

Document ID:



7916

**LHC Q1 LQXA  
Cryostat Shipping  
Traveler  
333728 / Rev. D**

**Job No: 248**  
**E + F Project/Task No.: 300/1.1.1.6.2**  
**M + S Project/Task No.: 300/1.1.1.6.2**

**Place This Side Down For Scanning!!!**

**LQXA07-0**

Document ID:



7916

Job No.:



248

Project/Task No.



300/1.1.1.6.2

Series:



LQXA

Serial No:



LQXA07

Rework ID:



0

Specification No.:



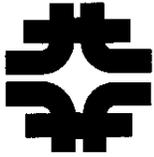
333728

Revision:



D

**LQXA07-0**



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

**LARGE HADRON COLLIDER  
Q1 - LQXA  
SHIPPING TRAVELER**

**Reference Drawing(s):**

**Q1/Q3 Shipping Fixture Final Assembly  
(ME-390729)**

**Q1 Magnet Shipping Assembly  
(ME-390727)**

**Project #/Task #: 300/1.1.1.6.2**

**Job # 248**

**Released By: John Szostak**

**Magnet/Device Series: LQXA**

**Date Issued: 5/24/2005 12:57:02 PM**

**Scanned Pages: 37**

**Prepared by: B. Jensen**

Title	Signature	Date
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TD / LHC Production Supervisor	<b>Jim Rife</b> Jim Rife / Designee	2/28/05
TD / LHC Production Engineer	<b>Rodger Bossert</b> Rodger Bossert / Designee	2/28/05
TD / LHC Project Engineer Cryostat	<b>Tom Page</b> Tom Nicol / Designee	3/3/05
TD / LHC Project Physicist	<b>Mike Lamm</b> Michael Lamm / Designee	2/28/05
TD / LHC Program Manager	<b>Jim Kerby</b> Jim Kerby / Designee	3/3/05

Revision Page

Revision	Step No.	Revision Description	TRR No.	Date
None	N/A	Initial Release	N/A	8/10/04
A	3.0	Step 3.0 New step to perform a nitrogen purge.	1666	
	3.0	Step 3.0 Moved old Step 3.0 to become new Step 7.0		
	3.4	New Step 7.5 Deleted old diagram and added new		
	3.5	New Step 7.6 Updated diagram.		
	6.0	Corrected Q1 RTD label from TT8331 to TT8321 in Table 6.0.1		
	6.0	Corrected Circuit A Label from HT1111- to YT1111- in Table 6.0.2		
	6.18	Added new step for Hipotting		
	10.0	Added information about Shipping w/check box		
	11.3	Deleted step to record serial number		
	11.7	Added Steps to verify protective bag installation responsibility/container assy		
	12.7	Deleted step		
	12.8	Moved to become new Step 7.4		
	13.3	Moved to become new Step 10.11		
B	8.7	Deleted second technician signoff line (duplicate)	1676	11/2/04
	8.1	Moved Step 8.10 to become new Step 8.1		
	11.8	Change from Fermi supplied material to (VCI Plastic)		
	11.9	Deleted step to; Hook-up a vacuum source and pump down the protective bag material.		
C	6.17	Added picture. Same as used in Step 7.1	1683	11/16/04
	7.5	Switched Step 7.5 with 7.6 and vice versa.		
	7.6	Added length measurement 342.5 mm		
	10.2	New step. Added check-off box to indicate Frame Separator Bars status.		
	10.3	New Step listing parts needed for Separator Bars.		
	10.6	New Step to install Shipping Frame into Shipping Container		
D	1.4	Removed Step. "All personnel performing steps in this traveler must have documented training for this traveler and associated operating procedures."	1690	2/28/05
	1.6	Added Step. "Protect the bellows during all stages of production." <b>DR No. HGQ-0500.</b>		
	7.4	Added step. "Label the Leads "A" and "B" as per Figure 7.4-A below."		
	8.9	Modified Step. Changed to "Install the Vinyl Flange Covers (MA-390491), (MA-390492), (MA-390493), (MA-390494), & the Alignment Fiducial Covers (MA-390495)."		
	8.10	Modified Step. Changed to "Are Accelerometers (Shock Recorders) available for installation? <input type="checkbox"/> Yes - Install Accelerometers as per Responsible Authority and Figure 8.10-A. below. <input type="checkbox"/> No - Accelerometers are <u>NOT</u> available for installation." <b>DR No. HGQ-0512.</b>		
	11.7	Modified Step. Changed first checkbox to "Performed by Shipping Company, proceed to Step <u>11.9</u> " per LQXA04.		
	11.8	Modified Step. Added "(This step may be N/A. See check box in step 11.7)"		

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

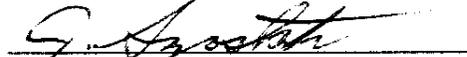
1.0 General Notes

- 1.1 All steps that require a sign-off shall include the Technician/Technician(s) first initial and full last name.
- 1.2 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.
- 1.3 All Discrepancy Reports issued shall be recorded in the left margin next to the applicable step.
- 1.4 Personnel shall perform all tasks in accordance with current applicable ES&H guidelines and those specified within the step.
- 1.5 Cover the product/assembly with Green Herculite (Fermi stock 1740-0100) when not being serviced or assembled.

**1.6 Protect the Bellows during all stages of production.**

2.0 Parts Kit List

- 2.1 Attach the completed Parts Kit for this production operation to this traveler. Ensure that the serial number on the Parts Kit matches the serial number of this traveler. Verify that the Parts Kit received is complete.

  
\_\_\_\_\_  
Process Engineering/Designee

5/24/05  
Date

3.0 Magnet Electrical Preparation

3.1 Does magnet require a purge of compressed dry nitrogen (N<sub>2</sub>)?

YES, PURGE REQUIRED, Proceed to Step 3.2

NO, PURGE NOT REQUIRED, Proceed to Step 4.0



Andy Hood  
Responsible Authority/Physicist

1-JUN-2005  
Date

3.2 If YES box was checked in Step 3.1, perform a required purge for a minimum of 2.5 days (3 days maximum) at a flow rate of 5 CFH of N<sub>2</sub>.

	Purge Time	Purge Date	Purge Flow Rate
Start			
Finish			

N/A  
Technician(s)

\_\_\_\_\_  
Date

4.0 Final Electrical Inspection

- 4.1 Perform an electrical inspection on each of the Magnet Halves and complete Magnet. Refer to the Valhalla and Leader Free Standing Coil Measurement Procedure (ES-292306).

**To measure the Resistance of the Q1 Cold Mass:**

- 4.1.1 Use Valhalla Scientific 4300B Digital Micro-Ohmmeter.
- 4.1.2 Set Test Current to **.1** Amp
- 4.1.3 Set Scale to 2V full scale.
- 4.1.4 Turn temperature compensation on.
- 4.1.5 Turn test current off.
- 4.1.6 Connect IHI to 'A' Power Lead (Quadrant #4) inner power lead as shown in Step 3.4.
- 4.1.7 Connect ILO to 'B' Power Lead (Quadrant #3) inner power lead as shown in Step 3.4.
- 4.1.8 Turn test current on.
- 4.1.9 Connect VHI and VLO to voltage taps as shown in resistance table.
- 4.1.10 Read resistance and record in traveler.

**Q1 Cold Mass Electrical Measurements**

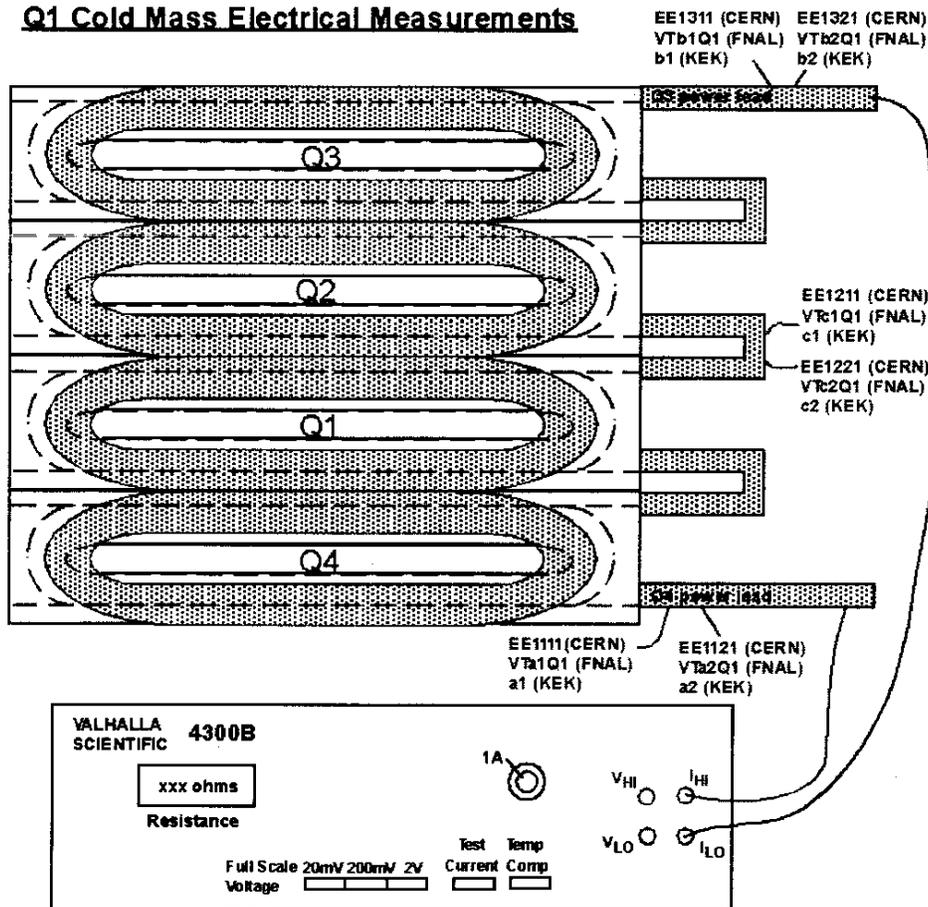


Table 4.0.1				
Q1 Resistance				Total Resistance
Voltage Tap Serial Number				
Description	Connect	CERN	KEK	Nominal 3.35 to 3.45 Ω
Half Magnet	V <sub>HI</sub>	EE1111	a1	3.42 Ω
	V <sub>LO</sub>	EE1211	c1	
Half Magnet	V <sub>HI</sub>	EE1211	c1	3.42 Ω
	V <sub>LO</sub>	EE1311	b1	

				Nominal 6.75 to 6.85
Total	V <sub>HI</sub>	EE1111	a1	6.83 Ω
	V <sub>LO</sub>	EE1311	b1	

O. Franzen  
Technician(s)

6.2.05  
Date

Check resistance of Redundant Voltage Taps.

Table 4.0.2				
Q1 Redundant Voltage Taps				Nominal 3.35 to 3.45
Description	Connect	CERN	KEK	Resistance
Half Magnet	V <sub>HI</sub>	EE1121	a2	3.42 Ω
	V <sub>LO</sub>	EE1221	c2	
Half Magnet	V <sub>HI</sub>	EE1221	c2	3.42 Ω
	V <sub>LO</sub>	EE1321	b2	

O. Franzen  
Technician(s)

6.2.05  
Date

5.0 **Measure Ls and Q of a Q1 Cold Mass:**

- 5.1 Use Agilent 4263B LCR Meter.
- 5.2 Turn power on by pushing line button. Wait 30 seconds until display screen is lit.
- 5.3 Recall program #1. To do this, push recall (Rcl), then push #1, then push Enter.
- 5.4 Push Auto/Hold button to release hold.
- 5.5 Verify that the frequency displayed in the upper right corner of the display screen is 1000 Hz and the level recorded in the lower right corner of the display screen is 1V or 1000 mV.
- 5.6 Connect  $H_{cur}$  to 'A' Power Lead (Quadrant #4) as shown in Step 3.4.
- 5.7 Connect  $L_{cur}$  to 'B' Power Lead (Quadrant #3) as shown in Step 3.4.
- 5.8 Connect  $H_{pot}$  and  $L_{pot}$  to voltage taps as shown in Ls and Q tables..
- 5.9 Read Ls and Q from display and record in traveler.

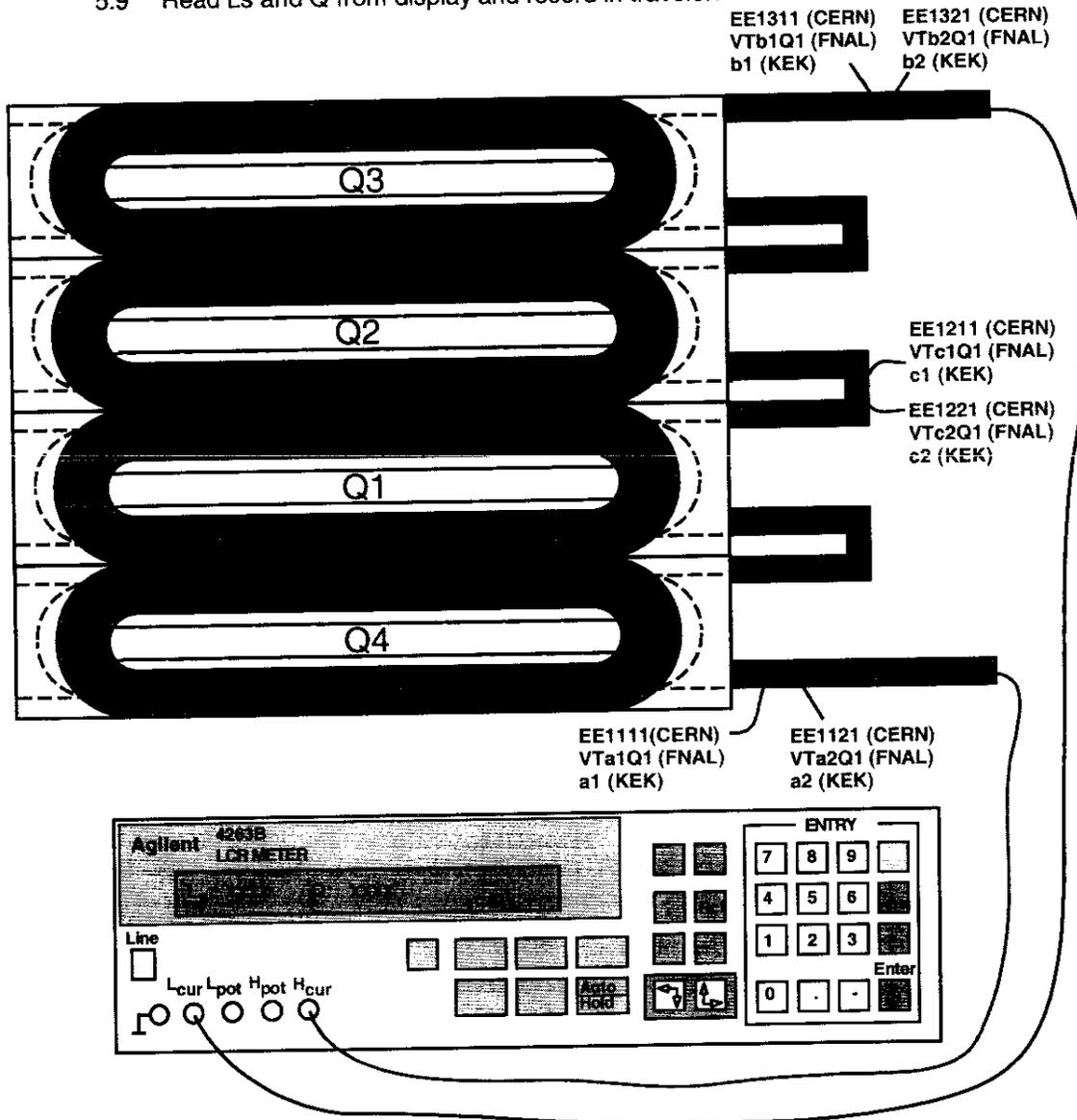


Table 5.0.1				
Q1 Inductance				
Voltage Tap Serial Numbers				Total Inductance
Description	Connect	CERN	KEK	Nominal 15 to 16 mH
Half Magnet	HPOT	EE1111	a1	7.5 mH
	LPOT	EE1211	c1	
Half Magnet	HPOT	EE1211	c1	15.5 mH
	LPOT	EE1311	b1	

				Nominal 30 to 32 mH
Total	HPOT	EE1111	a1	31.0 mH
	LPOT	EE1311	b1	

Table 5.0.2				
Q1 Q-Factor				
Voltage Tap Serial Numbers				Total Q factor
Description	Connect	CERN	KEK	Nominal 1.0 to 1.2
Half Magnet	HPOT	EE1111	a1	1.1
	LPOT	EE1211	c1	
Half Magnet	HPOT	EE1211	c1	1.1
	LPOT	EE1311	b1	

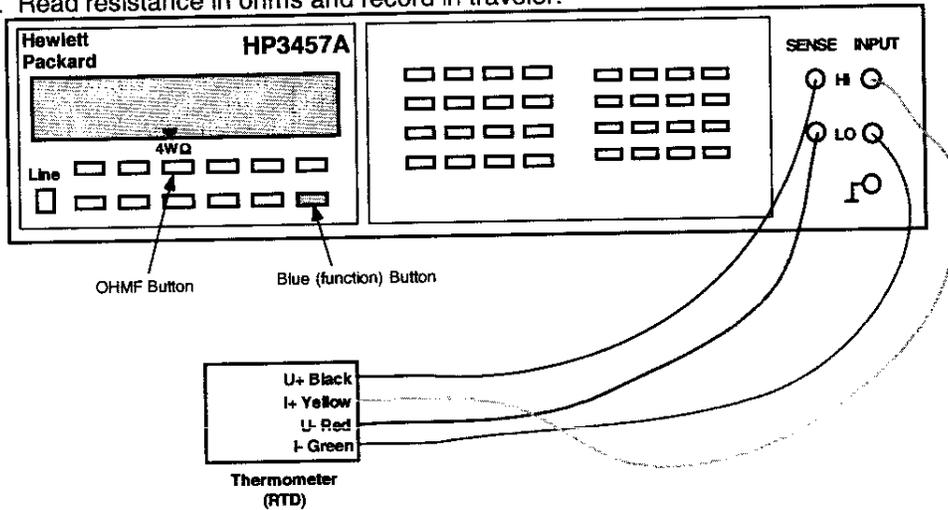
				Nominal 1.0 to 1.2
Total	HPOT	EE1111	a1	1.1
	LPOT	EE1311	b1	

C. Fianzo  
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6.2.05  
 Date

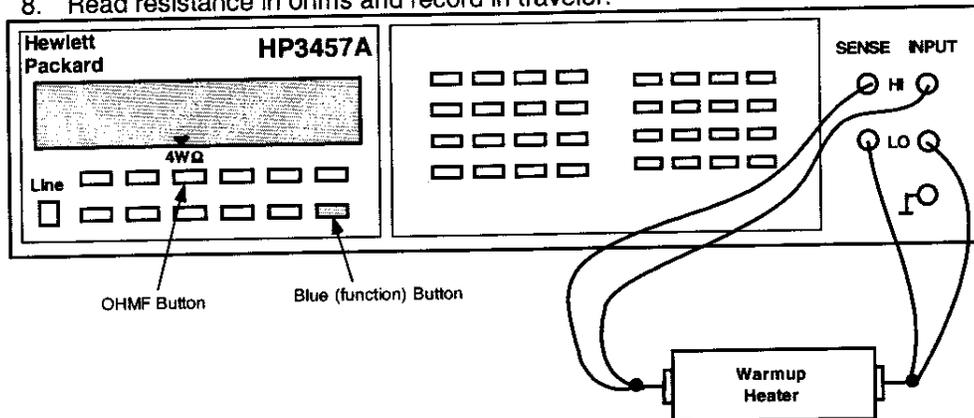
**To measure the resistance of a Thermometer (RTD):**

1. Use Hewlett Packard HP3457A digital multimeter.
2. Record temperature of building within +/- 5 degrees.
3. Press line button to turn line on.
4. Connect wires as shown in Figure below.
  - U+ (Black) to Sense HI
  - I+ (Yellow) to Input HI
  - U- (Red) to Sense LO
  - I- (Green) to Input LO
5. Push blue button (function key) once.
6. Push OHMF button.
7. Verify arrow in readout is above the  $4W\Omega$  (meaning a 4 wire resistance measurement).
8. Read resistance in ohms and record in traveler.



**To measure the resistance of a Cryogenic (Warm-up) Heater**

1. Use Hewlett Packard HP3457A digital multimeter.
2. Record temperature of building within +/- 5 degrees.
3. Press line button to turn line on.
4. Connect wires as shown in Figure below.
5. Push blue button (function key) once.
6. Push OHMF button.
7. Verify arrow in readout is above the  $4W\Omega$  (meaning a 4 wire resistance measurement). **Note: Although this is technically a 4 wire measurement, it is effectively a 2 wire measurement, since there are only 2 wires connected to each heater.**
8. Read resistance in ohms and record in traveler.



Q1 - RTD's and Cryogenic (warm-up) Heaters				
Temperature of Building ( $\pm 5^\circ$ ): <u>74<sup>o</sup></u>				
Component	Fermi	CERN	Range	Resistance
Q1 RTD, primary	TaQ1	TT8311	60 to 70 $\Omega$	63.2 $\Omega$
Q1 RTD, redundant	TbQ1	TT8321	60 to 70 $\Omega$	65.1 $\Omega$
Q1 Cryogenic (warm-up) Heater (LE) - wire at top (CERN #1 I+)	W1aQ1	EH8311+	16 to 18.5 $\Omega$	17.5 $\Omega$
Q1 Cryogenic (warm-up) Heater (LE) - wire at bottom (CERN #1 I-)	W2aQ1	EH8311-		
Q1 Cryogenic (warm-up) Heater (Non-LE) - wire at top (CERN #2 I+)	W1bQ1	EH8321+	16 to 18.5 $\Omega$	17.9 $\Omega$
Q1 Cryogenic (warm-up) Heater (Non-LE) - wire at bottom (CERN #2 I-)	W2bQ1	EH8321-		

C. Fianz  
 Technician(s)

6-2-05  
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Using the Hewlett Packard HP3457A digital multimeter, measure the Protection (Strip) Heater Resistance for Q1.

Q1 Protection (Strip) Heater Resistance					
Fermi	CERN	KEK	Description	Limit	Resistance
H1aQ1	YT1111+	HA1	Circuit A	28 to 32 $\Omega$	30.2 $\Omega$
H2aQ1	YT1111-	HA2			
H1bQ1	YT1121+	HB1	Circuit B	28 to 32 $\Omega$	30.1 $\Omega$
H2bQ1	YT1121-	HB2			

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6-2-05  
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- 6.17 Using the HP4284A, connect power thru the corrector Power Leads (H1A and H1B to measure Q1-H1 or V1A and V1B to measure Q1-V1). Connect the Sense Leads as shown in table below and record resistance.

**Corrector Bus Leads**

	V1A	V1B	H1A	H1B
--	-----	-----	-----	-----

(View Looking into Q1)

Readout Labels		Power Labels	Resistance
V1A	EE8111	V1A, V1B	0042 Ω
EE8111	V1B		17.57 Ω
V1A	V1B		17.57 Ω
H1A	EE8121	H1A, H1B	0045 Ω
EE8121	H1B		21.57 Ω
H1A	H1B		21.56 Ω

C. Fianney  
Technician(s)

6-02-05  
Date

6.18 Does Magnet require Hipotential Testing?



YES, HIPOT REQUIRED, Proceed to Step 6.6.

Maximum Voltage: 1500 V



NO, HIPOT NOT REQUIRED, Proceed to Step 7.0



*Andy*  
Responsible Authority/Physicist

1-JUN-2005  
Date

6.19 Hipot according to table below. Hipot to value recorded in Step 6.18. Maximum leakage is 3 $\mu$ A.



Have Crew Chief verify setup and sign below before continuing.

[Signature]  
 Crew Chief

6-2-05  
 Date

Table 6.19.1			
Hipot Heaters to Coil and Ground.			
High Potential	Grounded	Floating	Leakage
All Strip Heaters	Magnet Coils, Corrector Coils, Yoke, RTD's and Warm-up Heaters	Nothing	92 nA

Table 6.19.2			
Hipot Coil to Heaters and Ground			
High Potential	Grounded	Floating	Leakage
All Magnet Coils	Corrector Coils, Strip Heaters, Yoke, RTD's and Warm-up Heaters	Nothing	52 nA

[Signature]  
 Technician(s)

6 2 05  
 Date



[Signature]  
 Responsible Authority/Physicist  
 (for Andy Hacker)

6-2-05  
 Date

7.0 Magnet Preparation Non-IP Magnet End

7.1 Separate, identify, and label the Non-IP Magnet End Corrector leads as per (ME-369894) and figure 7.1-A below.

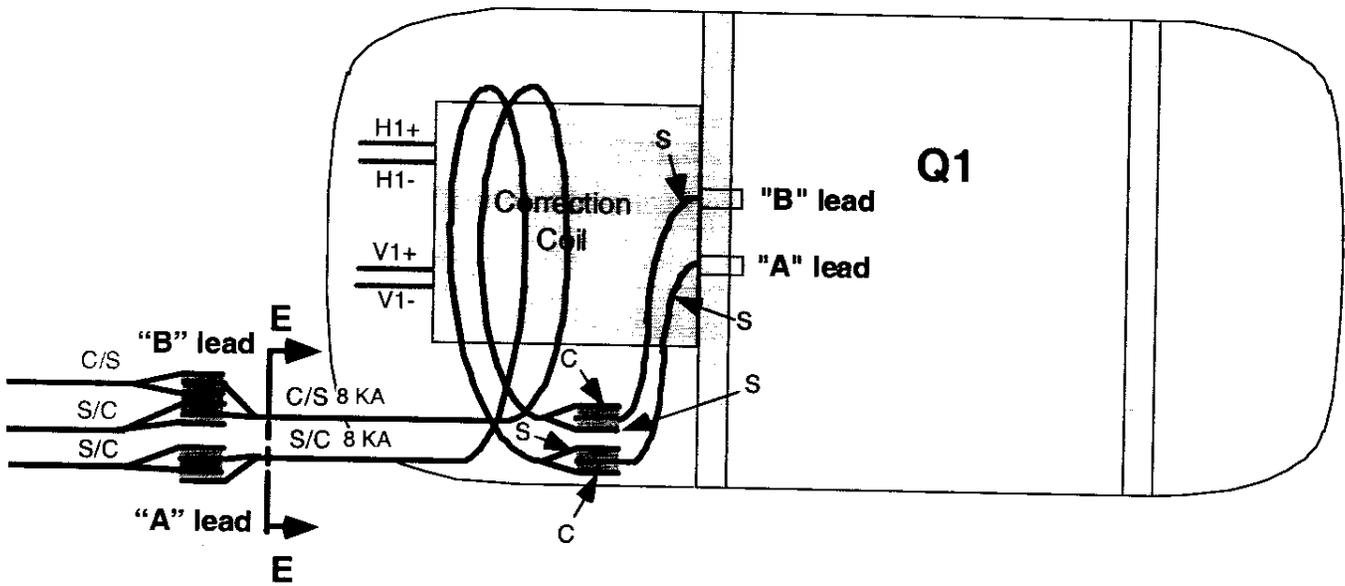


**Figure 7.1-A**

C. Fian  
 Technician(s)

6-2-05  
 Date

7.2 Locate and identify the 8 KA Bus Leads. Label the Leads "A" and "B" as per Figure 7.2-A below.



**INNER TRIPLET BUS AND EXPANSION LOOP LAYOUT**

**Figure 7.2-A**

C. Fian  
 Technician(s)

6-3-05  
 Date

7.3 Insulate the 8 KA Bus Leads using approved methods.

**Note(s):**

**These leads must be insulated using approved methods (refer to ME-369894), first as an individual lead, then insulated as a pair to prevent 'shorting' to the other leads**

C. Fian  
 Technician(s)

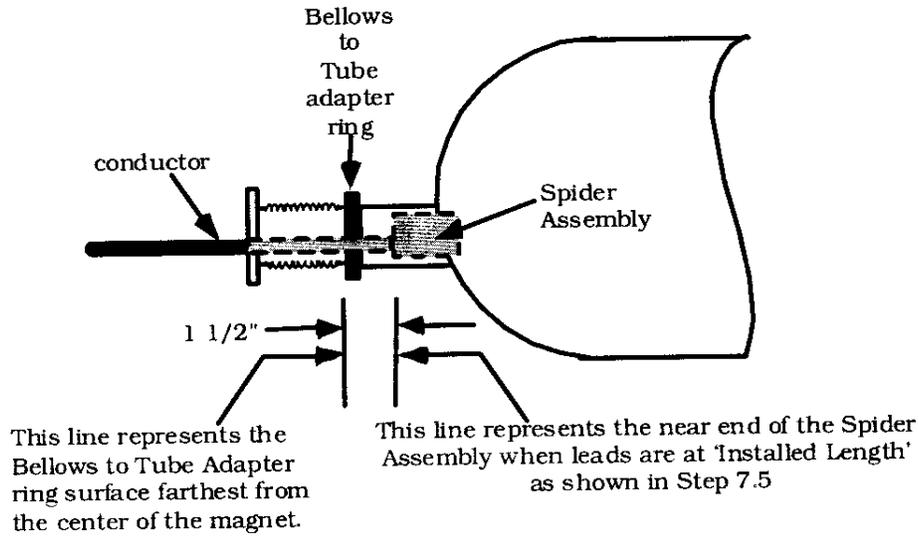
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7.4 Insulate the magnet leads using 3/4" Black Shrink Tubing (MA-318797). Ensure that the entire length of magnet leads are covered before heat shrinking.

C. Fian  
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Date

7.5 Move leads back and forth to ensure that the leads have sufficient travel for thermal expansion. Leads should have travel shown in figure below. From inside the bellows, measure from the outer edge of the Bellows to Tube adapter ring inward toward the magnet center.



Record Travel Distance	2"
------------------------	----

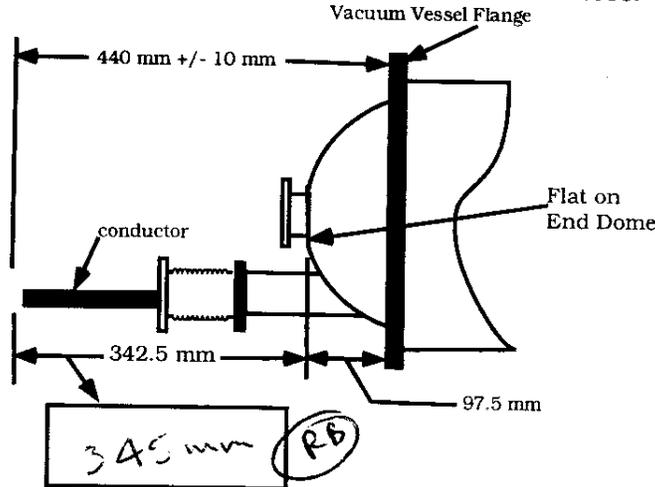
C. Fian  
Technician(s)

6/3/05  
Date

7.6 Measure and record the length of the conductor from the 'flat' of the magnet dome to the end of the conductor and record in the box provided below. (+/- 10mm)

**Note(s):**

**The 440 mm dimension for the magnet leads includes an approximate 30 mm of extra buffer cable for installation tolerances.**



C. Fina  
Technician(s)

6-3-05  
Date



7.7 Verify Step 7.5 Conductor measurement and Step 7.6 Spider Assembly measurement are acceptable.

Rodger Bent  
Responsible Authority/Physicist

6-3-05  
Date

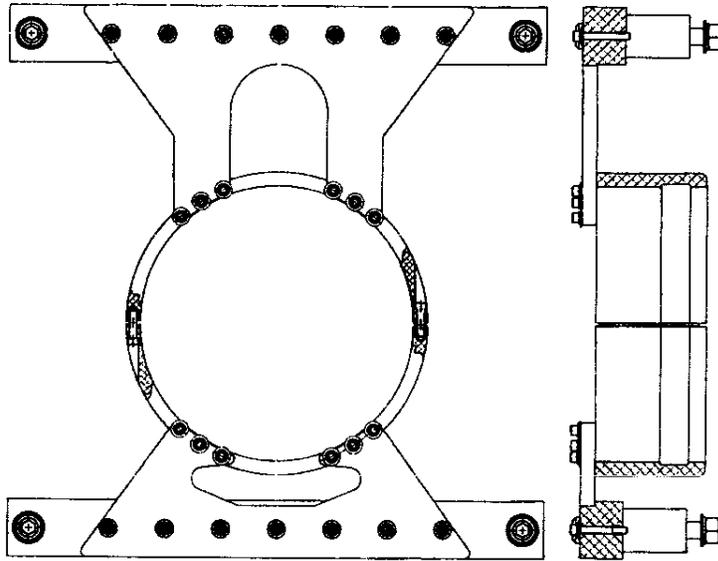
8.0 Magnet End Preparation

8.1 Install Bellows End Sliding Flange Assembly (ME-390021) using Bolts on both the Non-IP and IP Magnet Ends.

P. Francis  
Technician(s)

6-7-05  
Date

8.2 Acquire Q1 Shipping Restraint Assembly (ME-390250)(1 ea).



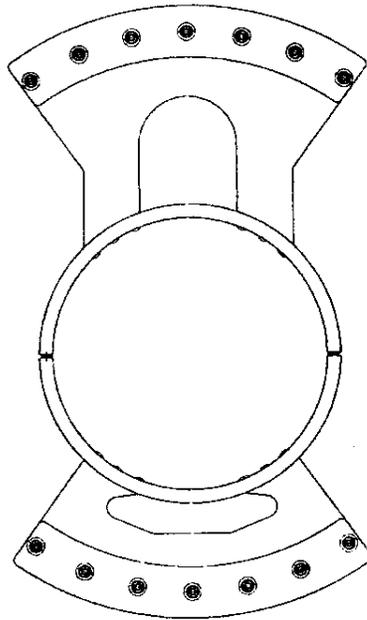
Q1/Q3 Shipping Restraint  
End View  
ME-390250

Q1/Q3 Shipping Restraint  
Side View  
ME-390250

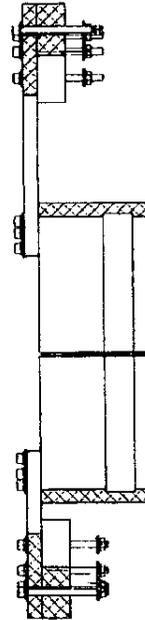
P. Francis  
Technician(s)

6-7-05  
Date

8.3 Acquire Q1 Non IP-End Shipping Restraint Assembly (ME-390251)(1 ea).



Q1 IP-End Shipping Restraint  
End View  
ME-390251



Q1 IP-End Shipping Restraint  
Side View  
ME-390251

O. Feung  
Technician(s)

6-7-05  
Date

- 8.4 Install the Shipping Restraint on the Non- IP Magnet end.

**Note(s):**

**Installation Shipping Restraint bolts should be only finger tight until complete assembly is installed.**

- 8.4.1 Install Cold Mass Collar (ME-390202) and secure using Socket Head Cap Screws (MA-393191), Plain Washers (MA-393060) and Lock Washers (MA-393061) per Q1 Shipping Restraint Assembly (ME-390250).
- 8.4.2 Install Upper Support Cross Bar (MD-390238)(1 ea) with Spacer Bushing (MB-390577) (2 ea) using Bolt (MA-393183 (2 ea), Lock Washer (MA-393186) (4 ea), Plain Washer (MA-393185) (4 ea), and Nut (MA-393184)(2 ea).
- 8.4.3 Install Lower Support Cross Bar (MD-390238)(1 ea) with Spacer Bushing (MB-390577) (2 ea) using Bolt (MA-393183 (2 ea), Lock Washer (MA-393186) (4 ea), Plain Washer (MA-393185) (4 ea), and Nut (MA-393184)(2 ea).
- 8.4.4 Install the Upper Bridge (ME-390240) to the Upper Support Bar using Bolt (MA-393187) (7 ea), Lock Washer (MA-393061) (7ea), and Flat Washer (MA-393060) (7ea).
- 8.4.5 Install the Lower Bridge (ME-390241) to the Lower Support Bar using Bolt (MA-393187) (7 ea), Lock Washer (MA-393061) (7ea), and Flat Washer (MA-393060) (7ea).
- 8.4.6 Secure Upper Bridge to Cold Mass Collar with Bolt (MA-393191) (6 ea), Lock Washer (MA-393061) (6 ea), and Plain Washer (MA-393060) (6 ea).
- 8.4.7 Secure Upper Bridge to Cold Mass Collar with Bolt (MA-393191) (6 ea), Lock Washer (MA-393061) (6 ea), and Plain Washer (MA-393060) (6 ea).
- 8.4.8 Tighten all the Shipping Restraint Bolts.

O. Finney  
Technician(s)

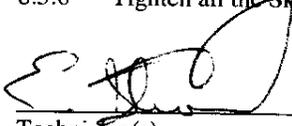
6. 7. 05  
Date

8.5 Install the Shipping Restraint on the IP Magnet end.

**Note(s):**

**Installation Shipping Restraint bolts should be only finger tight until complete assembly is installed.**

- 8.5.1 Install Cold Mass Collar (ME-390202) and secure using Socket Head Cap Screws (MA-393191), Plain Washers (MA-393060) and Lock Washers (MA-393061) per Q1 IP-END Shipping Restraint Assembly (ME-390251).
- 8.5.2 Install Upper Support Cross Bar (MD-390238)(1 ea) with Spacer Bushing (MB-390577) (2 ea) using Bolt (MA-393183 (2 ea), Lock Washer (MA-393186) (4 ea), Plain Washer (MA-393185) (4 ea), and Nut (MA-393184)(2 ea). *NO SPACER BOLTS TO BE USED - S. [unclear]*
- 8.5.3 Install Lower Support Cross Bar (MD-390238)(1 ea) with Spacer Bushing (MB-390577) (2 ea) using Bolt (MA-393183 (2 ea), Lock Washer (MA-393186) (4 ea), Plain Washer (MA-393185) (4 ea), and Nut (MA-393184)(2 ea).
- 8.5.4 Install the Upper Bridge (ME-390240) to the Upper Support Bar using Bolt (MA-393187) (7 ea), Lock Washer (MA-393061) (7ea), and Flat Washer (MA-393060) (7ea).
- 8.5.5 Install the Lower Bridge (ME-390241) to the Lower Support Bar using Bolt (MA-393187) (7 ea), Lock Washer (MA-393061) (7ea), and Flat Washer (MA-393060) (7ea).
- 8.5.6 Secure Upper Bridge to Cold Mass Collar with Bolt (MA-393191) (6 ea), Lock Washer (MA-393061) (6 ea), and Plain Washer (MA-393060) (6 ea).
- 8.5.7 Secure Upper Bridge to Cold Mass Collar with Bolt (MA-393191) (6 ea), Lock Washer (MA-393061) (6 ea), and Plain Washer (MA-393060) (6 ea).
- 8.5.8 Tighten all the Shipping Restraint Bolts.

  
\_\_\_\_\_  
Technician(s)

10-7-05  
\_\_\_\_\_  
Date

8.6 Install Electrical Bus Shipping Restraint Short End Cover (MD-390752) into Lower Cold Mass Pipe to protect the Buss Wire.

O. Fianca  
Technician(s)

6-17-05  
Date

8.7 Install Protective End onto PVC Bus Protector Tube.

O. Fianca  
Technician(s)

6-7-05  
Date

8.8 Secure bellows with Bellow Restraint/Protective Cover (MA-390153) using Screws (MA-390180).

O. Fianca  
Technician(s)

6-7-05  
Date

8.9 Install the Vinyl Flange Covers (MA-390491), (MA-390492), (MA-390493), (MA-390494), & the Alignment Fiducial Covers (MA-390495).

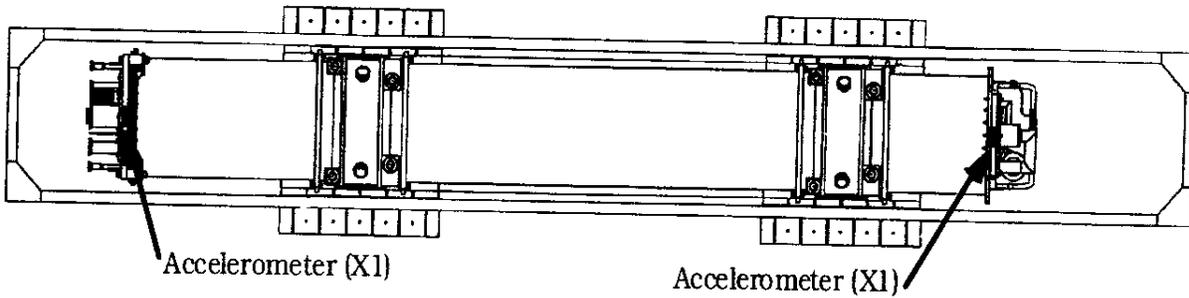
O. Fianca  
Technician(s)

6-07-05  
Date

8.10 Are Accelerometers (Shock Recorders) available for installation?

Yes - Install Accelerometers as per Responsible Authority and Figure 8.10-A. below.

No - Accelerometers are NOT available for installation.



**Figure 8.10-A**

*[Signature]*  
Technician(s)

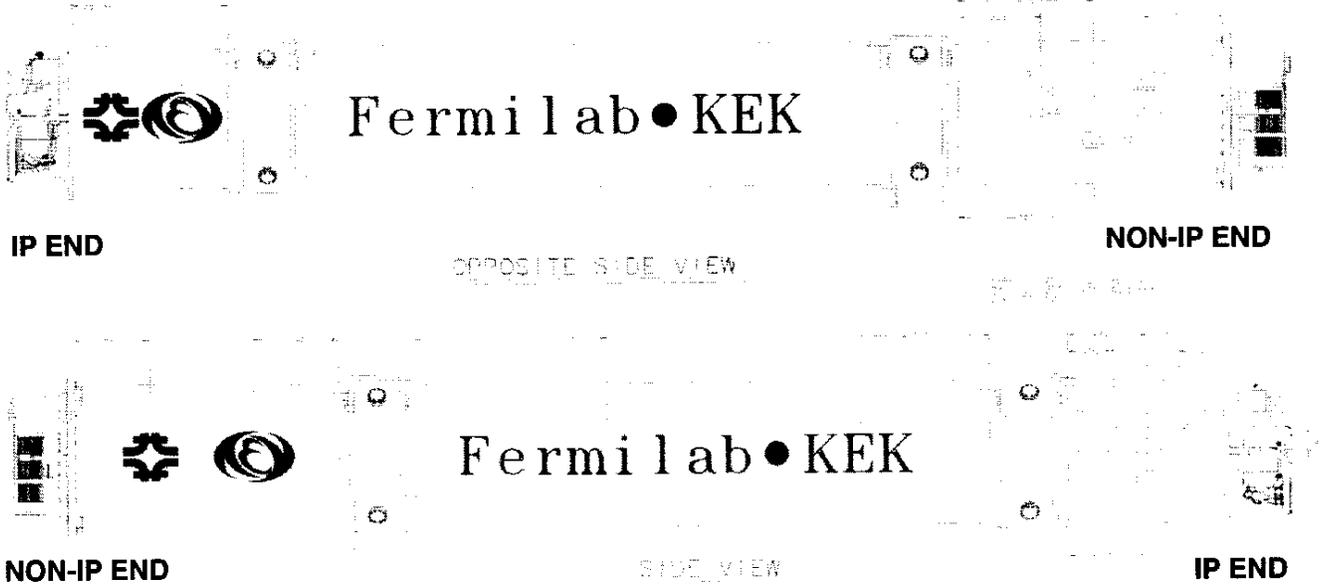
*July 6, 2005*  
Date

8.11 Install Magnet Identification Labels as per Q1 Identification Labeling Layout (ME-390761).

**Example:**

**If Serial No. at bottom of Traveler is: LQXA06**

**Stencil Serial No. should be: HCLQXA\_001-FL000006**



**Q1 IDENTIFICATION LABELING LAYOUT (ME-390761)**

William Ratzl  
 Technician(s)

7/5/05  
 Date



8.12 Verify Magnet has been properly labeled/stenciled, and serial number matches the bottom of this traveler and as per (ME-390761).

**Example:**

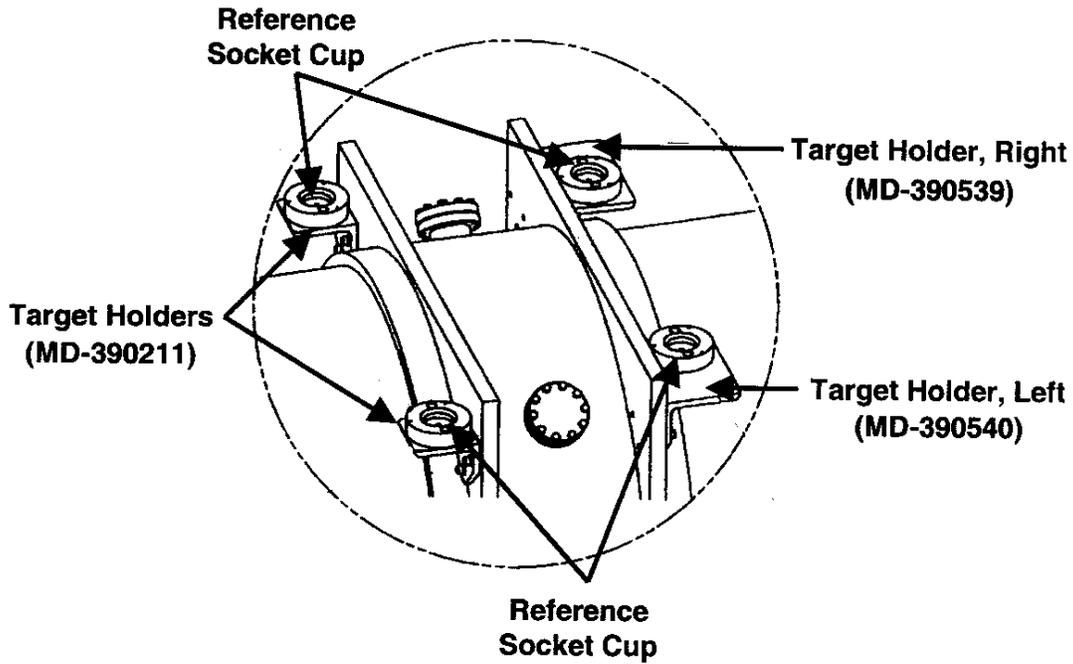
**If Serial No. at bottom of Traveler is: LQXA06**

**Stencil Serial No. should be: HCLQXA\_001-FL000006**

J. Gould  
 Lead Person

7/6/05  
 Date

9.0 Final Inspection/Installation



9.1 Verify Target Holder (MD-390211) (4 ea), Target Holder, Right (MD-390539) (2 ea), and Target Holder, Left (MD-390540) (2 ea) with Reference Socket Cup (MA-390426) (8 ea) and Protective Covers (MA-390495) are installed.

A. Soule  
Lead Person

7/6/05  
Date



9.2 Verify that the Target Holder had been pinned using Spring Pins (MA-393048) as per Q1 Cryostat General Assembly (ME-390132).

A. Soule  
Lead Person

7/6/05  
Date

10.0 Shipping the Magnet



TRR #  
1747

Check box if shipping frame is installed in Shipping Container. Proceed to STEP 11.0: 10.294A

Check box if Shipping Frame is NOT installed already installed in a Shipping Container. Proceed to STEP 10.1

[Signature]  
Lead Person

7/7/05  
Date

10.1 Acquire the Shipping Frame Assembly (ME-390729).

[Signature]  
Technician(s)

7-7-05  
Date

10.2 Verify that Frame Separator Bars are installed on the Shipping Frame Assembly. Refer to Q1/Q3 and Q2 Fixture Return Shipping Assembly (ME-390798).

Not Installed, proceed to Step 10.3. Verify Separator Bars are Ordered via Parts Kit. Contact Process Engineering Traveler Coordinator.

Installed on Shipping Frame Assembly, Proceed to Step 10.4.

[Signature]  
Technician(s)

7-7-05  
Date

10.3 Acquire the following parts.

Screw 1/2" - 13 X 3.5" I	MA-393384	6 ea
Washer, Bevel 1/2"	MA-393385	6 ea

Note:

Ensure Q2 to Q1/Q3 Hardware is also acquired/installed for usage by CERN:

Screw 3/4" - 10 x 3.5"	MA-393384	4 ea	Installed on two end Separator Bars
Hex Nut 3/4" - 10	MA-393387	4 ea	Installed on two end Separator Bars
Washer Flat 1"	MA 393389	2 ea	Installed on center Separator Bar

[Signature]  
Technician(s)

7-7-05  
Date

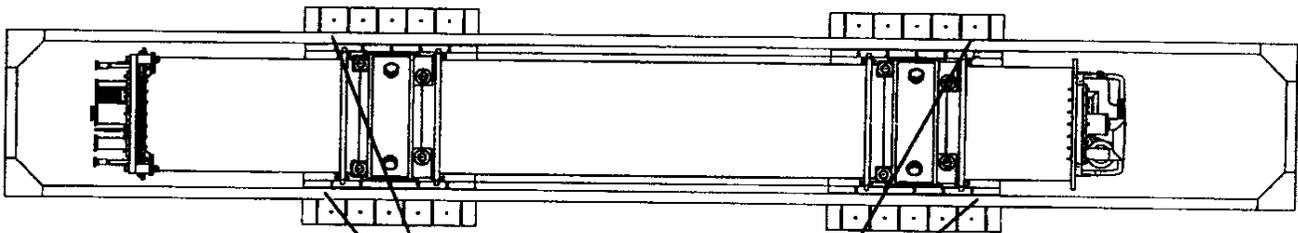
10.4 Acquire the following shipping hardware:

<b>Eyebolt</b>	<b>McMaster-Carr 3016T85</b>	<b>4 ea</b>
<b>Flat Washer</b>	<b>MA-393328</b>	<b>8 ea</b>
<b>Chain w/2 Hooks</b>	<b>MA-390702</b>	<b>4 ea</b>
<b>Flat Washer</b>	<b>MA-393323</b>	<b>6 ea</b>

*[Signature]*  
Technician(s)

7.7.05  
Date

10.5 Remove the Hoist Rings (4 ea) from the Outer Frame as per ME-390727.



*(already removed)*  
*[Signature]*  
Remove Hoist Rings (4 ea) before installing magnet

7.7.05  
Date

*TR 1747*

10.6 Transport the Shipping Frame Assembly (ME-390729) and install into the Shipping Container using approved methods.

*(already installed)*  
*[Signature]*  
Technician(s)

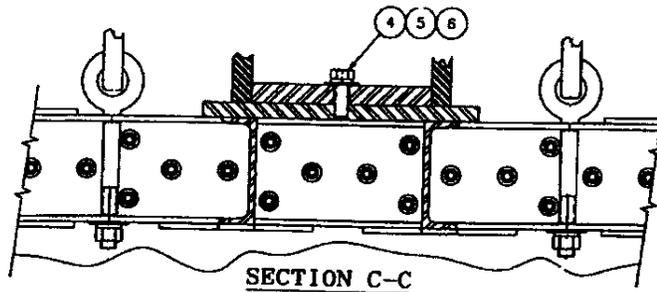
7.7.05  
Date

11.0 Magnet to Shipping Frame/Platform Installation

- 11.1 Transport the magnet to the Magnet Shipping Fixture and install using Bolt (MA-393321)(6 ea), Flat Washer (MA-393323)(6 ea), and Lock Washer (MA-393322)(6 ea).

**Note(s):**

**Apply a small amount of Anti-Seize to all the bolt threads prior to installing the bolts.**



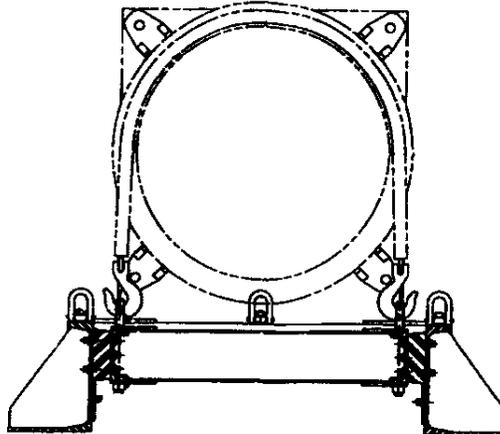
**Q1 Magnet Shipping Assembly  
(ME-390727)**

*[Signature]*  
Technician(s)

7/13/05  
Date

- 11.2 Install Eyebolts, McMaster-Carr #3016T85 (4 ea), Eyebolts, McMaster Carr #3016T87 (4 ea), Flat Washer (MA-393328)(8 ea), and Lock Washer (MA-393329)(8 ea) into Shipping Fixture.

**Note: Install all Eyebolts #3016T85 on one side of the shipping fixture. Eyebolts #3016T87 go on the opposite side.**



- 11.3 Install Lift All Pukka Wear Pad Protectors (MA-393345) onto magnet prior to installing Chain Sling.

*[Signature]*  
Technician(s)

7-13-05  
Date

11.4 Install chain sling w/2 hooks (MA-390702) (4 ea) into eyebolts

[Signature]  
Technician(s)

7-13-05  
Date

11.5 Tighten eyebolts until chains are snug.

[Signature]  
Technician(s)

7-13-05  
Date

11.6 Install an additional nut (double-nutting) on each eyebolt and tighten.

[Signature]  
Technician(s)

7-13-05  
Date

11.7 Wrapping of the magnet.

Performed by Shipping Company, proceed to Step 11.9

Performed by Fermilab, proceed to Step 11.8

[Signature]  
Lead Person

7-13-05  
Date

11.8 Wrap the magnet in protective material (VCI Plastic) and seal the seam using approved methods to form a protective bag. (This step may be N/A. See check box in step 11.7)

[Signature]  
Technician(s)

7-13-05  
Date

11.9 Install cross braces on the top of the shipping container.

[Signature]  
Technician(s)

7-13-05  
Date

11.10 Install protective cover on the top of the shipping container and secure.

[Signature]  
Technician(s)

7-14-05  
Date



*— C. Smith 7-14-05*

*Needs a battery PACK AND SHIPPING blocks welded to both coldmass covers.  
BEFORE FINAL SHIPPING TO CERN*

11.11 Verify the magnet, shipping frame are properly secured, and protected.

*T. [Signature]*  
Responsible Authority/designee

10/12/05  
Date



11.12 Close and secure doors on the shipping container.

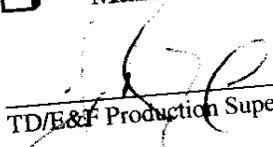
*[Signature]*  
Crew Chief

10/13/05  
Date

12.0 Documentation Update

12.1 Perform the following:

- Update DSR Keywords.
- Location.
- Location Verified Date.
- Status.
- Make entry regarding work performed.

  
\_\_\_\_\_  
TD/E&F Production Supervisor/designee

10/13/05  
Date

13.0 Production Complete

13.1 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:

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\_\_\_\_\_  
Process Engineering/Designee

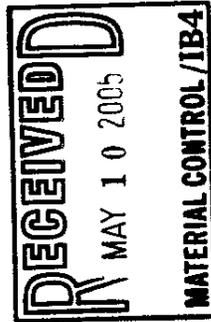
NOV 08 2005  
Date

TD - Engineering Fabrication Component Kit List

ORIGINAL

Process Engineering

Component Serial No.



LQXA07

Kit submitted by:

John Szostak Ext. 2003

Fermi ID No.

02943C

Date submitted:

5-May-05

Need date:

11-May-05

Deliver to:

ICB

Use with Traveler No.

333728

Job No.

248

M&S task number:

300 1.1.1.3.5

Drawing Title:

Q1 MAGNET SHIPPING ASSEMBLY

Drawing No.

ME-390727 Rev. NONE

Material Control Parts available

Verified by:

M. Schmidt

Fermi ID No.

04223N

Date submitted to stockroom:

5/9/2005

Parts issued

Issued by:

G. K. Z. 10

Fermi ID No.

11939

Date issued:

5/10/05

Parts received by E&F:

S. J. 10

Fermi ID No.

102943C

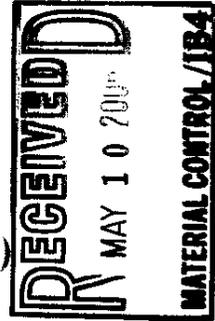
Date received by E&F:

5/11/05

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
1	KAPTON TAPE	MA	106723	A	EA	A/R					
2	3/4" BLACK SHRINK TUBING	MA	318797	A	EA	A/R					
3	Q1 CRYOSTAT ASSEMBLY	ME	390127	G	EA	ICB HAS					
4	BELLOWS PROTECTORS	MA	390153	*	EA	6	R7,2,2	6	QA	79773	126 pcs.
5	Q1/Q3 SHIPPING RESTRAINT ASSEMBLY	ME	390250	A	EA	1	ICB Has				In Container
6	Q1 IP-END SHIPPING RESTRAINT ASSEMBLY	ME	390251	*	EA	1	ICB Has				In Container
7	CHAIN SLING W/ 2 HOOKS	MA	390702	*	EA	4	ICB Has				In Container
8	Q1/Q3 SHIPPING FIXTURE	ME	390729	*	EA	ICB HAS					
9	ELECTRICAL BUS SHORT END COVER	MD	390752	*	EA	1	R7,3,4	1	QA	81802	17 pcs.
10	SOCKET HEAD CAP SCREW M4 x 10mm LG S.S.	MA	393180	*	EA	18	IB4 Bin	18	QA	79631	631 pcs.
11	3/4-10 HEX HD. BOLT x 2.50 LG. - GR. 8 STL.	MA	393321	*	EA	6	ICB Has				In Container

TD - Engineering Fabrication Component Kit List

ORIGINAL



	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
12	3/4 LOCK WASHER - STL.	MA	393322	*	EA	6	ICB Has				In Container
13	3/4 FLAT WASHER - STL.	MA	393323	*	EA	6	ICB Has				In Container
14	1"-8 HEX NUT - STL.	MA	393327	*	EA	16	ICB Has				In Container
15	1" FLAT WASHER - STL.	MA	393328	*	EA	8	ICB Has				In Container
16	1" LOCK WASHER - STL.	MA	393329	*	EA	8	ICB Has				In Container
17	LIFT ALL PUKKA WEAR PAD PROTECTORS	MA	393345	*	EA	4	ICB Has				In Container
18	EYEBOLT - 1"-8 x 12" LG.		390731-11	*	EA	4	ICB Has				In Container
19	EYEBOLT - 1"-8 x 9" LG.		390731-7	*	EA	4	ICB Has				In Container
20	ANTI-SEIZE			*	EA	ICB HAS					
21	ACCELEROMETER			*	EA	ICB HAS					

Revision Request Control Number:

Specification Number:  Current Revision:

Traveler or Document Title

Step #/Description of Revision:

- 4.0 Modified Steps. Added Step Numbers and instructions to each individual signoff.
- 7.5 Modified Step. Added Note "Protect the Bellows during all stages of production."
- 8.1 Modified Step. Added Note "Protect the Bellows during all stages of production."
- 8.8 Modified Step. Added Note "Protect the Bellows during all stages of production."
- 10.0 Modified Step. Changed Checkbox to "Check box if shipping frame is installed in Shipping Container. Proceed to STEP 10.2." per production request and LQXA06.
- 10.1 Modified Step. Changed to "Acquire the Shipping Frame Assembly (ME-390729). (May be N/A if 2nd box above is checked.)"
- 10.2 Modified Step. Changed to "Removed Check boxes per production request."
- 10.3 Modified Step. Changed to "Verify the following parts. Acquire as needed." per production request.
- 10.4 Modified Step. Changed to "Verify the following shipping hardware. Acquire as needed." per production request.
- 10.5 Modified Step. Changed to "Verify the Hoist Rings (4 ea) have been removed from the Outer Frame as per (ME-390727). Remove as needed." per production request.
- 4.0 to 13.0 Modified Steps. Changed step numbers to improve sequential numbering. The above changes were made before this change and thus reflect the old numberings.

Originator

Responsible Authority

Date

Revision Incorporated into the Traveler:

Revision Incorporated By

Date

Process Engineering Final Review:

Process Engineering/Designee

Date

## Instructions for the completion of the Revision Request Form

### Note(s):

Multiple steps may be effected by one Revision Request Form but only one specific Traveler or Document may be effected by each Revision Request Form.

If completing this form by hand, a Revision Request Control Number must be obtained before processing.

If completing this form entirely by electronic means, the printed copy to be filed in the Process Engineering Office is to be initiated by the individual incorporating the Revision Request and the individual who reviewed the Traveler or Document.

### Originator Instructions:

- 1) Specification Number: - Enter the Specification Number of the Traveler or Document to be revised. (Document title is inserted automatically from the spec. #)
- 2) Current Revision: - Enter the Revision of the Traveler or Document to be revised.
- 3) Step# / Description of the Revision: - Enter a description of the revision to be made and the step# it applies to, if applicable. If needed to describe the revision attach a copy of the page(s). If the revision is coming from a related document such as a Discrepancy Report or an Engineering Order attach a copy of that document to the Revision Request Form.
- 4) Originator: - Originator is the person generating the form. (Select Name from List)
- 5) Responsible Authority: - Responsible Authority is person responsible for the process in question. (Select Name from List)

### Process Engineering Office Instructions:

- 1) Revision Incorporated into the Traveler: - Signature of the individual who incorporated the revision.
- 2) Process Engineering Final Review: - Review the Traveler or Document revised, sign and date the form. The original completed Revision Request Form will be retained by the Process Engineering Office in the Revision Request Binder.