

SSC 40mm End Ground Wrap Systems

Problems have developed with the end ground wrap design used on 40mm magnets. The purpose of this note is to document these problems and the solutions associated with them. The original design is described in Fermilab drawing 0102-MC-271156 and its subassemblies. It is also shown in Figures 1 through 8.

The original design was used on all 40mm short magnets. This includes magnets DS0308 ,309, 310, 311, 313, 314 and 315. It was used on long magnets DC0300, 301 and 302.

The major components of the collared coil are the inner coil, outer coil, heater strips and collars. The purpose of the ground insulation is to electrically isolate these components. A short possibility is defined as an area in which there are no kapton ground wrap layers between any two of the major components. If the original system is used, there are three areas in which short possibilities exist. The first of these is shown in Figure 1. There is a line about 8mm (5/16 inch) long where both the inner coil cap and the outer coil cap are split. There is nothing except the cable insulation between the inner and outer coils along this line. The second is shown in Figure 4. There is a line which travels azimuthally along the length of the outer coil for which there is nothing between the heater strip and the outer coil except the .001 inch kapton bonded to the heater strip. The third is shown in Figures 7 and 8. There are two points at which the split between the outer coil kapton layers and their respective end pieces cross. At these points there is nothing between the heater strip and the collars except the .001 kapton bonded to the heater.

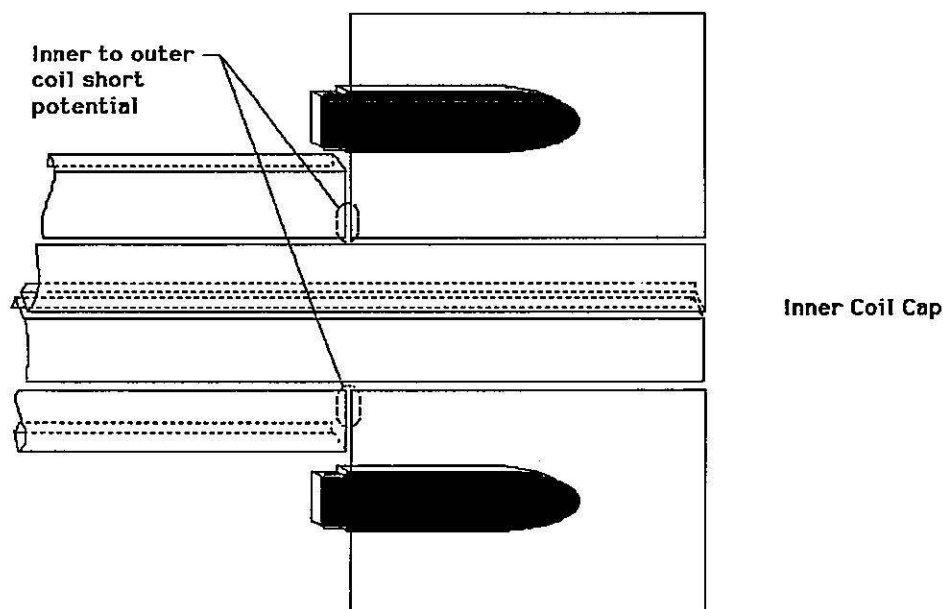
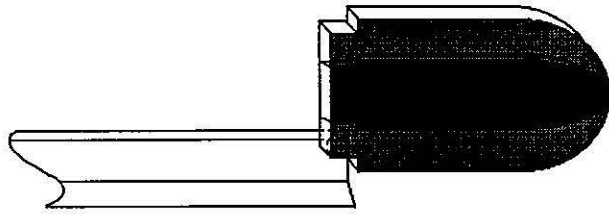


Figure 1.



Inner Z Strip

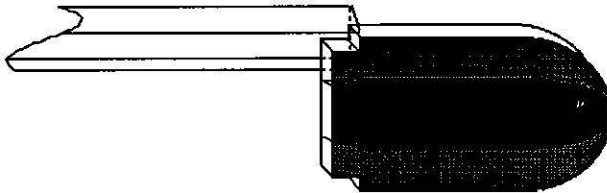
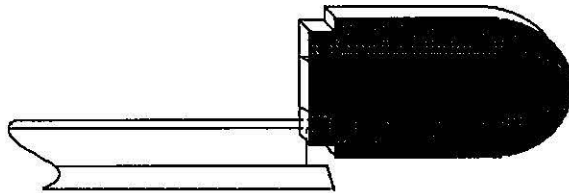


Figure 2



Outer Z Strip

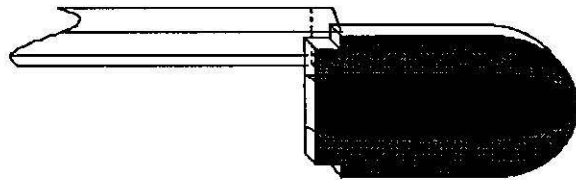
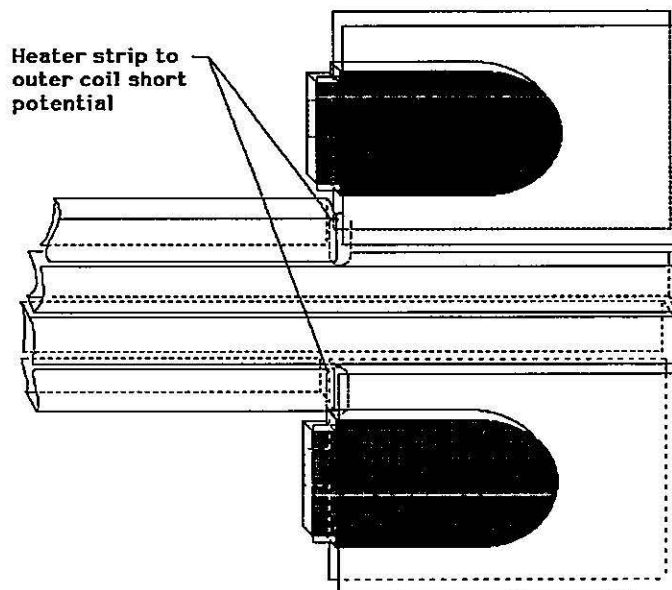


Figure 3.



Outer Coil
Cap

Figure 4.

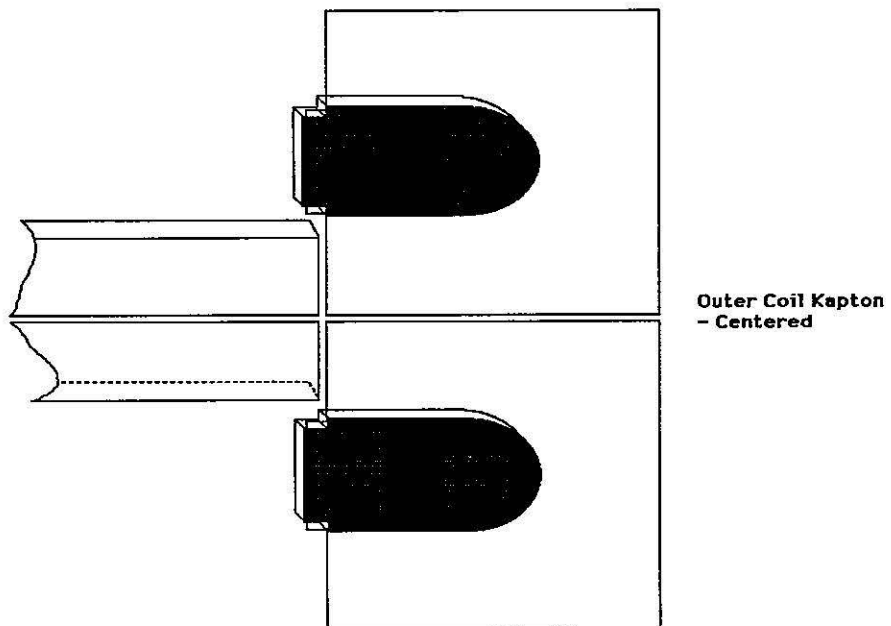


Figure 5.

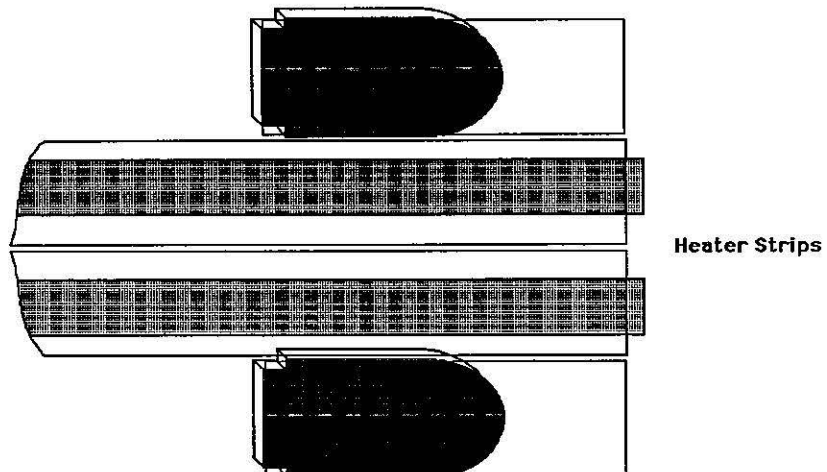


Figure 6.

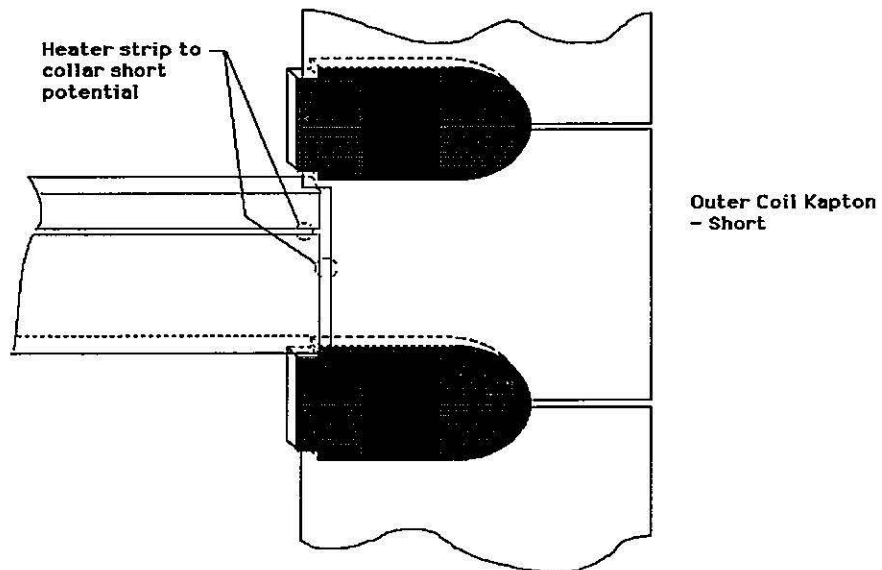


Figure 7.

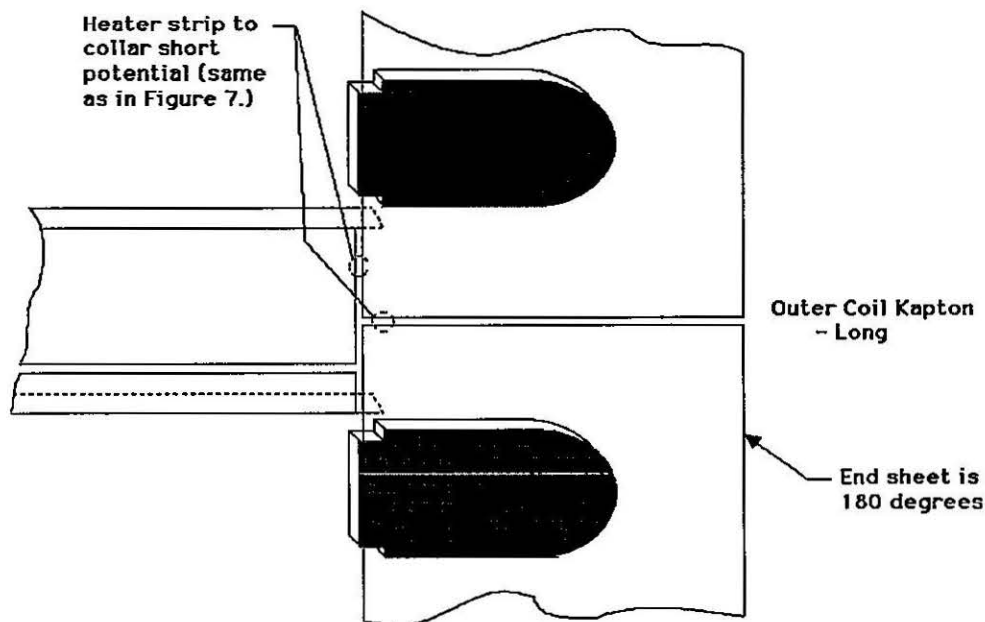


Figure 8.

Some 40mm magnets (DS0308, 309, 310, 311, 314 and DC0300) did not incorporate quench heaters (heater strips). For these magnets, the second two short possibilities did not exist, although the coil to coil potential was still there. For the rest of the 40mm short magnets and the early long ones (DS0313 and 315 and DC0301 and 302), the potential problems did exist. All these coils passed the appropriate hipots. DC0303, however, which initially was insulated with the original design, had a heater-to-collar short in the area where the short possibility exists. It was disassembled and repaired. The end ground wrap system was redesigned to eliminate the short possibilities. The new end ground wrap design is shown in Figures 9 through 16. It is being used on DC0304, 305 and 306.

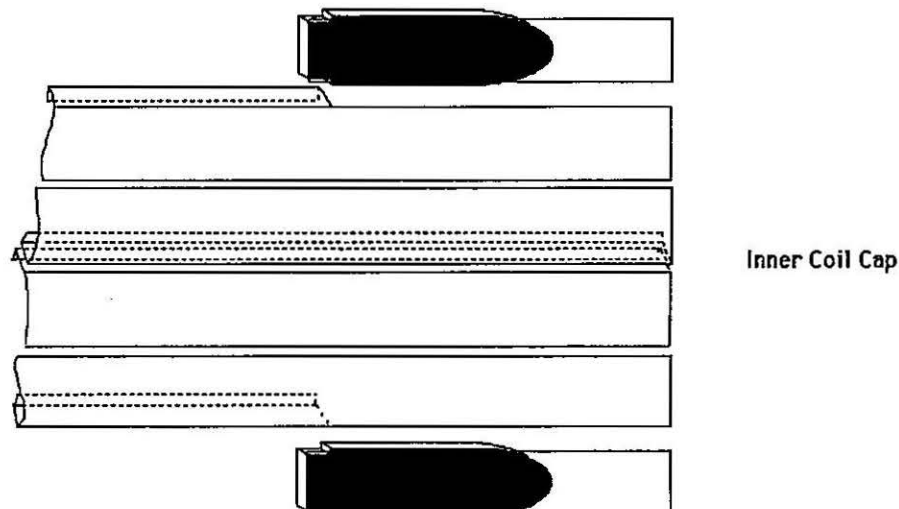
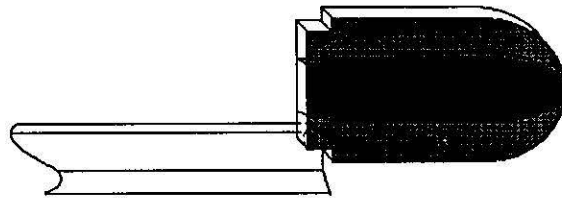


Figure 9.



Inner Z Strip

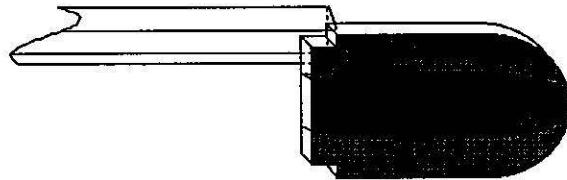
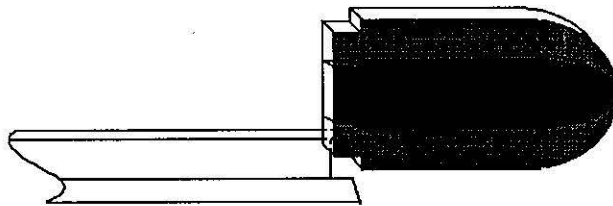


Figure 10.



Outer Z Strip

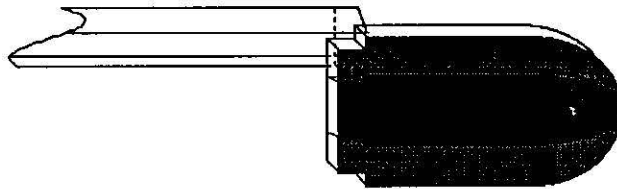
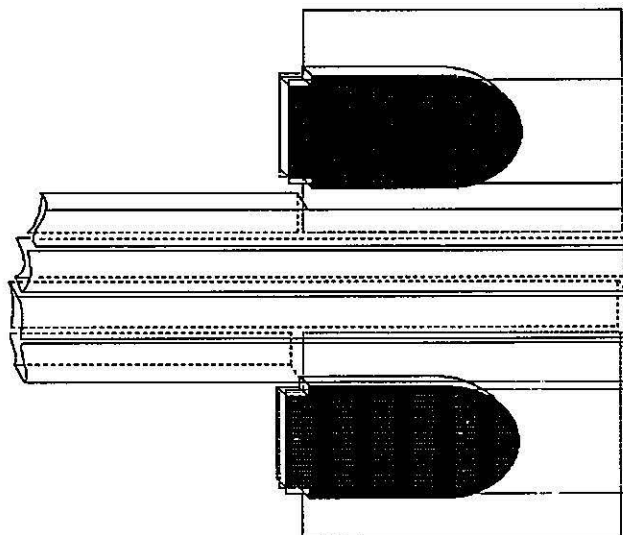


Figure 11.



Outer Coil
Cap

Figure 12.

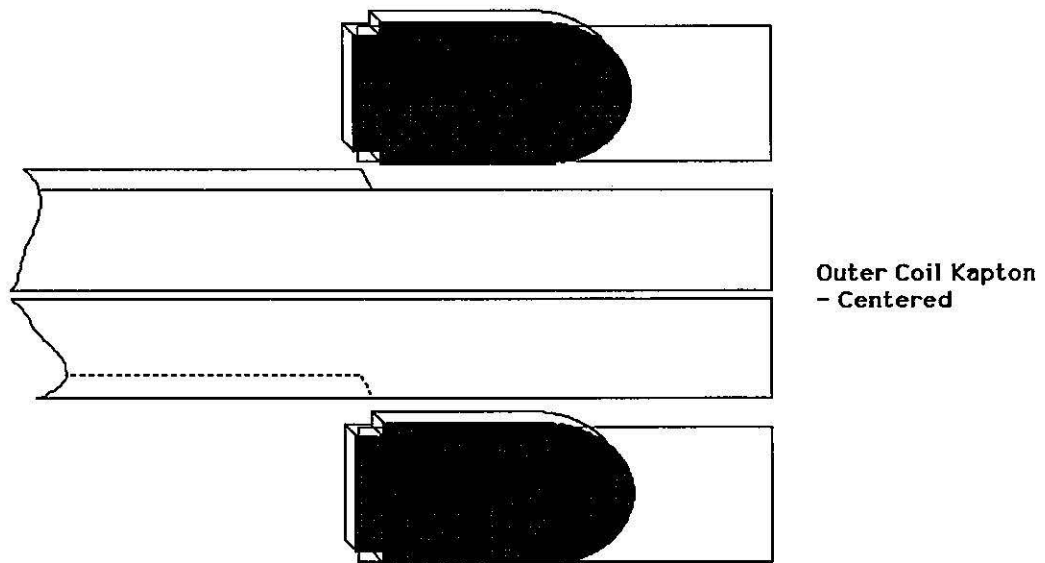


Figure 13.

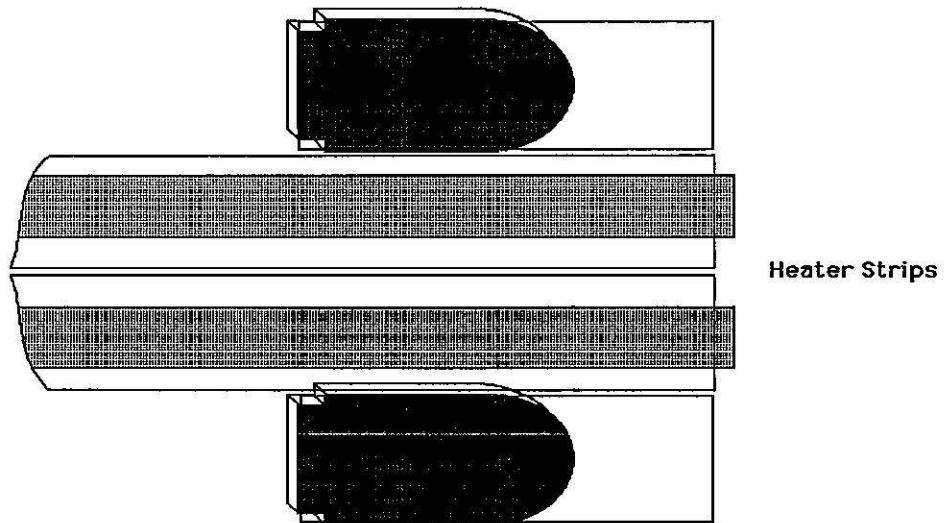


Figure 14.

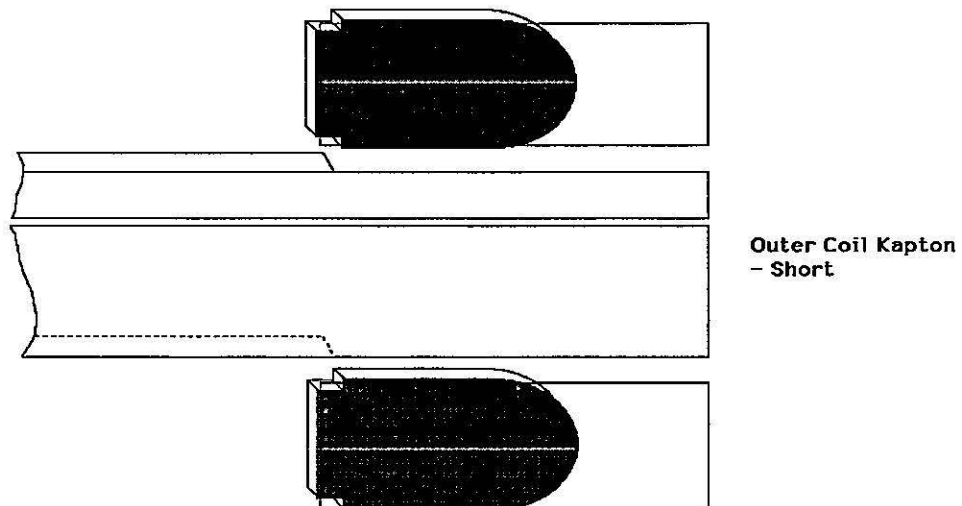


Figure 15.

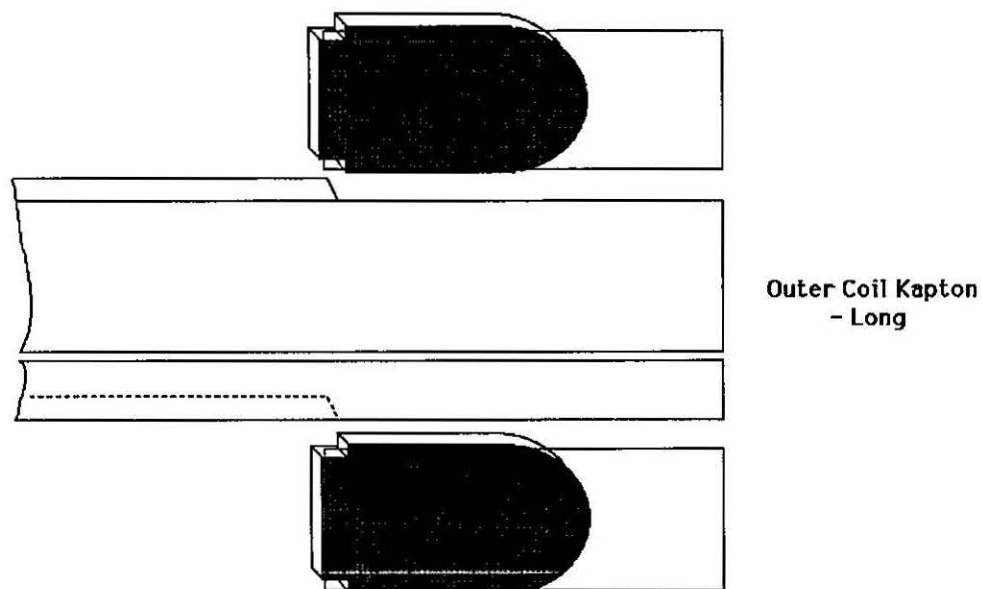


Figure 16.

DC0303, however, had already been insulated and collared with the original design. It was impossible, without uncollaring the entire magnet, to reinsulate with the new design. A repair was done on DC0303. It is shown in Figures 17 through 24. This system was used only on DC0303. It corrected the heater to coil and heater to collar problems at the expense of adding as much as .002 kapton in some places radially. It did not correct the inner to outer coil problem.

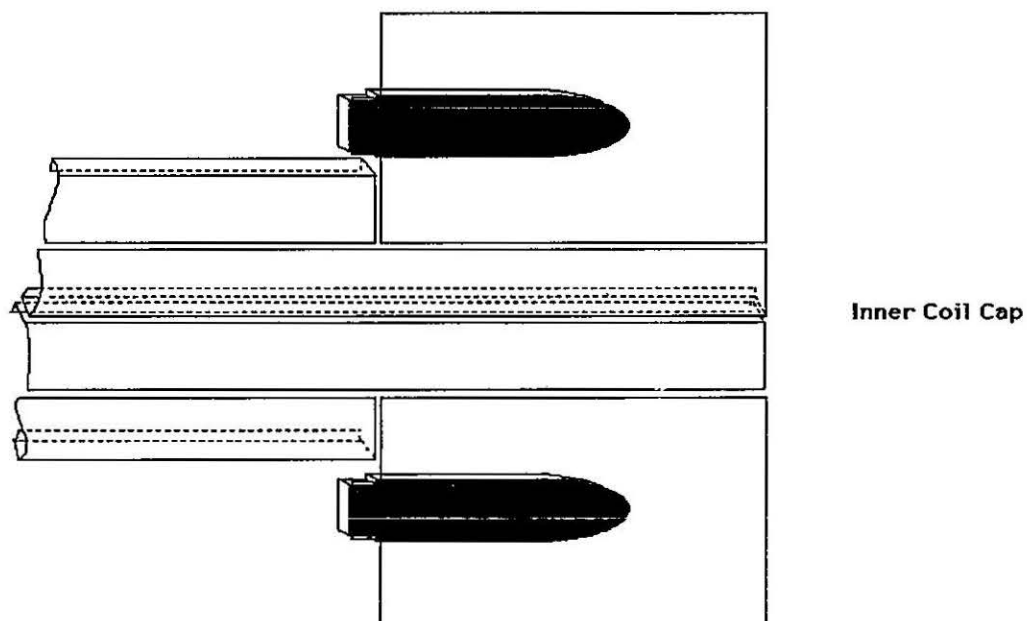
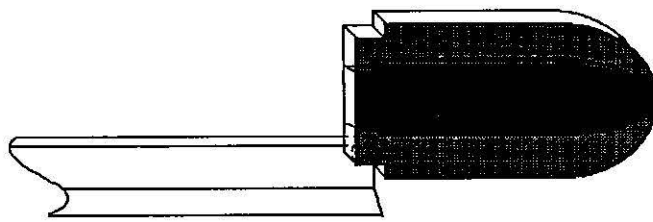


Figure 17.



Inner Z Strip

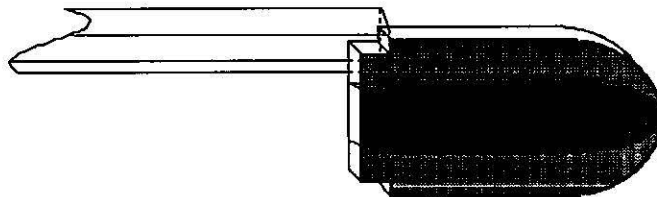
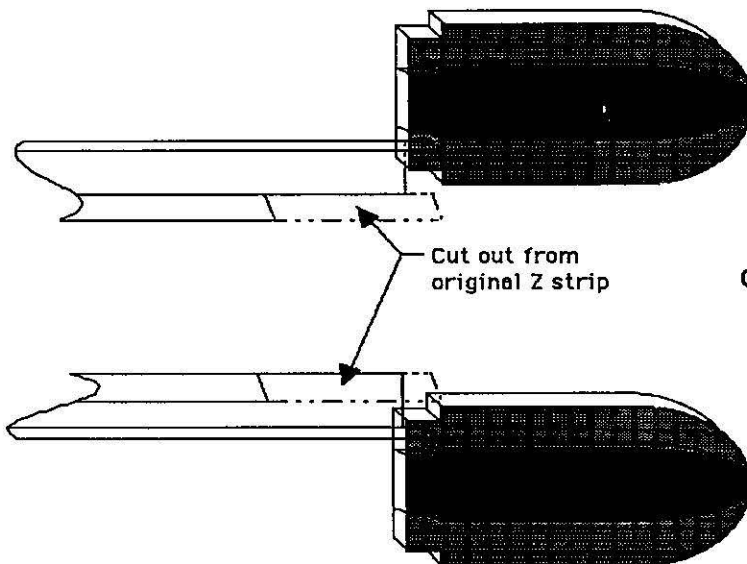


Figure 18.



Outer Z Strip

Figure 19.

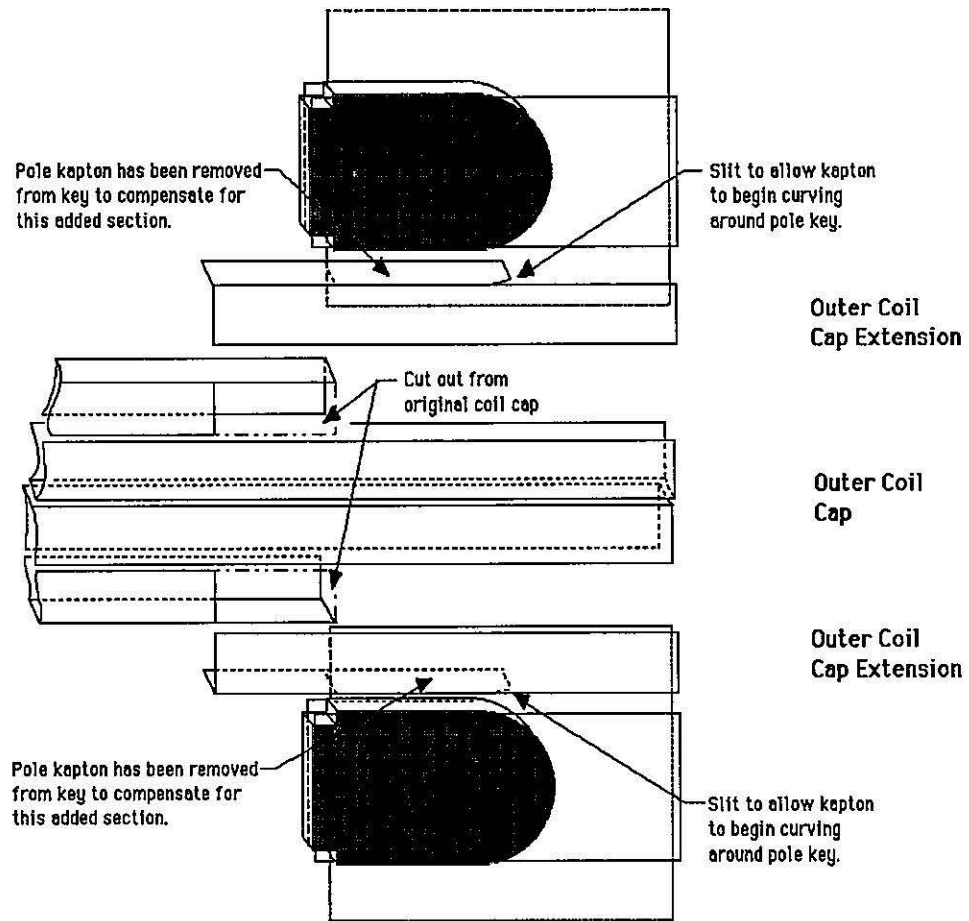


Figure 20.

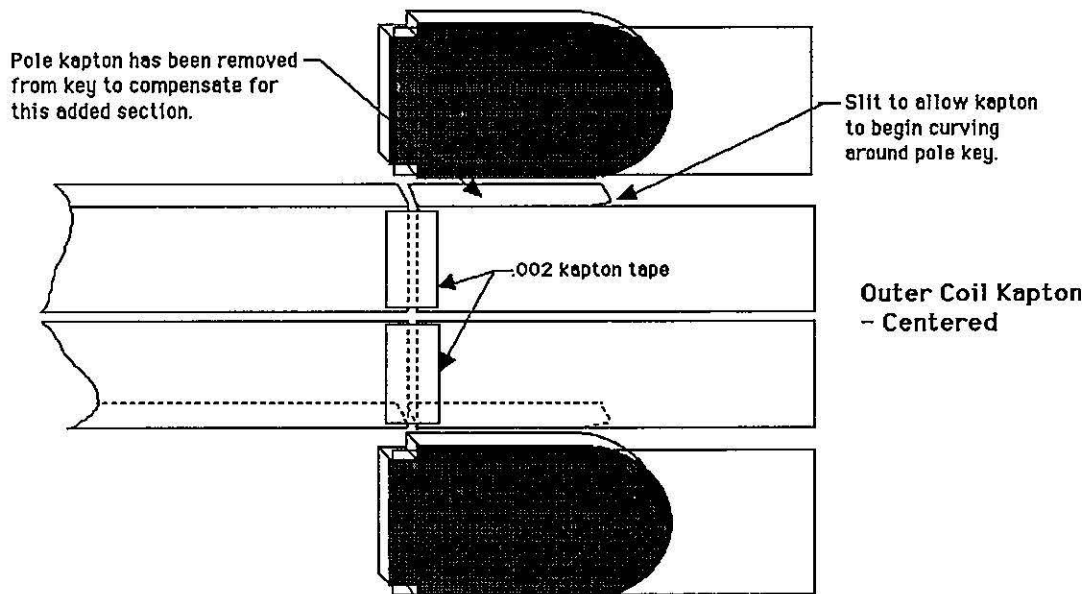


Figure 21.

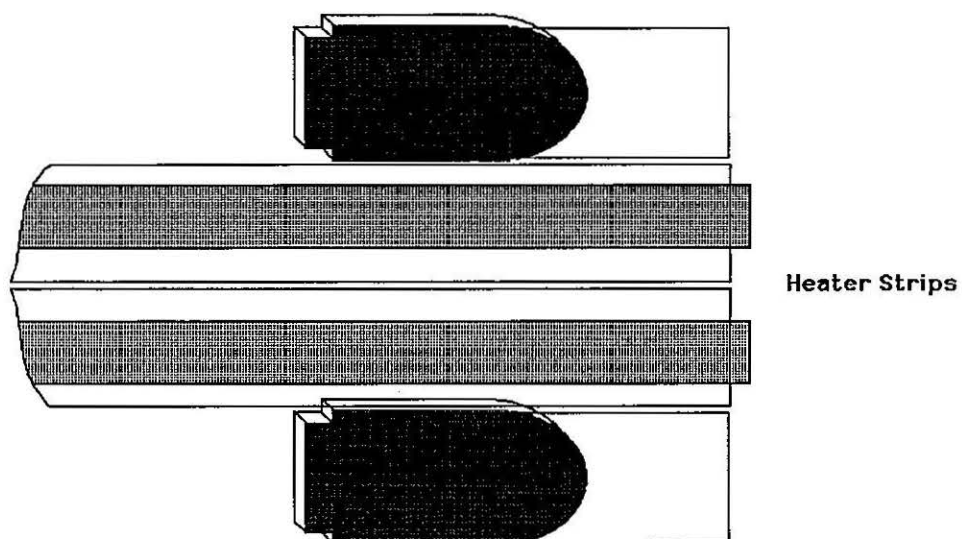


Figure 22.

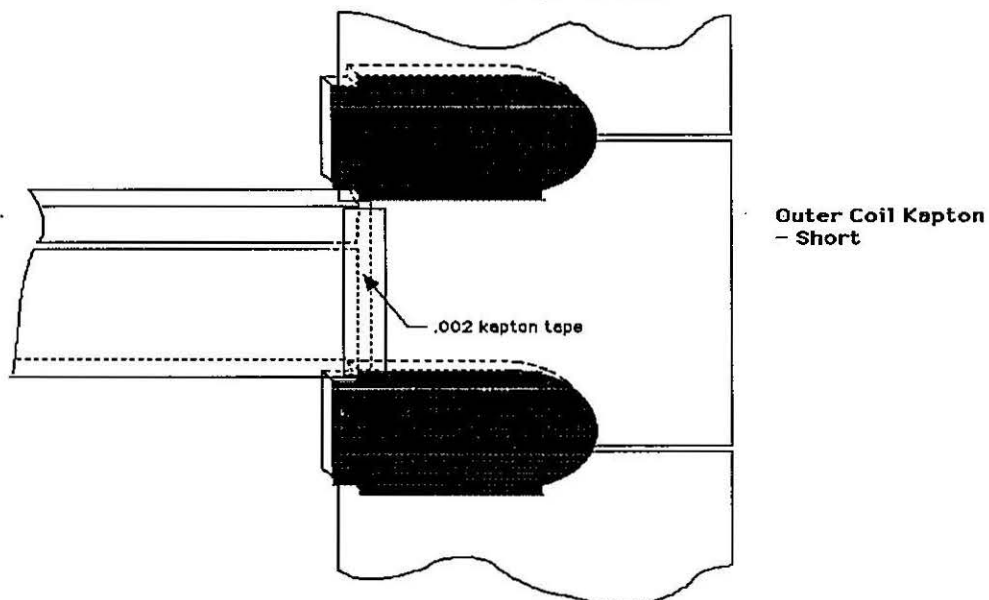


Figure 23.

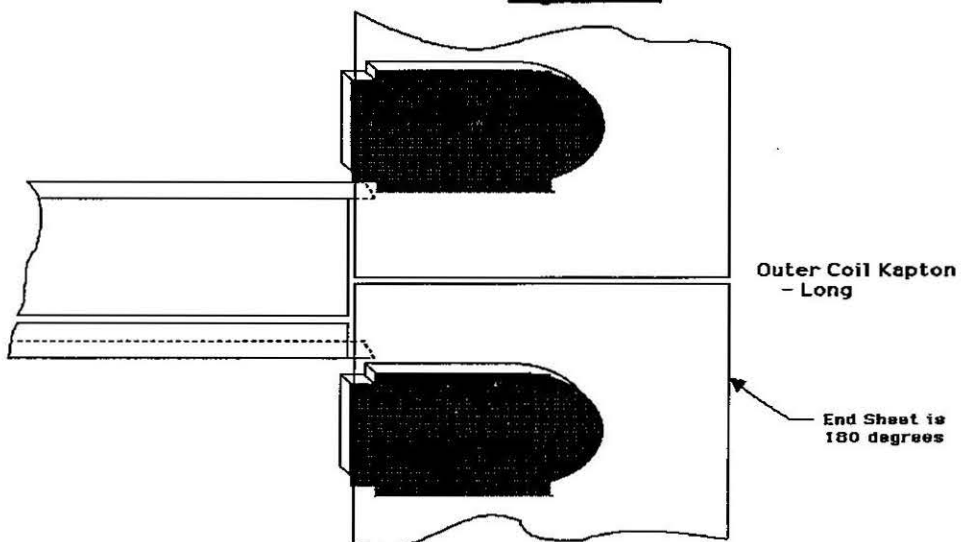


Figure 24.

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