

DZERO DETECTOR UPGRADE
Specification for SVX Sequencer Control Cables - Silicon and Fiber Tracker
8/31/99 Revised 04/13/00

Cabling for the SVX Sequencer to Interface Boards to Silicon Tracker and Fiber Tracker Detectors requires a very high performance and high signal density cable that allows the shield be used as a ground return for the signals. Fermilab wishes to purchase cables assemblies which are one to one with identical connectors on both ends using pleated foil halogen free cable. Assemblies are specified in Table 1.

3M Pleated Foil Cable Assembly

Qty	3M Parts Used	Length
500	90411/50 cable, 10150-6000EC, 10350-1230-00	25 feet +/-1”
140	90411/50 cable, 10150-6000EC,10350-1230-00	27 feet +/-1”
78	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	395 inches +/-1”
84	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	315 inches +/-1”
84	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	225 inches +/-1”
78	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	360 inches +/-1”
78	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	320 inches +/-1”
90	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	275 inches +/-1”
20	90411/80 cable, 10180-6000EC, 10380-12R1-00, 3341-17	120 inches +/-1”

Table 1

Cable termination Connector for Pleated Foil Cable

After the signal conductors are swaged onto this connector the pleated foil shield shall be brought as close as possible to the connector. This will insure 100% coverage of the signals to the connector termination.

Pleated Foil Shield Plating

The 3M pleated foil cable is only available with a virgin copper shield, so to insure that the surface area where the shell meets the shield will not oxidize we require that a silver plating be applied. This is the area where the conductive elastomer or ‘fuji-poly’ from the said assembly connects to the pleated foil shield, but also where the jackets strain relief’s are located.

We Request that the last 1-inch of the pleated foil be plated silver.

This will insure a good long-term ground connection that will not become corroded and fail to make contact. A silver plating solution called Cool-Amp manufactured by Cool-Amp Conducto-Lube co. The powder is mixed with water into a paste that is worked onto the shield with a rag or swab. The shield surface is then rinsed with water and dried.

It is crucial that all residues from the plating process must be removed from the surface of the pleated foil.

Connector assembly references.

3M cable part	Reference Location
80 pin Connector –10180-6000EC	http://www.mmm.com/interconnects/pdf/ts0423.pdf
50 pin Connector - 10150-6000EC	http://www.mmm.com/interconnects/pdf/ts0423.pdf
Shell - 10350-1230-00	http://www.mmm.com/interconnects/pdf/ts0396.pdf
Shell - 10380-12R1-00	http://www.mmm.com/interconnects/pdf/ts0666.pdf
Connector Assembly Reference	http://www.mmm.com/interconnects/pdf/ts0804.pdf
Cool-Amp Silver Plating Powder	http://www5.thomasregister.com/ss/.1774087673/catfrm.cgi?&index (Cool-Amp Conducto-Lube Co.)

Table 2

Cable Testing - Fermilab must approve the test fixture and testing procedures.

1. We require that all conductors be tested for continuity.
2. All conductors must be tested for shorts between adjacent conductors and to shield.
3. A high potential test must be performed between the pleated foil shield and all conductors and between the conductors to a voltage of 150 volts.

Cable Labeling

Two Labels are required at both ends of the cable at 6 inches from the ends. The label print area must be 1” x 1”. Labels must be self-laminating. It is preferred that the labels be laser printed using Brady laser label stock. Fermilab labeling text that is to be used by the vendor is shown in table 3. The vendor will also be required to install a second label supplied by Fermilab on all cables.

Cable	Labeling
25 ft	SVX Sequencer to Interface, 3M-90411/50 ,25 feet, date of manufacture (month, day, year), Manufacturers part Number
27 ft	SVX Sequencer to Fiber Tracker, 3M-90411/50, 27 feet date of manufacture (month, day, year), Manufacturers part Number
120 inches	SVX Emulator to Interface Test Cable, 3M-90411/80, 10 feet, date of manufacture (month, day, year), Manufacturers part Number
395 inches	Interface to Adapter Cable, 3M-90411/80, 395 inches, date of manufacture (month, day, year), Manufacturers part Number
315 inches	Interface to Adapter Cable, 3M-90411/80, 315 inches, date of manufacture (month, day, year), Manufacturers part Number
225 inches	Interface to Adapter Cable, 3M- 90411/80, 225 inches, date of manufacture (month, day, year), Manufacturers part Number
360 inches	Interface to Adapter Cable, 3M- 90411/80, 360 inches, date of manufacture (month, day, year), Manufacturers part Number
320 inches	Interface to Adapter Cable, 3M-90411/80, 320 inches, date of manufacture (month, day, year), Manufacturers part Number
275 inches	Interface to Adapter Cable, 3M-90411/80, 275 inches, date of manufacture (month, day, year), Manufacturers part Number

Table 3 (revised 10/18/1999 manufacturer part number added)

Delivery

Vendors must provide a written quote for the purpose of bidding on the fabrication of these cables. Bidding period is 10 working days. Approved vendor must deliver ten cables to Fermilab for inspection and not proceed until authorized by Fermilab. Fermilab inspection will not take longer than 15 days. Upon approval of the cables the remainder of the order will be given final approved for fabrication.

Delivery of first 10 cables within 30 days after contract is awarded. Remaining cables within 60 days after final approval.

Cable Assembly Examples and Lessons

Five cable assemblies are herein discussed two are not correct according to our need.

- The first example is a 68-conductor cable assembly, which has a major problem since there is no ground from the case to the foil shield. See figure 1.
- The second example is better but the foil shield does not extend to the connector housing. See figure 2.
- The third and fourth figures are example that demonstrates the proper assembly of the Pleated Foil Cables that are required.
- Example 5 is the optimized grounding scheme for the 80 conductor pleated foil cable used in the detector.

Technical Questions must be directed to Johnny Green (630)840-3392 or Mike Utes (630)840-2220

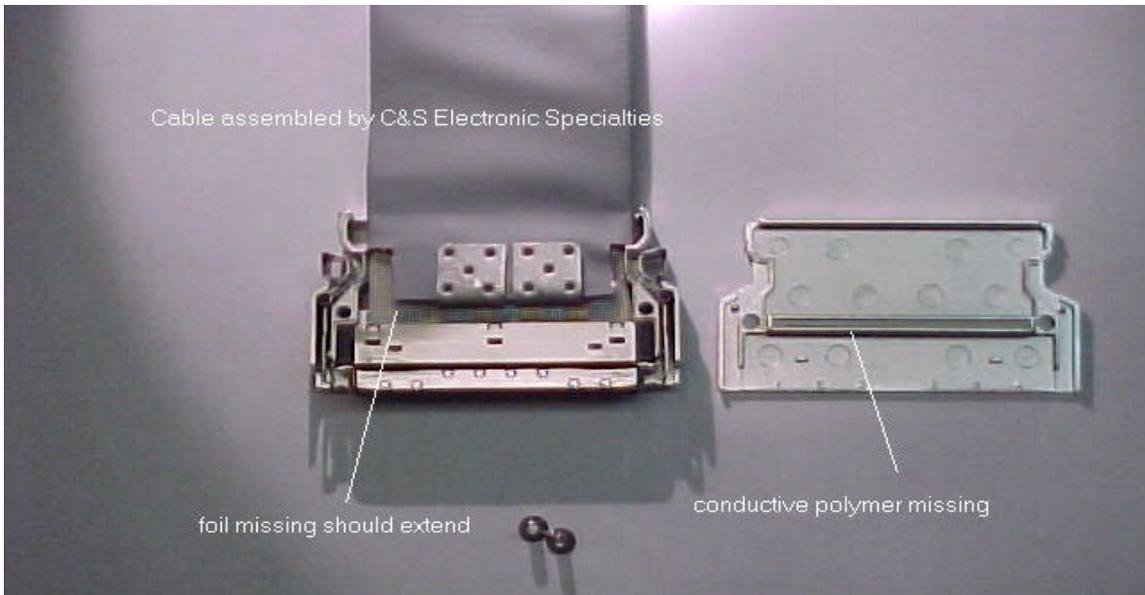


Figure 1

Please note in the above picture that no foil shield is exposed. The elastomer is missing from the connector shell. The result is a poor ground to the foil shield. Pictured above is pleated foil cable type 90201/68 with a 10168-6000EC connector and a 10368-A230-00 metal shell.

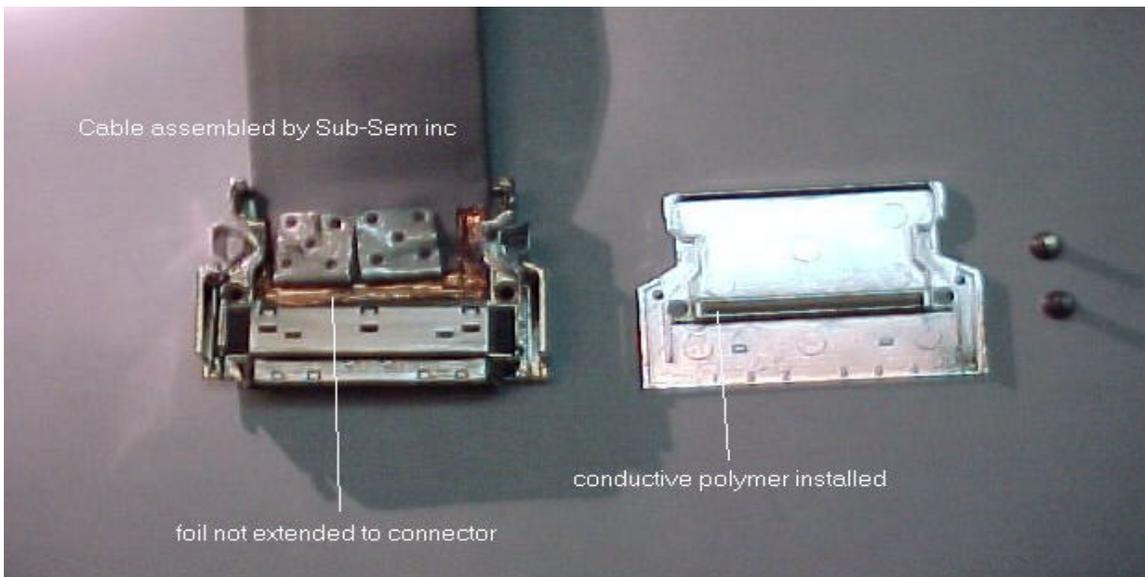


Figure 2

This example shows that the foil shield does extend. Better than example 1 since the conductive elastomer will make contact with the shield, but shield is not plated. Pictured above is 90211/50 cable with a 10150-6000EC connector and a 10350-1230-00 connector shell.

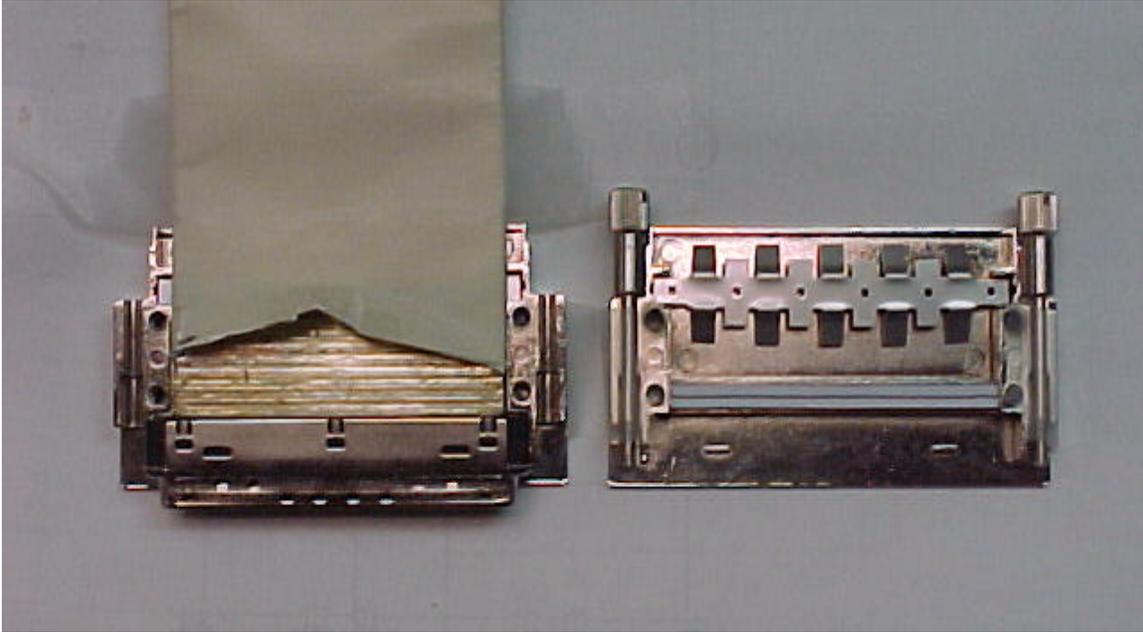


Figure 3
Example of an 80 conductor cable with cool-amp silver plating applied. Also notice that the pleated foil shield extends to the connector. The plating extends beyond the end of the jacket to a length of 1" Note the 'fugi-poly' location in the shell.

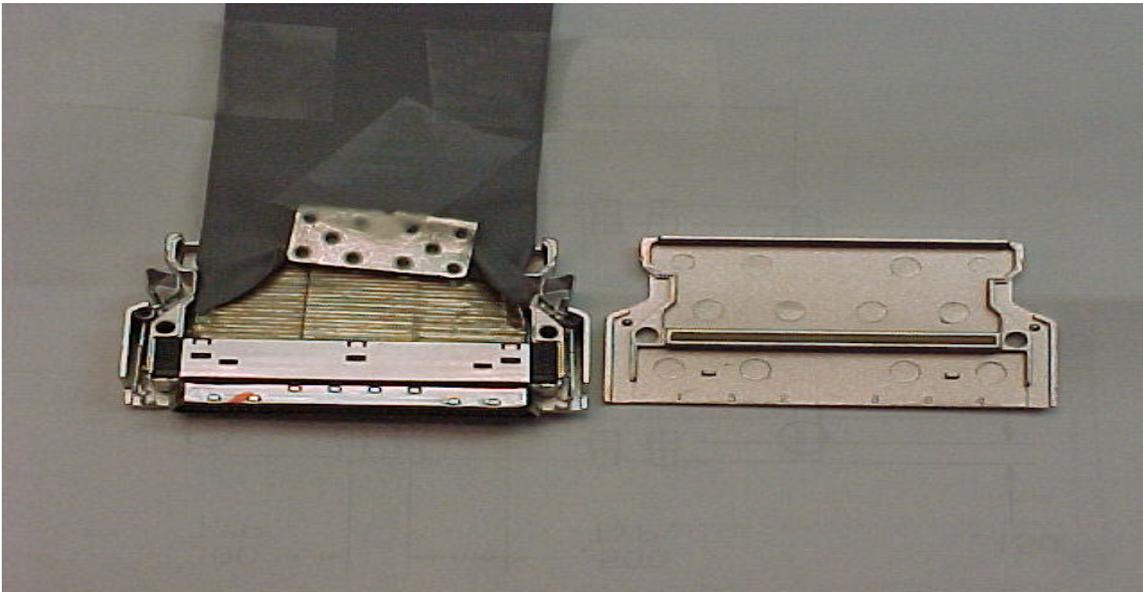


Figure 4
Example of a 50 conductor cable with Cool-Amp silver plating applied. Notice that the pleated foil shield extends to the connector. The plating extends beyond the end of the jacket to a length of 1". Note that the jacket has strain relief clamps attached, which also add to the grounding of the shield to the shell. The primary connection to the shell is by way of the conductive elastomer, mounted in the shell.

Optimized Grounding for 3M 90411-80 Cable

Please compare the example below to Figure 3. You will notice that another modification has been added to enhance the grounding of the pleated foil shield to the shell. It was determined that the fugi-poly grounding scheme was inadequate to sustain a long term reliable ground. So this modification as shown below was implemented. In addition to the Cool Amp plating, a tinned copper foil was overlapped and under-wrapped at the end of the jacket. Also the spring steel strain relief was first nickel striked and then over plated with tin. When the assembly is reassembled the strain relief makes the connection between the case and the tinned copper tape, which then makes the connection to the inner pleated foil shield. This modification was retrofitted on 23 earlier cable assemblies to be used for the 10% test.

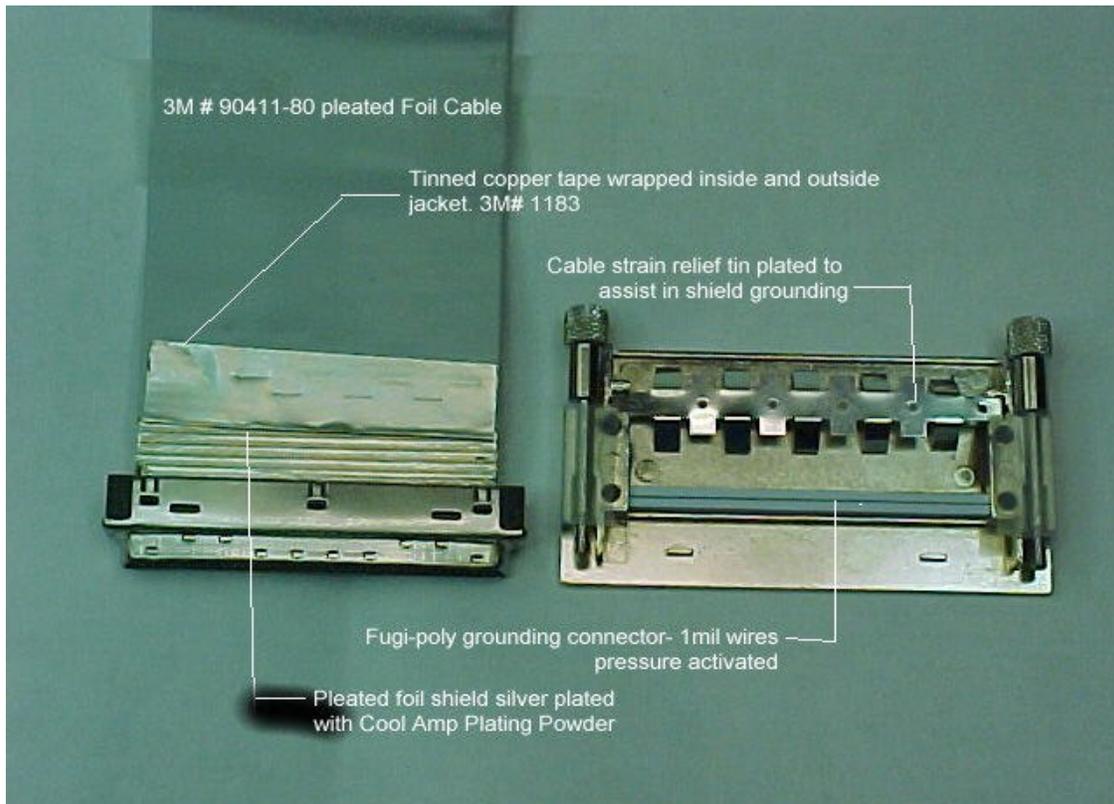


Figure 5

Conclusion

All the modifications described in this document are for the purpose of providing a more reliable and long term grounding connection. These cables are used in the Silicon Tracker and Fiber Tracker Upgrade of the D-Zero Colliding Detector.