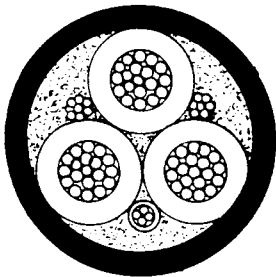




# Scotchcast<sup>®</sup> M-20

## Mine and Portable Cable Jacket Repair Kit



### Instructions 1 and 2 for (pages 2 and 4)

# Jacket Repair

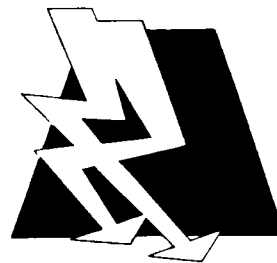
#### Supplements to Instruction 2 for:

- Insulation Repair (page 6)
- Conductor Repair (page 8)
- Cable Splice (page 10)

Cable Diameter Range: 1.6 in. to 2.5 in.

Mine Safety and Health Administration  
Acceptance No. P-142-5 MSHA

2047-X143



#### **WARNING!**

Before attempting any cable repairs, make sure that the proper cable is disconnected, locked out and suitably tagged!

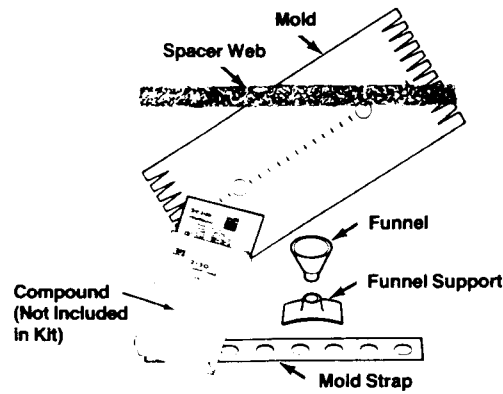
#### **Important Notice to Purchaser:**

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of all warranties, express or implied:

Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for his intended use, and user assumes all risk and liability whatsoever in connection therewith.

No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by officers of seller and manufacturer.

# Kit Components



## Instruction 1 Jacket Repair

- SHD-GC Cable
- Other cable with jacket thickness of 3/16" or 0.19" (5 mm) or more

Generally cables considered as thick jacketed, with jacket thickness of 3/16" (5 mm) or more.

Note: If cable's jacket thickness is less than 3/16" (5 mm), use Instruction 2 on page 4.

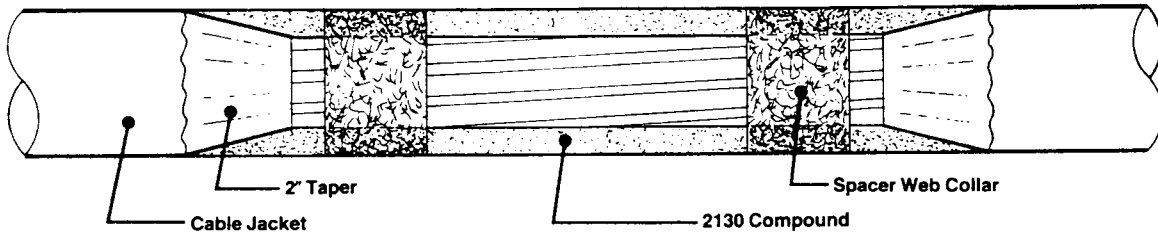


Figure 1

### A. Prepare Cable

1. Position cable to eliminate bending or sagging of repair area.
2. Remove entire cable jacket from repair area, for a length not exceeding 13" (330 mm). (Figure 2)
3. FULLY taper jacket ends for 2" (50 mm). (Figure 2)
4. THOROUGHLY scuff jacket for 2" (50 mm) beyond taper. Clean dust from scuffed area. (Figure 2)
5. Overwrap ground conductors with 1 half-lapped layer of tape:
  - SHIELDED CABLE (SHD-GC); use Scotch 13 Semi-conducting tape
  - NON-SHIELDED CABLE (600/2000 V.); use vinyl tape
6. Bind conductors together with band(s) of INVERTED vinyl tape (adhesive side out), located per Spacer Web positions shown in Figure 3. (Figure 2)

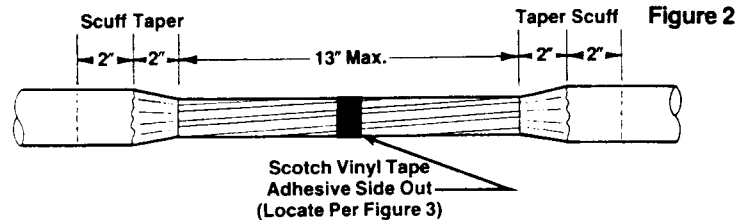


Figure 2

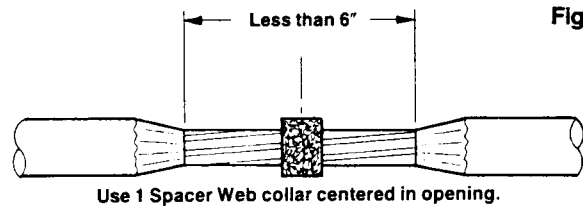
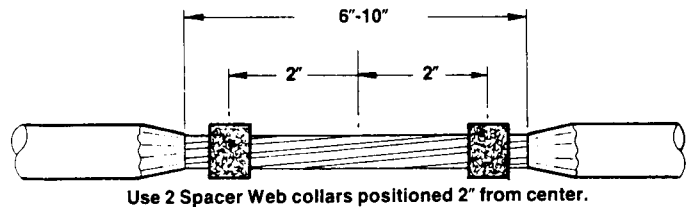
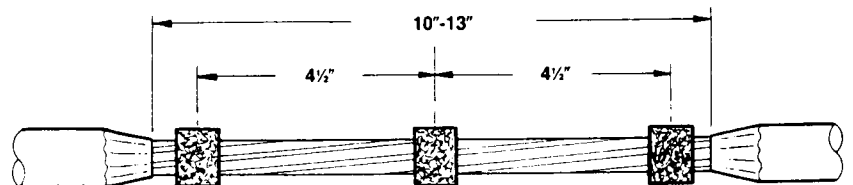


Figure 3



Use 2 Spacer Web collars positioned 2" from center.



Use 3 Spacer Web collars, positioned in center of opening and at 4 1/2" from center.

### B. Install Spacer Web

APPLIES ONLY TO REPAIR OPENINGS OF 6" (150 mm) AND LONGER.

1. Wrap on spacer web collar(s) per Figure 3; build up to diameter of cable jacket and cut off.
2. Split end(s) of spacer web and press into sides of collar(s). (Figure 4)

### C. Install Mold

1. Inspect mold: On previously used mold, make certain vent slits are clear of compound.
2. With cable straight, center mold over repair area with vent slits on top. Wrap snugly around, tucking one edge under. (Figure 5)

**NOTE: TUCKED EDGE MUST BE STRAIGHT TO FORM A SEAL.**

3. Position funnel supports over mold holes and secure tightly with mold straps. (Figure 6)

**NOTE: MOLD, FUNNEL SUPPORTS AND MOLD STRAPS MAY BE MOVED AROUND AT THIS TIME, TO ADJUST FOR FINAL POSITION.**

4. Starting 1/2" (12 mm) on cable jacket, apply one half-lapped layer of tape over the mold's notched ends. (Figure 6)
5. Install funnels into funnel support holes. (Figure 6)

### D. Pour Compound

1. Premix **BLACK** side of "Unipak", Scotchcast 2130 Compound, by squeezing to a smooth consistency.
2. Firmly grasp each flat side of the "Unipak" container near the center barrier; at the same time, pull sides of barrier apart and roll sides of thumbs through barrier. Break the barrier all the way across to the side seals. (Figure 7)
3. Alternately squeeze ends of "Unipak" forcing compound rapidly back and forth, strip compound from corners of "Unipak" container between fingers. Mix until color is completely uniform — 30 to 40 VIGOROUS SQUEEZES. **DO NOT EXCEED 1 MINUTE.** (Figure 8)
4. Clip off a corner of "Unipak" and immediately pour into funnels, alternating back and forth between them.
5. Fill mold until compound fills funnels to 1/2 full.
6. Allow compound to cure.
7. Check compound in funnels for curing.

**NOTE: REPAIR MAY BE DEMOLDED WHEN COMPOUND IS NO LONGER TACKY.**

### E. Demold

1. Remove funnels by twisting and lifting, breaking off from compound. (Figure 9)
2. Remove mold straps and funnel supports. (Figure 9)
3. Carefully cut off any spout compound protrusions from repair, using a knife. (Figure 9)
4. Remove tape from mold ends.
5. Remove mold from cable repair, working from the ends toward center.

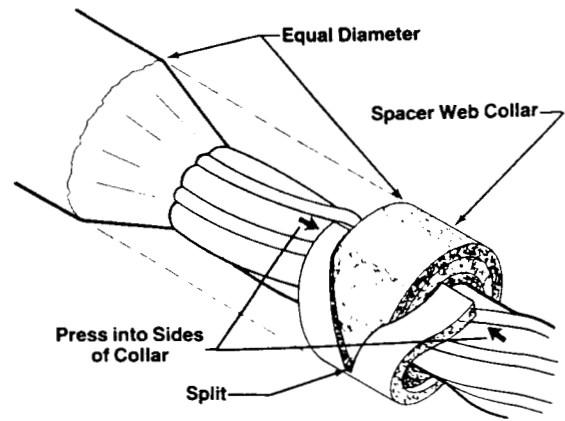


Figure 4

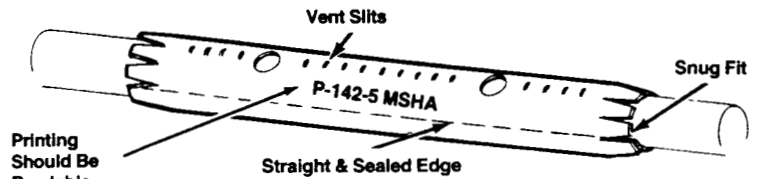


Figure 5

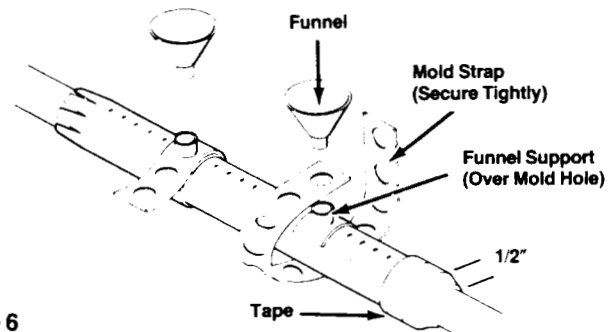


Figure 6

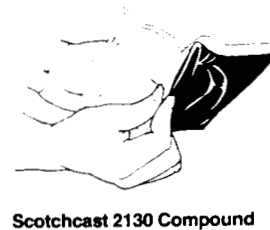


Figure 7

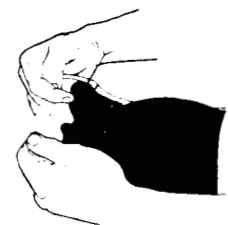


Figure 8

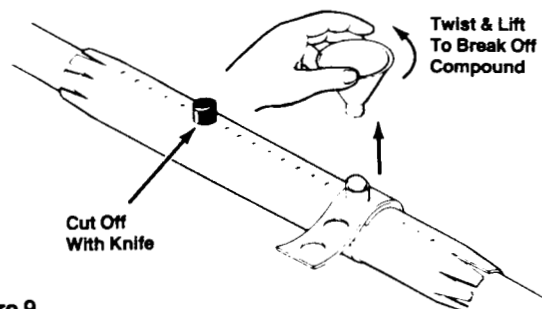
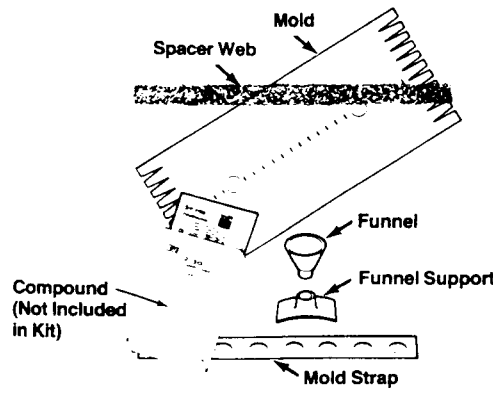


Figure 9

# Kit Components



## Instruction 2 Jacket Repair

- 600/2000 Volt Portable Cable
- Mine Power Feeder Cable
- Other cable with jacket thickness of less than 3/16" or 0.19" (5 mm)

Generally cables considered as thin jacketed, with jacket thickness of less than 3/16" (5 mm).

Note: If cable's jacket thickness is 3/16" (5 mm) or more, use Instruction 1 on page 2.

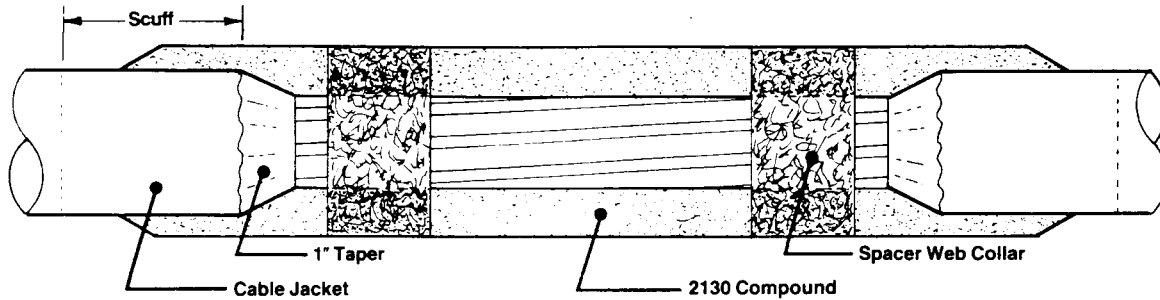


Figure 1

### A. Prepare Cable

1. Position cable to eliminate bending or sagging of repair area.
2. Remove entire cable jacket from repair area, for a length not exceeding 15" (380 mm). (Figure 2)
3. FULLY taper jacket ends for 1" (25 mm). (Figure 2)
4. THOROUGHLY scuff jacket ends EQUALLY, per Figure 2. Clean dust from scuffed area. (Figure 2)
5. Overwrap ground conductors with 1 half-lapped layer of tape:
  - SHIELDED CABLE (SHD-GC); use Scotch 13 Semi-conducting tape
  - NON-SHIELDED CABLE (600/2000 V.); use vinyl tape
6. Bind conductors together with band(s) of INVERTED vinyl tape (adhesive side out), located per Spacer Web positions shown in Figure 3. (Figure 2)

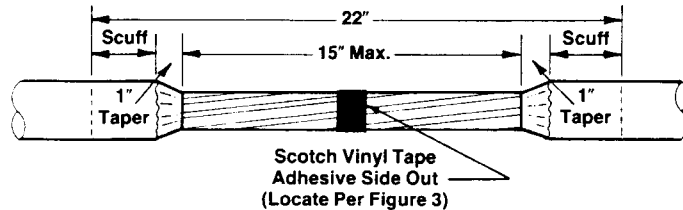


Figure 2

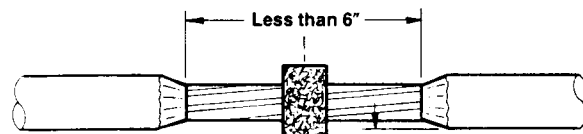
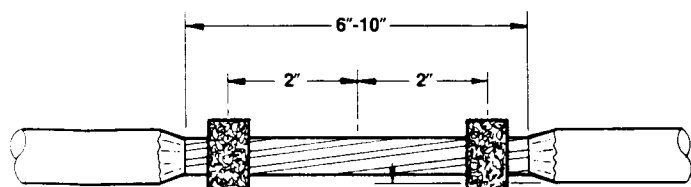


Figure 3

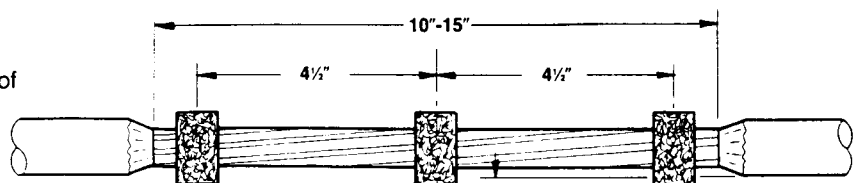
Use 1 Spacer Web collar centered in opening.



Use 2 Spacer Web collars positioned 2" from center.

### B. Install Spacer Web

1. Wrap on spacer web collar(s) per Figure 3; build up to 1 layer beyond cable jacket diameter and cut off. (Figure 3)
2. Split end(s) of spacer web and press into sides of collar(s). (Figure 4)



Use 3 Spacer Web collars, positioned in center of opening and at 4 1/2" from center.

### C. Install Mold

1. Inspect mold: On previously used mold, make certain vent slits are clear of compound.
2. With cable straight, center mold over repair area with vent slits on top. Wrap snugly around, tucking one edge under. (Figure 5)

**NOTE: TUCKED EDGE MUST BE STRAIGHT TO FORM A SEAL.**

3. Position funnel supports over mold holes and secure tightly with mold straps. (Figure 6)

**NOTE: MOLD, FUNNEL SUPPORTS AND MOLD STRAPS MAY BE MOVED AROUND AT THIS TIME, TO ADJUST FOR FINAL POSITION.**

4. Bundle mold's notched ends evenly around cable, maintaining cable centering. Starting 1/2" (12 mm) on cable jacket, apply one half-lapped layer of tape over notches. (Figure 7)

**NOTE: TENSION TAPE ONLY ENOUGH TO CONFORM TO MOLD.**

5. Install funnels into funnel support holes. (Figure 6)

### D. Pour Compound

1. Premix **BLACK** side of "Unipak", Scotchcast 2130 Compound, by squeezing to a smooth consistency.
2. Firmly grasp each flat side of the "Unipak" container near the center barrier; at the same time, pull sides of barrier apart and roll sides of thumbs through barrier. Break the barrier all the way across to the side seals. (Figure 8)
3. Alternately squeeze ends of "Unipak" forcing compound rapidly back and forth, strip compound from corners of "Unipak" container between fingers. Mix until color is completely uniform — 30 to 40 VIGOROUS SQUEEZES. **DO NOT EXCEED 1 MINUTE.** (Figure 9)
4. Clip off a corner of "Unipak" and immediately pour into funnels, alternating back and forth between them.
5. Fill mold until compound fills funnels to 1/2 full.
6. Allow compound to cure.
7. Check compound in funnels for curing.

**NOTE: REPAIR MAY BE DEMOLDED WHEN COMPOUND IS NO LONGER TACKY.**

### E. Demold

1. Remove funnels by twisting and lifting, breaking off from compound. (Figure 10)
2. Remove mold straps and funnel supports. (Figure 10)
3. Carefully cut off any spout compound protrusions from repair, using a knife. (Figure 10)
4. Remove tape from mold ends.
5. Remove mold from cable repair, working from the ends toward center.

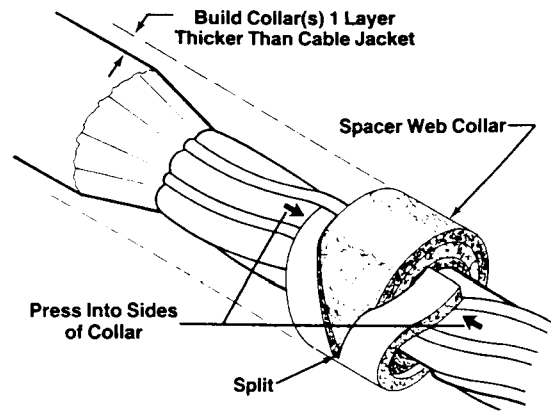


Figure 4

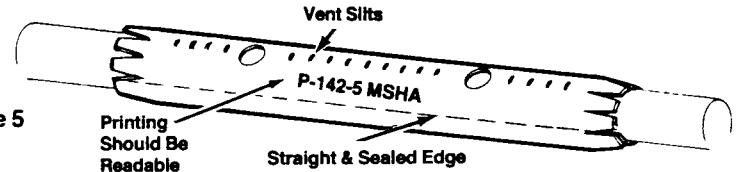


Figure 5

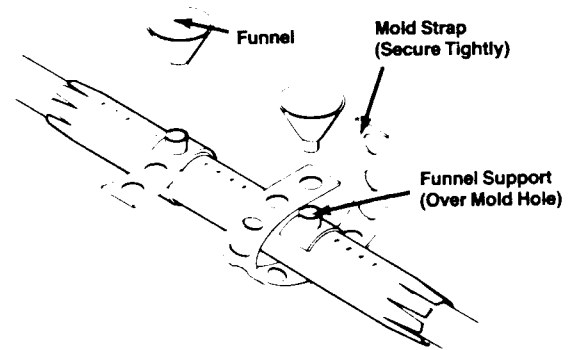


Figure 6

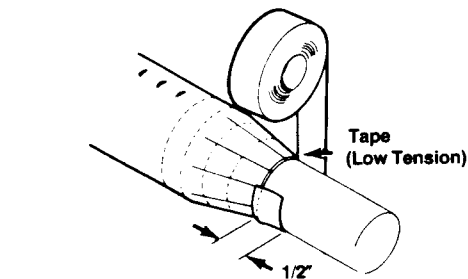


Figure 7

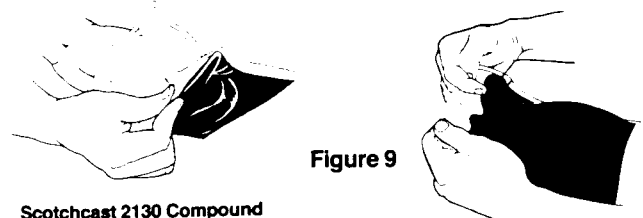


Figure 8



Figure 9

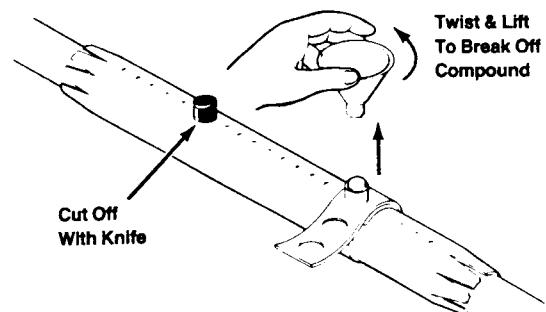


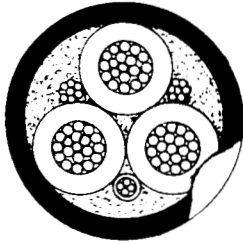
Figure 10

# Supplements to Instruction 2

Additional materials are required (as listed in applicable instruction)

## Instruction 3 Insulation Repair

For cable repair where one conductor's insulation has been damaged



### A. Prepare Cable Jacket

1. Position cable to eliminate bending or sagging of repair area.
2. Remove entire cable jacket from repair area, for a length not exceeding that shown in Figure 1.

*NOTE: ALLOW ADEQUATE REPAIR LENGTH FOR DIMENSIONS SHOWN IN DRAWINGS.*

#### 3. FULLY taper ends:

- 1" (25 mm) for jackets less than 3/16" (5 mm) thick
- 2" (50 mm) for jackets of 3/16" (5 mm) and thicker

4. Scuff cable jacket for an equal distance on each side of repair area; total length of repair area plus the scuffs should exceed the mold's overall length.

### B. Repair Damaged Insulation

#### 1. 600/2000 Volt Portable Cable (Non-Shielded) (Figures 1 & 2):

Additional tape required: Scotch 130C Splicing Tape

*NOTE: USE STANDARD CABLE PREPARATION PRACTICES*

#### 2. 600/2000 Volt Shielded Portable Cable (Figures 3 & 4):

Additional tapes required:

- Scotch 130C Splicing Tape
- Scotch 24 Shielding Tape
- Scotch 33 + Vinyl Plastic Tape or 33 Printed Tape (P-142-MSHA)

*NOTE: USE STANDARD CABLE PREPARATION PRACTICES*

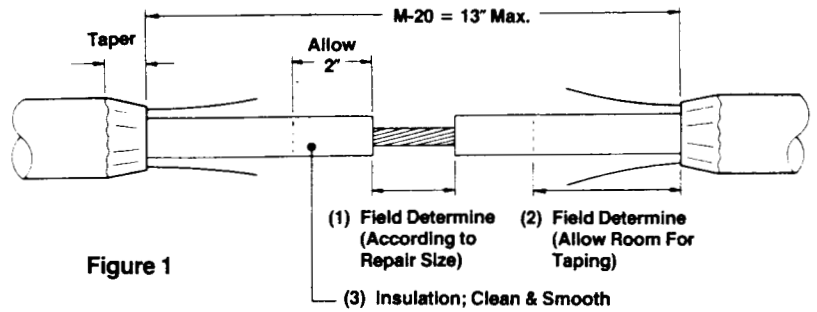


Figure 1

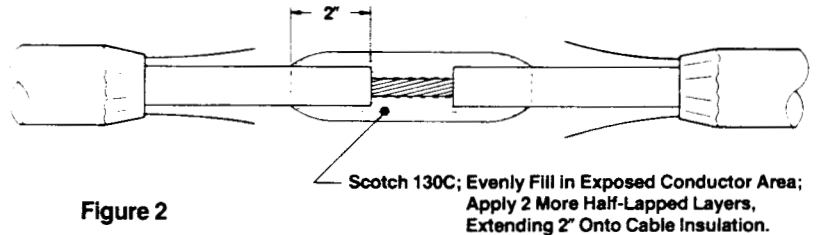


Figure 2

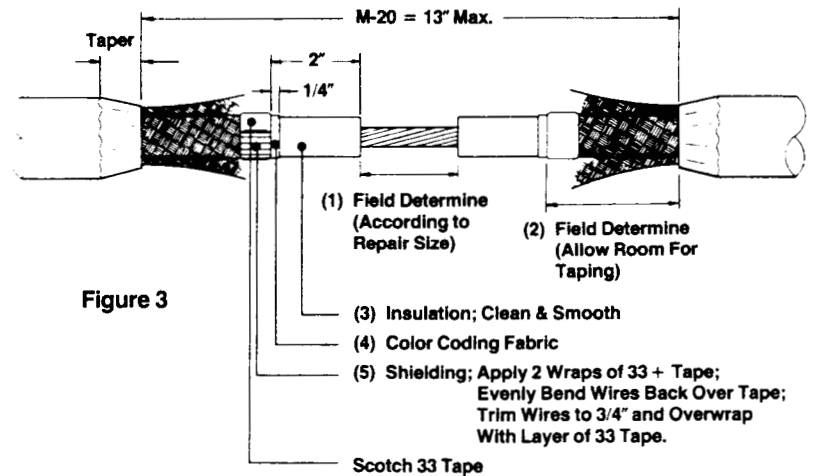


Figure 3

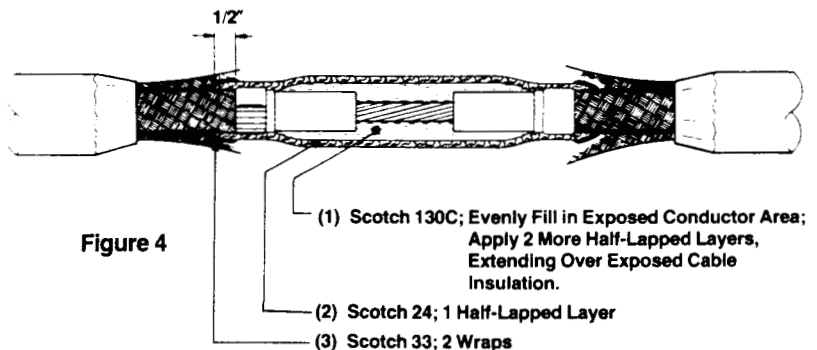


Figure 4

**3. 5 & 8 KV Shielded Cable Types SHD-GC, SH-D, MP-GC and MP (Figures 5 & 6):**

Additional tapes required:

- Scotch 13 Semi-Conducting Tape
- Scotch 130C Splicing Tape
- Scotch 24 Shielding Tape
- Scotch 33 + Vinyl Plastic Tape or 33 Printed Tape (P-142-MSHA)

Optional material:

- Scotch A-2 Cable Preparation Kit or Scotch A-3 Electricians' Abrasive Roll

**NOTE: USE STANDARD H.V. CABLE PREPARATION PRACTICES**

**C. Overwrap Ground Wires**

Apply 1 half-lapped layer of tape over bare ground conductors:

- *SHIELDED CABLE (SHD-GC)*; use Scotch 13 Semi-conducting tape
- *NON-SHIELDED CABLE (600/2000 V.)*; use vinyl tape

**D. Install Cable Repair Kit**

REFER TO INSTRUCTION 2

1. Bind conductors together with band(s) of *INVERTED* vinyl tape (adhesive side out), located per Spacer Web positions shown in *INSTRUCTION 2, FIGURE 3, PAGE 4*.
2. Wrap on spacer web collar(s); build *EQUAL DIAMETERS* to 1 layer greater than repair or cable diameter, whichever is largest. (Figure 7) *Locate and install collars according to INSTRUCTION 2, FIGURES 3 & 4, PAGES 4-5*.
3. Complete cable repair according to *KIT INSTRUCTION 2, starting with STEP C. 1., PAGE 5*.

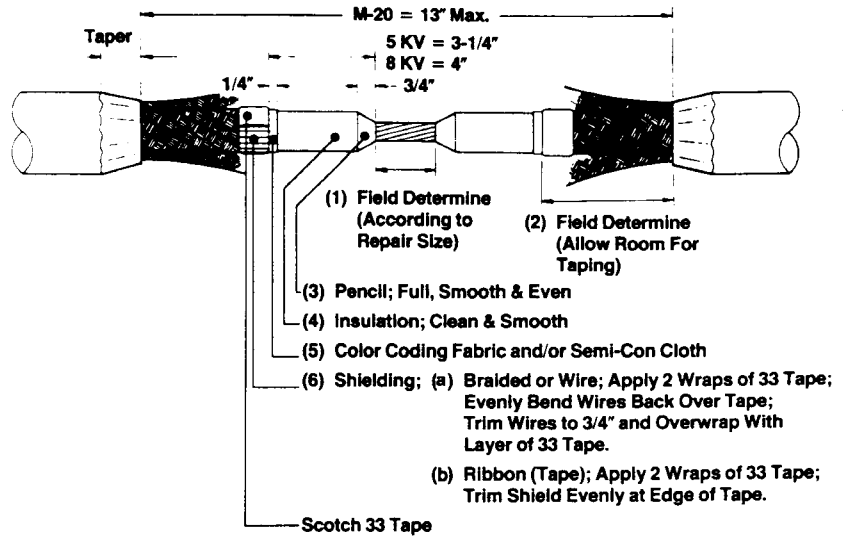


Figure 5

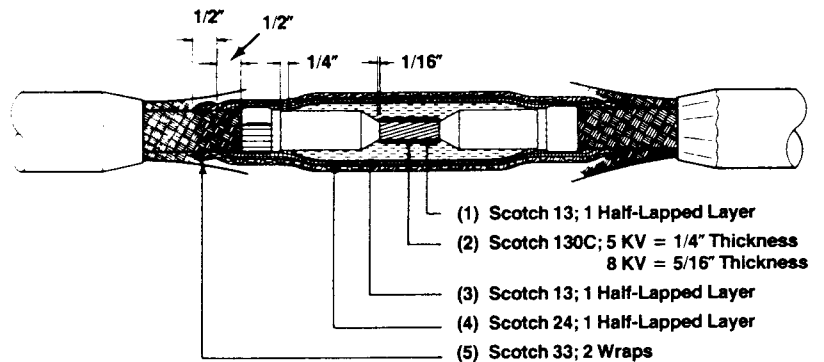


Figure 6

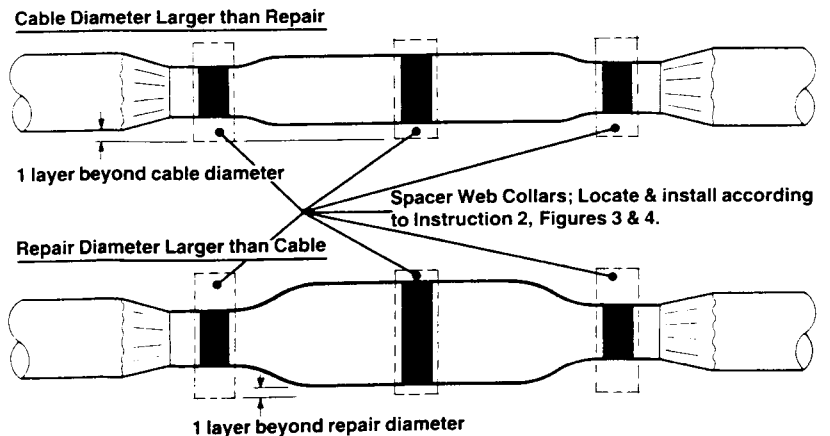
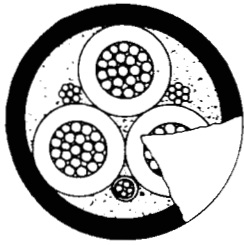


Figure 7

# Instruction 4 Conductor Repair

For cable repair where one conductor has been severed



## A. Prepare Cable Jacket

1. Position cable to eliminate bending or sagging of repair area.
2. Remove entire cable jacket from repair area, for a length not exceeding that shown in Figure 1.

*NOTE: ALLOW ADEQUATE REPAIR LENGTH FOR DIMENSIONS SHOWN IN DRAWINGS.*

### 3. FULLY taper jacket ends:

- 1" (25 mm) for jackets less than 3/16" (5 mm) thick
- 2" (50 mm) for jackets of 3/16" (5 mm) and thicker

4. Scuff cable jacket for an equal distance on each side of repair area; total length of repair area plus the scuffs should exceed the mold's overall length.

## B. Repair Damaged Conductor

### 1. 600/2000 Volt Portable Cable (Non-Shielded) (Figures 1 & 2):

Additional materials required:

- Scotch 130C Splicing Tape
- 3M 15000-Series Connector

*NOTE: USE STANDARD CABLE PREPARATION PRACTICES*

### 2. 600/2000 Volt Shielded Portable Cable (Figures 3 & 4):

Additional materials required:

- Scotch 130C Splicing Tape
- Scotch 24 Shielding Tape
- Scotch 33 + Vinyl Plastic Tape or 33 Printed Tape (P-142-MSHA)

*NOTE: USE STANDARD CABLE PREPARATION PRACTICES*

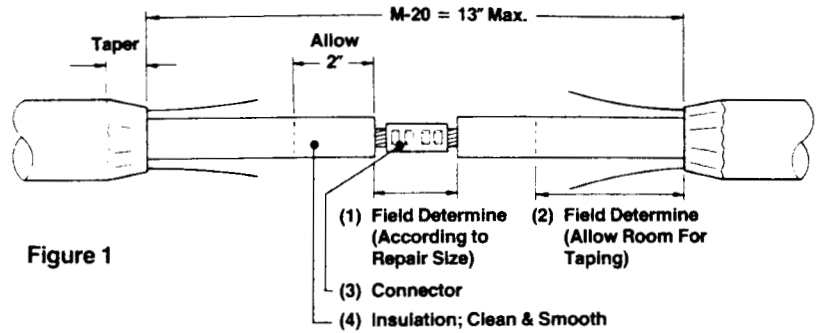


Figure 1

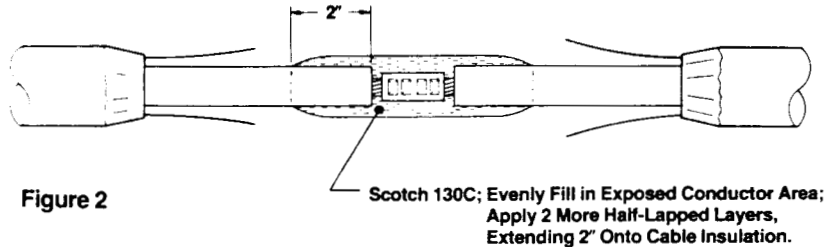


Figure 2

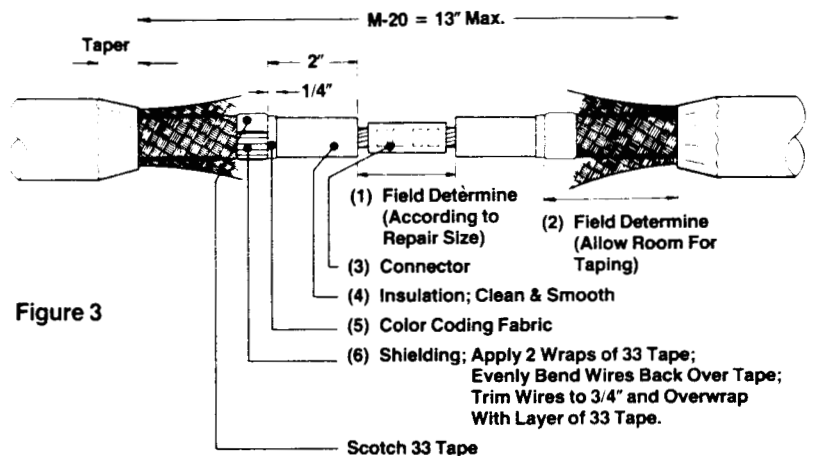


Figure 3

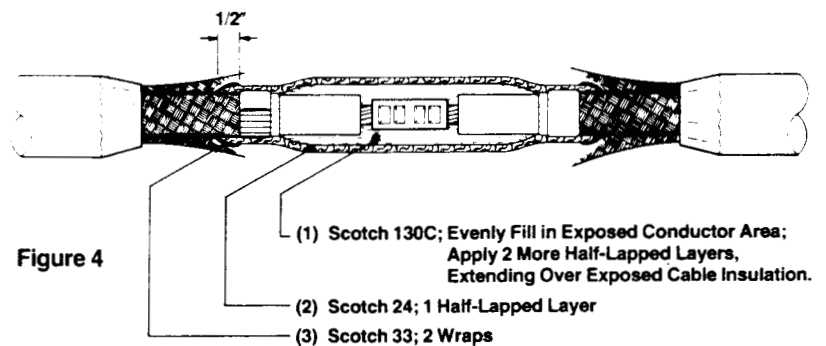


Figure 4



**3. 5 & 8 KV Shielded Cable Types SHD-GC, SH-D, MP-GC and MP (Figures 5 & 6):**

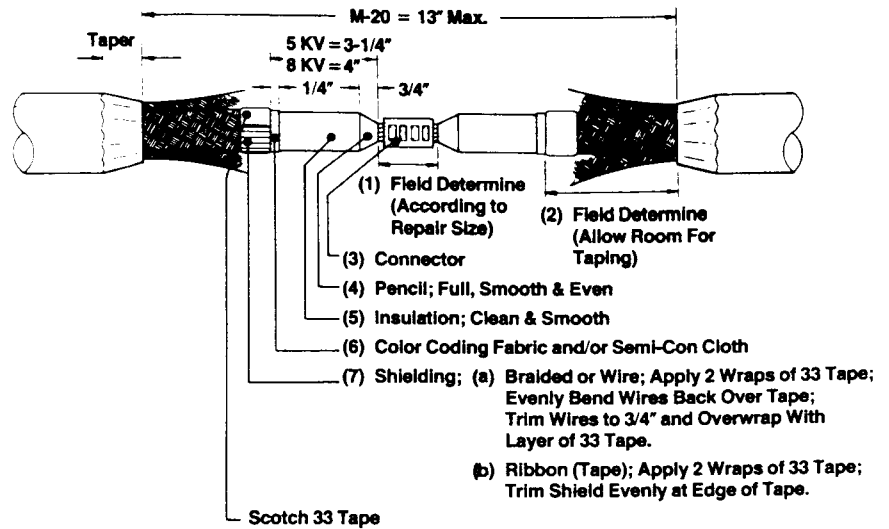
Additional materials required:

- Scotch 13 Semi-Conducting Tape
- Scotch 130C Splicing Tape
- Scotch 24 Shielding Tape
- Scotch 33+ Vinyl Plastic Tape or 33 Printed Tape (P-142-MSHA)
- 3M 15000-Series Connector or Scotchlok 10000-Series Connector

Optional material:

- Scotch A-2 Cable Preparation Kit or Scotch A-3 Electricians' Abrasive Roll

*NOTE: USE STANDARD H.V. CABLE PREPARATION PRACTICES*



**Figure 5**

**C. Overwrap Ground Wires**

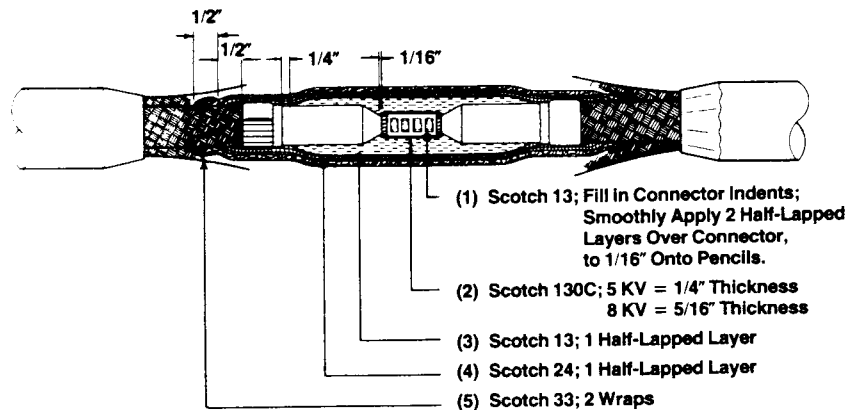
Apply 1 half-lapped layer of tape over bare ground conductors:

- *SHIELDED CABLE (SHD-GC)*; use Scotch 13 Semi-conducting tape
- *Non-shielded cable (600/2000 V.)*; use vinyl tape

**D. Install Cable Repair Kit**

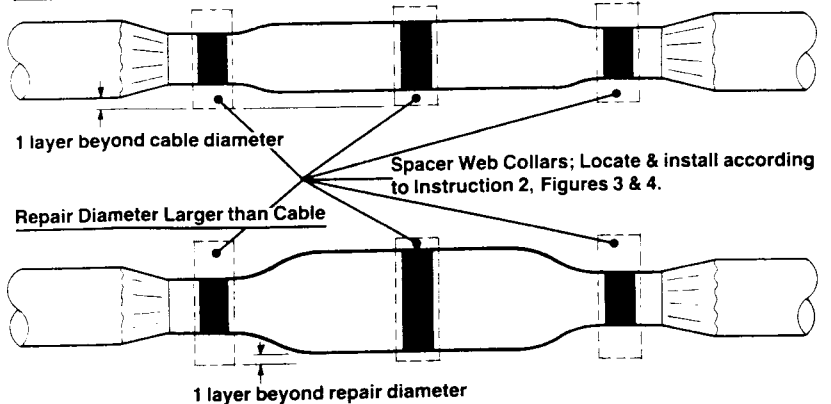
REFER TO INSTRUCTION 2

1. Bind conductors together with band(s) of *INVERTED* vinyl tape (adhesive side out), located per Spacer Web positions shown in *INSTRUCTION 2, FIGURE 3, PAGE 4*.
2. Wrap on spacer web collar(s); build *EQUAL DIAMETERS* to 1 layer greater than repair or cable diameter, whichever is largest. (Figure 7) *Locate and install collars according to INSTRUCTION 2, FIGURES 3 & 4, PAGES 4-5*.
3. Complete cable repair according to *KIT INSTRUCTION 2, starting with STEP C. 1, PAGE 5*.



**Figure 6**

**Cable Diameter Larger than Repair**

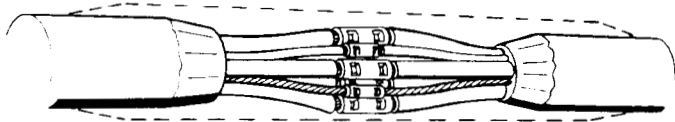


**Figure 7**

# Instruction 5

## 600/2000 Volt Portable Cable Splice

For splicing 3-conductor portable cable, shielded or non-shielded



### A. Prepare Cable Jacket

1. Position cable to eliminate bending or sagging of splice area.
2. Remove entire cable jacket from splice area, for a length not exceeding that shown in Figure 1.

**NOTE: ALLOW ADEQUATE LENGTH FOR DIMENSIONS SHOWN IN DRAWINGS.**

3. **FULLY** taper jacket ends:  
1" (25 mm) for jackets less than 3/16" (5 mm) thick  
2" (50 mm) for jackets of 3/16" (5 mm) and thicker
4. Scuff cable jacket for an equal distance on each side of splice area; total length of splice area plus the scuffs should exceed the mold's overall length.

### B. Splice Conductors

1. **600/2000 Volt Portable Cable (Non-Shielded) (Figures 1 & 2):**

Additional materials required:

- Scotch 130C Splicing Tape
- 3M 15000-Series Connectors (for power conductors, ground wires and ground check)

**NOTE: USE STANDARD CABLE PREPARATION PRACTICES**

2. **600/2000 Volt Shielded Portable Cable (Figures 3 & 4):**

Additional materials required:

- Scotch 130C Splicing Tape
- Scotch 24 Shielding Tape
- Scotch 33 + Vinyl Plastic Tape or 33 Printed Tape (P-142-MSHA)
- 3M 15000-Series Connectors (for power conductors, ground wires and ground check)

**NOTE: USE STANDARD CABLE PREPARATION PRACTICES**

### C. Overwrap Ground Wires

Apply 1 half-lapped layer of tape over bare ground conductors:

- **SHIELDED CABLE (SHD-GC);** use Scotch 13 Semi-conducting tape
- **NON-SHIELDED CABLE (600/2000 V.);** use vinyl tape

### D. Install Cable Repair Kit

REFER TO INSTRUCTION 2

1. Bind conductors together with band(s) of **INVERTED** vinyl tape (adhesive side out), located per Spacer Web positions shown in **INSTRUCTION 2, FIGURE 3, PAGE 4.**
2. Wrap on spacer web collar(s); build **EQUAL DIAMETERS** to 1 layer greater than repair or cable diameter, whichever is largest. (Figure 5) **Locate and install collars according to INSTRUCTION 2, FIGURES 3 & 4, PAGE 4-5.**
3. Complete cable repair according to **KIT INSTRUCTION 2, starting with STEP C. 1, PAGE 5.**

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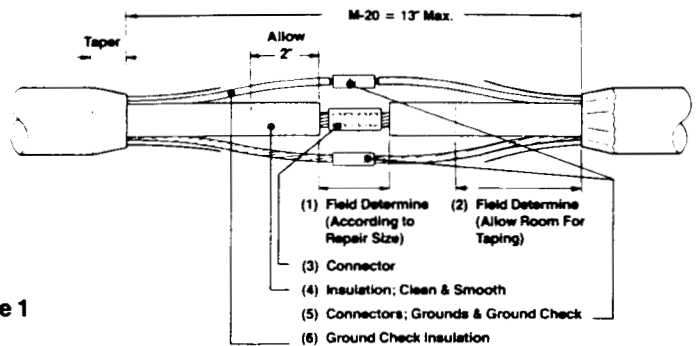


Figure 1

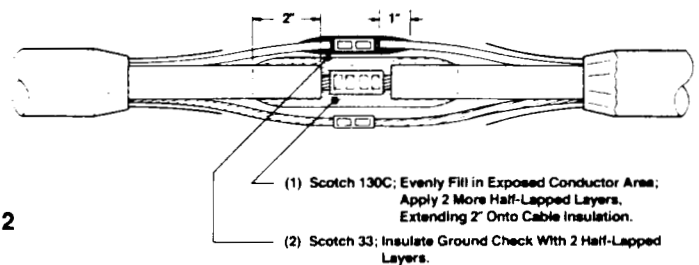


Figure 2

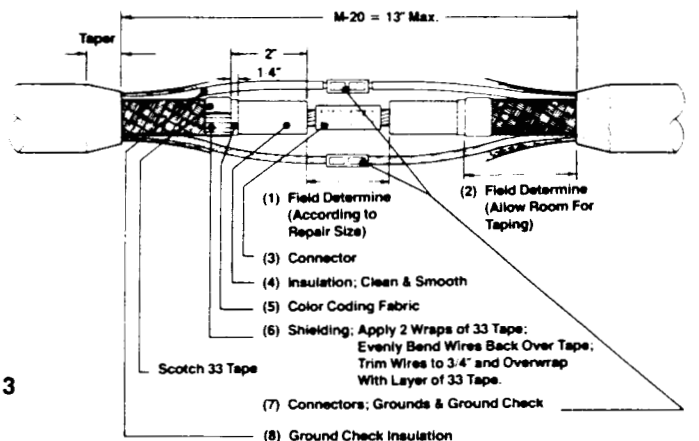


Figure 3

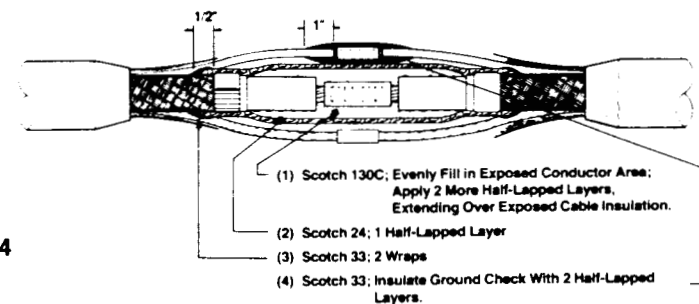


Figure 4

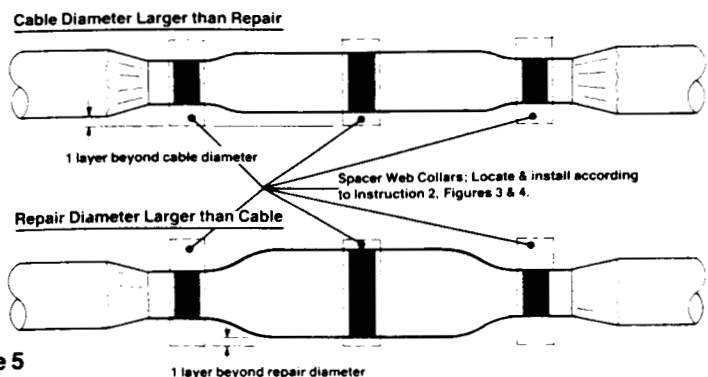


Figure 5

# Cable Crotch Seal (Trifurcation)

## A. Prepare Cable

1. Remove cable jacket; field determine removal length according to termination and spacing requirements, etc. (Figure 1)
2. **THOROUGHLY** scuff jacket end as follows:
  - M-20 Kit = 6" (150 mm)
  - M-30 Kit = 8" (200 mm)
  - M-40 Kit = 9" (230 mm)

Clean dust from scuffed area. (Figure 1)

3. *IF* individual power conductors and grounds are to be jacketed, apply jacketing now.

**TAPE METHOD:** Starting 3/4" (20 mm) from cable jacket, overwrap each conductor and ground with 2 half-lapped layers of Scotch 130C Splicing Tape; leave proper distance on ends of power conductors for installation of terminations. Apply 2 half-lapped layers of Scotch 33 + Vinyl Tape over the Scotch 130C.

4. **TERMINATIONS;** may be installed now or after completion of cable crotch seal.

### TERMINATION METHODS:

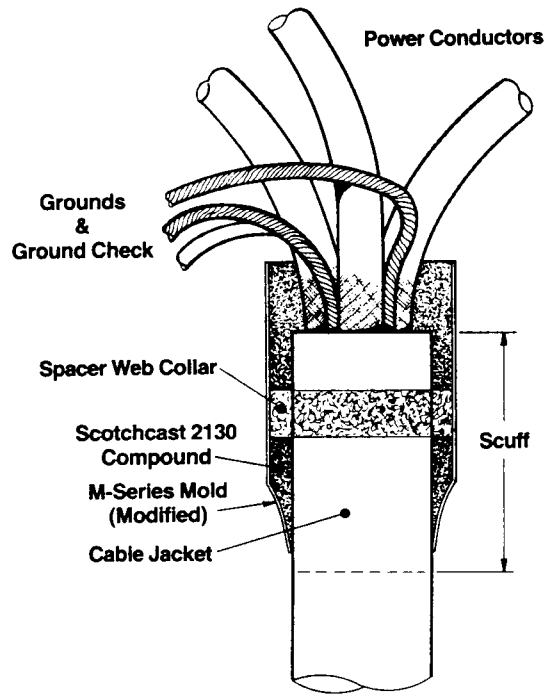
**TAPE** — Scotch K-Tape Termination Kits, 5700-Series. (An overwrap of Scotch 70 Silicone Tape is recommended for tracking protection)

**MOLDED RUBBER** — 3M Quick-Term Termination Kits, 5600-Series.

**PORCELAIN** — Scotchcast Porcelain Termination Kits, 5900-Series.

## B. Install Spacer Web

1. Wrap on spacer web collar per Figure 2; build it 2 layers thick and cut off.
2. Split end of spacer web and press into sides of collar to hold in place. (Figure 3)



Main Illustration

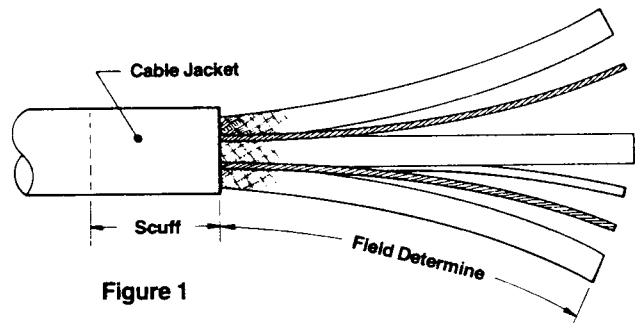


Figure 1

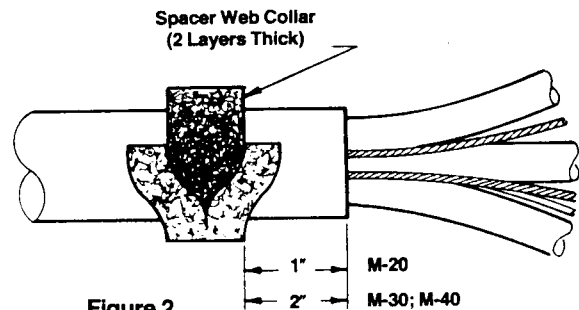


Figure 2

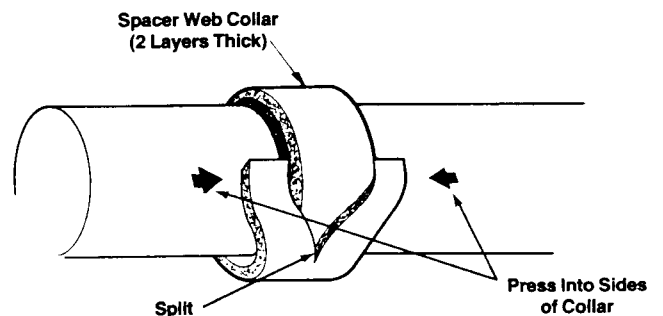


Figure 3

## Cable Crotch Seal (con't)

### C. Install Mold

1. Modify mold by cutting off at outside edge of a mold hole. (Figure 4)

*NOTE: THE SHORT CUT OFF END BECOMES THE CABLE CROTCH SEAL MOLD.* (Figure 4)

2. Seal the vent slits on outside of mold with a length of Scotch vinyl tape.

3. With cable straight, *CENTER* modified mold over spacer web collar. Wrap snugly around, tucking one edge under. (Figure 5)

*NOTE: TUCKED EDGE MUST BE STRAIGHT TO FORM A SEAL.*

4. Position a funnel support on the mold, locating it over the spacer web collar. Secure firmly with a mold strap. (Figure 5)

*NOTE: MOLD, FUNNEL SUPPORT AND MOLD STRAP MAY BE MOVED AT THIS TIME, TO ADJUST TO THE FINAL POSITION OF BEING CENTERED OVER THE SPACER WEB COLLAR.* (Figure 5)

5. Bundle mold's notched end evenly around cable, maintaining cable centering. Starting 1/2" (12 mm) on cable jacket, apply 1 half-lapped layer of Scotch 130C Tape over the notches. (Figure 5)

*NOTE: APPLY SCOTCH 130C WITH TACKY SIDE UP, WITH ONLY ENOUGH TENSION TO CONFORM TO MOLD.* (Figure 5)

6. With cable end mounted vertically, arrange individual conductors and grounds into final position. Allow a minimum clearance of 1/4" from edge of mold body. (Main illustration)

### D. Pour Compound

1. Premix *BLACK* side of "Unipak", 2130 Compound, by squeezing to a smooth consistency.

2. Firmly grasp each flat side of the "Unipak" container near the center barrier; at the same time, pull sides of barrier apart and roll sides of thumbs through it. Separate barrier all the way across to the side seals. (Figure 6)

3. Alternately squeeze ends of "Unipak" forcing compound rapidly back and forth, strip compound from corners using fingers. Mix until color is completely uniform — 30 to 40 VIGOROUS SQUEEZES. *DO NOT EXCEED 1 MINUTE.* (Figure 7)

4. Clip off a corner of "Unipak" and immediately pour into open top of mold. Fill mold to top edge.

5. Allow compound to cure.

*NOTE: REPAIR MAY BE DEMOLDED WHEN COMPOUND IS NO LONGER TACKY.*

### E. Demold

1. Remove mold strap and funnel support.
2. Remove Scotch 130C Tape and mold end.
3. Remove mold from cable crotch seal.

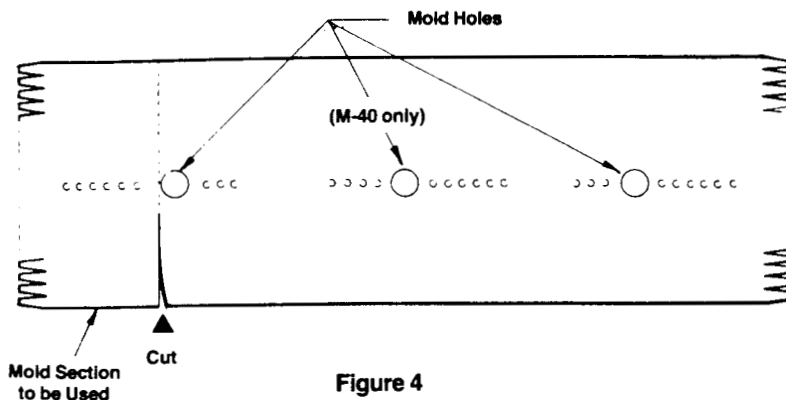


Figure 4

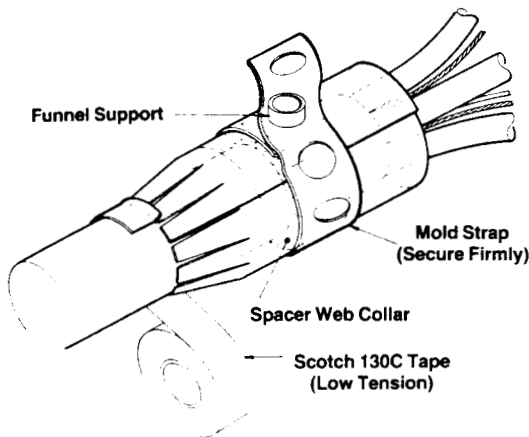


Figure 5

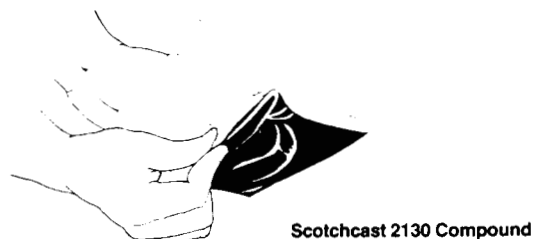


Figure 6



Figure 7