PRO BEAM* Jr. Expanded Beam (EB) Cable Plug Connector Kits

Instruction Sheet
408–8797
27 APR 04 Rev A

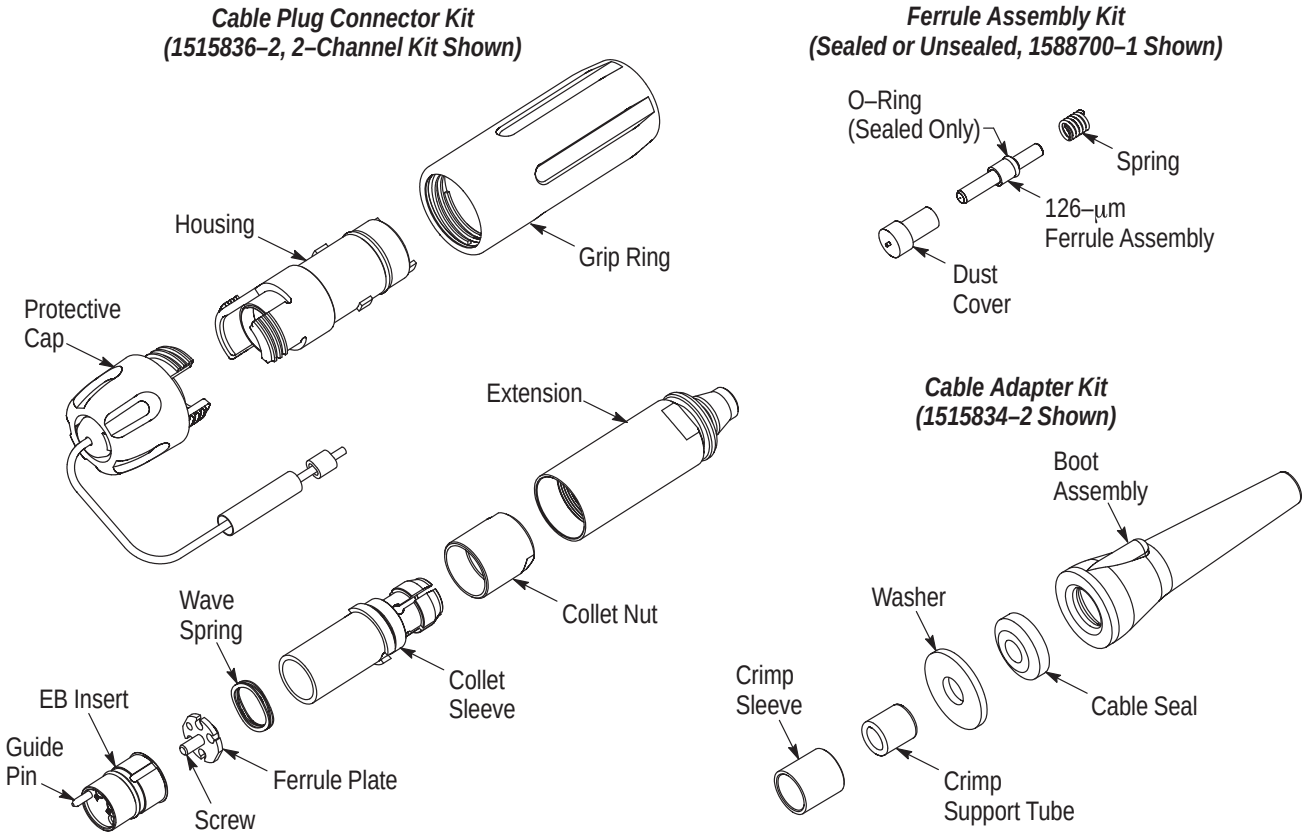


Figure 1

1. INTRODUCTION

PRO BEAM Jr. EB cable plug connector kits are designed to be installed onto jacketed fiber optic cable with KEVLAR® strength members. Each connector kit must be assembled using a ferrule assembly kit (for each connector channel) that corresponds with the mode of the fiber being used and a cable adapter kit that corresponds with the cable size being used.

NOTE *Dimensions in this instruction sheet are in metric units. Figures are not drawn to scale.*

Reasons for reissue of this instruction sheet are provided in Section 8, REVISION SUMMARY.

2. DESCRIPTION

Each kit contains the components shown in Figure 1.

3. HANDLING

DANGER *To avoid personal injury, NEVER look into the end of terminated or unterminated optical fibers. Laser radiation is invisible but can damage eye tissue.*

- Re–install the protective cap or mate the connector immediately after the cap has been removed to prevent contamination to the EB insert
- Do not touch the lens of the EB insert with your fingers or with any tools

NOTE *If the lens is touched or otherwise contaminated, clean the lens according to Section 6.*

4. TOOLS AND MATERIALS

The following tools and materials are necessary for preparation, assembly, inspection, and maintenance of the connector and cable assembly. Follow the operating instructions packaged with the tools and safety guidelines packaged with the materials.

NOTE *Items without a part number or supplier are customer supplied.*

4.1. Tools

— cable jacket strip tool

— KEVLAR® Shears 1278637–1

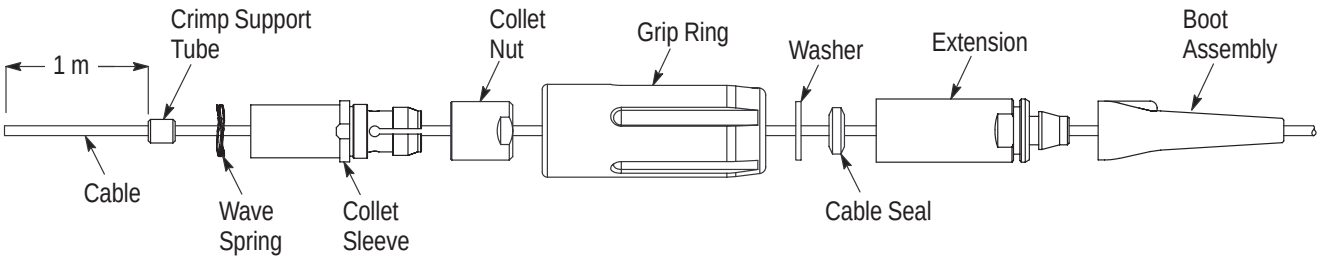


Figure 2

— SDE PEW 12 Hand Tool 91382–1 with Die Set 1673667–1 (408–8795)

— micrometer or vernier, dial, or digital caliper

— Fiber Stripping Tool 504024–1 (125–μm, red handle) (408–9485)

— Heat Cure Oven Assembly 502134–1 (120 Vac) or –2 (240 Vac) includes universal heat cure block or 502134–5 (120 Vac) or –6 (240 Vac) includes FSD heat cure block (408–9460)

— Curing Fixture 1693797–1 (408–8857)

— Sapphire Scribe Tool 504064–1 (408–4293)

— polishing machine (recommended) or Polishing Bushing 504862–1 (for hand polishing)

— Fiber Optic Inspection Microscope Kit (200×) 502970–3 (408–9801)

— 10× magnifier

— 2.5–mm hex wrench

— EB Insert Assembly Fixture 1515844–1

— Housing Key 1515831–1

— 15mm U–Wrench 1515387–1

— 17mm U–Wrench 1515389–1

— heat gun

4.2. Materials

— LOCTITE Adhesive 480

— lint–free tissues or cloths

— isopropyl alcohol (99%) or acetone

— Epoxy 504035–1 (4 grams)

— Epoxy Mixer 501202–1

— Epoxy Applicator Kit 501473–3

For hand polishing only:

— 5–μm Aluminum Oxide Polishing Film 228433–8

— 1mm Rubber Polishing Pad 501858–1 (green)

— Polishing Plate 501197–1 (216×280 mm)

— 0.3–μm Diamond Polishing Film 228433–5

— Final Polishing Film 502748–2

— lint–free applicator swabs

— DOW CORNING 55 O–ring lubricant or DuPont™ Krytox® LVP high–vacuum grease

— LOCTITE Adhesive 243

— clean dry air (canned)

5. ASSEMBLY PROCEDURE

IMPORTANT: Assemble the connector kit in a clean environment meeting the requirements of International Organization for Standardization (ISO) 14644–1 (Class 5), “Cleanrooms and Associated Controlled Environments, Part 1.” Make sure that all components are free from contamination.

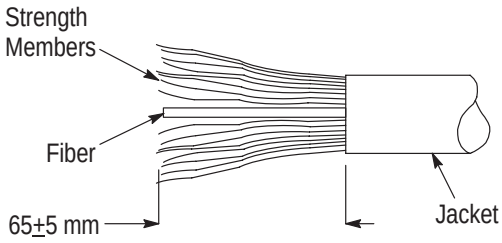
Proceed as follows:

5.1. Prepare the Cable

1. Slide the components shown in Figure 2 onto the cable allowing 1 m at the end of the cable for stripping the cable. Make sure to orient each component as shown.

2. Using the cable jacket strip tool, strip the jacket to the dimension shown in Figure 3, exposing the strength members and fiber.

Cable Strip Length



Note: Not to Scale

Figure 3

NOTE

These instructions are for single–channel connectors. For multi–channel connectors, perform the same assembly procedure for each channel.

5.2. Terminate the Fiber

1. Slide the crimp support tube forward until it aligns with the cable jacket. See Figure 4, Detail A.

2. Apply 2 or 3 drops of LOCTITE Adhesive 480 around the middle of the crimp support tube. Refer to Figure 4, Detail B.

3. Fold the strength members back over the crimp support tube allowing them to stick to the adhesive. See Figure 4, Detail C.

4. Slide the crimp sleeve (large diameter end first) over the fiber and approximately halfway over the crimp support tube. Using the shears, trim the strength members flush with edge of the crimp support tube. See Figure 4, Detail D.

5. Continue sliding the crimp sleeve onto the crimp support tube until it stops. *Make sure* that the crimp support tube stays aligned with the end of the cable jacket. See Figure 4, Detail E.

6. Place the crimp sleeve in the 8.6–mm hex nest of the hand tool, and crimp the crimp sleeve onto the crimp support tube. Make sure to position the crimp sleeve in the hex nest so that the crimp will locate from the back of the crimp sleeve to within the dimension shown in Figure 4, Detail E.

7. Using the micrometer or caliper, measure the crimp sleeve across the flats of the hex crimp to make sure that it conforms to the crimp height and crimp width shown in Figure 4, Detail F. If necessary, crimp again, and re–measure the crimp.

8. From the back of the crimp sleeve, inject LOCTITE Adhesive 480 between the crimp sleeve and crimp support tube. Then from the front and back of the crimp sleeve, inject the adhesive between the crimp support tube and cable jacket. See Figure 4, Detail G. Remove any excess adhesive from the outside and back edge of the crimp sleeve.

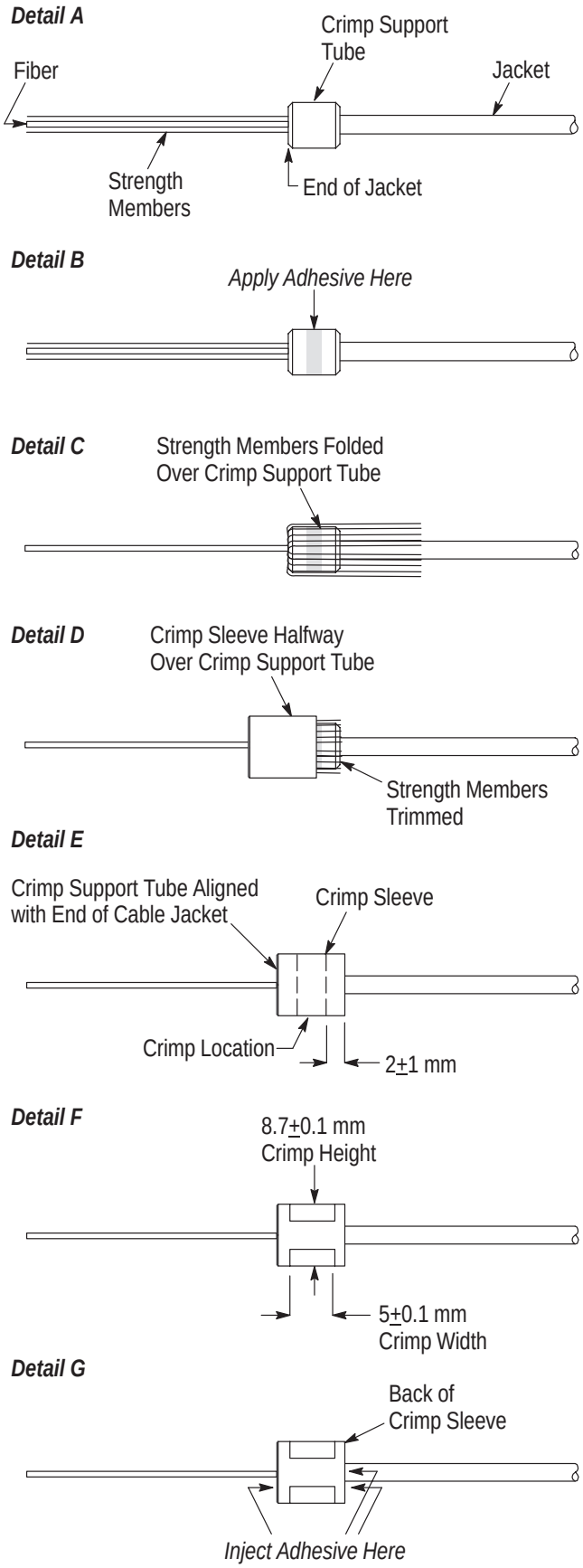


Figure 4

9. Mark the fiber at the dimension shown in Figure 5, Detail A, and using the fiber stripping tool, strip the buffer to the mark, exposing the bare fiber. Using a lint–free tissue or cloth dampened with the isopropyl alcohol or acetone, clean the bare fiber.

CAUTION *Take care not to break the bare fiber.*

10. Slide the spring onto the fiber. See Figure 5, Detail B.

11. For the sealed ferrule assembly, remove the O–ring from the ferrule assembly, and slide it onto the fiber. See Figure 5, Detail C.

12. Pre–heat the heat cure oven to 100°C.

13. Prepare the epoxy according to the following:

a. Remove the separating clip from the epoxy package. Using the epoxy mixer, mix the two components together thoroughly for 20 to 30 seconds.

b. Install the needle tip on the applicator from the epoxy applicator kit. Make sure it is secure. Remove the plunger.

c. Cut the epoxy packet open, and squeeze the epoxy into the back of the applicator. Re–assemble the plunger. Hold the applicator vertically, and slowly push on the plunger until the entrapped air escapes and a bead of epoxy appears at the needle tip.

d. Using a lint–free tissue or cloth dampened with the isopropyl alcohol or acetone, clean the tip of the applicator.

14. Hold the ferrule assembly vertically, and insert the needle tip into the base of the ferrule assembly until it is against the back (end closest to the base) of the ferrule assembly. Refer to Figure 6.

15. While holding the ferrule assembly *firmly* against the needle tip, *slowly* inject the epoxy until a small bead of epoxy (approximately 0.75 mm in diameter) forms at the end face of the ferrule assembly. DO NOT allow the bead to get too large or smear.

16. Withdraw the needle slightly, and inject an additional small amount of epoxy so that the cavity at the base of the ferrule assembly is approximately one–third to one–half full.

DANGER *To avoid personal injury, remember that epoxy is a hazardous material, and pay particular attention to the following:*

—ALWAYS follow manufacturer's safety guidelines.

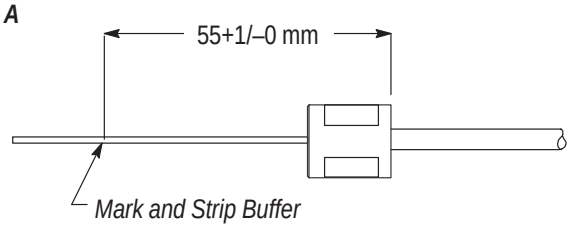
—ALWAYS wear protective gloves when using epoxy.

—ALWAYS use epoxy in a well ventilated area.

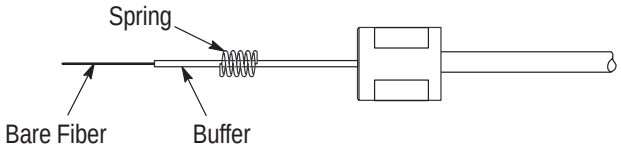
—AVOID prolonged and frequent contact with skin.

—AVOID inhaling fumes from epoxy.

Detail A



Detail B



Detail C — For Sealed Ferrule Assembly

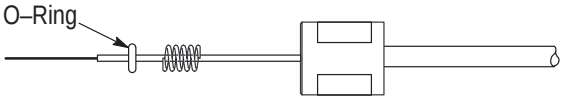


Figure 5

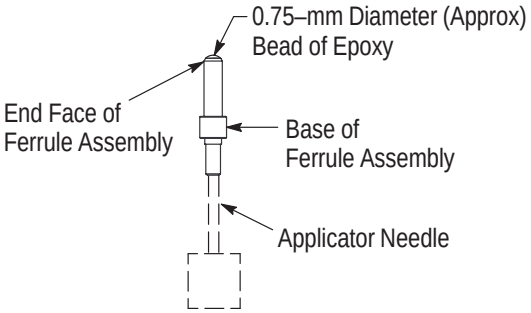


Figure 6

17. Place the crimp sleeve and fiber into the curing fixture according to the instructions included with the curing fixture.

Carefully insert the fiber into the back of the ferrule assembly (previously prepared with epoxy). Simultaneously slide and rotate the ferrule assembly on the fiber (to prevent any air pockets from being trapped in the epoxy) until it bottoms. Make sure that the bare fiber is protruding from the end face of the ferrule assembly. If it is not, re–strip and re–terminate the fiber.

Place the ferrule assembly in the curing fixture according to the instructions included with the curing fixture.

18. Cure the assembly in the heat cure oven for 20 minutes. Remove the assembly from the oven, and allow the assembly to cool to room temperature.

19. Measure the assembly to make sure that it conforms to the dimension given in Figure 7. If it does not, re–strip and re–terminate the fiber.

NOTE *Although the curing fixture is designed to ensure that the required functional length is obtained, it is still important to measure the assembly for this length after curing.*

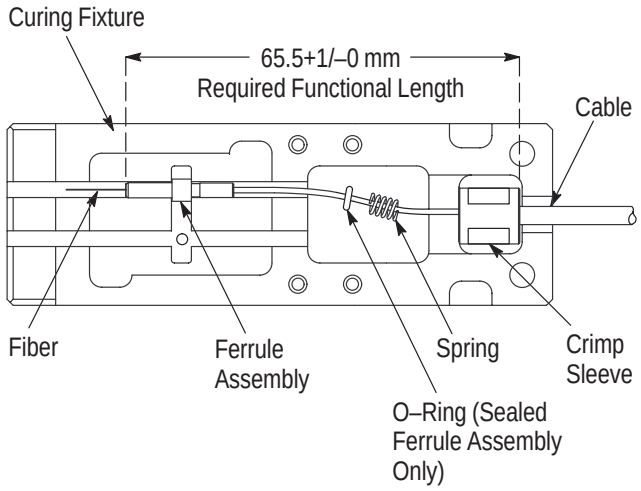


Figure 7

5.3. Cleave the Fiber

Firmly support the ferrule assembly, and draw the beveled edge of the scribe tool across the fiber as shown in Figure 8. After scoring the fiber, pull the fiber straight away from the ferrule assembly.

DANGER *Safely dispose of excess fiber.*

CAUTION *To avoid damage to the tip of the scribe tool, DO NOT allow the scribe tool to contact the epoxy.*

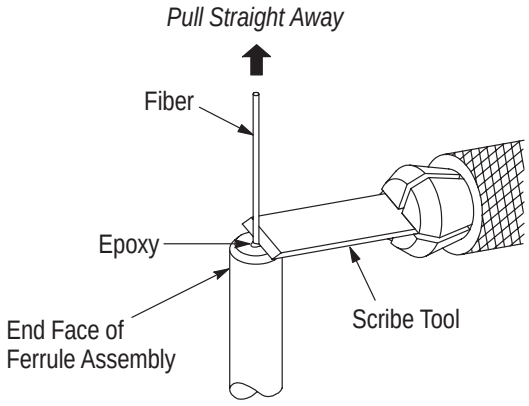


Figure 8

5.4. Polish the Fiber

It is recommended polishing the fiber using a polishing machine. The polish must produce a super–physical contact (PC) end finish for singlemode connectors and a flat end finish for multimode connectors. *Machine polishing produces the best results.* Polish the fiber according to the machine manufacturer's instructions.

If machine polishing is not possible, hand polish the fiber according to the following:

1. Using a small piece of the 5–μm polishing film, remove the fiber stub to the level of the epoxy.

2. Install the ferrule assembly onto the polishing bushing.

3. For singlemode connectors, place the green polishing pad on the polishing plate. Place the 5–μm polishing film on the green polishing pad.

   For multimode connectors, place the polishing plate on a hard flat surface. Place the 5–μm polishing film on the polishing plate.

4. Hold the ferrule assembly and rest the tips of your index finger, middle finger, and thumb on the top of the polishing bushing. Starting with very light pressure, polish the tip of the fiber in a figure–8 pattern. Refer to Figure 9. Polish the fiber until the epoxy turns a very light yellow.

NOTE *DO NOT remove all the epoxy. As the epoxy gets lighter, check the tip of the fiber frequently.*

5. Clean the end face of the ferrule assembly and polishing bushing with isopropyl alcohol or acetone and a lint–free tissue.

6. Place the 0.3–μm polishing film on the polishing pad (singlemode) or polishing plate (multimode). Polish in a figure–8 pattern. Stop polishing *as soon* as all the epoxy is removed.

7. Clean the end face of the ferrule assembly and polishing bushing with isopropyl alcohol or acetone and a lint–free tissue.

8. Place the final polishing film on the polishing pad (singlemode) or polishing plate (multimode). Apply several drops of water to an unused area of the film. Move the ferrule assembly in 20–mm circles on the water for 25 seconds.

NOTE *One sheet of final polishing film will be sufficient for 10 to 20 ferrule assemblies.*

9. Remove the ferrule assembly from the polishing bushing. Clean the end face and sides of the ferrule assembly with isopropyl alcohol or acetone and a lint–free tissue.

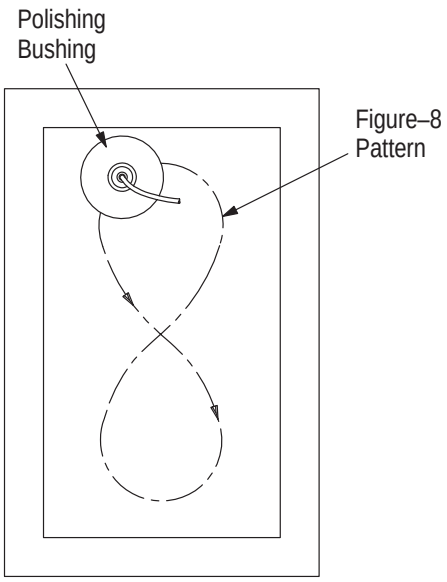


Figure 9

5.5. Inspect the Ferrule Assembly and Fiber

DANGER *Never inspect or look into the end of a fiber when optical power is applied to the fiber. The infrared light used, although it cannot be seen, can cause injury to the eyes.*

1. Using the fiber optic inspection microscope kit, inspect the ferrule assembly and fiber according to the following criteria (refer to Figure 10):

— Make sure that any epoxy is removed from the ferrule assembly

— Dirt may be mistaken for small pits. If dirt is evident on the ferrule assembly or fiber, clean with isopropyl alcohol or acetone and a lint–free tissue, then dry

— Fine polishing lines are acceptable

— Small peripheral chips at the outer rim of the fiber are acceptable

— Large chips in the center of the fiber are unacceptable, and the fiber must be re–terminated

2. If necessary, install the dust cover onto ferrule assembly to prevent contamination to the end face.

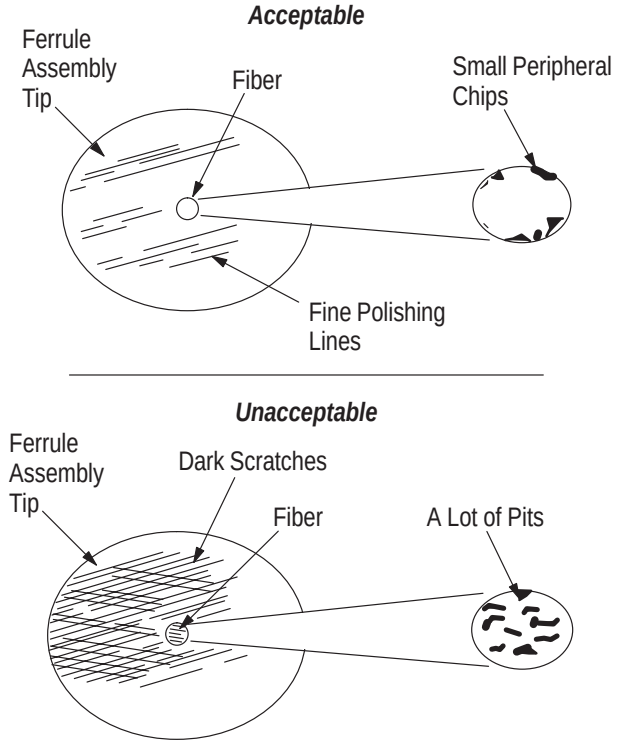


Figure 10

5.6. Complete the Assembly

1. Remove the protective label from the back (end opposite the lens) of the EB insert.

2. Using the magnifier, inspect the lens of the EB insert for any signs of contamination. If necessary, clean the lens according to Section 6.

3. Insert the ferrule assembly into the channel cavity of the EB insert until it bottoms. To avoid damage to the fiber, DO NOT push the fiber to install the ferrule assembly. See Figure 11, Detail A.

IMPORTANT: For multi–channel connectors, channels are designated on the EB insert with “A” and “B”. For proper system polarity, connect A to B, A1 to B1, and A2 to B2.

4. Slide the spring over the ferrule assembly and into the channel cavity (the spring will protrude slightly from the cavity). See Figure 11, Detail B.

5. Align the index pin hole of the ferrule plate with the index pin at the back of the EB insert, and slip the fiber into the closest slotted hole in the ferrule plate. See Figure 11, Detail C.

6. Hold the ferrule plate against the EB insert, making sure that the index pin enters the index hole. Thread the screw into the screw hole in EB insert. See Figure 11, Detail D. Using the 2.5–mm hex wrench, tighten the screw to a torque between 0.8 and 0.9 N–m. Check to make sure that the ferrule plate is flush with the EB insert.

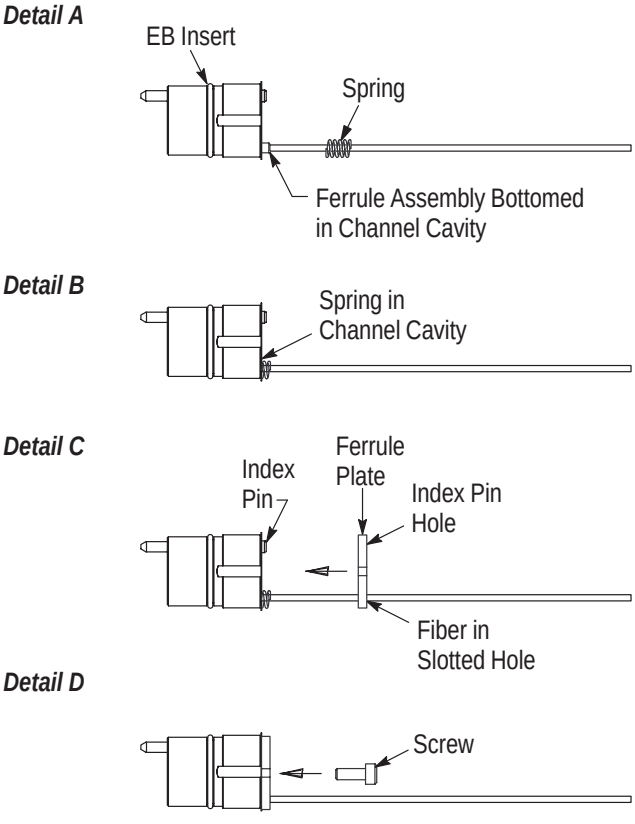


Figure 11

7. Fit the insert assembly fixture onto the EB insert. Refer to Figure 12, Detail A.

NOTE *Using the insert assembly fixture will help guide the EB insert into the housing and minimize the possibility of lubricant contaminating the face of the EB insert.*

8. Using an applicator swab, apply a *thin film* of the O–ring lubricant (or high–vacuum grease) around the O–ring on the outside of the EB insert and the front seal on the inside of the housing. Remove any excess lubricant. Refer to Figure 12, Detail B.

CAUTION *To avoid contaminating optical components, DO NOT use heavy deposits of the lubricant.*

9. Align the internal key (small bar inside) of the housing with the keyway (slot along the side) of the EB insert, and slide the insert assembly fixture with the EB insert into the housing. See Figure 12, Detail C.

10. Using the 2.5–mm hex wrench, push the EB insert into the housing until it bottoms. To avoid damage to the fiber, DO NOT push the fiber or cable to install the EB insert.

11. Remove the insert assembly fixture from the front of the housing.

12. Slide the wave spring over the crimp sleeve and into the housing. See Figure 12, Detail D.

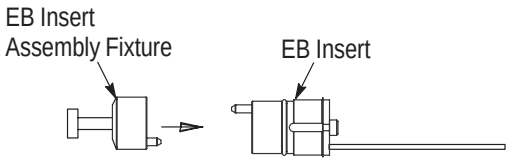
13. Align the locating detents of the collet sleeve with the locating tabs of the housing. Make sure that the fiber is not pinched, bent, or twisted. See Figure 12, Detail D.

14. While holding the cable jacket (to prevent the fiber from bending), slide the collet sleeve over the crimp sleeve until the raised edge inside the collet (approximately 1 mm from the back of the collet) catches the back edge of the crimp sleeve. Check to make sure that the locating detents and locating tabs have engaged. Refer to Figure 12, Detail E.

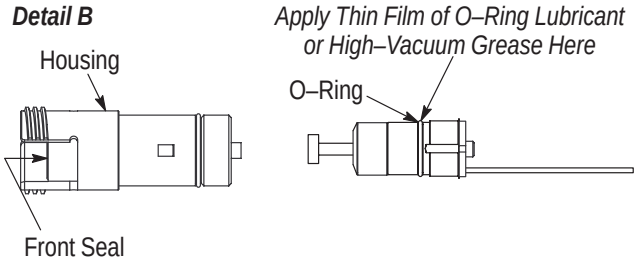
15. Using an applicator swab, apply a *thin film* of the O–ring lubricant (or high–vacuum grease) to the housing O–ring, thread of the collet, and the ramp of the collet. Refer to Figure 12, Detail F.

16. Slide the collet nut onto the collet sleeve, making sure that the collet sleeve is still in position (as described in Step 14). See Figure 12, Detail F. Finger–tighten the collet nut.

Detail A

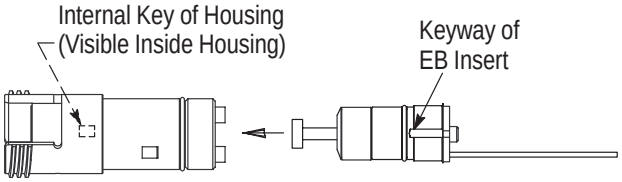


Detail B

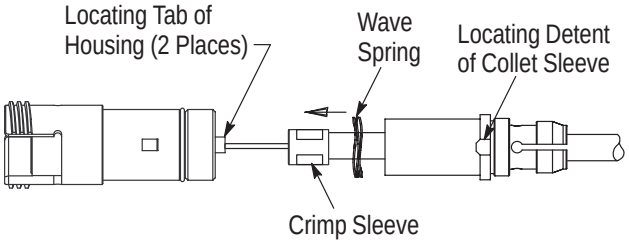


Apply Thin Film of O–Ring Lubricant or High–Vacuum Grease Here

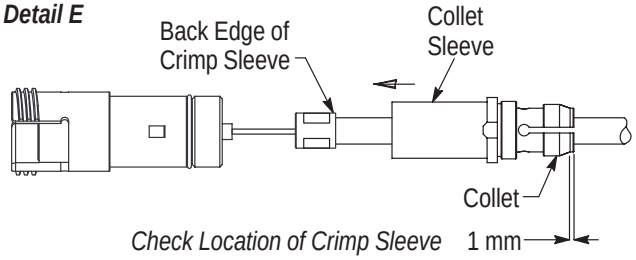
Detail C



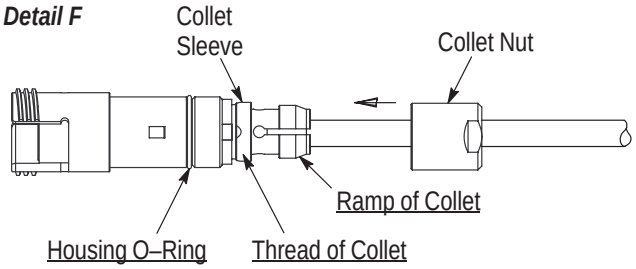
Detail D



Detail E



Detail F



Apply Thin Film of O–Ring Lubricant or High–Vacuum Grease Here

Figure 12

17. Push–fit the housing key onto the housing. Using the T–handle to hold the connector, apply 2 to 3 drops of LOCTITE Adhesive 243 to the threads of the housing. See Figure 13, Detail A.

18. Align the keyways (inside) of the grip ring with the external keys of the housing, and slide the grip ring over the housing and onto the housing key. Hand–tighten the grip ring onto the housing key. See Figure 13, Detail B.

19. Using the 15mm U–wrench, tighten the collet nut to a torque between 3.6 and 4 N–m.

20. Apply the O–ring lubricant (or high–vacuum grease) to the outside diameter and both the front and rear face of the cable seal. Then apply a *thin film* of the O–ring lubricant (or high–vacuum grease) around the cable jacket just beyond the collet nut. Refer to Figure 13, Detail C.

21. Slide the extension (along with the washer and cable seal) against the collet nut. Continue sliding the extension over the housing and into the grip ring. See Figure 13, Detail D. Using the 17mm U–wrench, tighten the extension to a torque between 6 and 10 N–m.

22. Unscrew the grip ring, then remove the housing key. Make sure that the locating tabs of the housing and locating detents of the collet sleeve are still engaged (from Step 14).

To check engagement, slide the grip ring toward the cable as far as possible, then try to rotate the grip ring. If the grip ring *does not* rotate, the locating detents and locating tabs are engaged. If the grip ring *does* rotate:

a. Re–install the housing key onto the housing and the grip ring onto the housing key.

b. Unscrew the extension, then slide it toward the cable until the rear of the collet sleeve and collet nut are exposed.

c. While pushing the cable toward the collet sleeve, rotate the cable and collet sleeve ±90 degrees until the locating tabs and locating detents engage.

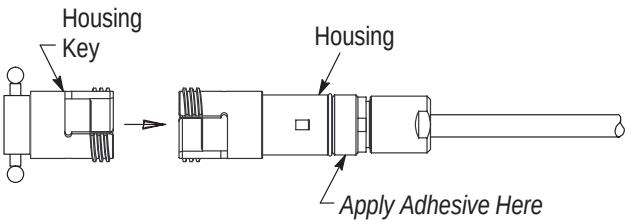
d. Re–assemble the extension (as described in Step 21).

23. Apply LOCTITE Adhesive 480 completely around the cone of the extension. See Figure 13, Detail E.

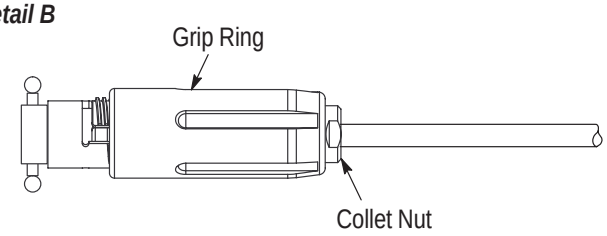
24. Slide the boot assembly over the cone of the extension until it is tight against the shoulder of the extension. Immediately rotate the boot assembly so that the orientation tab is aligned with a desired reference point (using the guide pin of the EB insert is recommended). See Figure 13, Detail F.

NOTE *Make sure to use the same reference point to align the boot assembly for subsequent connectors.*

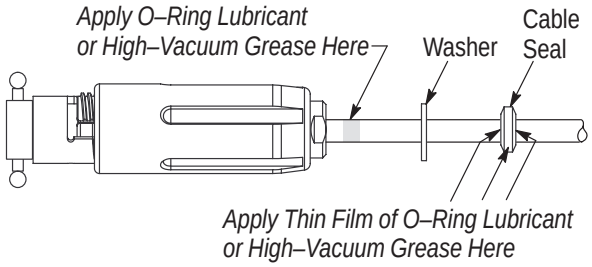
Detail A



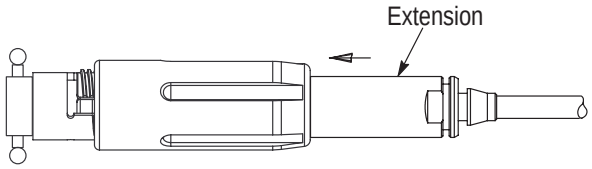
Detail B



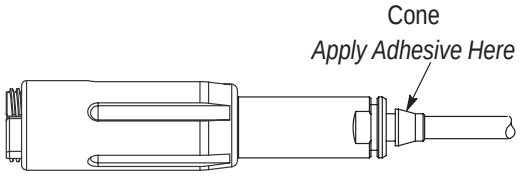
Detail C



Detail D



Detail E



Detail F

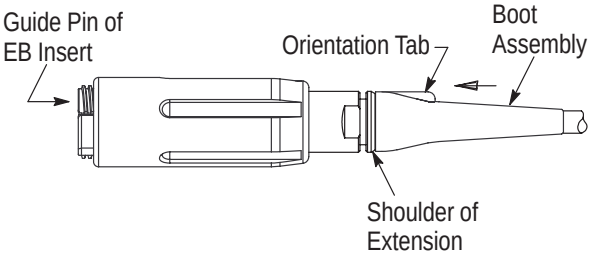


Figure 13

5.7. Install the Protective Cap

1. Loop the tether wire around the groove in the extension, and feed the end of the tether wire into the open end of the tether crimp sleeve. Pull approximately 3 to 5 mm of the tether wire through the tether crimp sleeve. See Figure 14, Detail A.

2. Pull on the long end of the tether wire to tighten the loop. Using the crimping tool and the 4–mm hex nest, crimp the tether crimp sleeve onto the tether wire.

3. Slide the shrink tube over the tether crimp sleeve. Using the heat gun, apply heat to the tube until it is secure. See Figure 14, Detail B.

4. Thread the protective cap onto the grip ring. Finger–tighten the cap. See Figure 14, Detail C.

6. MAINTENANCE

The EB insert is shipped with a protective label on the back of the EB insert to keep the channel cavities clean. The EB insert is ready for use; however, if the lens becomes contaminated, clean as follows:

1. Moisten an applicator swab with the isopropyl alcohol or acetone.

2. Using a back–and–forth or swirling motion, wipe the lens with the applicator swab.

3. Blow clean dry air over the lens until remaining fluid and stray particles are removed.

4. Using the magnifier, inspect the lens to make sure that all contamination is removed.

5. Re–install the protective cap, or mate the connector immediately to prevent contamination to the lens of the EB insert.

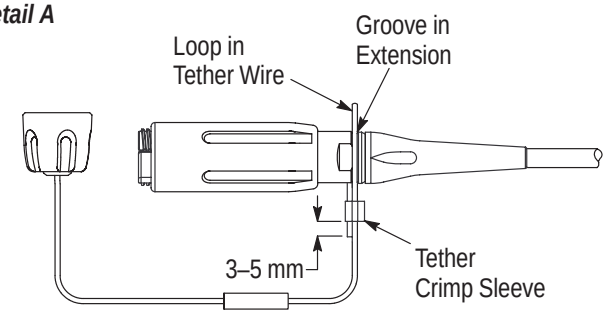
7. REPLACEMENT AND REPAIR

Kit components are not repairable. DO NOT use any damaged or defective components. DO NOT re–use the crimp support tube, crimp sleeve, or fiber assembly by removing the fiber.

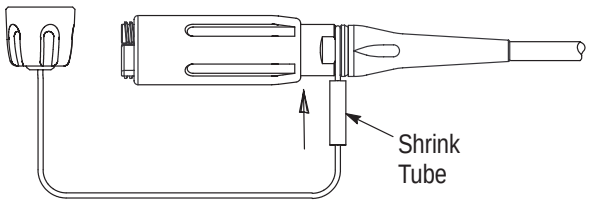
Order replacement parts through your Tyco Electronics representative, or call 1–800–526–5142, or send a facsimile of your purchase order to 717–986–7605, or write to:

CUSTOMER SERVICE (038–035)
TYCO ELECTRONICS CORPORATION
PO BOX 3608
HARRISBURG PA 17105–3608

Detail A



Detail B



Detail C

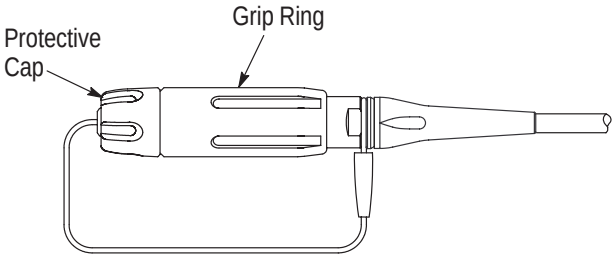


Figure 14

8. REVISION SUMMARY

Revisions to this instruction sheet per EC 0990–0552–04 include:

- Added type of strength members to Section 1
- Added sealed ferrule assembly
- Modified Paragraphs 4.1, 4.2, and 5.2
- Modified Figure 4
- Changed dimension in Figure 5
- Added dimension to Figure 6
- Changed Figure 7
- Modified Steps 17, 18, 20, and 22 in Paragraph 5.6
- Added information to Figure 13, Detail C