

**Fermi National Accelerator Laboratory
Batavia, IL 60510**

**FERMI MAIN INJECTOR 3Q60
MAGNET ASSEMBLY TRAVELER**

Reference Drawing(s)

3Q60 Magnet Half Yoke Assembly With Pole Tip

5520-ME-331964

3Q60 Magnet Assembly With Beam Tube

5520-ME-331965

3Q60/3Q120A Magnet Manifold Assembly

8020-ME-351004

Budget Code: MYI Project Code: MAF

Released by: Date:

Prepared by: W. L. Isiminger

Title	Signature	Date
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TD / E&F Assembly	<i>James R. K...</i>	7-24-98
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TD / E&F Device Design	<i>Walt...</i>	7/23/98
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Revision Page

Revision	Revision Description	Date
A	Step 3.3: Changed 18.6 mΩ to 19.0 mΩ and Added Ls/Q per new release of ES-331810 Rev. "D". Step 4.4: Changed 18.6 mΩ to 19.0 mΩ and Added Ls/Q per new release of ES-331810 Rev. "D". Step 6.5: Changed 18.6 mΩ to 19.0 mΩ and Added Ls/Q per new release of ES-331810 Rev. "D". Step 8.2: Added Ls/Q per new release of ES-331810 Rev. "D". Step 8.5: Changed flow data, 60 psi changed from 4.8 gpm to 5.4 gpm, 100 psi changed from 6.8 gpm to 7.0 gpm per new release of ES-331810 Rev. "D". TRR. No. 0863	07/20/98

Ensure appropriate memos and specific instructions are placed with the traveler before issuing the sub traveler binder to production.

1.0 General Notes

- 1.1 White (Lint Free) Gloves (Fermi stock 2250-1800) or Surgical Latex Gloves (Fermi stock 2250-2494) shall be worn by all personnel when handling all product parts after the parts have been prepared/cleaned.
- 1.2 All steps that require a sign-off shall include the Technician/Inspectors first initial and full last name.
- 1.3 No erasures or white out will be permitted to any documentation. All incorrectly entered data shall be corrected by placing a single line through the error, initial and date the error before adding the correct data.
- 1.4 All Discrepancy Reports issued shall be recorded in the left margin next to the applicable step.
- 1.5 All personnel performing steps in this traveler must have documented training for this traveler and associated operating procedures.
- 1.6 Personnel shall perform all tasks in accordance with current applicable ES&H guidelines and those specified within the step.
- 1.7 Cover the 3Q60 Half Magnet/Magnet Assemblies with green Herculite (Fermi stock 1740-0100) when not being serviced or assembled. Completed assemblies are to be stored in the 3Q60 Magnet Storage Area.

2.0 Parts Kit List

- 2.1 Attach the completed Parts Kit List for the 3Q60 Magnet to this traveler. Ensure that the serial number on the Parts Kit List matches the serial number of this traveler. Verify that the Parts Kit received is complete.

Process Engineering/Designee

Date

3.0 Pre-Assembly Inspection

- X 3.1 Using the overhead crane and the 3Q60/3Q120 Lifting Fixture (ME-351438), transport two (2) 3Q60 Half Magnet Assemblies (ME-331964) to the magnet assembly area. Record the serial numbers of the half magnets below:

Half Magnet Serial Number:	
Half Magnet Serial Number:	

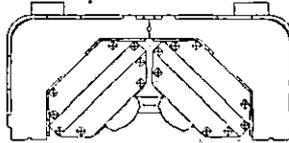
Lead Person _____
Date

- X 3.2 Verify that the "OK to Proceed" tags are attached to the half magnets. Remove the tags and attach them to this traveler:

Lead Person _____
Date

- X 3.3 Visually inspect the ground wrap insulation to ensure uniform application. Perform a visual inspection of the assembly and Electrical inspection, record the results below. There are to be no clamps used for the following tests.

Quadrant #2 Quadrant #1



Quadrant 1

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		Reference Test Only Not Subject to Limit Values				
Q @ 100 Hz		Reference Test Only Not Subject to Limit Values				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				

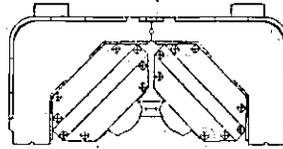
Quadrant 2

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		Reference Test Only Not Subject to Limit Values				
Q @ 100 Hz		Reference Test Only Not Subject to Limit Values				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				
Hipot Quad 1 Coil to Quad 2 Coil @ 100 Vdc		< 5μA				

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Quadrant #3 Quadrant #4



Quadrant 3

Full Coil Serial No.	Equipment Serial Number	Limit	Core Serial No.	Pass	Fail	Out of Tolerance
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		Reference Test Only Not Subject to Limit Values				
Q @ 100 Hz		Reference Test Only Not Subject to Limit Values				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				

Quadrant 4

Full Coil Serial No.	Equipment Serial Number	Limit	Core Serial No.	Pass	Fail	Out of Tolerance
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		Reference Test Only Not Subject to Limit Values				
Q @ 100 Hz		Reference Test Only Not Subject to Limit Values				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				
Hipot Quad 3 Coil to Quad 4 Coil @ 100 Vdc		< 5μA				

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Visually inspect the coils for the following, which will include but not be limited to:

Quadrant 1

Coil Serial Number: QCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 2

Coil Serial Number: QCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 3

Coil Serial Number: QCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 4

Coil Serial Number: QCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Inspector

Date

XX

3.4 Verify that the recorded results are in compliance with ME-331964 and ES-331810.

Lead Inspector

Date

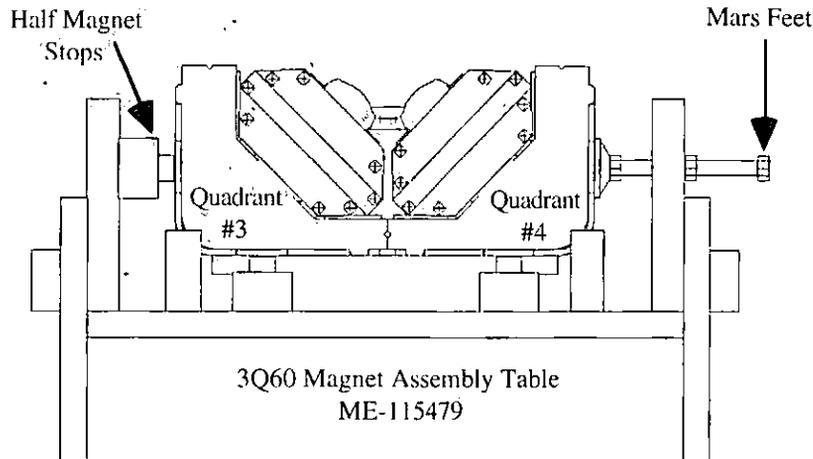
Crew Chief

Date

- 3.5 Using the overhead crane, the 3Q60/3Q120 Lifting Fixture (ME-351438), the appropriate slings, and the Flip-Rite (Model 8F7:5T or equivalent), roll - over one of the half magnet assemblies so that the parting plane is facing up. Place the half magnet assembly into the base of the 3Q60/3Q120 Magnet Assembly Fixture (ME-115479).

Note(s):

Ensure that the Detail #3 print (ME-351438) is in place when rolling the half magnet assembly over.



Technician

Date

- 3.6 Remove the braces (item #3) and tighten the mars feet bolts until the half magnet assembly (laminations of the core) comes into contact (stopping the assembly from further movement) with the half magnet stops on the assembly table.

Technician

Date

- 3.7 Receive one (1) Beam Tube (MC-351001) from stock. Measure 5 1/4" from the lead end (marked on outside of tube) of the Beam Tube (MC-351001), mark this location using Kapton Tape (MA-116534), then measure 62" from that mark location of the beam tube and mark this location using another piece of Kapton tape. Using Kapton Tape (MA-351003) at the marked location, apply the tape to one (1) side of the beam tube stopping at the other marked location. Rotate the beam tube 180°, starting at the lead end of the beam tube 5 1/4" in as marked, overlap the Kapton tape 3/8" on both sides and apply it to the beam tube stopping at the other marked location. Remove the Kapton tape marking the start and stopping points.

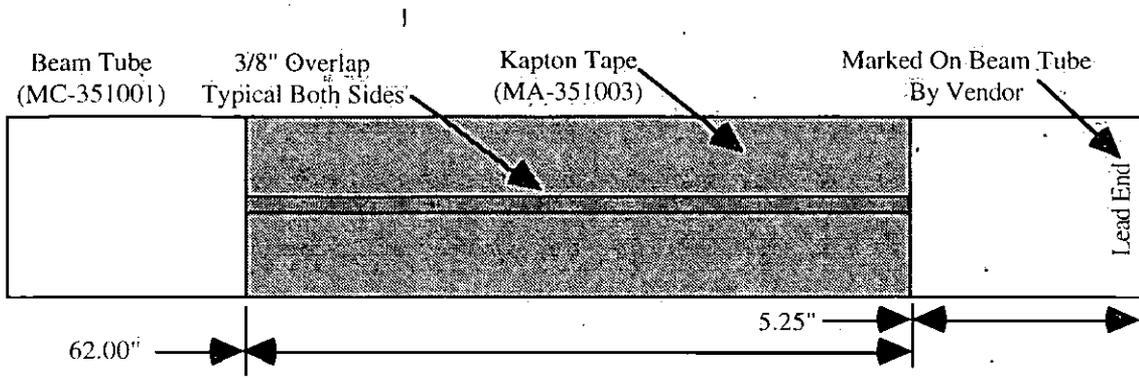
Note(s):

The Kapton tape is to be applied longitudinally, not wrapped with a 3/8" overlap.

Technician

Date

- XX 3.8 Inspect the beam tube for compliance to MC-331989. Verify the distances from the lead end of the beam tube and that there is a 3/8" overlap on both sides of the beam tube.

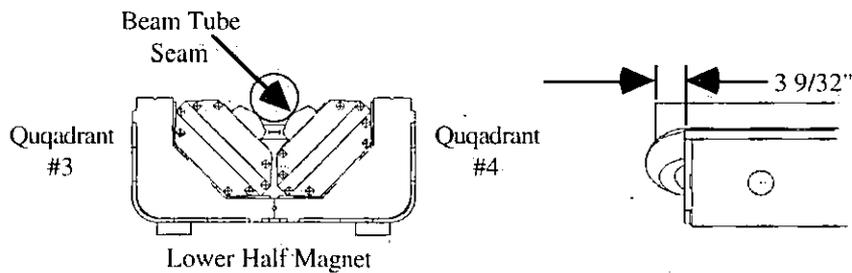


Lead Inspector	Date
Crew Chief	Date

- X 3.9 Visually verify the placement of the 5 pole tip spacers per ME-331964.

Lead Person	Date
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- 3.10 Position the beam tube within the half magnet assembly with respect to the leads as marked. Place the weld seam of the beam tube such that it is on the center line of the pole tip to within .060" of quadrant four (4). Measuring from the return end, position the beam tube 3 9/32" from the quarter yokes face.



Technician	Date
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- 3.11 Using the overhead crane and 3Q60/3Q120 Lifting Fixture (ME-351438), raise the half magnet assembly into the air sufficiently so that Isopropyl Alcohol (Fermi stock 1920-0300) and Heavy Disposable Wipers (Fermi stock 1660-2600 or equivalent), can be used to clean the parting plane areas of the half magnet assemblies that will or may come into contact with each other or the 1/4" diameter rods (keys).

Warning:

During the cleaning process, do not allow any persons to endanger themselves by standing under the suspended load.

Technician

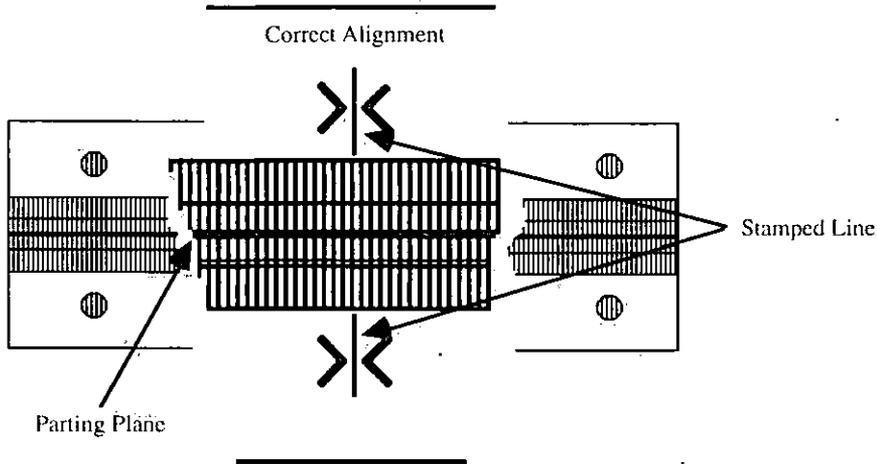
Date

- X 3.12 Visually verify the placement of the 5-pole tip spacers per ME-331964.

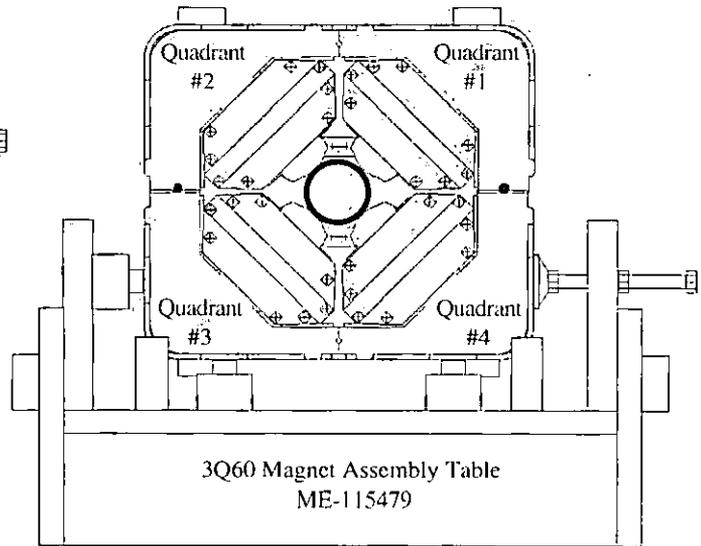
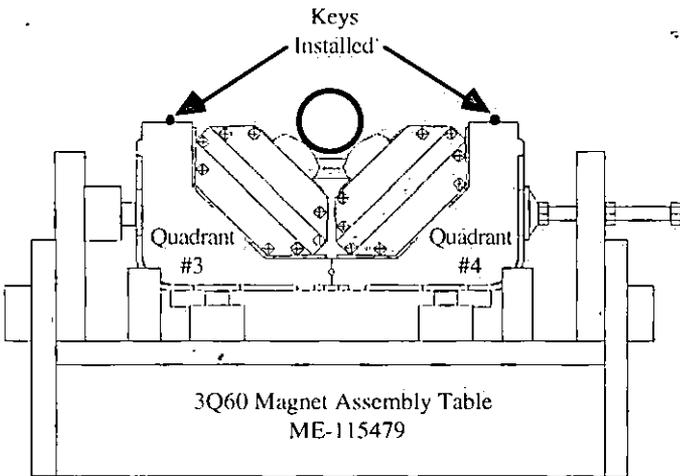
Lead Person

Date

- 3.13 Position the 1/4" diameter rods (keys) (MA-331951) into the key ways (quadrants three (3) and four (4)) of the half magnet assembly on the magnet assembly table. Using the overhead crane and lifting fixture, position the half magnet (containing quadrants one (1) and two (2)) assembly onto the half magnet (containing quadrants three (3) and four (4)) assembly setting in the assembly table. Align the two (2) half assemblies so that the two stamped lines at the center of the cores align within 1/32".



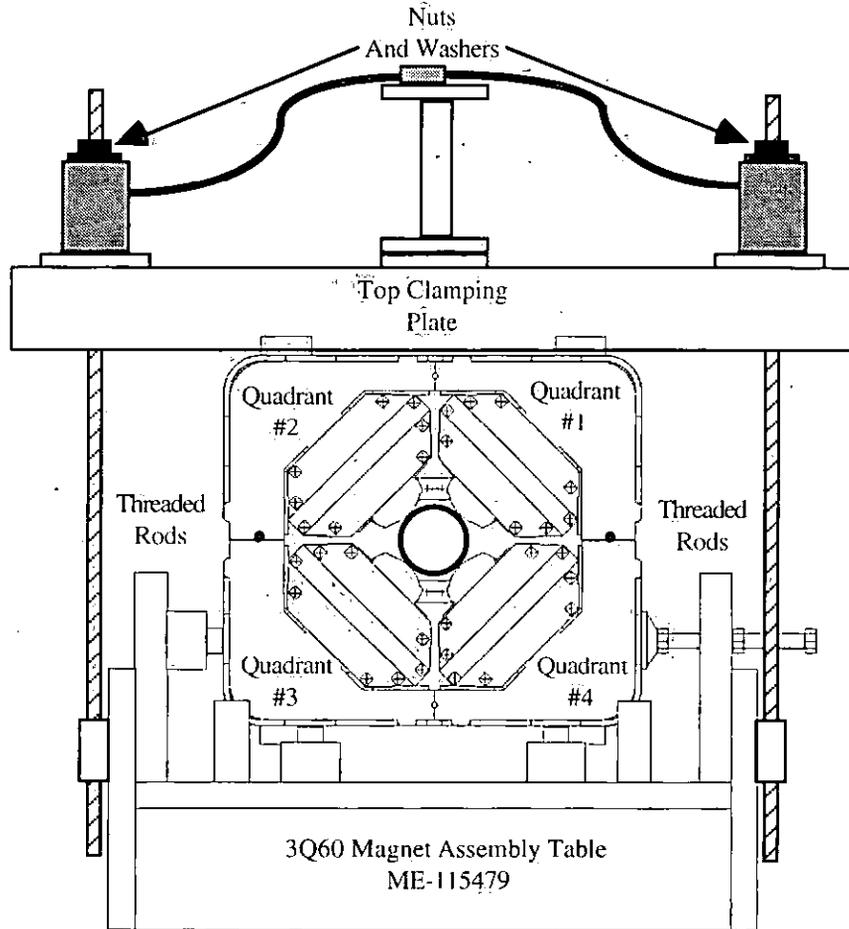
Note(s):
 When positioning the half assembly onto the magnet assembly table ensure that the leads are exiting the same end as the half magnet assembly previously positioned on the assembly table.



Technician

Date

- 3.14. Using the overhead crane and the appropriate slings, position the Top Clamping Plate on the Magnet Assembly Table (ME-115479). Insert the threaded rods with the nuts and washers attached at one end, through the Enerpac's into the assembly table. Hand tighten the washers and nuts at the bottoms of the threaded rods.



Technician

Date

- X 3.15 Using the Assembly Table (ME-115479), energize the Enerpac pump and apply pressure to the magnet assembly. The pressure applied to the Enerpac's should be (2500 ± 100) . Record the pressure applied in the table below.

Warning:

DO NOT exceed 5000 psi on the lines!

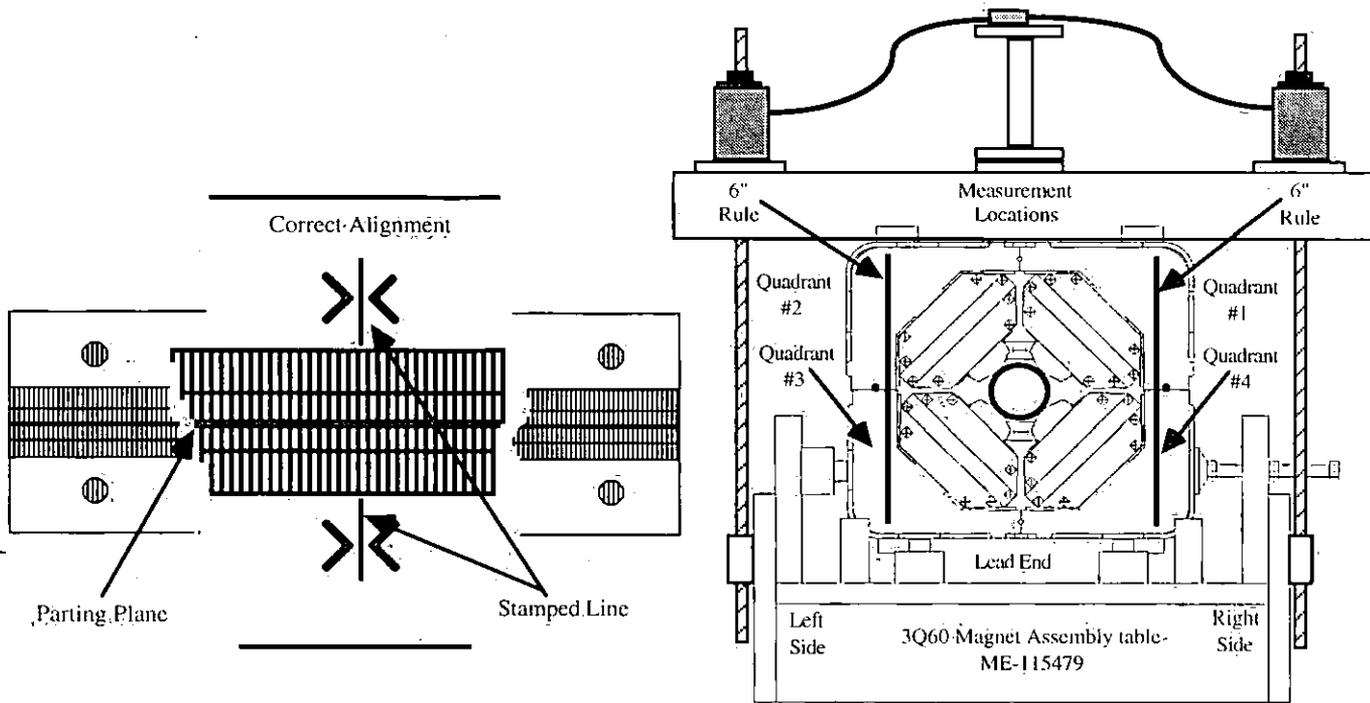
Pressure 2500 Lbs. ± 100

Lead Person

Date

- 3.16 Ensure that the two assemblies are aligned such that any mismatch due to length difference is split equally on both ends within .030".

The four (4) stamped lines at the center of the cores align within 1/32". Pass



Using a six inch rule (Starrett C304SRE-6 or equivalent) and feeler-gauges (Starrett No. 667), or equivalent, measure the offset at both sides of each end of the half yoke assemblies.

Note(s):

When making the core face measurement, indicate the core that the 6" ruler is flush against during this measurement by recording a 0 in the appropriate box. Record the gap between the ruler and the adjacent core in the appropriate box.

Lead End Not to exceed .030"				Non-Lead End Not to exceed .030"			
Left Side		Right Side		Left Side		Right Side	
Top Core	Bottom Core	Top Core	Bottom Core	Top Core	Bottom Core	Top Core	Bottom Core

Inspector _____

Date _____

- 3.17 Using Isopropyl Alcohol (Fermi stock 1920-0300) and Heavy Disposable Wipers (Fermi stock 1660-2600 or equivalent), clean the tie strap valleys created by bringing the two half magnet assemblies together and all areas that will or may come into contact with the tie strap.

Technician

Date

- 3.18 Centrally position two (2) Tie Straps (MB-331950) within the magnets tie strap valleys (one (1) per side). Tighten the tie strap bolts to hold the tie straps into position. Ensure that during the tightening process that the tie straps do not move from the centrally located positions.

Technician(s)

Date

- 3.19 Using white chalk indicate the locations of the welds and the lengths of the welds as per ME-331965. Using Aluminum Foil (Fermi stock 1750-0350) cover all exposed areas of the hydraulics or assembly table that may come in contact with the weld spatter resulting in damage.

Technician

Date

- X 3.20 Verify the following.

Item Verification	OK
Assemblies aligned so mismatch due to length differences are split equally on both ends within .030"	
The beam tube is positioned within the half magnet assembly with respect to the leads as marked	
The weld seam of the beam tube is on the center line of the pole tip to within .060" of quadrant four (4)	
Measuring from the return end the beam tube is positioned 3 9/32" from the quarter yokes face	
The coils are correctly positioned within the cores per ME-331965	
The 1/4" Rods (key) are tight within the core	
The leads are all located at the same end of the assembly	
Tie straps are positioned in .500" off of both ends of the assembly, any difference equally split on both ends within .030"	
The insulation of the coils is free of dirt, grease, oil, damage, etc...	
The tie wrap containing the coil serial numbers is attached to each of the coil packages.	
The weld pattern on the assembly is per ME-331965	
The assembly table is under pressure and all the associated clamps are tight	
Back leg gap ($\leq .005"$) measurements are to be taken through the holes in the tie strap	
Back leg gap ($\leq .010"$) measurements taken at the End packs	

Lead Person

Date

4.0 Pre-Weld Inspection

X 4.1 Visually inspect the following. Record in the table provided the pressure that is applied to the assembly table by the Enerpac's.

Inspect	Pass	Fail
Assemblies aligned so mismatch due to length differences are split equally on both ends within .030"		
The beam tube is positioned within the half magnet assembly with respect to the leads as marked		
The weld seam of the beam tube is on the center line of the pole tip to within .060" of quadrant four (4)		
The coils are correctly positioned within the cores per ME-331965		
The 1/4" Rods (key) are tight within the core		
The leads are all located at the same end of the assembly		
Tie straps are positioned in .500" off of both ends of the assembly, any difference equally split on both ends within .030"		
The insulation of the coils is free of dirt, grease, oil, damage, etc...		
The tie wrap containing the coil serial numbers is attached to each of the coil packages.		
The weld pattern on the assembly is per ME-331965		
The assembly table is under pressure and all the associated clamps are tight		

Warning:

DO NOT exceed 5000 psi on the lines!

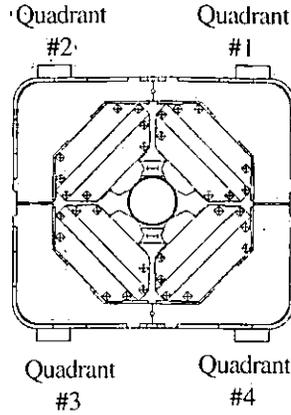
<p>Pressure 2500 Lbs. ±100</p>

Inspector

Date

- X 4.2 Measure the beam tube position from the return end to each of the quarter yokes faces and record the results in the table provided. The average of these four (4) measurements shall not exceed 3.281".

Location	Measurement
Quadrant 1	
Quadrant 2	
Quadrant 3	
Quadrant 4	
Total	
Divided by	4
Average of (Limit 3.281")	



Inspector

Date

- X. 4.3 Starting at the lead end of the half magnet assembly on the end pack, measure and record in the table below the backleg gap in seven (7) locations. Except for the end pack measurements, all other measurements are to be taken through the holes in the tie strap.

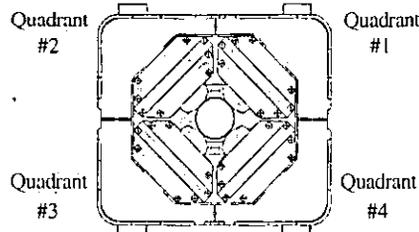
Left Side Of Assembly					Right Side Of Assembly				
Location	Measurement	Limit	Pass	Fail	Location	Measurement	Limit	Pass	Fail
Lead End End Pack		≤ .020"			Lead End End Pack		≤ .020"		
6"		≤ .010"			6"		≤ .010"		
18"		≤ .010"			18"		≤ .010"		
30"		≤ .010"			30"		≤ .010"		
42"		≤ .010"			42"		≤ .010"		
54"		≤ .010"			54"		≤ .010"		
Return End End Pack		≤ .020"			Return End End Pack		≤ .020"		

Total Of The 14 Measurements Taken Above			
Divided By	14	Pass	Fail
Average ≤ .005"			

Inspector

Date

X 4.4 Perform an Electrical inspection, record the results below.



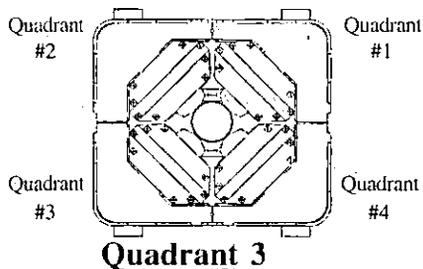
Quadrant 1

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				

Quadrant 2

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				
Hipot Quad 1 Coil to Quad 2 Coil @ 100 Vdc		< 5μA				
Hipot Quad 2 Coil to Quad 3 Coil @ 100 Vdc		< 5μA				

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Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				

Quadrant 4

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				
Hipot Beam Tube to Core @ 100 Vdc		< 5μA				
Hipot Quad 3 Coil to Quad 4 Coil @ 100 Vdc		< 5μA				
Hipot Quad 1 Coil to Quad 4 Coil @ 100 Vdc		< 5μA				

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X 4.5 Visually inspect the coils for the following, which will include but not be limited to:

Quadrant 1

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 2

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 3

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 4

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Inspector

Date

XX 4.6 Verify that the recorded results in steps 4.1 through 4.5 are in compliance with ME-331965/ES-331810. Visually verify that the coil packages are assembled with the lead locations in the positions shown on print ME-331965.

Warning:

At no time are the diagrams within this traveler to be used to verify this step. Ensure that the most current available print is used for assembly verification at this point.

Lead Inspector

Date

Crew Chief

Date

5.0 Welding Procedure

5.1 Using the Blue Thermo Shield (Frommelt # M1089) or equivalent, cover and seal all areas of the exposed coils or other items that may be damaged by weld spatter and secure the shield into place using Pressure Sensitive Green Tape (Fermi stock 1365-1020) or equivalent.

Technician(s) _____
Date

Note(s):

At no time during the following steps is the Assembly Fixture to have the pressure released.

XX 5.2 Visually verify that all the coils and associated items that could be damaged by weld spatter are completely covered/sealed and protected by the Blue Thermo Shield.

Lead Inspector _____
Date

Crew Chief _____
Date

5.3 Weld the magnet assembly in accordance with the 3Q60 Magnet Assembly drawing ME-331965.

Welder _____
Date

Technician(s) _____
Date

XX 5.4 Visually inspect all the welds for compliance to ME-331965.

Lead Person _____
Date

Inspector _____
Date

5.5 Back out the tie strap retaining bolts, remove all weld spatter and clean the welded assembly. Stamp the assembly serial number (indicated at the base of this traveler) in 1/2 inch high characters on both tie straps (just welded on) at the lead end of the assembly.

Technician(s) _____
Date

X 5.6 Visually check the assembly for excessive weld spatter. Verify that the assembly serial number was stamped properly on the tie straps per ES-331729. Record in the table provided the pressure that is applied to the assembly table by the Enerpacs.

Pressure
2500 Lbs. ±100

Lead Person _____
Date

5.7 Remove the Thermo Shield and tape. Release the pressure on the magnet assembly.

Technician(s)

Date

5.8 Remove the threaded rods and clamping shoes from the assembly table. Release any and all other clamping devices used for welding that may retain the assembly within the fixture. Using the overhead crane and the appropriate slings, remove the 3Q top clamping fixture from the assembly table.

Technician(s)

Date

5.9 Attach four (4) swivel clevis (capable of lifting over 10,000 Lbs) to the ball mount tabs. Using the overhead crane, the appropriate slings, lift and move the assembly to the designated area for post weld inspection and manifolding. Support the assembly with wooden 4 X 4's.

Technician(s)

Date

6.0 Post-Weld Inspection.

X 6.1 Visually inspect the following.

Inspect	Pass	Fail
The beam tube is positioned within the half magnet assembly with respect to the leads as marked		
The weld seam of the beam tube is on the center line of the pole tip to within .060" of quadrant four (4)		
The coils are correctly positioned within the cores per ME-331965		
The 1/4" Rods (key) are tight within the core		
The leads are all located at the same end of the assembly		
Tie straps are positioned in .500" off of both ends of the assembly, any difference equally split on both ends within .030"		
The insulation of the coils is free of dirt, grease, oil, damage, etc...		
The tie wraps containing the coil serial numbers are attached to the coils.		
The weld pattern on the assembly is per ME-331965		

Inspector: _____

Date: _____

X 6.2 Measure the beam tube position from the return end to each of the quarter yoke faces and record the results in the table provided. The average of these four (4) measurements shall not exceed 3.281".

Location	Measurement
Quadrant 1	
Quadrant 2	
Quadrant 3	
Quadrant 4	
Total	
Divided by	4
Average of (Limit 3.281")	

Inspector: _____

Date: _____

- X 6.3 Starting at the lead end of the magnet assembly on the end pack, measure and record in the table below the backleg gap in seven (7) locations. Except for the end pack measurements, all other measurements are to be taken through the holes in the tie strap.

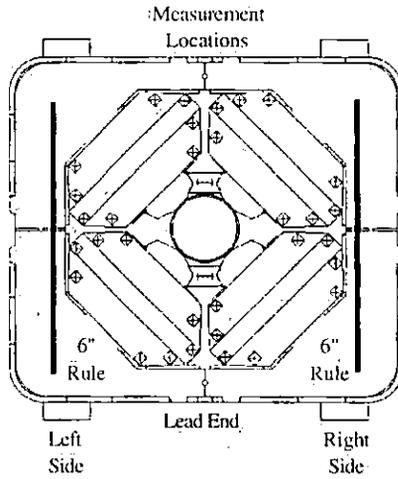
Left Side Of Assembly					Right Side Of Assembly				
Location	Measurement	Limit	Pass	Fail	Location	Measurement	Limit	Pass	Fail
Lead End		≤ .020"			Lead End		≤ .020"		
End Pack					End Pack				
6"		≤ .010"			6"		≤ .010"		
18"		≤ .010"			18"		≤ .010"		
30"		≤ .010"			30"		≤ .010"		
42"		≤ .010"			42"		≤ .010"		
54"		≤ .010"			54"		≤ .010"		
Return End		≤ .020"			Return End		≤ .020"		
End Pack					End Pack				

Total Of The 14 Measurements Taken Above			
Divided By	14	Pass	Fail
Average ≤ .005"			

Inspector _____

Date _____

- X 6.4 Using a six inch rule, (Starrett C304SRE-6 or equivalent) and feeler gauges, (Starrett No. 667) or equivalent, measure the offset at both sides and each end of the half yoke assemblies.



Note(s):

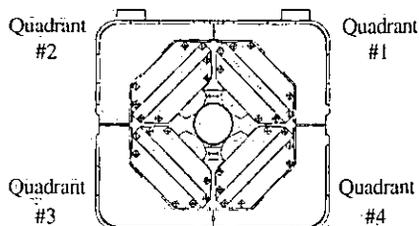
When making the core face measurement, indicate the core that the 6" ruler is flush against during this measurement by recording a 0 in the appropriate box. Record the gap between the ruler and the adjacent core in the appropriate box.

Lead End Not to exceed .030"				Non-Lead End Not to exceed .030"			
Left Side		Right Side		Left Side		Right Side	
Top Core	Bottom Core	Top Core	Bottom Core	Top Core	Bottom Core	Top Core	Bottom Core

Inspector

Date

X 6.5 Perform an Electrical inspection, record the results below.



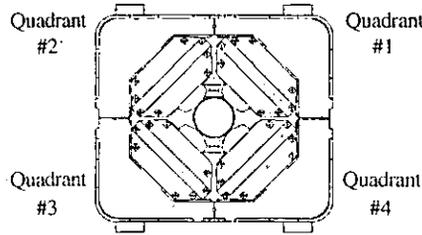
Quadrant 1

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				

Quadrant 2

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				
Hipot Quad 1 Coil to Quad 2 Coil @ 100 Vdc		< 5μA				
Hipot Quad 2 Coil to Quad 3 Coil @ 100 Vdc		< 5μA				

Continued On The Next Page



Quadrant 3

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		<.5μA				

Quadrant 4

Full Coil Serial No.		Core Serial No.				
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		19.0 mΩ to 21.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		5.6 mH to 6.2 mH				
Q @ 100 Hz		11.7 to 12.9				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coil to Core @ 100 Vdc		< 5μA				
Hipot Beam Tube to Core @ 100 Vdc		< 5μA				
Hipot Quad 3 Coil to Quad 4 Coil @ 100 Vdc		< 5μA				
Hipot Quad 1 Coil to Quad 4 Coil @ 100 Vdc		< 5μA				

Continued On The Next Page

X 6.6 Visually inspect the coils for the following, which will include but not be limited to:

Quadrant 1

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 2

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 3

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 4

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Inspector

Date

XX 6.7 Verify that the recorded results in steps 6.1 through 6.6 are in compliance with ME-331965/ES-331810. Visually verify that the coil packages are assembled with the lead locations in the positions shown on print ME-331965.

Warning:

At no time are the diagrams within this traveler to be used to verify this step. Ensure that the most current available print is used for assembly verification at this point.

Lead Inspector

Date

Crew Chief

Date

7.0 Manifolding

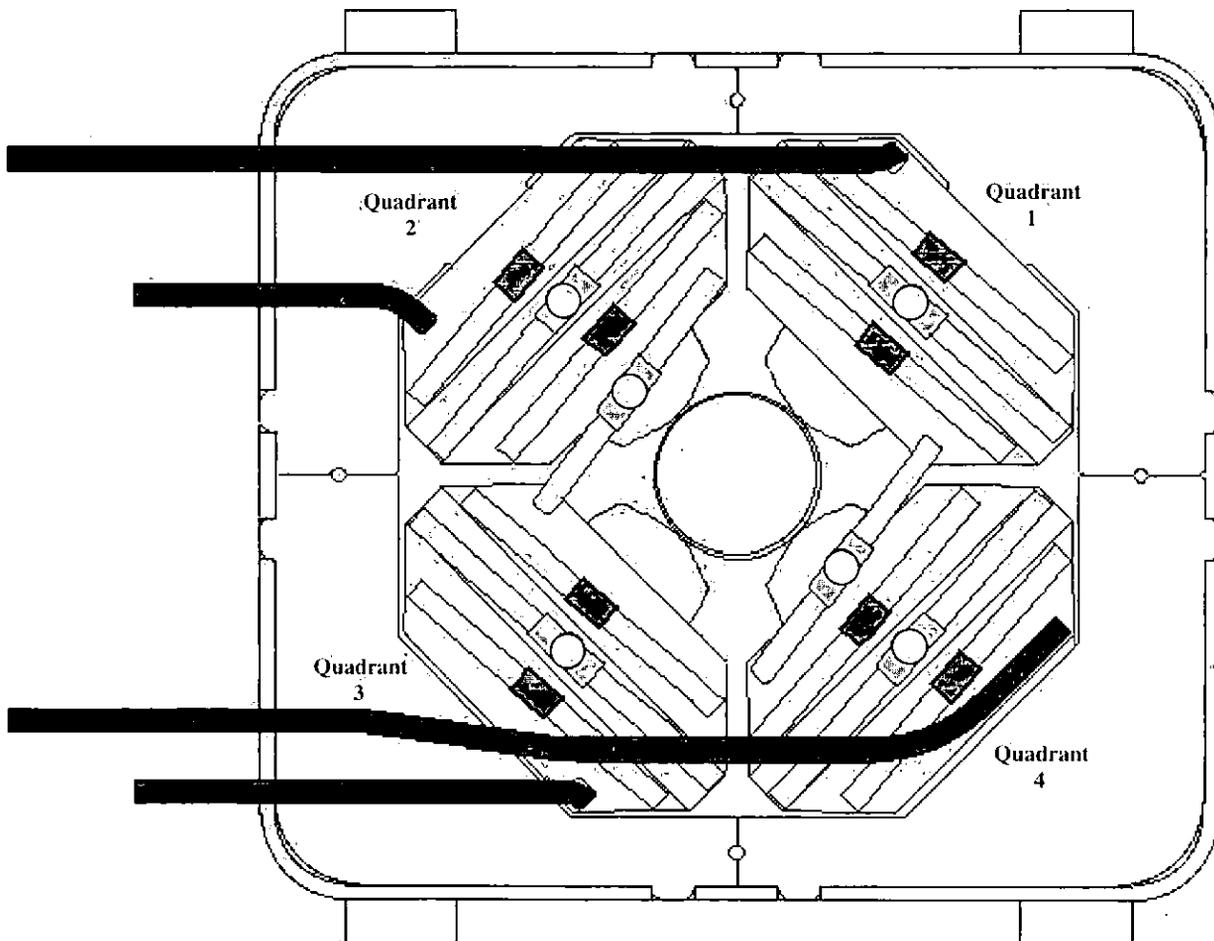
7.1 Bend the remaining leads previously not bent as per print ME-351004.

Note(s):

At no time is the picture included within this traveler to be used in place of the latest released print. All diagrams within are strictly for reference use only.

All completed bends when measured from the core face to the inside of the bent lead shall be no closer than 3 3/4" to the cores face.

All completed bends that exit the end cans used for impregnation when measured from the core face to the inside of the bent lead shall be no closer than 5 1/32" to the cores face.



Technician(s)

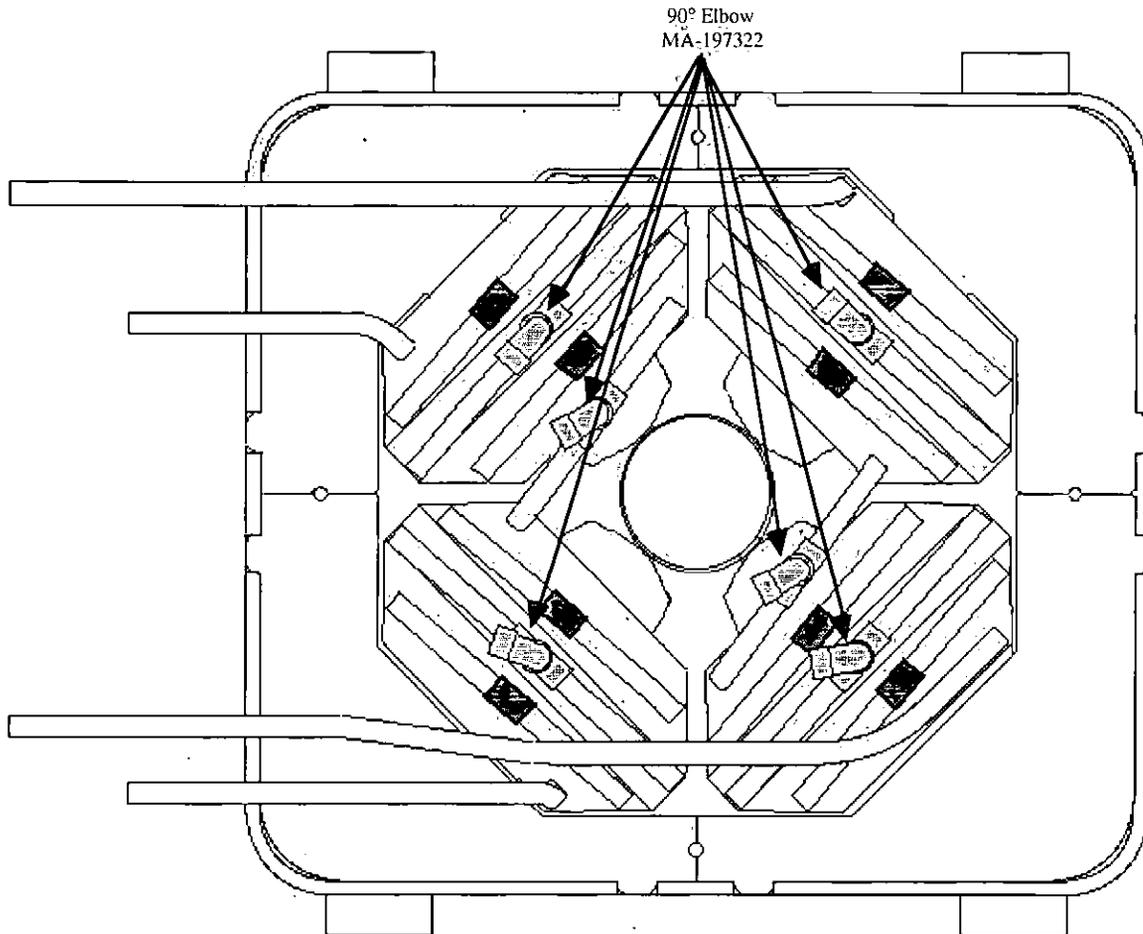
Date

Note(s):

The following is strictly a dry stacking of the intended manifold layout prior to the actual soft soldering/brazing of the assembly.

7.2 The following steps are one of many possible dry stacking options.

7.2.1 Attach the couplings (MA-197322) to the cut leads of the magnet assembly per ME-351004.



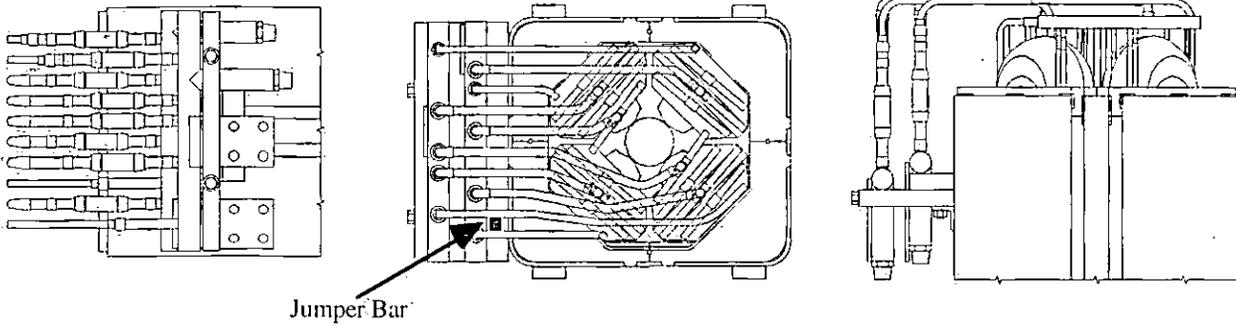
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7.2.2 Position the End Cover Heat Barrier (MC-351503) such that it will provide support for the remaining manifold as the dry stacking is finished.

Note(s):

These diagrams below are strictly for reference only! At no time are these diagrams to be used in place of the most recent released print ME-351004.



Technician(s) _____
Date

X. 7.3 Visually verify that the manifold is dry stacked in accordance with ME-351004.

Lead Person _____
Date

7.4 At the operators discretion the manifold may be marked as to each parts location and removed, then reassembled once the protective compounds called out are in place. If not, use Dura Board Ceramic Fiber Insulation (MA-225571) or equivalent and Super 8 Cement (MA-116559) or equivalent in the areas of the coils to protect the coils from the heat during the brazing/soldering operation.

Note(s):

During the insulation process being performed prior to brazing/soldering, make every effort to ensure that no water gets past the Herculite barrier and on to the insulated coils.

Technician(s) _____
Date

XX 7.5 Visually verify that the manifold is dry assembled in accordance with ME-351004. Verify that all the areas requiring protection during the brazing/soldering operation are protected.

Lead Inspector _____
Date

Crew Chief _____
Date

- 7.6 Braze/solder the manifold assembly using Sil-Fos #15 (MA-116256), SP 30 Paste Flux (Fermi stock 1070-2422) or equivalent and Tin-Antimony Soft Solder (Fermi stock 1070-8110) or equivalent in accordance with ME-351004 and the General Brazing Specification (ES-318973).

Note(s):

Do not forget to braze the Jumper Bar (MA-351561) to the manifold assembly per ME-351004.

All items contained within the end cans are soft soldered. All items not located within the end cans are brazed.

Warning:

All braze joints are to air cool, at no time is water to be used to cool the brazed joints.

Technician(s)	Date

- X 7.7 Visually verify that the manifold is brazed/soldered in accordance with ME-351004. Ensure that the jumper bar is attached per ME-351004.

Lead Person	Date

- 7.8 Clean the manifold assembly, removing the insulation used to protect the coils and the Herculite. Using Scotch-Brite no. 7447 (Fermi stock 1202-2020 or equivalent), KPC 820N (Fermi stock 1920-0705 or equivalent) and Heavy Disposable Wipers (Fermi stock 1660-2600 or equivalent) clean the manifold assembly.

Technician(s)	Date

8.0 Post Manifold Inspection

- X 8.1 Visually inspect the manifold for any possible locations that have not been brazed that may cause water to spray onto the insulated coils. Ensure that the manifold is completed as per ME-351004.

Inspector

Date

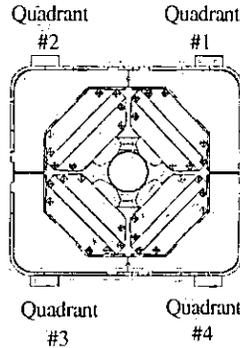
- X 8.2 Perform the following electrical.

Magnet Serial No. _____						
Electrical Test	Equipment Serial Number	Limit	Actual Measurement	Pass	Fail	Out of Tolerance
Resistance		76.0 mΩ to 84.0 mΩ				
LS @ 1 KHz		Reference Test Only Not Subject to Limit Values				
Q _i @ 1 KHz		Reference Test Only Not Subject to Limit Values				
LS @ 100 Hz		40.5 mH to 41.5 mH				
Q @ 100 Hz		14.0 to 15.2				
100 Volt Ring		Reference Test Only Not Subject to Limit Values				
Hipot Coils to Core @ 100 Vdc		< 5μA				
Hipot Beam Tube to Core @ 100 Vdc		< 5μA				

Inspector

Date

X 8.3 Visually inspect the coils for the following, which will include but not be limited to:



Quadrant 1

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 2

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 3

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Quadrant 4

Coil Serial Number: QQCCA-		
Operation	Pass	Fail
All materials must be clean, dry, free from grease, oils, etc.		
The insulation is free of damage and there is no exposed copper.		
The tie wrap containing the coil serial number is attached to the coil.		

Inspector _____

Date _____

- X 8.4 Attach the required fittings to perform the flow test. Using house air, check the manifold assembly for any leaks. Using green Herculite (Fermi stock 1740-0100), protect the exposed coils as best as possible from water damage prior to doing the flow and hydrostatic tests.

Inspector Date

- X 8.5 Perform a Flow Check at a ΔP of 60 PSI and 100 PSI. A hydrostatic check at 500 PSI and record the results below.

Flow Cart Serial Number			
Desired ΔP	Actual ΔP Attained	Minimum Desired Flow in GPM	Attained Flow in GPM
60 PSI		5.4 GPM	
100 PSI		7.0 GPM	

Perform a hydrostatic check of the joints at 500 PSI for 30 minutes. Pass

Once the tests are complete and the water passages blown dry, remove the Herculite from the assembly.

Inspector Date

- XX 8.6 Verify that the results in step 8.1 through 8.5 are acceptable.

Lead Inspector Date

Crew Chief Date

9.0 Production Complete

XXX 9.1 Process Engineering verify that the 3Q60 Magnet Assembly Traveler (5520-TR-333293) is accurate and complete. This shall include a review of all steps to ensure that all operations have been completed and signed off. Ensure that all Discrepancy Reports, Reports, Repair/Rework Forms, Deviation Index and dispositions have been reviewed by the Responsible Authority for conformance before being approved.

Comments:

Process Engineering/Designee

Date

XXX 9.2 Assembly verify that the 3Q60 Magnet Assembly Traveler (5520-TR-333293) is accurate and complete. This shall include a review of all steps to ensure that all operations have been completed and signed off. Ensure that all Discrepancy Reports, Nonconformance Reports, Repair/Rework Forms, Deviation Index and dispositions have been reviewed by the Responsible Authority for conformance before being approved.

Comments:

Assembly/Designee

Date

10.0 Attach the Process Engineering "Okay to Proceed" Tag to the half magnet assembly.

Process Engineering/Designee

Date

11.0 Proceed to the next major assembly operation - 3Q60 Magnet Impregnation/Final Assembly Traveler (5520-TR-333294).