Document ID: 

3884

Incoming Magnet Repair Inspection/Survey

318898 / Rev. C

Job No:	**222**
E + F Project/Task No.:	**36/1.02.02.05.02.05**
M + S Project/Task No.:	**36/1.02.02.05.02.05**

Place This Side Down For Scanning!!!

DSMB002-0

Document ID: 

3884

Job No.: 

222

Project/Task No. 

36/1.02.02.05.02.05

Series: 

DSMB

Serial No: 

DSMB002

Rework ID: 

0

Specification No.: 

318898

Revision: 

C

DSMB002-0

Fermi National Accelerator Laboratory
Batavia, IL 60510

Conventional Magnet/Device
Incoming Magnet Repair Inspection/Survey

Reference Drawing(s)

Project # / Task #:36/1.02.02.05.02.05	**Job #:222**
Released by:Jan Szal	**Magnet/Device Series:DSMB**
Date:3/24/2005 8:06:07 AM	**Scan Pages:** 16
Prepared by: R. Jensen, M. Cullen	

Title	Signature	Date
TD / E&F Process Engineering	**Bob Jensen** Bob Jensen/Designee	**1/28/04**
TD / E&F Assembly	**Dan Smith** Dan Smith/Designee	**1/28/04**
TD / E&F Fabrication Manager	**John Carson** John Carson/Designee	**1/28/04**

Revision Page

Revision	Step No.	Revision Description	TRR No.	Date
None	N/A	Initial Release	N/A	6/30/95
A		Transferred from Mac to PC format.	0945	2/3/00
	3.2	Inserted a Radiation and Lead Paint Survey. Changed cover page approval list.		
B	Cover	Corrected spelling of Devise to Device.	1231	9/18/01
	4.2	Add a no 'Removal/Replacement.. check box.		
	4.5	Changed 'No Damage Noted' to 'If No Damage is noted, check no damage box. Added check box		
	4.6	Added a no water path check box, added if no water path, check box.		
	6.1	Add a no water path check box, added if no water path, check box.		
	6.2	Added a no water path check box, added if no water path, check box		
	8.1	Added check box, 'No MFA/CAC Action Required.'		
	10.1	Deleted step, 'O.K. to proceed' tag, not used		
C	2.2	Update DSR	1600	1/28/04
	7.2	Update DSR		

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 product/assembly with Green Herculite (Fermi stock 1740-0100) when not being serviced or assembled.

2.0 Parts Kit List

2.1 No Parts Kit List required.

2.2 Update DSR.

Lead Person

3-26-05
Date

3.0 Hazard Survey

3.1 Perform a Radiation Survey and record results below. Describe Location and Level of any "HOT" spots.

1.6 mR@ 1 Foot

Note(s):

If device is more than Radiation Class 1, reject acceptance of the device, unless there is written authorization from the Section Head.
If written authorization is given attach to the traveler.

Technician(s) Date 3-01-05

3.2 Send a sample of the paint to ES & H for lead testing, unless previously cleared by ES & H

☑ No Lead ES & H Approved

☐ Lead Based Paint Follow Precautions Below

MAGNET MANUFACTURED AFTER NO LEAD PAINT POLICY ENFORCED

Technician(s) Date 3-26-05

4.0 Visual Inspections

4.1 Record Magnet Serial No. and Magnet Type below.

DSMB002-0 — Magnet Serial No.

P-SEPTUM — Magnet Type

4.2 Attach the "REMOVAL/REPLACEMENT/REPAIR OF A.D. COMPONETS' sheet or equivalent documentation to this traveler.

☑ No 'Removal/Replacement/Repair of A.D. Components' and/or equivalent documentation received.

D. Coe — Technician(s)

3-26-05 — Date

4.3 Acquire previous magnet data/travelers, if available. Produce a summary sheet showing previous electrical, flow, hydro, and other pertinent information for reference during testing.

~~Do any~~ previous documents exist Yes ☐ No ☑

D. Coe — Process Engineering

3-26-05 — Date

DATE SEPT 2003

4.4 Perform a visual inspection of the magnet, noting any damage to the cores, coil leads/ends, potting covers, beam tube, beam tube flanges and manifold. Record any noted damage below. Any recorded damage shall be specifically photographed and photos attached to this traveler.

Note(s):

If no damage is noted, check the 'No Damage Noted' box.

☐ No Visible Damage Noted.

RADIO ACTIVE METAL CHIPS INSIDE OF SEPTUM VACUUM CHAMBER WAS MACHINED FOR MODIFICATION TO INCREASE BEAM APETURE SIZE

D C Doe — Technician(s)

3-26-03 — Date

4.5 Verify the cooling water has been blown out of the coolant passages.

☑ No Water Cooling Passages.

Note(s):

Unless the magnet is new, it is to be assumed that the magnet has water in it and that it is radioactive.

D C Doe — Technician(s)

3-26-03 — Date

5.0 Electrical Inspection

5.1 Perform a Resistance (R), Inductance (Ls), and 'Q' electrical inspection and record the results below.

Equipment Serial No. 32-1005 - 8469

	Resistance	Ls @1KHz	Q@1KHZ	Ls @100Hz	Q @ 100Hz
Upper Half	X	X	X	X	X
Lower Half	X	X	X	X	X
Total Magnet	.017 mΩ	.25 μH	.2	.0002 mH	.0

D. Gde — Inspector

4-1-05 — Date

DR SAT-0007

5.2 Hipot the Magnet.

Equipment Serial No. A1050S

~~2000~~500 Volts with < 5μA	Total Magnet	Upper Half	Lower Half
Coil to Core	5 mA @ 60 Hz	X	X
Coil to Beam Tube	X	X	X
Core to Beam Tube	X	X	X

D. Gde — Inspector

3-26-05 — Date

5.3 Perform Ring Test at 100 Volts. Attach the Ring Test results to the back of this traveler.

D. Gde — Inspector

4-1-05 — Date

6.0 Flow Test and Hydro

6.1 Perform a flow test at a ΔP of 60 psi and 100 psi as per the Mechanical (flow) Inspection (ES-318968)

☑ No Water Cooling Passages.

ΔP of 60 psi _____GPM

ΔP of 100 psi _____GPM

Note(s):

Include a diagram of the water input and output test locations, and what part of the magnet is being tested.

D. Cote 4-1-05

Inspector Date

6.2 Perform a hydro static check of the manifold/coil system at 500 psi for 30 minutes.

☑ No Water Cooling Passages.

☐ **Pass** ☑ **Fail**

D. Cote 4-1-05

Inspector Date

5.0 Electrical Inspection

5.1 Perform a Resistance (R), Inductance (Ls), and 'Q' electrical inspection and record the results below.

Equipment Serial No.	Resistance	Ls @1KHz	Q@1KHZ	Ls @100Hz	Q @ 100Hz
Upper Half					
Lower Half					
Total Magnet					

N/A SEE WHITE PAGE 7 OF 10
Inspector

4/1/05
Date

* As per DR-SPT-0007

5.2 Hipot the Magnet.

Equipment Serial No.			
~~500~~ 2000 Volts with < 5μA	Total Magnet	Upper Half	Lower Half
Coil to Core	< 1 μA		
Coil to Beam Tube			
Core to Beam Tube			

Inspector

4.1.05
Date

5.3 Perform Ring ~~Test~~ at 100 Volts. Attach the Ring Test results to the back of this traveler.

N/A SEE WHITE PAGE 7 OF 10
Inspector

4/1/05
Date

7.0 Beam Tube Vacuum Inspection

7.1 Perform a vacuum leak check on the Beam Tube.

Check box if no Beam Tube is installed in the Magnet. ☐

PART NO.		SCALE UNITS BEFORE HELIUM PROBE	SCALE UNITS WHILE ENCLOSURE FLOODING	DETERMINATION OF MINIMUM DETECTABLE LEAK				
DATE TIME	OPERATOR'S LAST NAME			MDS ÷ ((Response - Bckgnd) ÷ Leak Value) = MDL				
	G[illegible]	6.0E1	6.0E1	.2	4.3E5	6.0E1	2.05×10^{-8}	4.8×10^{-10}

D. G[illegible] (signature) 4-1-05
Inspector Date

7.2 Update DSR.

D. G[illegible] (signature) 5/2/05
Lead Person Date

7.3 Photograpgh the magnet, and store in OnBase.

D. G[illegible] (signature) 5/2/05
Inspector Date

Fermi National Accelerator Laboratory
Technical Division

DSMB Antiproton Source Septum-Magnet

Serial No: DSMB002-0 **Drawing No:** ME-322700 **Magnet Weight:** 1,220 Lbs

DC Resistance:	.017 mΩ	**HiPot Coil To Core @ 2000VDC**	<.1 μA
Ls @ 1kHz:	.25 μH		
Q @ 1kHz:	.2		
Ls @ 100Hz:	.2 μH		
Q @ 100Hz:	.0		

Previous Serial No(s): DSMB002-0

Remarks: None.

Date Completed: 4/19/2005

8.0 Production Complete

8.1 Process Engineering verify that the Traveler 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.

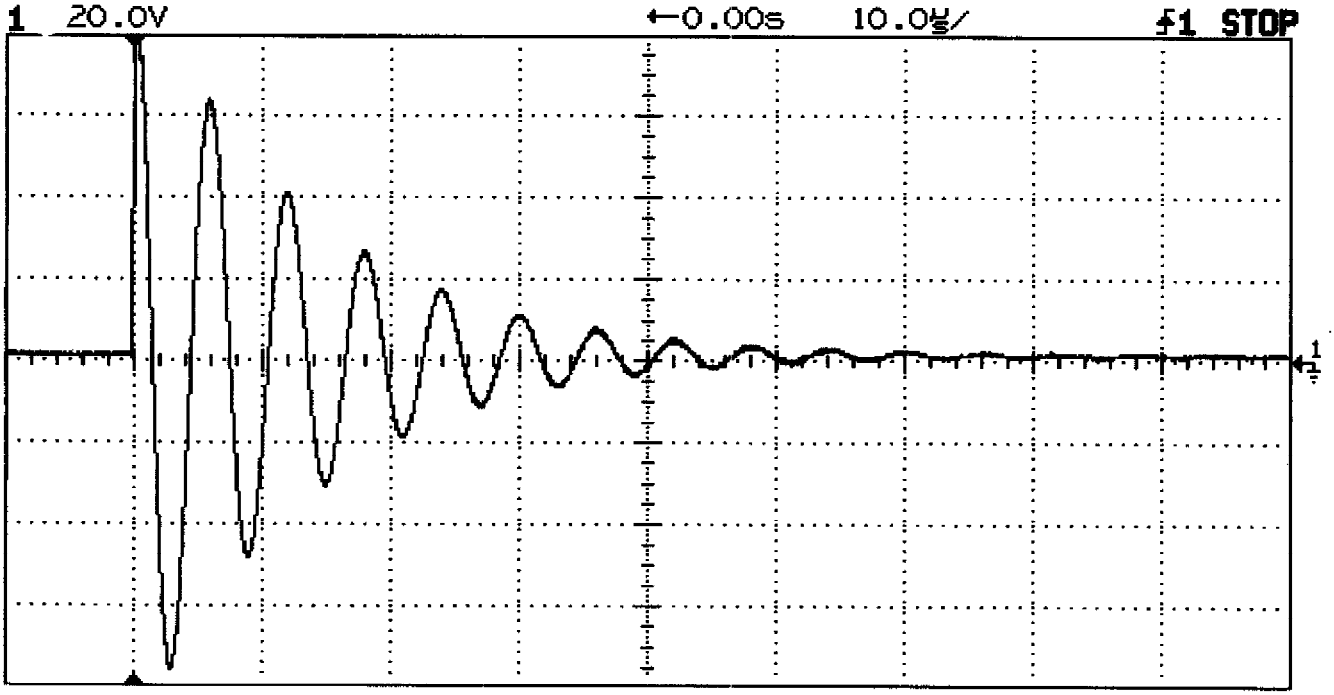
Comments:

REWORK COMPLETE BUSSWORK

Process Engineering/Designee

5/2/05
Date

14:41:59 Fri Apr 1, 2005



	State	Volts/Div	Position	Cplg	BW Lim	Inv	Probe
Chan 1	On	20.00 V	0.000 V	AC	On	Off	10:1
Chan 2	Off	50.00mV	0.000 V	DC	Off	Off	1:1

	Mode	Main Time/Div	Main Delay	Time Ref	Delayed Time/Div	Delayed Delay
Horizontal	Normal	10.00us/	0.000 s	Left	--------	-----

Trigger	Mode	Source	Level	Holdoff	Slope	Couplg	Reject	NoiseRej
	Normal	Ch 1	8.125 V	22.20us	Pos	DC	Off	Off

Display Mode: Normal

Traveler	31858 R@
Step #	5.3
Magnet Serial Number	DSMB 0002-D
Technician	D. Cole
Page Count	1 of 1

Traveler Title:	Specification No:	Revision:	DR No:
Incoming Magnet Repair Inspection/Survey	5520-TR-318898	C	SPT-0007

Step No:	Drawing No:	Routing Form No:	Serial No:	Rework ID:
4.4/5.2	ME-322700		DSMB002	0

Discrepancy Description:

Traveler step 4.4 instructs to, Perform a visual inspection of the magnet, noting any damage to the cores, coil leads/ends, potting covers, beam tube, beam tube flanges and manifold.
Step 5.2 instructs to, Hipot the Magnet, Coil to Core. The specification calls for <5uA current leakge coil to ground at 2,000 VDC
Step 4.4 actual visual inspection discovered that there are metal chips inside of the vacuum beam aperture area, probably created when machining for beam aperture upgrade work.
Step 5.2 actual hipot coil to core current leakage is 5mA @ 60VDC. Probaly caused by the metal chips created during a machining process for modifying the beam aperature.

APR 2 8 2005

Originator: Dennis Gaw

Date: 3/26/2005

Cause of Nonconformance:

Probably metal chips from machining.
(Confirmed that there were metal chips inside the vacuum chamber Dennis Gaw 4-6-05.)

Responsible Authority: Sasha Makarov

Date: 3/28/2005

Disposition:

Clean up with lint free rag, vacuum, strong permanent magnet. Roll magnet over for several times during the cleaning. (Many metal chips were removed from the vacuum chamber, the device has now passed the 2KV hipot testing Dennis Gaw 4-6-05.)

Responsible Authority: Sasha Makarov

Date: 3/28/2005

Corrective Action to Prevent Recurrence:

None

Responsible Authority: Sasha Makarov

Date: 3/28/2005

Corrective Action/Disposition Verified By: Dennis Gaw

Date: 4/6/2005

Will Configuration be affected?: ☐ YES ☑ NO

Identified problem area:

☐ Material ☐ Manpower ☑ Method ☐ Machine ☐ Measurement

Reviewed By: Bob Jensen

Date: 4/7/2005