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Issue 1, October 1989

Cabling Methods
Shielded and Coaxial Cables

Contents

General

Purpose

This practice presents:

- Methods for use of the Thomas & Betts RSK Wraparound Connector utilized in connecting ground leads to shielded NE 75X series cable.
- Procedures for the preparation of 4 162 and GT-16 cable.
- Procedures for RG-5 8 and RG-59 coaxial cable.
- Descriptions of various types of tools, dies, and fittings for Trompeter Electronics (vendor) BNC/TPS connectors.

Filing Instructions

File this practice in numerical order in your GTEP set.

Department Originating This Issue

This practice was written by the COE Installation staff, Telephone Operations Headquarters, Irving, Texas.

Notes

The RSK 301 wraparound connector can terminate a 20 GA. or 22 GA. solid or stranded drain lead to 75X series cable.

4162 series single paired shielded cable, used for generator and generator ground, and with transmission equipment, may be run in P-wire rings or on the cable rack/grid with analog-type cables.

The RG-5 8 and RG-59 coaxial cable information for the 90 mb/s and DX-3 level optical multiplex signals and dies to crimp connectors is provided.

The TACA Model T – Type CA cable stripper (Figure 1, MC 578411) is the only tool required to butt and strip shielded cable. Refer to GTEP 075-490-101.

Tools and Materials Required

NE 75X Series Cables

The tools and materials required for the NE 75X series cables are:

- Cable stripper, TACA MODEL T - TYPE CA (MC 578411)
- Gun, 750 Thermo, EP5-WEC or equivalent (MC 588916)
- Cutters or scissors, diagonal
- Hand-held crimping tool, T&B WT-740 (MC 578817)
- Crimping die, T&B #801B7 (MC 581198)
- Wraparound connector, RSK 301 (MC 768839)
- Wire, 22 GA. solid black W-5006-1 (MC 764340)
- Shrinkable tubing, RNF-100 type 1, l/4" (MC 764660)

4162 Series Cables

The tools and materials required for the 4 162 series cables are:

- Cable stripper, TACA Model T – Type CA (MC 578411)
- Sleeving, PVC-105-18 black (MC 761712)
- Shrinkable tubing, RNF-100 Type 2, 3/8"x4" (MC 768502)

Cabling Methods
Shielded and Coaxial Cable

1. Updating Practice 256-050-216

1.1 Purpose

This addendum updates the information in GTE Telephone Operations Practice 256-050-216, Issue 1, October 1989.

1.2 Filing Instructions

The following chart provides instructions for updating this practice.

Step	**Updating** Practice 256-050-216
1	Remove pages: . 1/2. • 7/8.
2	Replace them with the new pages attached to this addendum.

1.3 Revision Bars

Revision bars mark ail parts of the practice changed by this addendum.

Tools and Materials Required, continued

RG Series Coaxial Cables and BNC/TPS Type Connectors

The tools and materials required for the RG series coaxial cables and BNC/TPS type connectors are:

- CT-3 tool crimp coax (MC 589309)
- Die RG58 Cable, CT3-1 (MC 589310)
- Die RG59 Cable, CT#-2 (MC 589311)
- Die (Modified CT3-2) (MC 589312)
- Stripping Tool ST1) (MC 588992)
- Stripping cassette (STC-F, tool crimp) (MC 589313)
- Stripping cassette (STC-W, wrench crimp) (MC 588993)
- Crowfoot wrench, 7/16", 3/8" or TF-14H (MC 589314)
- Wrench, torque (inch pound measurement)
- Solder iron (Unger), 40-watt (MC 575429)
- Tip for Unger solder iron (MC 578781)
- Roll solder, thin diameter, 40/60
- Crimp plug, PL-llC-013 Mini WECO (MC 768557)
- Sleeve (crimp replacement) 800- 16 13-5 for Mini WECO plug listed above (MC 769676)
- Connector BNC, PL-20-2, used on RG-59 and TG-62 cable (MC 763837)
- Plug TPS, PL-50-2, used on RG-58 and RG-59 cable, wrench crimp (MC 769673)
- Magnifier w/light (can also be used to inspect connection) (MC 584645)
- Connector type BNC (wrench crimp) accepts cable sizes 724, 8281, and 9141 (MC 766549)

GT-16 Series Cables

The tools and materials required for the GT- 16 type cable are:

- Harness, grounding (MC 749867)
- Tube shrink, RNF-100 (MC 768502)
- Screw, PHTC 12-24x1/2 (MC 766372)
- Washer, Belleville (MC 767722)
- Plier, side cutting 7" D-201-7NE
- Cable stripper, TACA Model T – Type CA (MC 578411)

Cable Preparation

NE 75X Series Cables

Using the TACA Model T - Type CA cable stripper, vertically slit the cable up to the first equipment shelf that will require shielded cable pair(s). Remove all the cable pair(s) to be terminated **at** that shelf position and leave the remaining pairs in the sheathing. Place a cable tie just above, and another just below the position of the pair removed from the cable. Continue to place cable ties on the cable to provide the insulation for the metallic shield and to maintain a neat appearance for the cable as it is distributed through the remainder of the equipment shelves. From the point of the break off, along each shelf, the exposed shielded pair(s) must be insulated with RNK-100 Type 1, l/4" shrinkable tubing (MC 764660).

NOTE: Do **not use the** IR-500 **infrared heater tool to shrink the tubing. The heat produced by this tool is too great for the tubing** and **may flash the tubing on fire.** Use **a hot air type, such as a 750 thermo gun,** EP5-WEC (MC 588916) **or equivalent.**

Bring the insulated pair(s) as close as possible to the break-off point of the equipment terminal fanning strip and connect the ground drain lead with the Thomas & Betts hand crimping tool (MC 5788 17), as shown in Figures 2 and 3.

NOTE: **An alternative (solder sleeve method) to this procedure can be found in** GTEP 256-050-215.

Bunch the shield and cut off with diagonal cutters or scissors, as shown in Figure 4.

Expose the shield by stripping the tubing to the dimension shown on Figure 5.

The RSK 301 wraparound connector (MC 768839) is insulated with color-coded mylar (yellow). The mylar portion of the connector, which extends approximately l/4" on each side, should overlap onto the shrink tubing and the drain ground lead as shown in Figure 6.

The ground drain lead used must be W-5006-1 wire strap solid BLK 22 GA. (MC 764340).

4162 Series Cable

Cable preparation for 4 162 series cable is as follows:

The outer sheath of 4 162 series cable must be butted with the TACA Model T - Type CA cable stripper (MC 5784 11) at the top of the relay rack, just below the top cable bracket. Cable pairs are to be brought down vertically and distributed to each shelf to be served.

At the equipment end, bring the cable pair(s) as close as possible to the terminal block fanning strip hole. Butt the pair sheath approximately 4" back from the fanning strip, trim the shield, and insulate the bare ground drain lead as shown in Figure 7.

The sleeving used to insulate the bare ground drain lead is PVC 105-l 8 sleeving BLK (MC 7617 12). Allow enough sleeving at the point of termination to avoid shiners.

Insulate the sleeving at the butt of the pair with RNF-100 type 2-3/8" at 4' shrinkable tube (MC 768502) as shown in Figure 8. Use the 750 thermo gun (MC 588916) or equivalent.

4162 Series Cable, continued

The frame end of the 4 162 **series type** cable runs is to be protected with shrink tubing to maintain a neat appearance. This is accomplished by insulating each individual sheath pair per instructions found on Page 4 of this practice.

NOTE: Provide room at the fanning strip so that rebutting will not be necessary, in the event that new high frequency cable assignments are run to the existing terminal pairs.

4162 Series Cable – Temporary Preparation

Temporary cable preparation for 4 162 series cable in DSX installations is as follows:

On the majority of DSX installations, it is necessary to change the LTS or STS assignments on existing span lines. This necessitates running new high frequency cables and fanning to the existing verticals at the STF. To allow room in the terminal block for the new LTS or STF cable run, the installer must re-butt the existing 4 162 type cable pair sheath.

Utilizing the TACA Model T – Type CA cable stripper (MC 578411), re-butt the cable pair sheath approximately 4 inches back from the terminal block in the following sequence:

1. Circle cut the cable pair sheath just to the shield.

CAUTION: DO NOT CUT THE SHIELD.

2. Strip the cable pair sheath back as close as possible to the terminal block. This operation exposes the braided shield. At this point, the installer should be able to slide the exposed shield toward the new butt location.

3. Slide the exposed shield back toward the new butt location. This operation causes a bunching effect in the shield. To hold the shield in its new location, use a strip of #88 type tape (MC 528275); wrap the bunched shield and continue to wrap onto the cable pair sheath.

NOTE: Use **the above procedure for temporary conditions only: e.g.,**

- DSX **applications that require recabling at the protector frame.**
- **When the existing cable at the protector frame is type 4162 cable.**
- **When the existing 4162 cable blocks the fanning** strip **holes and prevents fanning of new cable pairs.**

RG Series Coaxial Cables and BNC/TPS Type Connectors

Prior to working behind fiber optic equipment, ensure that there is adequate lighting to help prevent eye strain.

At the completion of installation of BNC/TPS connectors to the coaxial cable, a test is performed on each affected cable to ensure that the messenger has not been opened or crossed with its shield, and to ensure a secure makeup of the cable.

RG Series Coaxial Cables and BNC/TPS Type Connectors, continued

WRENCH CRIMP TYPE:

NOTE: The tools necessary to perform the wrench crimp connection are shown in Figures 9, 10, and 11.

1. Place wrench crimp nut onto cable. See Figure 12.
2. Make a clean perpendicular cut through the cable jacket, braid, and dielectric, exposing 5/16 inch of center conductor. See Figure 12.
3. Cut jacket back, plus an additional 5/32 inch, and bend braid outward to allow free entry of cone. Doing this prevents cone from forcing the braid up under the jacket. See Figure 13.
4. Lightly tin center conductor.
5. Insert center conductor and dielectric into pin/cone assembly. See Figure 13. Push edge of cone between dielectric and braid. Continue to push cable into cone until cable dielectric seats against cone dielectric. The center conductor should be visible in pin solder hole. (The braid may be combed out over the cone and excess strands trimmed to cone edge, if preferred .)
6. Solder center connector to pin.
7. Bring wrench crimp nut up onto tapered portion of cable. See Figure 13.
8. Assemble connector body over pin/cone assembly and engage with clamp nut. See Figures 13 and 14.
9. Wrench tighten to 30-40 inch pounds of torque.

DIE CRIMP TYPE :

1. Place clamp nut and outer sleeve onto cable. See Figure 16.
2. Strip cable as shown in Figure 16, and bend braid outward to allow free entry of pin/sleeve assembly.
3. Lightly tin center conductor.
4. Push pin/sleeve assembly under braid until bottomed. See Figure 17.
5. Solder center conductor to pin. See Figure 17.
6. Bring outer sleeve forward over braid and crimp. See Figures 17 and 18
7. Insert pin/sleeve assembly into barrel, then engage clamp not with barrel. See Figure 19.
8. Holding clamp nut rigid, wrench tighten barrel to 30-40 inch pounds torque. See Figure 19.

GT-16 Series Cables

GT-16 type cable differs from other cables discussed in this practice in that the total cable pairs are enclosed in a common foil shield. When preparing GT- 16 cable, the installer should note that since the GT- 16 type cable is protected under a common foil shield, in running this type of cable, the total sheath should be brought as close as practical to the termination point. The criterion can be met by "butting" the sheath of the cable just after the break-off point to the equipment shelf being served, or at a midpoint between two shelves of equipment, if the two shelves are being served and/or cabled by one common cable run. In the butting process of GT-16 type cable, there is no set limit as to the length of an unprotected cable pair, as measured from the "butt" point to the termination point.

In order to facilitate a drain lead for GT-16 type cable, the following preparation should be followed:

A ground harness is available from Supply. (Reference the Tools and Materials section, Page 3.) Figure 20 portrays a ground harness which is utilized as a drain lead, in the preparation of GT-16 type cable. For this type of harness, the following preparation procedure should be followed:

Figure 2 1 portrays a typical GT-16 type cable, as prepared for drain lead installation. Installer will note that the plastic sheath has been trimmed approximately 1/2" back from the tip of the foil shield, and in addition, the plastic insulation has been trimmed approximately 1/2" ahead of the foil shield to allow for extra protection to the encased cable pairs. The stripping operation is accomplished with the TACA Model T – Type CA cable stripper (MC 578411).

See Figure 21. The installer will note that the foil shield has been raised off its own wrap. This operation has positioned the foil shield in such a manner that it accepts the installation of the ground harness.

Figure 22 portrays the ground harness in position on the foil shield. The serrated clamp and/or jaw of the ground harness can now be closed on the foil shield. This operation is accomplished by utilizing the plier side cutting 7". The 7" plier, as shown in Figure 15, creates sufficient pressure to the ground harness clamp, enabling the serrated tangs of the clamp to pierce the foil shield and insure a solid secure bond between the ground harness clamp and the foil shield.

Figure 15 shows the completed attachment of the ground harness to the foil shield. At this point in the preparation, the installer is able to position the raised foil shield and ground harness installation to the original location on the existing foil shield wrap.

A typical completed drain lead method is illustrated in Figure 23. To protect this type of preparation. the installer now places the RNF 100 type shrink tubing to insulate the complete installation (see Figure 24), utilizing the 750 thermo gun or equivalent.

NOTE: **Care and good judgment must be practiced when performing the operation described above. The application of excess heat will in some cases cause a "plastic run" condition on the enclosed cable pairs.**

GT-16 Series Cables, continued

To complete a ground harness for a drain lead application, the installer places the terminal and/or lug end of the ground harness at a convenient screw hole location in the rack and/or frame being cabled. This procedure is accomplished by the utilization of the items listed on Page 3 of this practice.

Electrical Tape Usage Qualification

When rework or inadvertent nonplacement of heat shrink has taken place, it is permissible to use a quality grade gray plastic tape rated in excess of 6OOV and 175 F. The gray tape is to be wound tightly and evenly starting on the wire with two square wraps. The tape will then be wrapped toward the cable sheath with an overlap of at least half the tape width for a length of approximately 1 l/2 to 2" onto the cable sheath. The last two turns must be put on:

- So that the end of the tape completely overlaps the preceding turns of tape.
- Without tension.

NOTE: The use **of heat shrink on ground drain leads and cable butts is still a requirement for ail new work.**

Figures

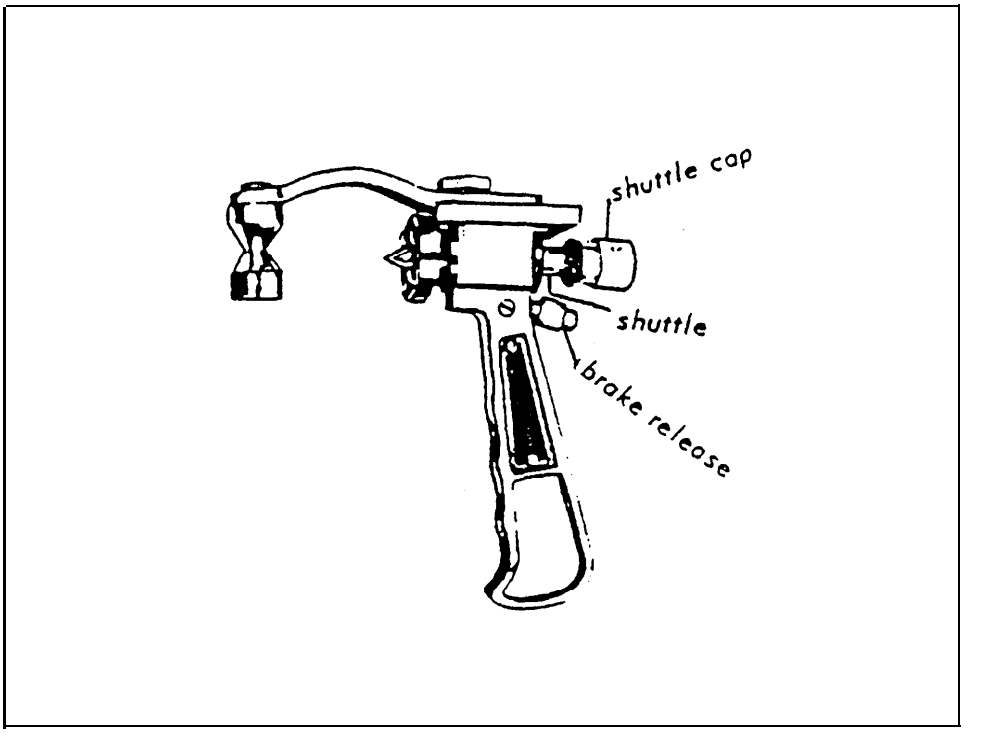


Figure 1 – TACA Model T – Type CA Cable Stripper (MC 578411)

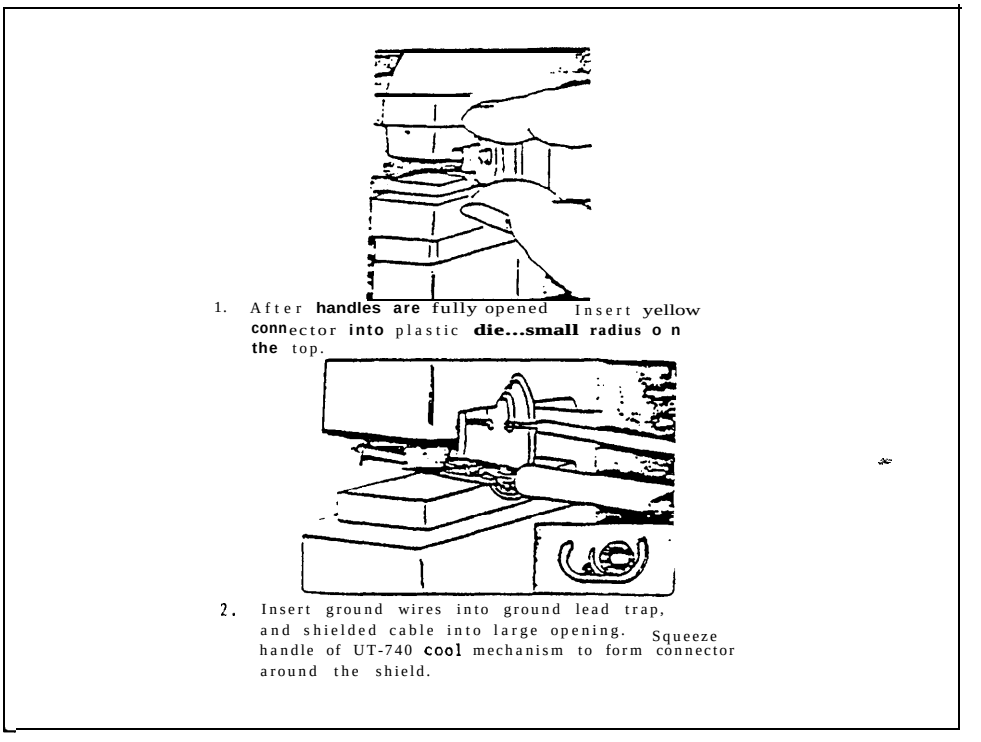


Figure 2

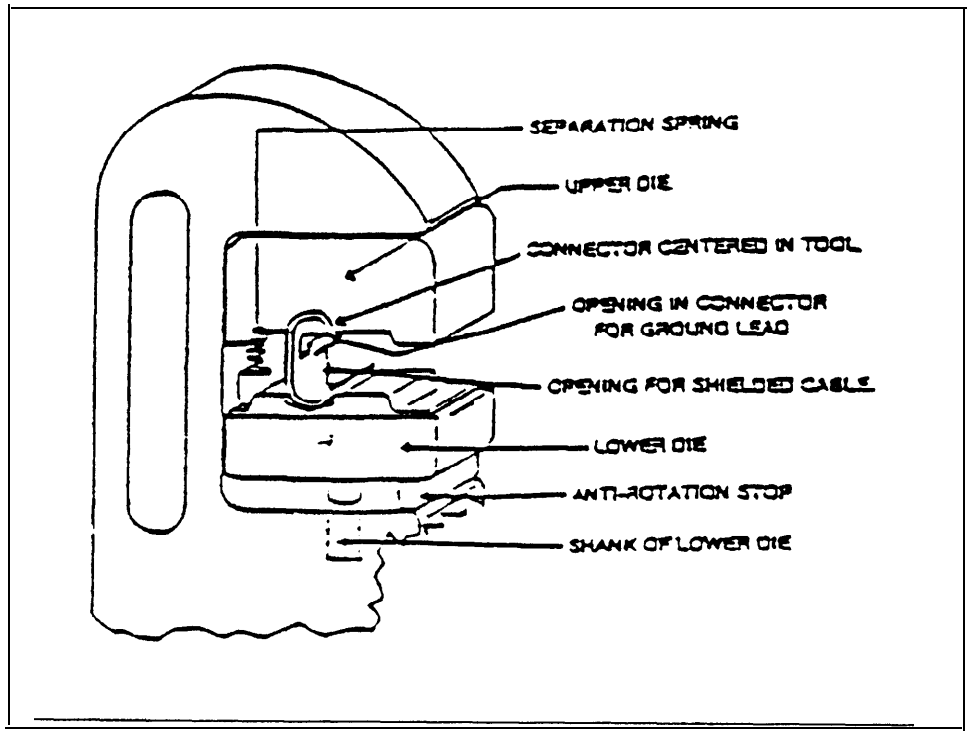


Figure 3

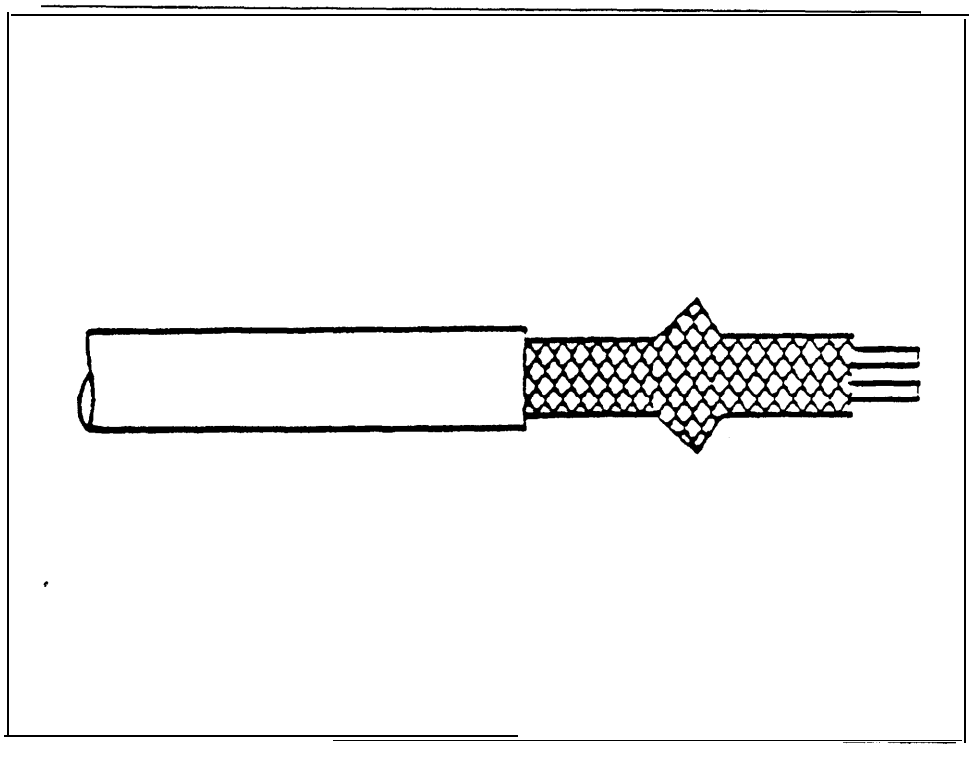


Figure 4

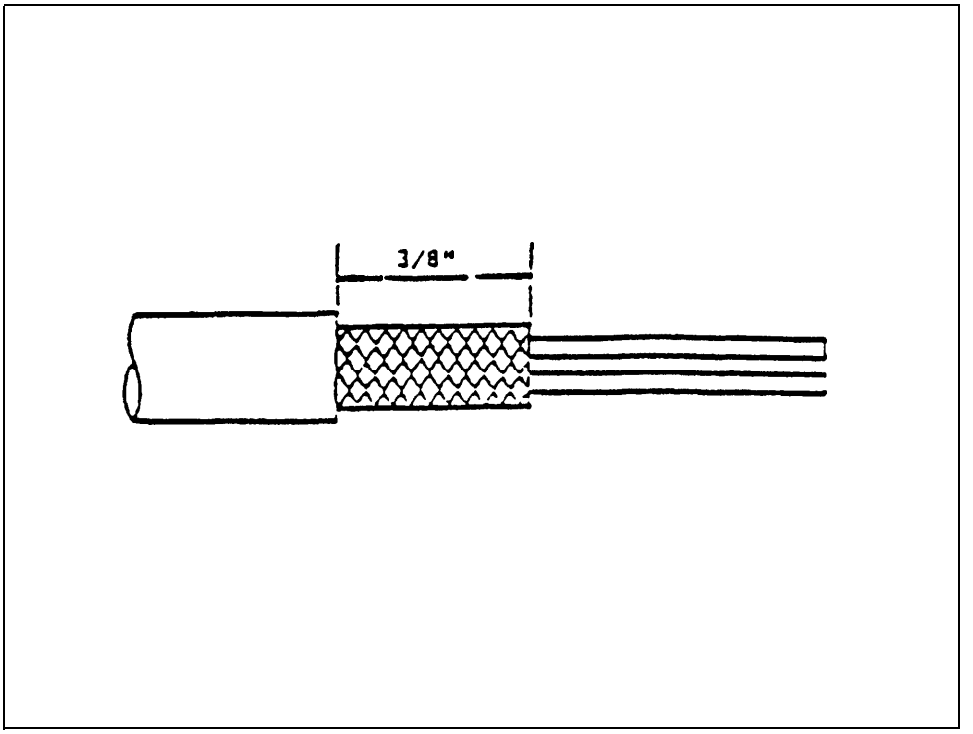


Figure 5

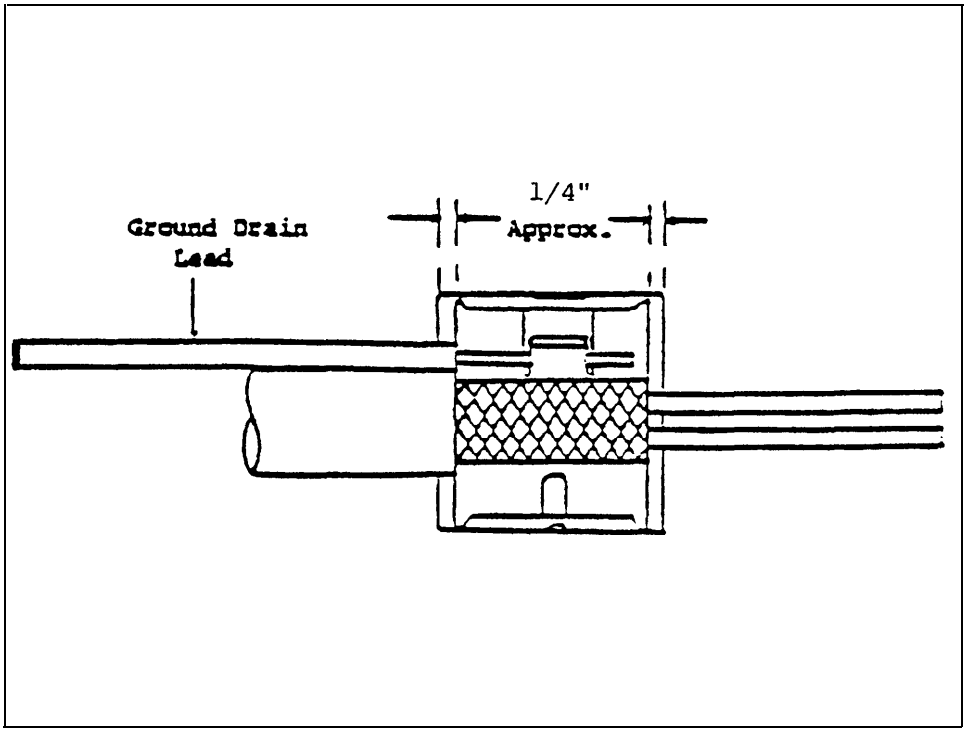


Figure 6

NOTE: Ground Drain Lead may be brought into the wraparound connector from either direction.

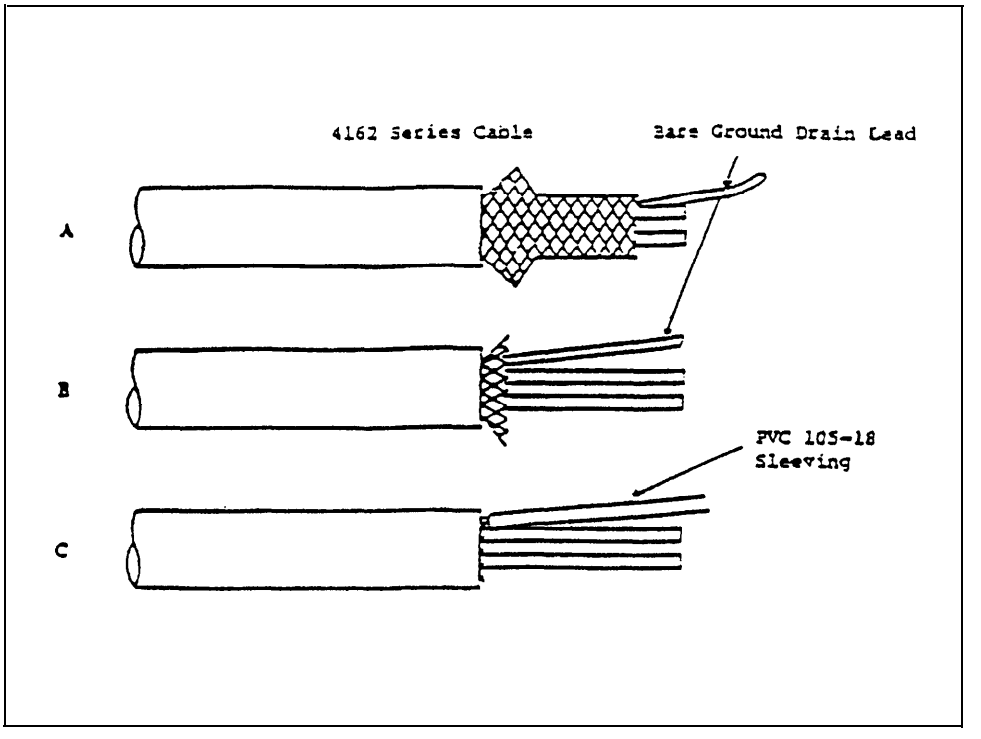


Figure 7 – 4162 Series Cable (A, B, C)

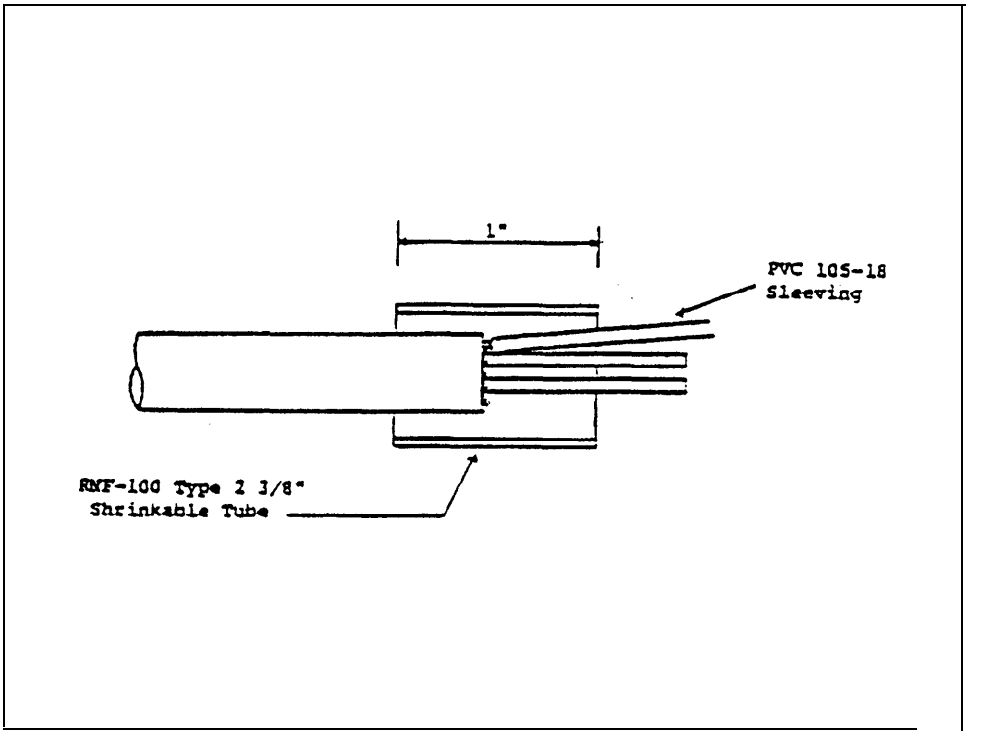
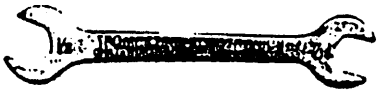


Figure 8



ASSEMBLY TOOL
ATI (for BNC, TNC, N, Twinax, Ttiax)
AT2 (for TPS, SMA, PLIC)
Wrenches are thin to accommodate **connector wrench flats.**

Figure 9 – Assembly Tool

STRIPPING **TOOL**
STI Stripping **Tool Only**
ST1/Cassette No. Stripping Tool With Cassette

Figure 10 – Stripping Tool (MC 588992)

Figure 11 – Stripping Cassette (MC 588993)

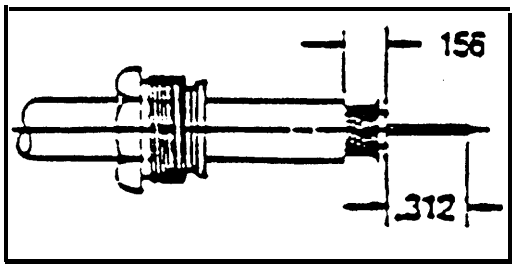


Figure 12

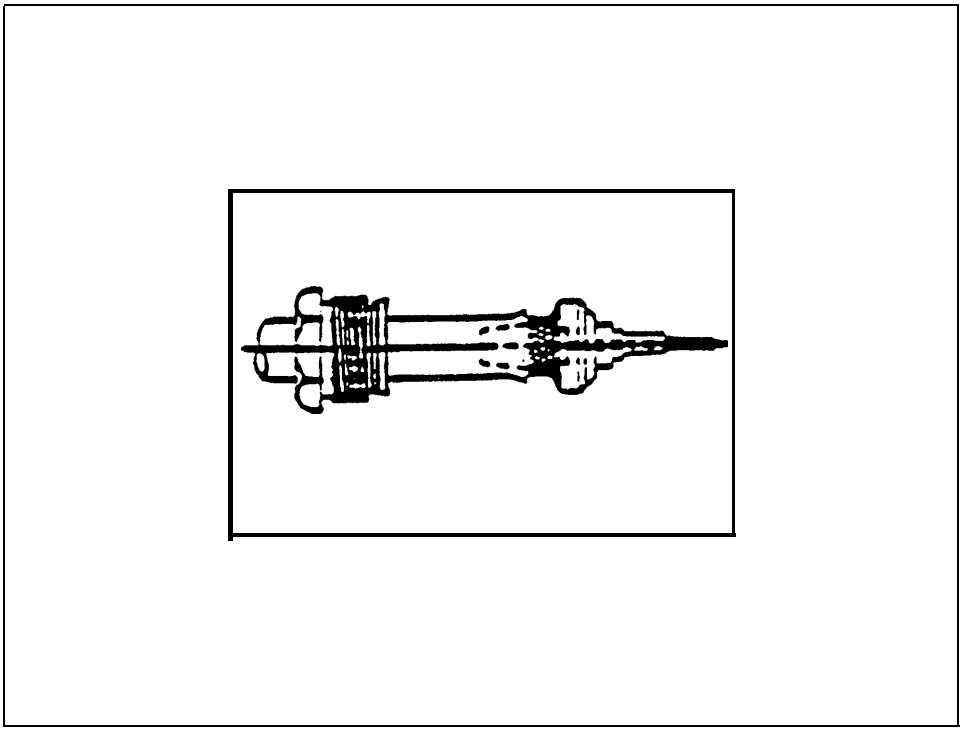


Figure 13

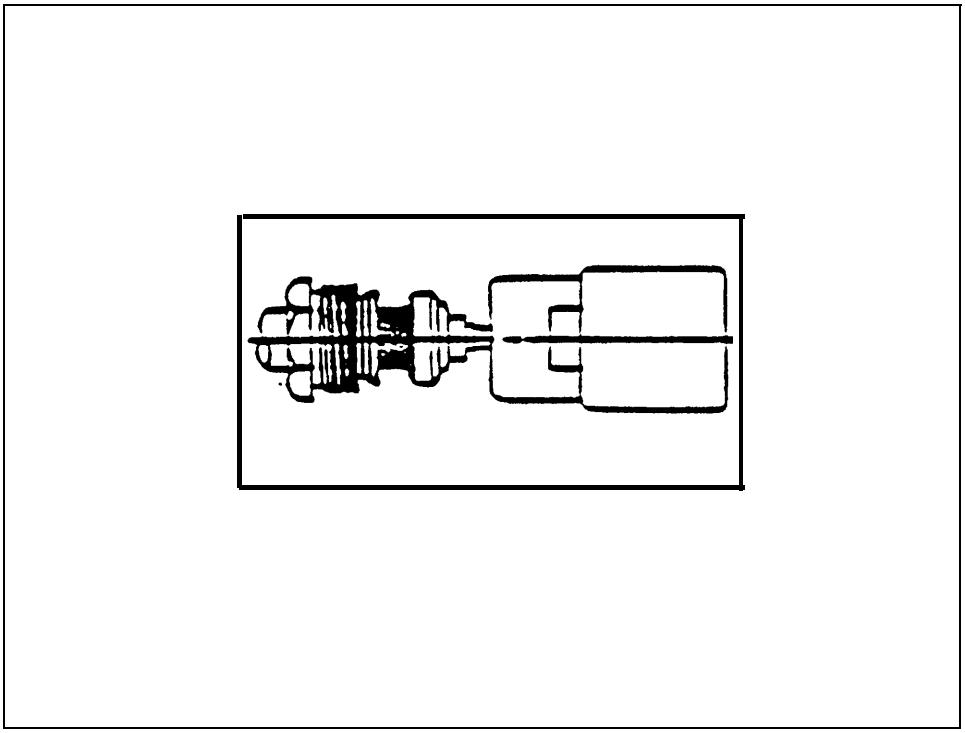


Figure 14

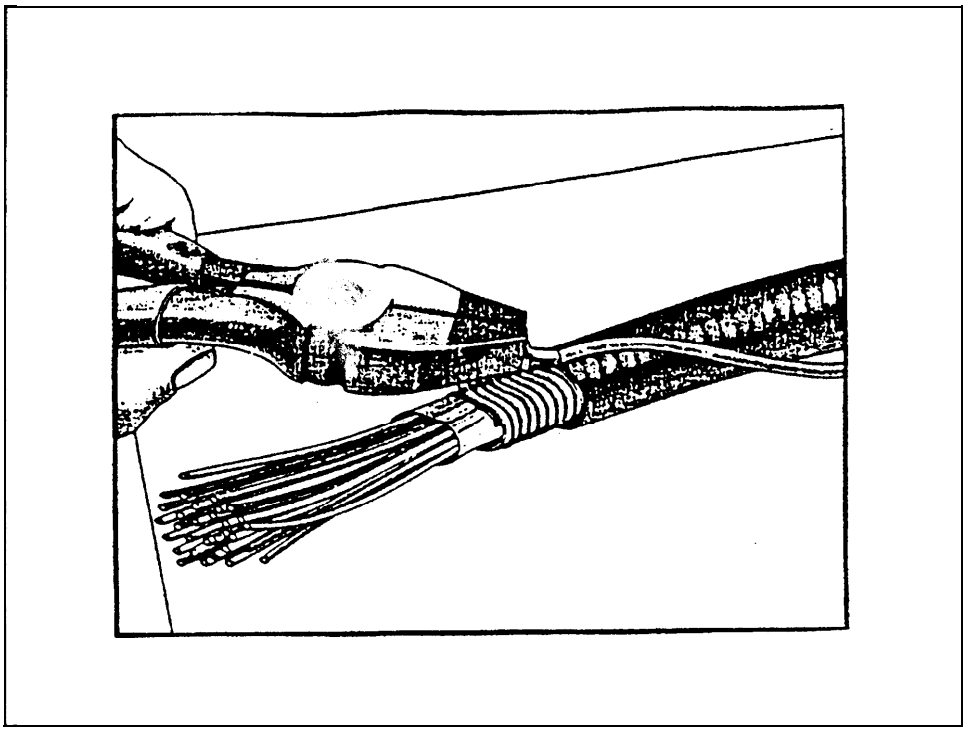


Figure 15

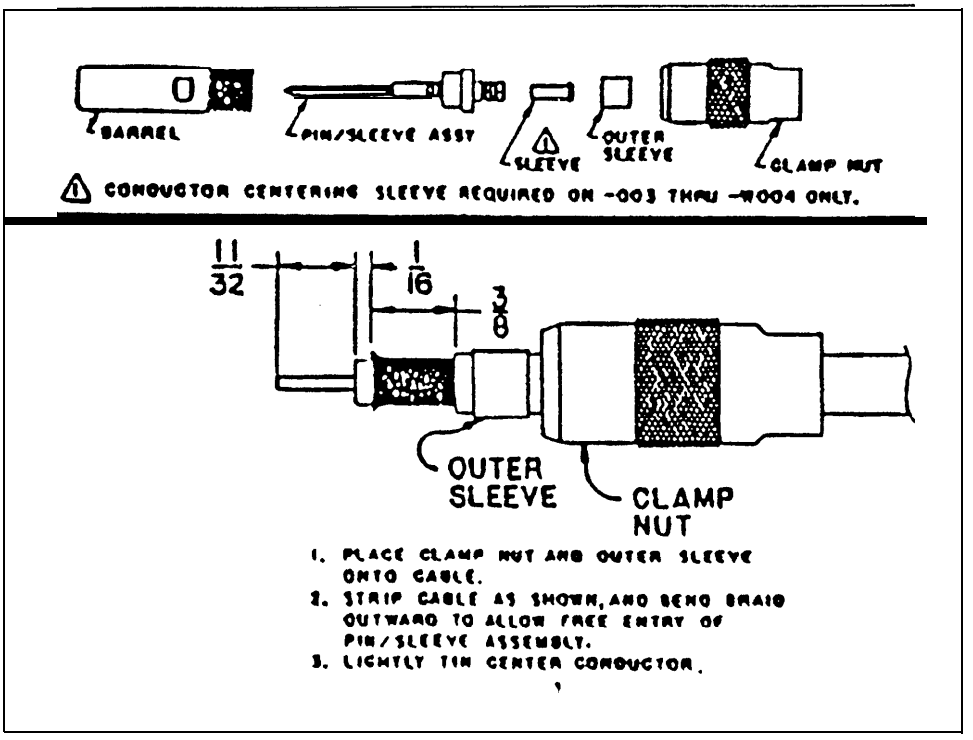


Figure 16

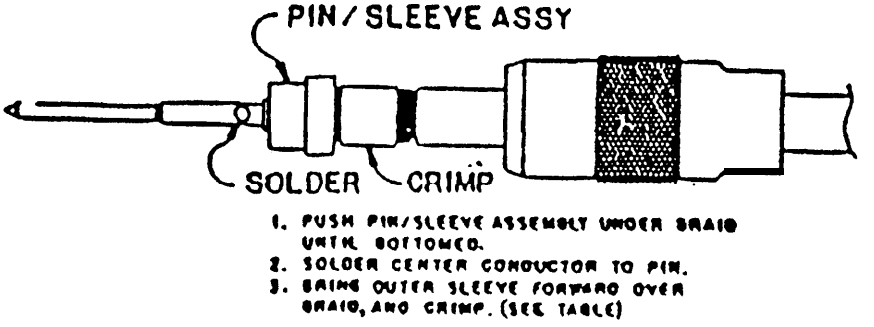


Figure 17

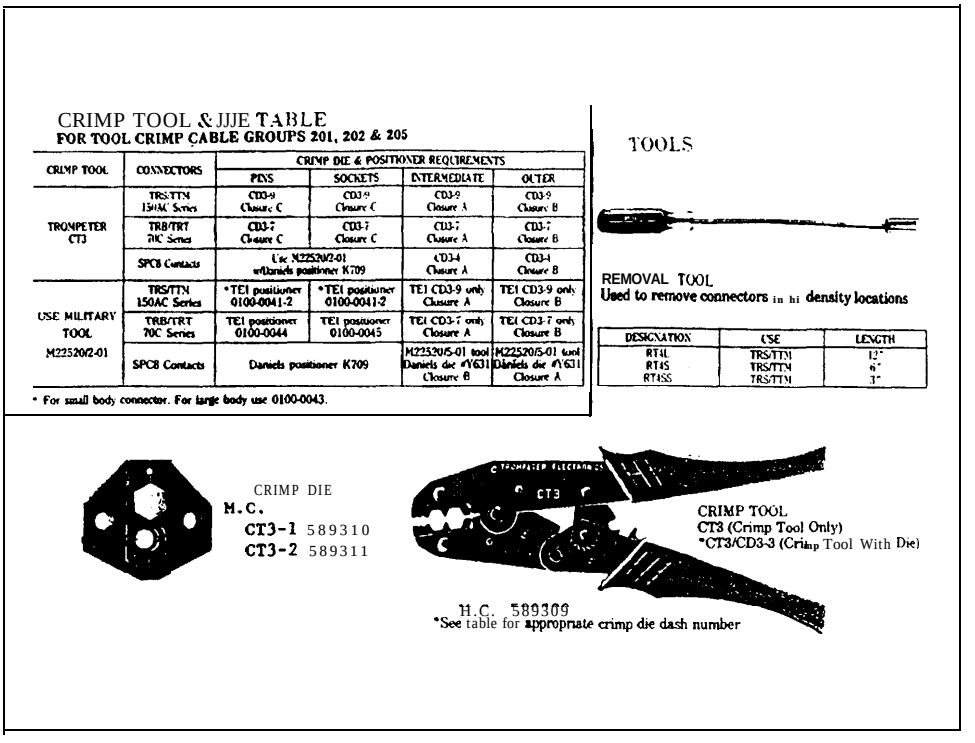
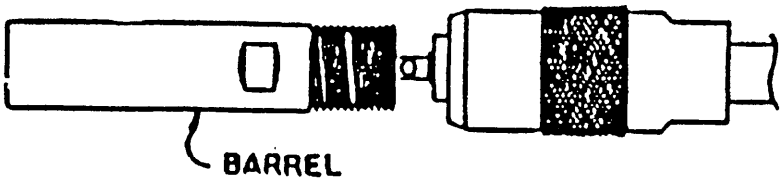


Figure 18



1. INSERT PIN/SLEEVE ASSEMBLY INTO BARREL. ENGAGE CLAMP NUT WITH BARREL.
2. HOLDING CLAMP NUT RIGID, WRENCH TIGHTEN BARREL TO 30-40 IN. LB. TORQUE.

Figure 19

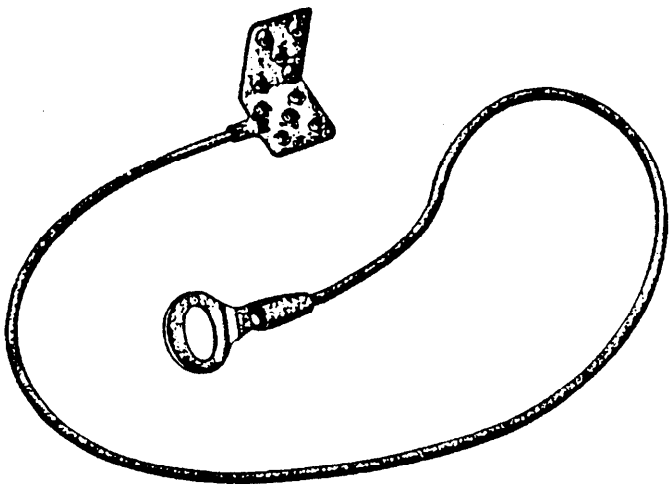


Figure 20

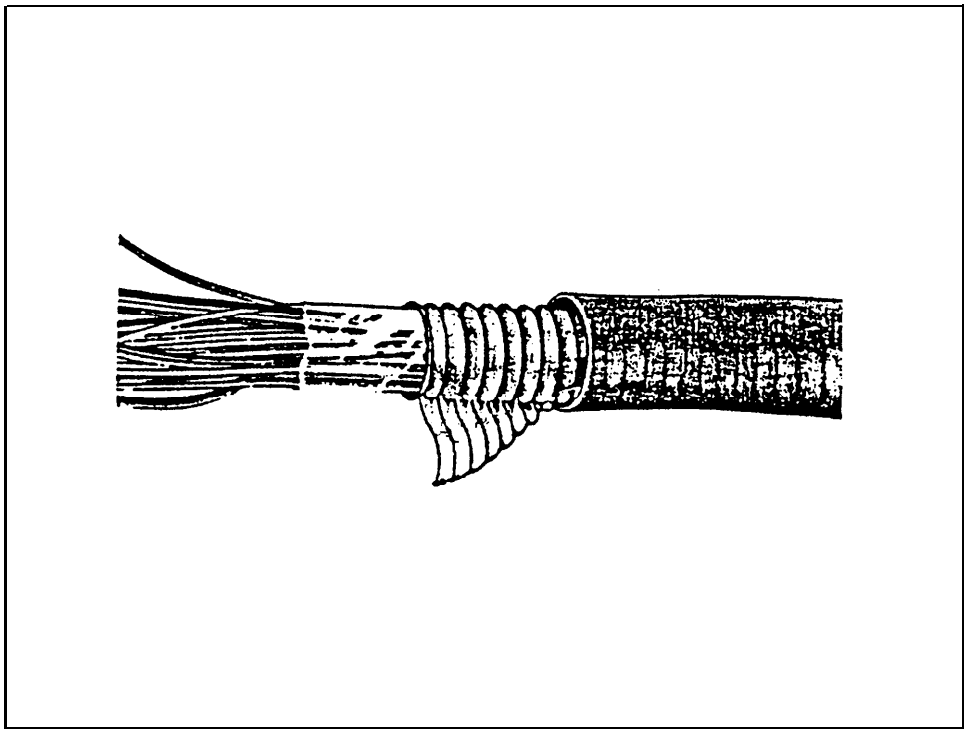


Figure 21

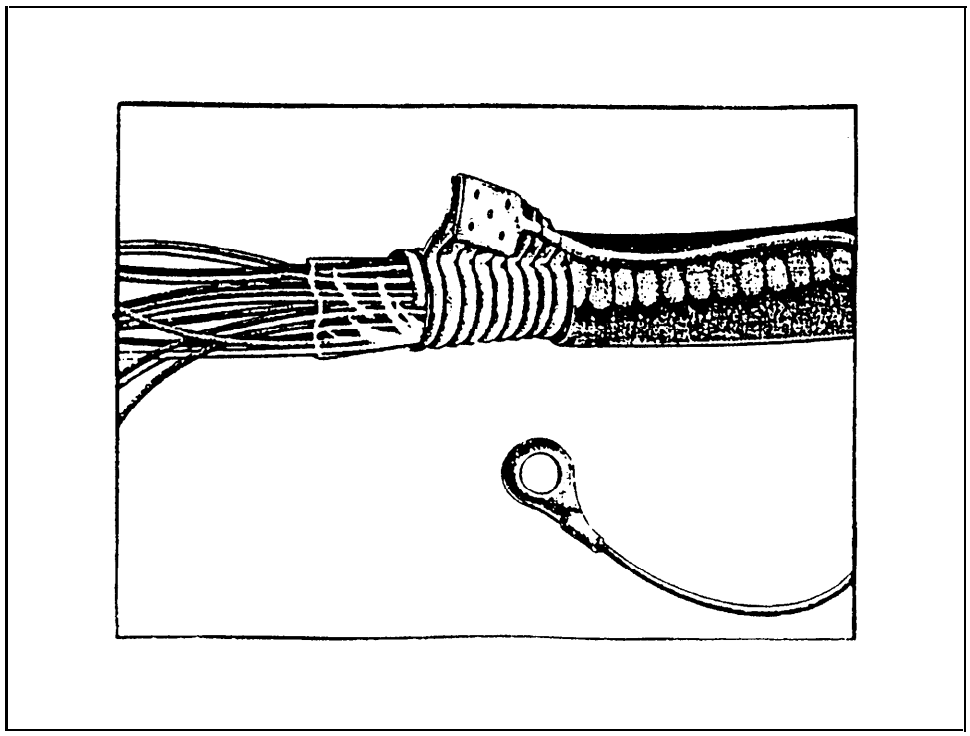


Figure 22

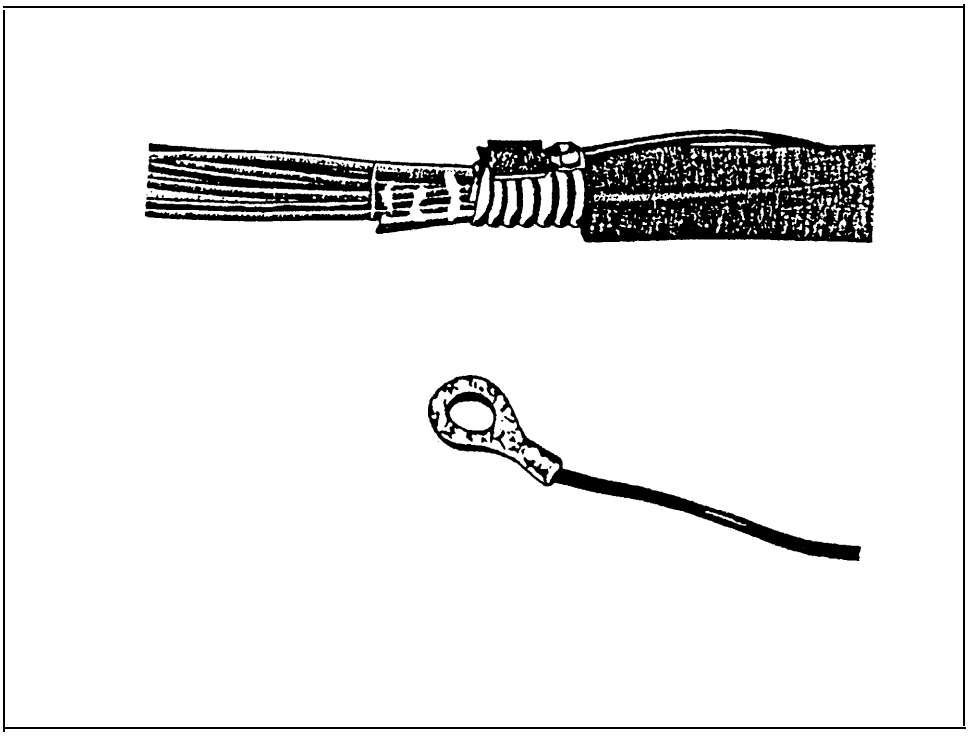


Figure 23

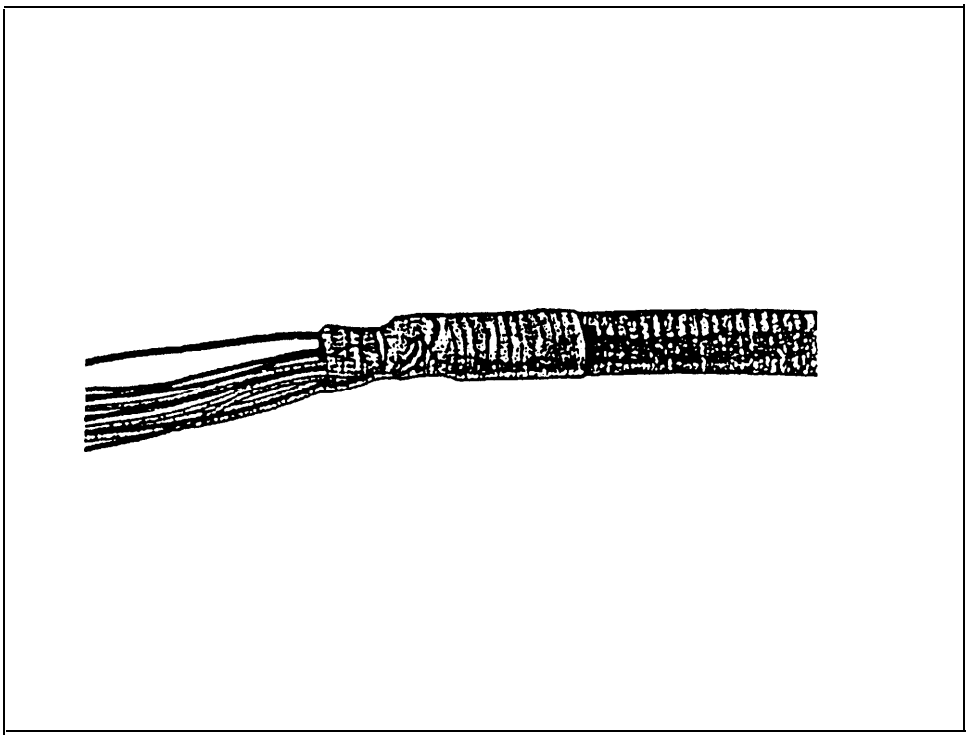


Figure 24