WOODWARD

Application Note 51466
(Revision NEW, 12/2012)
Original Instructions

DVP Flying Lead Cable Field Shortening Guide

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Contents

Contents

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **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.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

⚠WARNING

EXPLOSION HAZARD—Do not remove covers or connect/disconnect electrical connections unless power has been switched off and the area is known to be non-hazardous.

Chapter 1.
General Information

DVP cables are used to connect the DVP digital driver to a Woodward actuator/valve. The following guide provides a procedure for Woodward DVP cables to be shortened in the field after shipment from Woodward. Shortening of the cable is only possible on the flying lead end.

Some tools will be required to complete these tasks.

NOTICE

Do not tamper with the connector end of cable under any circumstances.

NOTICE

Only authorized and qualified electrical personnel should perform this procedure.

Chapter 2.
Motor Power Cable

References

- This section is for use with Woodward part numbers 5450-1460.XX.
- Woodward drawing 9907-2225.

Necessary Materials

- 1 foot of large 0.750 black shrink sleeving for the overall cover at the end of the cable. P/N M23053/5-109-0.
- 1 foot of 0.125 Yellow heat shrink sleeving for the shield wires. P/N M23053/5-104- 4.
- 1 foot of 0.125 Black heat shrink sleeving for ground wire. P/N M23053/5-104-0.
- 1 foot of 0.125 Black heat shrink sleeving for ground wire. P/N M23053/5-106-0.
- Shield terminator. Qty 4. P/N M83519/1-4.

Required Tools

- Wire stripper: Ideal Industries, P/N 45-1987 or equivalent.
- Wire cutter: Ideal Industries P/N 45-074 or equivalent.
- Wire cutter: Ideal Industries P/N 45-404, Blade P/N K-6493. This wire cutter is used to cut the jacket on M27599 type cable.
- Heat gun: Steinel, Model HL1910E or equivalent. Set temperature to (200 to 210) °C / (392 to 410) °F for shrinking of sleeving.
- Utility knife.
- Orange stick Jonard Industries P/N S-389M/10 or equivalent.
- Soldering iron.

Preparation for Termination

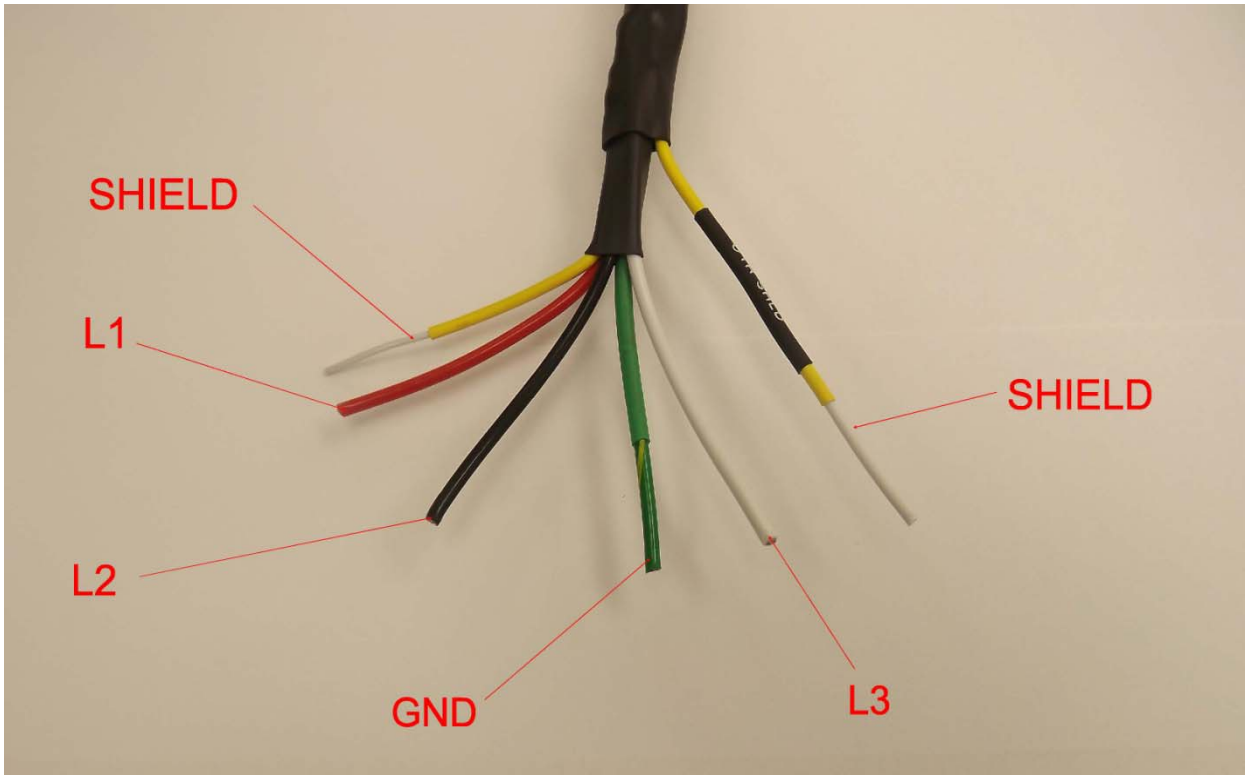
1. Ensure all equipment power is turned off.
2. Ensure you have the proper conduit connectors, cable grips, feed-throughs and the tools necessary to complete the installation.
3. Have some extra shrink tubing and a permanent marker on hand for terminations and marking as necessary.
4. Determine the overall cable length needed from the connector’s mating face and lay the cable so that it will not create a safety hazard.
5. Ensure that there are no equipment operations that would damage the cable, fork lift paths etc.
6. Mark the cable to the length necessary.
7. Double-check the routing and the length required. (Measure twice, cut once.)

Reference Cable

Reference Cable—Connector and “Flying Leads” on as-shipped cable.

Identification of Wires

- Red for L1.
- Green/Yellow for Ground.
- White for L3.
- Black for L2.



Cable Components.

Preparation of Cable for Cutting

Prepare to cut the cable to the appropriate length.

1. Mount the cable feed-through to the equipment panel.
2. Pull the cable through the panel feed-through and into the termination area.
3. Tighten the cable to the feed-through clamp at the proper location.
4. Cut off the excess outer Viton tubing.
5. Cut off excess machine braid.
6. Triple-check the cable length.
7. Cut the inner cable a few centimeters / inches longer than necessary, leaving room for a maintenance/strain relief loop.

Removal of Viton Outer Sheath

Using a utility knife, remove 15 cm / 6 inches of Viton outer sheath.

Cable with flying lead ends removed and Viton sheath removed. Kapton tape is to be removed utilizing a utility knife. Kapton is shown as a yellowish color.

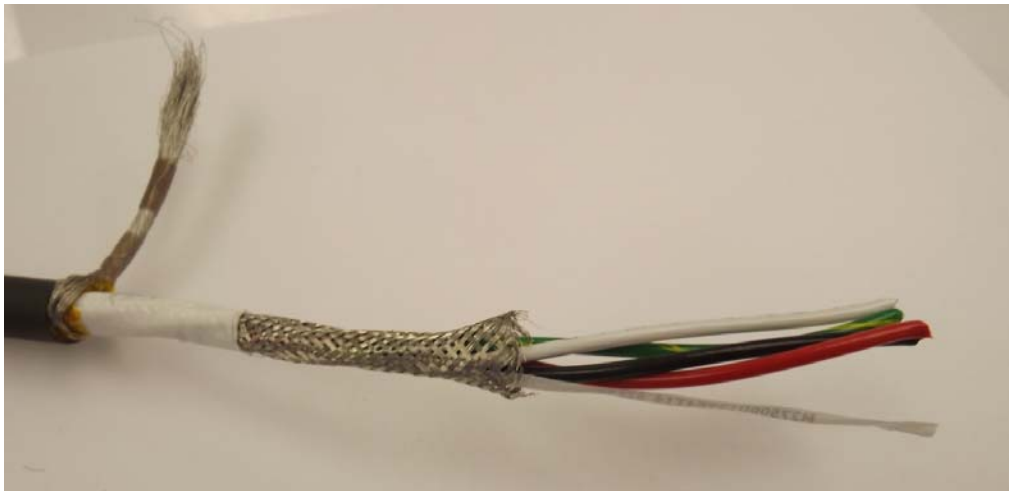
Outer Braiding

Cable with outer sheath removed. Kapton tape removed using utility knife, revealing outer machined braiding exposed. Outer shield is to be combed back utilizing “Orange Stick” or equivalent.

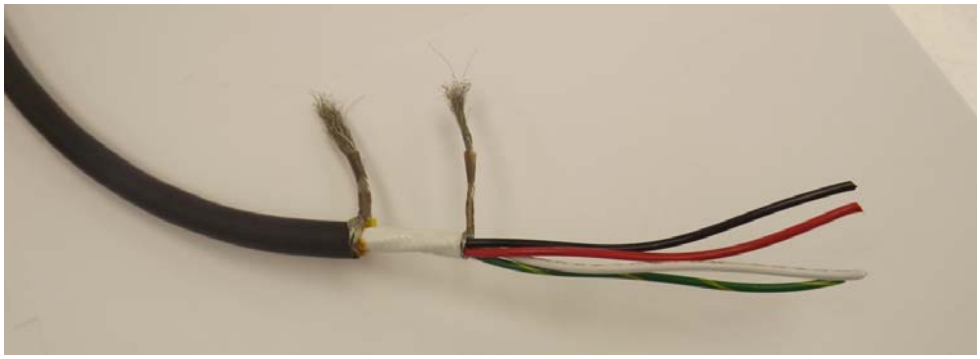
Removal of Inner Cable Jacket

Outer shield formed into “pigtail”, second layer of Kapton tape removed. Insulation trimmed back exposing inner shield.

Cutback Inner Shield

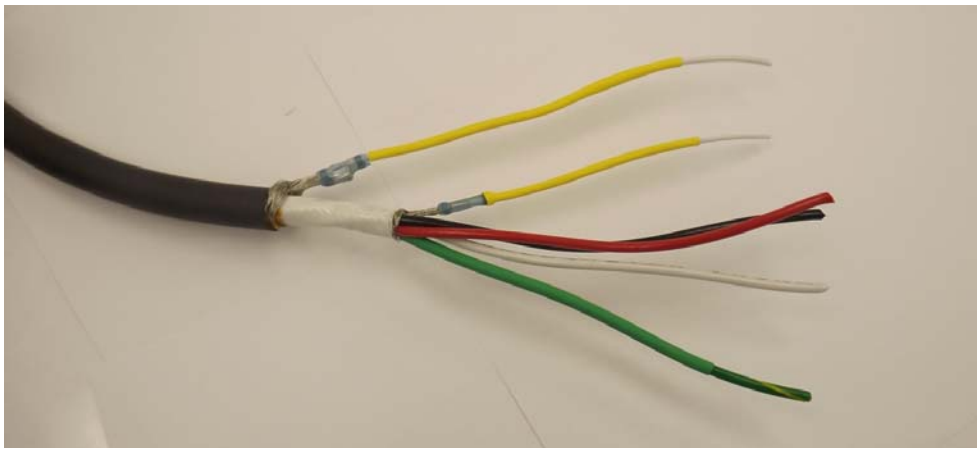


Inner shield trimmed back to expose individual conductors.



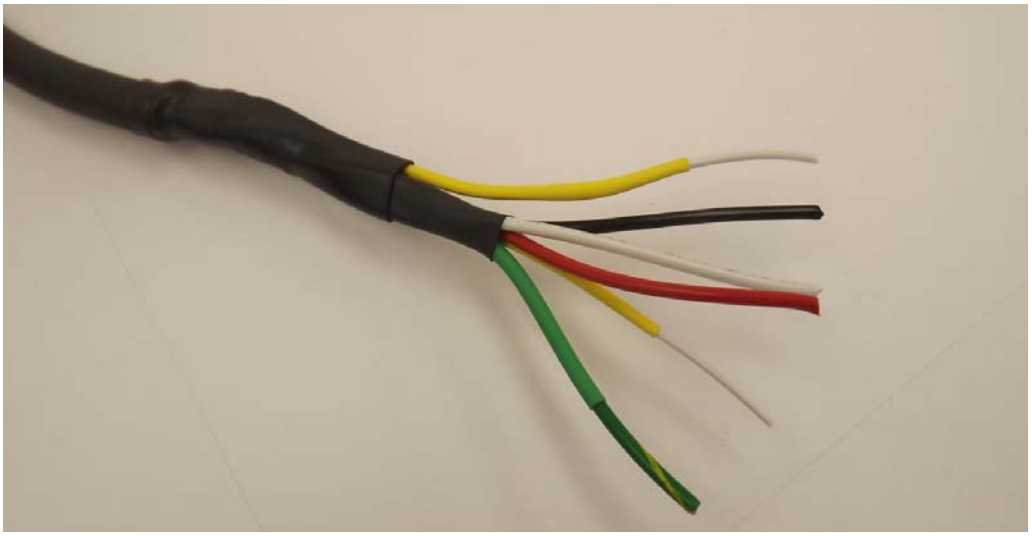
Outer and inner shields are now “pig tailed” awaiting shield wire extensions, solder sleeves and heat shrink sleeving.

Wire Shrink and Shield Termination



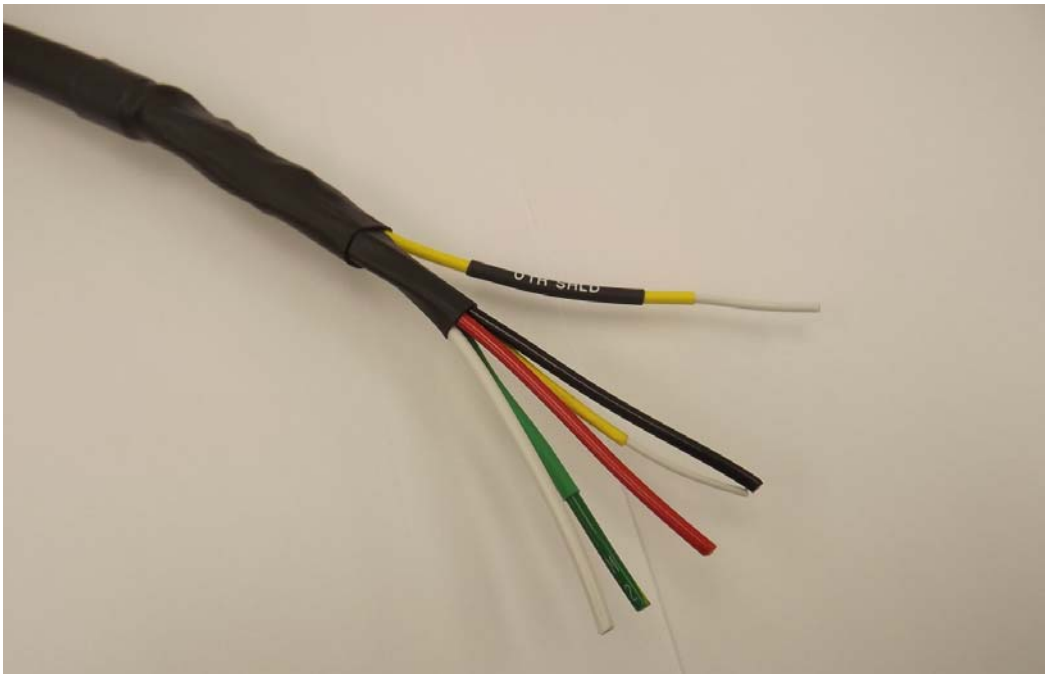
Shield “pigtails” now have wire, solder sleeves and yellow shrink sleeving installed. Green wire with yellow stripe and green shrink sleeving installed.

Cable Heat Shrink Application and Cable Finishing



The cable is finished with 2 layers of black heat shrink sleeving. The cable needs to have the outer shield identifier installed.

Labeling Application



Cable has outer shield identifier installed and is complete for installation.

Chapter 3.
Actuator Resolver Feedback 1

References

- This section for use with Woodward part numbers 5450-1462.XX.
- Woodward drawing 9907-2227.

Necessary Materials

- 1 foot of large 0.750 black shrink sleeving for the overall cover at the end of the cable. P/N M23053/5-109-0.
- 1 foot of 0.125 Yellow heat shrink sleeving for the shield wires. P/N M23053/5-104- 4.
- 1 foot of 0.125 Black heat shrink sleeving for ground wire. P/N M23053/5-104-0.
- 1 foot of 0.125 Black heat shrink sleeving for ground wire. P/N M23053/5-106-0.
- Shield terminator. Qty 4. P/N M83519/1-4.

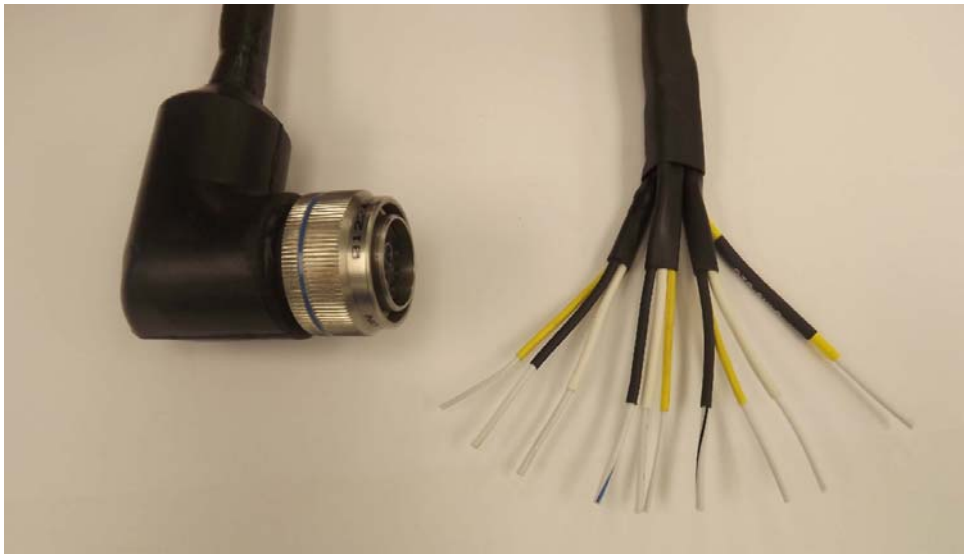
Required Tools

- Wire stripper: Ideal Industries, P/N 45-1987 or equivalent.
- Wire cutter: Ideal Industries P/N 45-074 or equivalent.
- Wire cutter: Ideal Industries P/N 45-404, Blade P/N K-6493. This wire cutter is used to cut the jacket on M27599 type cable.
- Heat gun: Steinel, Model HL1910E or equivalent. Set temperature to (200 to 210) °C / (392 to 410) °F for shrinking of sleeving.
- Utility knife.
- Orange stick Jonard Industries P/N S-389M/10 or equivalent.
- Soldering iron.

Preparation for Termination

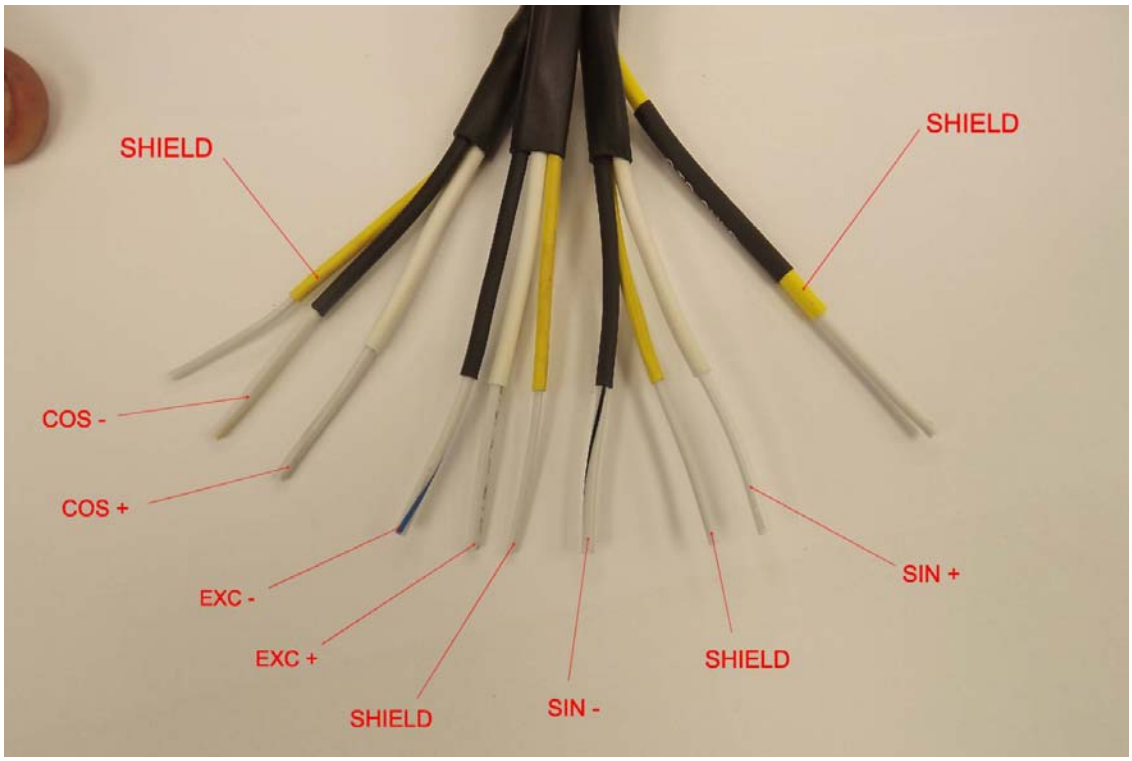
1. Ensure all equipment power is turned off.
2. Ensure you have the proper tools necessary to complete the installation.
3. Have a permanent marker on hand for terminations and marking as necessary. The color should be in contrast to wire insulation color.
4. Determine the overall cable length needed from the connector's mating face and lay the cable so that it will not create a safety hazard.
5. Ensure that there are no equipment operations that would damage the cable, fork lift paths etc.
6. Mark the cable to the length necessary.
7. Double check the routing and the length required. (Measure twice, cut once)

Reference Cable



Reference Cable—Connector and "Flying Leads" on as-shipped cable.

Identification of Wires



Cable Components.

Preparation of Cable for Cutting

Prepare to cut the cable to the appropriate e length.

1) Mount the cable feed-through to the equipment panel.
2) Pull the cable through the panel feed-through and into the termination area.
3) Tighten the cable to the feed-through clamp at the proper location.
4) Cut off the excess outer Viton tubing.
5) Cut off excess machine braid.
6) Triple-check the cable length.
7) Cut the inner cable a few centimeters / inches longer than necessary, leaving room for a maintenance/strain relief loop.

Removal of Viton Outer Sheath

Using a utility knife, remove 15 cm / 6 inches of Viton Outer Sheath.

Cable with flying lead ends removed and Viton sheath removed. Kapton tape is to be removed utilizing a utility knife. Kapton is shown as a yellowish color.

Outer Braiding

Cable with outer sheath removed. Kapton tape removed using utility knife revealing outer machined braiding exposed. Outer shield is to be combed back utilizing “Orange Stick” or equivalent.

Outer Shield Comb Back

Shield being combed out utilizing a Orange Stick. Jonard Industries, P/N S-389M/10. Other tools may be used as long as the tool is ***not sharp*** enough to damage other components(insulation, conductors, etc).

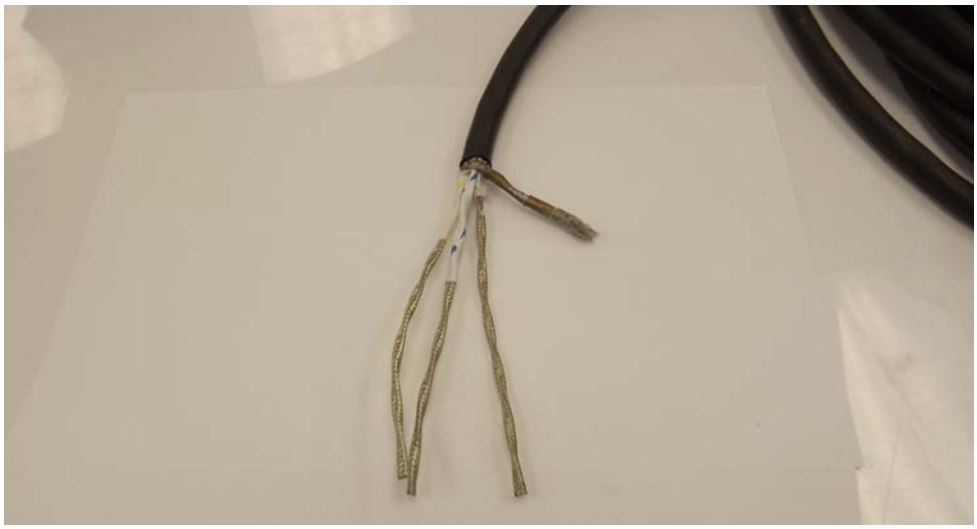
Outer Shield Removal

Outer shield has been combed back with an “Orange stick”, Jonard Industries P/N S-389M/10 or some type of blunt implement to reveal Kapton tape.

Kapton Tape Removal

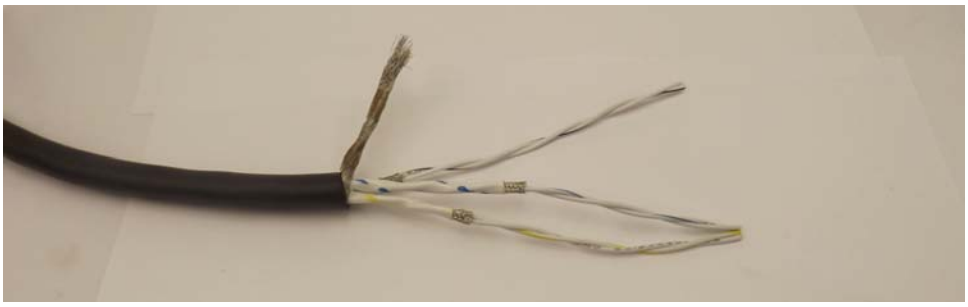
Kapton tape removed with a utility knife to expose wires and filler material. Outer shield has been formed into a “pigtail”.

Outer Wire Jacket Trimming



Outer wire jacket has been trimmed back approximately 8 cm / 3 inches with wire cutter, Ideal Industries P/N 45-404 and blade P/N k-6493 to reveal inner shield. Filler material has been removed with a utility knife.

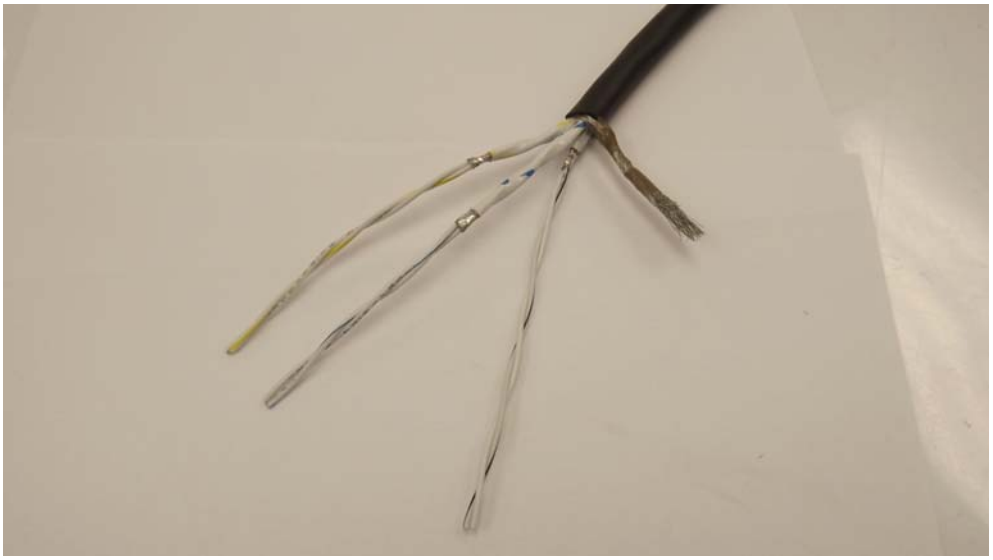
Inner Shields Trimmed



Inner shields trimmed back to expose individual conductors. First shield is trimmed back to within 13 mm / 0.5 inch of Viton tubing. Subsequent shields are staggered approximately 19 mm / 0.75 inch from the first.

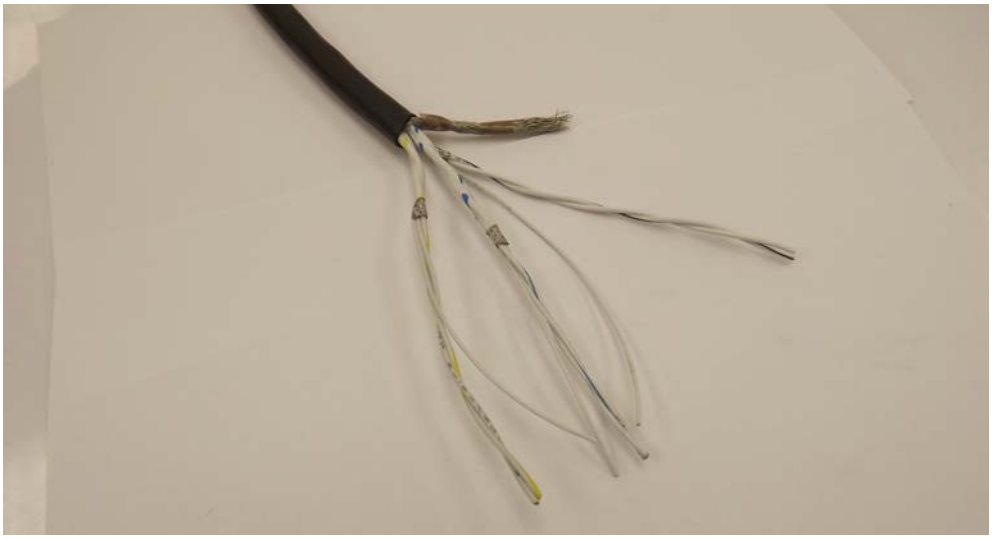
Tinning of Shields

Shields have been tinned and are ready to have shield wire extensions added.



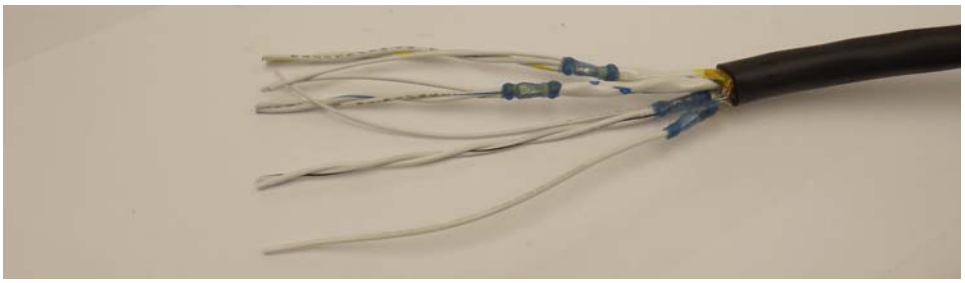
Shield Wire Extensions

Shield wire extensions have been soldered and are trimmed to length with wire cutters, Ideal Industries P/N 45--074. The distance from Viton tubing to the end of the conductors is approximately 15 cm / 6 inches.



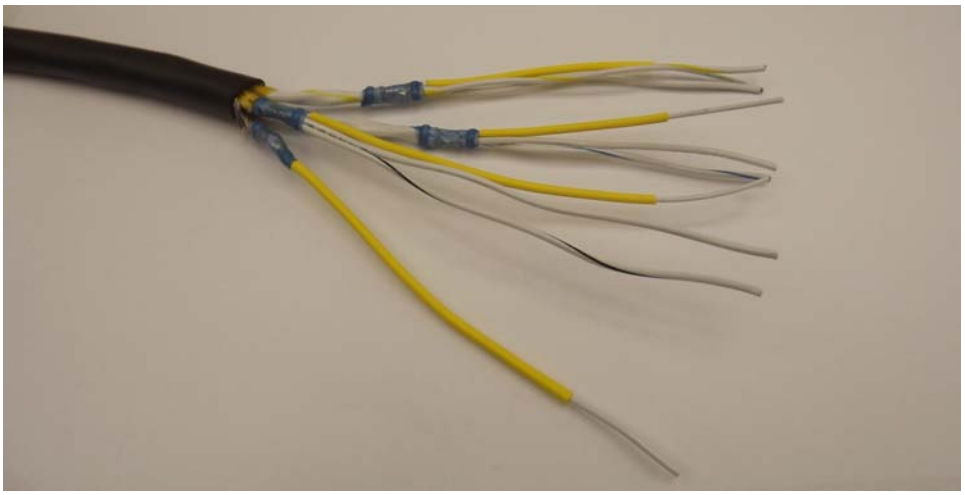
Addition of Solder Sleeves

Outer shield wire extensions have been soldered in place and solder sleeves have been installed. Heat gun temperature should be in the (232 to 288) °C / (450 to 550) °F range. If solder sleeves are not available, black shrink sleeving may be used, P/N M23053/5-107-0.



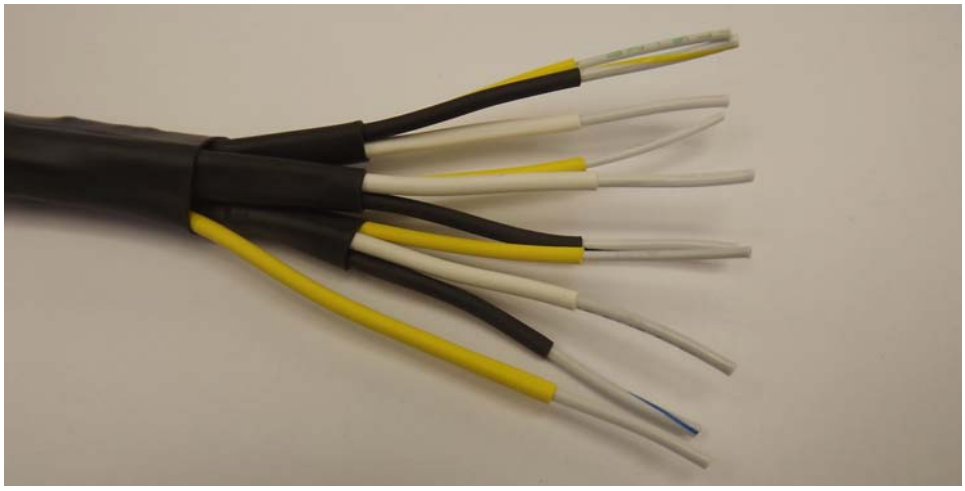
Addition of Shrink Sleeving to Inner and Outer Shields

Outer and inner shields have yellow shrink sleeving installed P/N M23053/5-104-4 within 2.5 cm / 1.0 inch of end of conductor. Heat gun temperature should be set at (200 to 210) °C / (392 to 410) °F. Caution is to be used not to scorch shrink sleeving.



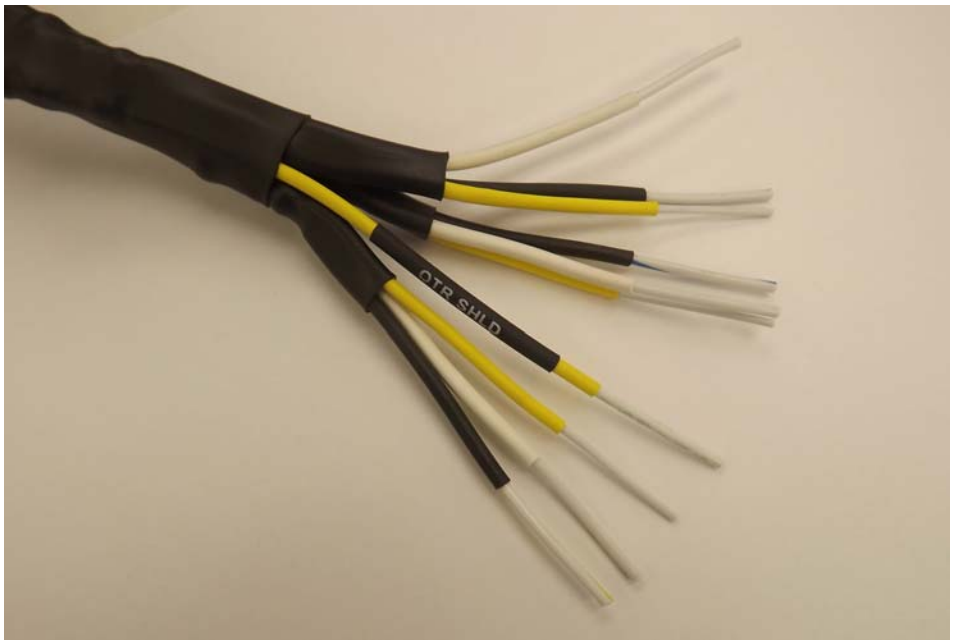
Individual Conductors

Individual conductors have appropriate color of shrink sleeving installed. Black shrink sleeving P/N M23053/5-104-0 has been installed in same manner as in previous step.



Finished Cable

The cable is finished with 2 layers of black heat shrink sleeving and the outer shield identifier is installed. The cable is finished and ready for installation. Black shrink sleeving P/N M23053/5-106-0, 88.9 mm / 3.50 inches long and P/N M23053/5-109-0, 76.2 mm / 3.00 inches long installed overall.



Chapter 4.
Resolver Feedback 2

References

- This section for use with Woodward part numbers 5450-1461.XX.
- Woodward Drawing 9907-2226

Necessary Materials

- 1 foot of large 0.750 black shrink sleeving for the overall cover at the end of the cable. P/N M23053/5-109-0.
- 2 feet of 0.125 Orange heat shrink sleeving. P/N M23053/5-104-3.
- 2 feet of 0.125 Blue heat shrink sleeving. P/N M23053/5-104-6.
- 2 feet of 0.125 Red heat shrink sleeving. P/N M23053/5-104-2.
- 2 feet of 0.125 Yellow heat shrink sleeving for the shield wires. P/N M23053/5-104- 4.
- 2 feet of 0.125 Black heat shrink sleeving for ground wire. P/N M23053/5-104-0.
- 2 feet of 0.125 Black heat shrink sleeving for ground wire. P/N M23053/5-106-0.
- Shield terminator. Qty 6. P/N M83519/1-4.

Required Tools

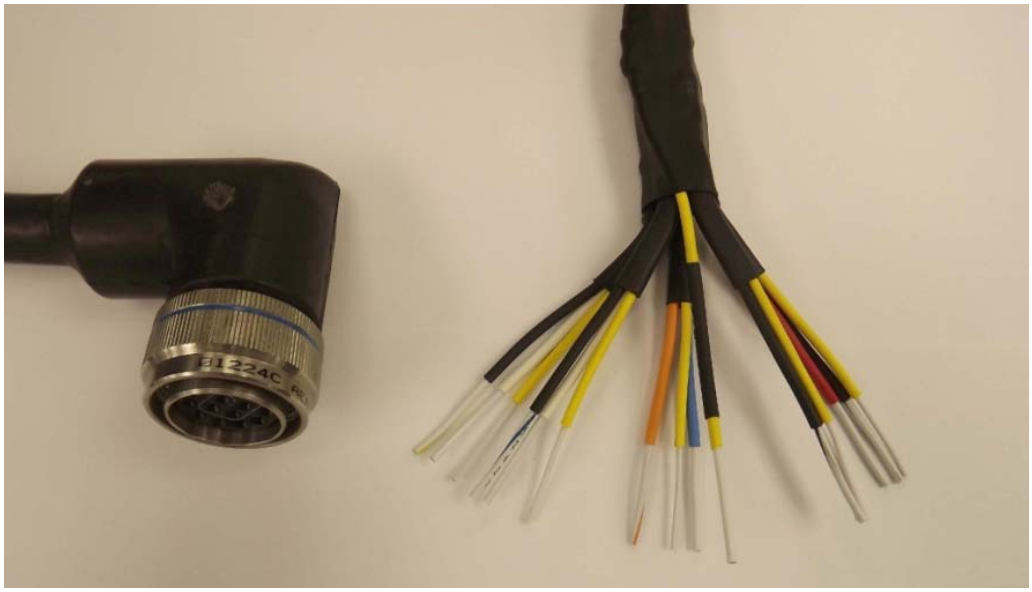
- Wire stripper: Ideal Industries, P/N 45-1987 or equivalent.
- Wire cutter: Ideal Industries P/N 45-074 or equivalent.
- Wire cutter: Ideal Industries P/N 45-404, Blade P/N K-6493. This wire cutter is used to cut the jacket on M27599 type cable.
- Heat gun: Steinel, Model HL1910E or equivalent. Set temperature to (200 to 210) °C / (392 to 410) °F for shrinking of sleeving.
- Utility knife.
- Orange stick Jonard Industries P/N S-389M/10 or equivalent.
- Soldering iron.

Preparation for Termination

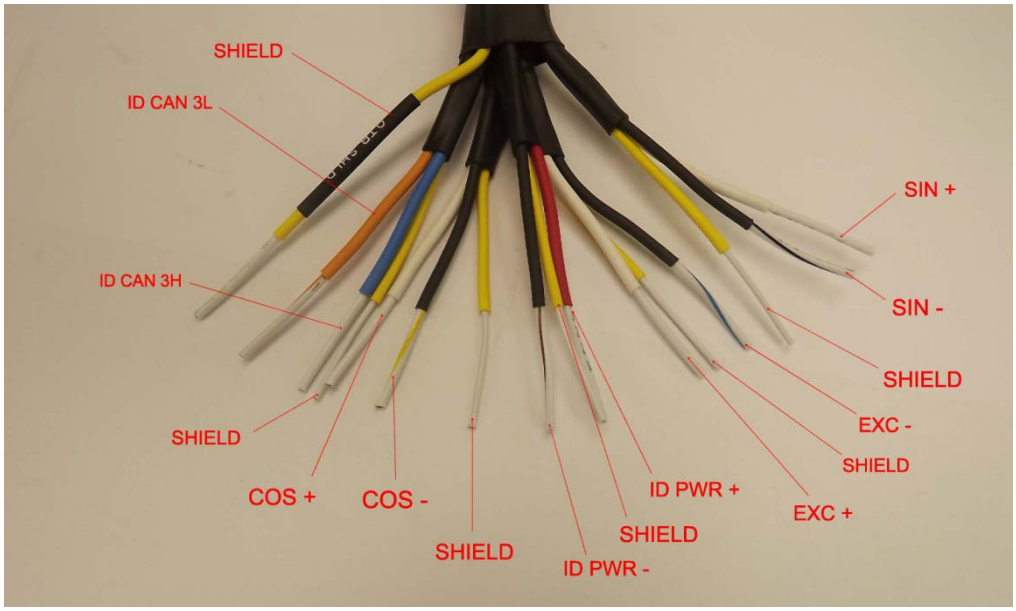
1. Ensure all equipment power is turned off.
2. Ensure you have the proper tools necessary to complete the installation.
3. Have a permanent marker on hand for terminations and marking as necessary. The color should be in contrast to wire insulation color.
4. Determine the overall cable length needed from the connector’s mating face and lay the cable so that it will not create a safety hazard.
5. Ensure that there are no equipment operations that would damage the cable, fork lift paths etc.
6. Mark the cable to the length necessary.
7. Double check the routing and the length required. (Measure twice, cut once)

Reference Cable

Reference Cable - Connector and “Flying Leads” on as-shipped cable.



Identification of Wires



Preparation of Cable for Cutting

Prepare to cut the cable to the appropriate e length.

1. Mount the cable feed-through to the equipment panel.
2. Pull the cable through the panel feed-through and into the termination area.
3. Tighten the cable to the feed-through clamp at the proper location.
4. Cut off the excess outer Viton tubing.
5. Cut off excess machine braid.
6. Triple-check the cable length.
7. Cut the inner cable a few centimeters / inches longer than necessary, leaving room for a maintenance/strain relief loop.

Removal of Viton Outer Sheath

Using a utility knife remove 15 cm / 6 inches of Viton Outer Sheath.

Cable with flying lead ends removed and Viton sheath removed. Kapton tape is to be removed utilizing a utility knife. Kapton is shown as a yellowish color.

Outer Braiding

Cable with outer sheath removed. Kapton tape removed using utility knife revealing outer machined braiding exposed. Outer shield is to be combed back utilizing “Orange Stick” or equivalent.

Outer Shield Comb Back

Shield being combed out utilizing a Orange Stick. Jonard Industries, P/N S-389M/10. Other tools may be used as long as the tool is ***not sharp*** enough to damage other components(insulation, conductors, etc).

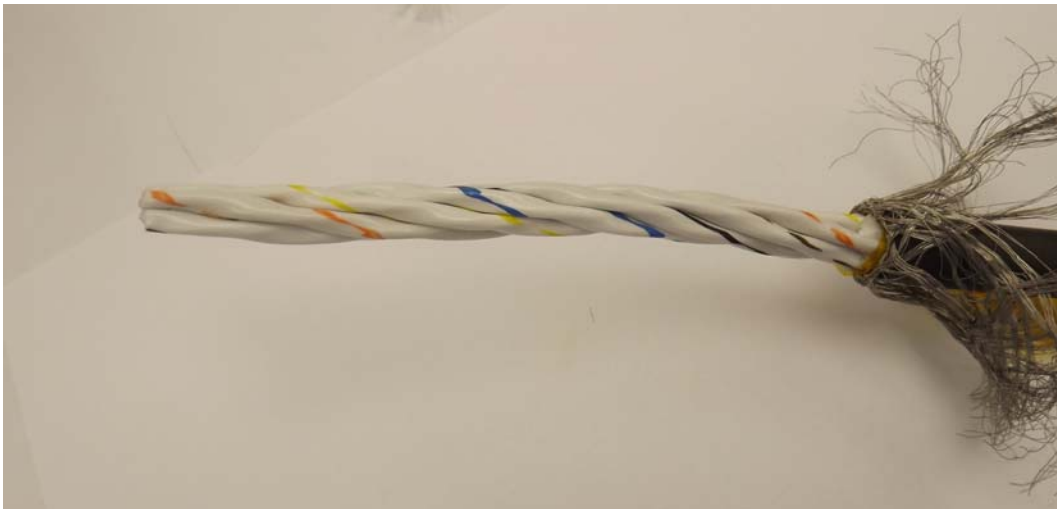
Outer Shield Removal

Outer shield has been combed back with an “Orange stick”, Jonard Industries P/N S-389M/10 or some type of blunt implement to reveal Kapton tape.

Kapton Tape Removal

Kapton tape removed with a utility knife to expose wires and filler material.

Filler Material Removed



Filler material has been removed with a utility knife. Outer shield pigtail is ready to be formed.

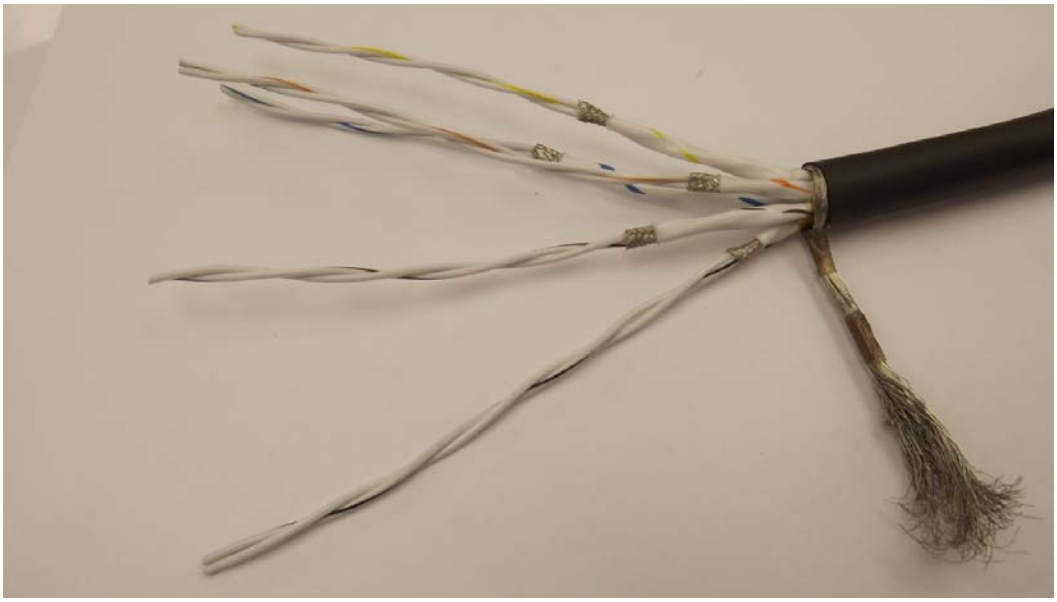
Outer Shield Pigtail Formed

Outer shield pigtail has been formed.

Outer Jacket Trimmed

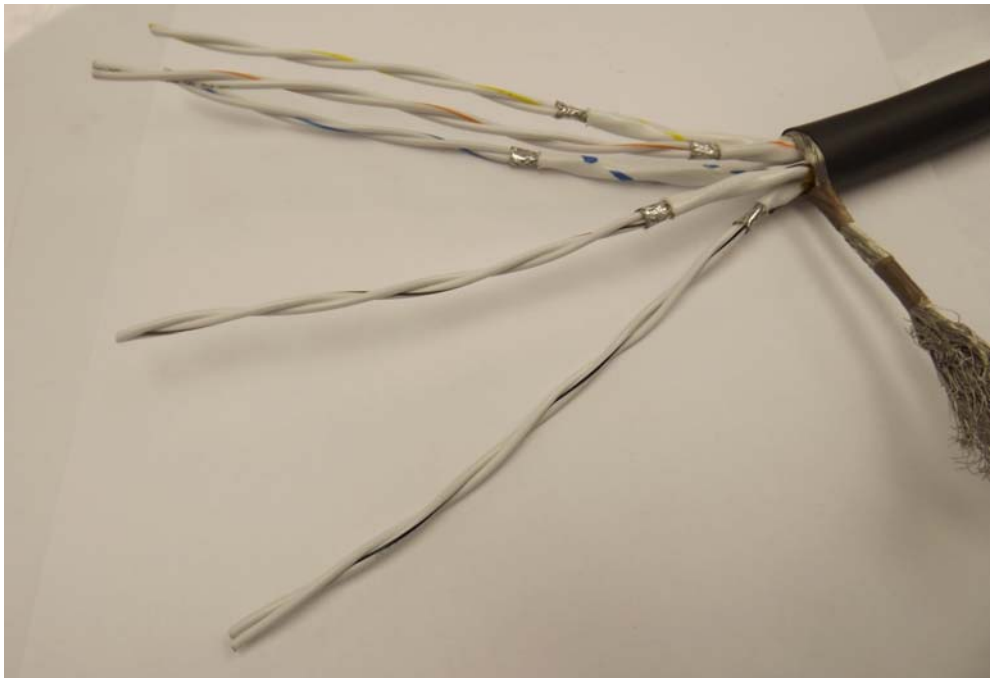
Cable jacket has been stripped back approximately 15 cm / 6 inches from end of cable using wire cutter, Ideal Industries P/N 45-404, blade P/N K-6493.

Inner Shields Trimmed to Length



Inner shields trimmed back to expose individual conductors. First shield is trimmed back to within 13 mm / 0.5 inch of Viton tubing. Subsequent shields are staggered approximately 19 mm / 0.75 inch from the first.

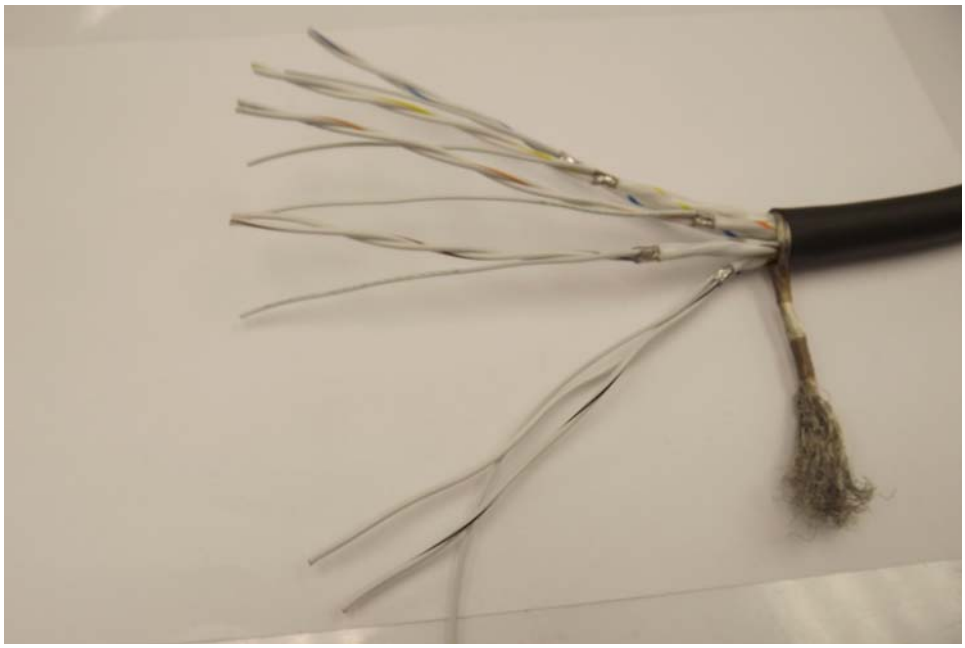
Shields Tinned



Shields have been tinned and are ready to have shield wire extensions added.

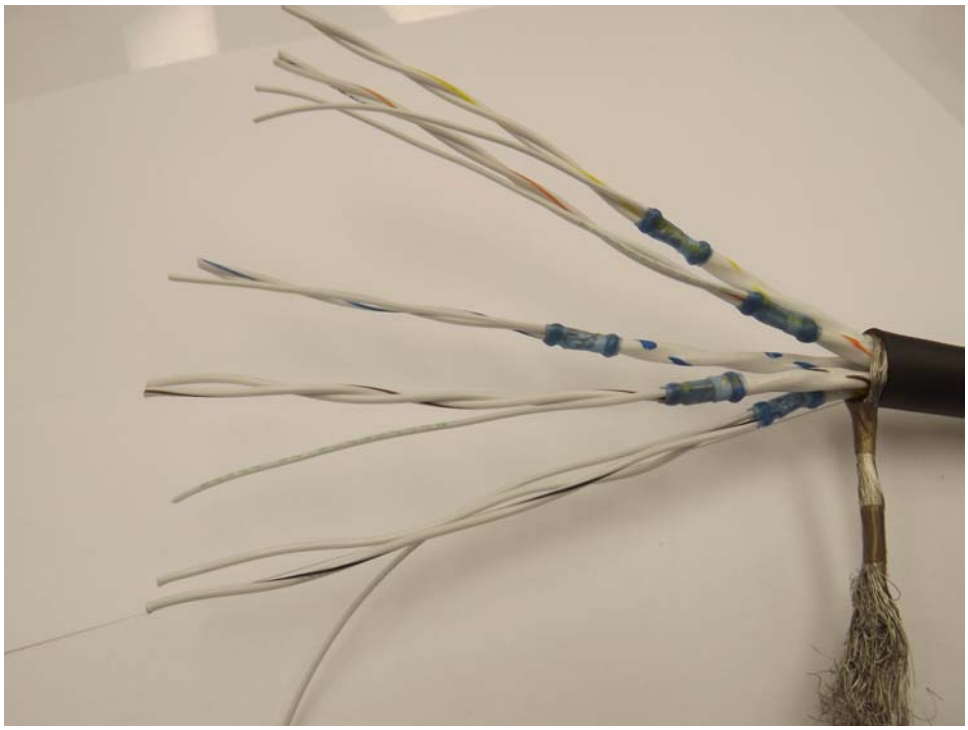
Shield Extensions Added

Outer shield wire extensions have been soldered in place and solder sleeves need to be installed. Heat gun temperature should be in the (232 to 288) °C / (450 to 550) °F range. If solder sleeves are not available, black shrink sleeving may be used, P/N M23053/5-107-0.



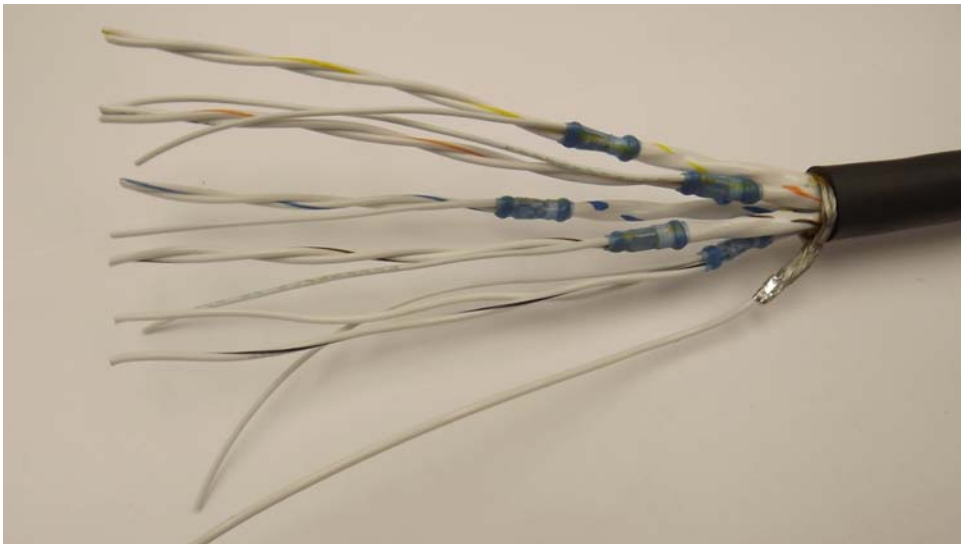
Solder Sleeves Added to Shield Extensions

Outer shield wire extensions have been soldered in place and solder sleeves have been installed. Heat gun temperature should be in the (232 to 288) °C / (450 to 550) °F range. If solder sleeves are not available, black shrink sleeving may be used, P/N M23053/5-107-0.



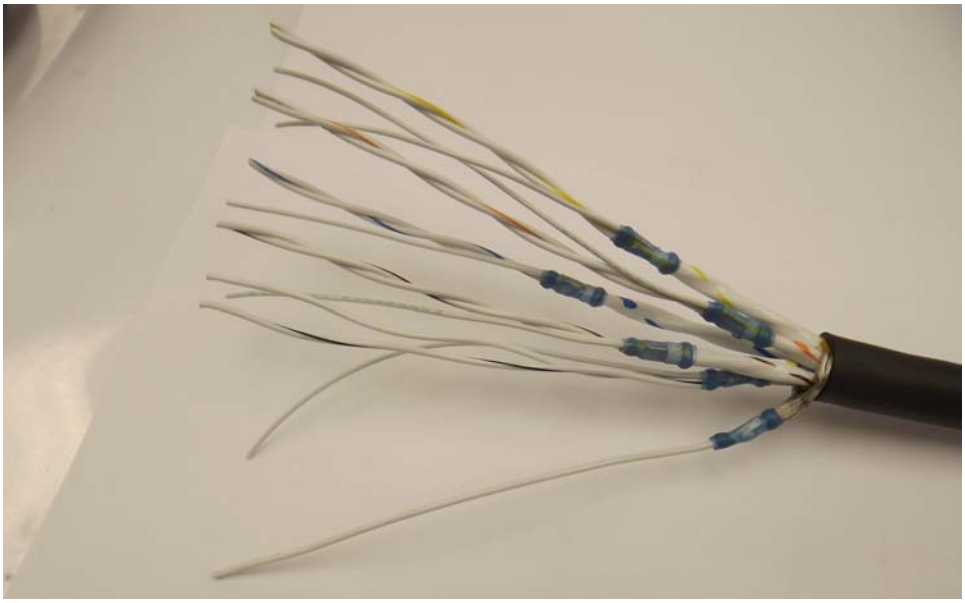
Outer Shield Extension Soldered in Place

Outer shield has wire extension soldered in place.

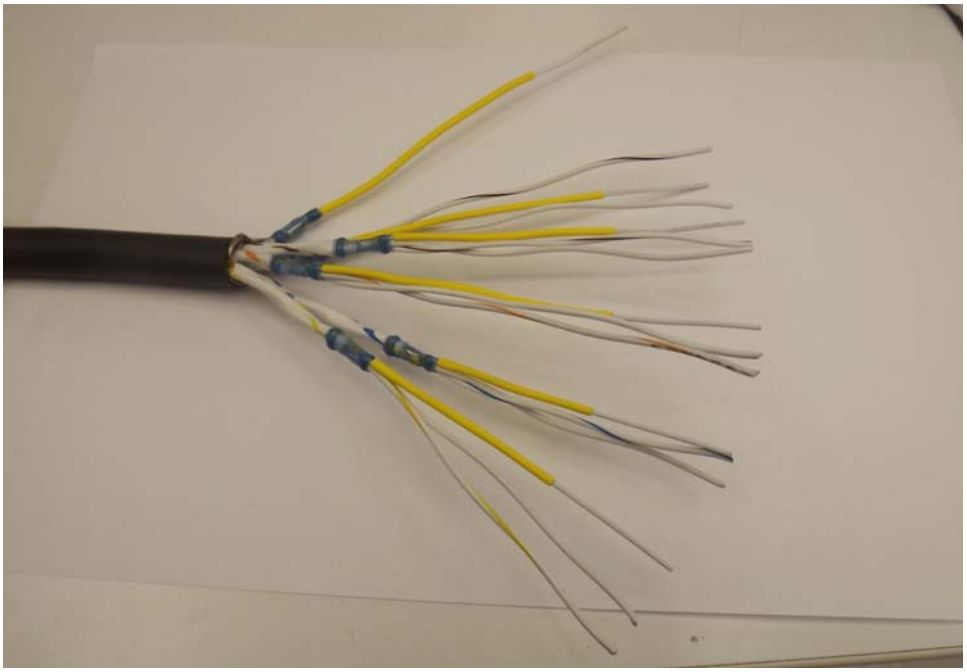


Outer Shield Solder Sleeve Added

Outer shield has solder sleeve installed. Heat gun temperature should be in the (232 to 288) °C / (450 to 550) °F range. If solder sleeves are not available, black shrink sleeving may be used, P/N M23053/5-107-0.

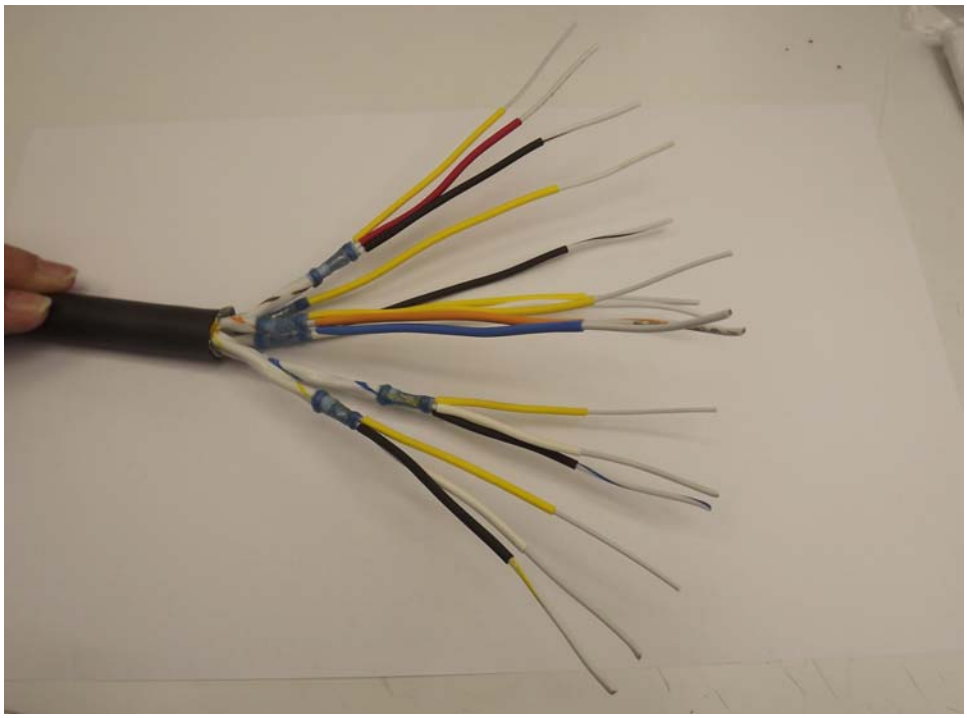


Inner and Outer Shields



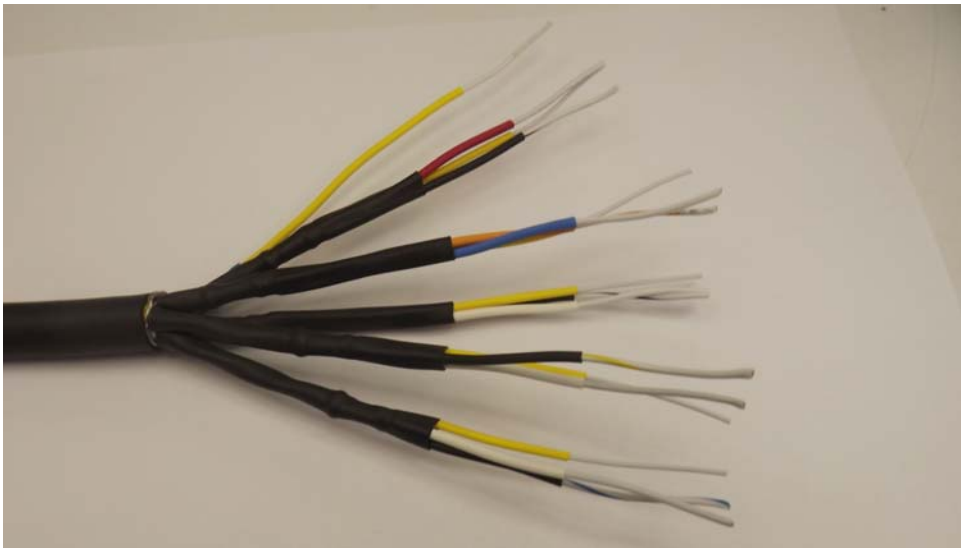
Outer and inner shields have yellow shrink sleeving installed, P/N M23053/5-104-4 within 2.5 cm / 1.0 inch of end of conductor. Heat gun temperature should be set at (200 to 210) °C / (392 to 410) °F. caution is to be used not scorch shrink sleeving.

Individual Conductors



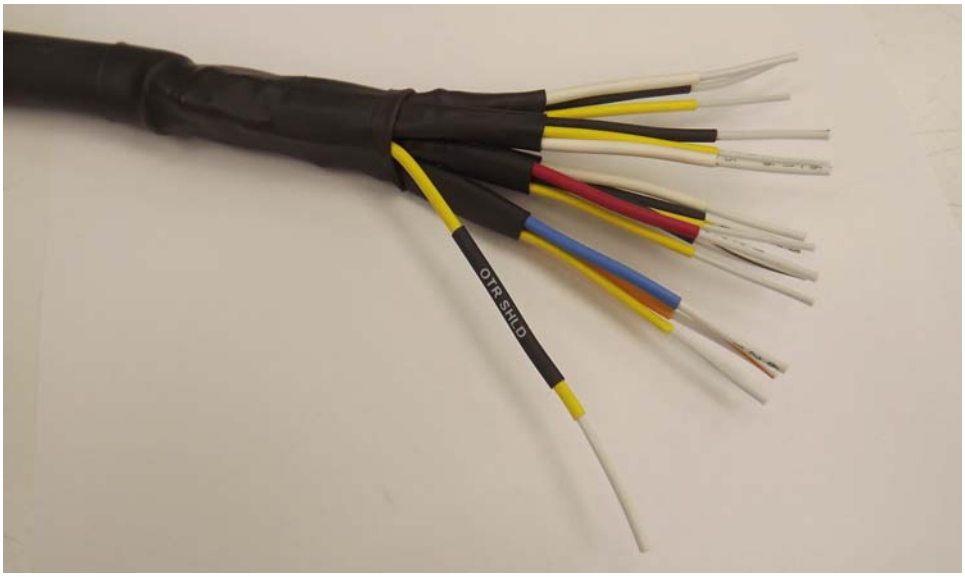
Individual conductors have appropriate color of shrink sleeving installed.

Grouped Conductors



Black shrink sleeving, P/N M23053/5-106-0, 88.9 mm / 3.50 inches long is installed to grouped wires.

Finished Cable



The cable is finished with 2 layers of black heat shrink sleeving and the outer shield identifier is installed. The cable is finished and ready for installation. Black shrink sleeving P/N M23053/5-106-0, 88.9 mm / 3.50 inches long and P/N M23053/5-109-0, 76.2 mm / 3.00 inches long installed overall.

Chapter 5.
Service Options

Product Service Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM and Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.
- A **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

You can locate your nearest Woodward distributor, AISF, RER, or RTR on our website at:

www.woodward.com/directory

Woodward Factory Servicing Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- return authorization number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact us via telephone, email us, or use our website: **www.woodward.com**.

How to Contact Woodward

For assistance, call one of the following Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (0) 21 52 14 51
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Turbine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

You can also locate your nearest Woodward distributor or service facility on our website at:

www.woodward.com/directory

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Your Name	
Site Location	
Phone Number	
Fax Number	
Engine/Turbine Model Number	
Manufacturer	
Number of Cylinders (if applicable)	
Type of Fuel (gas, gaseous, steam, etc)	
Rating	
Application	
Control/Governor #1	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #2	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #3	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51466.

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Email and Website—www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address / phone / fax / email information for all locations is available on our website.