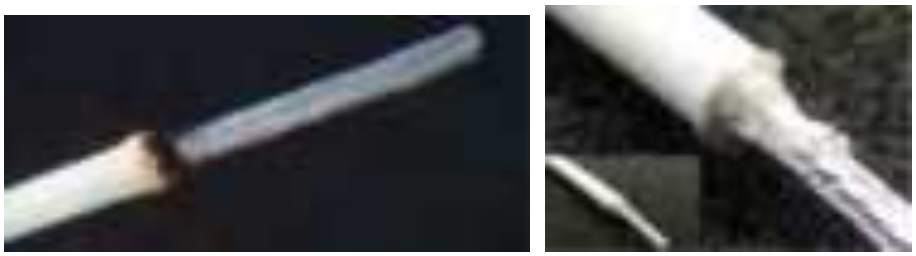


Figure 186
Ensure Jacket is Not Burned or Melted

d. Ensure there are no cuts, breaks, cracks or splits in the insulation.

⚠ **CAUTION** USE ADEQUATE VENTILATION AND AVOID CHARRING OR BURNING DURING INSTALLATION. CHARRING OR BURNING THE PRODUCT WILL PRODUCE FUMES THAT MAY CAUSE EYE, SKIN, NOSE AND THROAT IRRITATION.

13. Slide the solder sleeve onto one wire, in a stand-by position.

14. Align wires in such a manner that all strands are parallel. Then, slide the sleeve over the splice area and center the solder preform of the sleeve at the center of the splice length (Figure 187).

Figure 187
Solder Preform at Center of Splice Length

⚠ **CAUTION** THE HEATING TOOL AND THE ASSEMBLY BECOME HOT DURING THE INSTALLATION OF THE SOLDER SLEEVE WIRE SPLICE. TO PREVENT BURNS, ALLOW TOOL AND THE ASSEMBLY TO COOL DOWN BEFORE HANDLING.

CAUTION IF HEAT IS BEING APPLIED NEAR HALAR® BRAIDING, A NON-FLAMMABLE HEAT SHIELD MUST BE USED AROUND BRAID TO PREVENT ITS DAMAGE.

15. Pre-heat the hot air gun equipped with the appropriate reflector, until the operating temperature of 752°±68°F (400°±20°C) is achieved.
16. Center the reflector at the solder preform location.

NOTICE: In the next step, the deformation of the solder preform is not enough to consider that the soldering has been done efficiently.

17. Heat the solder sleeve device until the sleeve is totally shrunk; the solder preform has melted and flowed through the wire strands. Stop heating when a solder fillet can be seen between the conductors.
18. Finish by shrinking totally both ends of the sleeve, to complete the melting of the sealing rings.
19. Inspect solder sleeve as follows:
    - The conductors must not pass over the wire jackets.
    - The solder joint must have a minimum length of 0.140” (3.5 mm).
    - The solder sleeve device must cover the entire stripped area.
    - The solder preform must be totally melted and flowed along the conductors to create a solder fillet.
    - A solder fillet must be visible between conductors. Visible remains of solder indicate that the joint has been under-heated.
    - A lack of solder indicates that the joint has been over-heated (the solder may have disappeared in the strands by capillary effect).
    - The sleeve must be completely shrunk.
    - The solder sleeve device must not be cut, split, or pierced.
    - No copper strands must poke through the sleeve.
    - The sleeve and the wire jackets must not show evidence of mechanical damage or over-heating, such as melting zones, burning, spikes, etc.
    - A slight browning of the sleeve is not considered as a defect and is not sign of performance degradation.
20. Visual Inspection Guide
    a. Underheated Installation
       - Contour of solder preform is visible in joint area.
       - Contour of wires, in joint area, is obscured by solder.

Figure 188
Underheated Installation

b. Over-Heated Installation

- Joint area is not visible because of severe darkening.
- Solder fillet is not visible along the wires interface.
- Wire insulation is damaged outside the sleeve.

Figure 189
Over-Heated Installation

c. Acceptable Installation

- Joint area is clearly visible through the sleeve.
- Solder preform has lost all appearance of ring shape.
- Contour of wires is visible through the solder.
- Fillet is clearly visible along the wires interface.
- Inserts have melted along the wires.

Figure 190
Acceptable Installation

21. If installation is acceptable, continue to next step. If installation is not acceptable, complete the following, as applicable:

a. Repair of the Underheated Assembly:

(1) Heat the assembly again in order to complete the melting and flowing of the solder preform.

(2) Reinspect using steps 19 and 20.

b. Repair of an Over-heated Assembly:

(1) Remove the solder sleeve device as follows:

(2) Cut the sleeve with a sharp cutter blade. Take care not to damage the wires.

(3) Heat the device with a hot air gun, to soften it and remove it with a pair of pliers.

(4) Install a new solder sleeve, starting at step 13.

22. If harness coverings were disturbed to facilitate repair, repair or replace coverings using procedures in Section B - Halar® and Copper Shield Braid Repair.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(3) Single and Multi-Conductor Shielded Cable Splicing Using Cable Splice Kit.

(a) Tooling

Part Number	Description	Manufacturer
AD-1377	Crimp Tool, Splice, 26 – 12 AWG (Red, Blue, Yellow)	TE Connectivity
OR		
M22520/5-01	Crimp Tool, Handle	
M22520/5-102	Crimp Die, 12-16 AWG (Use with M22520/5-01 Crimp Handle)	
M22520/5-103	Crimp Die, 26 -16 AWG (Use with M22520/5-01 Crimp Handle)	
OR		
M22520/10-01	Crimp Tool, Handle	
M22520/10-103	Crimp Die, 12-16 AWG (Use with M22520/10-01 Crimp Handle)	
M22520/10-103	Crimp Die, 26 -16 AWG (Use with M22520/10-01 Crimp Handle)	
	Wire Strippers for Wire Insulation	
	Small Scissors or Diagonal Cutters for Braid	
	Ruler Readable to 0.025” (0.50mm)	
*	Heat Gun - Temperature Setting of 750°F to 850°F with Reflector	*

*The following heat guns or equivalent alternate may be used:

- Thermogun Model 500B with TG-135 Reflector
- Mini-Gun 1 with MG-1 reflector
- Steinel HL1910E with PR-25 reflector

(b) Parts

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Number of Primary Wires	AWG of Primary Wire	Color Band	Kit Part Number(s)	
60N29945-2-CT	1	20, 18, 16	Blue	05K31748	05K31749
60N29945-3-CT	1	16, 14, 12	Yellow	05K31748	05K31749
60N29945-5-CT	2	26-20	Red	05K31748	05K31749
60N29945-11-CT	3/4	18-16	Blue	05K31748	05K31749

(c) Procedure

This section is for the repair of shielded single and multi-conductor cable using shielded cable splice kit. If a cable is damaged at a single point and there is sufficient slack in the wire, the damaged cable can be repaired using the splice kit. If a cable is damaged along its length, the damaged segment must be cut out and replaced with a jumper cable and two splice kits, unless it is damaged within 6 inches of a connector. If damaged within 6 inches of a connector, replace connector contact and wire, then splice to remaining cable. Refer to manual section for connector contact being replaced for instructions.

1. Open cable and remove cable clamps as required to access wire damage.
2. Work damaged wires to outside of wire bundle. Pull slack in wire toward damaged area to prevent strain on repair.
3. If more than one wire is to be spliced tag wires before proceeding.
4. Cut out the segment of cable with damage. If a jumper wire is required, cut out at least 6 inches of the damaged wire to allow room for splicing.
5. Determine type and gauge of cable to be repaired/replaced from wiring diagram the harness schematic in the applicable Engine Maintenance Manual and wire identification code examples shown in the beginning of this Section.
6. Cut replacement wire 5 inches longer than removed segment.
7. From Parts section, select applicable splice for wire being repaired/replaced.
8. Install primary wire splices as follows:

NOTICE: ALL TOLERANCES ARE ± 0.025" (±0.635 mm).

Cable Preparation:

a. For Single Conductor Cable:
   (1) Remove cable jacket and shield 0.700 inches (17.8 mm).
   (2) Strip primary wires 0.275 inches (6.985 mm).
   (3) Remove cable jacket 0.375 inches (9.525 mm).

b. For Two Conductor Cable:
   (1) Remove cable jacket and shield back 1.825 inches (46.355 mm).
   (2) Cut 1 primary on each cable: 17.00 (0.675) from cable jacket.

   NOTICE: Short primaries on cable A must be left uncut on cable B.

   (3) Strip primary wires 0.275 inches (6.985 mm).
   (4) Remove cable jacket 0.375 inches (9.525 mm).

c. For Three and Four Conductor Cable:
   (1) Remove cable jacket and shield 1.825 inches (46.355 mm).
   (2) Cut primaries: 3-conductor: 2 on cable A and 1 on cable B; 4-conductor: 2 on both cables A and B: 17.00 (0.675) from cable jacket.

   NOTICE: Short primaries on cable A must be left uncut on cable B.

   (3) Strip primary wires 0.275 inches (6.985 mm).
   (4) Remove cable jacket 0.375 inches (9.525 mm).

9. Remove primary wire splice sleeves from kit.

Figure 191
Primary Wire Splice Sleeves

10. Slide primary wire heat sleeve onto the longer of each wire (Figure 192), ensure the narrowest opening of the sleeve goes first (away from contact).

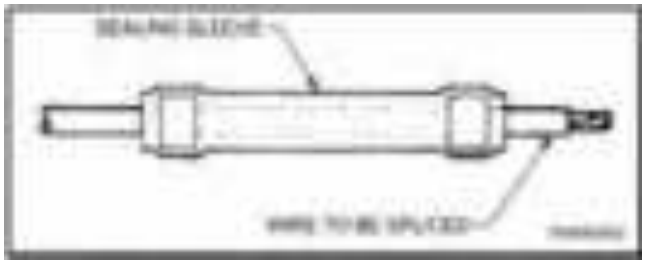


Figure 192
Primary Wire Heat Sleeve on the Longer of Each Wire

11. Strip 0.75 in. (19.05 mm) of insulation from wire.

12. Inspect wire strands as follows:

    g. Broken, nicked, or cut strands as listed below and shown in Figure 193.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

Figure 193
Examples of Unacceptable Wire Strands

13. Inspect the wire insulation jacket for the following:

a. Properly cut as shown in Figure 194.

Figure 194
Properly Cut Insulation Jacket

Figure 195
Example of Unacceptable Insulation Jacket

b. Any uneven, ragged pieces (frays, tails, tags) (Figure 195) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.

c. Inter-tape or frayed insulation exposure-"L" (Figure 196) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 196
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 197.

Figure 197
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 198.

Figure 198
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

14. Insert wire into barrel of crimp of primary wire splice. Ensure wire is fully seated in barrel and wire is visible in inspection window as shown in Figure 199.

Figure 199
Inspection Window

15. Using crimp tool, insert splice into tool and close crimp handle until clicking sound stops, then release handle and remove splice.

16. Repeat steps 3 through 6 for opposite wire.

17. Repeat steps 3 through 7 for remaining wires.

NOTICE: Ensure the primary wires are staggered and correctly connected to the mating wire on the opposite cable as shown in Figure 200.

Figure 200
Primary Wires Staggered

18. Inspect splice and crimps for the following:

    a. Double sided crimp splice is not cracked.
    b. Wire insulation does not extend into the wire crimp barrel (see Item A of Figure 204).
    c. Crimp indent is not off the end of the splice (see Item B of Figure 201).
    d. Wire end(s) are visible through the inspection window(s) (see Item C of Figure 201).
    e. Wire insulation gap is not greater than 2 wire diameters including insulation (see Item D of Figure 201).

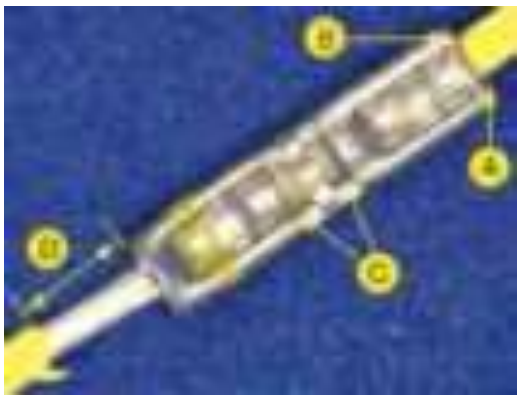


Figure 201
Inspection Items

19. Wire strands do not extend out of inspection window (Figure 202).

Figure 202
Inspection Window

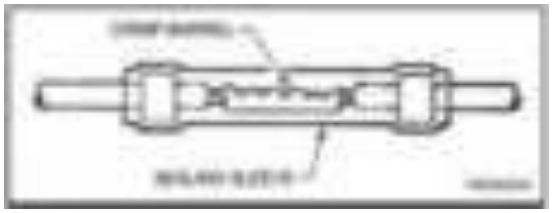


Figure 203
Primary Wire Heat Sleeve

20. Center primary wire heat sleeve over splice as shown in Figure 203.

WARNING DO NOT USE OPEN FLAME OR ANY ELECTRIC MOTOR OPERATED HEAT GUN WITH NON-SEALED BRUSHES ON ANY AREA OF AN AIRCRAFT WHERE THERE IS FUEL OR FUEL VAPOR PRESENT. USE ONLY HOT AIR GUN M83521/5-01 OR EQUIVALENT.

WARNING USE OF NITROGEN WITH HOT AIR GUN M83521/5-01 OR EQUIVALENT IN AN ENCLOSED AREA CAN BE HAZARDOUS. ENSURE AREA IS WELL VENTILATED.

21. Shrink sealing sleeve using hot air gun with small termination reflector. Shrink middle first and move heat towards one end until sealant melts and begins to flow out of sleeve, then move towards the other end, as shown in Figure 204.

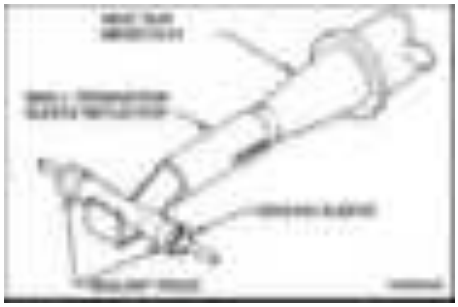


Figure 204
Shrink Sealing Sleeve

22. Repeat steps 12 and 13 for remaining splices.

23. Inspect sealing sleeve to ensure it is properly centered and shrunk (Figure 205).

Figure 205
Properly Centered and Shrunk Sealing Sleeve

24. Place the shield splice sleeve (large end first) onto the cable.

25. Center the shield splice sleeve over the splice and the exposed cable shields.

26. Heat sleeve as follows:
    a. Heat center of sleeve until the solder melts and the shield and tube recover.
    b. Move the heat toward one end of the shield slowly enough to keep the sleeve recovering as you move along.
    c. Apply heat for an additional 5 to 10 seconds to the final half-inch of the sleeve shield to ensure sufficient heat transfer to the cable shield to make a good joint.
    d. Apply heat to end of sleeve until rings melt and flow along cable jacket.
    e. Repeat for opposite end of sleeve.

27. Inspect cable shield heat sleeve as follows:
    - Sleeve/shield must be recovered along its entire length.
    - Sleeve must be recovered tightly around cable jacket.
    - Sealing rings must have flowed along cable jacket.
    - Sleeve must not have discolored to the degree that joint cannot be inspected.
    - Sleeve must not cut or split.
    - Strands must not be poking through the sleeve.

Figure 206
Cable Shield Heat Sleeve Inspection

28. If during repair, a shield solder sleeve was removed, replace as follows before terminating repaired/replaced cable to connector:
    a. Select solder sleeve from table below.

    The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Cable	Kit Part Number(s)	
M83519/2-8	All 1/2 Conductor	05K31748	05K31749
M83519/2-9	3 Conductor (18 AWG)	05K31748	05K31749

29. Install solder sleeve as follows:
    a. Remove shield outer sleeve a minimum of 3 inches from end of cable.
    b. Remove shield, leaving 0.85 in. (21.6 mm) in place for M83519/2-8 and 0.130 in. (3.3 mm) for M83519/2-9.
    c. Slide solder sleeve over exposed shield (Figure 207).

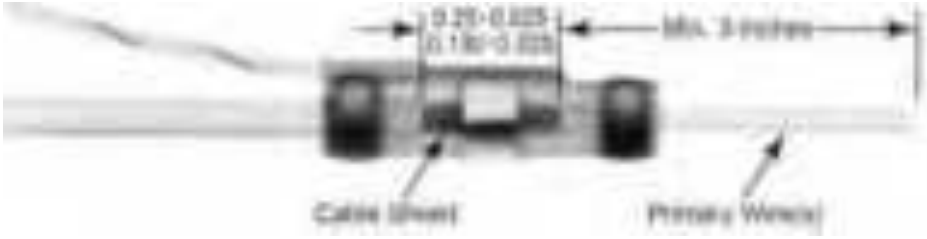


Figure 207
Install Solder Sleeve

30. Recover solder sleeve as follows:

    a. Heat center of sleeve until the solder melts and the shield and tube recover.

    b. Move the heat toward one end of the shield slowly enough to keep the sleeve recovering as you move along.

    c. Apply heat for an additional 5 to 10 seconds to the final half-inch of the sleeve shield to ensure sufficient heat transfer to the cable shield to make a good joint.

    d. Apply heat to end of sleeve until rings melt and flow along cable jacket, repeat for opposite end of sleeve.

31. Inspect cable shield heat sleeve as follows:

- Sleeve/shield must be recovered along its entire length.
- Sleeve must be recovered tightly around cable jacket.
- Sealing rings must have flowed along cable jacket.
- Sleeve must not have discolored to the degree that joint cannot be inspected.
- Sleeve must not cut or split.
- Strands must not be poking through the sleeve.

Figure 208
Inspect the Cable Shield Heat Sleeve

32. If harness coverings were disturbed to facilitate repair, repair or replace coverings using procedures in Section B.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(4) Thermocouple Cable Splicing Using Chromel/Alumel Splices.

This procedure is to be used in areas where any splice repair would be exposed to temperature changes.

(a) Parts

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
60N29944-CT	Sleeve-Splice Sealing System, Thermocouple, 16-22 AWG	05K31750 05K31751

(b) Tools

Part Number	Description
46673	Crimper

(c) Procedure

This section is for the repair of thermocouple cable using using Chromel/Alumel splice kit shown below only in areas where the splice(s) are expected to be exposed to temperature changes. In areas where the splice(s) would not be subject to temperature changes, M81824 environmental splices may be used and applied using that section.

Figure 209
Chromel/Alumel Splice Kit

If a wire is damaged at a single point and there is sufficient slack in the wire, the damaged wire can be repaired using the splice kit. If a wire is damaged along its length, the damaged segment must be cut out and replaced with a jumper cable and two splice kits, unless it is damaged within 6 inches of a connector. If damaged within 6 inches (15.2 cm) of a connector, replace connector and wire, then splice to remaining cable. Refer to manual section for thermocouple connector replacement instructions.

1. Open cable and remove cable clamps as required to access wire damage.
2. Work damaged wires to outside of wire bundle. Pull slack in wire toward damaged area to prevent strain on repair.
3. If more than one wire is to be spliced tag wires before proceeding.
4. Cut out the segment of cable with damage. If a jumper wire is required, cut out at least 6 inches (15.2 cm) of the damaged wire to allow room for splicing.
5. Determine type and gauge of cable to be repaired/replaced from wiring diagram the harness schematic in the applicable Engine Maintenance Manual and wire identification code examples shown in the beginning of this Section.

6. Cut replacement wire 5 inches (12.7 cm) longer than removed segment.
7. From Parts section, select applicable splice for wire being repaired/replaced.
8. Strip 2.10 ± 0.1 inch (53.3 ± 2.5 mm) of jacket from the end of the cables to be spliced.
9. Cut the Alumel conductor (Red) of one cable and the Chromel conductor (Yellow) of the second at a point 0.90 ± 0.05 inch (22.9 ± 1.3 mm) from the cable jacket.
10. Strip all conductors 0.40 ± 0.05 inch (10.2 ± 1.3 mm).
11. Inspect wire strands as follows:
    a. Broken, nicked, or cut strands as listed below and shown in Figure 210.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

Figure 210
Examples of Unacceptable Wire Strands

12. Inspect the wire insulation jacket for the following:
    a. Properly cut as shown in Figure 211.

Figure 211
Properly Cut Insulation Jacket

Figure 212
Example of Unacceptable Insulation Jacket

    b. Any uneven, ragged pieces (frays, tails, tags) (Figure 212) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.
    c. Inter-tape or frayed insulation exposure-"L" (Figure 213) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 213
Inter-Tape or Frayed Insulation Exposure

d. Un−stranded, splayed, or Bird cage strands as shown in Figure 214.

Figure 214
Example of Unacceptable Wire Strands

e. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 215.

Figure 215
Examples of Burned and Melted Insulation

f. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

13. Place the Outer cover Sleeve over away from the splice area.

14. Place one Sealing Sleeve on the longer lead of each cable.

15. Crimp the conductors into the correct splice (color coded to match conductors), Yellow wire into Gray splice and Red wire into Green splice, as follows:

a. To open the crimping jaws, close the tool handles until the CERTI-CRIMP hand crimping tool ratchet control releases. Note that the tool handles cannot be opened until they have been FULLY closed.

b. Push the locator up and, from the FRONT side of the tool, insert the terminal or splice wire barrel sleeve into the crimping jaws making sure that the edge of the wire barrel sleeve rests against the locator, as shown in Figure 216.

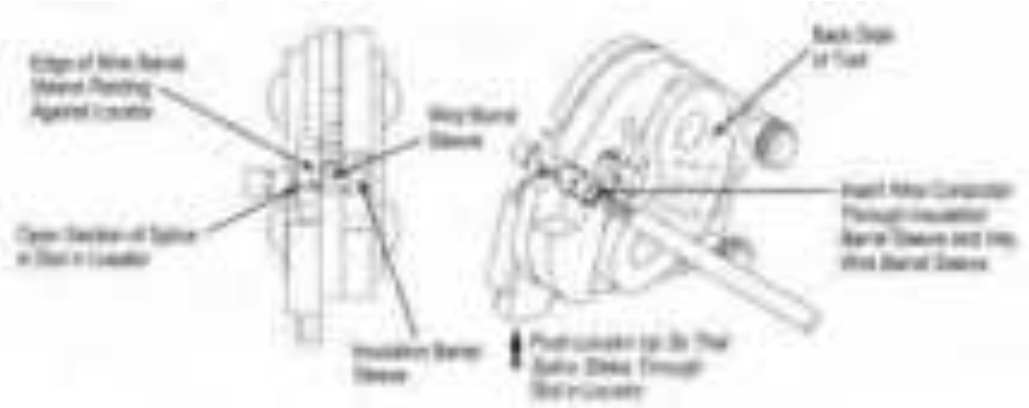


Figure 216
Wire Barrel Sleeve Rests Against the Locator

c. Close tool handles just enough to hold the terminal or splice within the crimping jaws.

CAUTION CLOSING THE TOOL HANDLES TOO TIGHTLY WILL DEFORM THE TERMINAL OR SPLICE.

d. Insert wire conductor through the insulation barrel sleeve and into the wire barrel sleeve until it is flush with the outer edge of the wire barrel sleeve (Figure 217).

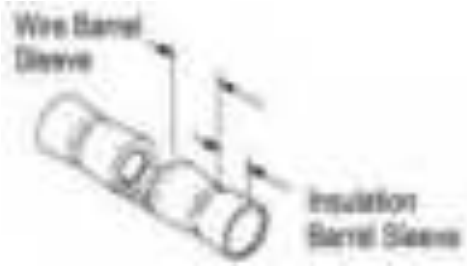


Figure 217
Wire Barrel Sleeve Flush with the Outer Edge

e. Hold wire in place and close the tool handles FULLY to crimp the terminal or splice. Allow tool handles to open FULLY. Remove the crimped terminal or splice from the crimping jaws.

NOTICE: If the splice cannot be turned around to position the uncrimped sleeve in the crimping jaws, turn the tool around.

f. To crimp the other half of the splice, reposition the uncrimped sleeve in the crimping jaws as described in Step b. Follow Steps c through f to complete the crimp.

16. Inspect the crimp. Refer to Figure 218 for a properly crimped terminal and splice. Check the insulation grip on the crimped terminal or splice.

Figure 218
Properly Crimped Terminal and Splice

WARNING DO NOT USE OPEN FLAME OR ANY ELECTRIC MOTOR OPERATED HEAT GUN WITH NON-SEALED BRUSHES ON ANY AREA OF AN AIRCRAFT WHERE THERE IS FUEL OR FUEL VAPOR PRESENT. USE ONLY HOT AIR GUN M83521/5-01 OR EQUIVALENT.

WARNING USE OF NITROGEN WITH HOT AIR GUN M83521/5-01 OR EQUIVALENT IN AN ENCLOSED AREA CAN BE HAZARDOUS. ENSURE AREA IS WELL VENTILATED.

17. Center the Sealing Sleeves over the splices as shown in Figure 219 and heat, using the heat gun, until the sleeve recovers and the sealing inserts melt and flow along the wire.

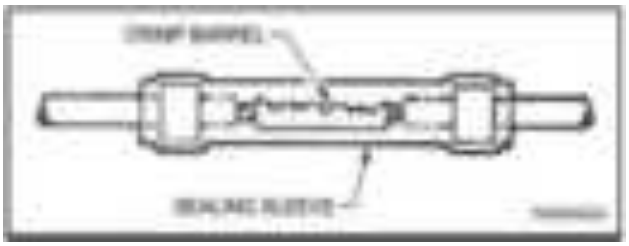


Figure 219
Center Sealing Sleeves Over the Splices

18. Center the Outer cover Sleeve over the assembly and heat until it recovers tightly onto the assembly.

19. If harness coverings were disturbed to facilitate repair, repair or replace coverings using procedures in Section B.

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

B. Halar® and Copper Shield Braid Repair

(a) Tooling

Some common hand tools and supplies may be required during this procedure.

(b) Parts

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
AA52084-C-2-BLK	Lacing Tape, Nomex, Synthetic Elastomer Finish, Black	N/A
AA59163-1II0040BLK	Tape, Silicone, Self-Fusing, Black w/Guideline - 1.00in. Wide x .040in. Thick	N/A
AA59569R36T0500*	Braid, Wire, Tin Coated Copper, 0.500in.	05K31752
AA59569F36T0781*	Braid, Wire, Tin Coated Copper, 0.781in.	05K31752
AA59569R30T1000*	Braid, Wire, Tin Coated Copper, 1.00in.	05K31752
60P31549-CT	Label, Cable Marker, 0.25in.	05K31721 05K31722
60P31550-CT	Label, Cable Marker, 0.50in.	05K31721 05K31722
MS3367-5	Cable Tie, 0.14in. X 5.50in.	05K31721 05K31722

*Any of these sizes or alternate sizes may be used, provided the repair is fully enclosed, when wrapped.

(c) Procedure – Repair of Halar® Braid

This procedure is for the repair of Halar® braid that is within the repairable limits in Section 3A and 3B – Harness Damage Limits and Repairable Damage for all harness locations.

CAUTION USE EXTREME CARE WHEN REMOVING BRAID TO PREVENT WIRE DAMAGE. WHEN USING SCISSORS OR KNIFE, CAREFULLY CUT ALONG HARNESS TO DISTANCE REQUIRED. ENSURE CUTTING EDGES FACE OUTBOARD TO PREVENT WIRE DAMAGE.

1. Trim away any damaged braid by cutting braid axially (lengthwise) along harness to distance required. Ensure cutting edge faces away from wires to prevent wire damage. If braid is just frayed, removed frayed edges only and proceed to step (d).
2. At required distance cut braid circumference at each end of axial cut and remove braid.
3. Inspect harness for possible damage incurred during cutting and repair as necessary.

NOTICE: When using silicone self-bonding tape, the hands should be completely free from dirt or oil.

4. Attach tape to the braid as follows (See Figure 220):
   a. Start wrapping tape a minimum of ½in. (1.27cm) from edge of braid before damage, by taking a complete turn of tape around bundle, keeping guideline at a right angle bundle axis.

b. Continue wrapping tape around bundle, overlapping the guideline of the preceding wrap, until the tape completely covers the damaged area of braid by a minimum of ½in. (1.27cm) on opposite end.

c. Terminate tape by taking a complete turn around braid, keeping guideline at a right angle to bundle axis.

d. Use Nomex lacing tape to secure both ends of tape.

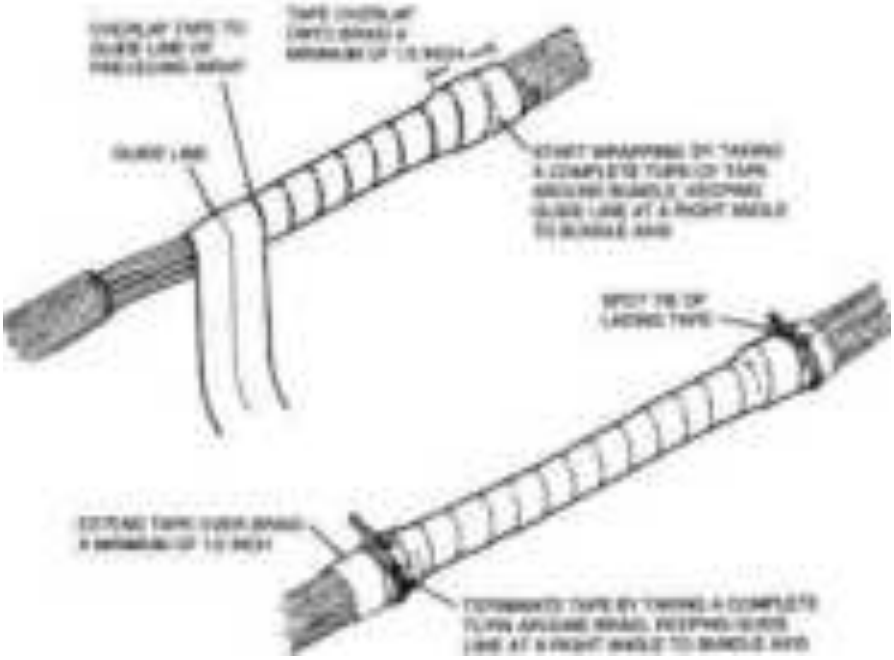


Figure 220
Attach Tape to Braid

(d) Procedure – Repair Copper Shield Braid

This procedure is for repair of shield braiding in the following harness locations: A001-P1 – A001-P4, A002-P1, A002-P2, AF-P1, AF-P2, A110-P, main trunk and coil box pass-thru.

If copper shield braid at connectors A001-P1 – A001-P4, A002-P1, A002-P2, AF-P1, AF-P2, and A110-P is protruding from Halar® braid and is frayed/cut, or main trunk or coil box pass-thru shield braid is frayed/cut, complete the following:

Remove heat shrink, if installed, from affected area using Steps 1-3 in the Procedure – Replacement section from F. Heat Shrink Repair/Replacement in this chapter.

1. If braid is frayed, complete this step. If braid is torn or cut on main trunk or at coil box pass-thru or connector back shell and there is less than 50% of braid not secured under Band-It® clamp, complete Step 2 in this section.

   a. Using small diagonal cutters or surgical scissors, trim away the damaged ‘hairs’ of the shield braid, so there are no ends protruding.

   b. Start wrapping tape a minimum of ½in. (1.27cm) from edge of braid before damage, by taking a complete turn of tape around bundle, keeping guideline at a right angle bundle axis.

c. Continue wrapping tape around bundle, overlapping the guideline of the preceding wrap, until the tape completely covers the damaged area of braid by a minimum of ½in. (1.27cm) on opposite end.

d. Terminate tape by taking a complete turn around braid, keeping guideline at a right angle to bundle axis.

e. Use Nomex lacing tape to secure both ends of tape.

2. If braid is torn or cut on the main trunk or at the coil box pass-thru or connector back shell and there is less than 50% of braid under Band-It® clamp, complete this step.

a. Open Halar® braid to access damaged copper braid.

b. Trim away any damaged braid by cutting braid axially (lengthwise) along harness to distance required. Ensure cutting edge faces away from wires to prevent wire damage. If braid is just frayed, removed frayed edges only and proceed to step (d).

c. At required distance cut braid circumference at each end of axial cut and remove braid.

d. Inspect harness for possible damage incurred during cutting and repair as necessary.

e. Cut appropriately sized copper braid to the length required to overlap the damaged area of the existing braid.

f. Open the new braid by cutting it length wise, being careful to not let it unravel.

g. Wrap the new braid around the damage.

h. Trim braid so it overlaps onto itself is not more than 0.25in. (6.35mm) and secure with Nomex lacing tape.

i. Use Nomex lacing tape to secure both ends of the braid.

C. Heat Sleeve Repair

This procedure is for the repair of silicone heat sleeve that is within the repairable limits in Section 3,F - Harness Damage Limits and Repairable Damage located on the harness main trunk and CIP leads.

(1) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description
	Isopropyl Alcohol
	Cotton Gloves, Lint Free, White*
	Emory Cloth

*Latex or Neoprene gloves may be used as substitute.

(2) Parts

Part Number	Description
AA52084-C-2-BLK	Lacing Tape, Nomex, Synthetic Elastomer Finish, Black
AA59163-1II0040RED	Tape, Silicone, Self-Fusing, Red w/Guideline - 1.00in. Wide x .040in. Thick
RTV-106*	RTV, Silicone Elastomer, High Temp, Red

*Equivalent product may be used.

(3) Procedure

This procedure can be completed with the harness assembly installed on the engine if all of the conditions that follow are correct.

- There is sufficient room to prep the area and apply the sealant to the damaged silicone heat sleeve without removing the harness.
- The repaired harness assembly will not be handled, disturbed, or flexed for a minimum of 6 hours with ambient temperature at or above 70°F (21°C).
- Tiedown straps, lockwire or clamps will not be installed over the repaired area.

(a) Examine the damage to the heat sleeve.

1. If the damage is under or adjacent to a tiedown strap or clamp used to secure the harness, remove the strap or clamp.
2. If the damage to the silicone outer sleeve is greater than 2in. (5.08cm) diameter, or where the damage includes the harness Halar® and/or copper braiding underneath the heat sleeve, this repair cannot be used.
3. If the heat sleeve fiberglass braid underneath the outer silicone cover damage is also damaged, as shown in Figure 221, go to Step (b). If braid is not damaged, go to Step (c).

Figure 221
Damage Braiding and Sleeve Preparation

(b) Using the tweezers and a sharp cutting instrument (razor blade, X-Acto® knife, small scissors, scalpel, etc.), carefully cut damaged strands as close to the inside edge of the outer sleeve damage as possible. Ensure there are no braid strands protruding above the outer sleeve.

(c) Prep the repair area as follows:

1. Using Emory cloth, scuff the outer sleeve area 0.25in. (6.35mm) maximum around the damage. Refer to Figure 221.

WARNING DO NOT USE ISOPROPYL ALCOHOL NEAR FLAMES OR HEAT. DO NOT LET IT STAY ON YOUR SKIN. ALSO MAKE SURE THAT YOU HAVE A GOOD FLOW OF CLEAN AIR. THIS MATERIAL IS FLAMMABLE AND DANGEROUS TO YOUR SKIN, EYES, AND LUNGS.

2. Moisten a clean dry lint free white cotton cloth with isopropyl alcohol.
3. Move the moist cloth lightly along the surface. Turn the cloth after each pass. Continue until a clean area of the cloth is clean after it has been moved along the surface.
4. Let the heat sleeve dry for 15 minutes.
5. Use clean, white, cotton gloves for all further handling of the damaged heat sleeve. This prevents contamination of the clean surface.

(d) Leaving the damaged area open, fill the damaged area with RTV-106 or equivalent sealant. Refer to Figure 222. Do not permit bubbles or bare spots.

Figure 222
Applying Sealant

(e) Using a tongue depressor/popsicle stick or equivalent, apply additional RTV-106 or equivalent sealant over damaged area and feather over outer sleeve flush to the edges of the area scuffed in Step (c)1. Do not extend the sealant beyond the scuffed area.

CAUTION IF YOU FLEX OR BEND THE REPAIR AREA BEFORE THE SEALANT HAS CURED, YOU WILL CAUSE THE REPAIR TO FAIL. IF THIS OCCURS, THE REPAIR MUST BE REPEATED.

(f) Let the sealant cure for 6 hours before you flex the repaired harness that contains the sleeve repair.

(g) After sealant has cured for 6 hours, inspect as follows:

1. Bend the repaired area and inspect for proper bonding between the sealant and the silicone outer sleeve.
2. If the sealant separates from the repair sleeve or the outer sleeve, do the following.
   - Remove the loose sealant.
   - Very thoroughly clean the areas to which the sealant must bond using a clean, lint free cloth and isopropyl alcohol.
   - Repeat Steps (d) and (e) as necessary.
   - Do not flex the repair area until at least 12 hours after the repair.

(h) If the sealant does not separate from the silicone part of the heat sleeve, wrap the repair as follows (See Figure 223):

1. Start wrapping tape a minimum of 1in. (2.54cm) from edge of repair, by taking a complete turn of tape around bundle, keeping guideline at a right angle to sleeve axis.
2. Continue wrapping tape around sleeve, overlapping the guideline of the preceding wrap, until the tape completely covers the repaired area by a minimum of 1in. (2.54cm) on opposite end.
3. Terminate tape by taking a complete turn around sleeve, keeping guideline at a right angle to sleeve axis.
4. Use Nomex lacing tape to secure both ends of tape.

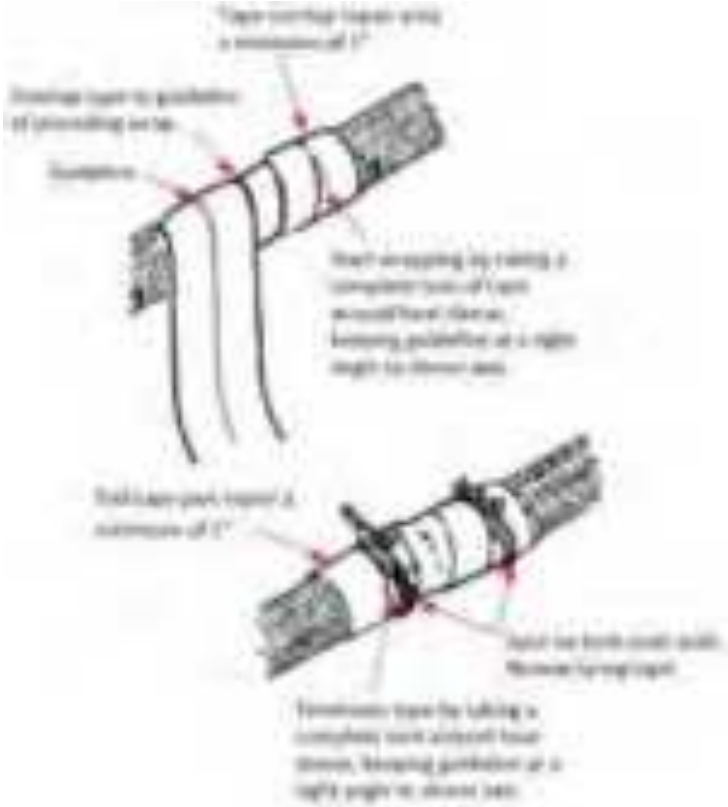


Figure 223
Wrap the Repair

D. Heat Shrink Repair/Replacement

(1) Tooling

Some common hand tools and supplies may be required during this procedure.

(2) Parts

Repair

Part Number	Description
AA52084-C-2-BLK	Lacing Tape, Nomex, Synthetic Elastomer Finish, Black
AA59163-1II0040BLK	Tape, Silicone, Self-Fusing, Black w/Guideline - 1.00in. Wide x .040in. Thick

Replacement

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
M23053/5-111-0	Insulation Sleeving, Heat Shrinkable, Black, 1.500in. ID	05K31752
M23053/5-116-0	Insulation Sleeving, Heat Shrinkable, Black, Class 1 Over-Expanded, 2.000in. ID	05K31752
M23053/5-120-0	Insulation Sleeving, Heat Shrinkable, Black, Class 1 Over-Expanded, 2.375in. ID	05K31752

(3) Procedure – Repair

This procedure is for the repair of heat shrink that is within the repairable limits in Section 3A and 3B - Harness Damage Limits and Repairable Damage for all harness locations.

(a) Remove torn, ripped, ragged pieces of heat shrink using small scissors or razor blade.

NOTICE: When using silicone self-bonding tape, the hands should be completely free from dirt or oil.

For steps (b) thru (f), see Figure 224.

(b) Starting at the connector, wrap tape one complete turn around the potting.

(c) Using the same continuous length of tape wrapped around the connector, spiral-wrap, with a 50% overlap, a single layer over exposed wires and onto braid.

NOTICE: To achieve a neat appearing boot, follow guideline on tape and keep tape stretched tightly.

(d) Overlap the tape onto the bundle braid a minimum of ½in. (1.27cm) to prevent wire exposure even when flexing the bundle.

(e) Terminate the silicone tape by wrapping at least a full turn of tape around the bundle, keeping the guideline at a right angle to the horizontal axis of the bundle.

NOTICE: Do not keep tape under tension while applying this last wrap.

(f) With nomex lacing tape, make a spot tie on the tape termination at the braid end.

(g) If label was damaged or removed, go to Section 5 to make and apply new label.

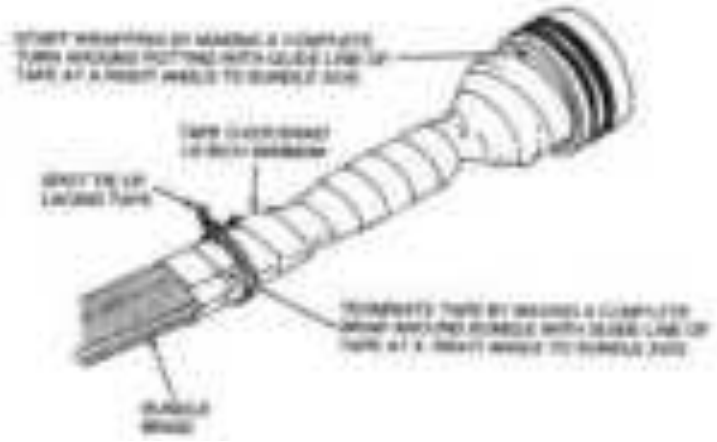


Figure 224
Tape Wrapping

Connector Installation and Check

(a) Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(b) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

(4) Procedure - Replacement

This procedure is for the replacement of heat shrink that is not within the repairable limits in Section 3A and 3B - Harness Damage Limits and Repairable Damage for the following harness locations:

A001-P1 – A001-P4, A002-P1, A002-P2, AF-P1, AF-P2, A110-P, coil box pass-thru.

If damage is within repairable limits, use the Procedure – Replacement section from F. Heat Shrink Repair/Replacement in this chapter.

If copper shield braid is damaged, go to the Halar® and Copper Shield Braid Repair section in this chapter.

NOTICE: If coil box pass-thru heat shrink requires replacement, the cable harness and coil box pass-thru must be removed from the coil box before proceeding. Do not remove pass-thru from harness.

(a) Using razor blade or equivalent, cut along the entire length of the white connector label and remove and discard.

(b) Using razor blade or equivalent, cut along the entire length of the heat shrink to be removed, being careful not to cut the braiding underneath.

(c) Remove the cut heat shrink from the harness. If necessary, use needle nose pliers, forceps or equivalent, to grip the edge of the heat shrink and peel it off.

(d) Ensure any exposed copper shield braid under heat shrink is not damaged. If damage is found, go to the procedure to Repair Copper Shield Braid in Section B. Halar® and Copper Shield Braid Repair in this chapter and repair before proceeding. If there is no damage to braid, continue to next step.

(e) Using Table 1, determine the size and length of the heat shrink required and cut to length. After heat shrink is cut, for connector repair, go to step (f) for coil box pass-thru, go to step (g).

Table 1
Heat Shrink Sizing

	WHERE USED		
	A001-P3, A001-P4	A001-P1, A001-P2, A002-P1, A002-P2, AF-P1, AF-P2, A110-P	Coil Box Pass-Thru
Part Number (Black)	M23053/5-111-0	M23053/5-116-0	M23053/5-120-0
Length (Black)	6in.	7in. (4in. for A110-P)	4.5in.

(f) For connectors, use the following steps:

1. Position heat shrink over connector and cable, covering the back of the connector back shell. Connectors with 45° back shells should be covered as shown in Figure 225. Connectors with straight back shells and back shells with cable clamps are to be covered as shown in Figure 226 and 227.

Figure 225
45° Back Shell

Figure 226
Straight Back Shell

Figure 227
Back Shell with Cable Clamp

⚠ **CAUTION** IN THE NEXT STEP, ENSURE HEAT IS NOT APPLIED FOR MORE THAN 5-6 SECONDS IN THE AREA WHERE THERE IS HALAR® BRAIDING, AS DAMAGE TO THE BRAIDING WILL OCCUR.

2. Using heat gun, recover heat shrink. Adjust fit during recovery to ensure heat shrink extends a maximum of 4in. (10.16cm) behind back shell after it is recovered.

3. Use the applicable connector information below to create a new label using the procedure in Section 5 - Label Replacement and Installation.

(g) For coil box pass-thru, use the following steps:

1. Compress coil connectors together and slide heat shrink over connectors, cables and pass-thru until heat shrink is in proper position as shown in Figure 230. The heat shrink in Figure 228 is already recovered. The picture is only to show position.

Figure 228
Coil Box Pass-Thru

CAUTION IN THE NEXT STEP, ENSURE HEAT IS NOT APPLIED FOR MORE THAN 5-6 SECONDS IN THE AREA WHERE THERE IS HALAR® BRAIDING, AS DAMAGE TO THE BRAIDING WILL OCCUR.

2. Using heat gun, recover heat shrink. Heat shrink should fit over Band-It® clamp and sit flush with face of pass-thru and should extend onto the harness 4 ± 0.50in. (10.16 ± 1.27cm).

Connector Installation and Check

1. Complete a continuity check using the harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.
2. Connect the connector. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.
3. Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

E. Terminal Lug Replacement

The procedures in this section are for the repair and or replacement of the following connectors:

E54	E70
GNB-B	GND-A

(1) Tooling

Some common hand tools and supplies may be required during this procedure.

Part Number	Description	Manufacturer
M22520/10-01	Tool, Crimping, Terminal	
M22520/10-101	Die, Crimper	
OR		
M22520/5-01	Tool, Crimping, Terminal	
M22520/5-100	Die, Crimper	
OR		
M22520/40-01	Tool, Crimping, Terminal	

(2) Parts

Terminal information can be found in Section 7 – Wiring Harness Parts List. Refer to Section 8 - Wiring Harness Repair Kits for kits containing parts to replace Terminal Lugs.

(3) Procedure

NOTICE: As there are manufacturer variations in the appearance of terminal lug MS25036-154, the terminal lug shown in this procedure is representative, but may not look like the one used. Terminal lug appearance variations are shown in Figure 229.

Figure 229
Terminal Lugs

(a) Using diagonal cutters, remove the old terminal lug by cutting the wire directly behind the sleeve of the lug and discard terminal. If any of the connector marker is left on the wire, pull it off and discard.

(b) Using wire strippers or equivalent, carefully strip 0.203in. to 0.234in. (5.16mm to 5.94mm) of wire insulation as shown in Figure 230.

Figure 230
Insulation Removal

(c) Inspect wire strands as follows:

1. Broken, nicked, or cut strands as listed below and shown in Figure 231.

Number of Strands per Conductor*	Total Allowable Nicked or Broken Strands
1 and 7	None Nicked, Broken or Severed
19	2 Nicked, None Broken or Severed
37	4 Nicked, None Broken or Severed
More than 37	6 Nicked, None Broken or Severed

*No nicked or broken strands are permitted for Chromel/Alumel conductor regardless of the number of conductor strands.

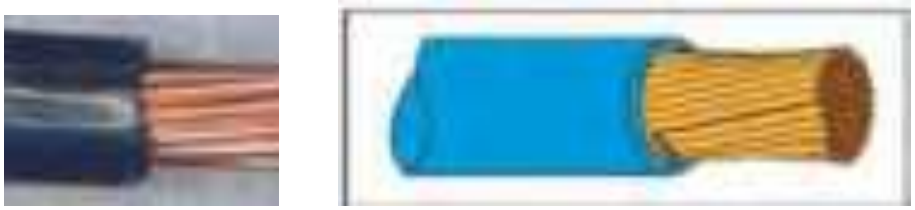


Figure 231
Examples of Unacceptable Wire Strands

(d) Inspect the wire insulation jacket for the following:

1. Properly cut as shown in Figure 232.

Figure 232
Properly Cut Insulation Jacket

Figure 233
Example of Unacceptable Insulation Jacket

2. Any uneven, ragged pieces (frays, tails, tags) (Figure 233) are no greater than 50% of the wire diameter or 0.039 inch (1 mm), whichever is greater.
3. Inter-tape or frayed insulation exposure-"L" (Figure 234) exceeds 0.039 in. (1 mm) or 50% of the insulation outside diameter whichever is greater.

Figure 234
Inter-Tape or Frayed Insulation Exposure

4. Un−stranded, splayed, or Bird cage strands as shown in Figure 235.

Figure 235
Example of Unacceptable Wire Strands

5. If thermal stripper was used, ensure the jacket is not burned or melted into the wire strands as shown in Figure 236.

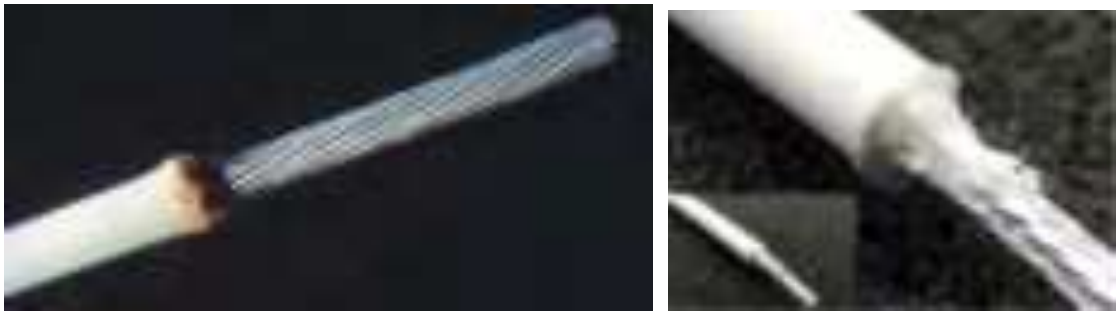
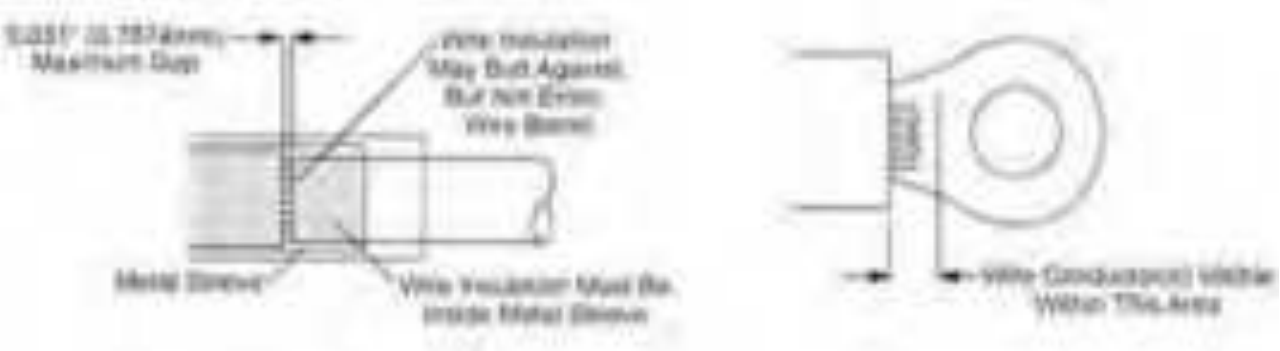


Figure 236
Examples of Burned and Melted Insulation

6. Ensure there are no cuts, breaks, cracks, or splits in the insulation.

(e) Insert stripped wire into the wire barrel of the terminal lug until the wire insulation is against the wire barrel, but not inside it. The wire insulation must be inside the metal sleeve. A gap between the wire insulation and wire barrel is allowed, but not to exceed 0.031in. (0.7874mm). See Figure 237.



Rear of Terminal Front of Terminal

Figure 237
Wire Installation into Terminal Lug

(f) Crimp terminal lug to wire by inserting lug into die and closing crimp handles together until the audible clicking stops, then release handle. Do not use excessive force when closing handles, as damage to the terminal will occur.

Figure 238
Terminal Crimpers and Die Sets

(g) After crimping, reference Figure 239 below and inspect crimp for the following:

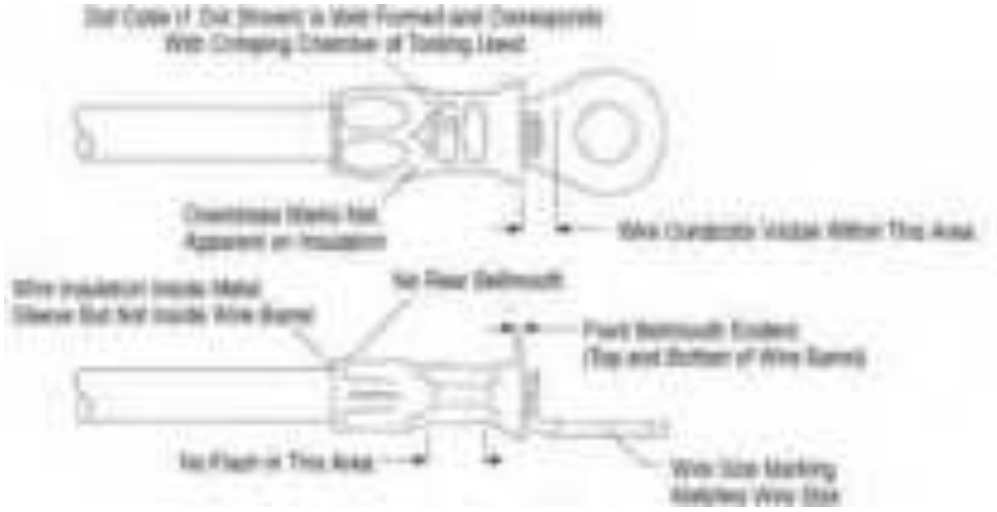


Figure 239
Terminal Inspection After Crimping

1. Flash - There shall be no flash or extruded insulation material visible in the most compressed area of the wire crimp.
2. Terminal Insulation - The insulation of the terminal must not be cut or show uneven stress marks or highlighted marks on the insulation.
3. Wire Location
   - Terminals shall have the wire ends flush or extended slightly beyond the end of the wire barrel.
   - Splices shall have the end of the wire located against the wire stop inside the center of the splice.
   - End caps shall have the end of the wire bottomed in the end cap.
4. Insulation Crimp Check - The insulation crimp must capture the wire insulation. The wire insulation must not be crimped inside the wire barrel of the terminal. The wire insulation must be inside the metal sleeve to provide strain relief for the wire.
5. Gently pull wire as shown in Figure 240 and ensure wire does not come out of terminal lug.

Figure 240
After Crimping Pull Test

(h) If crimp passes inspection, continue to step (i). If crimp fails, repeat steps (a) to (c).

NOTICE: If polyimide tape (yellow tape) was removed, ensure new polyimide tape is applied and overlaps tape that was not removed. Tape part numbers can be found in Section 7.

(i) Go to Section 5 - Label Replacement and Installation to make and apply new label.

Terminal Installation and Check

(a) Complete a continuity check using the harness schematic the harness schematic in Appendix B of the applicable engine maintenance manual.

(b) Install terminal to engine with the appropriate bolt. Refer to 72-70, Wiring Harness Connectors Section of the applicable engine maintenance manual for instructions.

(c) Complete an Operational Ground Check of the engine per Chapter 72-00 of the applicable engine maintenance manual.

5. Label Replacement and Installation

If any harness label is illegible, damaged, or removed during a repair, complete this section to replace the label(s).

A. Tooling

Some common hand tools and supplies may be required during this procedure.

Description
Marker, Permanent, Fine Tip
Heat Gun - Temperature Setting of 750°F to 850°F with Reflector

B. Parts

The right-hand column in the table below identifies applicable kit part number(s) found in Section 8 - Wiring Harness Repair Kits.

Part Number	Description	Kit Part Number(s)
60P31549-CT	Label, Cable Marker, 0.25in.	05K31721 05K31722
60P31550-CT	Label, Cable Marker, 0.50in.	05K31721 05K31722
MS3367-5	Cable Tie, 0.14in. X 5.50in.	05K31721 05K31722
M23053/5-108-9	Insulation Sleeving, Heat Shrinkable, White, 0.500" ID	N/A
M23053/5-111-9	Insulation Sleeving, Heat Shrinkable, White, 1.500" ID	N/A
M23053/5-116-9	Insulation Sleeving, Heat Shrinkable, White, Class 1 Over-Expanded, 2.000" ID	N/A

C. Procedure

NOTICE: If cable marker labels are not available or do not properly fit, white heat shrink listed in section b may be used in place of label. Refer to alternate labelling in this section.

(1) Determine the appropriately sized marker for the one being replaced using the parts list in Section 5,B.

(2) Using a fine tip marker, write the reference designator and nomenclature (eg. A010-P Inj 6) on the new label. Allow ink 5 to 10 minutes to completely dry.

(3) Grip cable marker by the end closest to the backbone.

(4) Gently pull the marker away from the backbone as shown in Figure 1. This ensures that the force is applied across both of the perforations, thus preventing the product from tearing into the cable tie holes.

Figure 1
Removal of Marker from backbone

NOTICE: To prevent tearing of the cable marker during installation, the cable ties must be applied correctly. Incorrect use of the cable ties exerts undue stress to the edges of the cable-tie holes.
It is recommended that the cable marker is installed in its final desired position and **not** slid after fixing along the cable into the final position.

(5) Install cable ties through holes in label as shown in Figure 2. Note correct positioning of cable ties in photo below.

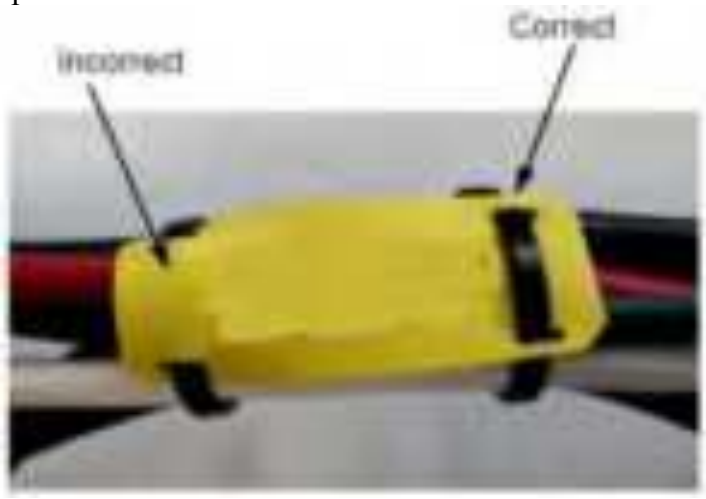


Figure 2
Positioning of Cable Ties in Label

(6) For connector label, install on harness no more than 3in. (7.62cm) behind connector back shell. For harness label, install on the approximate middle of the main trunk heat sleeve.

(7) Secure cable ties and pull hand tight. Cable ties should be tight enough to keep label from sliding, but do not dig into cable or heat sleeve.

(8) Trim excess portion of cable tie flush with face of cable tie lock.

(9) Once installed, ensure writing on label is readable and not smudged.

Alternate Procedure

(1) Select the appropriate size heat shrink from Section 5B for the connector/cable that will be labeled.

(2) Flatten the heat shrink out to give a flat surface for writing.

(3) Using a fine tip permanent marker, mark the heat shrink with the connector reference designator and nomenclature (eg. A010-P Inj 6). Allow ink 5 to 10 minutes to completely dry.

(4) Install label no more than 3" behind connector or connector back shell.

⚠ **CAUTION** IN THE NEXT STEP, ENSURE HEAT IS NOT APPLIED FOR MORE THAN 5-6 SECONDS IN THE AREA WHERE THERE IS HALAR® BRAIDING, AS DAMAGE TO THE BRAIDING WILL OCCUR.

(5) Using heat gun, recover heat shrink. Ensure the heat shrink is fully recovered (no wrinkles) and writing is readable and not smudged.

6. Harness Illustrated Parts

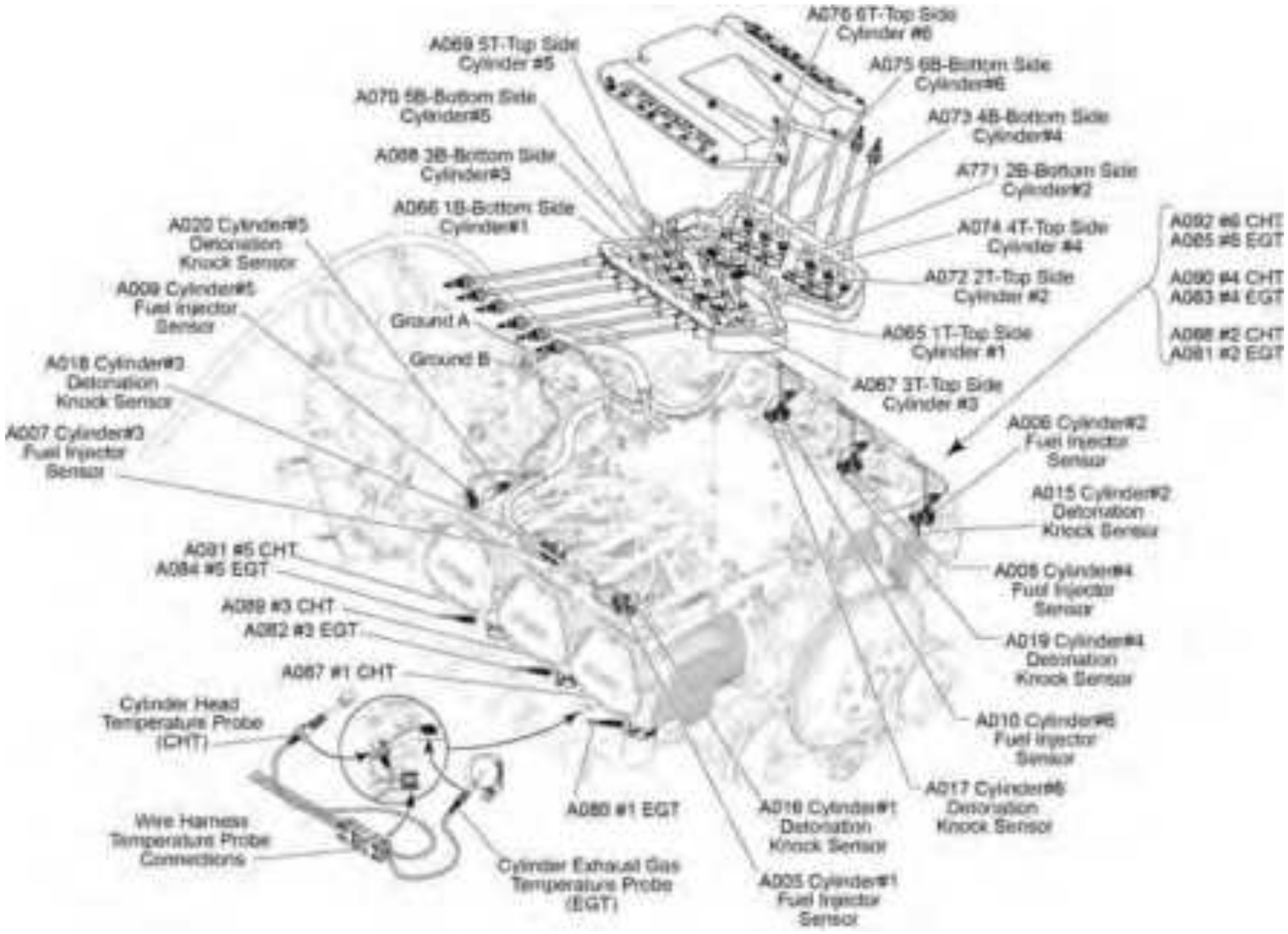


Figure 1
Wiring Harness Connectors – Top of Engine

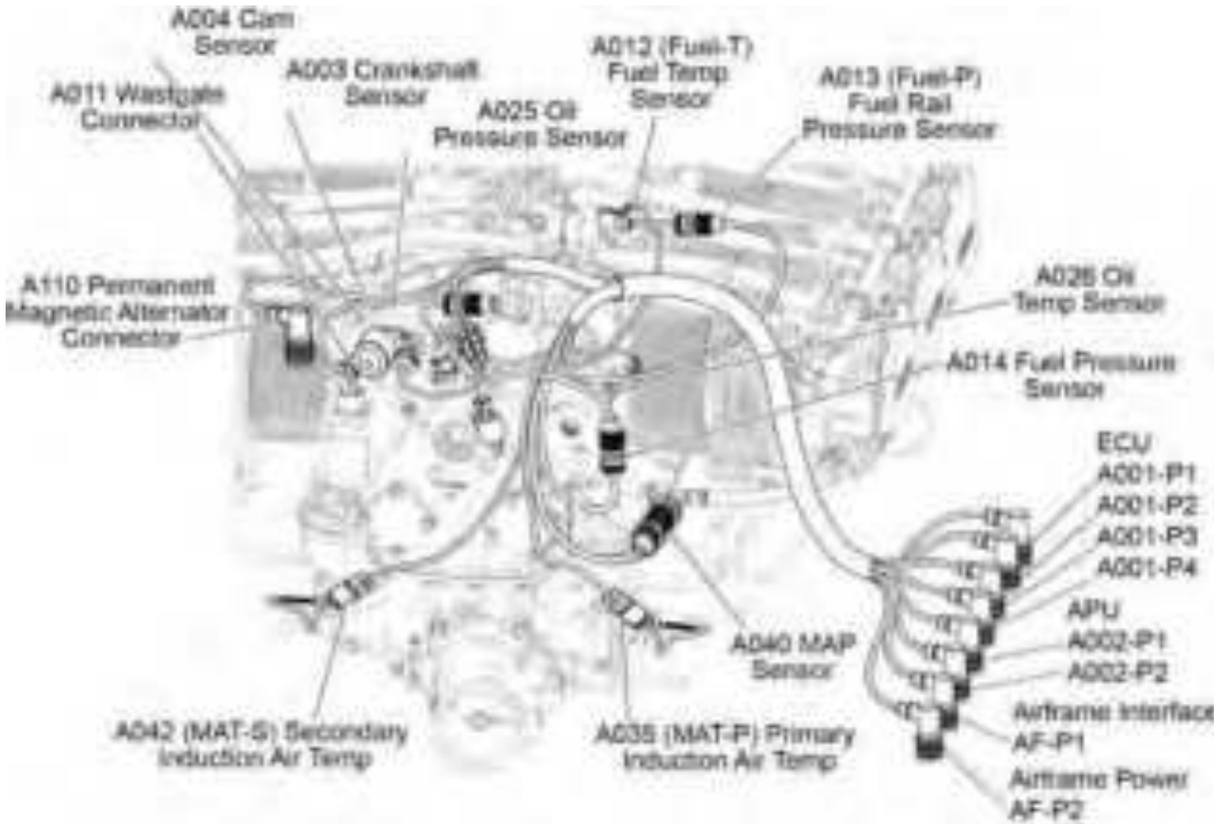


Figure 2
Wiring Harness Connectors – Back of Engine

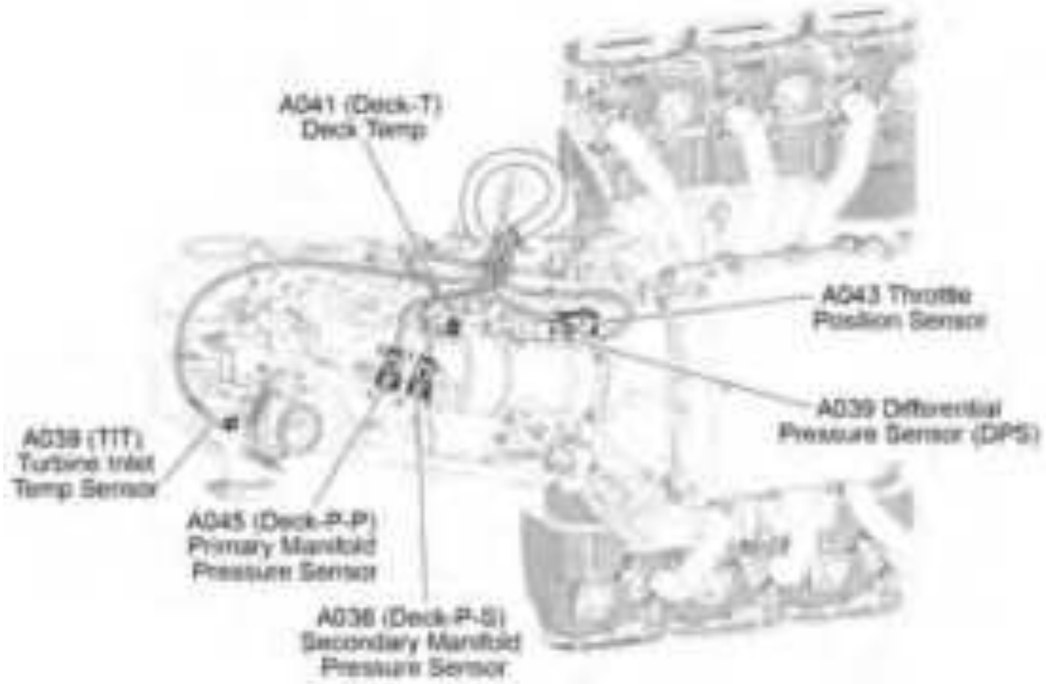


Figure 3
Wiring Harness Connectors – Bottom of Engine

7. Wiring Harness Parts List

This table is a comprehensive listing of connectors, terminals, and splices used throughout this manual.

Lycoming P/N	Description	Where Used	Included in Kit#
PUSH TO SEAT CONNECTORS			
60J29743-CT	Connector Assy, ASM Conn F Gt 150 SLD	A005-P THRU A010-P	05K31725 05K31726 05K31727 05K31728
60K29739-CT	Contact, Terminal, 0.75-1.0 Mm, 20-18 AWG	A005-P THRU A010-P	05K31723 05K31724 05K31727 05K31728
60N29742-CT	Seal, Cable, White	A005-P THRU A010-P	05K31723 05K31724 05K31727 05K31728
60J29746-CT	Lock, Terminal Position Assurance, Blue	A005-P THRU A010-P	05K31727 05K31728
60K29745-CT	Lock, Connector Position Assurance, Green	A005-P THRU A010-P	05K31727 05K31728
60J29716-CT	Connector Assy	A035-P, A041-P, A042-P	05K31725 05K31726 05K31729 05K31730
60K29723-CT	Contact, Terminal, 0.35-0.5 Mm, 22-20 AWG	A035-P, A037-P, A045-P, A041-P, A042-P	05K31723 05K31724 05K31729 05K31730 05K31731 05K31730
60K29714-CT	Lock, Secondary, Terminal Position Assurance	A035-P, A041-P, A042-P	05K31729 05K31730
60J29732-CT	Connector Assy	A036-P, A037-P, A038-P, A045-P	05K31725 05K31726 05K31731 05K31732
60N29740-CT	Seal, Cable, Blue	A036-P, A037-P, A038-P, A045-P	05K31723 05K31724 05K31731 05K31732

Lycoming P/N	Description	Where Used	Included in Kit#
PUSH TO SEAT CONNECTORS (Cont.)			
60K29723-CT	Contact, Terminal, 0.35-0.5 Mm, 22-20 AWG	A036-P, A037-P, A038-P, A045-P	05K31723 05K31724 05K31729 05K31730 05K31731 05K31730
60K29718-CT	Lock, Secondary, Terminal Position Assurance	A036-P, A037-P, A038-P, A045-P	05K31731 05K31732
PULL TO SEAT CONNECTORS			
60J29736-CT	Connector Assy, Conn F M/P 150.2 N/A	A043-P	05K31725 05K31726 05K31733 05K31734
60J29136-11-CT	Contact, Terminal, 0.50-0.35 Mm, 20-22 AWG	A043-P, A039-P	05K31723 05K31724 05K31733 05K31734 05K31738
60J29735-CT	Connector Assy, Conn 2f M/P 150.2 P2s	A011-P, A050-P (if equipped)	05K31725 05K31726 05K31735
60K29765-CT	Contact, Terminal, 0.80-1.0 Mm, 16-18 AWG	A011-P, A050-P (if equipped)	05K31723 05K31724 05K31735 05K31736 05K31737
60J29738-CT	Connector Assy	A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P	05K31725 05K31726 05K31736 05K31737
60K29765-CT	Contact, Terminal, 0.80-1.0 Mm, 16-18 AWG	A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P	05K31723 05K31724 05K31735 05K31736 05K31737
60J29136-01-CT	Connector Assy	A039-P	05K31725 05K31726 05K31738

Lycoming P/N	Description	Where Used	Included in Kit#
PULL TO SEAT CONNECTORS (Cont.)			
60J29136-11-CT	Contact, Terminal, 0.35-0.5 Mm, 22-20 AWG	A039-P	05K31723 05K31724 05K31733 05K31734 05K31738
60J29552-CT	Connector Assy, Black	A015-P, A016-P, A017-P, A018-P, A019-P, A020-P	05K31725 05K31726 05K31739 05K31740
60N29553-CT	Seal, Cable, Light Blue	A015-P, A016-P, A017-P, A018-P, A019-P, A020-P	05K31723 05K31724 05K31739 05K31740
60K29554-CT	Contact, Terminal, 0.5-1.0 mm, 22-18 AWG	A015-P, A016-P, A017-P, A018-P, A019-P, A020-P	05K31723 05K31724 05K31739 05K31740
60P29555-CT	End Clip, Black	A015-P, A016-P, A017-P, A018-P, A019-P, A020-P	05K31739 05K31740
60P29556-CT	Cap, Protective, Black, 90 Deg	A015-P, A016-P, A017-P, A018-P, A019-P, A020-P	05K31739 05K31740
60J29749-CT	Connector Assy	A012-P, A026-P	05K31725 05K31726 05K31741
60N29755-CT	Seal, Cable, Yellow	A012-P, A026-P	05K31723 05K31724 05K31741
60K29754-CT	Contact, Terminal, Socket, 0.25-0.35 Mm, 22-20 AWG	A012-P, A026-P	05K31723 05K31724 05K31741
60K29940-CT	Contact, Terminal, Socket, 0.25-0.35 Mm, 22-20 AWG	A012-P, A026-P	N/A
60J29750-CT	Connector Assy, Splash Proof, With Secondary Lock	A003-P, A004-P	05K31725 05K31726 05K31742
60N29752-CT	Seal, Cable, Blue	A003-P, A004-P	05K31723 05K31724 05K31742

Lycoming P/N	Description	Where Used	Included in Kit#
PULL TO SEAT CONNECTORS (Cont.)			
60K29753-CT or 60K29942-CT	Contact, Terminal, 0.2-0.5 Mm, 24-20 AWG	A003-P, A004-P	05K31723 05K31724 05K31742
60N29712-CT	Splice, Solistrand, 8 AWG	Starpoint A, Starpoint B	N/A
D38999/26FH35SN	Connector, Plug	A001-P1	N/A
D38999/26FH35SA	Connector, Plug	A001-P2	N/A
D38999/26FD35SN	Connector, Plug	A001-P3	N/A
D38999/26FD35SA	Connector, Plug	A001-P4	N/A
D38999/26FE35SN	Connector, Plug	A002-P1	N/A
D38999/26FE35SA	Connector, Plug	A002-P2	N/A
D38999/26FD35SB	Connector, Plug	AF-P1	N/A
MS3459L18-10P	Connector, Plug, Self-Locking Coupling Nut	AF-P2	N/A
*MS3459L16-10P or **MS3459W16-10P	Connector, Plug Connector, Plug	A110-P A110-P	N/A N/A
D38999/26WA98SN	Connector Assy.	A013-P, A014-P, A025-P, A040-P	N/A
M39029/56-348	Contact, Socket, 22 AWG	A001-P1, A001-P2, A001-P3, A001-P4, A002-P1, A002-P2, AF-P1	05K31723 05K31724
M39029/29-213	Contact, Pin, 12 AWG	AF-P2, A110-P	05K31723 05K31724
M39029/56-351	Contact, Socket, 20 AWG	A013-P, A014-P, A025-P, A040-P	05K31723 05K31724
M85049/8923N03	Backshell, 45°, Self-Locking	A001-P1, A001-P2	N/A
M85049/8915N03	Backshell, 45°, Self-Locking	A001-P3, A001-P4	N/A
M85049/8817N03	Backshell, Straight, Self-Locking	A002-P1, A002-P2	N/A
M85049/38S15N	Backshell, Straight, Self-Locking	AF-P1	N/A
M85049/118S18N	Backshell, Straight, Self-Locking	AF-P2	N/A
*M85049/82-16N02 or **M85049/82-16W02	Backshell Backshell	A110-P A110-P	N/A N/A
M85049/38S9W	Backshell, Straight, Self-Locking	A013-P, A014-P, A025-P, A040-P	N/A
* Connector P/N MS3459L16-10P must be used with Backshell P/N M85049/82-16N02 ** Connector P/N MS3459W16-10P must be used with Backshell P/N M85049/82-16W02			

Lycoming P/N	Description	Where Used	Included in Kit#
PULL TO SEAT CONNECTORS (Cont.)			
M85049/128-3 or 60P29756-CT	Shield Band, Connector, Electrical Backshell, .245in. X 14.25in.	A001-P1, A001-P2, A001-P3, A001-P4, A002-P1, A002-P2, Coil Box Pass Thru, A110-P	N/A
MS25036-154	Terminal, Lug, Insulated, 14-16 AWG	E54, E70	05K31753
60J29760-CT	Connector, Thermocouple	A080-P THRU A085-P, A087-P thru A093-P	05K31725 05K31726
60N29761-CT	Wire, Thermocouple, Duplex Insulated, 22 AWG		05K31750 05K31751
60P29758-CT or	Tape, Polyimide, .5” x 36 YD x 2.6 MIL		N/A
60P29759-CT	Tape, Polyimide, 1” x 36 YD x 2.6 MIL		N/A
	Loctite® 2422	A013-P, A014-P, A025-P, A040-P	N/A

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8. Wiring Harness Repair Kits

This section lists kits that contain the parts necessary for repair of the wiring harness.

Lycoming Kit Part Number 05K31721					
Kit Name: Kit - Label (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): None					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60P31549-CT	Label, Cable Marker, 0.25in.	3	None		All Connectors
60P31550-CT	Label, Cable Marker, 0.50in.	3	None		Main Harness
MS3367-5-0	Cable Tie, 0.14in. X 5.50in.	6	None		All

Lycoming Kit Part Number 05K31722					
Kit Name: Kit - Label (Fleet)					
Shelf Life of Entire Kit (Quarters): None					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60P31549-CT	Label, Cable Marker, 0.25in.	10	None		All Connectors
60P31550-CT	Label, Cable Marker, 0.50in.	10	None		Main Harness
MS3367-5-0	Cable Tie, 0.14in. X 5.50in.	25	None		All

Lycoming Kit Part Number 05K31723					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 8					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
M39029/56-348	Contact, Socket, 22 AWG	5	None		A001-P1, A001-P2, A001-P3, A001-P4, A002-P1, A002-P2, AF-P1
M39029/56-351	Contact, Socket, 20 AWG	5	None		A013-P, A014-P, A025-P, A040-P
M39029/29-213	Contact, Pin, 12 -14 AWG	5	None		AF-P2, A110-P
60K29739-CT	Contact, Terminal, 0.75-1.0 mm, 20-18 AWG	5	12		A005-P THRU A010-P
60N29742-CT	Seal, Cable, White	5	20		A005-P THRU A010-P
60K29723-CT	Contact, Terminal, 0.35-0.5 mm, 22-20 AWG	5	12		A035-P, A036-P, A037-P, A038-P, A041-P, A042-P, A045-P,
60N29740-CT	Seal, Cable, Blue	5	20		A035-P, A036-P, A037-P, A038-P, A041-P, A042-P, A045-P,
60J29136-11-CT	Contact, Terminal, 0.50-0.35 mm, 20-22 AWG	5	12		A039-P, A043-P
60K29765-CT	Contact, Terminal, 0.80-1.0 mm, 16-18 AWG	5	12		A011-P, A050-P (if equipped), A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P

Lycoming Kit Part Number 05K31723 (Cont.)					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60K29554-CT	Contact, Terminal, 0.5-1.0 mm, 22-18 AWG	5	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60N29553-CT	Seal, Cable, Light Blue	5	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60K29754-CT	Contact, Terminal, Socket, 0.25-0.35 mm, 22-20 AWG	5	8		A012-P, A026-P
60N29755-CT	Seal, Cable, Yellow	5	60		A012-P, A026-P
60K29753-CT	Contact, Terminal, 0.2-0.5 mm, 24-20 AWG	5	8		A003-P, A004-P
60N29752-CT	Seal, Cable, Blue	5	60		A003-P, A004-P

Lycoming Kit Part Number 05K31724					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 8					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
M39029/56-348	Contact, Socket, 22 AWG	10	None		A001-P1, A001-P2, A001-P3, A001-P4, A002-P1, A002-P2, AF-P1
M39029/56-351	Contact, Socket, 20 AWG	10	None		A013-P, A014-P, A025-P, A040-P
M39029/29-213	Contact, Pin, 12 -14 AWG	10	None		AF-P2, A110-P
60K29739-CT	Contact, Terminal, 0.75-1.0 mm, 20-18 AWG	20	12		A005-P THRU A010-P
60N29742-CT	Seal, Cable, White	5	20		A005-P THRU A010-P
60K29723-CT	Contact, Terminal, 0.35-0.5 mm, 22-20 AWG	20	12		A035-P, A036-P, A037-P, A038-P, A041-P, A042-P, A045-P,
60N29740-CT	Seal, Cable, Blue	5	20		A035-P, A036-P, A037-P, A038-P, A041-P, A042-P, A045-P,
60J29136-11-CT	Contact, Terminal, 0.50-0.35 mm, 20-22 AWG	20	12		A039-P, A043-P
60K29765-CT	Contact, Terminal, 0.80-1.0 mm, 16-18 AWG	20	12		A011-P, A050-P (if equipped), A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P

Lycoming Kit Part Number 05K31724 (Cont.)					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60K29554-CT	Contact, Terminal, 0.5-1.0 mm, 22-18 AWG	20	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60N29553-CT	Seal, Cable, Light Blue	5	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60K29754-CT	Contact, Terminal, Socket, 0.25-0.35 mm, 22-20 AWG	20	8		A012-P, A026-P
60N29755-CT	Seal, Cable, Yellow	5	60		A012-P, A026-P
60K29753-CT	Contact, Terminal, 0.2-0.5 mm, 24-20 AWG	20	8		A003-P, A004-P
60N29752-CT	Seal, Cable, Blue	5	60		A003-P, A004-P

Lycoming Kit Part Number 05K31725					
Kit Name: Kit – Connector Assembly (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29760-CT	Connector, Thermocouple (# SMPW-CC-K-F)	3	None		A080-P thru A085-P, A087-P thru A093-P
60J29743-CT	Connector Assy, ASM CONN F GT 150 SLD	3	20		A005-P thru A010-P
60J29716-CT	Connector Assy	3	20		A035-P, A041-P, A042-P
60J29732-CT	Connector Assy	3	20		A036-P, A037-P, A038-P, A045-P
60J29736-CT	Connector Assy, Conn F M/P 150.2 N/A	3	20		A043-P
60J29735-CT	Connector Assy, Conn 2F M/P 150.2 P2S	3	20		A011-P, A050-P (if equipped)
60J29738-CT	Connector Assy	3	20		A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P
60J29136-01-CT	Connector Assy	3	20		A039-P
60J29552-CT	Connector Assy, Black	3	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60J29749-CT	Connector Assy	3	60		A012-P, A026-P
60J29750-CT	Connector Assy, Splash Proof, with Secondary Lock	3	60		A003-P, A004-P

Lycoming Kit Part Number 05K31726					
Kit Name: Kit - Connector Assembly (Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29760-CT	Connector, Thermocouple (# SMPW-CC-K-F)	10	None		A080-P thru A085-P, A087-P thru A093-P
60J29743-CT	Connector Assy, ASM CONN F GT 150 SLD	10	20		A005-P thru A010-P
60J29716-CT	Connector Assy	10	20		A035-P, A041-P, A042-P
60J29732-CT	Connector Assy	10	20		A036-P, A037-P, A038-P, A045-P
60J29736-CT	Connector Assy, Conn F M/P 150.2 N/A	10	20		A043-P
60J29735-CT	Connector Assy, Conn 2F M/P 150.2 P2S	10	20		A011-P, A050-P (if equipped)
60J29738-CT	Connector Assy	10	20		A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P
60J29136-01-CT	Connector Assy	10	20		A039-P
60J29552-CT	Connector Assy, Black	10	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60J29749-CT	Connector Assy	10	60		A012-P, A026-P
60J29750-CT	Connector Assy, Splash Proof, with Secondary Lock	10	60		A003-P, A004-P

Lycoming Kit Part Number 05K31727					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29743-CT	Connector Assy, ASM CONN F GT 150 SLD	1	20		A005-P thru A010-P
60K29739-CT	Contact, Terminal, 0.75-1.0 mm, 20-18 AWG	3	12		
60N29742-CT	Seal, Cable, White	3	20		
60J29746-CT	Lock, Terminal Position Assurance, Blue	1	20		
60K29745-CT	Lock, Connector Position Assurance, Green	1	20		
M23053/5-103-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31728					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29743-CT	Connector Assy, ASM CONN F GT 150 SLD	6	20		A005-P thru A010-P
60K29739-CT	Contact, Terminal, 0.75-1.0 mm, 20-18 AWG	15	12		
60N29742-CT	Seal, Cable, White	15	20		
60J29746-CT	Lock, Terminal Position Assurance, Blue	6	20		
60K29745-CT	Lock, Connector Position Assurance, Green	6	20		
M23053/5-103-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31729					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29716-CT	Connector Assy	1	20		A035-P, A041-P, A042-P
60K29723-CT	Contact, Terminal, 0.35-0.5 mm, 22-20 AWG	3	12		
60K29714-CT	Lock, Secondary, Terminal Position Assurance	1	20		
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31730					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29716-CT	Connector Assy	5	20		A035-P, A041-P, A042-P
60K29723-CT	Contact, Terminal, 0.35-0.5 mm, 22-20 AWG	12	12		
60K29714-CT	Lock, Secondary, Terminal Position Assurance	5	20		
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31731					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29732-CT	Connector Assy	1	20		A036-P, A037-P, A038-P, A045-P
60N29740-CT	Seal, Cable, Blue	3	20		
60K29723-CT	Contact, Terminal, 0.35-0.5 mm, 22-20 AWG	3	12		
60K29718-CT	Lock, Secondary, Terminal Position Assurance	1	20		
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31732					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29732-CT	Connector Assy	5	20		A036-P, A037-P, A038-P, A045-P
60N29740-CT	Seal, Cable, Blue	15	20		
60K29723-CT	Contact, Terminal, 0.35-0.5 mm, 22-20 AWG	15	12		
60K29718-CT	Lock, Secondary, Terminal Position Assurance	5	20		
M23053/5-105-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	5	48		

Lycoming Kit Part Number 05K31733					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29736-CT	Connector Assy, Conn F M/P 150.2 N/A	1	20		A043-P
60J29136-11-CT	Contact, Terminal, 0.50-0.35 mm, 20-22 AWG	8	12		
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31734					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29736-CT	Connector Assy, Conn F M/P 150.2 N/A	2	20		A043-P
60J29136-11-CT	Contact, Terminal, 0.50-0.35 mm, 20-22 AWG	18	12		
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31735					
Kit Name: Kit - Connector (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29735-CT	Connector Assy, Conn 2F M/P 150.2 P2S	2	20		A011-P, A050-P (if equipped)
60K29765-CT	Contact, Terminal, 0.80-1.0 mm, 16-18 AWG	6	12		
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31736					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29738-CT	Connector Assy	1	20		A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P
60K29765-CT	Contact, Terminal, 0.80-1.0 mm, 16-18 AWG	4	12		
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31737					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29738-CT	Connector Assy	6	20		A065-P, A066-P, A067-P, A068-P, A069-P, A070-P, A071-P, A072-P, A073-P, A074-P, A075-P, A076-P
60K29765-CT	Contact, Terminal, 0.80-1.0 mm, 16-18 AWG	20	12		
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31738					
Kit Name: Kit - Connector (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): 12					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29136-01-CT	Connector Assy	1	20		A039-P
60J29136-11-CT	Contact, Terminal, 0.50-0.35 mm, 20-22 AWG	5	12		
M23053/5-104-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		
M23053/5-108-0	Insulation Sleeving, Heat Shrinkable	1 Ft.	48		

Lycoming Kit Part Number 05K31739					
Kit Name: Kit - Connector (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 40					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29552-CT	Connector Assy, Black	1	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60N29553-CT	Seal, Cable, Light Blue	3	40		
60K29554-CT	Contact, Terminal, 0.5-1.0 mm, 22-18 AWG	3	40		
60P29555-CT	End Clip, Black	1	40		
60P29556-CT	Cap, Protective, Black, 90 Deg.	1	40		

Lycoming Kit Part Number 05K31740					
Kit Name: Kit - Connector (Fleet)					
Shelf Life of Entire Kit (Quarters): 40					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29552-CT	Connector Assy, Black	5	40		A015-P, A016-P, A017-P, A018-P, A019-P, A020-P
60N29553-CT	Seal, Cable, Light Blue	12	40		
60K29554-CT	Contact, Terminal, 0.5-1.0 mm, 22-18 AWG	12	40		
60P29555-CT	End Clip, Black	5	40		
60P29556-CT	Cap, Protective, Black, 90 Deg.	5	40		

Lycoming Kit Part Number 05K31741					
Kit Name: Kit - Connector (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): 8					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29749-CT	Connector Assy	2	60		A012-P, A026-P
60N29755-CT	Seal, Cable, Yellow	6	60		
60K29754-CT	Contact, Terminal, Socket, 0.25-0.35 mm, 22-20 AWG	6	8		

Lycoming Kit Part Number 05K31742					
Kit Name: Kit - Connector (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): 8					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60J29750-CT	Connector Assy, Splash Proof, with Secondary Lock	2	60		A003-P, A004-P
60N29752-CT	Seal, Cable, Blue	9	60		
60K29753-CT	Contact, Terminal, 0.2-0.5 mm, 24-20 AWG	9	8		

Lycoming Kit Part Number 05K31743					
Kit Name: Kit – Repair Sleeve (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N31500-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Green	2	20		Single Conductor Wire 24-26 AWG
60N31501-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Red	2	20		Single Conductor Wire 20-22 AWG
60N31502-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Blue	2	20		Single Conductor Wire 16-18 AWG
60N31503-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Yellow	2	20		Single Conductor Wire 12-14 AWG

Lycoming Kit Part Number 05K31744					
Kit Name: Kit – Repair Sleeve (Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N31500-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Green	10	20		Single Conductor Wire 24-26 AWG
60N31501-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Red	10	20		Single Conductor Wire 20-22 AWG
60N31502-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Blue	10	20		Single Conductor Wire 16-18 AWG
60N31503-CT	Side Entry Repair Sleeve, Immersion Resistant, 150 Degree C, Yellow	10	20		Single Conductor Wire 12-14 AWG

Lycoming Kit Part Number 05K31745					
Kit Name: Kit – Terminal Splice (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
M81824/1-1	Terminals Splice, 20-26 AWG, Red	5	20		M22759/43-22-9
M81824/1-2	Terminals Splice, 16-20 AWG, Blue	5	20		M22759/43-18-9
M81824/1-3	Terminals Splice, 12-16 AWG, Yellow	5	20		M22759/43-14-9, M22759/43-12-9

Lycoming Kit Part Number 05K31746					
Kit Name: Kit – Solder Sleeve (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N31504-CT	Solder Sleeves, 22 AWG	5	20		M22759/43-22-9
60N31505-CT	Solder Sleeves, 20 - 18 AWG	5	20		M22759/43-18-9
60N31506-CT	Solder Sleeves, 16 - 14 AWG	5	20		M22759/43-14-9
60N31507-CT	Solder Sleeves, 12 AWG	5	20		M22759/43-12-9

Lycoming Kit Part Number 05K31747					
Kit Name: Kit – Solder Sleeve (Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N31504-CT	Solder Sleeves, 22 AWG	10	20		M22759/43-22-9
60N31505-CT	Solder Sleeves, 20 - 18 AWG	10	20		M22759/43-18-9
60N31506-CT	Solder Sleeves, 16 - 14 AWG	10	20		M22759/43-14-9
60N31507-CT	Solder Sleeves, 12 AWG	10	20		M22759/43-12-9

Lycoming Kit Part Number 05K31748					
Kit Name: Kit – Solder Sleeve and Sleeve-Splice (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N29945-2-CT	Sleeve - Splice, Shielded Cable (16 - 20 AWG), 1 Conductor	1	20		M27500-18SP1S23
60N29945-3-CT	Sleeve - Splice, Shielded Cable (16 - 12 AWG), 1 Conductor	1	20		M27500-14SP1S23
60N29945-5-CT	Sleeve - Splice, Shielded Cable (26 - 20 AWG), 2 Conductor	1	20		M27500-22SP2S23
60N29945-11-CT	Sleeve - Splice, Shielded Cable (18 - 16 AWG), 3/4 Conductor	1	20		M27500-18SP3S23
M83519/2-8	Solder Sleeves & Shield Tubing S-Sleeve (22 AWG)	5	60		M27500-22SP2S23
M83519/2-9	Solder Sleeves & Shield Tubing S-Sleeve (18 AWG)	5	60		M27500-18SP1S23

Lycoming Kit Part Number 05K31749					
Kit Name: Kit – Solder Sleeve and Sleeve-Splice (Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N29945-2-CT	Sleeve - Splice, Shielded Cable (16 - 20 AWG), 1 Conductor	2	20		M27500-18SP1S23
60N29945-3-CT	Sleeve - Splice, Shielded Cable (16 - 12 AWG), 1 Conductor	2	20		M27500-14SP1S23
60N29945-5-CT	Sleeve - Splice, Shielded Cable (26 - 20 AWG), 2 Conductor	2	20		M27500-22SP2S23
60N29945-11-CT	Sleeve - Splice, Shielded Cable (18 - 16 AWG), 3/4 Conductor	2	20		M27500-18SP3S23
M83519/2-8	Solder Sleeves & Shield Tubing S-Sleeve (22 AWG)	10	60		M27500-22SP2S23
M83519/2-9	Solder Sleeves & Shield Tubing S-Sleeve (18 AWG)	10	60		M27500-18SP1S23

Lycoming Kit Part Number 05K31750					
Kit Name: Kit – Thermocouple (Non-Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N29944-CT	Sleeve - Splice Sealing System, Thermocouple, 16-22 AWG	2	20		A080-P thru A085-P, A087-P thru A093-P
60N29761-CT	Wire, Thermocouple, Duplex Insulated, 22 AWG	5 Ft.	None		

Lycoming Kit Part Number 05K31751					
Kit Name: Kit – Thermocouple (Fleet)					
Shelf Life of Entire Kit (Quarters): 20					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
60N29944-CT	Sleeve - Splice Sealing System, Thermocouple, 16-22 AWG	5	20		A080-P thru A085-P, A087-P thru A093-P
60N29761-CT	Wire, Thermocouple, Duplex Insulated, 22 AWG	10 Ft.	None		

Lycoming Kit Part Number 05K31752					
Kit Name: Kit – Braid Wire and Insulation Sleeving (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): 48					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
AA59569R36T0500	Braid, Wire, Tin Coated Copper, 0.500 In.	2 Ft.	None		A001-P1 – A001-P4, A002-P1, A002-P2, AF-P1, AF-P2, A110-P, Main Trunk and Coil Box Pass-Thru.
AA59569F36T0781	Braid, Wire, Tin Coated Copper, 0.781 In.	2 Ft.	None		A001-P1 – A001-P4, A002-P1, A002-P2, AF-P1, AF-P2, A110-P, Main Trunk and Coil Box Pass-Thru.
AA59569R30T1000	Braid, Wire, Tin Coated Copper, 1.00 In.	2 Ft.	None		A001-P1 – A001-P4, A002-P1, A002-P2, AF-P1, AF-P2, A110-P, Main Trunk and Coil Box Pass-Thru.
M23053/5-111-0	Insulation Sleeving, Heat Shrinkable, Black, 1.500 In. ID	2 Ft.	48		A001-P3, A001-P4
M23053/5-116-0	Insulation Sleeving, Heat Shrinkable, Black, Class 1 Over-Expanded, 2.000 In. ID	2 Ft.	48		A001-P1, A001-P2, A002-P1, A002-P2, AF-P1, AF-P2, A110-P
M23053/5-120-0	Insulation Sleeving, Heat Shrinkable, Black, Class 1 Over-Expanded, 2.375 In. ID	2 Ft.	48		Coil Box Pass-Thru

Lycoming Kit Part Number 05K31753					
Kit Name: Kit – Lug Terminal (Non-Fleet and Fleet)					
Shelf Life of Entire Kit (Quarters): None					
BOM of Kit					
Lycoming P/N	**Part Description**	**Quantity**	**Shelf Life (Quarters)**	**Picture**	**Connector Reference Designator/Where Used**
MS25036-154	Terminal, Lug, Insulated, 14-16 AWG	10	None		E54, E70

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