

**Cable with Inner and Outer Crimp Ferrules.**

Figure 1

## 1. INTRODUCTION

This instruction sheet covers the use of AMPLIMITE Connector HD-20 Shielded Cable Clamp Kits with available ferrules listed in Figures 2 and 8, and grommets listed in Figure 14.



*Dimensions are in millimeters [with inch equivalents in brackets]. Figures and illustrations are for identification only and are not drawn to scale.*

Read these instructions carefully before using cable clamp kits and ferrules.

Reasons for reissue of this sheet are provided in Section 9, REVISION SUMMARY.

## 2. DESCRIPTION (Figure 1)

Each shielded cable clamp kit consists of two symmetrical cable clamps which contain strain-relief bars. Each kit also includes two captive screws, two fillister head screws, and two nuts.

The shielded cable clamps are designed to provide electromagnetic shielding and strain-relief for braid-and/or foil-type (with drain wire) shielded cables. The shielded cable clamps may be used on cables fitted with split-ring or crimp ferrules, on cables without ferrules, or on cables fitted with grommets. Unshielded

cable clamp with grommet kits are also available to provide strain relief only.

Refer to Paragraph 3 when using cable without ferrules, to Paragraphs 5 and 6 for installation of cable clamps on cable with ferrules, and to

Paragraph 7 for installation of cable clamps on cable with grommets.

Cable clamps are available in five sizes for AMPLIMITE connectors with corresponding contact positions (9, 15, 25, 37, and 50 for HD-20, and 15, 26, 44, 62 and 78 for HD-22).

Refer to Figure 2 and Figure 8 to determine the appropriate clamp kit relative to cable diameter, AMPLIMITE connector size, and type of ferrule (if used) for the cable.

Refer to Figure 14 to determine appropriate grommet set and cable clamp kit relative to cable diameter.



*If cable diameter is too small to fit properly into strain-relief, apply heat-shrinkable tubing before working braid over cable jacket to build up the outside diameter of the cable. The inside diameter of the heat-shrinkable tubing should be no more than twice the outside diameter of the cable. See Figure 3.*

| FERRULES  |           | STRAIN-RELIEF |                |
|-----------|-----------|---------------|----------------|
| INNER     | OUTER     | ZINC DIE CAST | PLATED PLASTIC |
| 745129-[] | 745130-[] | 5745171-[]    | 5745833-[]     |
|           |           | 5745172-[]    | 5745854-[]     |
|           |           | 5745173-[]    | 5747098-[]     |
|           |           | 5745174-[]    | 5747099-[]     |
|           |           | 5745175-[]    | 5747100-[]     |

Figure 2

### 3. ATTACHING CABLE CLAMP ASSEMBLY (Figure 3)

#### 3.1. Braided Shield Cable (Without Ferrule)

1. Strip cable jacket from end of conductors. Refer to the table in Figure 7 for the cable jacket strip length for HD-20 and HD-22 connectors.
2. Push braided shield away from conductors to form a bulge at base of outer cable jacket. Work braided shield back over outer jacket. It may be necessary to unweave shield and place strands over outer jacket (strands should be spread evenly over outer jacket).
3. Install tape or heat-shrinkable tubing without sealant to secure loose strand ends to cable until cable clamps are installed. The braid should be exposed 14.27 mm [.562 in.] between tape or tubing and conductors. See Figure 3. Use an electric heat gun as the heat source.
4. Terminate conductors with contacts and insert contacts into rear of connector or terminate to connector per the appropriate document listed in Figure 4.

5. Position one half of cable clamp on cable and connector. Ensure that flange of connector is behind flange gripper of clamp and that braided shield of cable is in strain-relief grooves of clamp.

6. Position the other half of clamp on top of cable and start the two fillister head screws and nuts on the clamps.

7. Insert captive screws into mounting holes. Alternately tighten the fillister head screws until the two clamp halves bottom on each other. Torque values should not exceed 0.53 Nm [4.7 in.-lbs].



**CAUTION** Excess braided shield may be left secured or may be trimmed off directly behind clamps with a sharp shield trimming tool. Take care not to nick or cut conductors. If heat-shrinkable tubing was used to secure braid, do NOT trim the tubing.

#### 3.2. Foil Shield Cable (Without Ferrule)

1. Strip the cable jacket from end of conductors. Refer to the table in Figure 7 for the cable jacket strip length for HD-20 connectors.
2. Unwrap foil shield from cable and wrap it around outer jacket. Wrap drain wire around foil. Ensure that conductive side of foil is facing outward.
3. Secure ends of foil and drain wire with tape or heat-shrinkable tubing until clamps are installed. Leave 14.27 mm [.562 in.] of foil exposed between tape or tubing and conductors.
4. Terminate conductors with contacts and insert contacts into rear of connector or terminate to connector per the appropriate document listed in Figure 4.

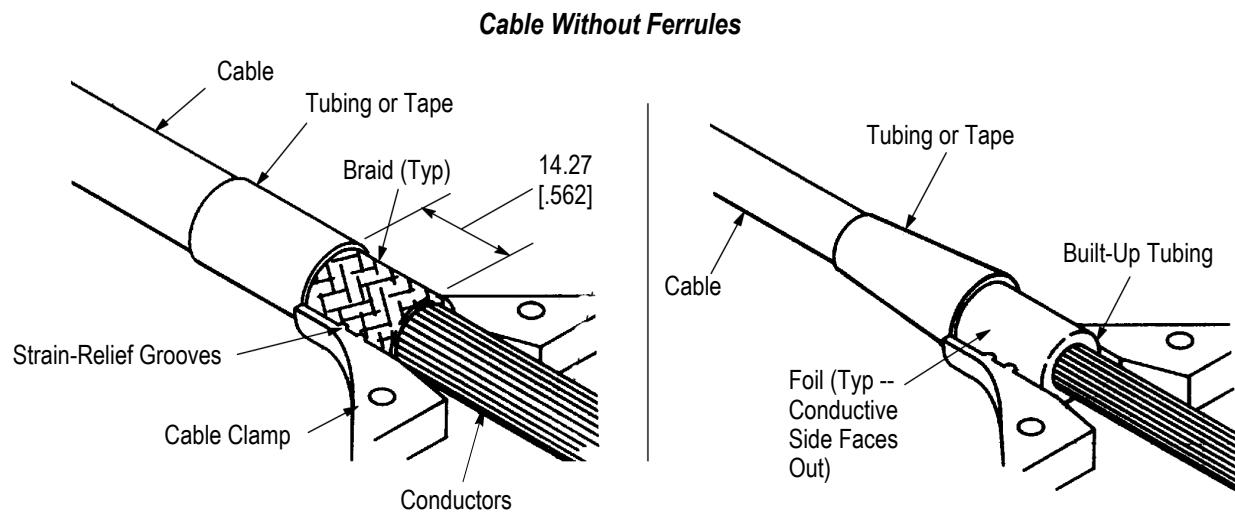


Figure 3

| CONNECTOR TYPE     | DOCUMENT                            |
|--------------------|-------------------------------------|
| HDP-20 Crimp Snap  | Instruction Sheet 408-7514          |
| HDP-20 Solder Cup  | Instruction Sheet 408-9193          |
| HDE-20 All Plastic | Instruction Sheet 408-6621          |
| HDE-20 Metal Shell | Instruction Sheet 408-6645          |
| HDP-22             | Application Specification 114-10001 |

Figure 4

5. Position one half of cable clamp on cable and connector. Ensure that flange of connector is behind flange gripper of clamp and that foil shield of cable and the drain wire are in strain-relief grooves of clamp.

6. Position the other half of the clamp on top of cable and start the two fillister head screws and nuts on the clamps.

7. Insert captive screws into mounting holes. Alternately tighten the fillister head screws until the two clamp halves bottom on each other. Torque values should not exceed 0.53 Nm [4.7 in.-lbs].



**CAUTION** Excess foil may remain secured with tape or may be trimmed directly behind clamp with a sharp trimming tool. Take care not to nick or cut conductors. If heat-shrinkable tubing was used to secure foil, do NOT trim the tubing.

#### 4. LATCHING BLOCKS (Figure 5)

The cable clamps may be mounted to a connector-mounted block or a panel-mounted block.

Cable clamps may be used with latching blocks (208101, 745007, 745245, and 745286) by removing mounting screws and replacing them with spring latches (745255-2). Refer to Instruction Sheet 408-9130 and to Figure 5 of this document for proper assembly of spring latches.

#### 5. SPLIT RING FERRULE ASSEMBLY (Figure 6)

Refer to the table in Figure 8 for the proper ferrule for the cable and for the AMPLIMITE connector you are using, and proceed as follows:

1. Cut the cable to the desired length and slide the ferrule onto the cable.
2. Strip cable jacket from end of conductors. Take care not to nick or cut braid. Refer to the table in Figure 7 for the cable jacket strip length for HD-20 and HD-22 connectors.

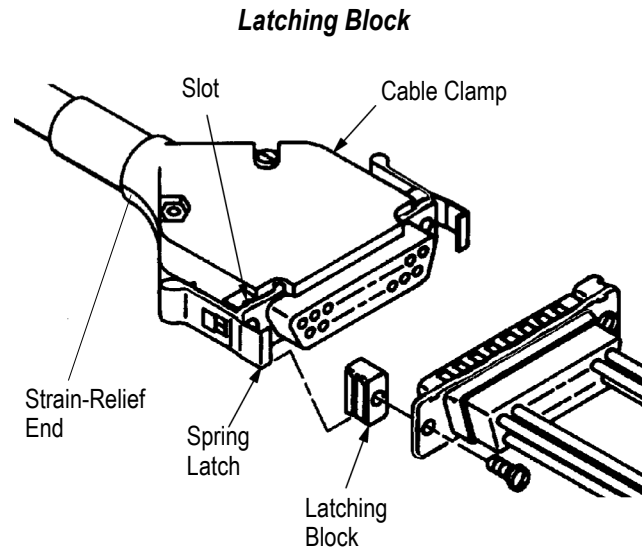


Figure 5

3. If using braided cable, fold braid back over cable without splitting or slicing the braid. If using foil cable with a drain wire, cut the foil to the jacket and remove foil. Wrap the drain wire once around the ferrule, making sure that the drain wire is NOT left in the slotted opening in the ferrule. If using cable with both foil and braid, cut foil to jacket and remove foil after folding braid back over jacket. Slide ferrule under braid to end of cable jacket.

4. Trim excess braid or drain wire to approximately 15.24 mm [.600 in.] from end of cable jacket.

5. Terminate conductors with contacts and insert contacts into rear of connector or terminate to connector per the appropriate document listed in Figure 4.

6. Position one half of cable clamp on cable and connector. Ensure that flange of connector is behind flange gripper of clamp and that ferrule is positioned against inner strain-relief bar of cable clamp (see Figure 10).

7. Position the other half of the clamp on top of cable and start the two fillister head screws and nuts on the clamps.

8. Insert captive screws into mounting holes. Alternately tighten the fillister head screws until the two clamp halves bottom on each other. Torque values should not exceed 0.53 Nm [4.7 in.-lbs].

#### 6. CRIMP FERRULE ASSEMBLY (FIGURE 9)

Refer to the table in Figure 2 for the proper ferrule for the cable and for the AMPLIMITE connector you are using, and proceed as follows:

### Split-Ring Ferrule

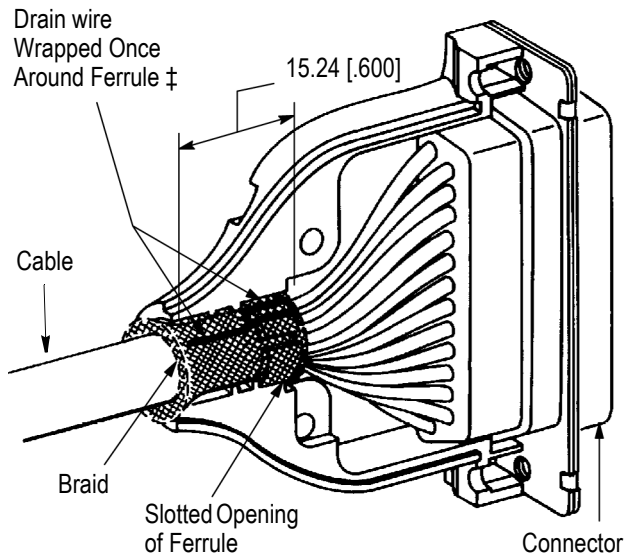



Figure 6

**NOTE**  Crimp ferrules are for use with cables with braided shield ONLY. They are not for use with foil shield cable. If a cable with both braid and foil is being used, remove the foil before crimping ferrules.

1. Slide outer ferrule over cable.
2. Strip cable jacket from end of conductors. Be careful not to cut braid. Refer to the table in Figure 7 for the cable jacket strip length for HD-20 and HD-22 connectors.
3. Cut braid approximately 12.7 mm [.500 in.] from end of cable jacket.
4. Flare braid and slide inner ferrule under it. Do NOT unweave braid. Make sure that inner ferrule butts against cable jacket.
5. Slide outer ferrule over inner ferrule.
6. Place the cable assembly into Hand Crimping Tool 543344-1, equipped with Die Assembly 543013-[ ], if crimping manually. See Instruction Sheet 408-9318, packaged with the die set, for specific crimping instructions. The hand crimping tool is described in Instruction Sheet 408-9315. If using an applicator in an automatic machine, consult the appropriate applicator instruction sheet or consult your local TE representative.
7. Crimp the ferrules and remove crimped assembly from crimping dies. Trim excess braid from between the two ferrules. Take care not to nick or cut conductors.

8. Terminate conductors with contacts and insert contacts into rear of connector or terminate to connector per the appropriate document listed in Figure 4.

9. Position one half of cable clamp on cable and connector. Ensure that flange of connector is behind flange gripper of clamp and that inner ferrule is positioned between the two strain-relief bars of the clamp (see Figure 11).

10. Position the other half of the clamp on top of cable and start the two fillister head screws and nuts on the clamps.

11. Insert captive screws into mounting holes. Alternately tighten the fillister head screws until the two clamp halves bottom on each other. Torque values should not exceed 0.53 NSm [4.7 in.-lbs].



**CAUTION** Damaged contacts or ferrules may not be used. If a damaged contact or ferrule is evident, it must be removed and replaced with a new one.

| CABLE JACKET STRIP LENGTH FOR HD-20/HD-22 CONNECTORS |                             |                           |                        |                                                            |
|------------------------------------------------------|-----------------------------|---------------------------|------------------------|------------------------------------------------------------|
| CONNECTOR TYPE                                       | POSITION<br>HD-20/<br>HD-22 | GROMMET/<br>FERRULE STYLE | STRIP LENGTH*          | MASS TERM.** HAND<br>TOOLING DIMENSION<br>(Tooling Ident.) |
| HDE-20                                               | 9                           | None/Grommet              | 25.4-38.1 [1.00-1.50]  | J                                                          |
| HDE-20                                               | 9                           | Split Ring                | 25.4-38.1 [1.00-1.50]  | J                                                          |
| HDE-20                                               | 9                           | Crimp Style               | 48.3-53.33 [1.90-2.10] | F                                                          |
| HDE-20                                               | 15                          | None/Grommet              | 25.4-38.1 [1.00-1.50]  | J                                                          |
| HDE-20                                               | 15                          | Split Ring                | 25.4-38.1 [1.00-1.50]  | J                                                          |
| HDE-20                                               | 15                          | Crimp Style               | 48.3-53.33 [1.90-2.10] | F                                                          |
| HDE-20                                               | 25                          | None/Grommet              | 33.0-40.6 [1.30-1.60]  | J                                                          |
| HDE-20                                               | 25                          | Split Ring                | 33.0-40.6 [1.30-1.60]  | J                                                          |
| HDE-20                                               | 25                          | Crimp Style               | 48.3-53.33 [1.90-2.10] | F                                                          |
| HDE-20                                               | 37                          | None/Grommet              | 35.6-43.2 [1.40-1.70]  | J                                                          |
| HDE-20                                               | 37                          | Split Ring                | 35.6-43.2 [1.40-1.70]  | J                                                          |
| HDE-20                                               | 37                          | Crimp Style               | 55.9-61.0 [2.20-2.40]  | F                                                          |
| HDP-20/-22                                           | 9/15                        | None/Grommet              | 25.4-38.1 [1.00-1.50]  | ---                                                        |
| HDP-20/-22                                           | 9/15                        | Split Ring                | 25.4-38.1 [1.00-1.50]  | ---                                                        |
| HDP-20/-22                                           | 9/15                        | Crimp Style               | 48.3-53.33 [1.90-2.10] | ---                                                        |
| HDP-20/-22                                           | 15/26                       | None/Grommet              | 25.4-38.1 [1.00-1.50]  | ---                                                        |
| HDP-20/-22                                           | 15/26                       | Split Ring                | 25.4-38.1 [1.00-1.50]  | ---                                                        |
| HDP-20/-22                                           | 15/26                       | Crimp Style               | 48.3-53.33 [1.90-2.10] | ---                                                        |
| HDP-20/-22                                           | 25/44                       | None/Grommet              | 27.9-40.6 [1.10-1.60]  | ---                                                        |
| HDP-20/-22                                           | 25/44                       | Split Ring                | 27.9-40.6 [1.10-1.60]  | ---                                                        |
| HDP-20/-22                                           | 25/44                       | Crimp Style               | 55.9-61.0 [2.20-2.40]  | ---                                                        |
| HDP-20/-22                                           | 37/62                       | None/Grommet              | 27.9-40.6 [1.10-1.60]  | ---                                                        |
| HDP-20/-22                                           | 37/62                       | Split Ring                | 27.9-40.6 [1.10-1.60]  | ---                                                        |
| HDP-20/-22                                           | 37/62                       | Crimp Style               | 55.9-61.0 [2.20-2.40]  | ---                                                        |
| HDP-20/-22                                           | 50/78                       | None/Grommet              | 27.9-40.6 [1.10-1.60]  | ---                                                        |
| HDP-20/-22                                           | 50/78                       | Split Ring                | 27.9-40.6 [1.10-1.60]  | ---                                                        |
| HDP-20/-22                                           | 50/78                       | Crimp Style               | 55.9-61.0 [2.20-2.40]  | ---                                                        |

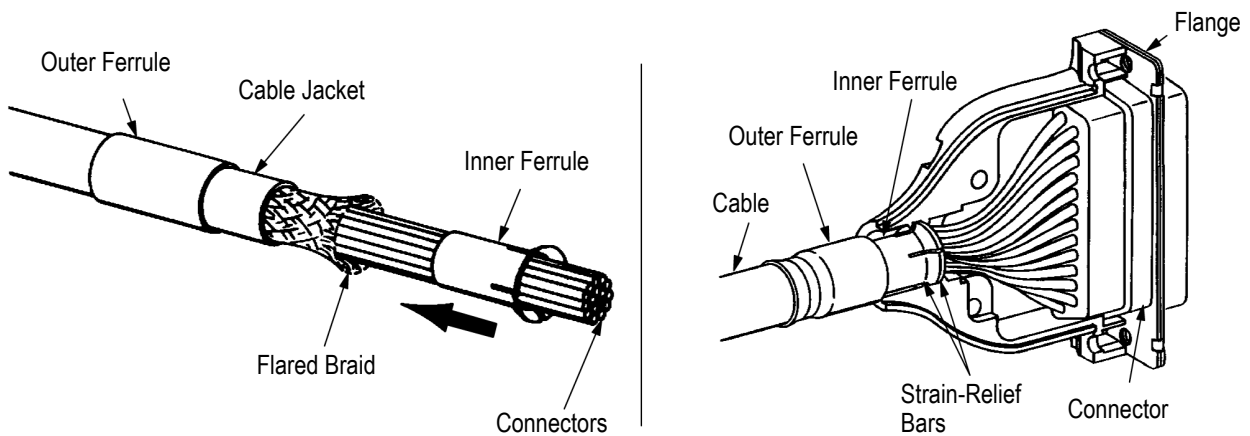
\*The strip length dimension range is designed to accommodate a variety of cable designs. In order to determine the proper strip length, before beginning production runs, consideration must be given to the flexibility and type of wire, bundling of wire due to circuit arrangement, and other like factors. In any case, the ferrule placement discussed in the assembly procedures must be per Figure 10 for split ring ferrules and per Figure 11 for crimp ferrules. \*\*Mass termination hand tooling dimension pertains to HDE connectors ONLY.

Figure 7

| CONNECTOR SIZE<br>(HD-20/HD-22) | CABLE RANGE<br>(OD)     | SPLIT-RING<br>FERRULE | STRAIN-RELIEF 180° CABLE |                |
|---------------------------------|-------------------------|-----------------------|--------------------------|----------------|
|                                 |                         |                       | ZINC DIE CAST            | PLATED PLASTIC |
| 1<br>(9-Posn/15-Posn)           | 4.06-5.08 [.160-.200]   | 745508-2              | 745171-2                 | 745854-5       |
|                                 | 5.33-6.10 [.210-.240]   | 745508-3              | 745171-1                 | 745854-3       |
|                                 | 8.38-9.40 [.330-.370]   | 745508-6              | 745171-5                 | 745854-1       |
| 2<br>(15-Posn/26-Posn)          | 4.70-5.72 [.185-.225]   | 745508-3              | 745172-3                 | 747099-7       |
|                                 | 6.10-7.62 [.240-.300]   | 745508-4              | 745172-2                 | 747099-5       |
|                                 | 8.51-9.52 [.335-.375]   | 745508-6              | 745172-1                 | 747099-3       |
|                                 | 9.91-10.92 [.390-.430]  | 745508-1              | 745172-3                 | 747099-1       |
| 3<br>(25-Posn/44-Posn)          | 6.10-7.11 [.240-.280]   | 745508-4              | 745173-5                 | 745833-9       |
|                                 | 7.87-8.89 [.310-.350]   | 745508-5              | 745173-4                 | 745833-7       |
|                                 | 9.91-10.92 [.390-.430]  | 745508-1              | 745173-3                 | 745833-5       |
|                                 | 11.18-12.19 [.440-.480] | 745508-1              | 745173-2                 | 745833-3       |
|                                 | 12.45-13.46 [.490-.530] | 745508-9              | 745173-1                 | 745833-1       |
| 4<br>(37-Posn/62-Posn)          | 7.87-8.89 [.310-.350]   | 745508-5              | 745174-5                 | 747100-9       |
|                                 | 9.91-10.92 [.390-.430]  | 745508-1              | 745174-4                 | 747100-7       |
|                                 | 11.68-12.7 [.460-.500]  | 745508-8              | 745174-3                 | 747100-5       |
|                                 | 13.59-14.60 [.535-.575] | 1-745508-0            | 745174-2                 | 747100-3       |
|                                 | 15.49-16.51 [.610-.650] | 1-745508-1            | 745174-1                 | 747100-1       |
| 5<br>(50-Posn/78-Posn)          | 8.51-9.52 [.335-.375]   | 745508-6              | 745175-6                 | ---            |
|                                 | 10.41-11.43 [.410-.450] | 745508-7              | 745175-5                 | ---            |
|                                 | 12.32-13.34 [.485-.525] | 745508-9              | 745175-4                 | ---            |
|                                 | 14.22-15.24 [.560-.600] | 1-745508-0            | 745175-3                 | ---            |
|                                 | 16.13-17.14 [.635-.675] | 1-745508-1            | 745175-2                 | ---            |
|                                 | 18.03-19.05 [.710-.750] | 1-745508-2            | 745175-1                 | 747098-1       |

Figure 8

**Crimp Ferrules**



**Slipping Inner Ferrule Under Braid**

**Installing Cable Into Cable Clamps**

Figure 9

Ferrule Placement

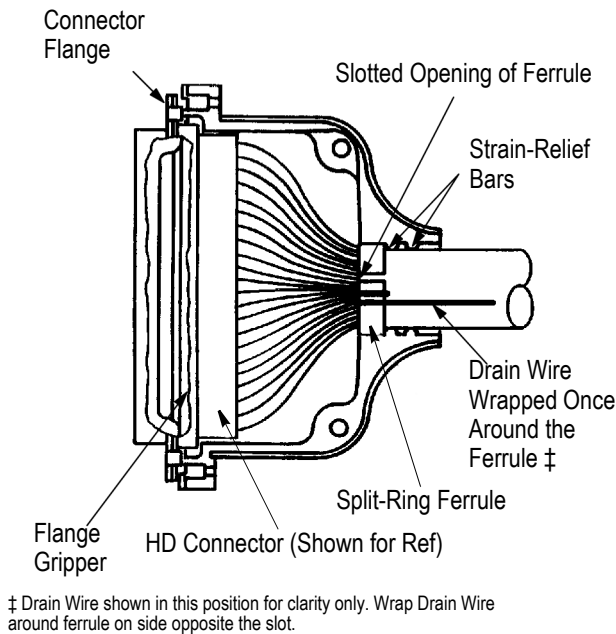


Figure 10

Ferrule Placement

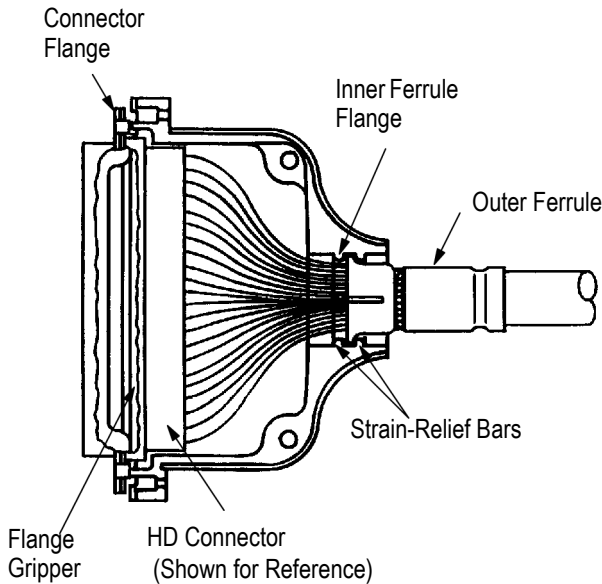
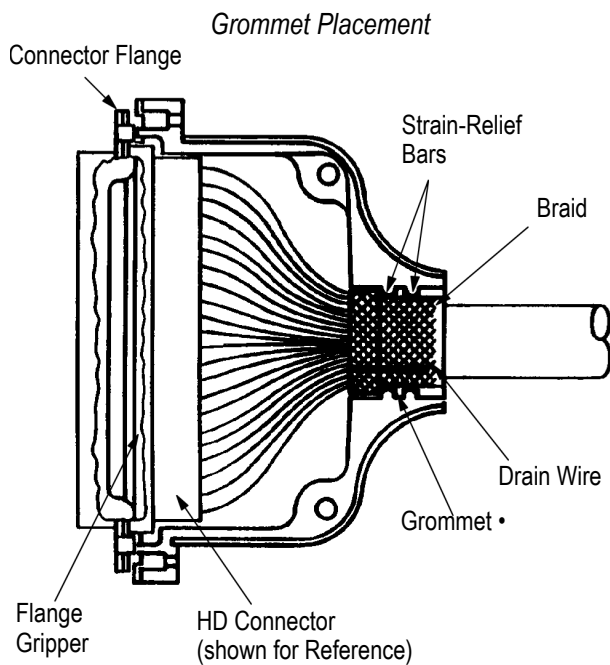


Figure 11

**7. GROMMET ASSEMBLY** (Figure 12 and Figure 13)

Refer to the table in Figure 14 to select the proper cable clamp kit with grommets for the cable you are using and proceed as follows:

1. Cut the cable to the desired length. Slide the appropriate size grommet onto the cable with the large O.D. toward the cable end being terminated.
2. Strip cable jacket from end of conductors. Take care not to cut any foil, braid, or drain wire if present. Refer to table in Figure 7 for the cable jacket strip length for HD-20 and HD-22 connectors.
3. If cable has neither braid nor foil, slide grommet to end of cable jacket and go to Step 7.
4. **If cable has only foil** around the conductors, cut foil to end of jacket and remove. If drain wire is present, trim to a length of approximately 15.24 mm [.600 in.] from end of jacket. Slide grommet to end of cable jacket, bend any drain wire back over top of grommet, and go to Step 7.
5. **If cable has only braid**, trim braid to approximately 15.24 mm [.600 in.] from end of cable jacket. Slide grommet to end of cable jacket and fold the braid as evenly as possible around the grommet. It may be easier to fold the braid back over the jacket end first, then slide the grommet under it. Go to Step 7.
6. **If cable has both foil and braid**, trim foil, braid, and any drain wire to approximately 15.24 mm [.600 in.] from end of cable jacket. Slide grommet to end of cable jacket and fold the braid as evenly as possible around the grommet. It may be easier to fold the braid back over the jacket end first, then slide the grommet under it. Cut foil to end of jacket and remove. Fold drain wire, if present, over the braid and go to Step 7.
7. Terminate conductors with contacts and insert contacts into rear of connector or terminate the connector per the appropriate document listed in Figure 4.
8. Position one half of cable clamp on cable and connector. Ensure that the flange of the connector is behind the flange gripper of the clamp and that the large O.D. of the grommet is seated against the connector side of the inner strain relief bar of the cable clamp.
9. Position the other half of the clamp on top of cable and start the two fillister head screws and nuts on the clamps.



• NOTE: Large End of Grommet Toward Connector

Figure 12

10. Insert captive screws into mounting holes. Alternately tighten the fillister head screws until the two clamp halves bottom on each other. Torque values should not exceed 0.53 Nm [4.7 in.-lbs].

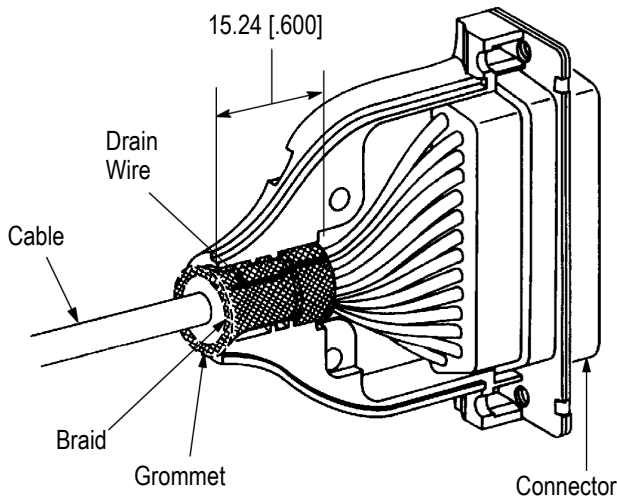


Figure 13

**8. OPTIONAL SCREWLOCK** (Figure 15)

In some cable-to-cable applications, it is desirable to install screwlocks in one of the mating assemblies which can engage mounting screws or jackscrews from the other assembly. this can be done as follows:

1. Complete the backshell and connector assembly as described in one of the previous procedures (other than latching blocks).
2. Insert screwlock from kit 5747223-3 through each flange of the completed assembly.
3. Install saddle washer 5206473-3 over the screwlock threads and against the rear of both backshell flanges.
4. Apply lock washers and hex nuts to the screwlock threads and tighten to a max of 0.53 Nm [4.7 in.-lbs].

**9. REVISION SUMMARY**

Since the previous release of this document, the new company logo was applied.



| CONNECTOR SIZE<br>(HD-20/HD-22) | CABLE RANGE (OD)       | 180° STRAIN-RELIEF |                |                  |
|---------------------------------|------------------------|--------------------|----------------|------------------|
|                                 |                        | SHIELDED           |                | UNSHIELDED       |
|                                 |                        | ZINC DIE CAST      | PLATED PLASTIC | UNPLATED PLASTIC |
| 1<br>(9-Posn/15-Posn)           | 4.70-8.13 [.185-.320]  | 5748676-1          | 5748677-1      | 5748678-1        |
| 2<br>(15-Posn/26-Posn)          | 4.70-8.13 [.185-.320]  | 5748676-2          | 5748677-2      | 5748678-2        |
| 3<br>(25-Posn/44-Posn)          | 4.83-11.94 [.190-.470] | 5748676-3          | 5748677-3      | 5748678-3        |
| 4<br>(37-Posn/62-Posn)          | 4.83-11.94 [.190-.470] | 5748676-4          | 5748677-4      | 5748678-4        |
| 5<br>(50-Posn/78-Posn)          | 4.83-11.94 [.190-.470] | 5748676-5          | 5748677-5      | 5748678-5        |

Figure 14

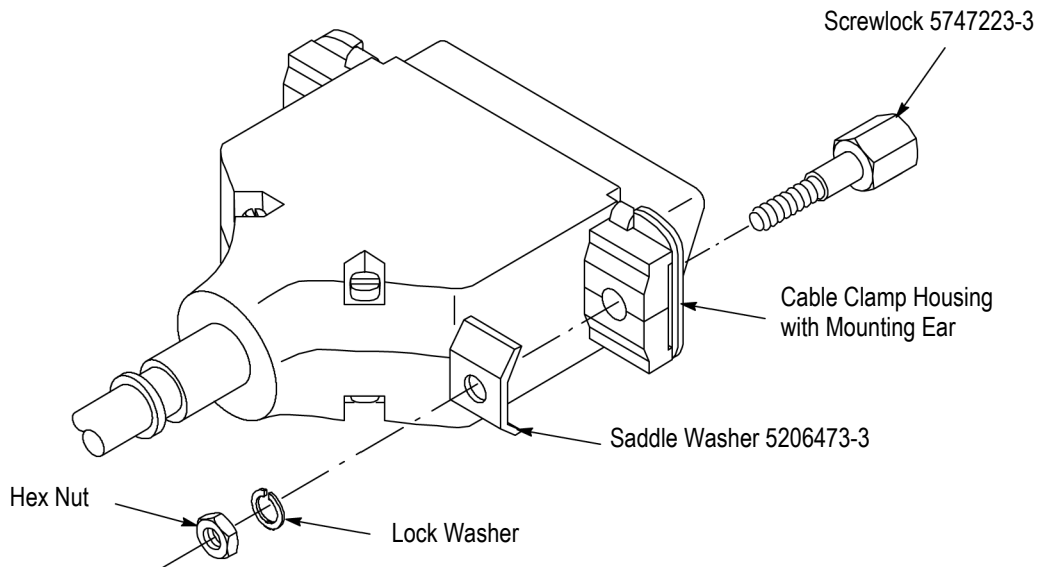


Figure 15