

## *100' Data Cable Assembly Instructions for 2002/2003 BTeV Pixel Test Beam*

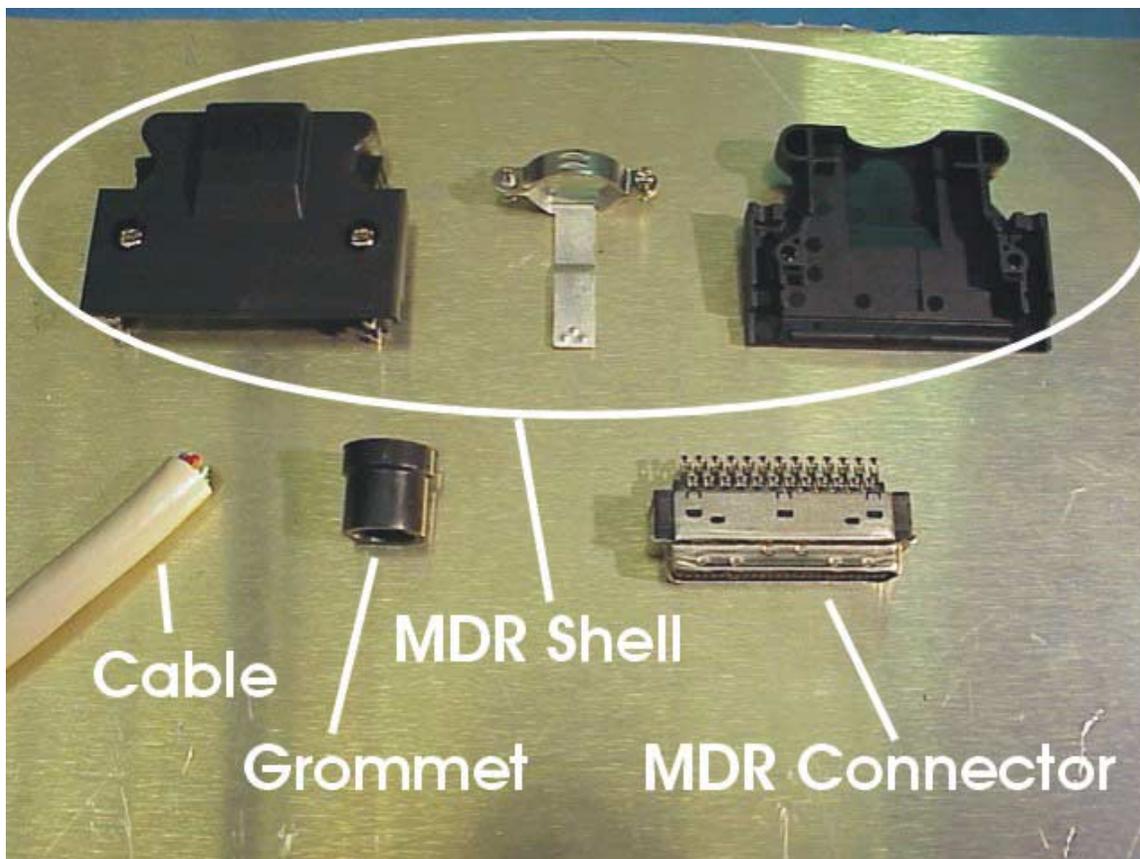
### **1 Introduction**

This document describes the components and procedures for assembling 100' long data cables for use in the 2002/2003 Pixel Test Beam at Fermilab. The 100' data cable connects the Test Beam Feed-Through board (click [here](#) for the Test Beam Feed-Through board documentation) in the counting room to the Test Beam Feed-Through board in the hut. The cable is a round, shielded cable containing 25 twisted pairs (50 conductors). The cable is terminated on each end with a Mini D Ribbon (MDR) connector.

### **2 Parts List**

The table and image below describe the parts required:

<i><b>Part</b></i>	<i><b>Description</b></i>	<i><b>Data Sheet</b></i>
100' 3M Cable, #3600B/50	Round, Shielded Jacketed cable	<a href="#">3M_3600BCable.pdf</a>
3M MDR Shell, #10350-52F0-008	MDR Shell	<a href="#">3M_MDRShell.pdf</a>
3M MDR Solder Cup, #10150-3000VE	MDR Solder Cup Connector	<a href="#">3M_MDRConnector.pdf</a>
AMP Grommet, AMP# 747973-1, Digi-Key# A23669-ND	Grommet	<a href="#">AMP_Grommet.pdf</a>



The 3M cable is delivered in 300' rolls. The roll must be cut into three 100' sections.

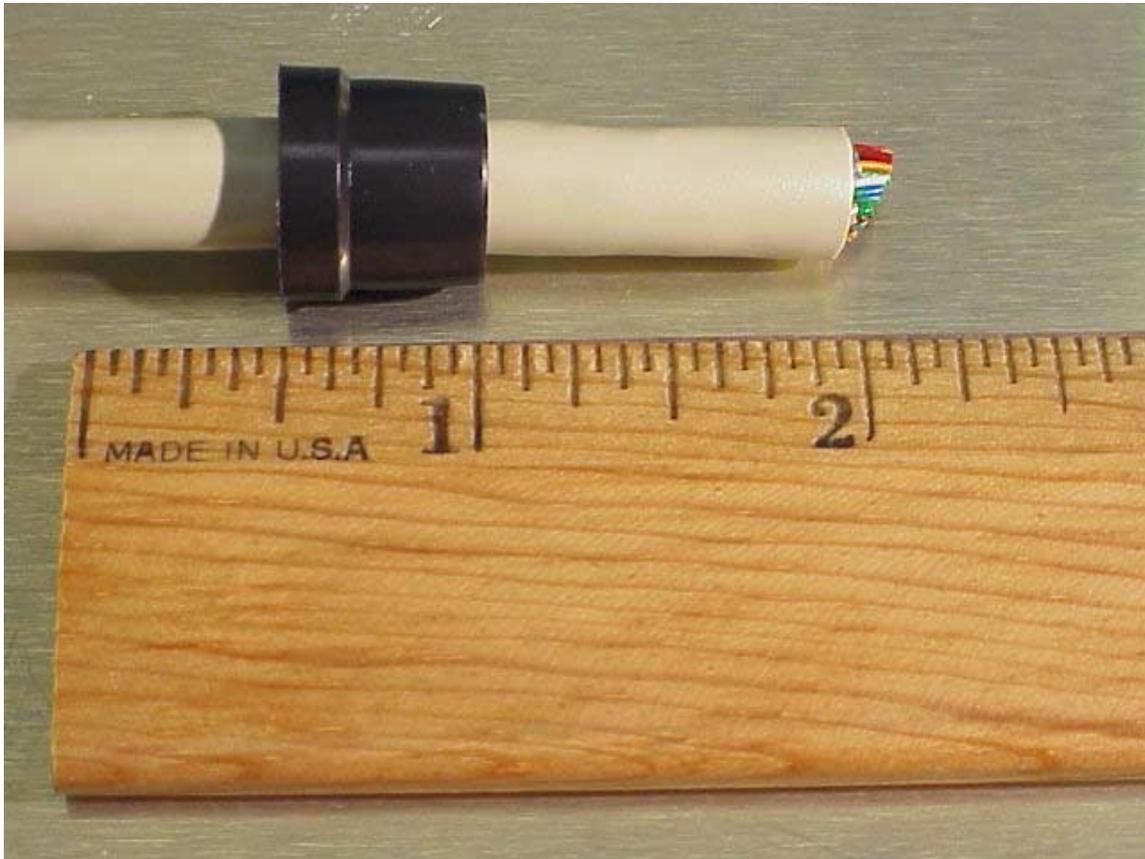
Note that the part number associated with the grommet is a grommet set of 6 differing sizes. The grommet used for this cable assembly is the .310" grommet labeled "F" on the grommet set.

### **3 Assembly**

This section describes the procedure for assembling a single end of the 100' cable. The procedure for assembling both ends is the same.

#### **3.1 Install Grommet**

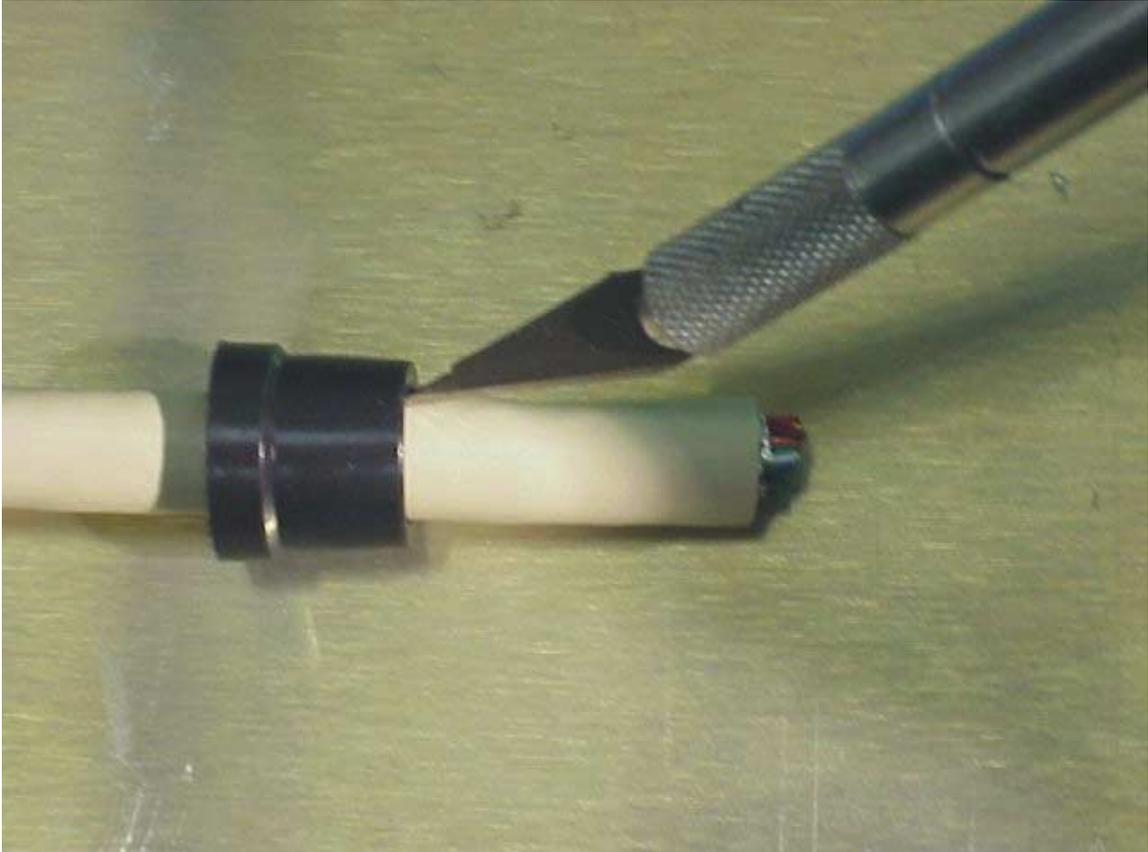
Install the rubber grommet over the cable as shown below:



Make sure the flared end (the end of the grommet that has a larger outer diameter) is facing away from the end of the cable. If it is difficult to slide the grommet over the cable, lubricate the cable with WD-40 or a similar lubricant. Push the grommet down the cable until it is approximately one inch from the end.

### **3.2 Remove Jacket**

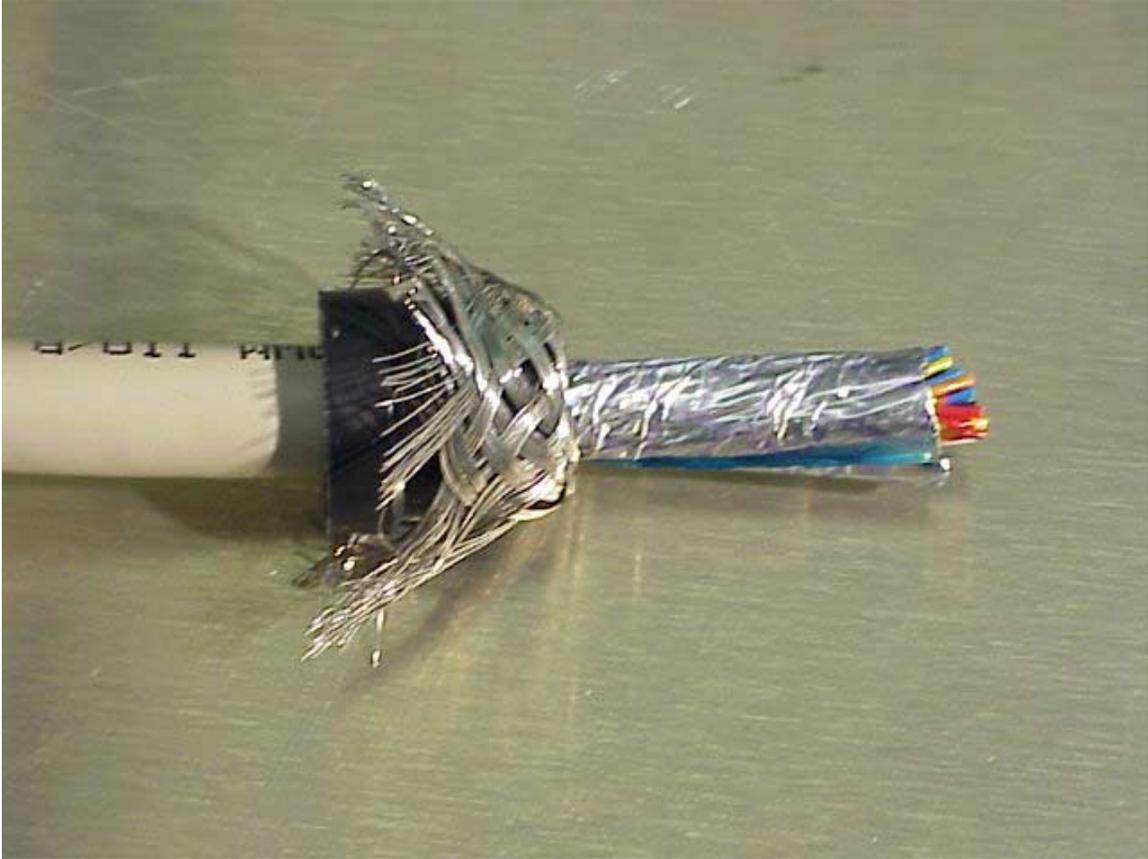
Using a knife, cut and remove the outer PVC jacket from the cable between the grommet and the end of the cable:





### **3.3 *Fold Back Braided Shield***

Push back the braided shielding and droop it over the grommet as shown below:



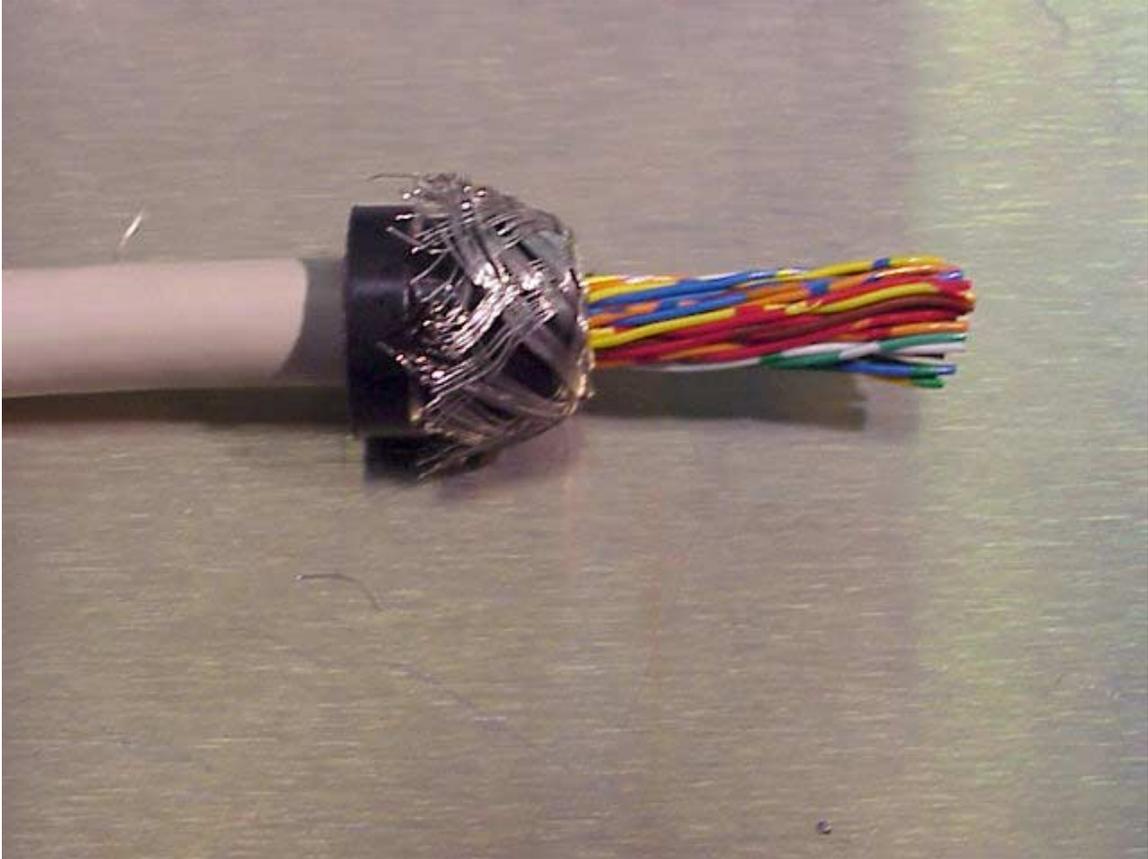
### **3.4 Trim Braided Shield**

Trim back the braided shield so that it does not cover the flared part of the grommet but does cover the rest of the grommet:



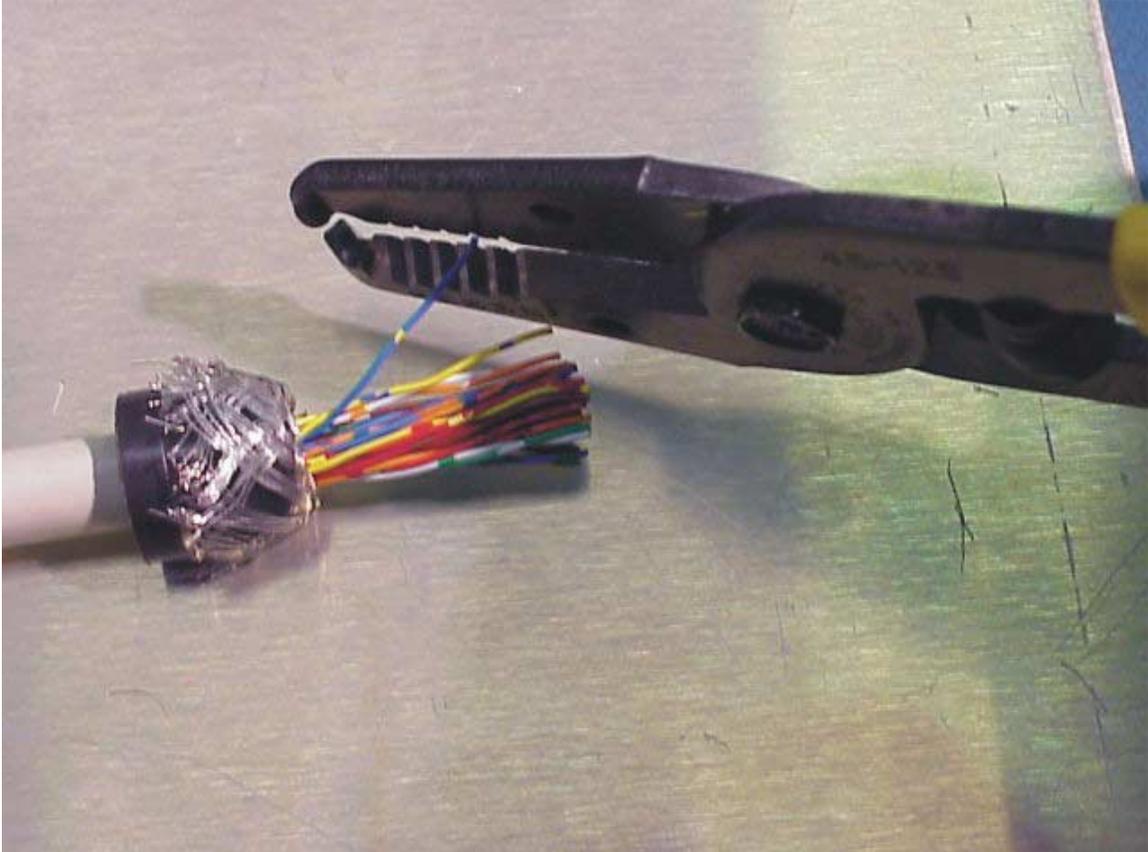
### **3.5 Remove Foil Shield**

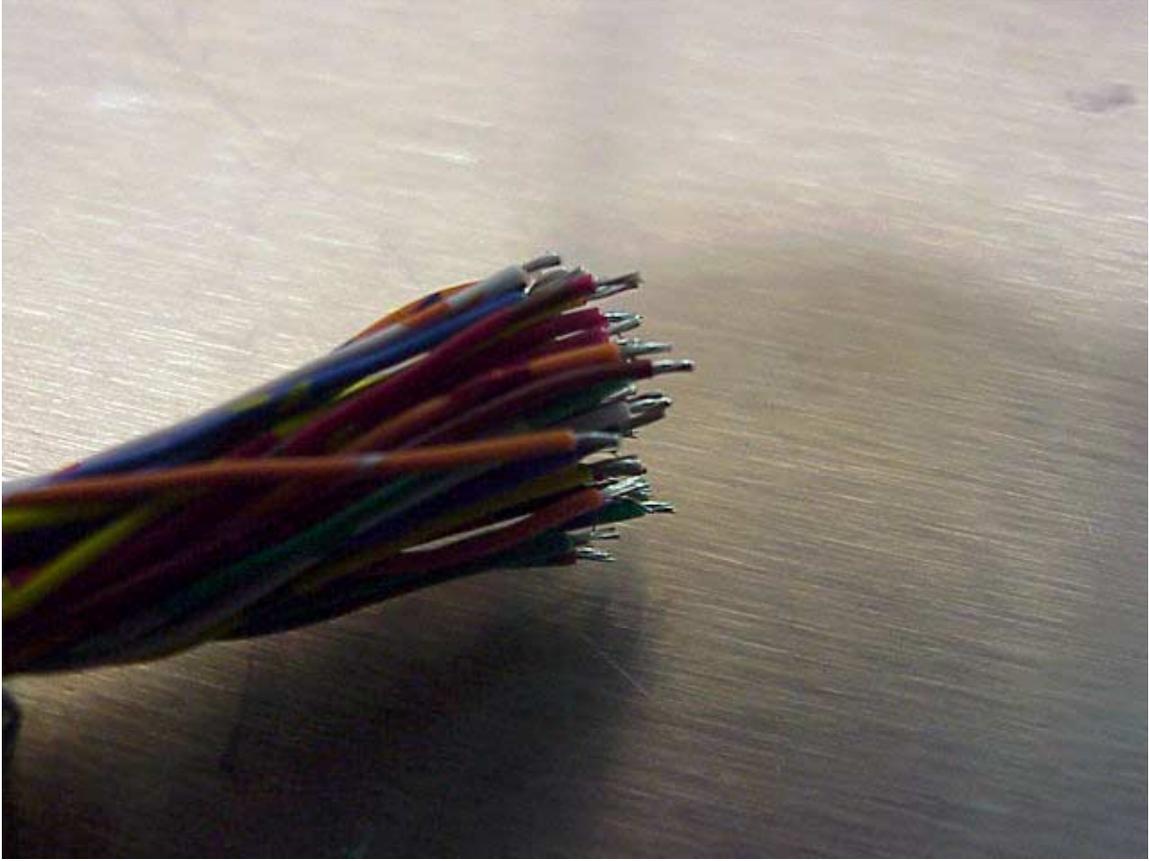
Remove the foil shield that is between the grommet and the end of the cable:



### **3.6 Strip Wire Ends**

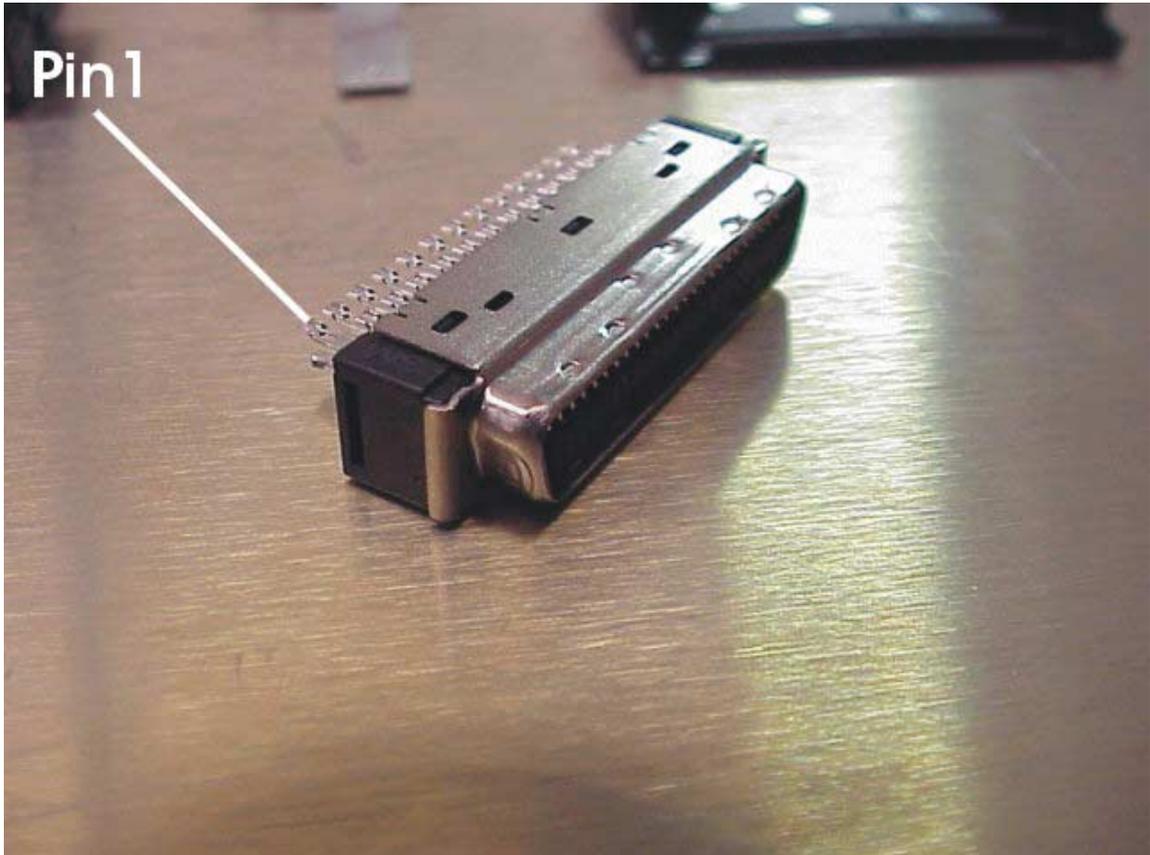
With a wire stripper, remove the wire insulation from each of the 50 conductors leaving approximately 1/16" of wire exposed:





### **3.7 Establish Location of Pin 1**

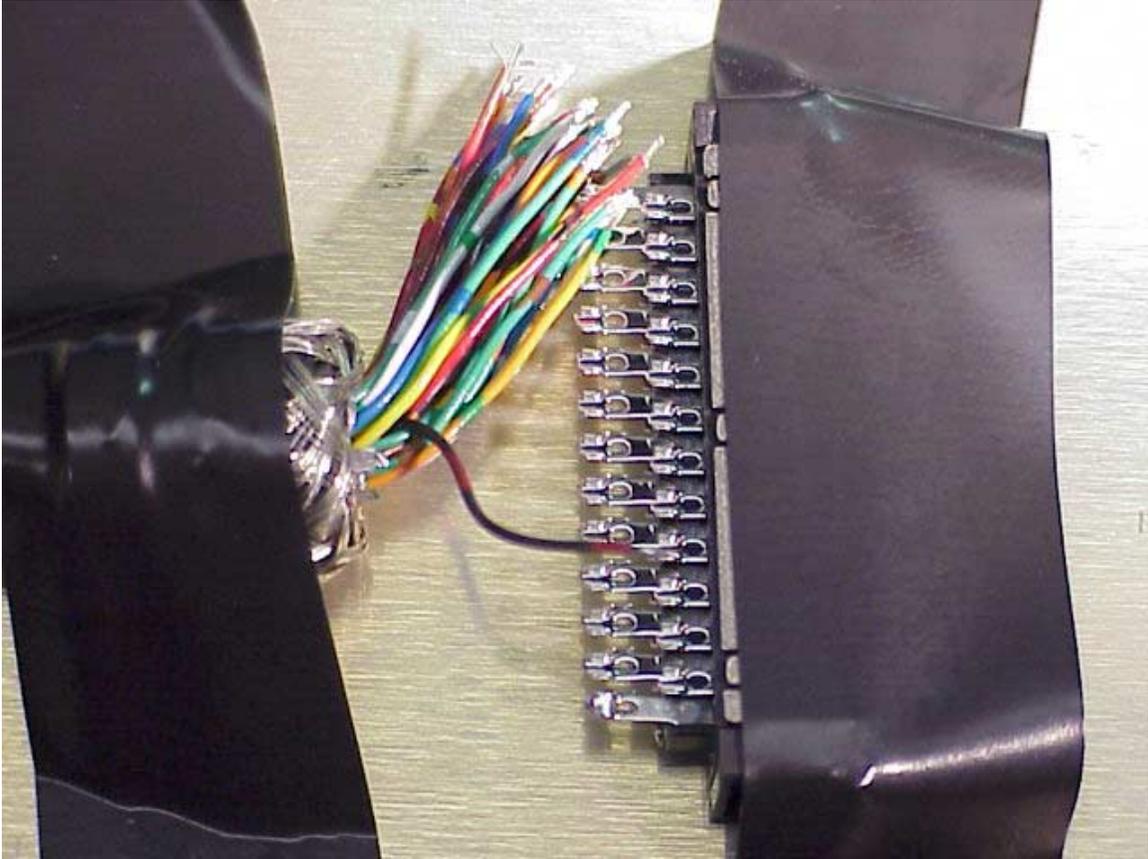
Take the MDR connector and locate pin 1. Pin 1 is shown on the data sheet as “position 1” ([3M\\_MDRConnector.pdf](#)) and shown in the image below:



### 3.8 Prepare for Soldering pins 1-25

Secure in place both the MDR connector and the cable such that pin 1 of the connector is on the top half (as shown in section 3.7) and the cable is close enough for all of the wires to reach the solder cups on the connector. Using tweezers, find conductor 1 of the cable (black/red wire). Use the 3M Cable data sheet ([3M 3600BCable.pdf](#)) to map the cable conductor numbers to the color codes on the wires. This mapping is also shown below:

Pair	Cond	1st Conductor		Cond	2nd Conductor	
		Solid	Band		Solid	Band
1	1	Black	Red	2	Red	Black
2	3	Black	White	4	White	Black
3	5	Black	Green	6	Green	Black
4	7	Black	Blue	8	Blue	Black
5	9	Black	Yellow	10	Yellow	Black
6	11	Black	Brown	12	Brown	Black
7	13	Black	Orange	14	Orange	Black
8	15	Red	White	16	White	Red
9	17	Red	Green	18	Green	Red
10	19	Red	Blue	20	Blue	Red
11	21	Red	Yellow	22	Yellow	Red
12	23	Red	Brown	24	Brown	Red
13	25	Red	Orange	26	Orange	Red
14	27	Green	White	28	White	Green
15	29	Green	Blue	30	Blue	Green
16	31	Green	Yellow	32	Yellow	Green
17	33	Green	Brown	34	Brown	Green
18	35	Green	Orange	36	Orange	Green
19	37	White	Blue	38	Blue	White
20	39	White	Yellow	40	Yellow	White
21	41	White	Brown	42	Brown	White
22	43	White	Orange	44	Orange	White
23	45	Blue	Yellow	46	Yellow	Blue
24	47	Blue	Brown	48	Brown	Blue
25	49	Blue	Orange	50	Orange	Blue



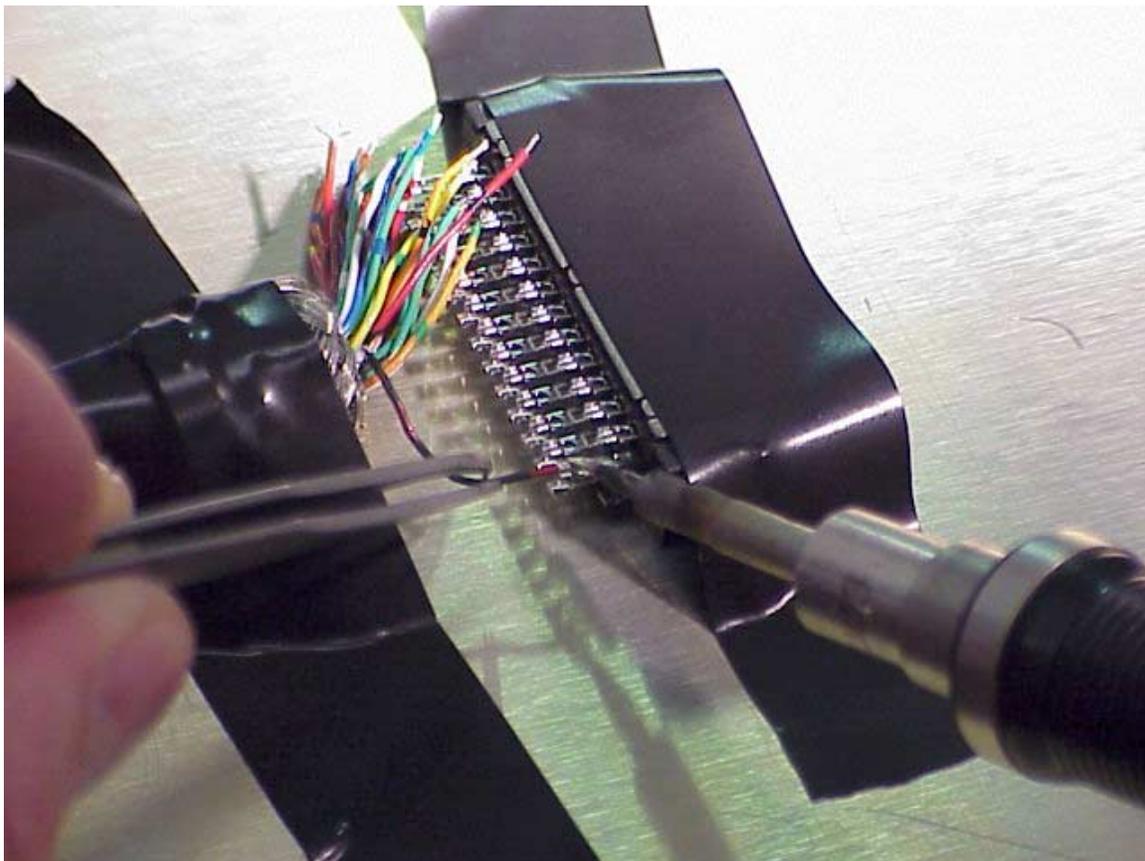
### **3.9 Solder Wires 1 – 25**

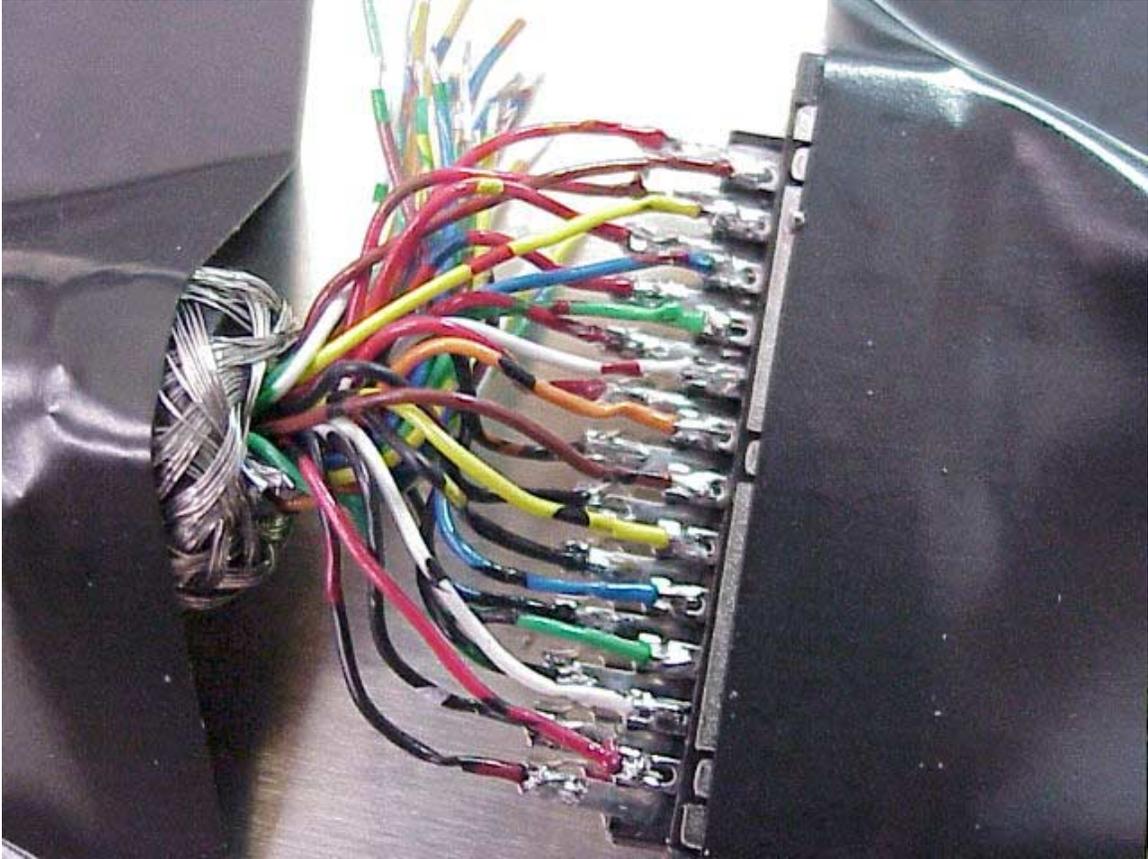
Use a soldering iron with a fine tip and perform the soldering under a microscope for best results.

To make a solder connection from the cable wire to the connector solder cup, first flow solder on both the solder cup on the connector and on the end of the wire. Using tweezers, place the wire through the hole on the solder cup (the eye of the needle). Use the soldering iron flow the solder and make the connection.

Repeat this process for conductors 1 through 25. Make sure wire conductor 1 is connected to connection position 1, conductor 2 to position 2, and so on.

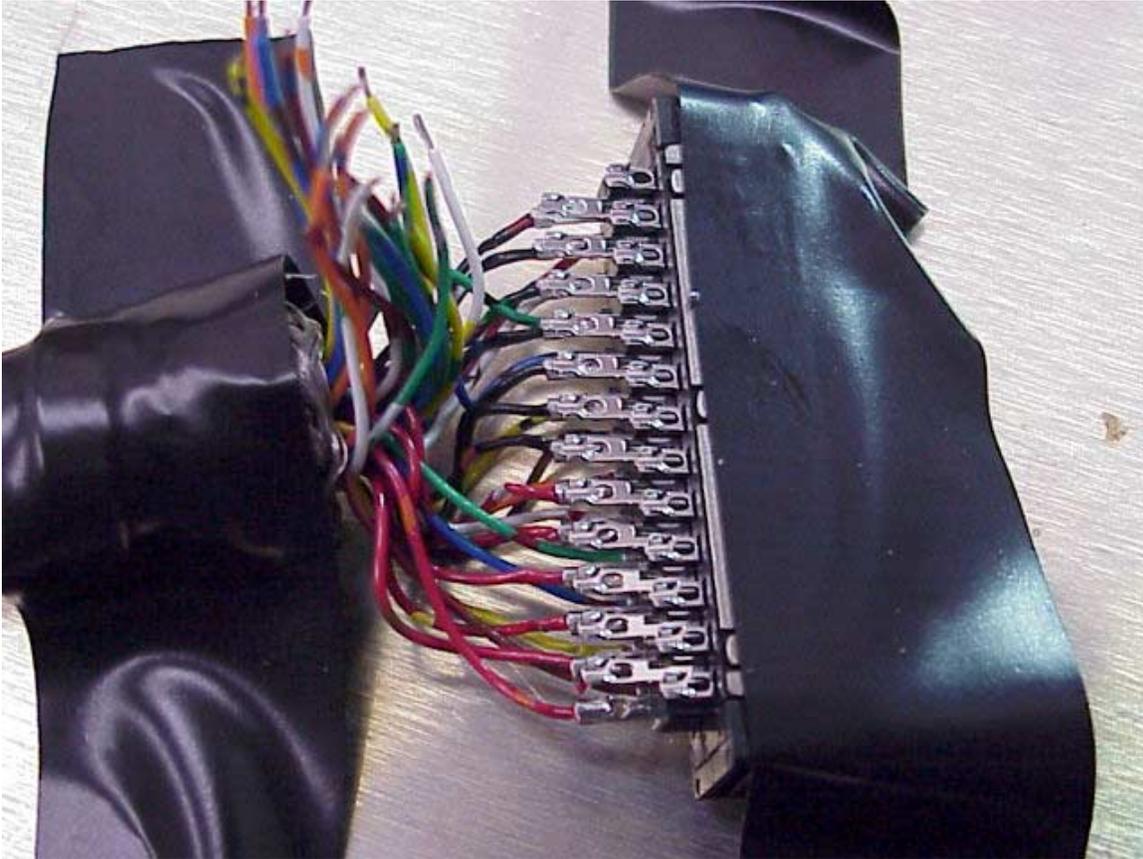
When threading the wire through the hole on the solder cup, make sure the wire does not get pushed down too far, otherwise it can short to the solder cup below it.

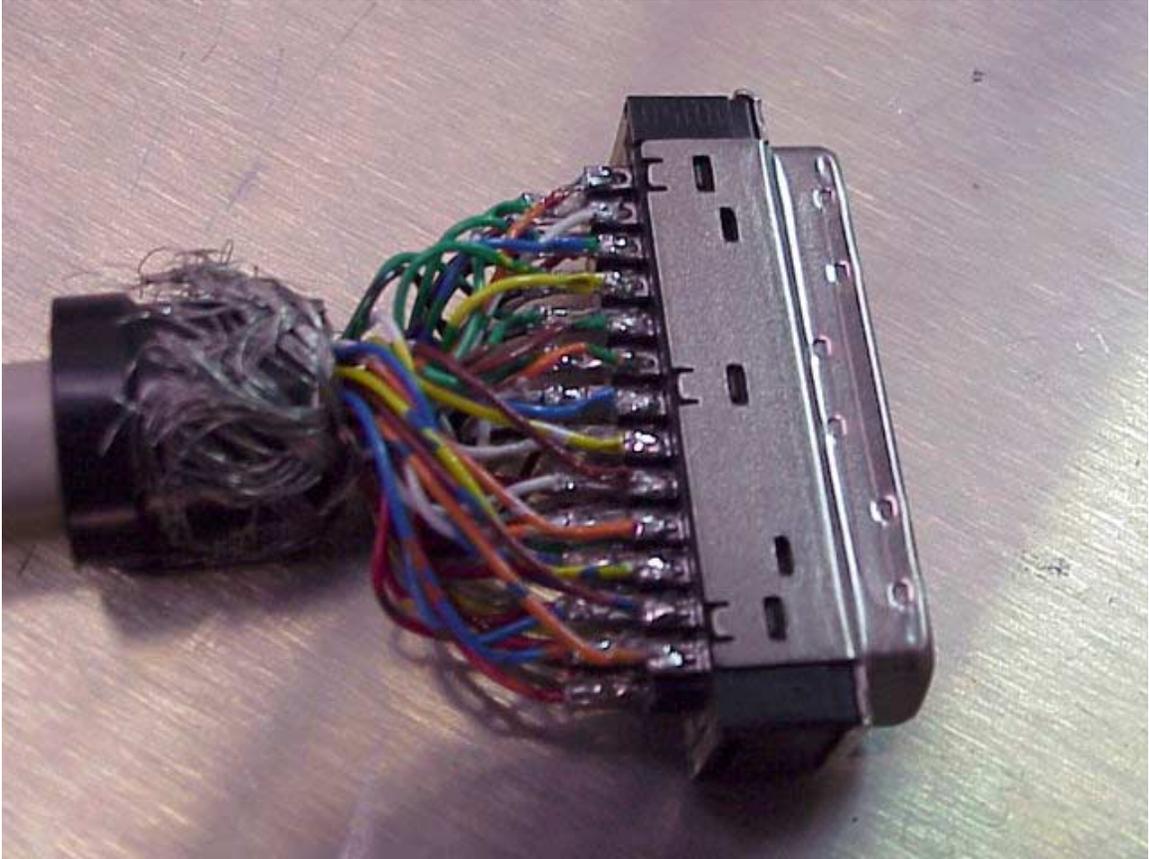




### **3.10 Solder Wires 26-50**

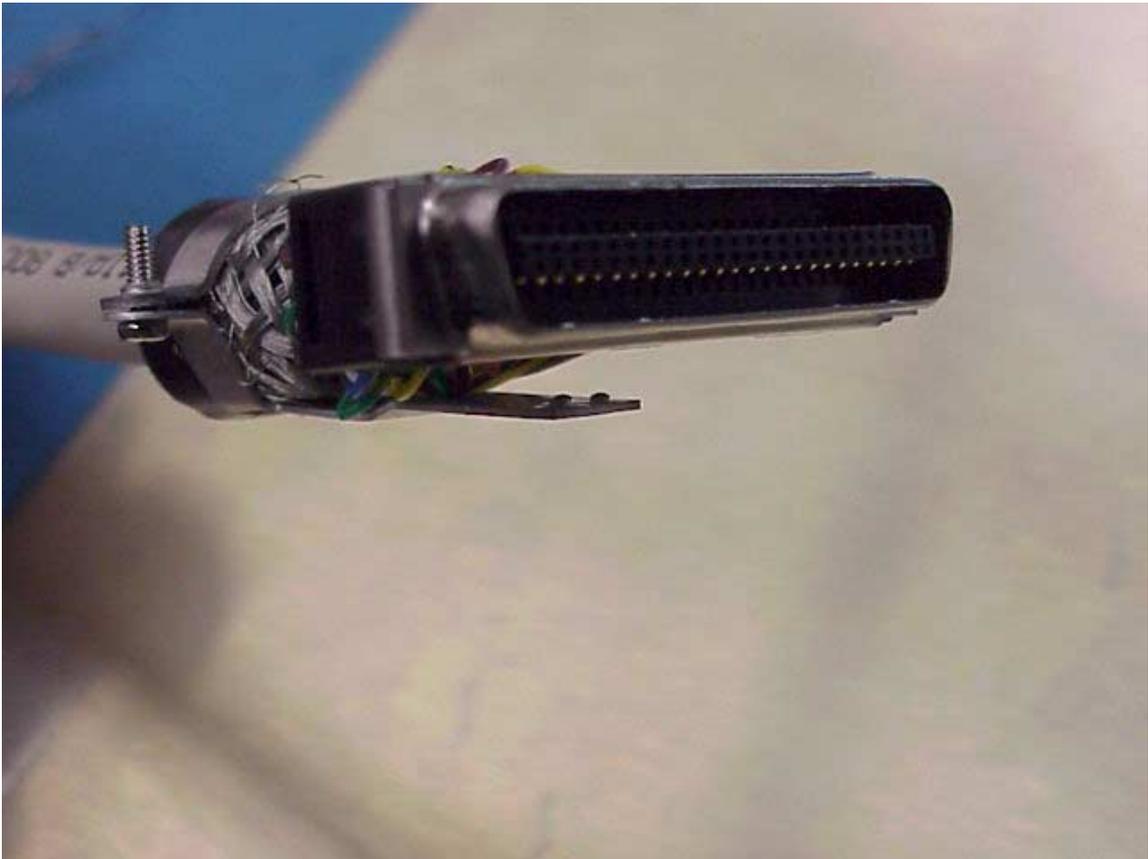
After conductors 1-25 are soldered to the connector, flip the cable and the connector upside down to have access to positions 26-50. Realize that position 26 is on the opposite end of the connector of position 25. Re-secure the cable and connector and proceed to solder positions 26-50.





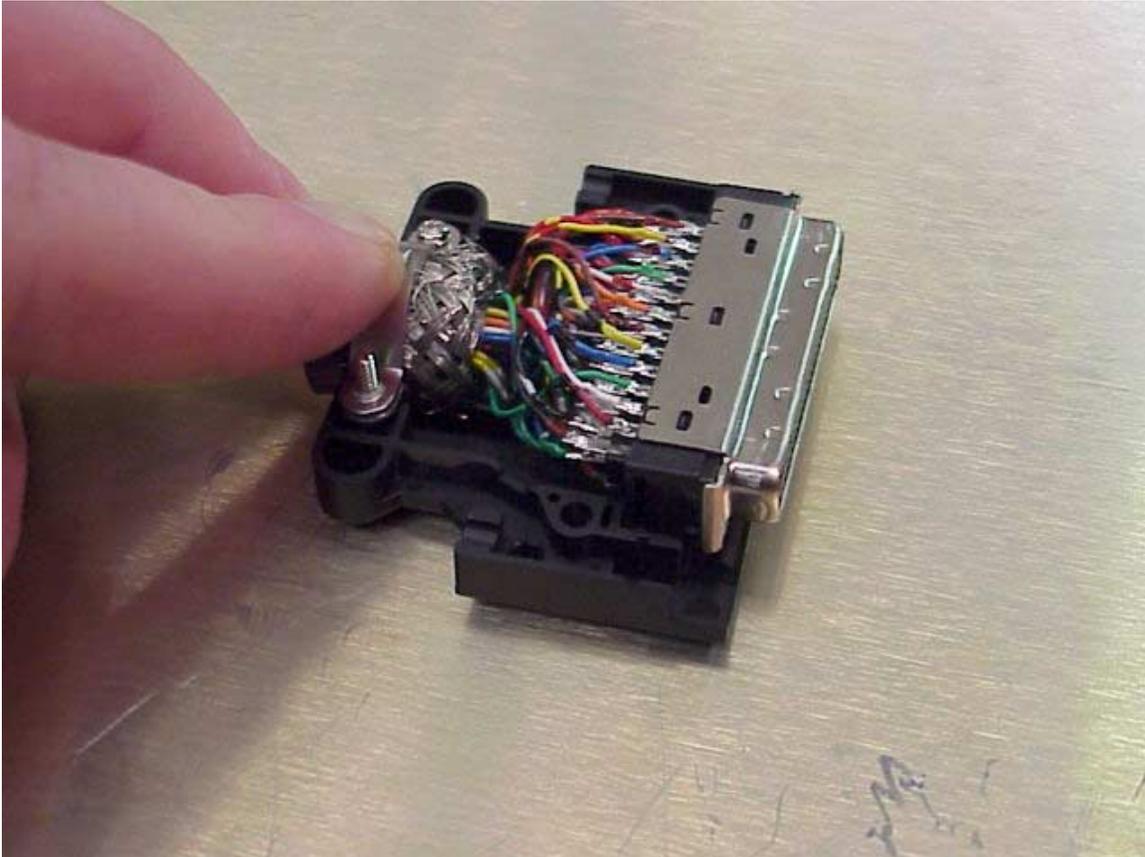
### **3.11 Install Shell Ground Strap**

Install the ground strap so that the long tab of the ground strap runs underneath the connector as shown below:



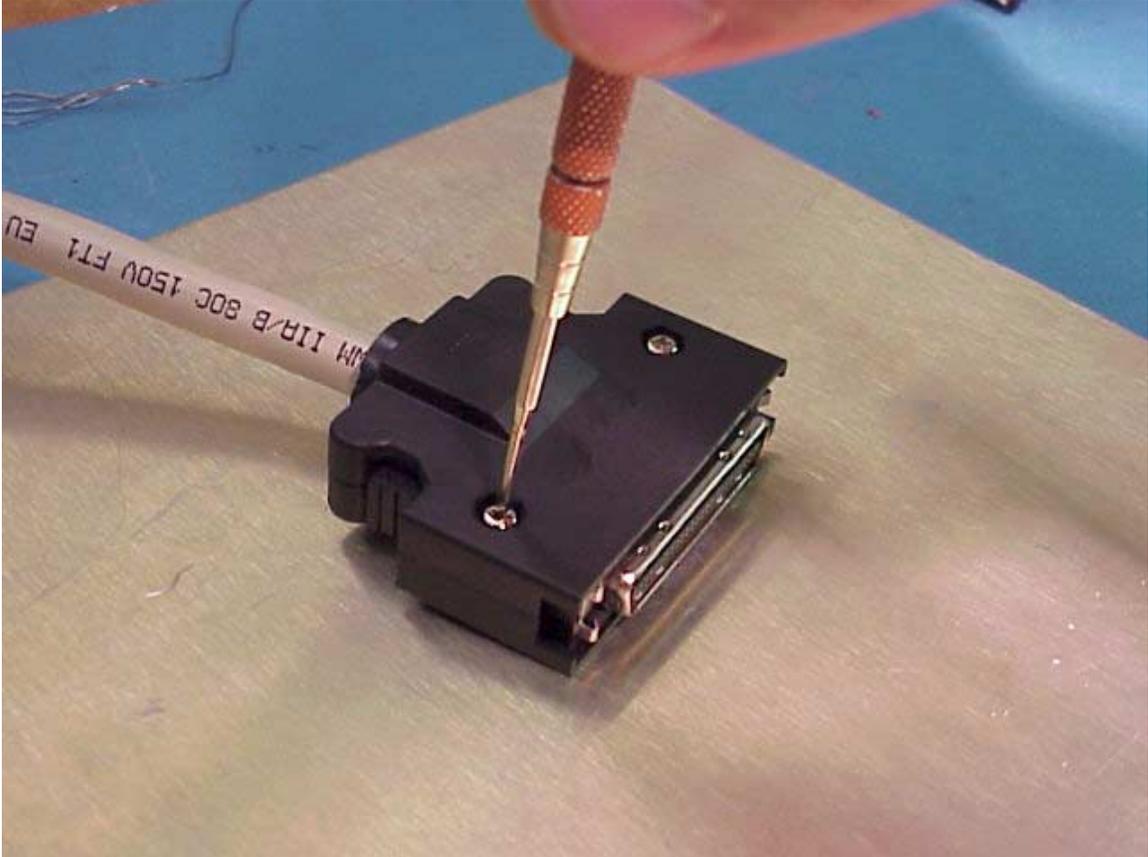
### **3.12 Place In Lower Shell**

Place the cable, ground strap, and connector in the lower shell (the part of the shell with the nuts, not the screws) as shown below:



### **3.13 Install Top Shell**

Install and secure the top portion of the shell. Tighten the shell screws:



The assembly of a single cable end is now complete.