Document ID: 3185

LHC Q3 LQXC Cryostat Final Assembly Traveler

333730 / Rev. NONE

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**

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LQXC01-0

Document ID:

3185

Job No.:

248

Project/Task No.

300/1.1.1.6.2

Series:

LQXC

Serial No:

LQXC01

Rework ID:

0

Specification No.:

333730

Revision:

NONE

LQXC01-0

Fermi National Accelerator Laboratory
Batavia, IL 60510

LARGE HADRON COLLIDER
Q3 - LQXC
CRYOSTAT FINAL ASSEMBLY TRAVELER

Reference Drawing(s):
Q3 Cryostat General Assembly (ME-390132)
Q3 Cryostat Assembly Internal Piping (ME-390213)

Project/Task Number:

Released By: *John Szostak* **Magnet/Device Series:** *LQXC*

Date Issued: *9/24/2004 11:12:32 AM* **Scanned Pages:** 46

Prepared by: J. Szostak

Title	Signature	Date
TD / E&F Process Engineering	*Bob Jensen* Bob Jensen / Designee	*9/10/04*
TD / LHC Production Supervisor	*Jim Rife* Jim Rife / Designee	*9/10/04*
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Revision Page

Revision	Step No.	Revision Description	TRR No.	Date
None	N/A	Initial Release	N/A	9/10/04

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)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.

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.

J. Ayostah
Process Engineering/Designee

9/24/04
Date

3.0 Vacuum Vessel Preparation and Painting

3.1 Record the Vacuum Vessel Serial Number.

Q3 - 1

S Gould
Technician(s)

4/10/04
Date

3.2 Inspect the transition area between the Support Sections and Tube Sections. Grind smooth if necessary.

S Gould
Technician(s)

4/10/04
Date

3.3 Clean the Vacuum Vessel (ME-390133) using a vacuum cleaner or equivalent.

S Gould
Technician(s)

4/10/04
Date

TRR# 1711

3.4 Leak Check the Vacuum Vessel Assembly (ME-390133) per ES-107240 and record results in table below.

Part No.	DETERMINATION OF DETECTABLE LEAK						
	M.D.S. ÷ ((Response – Background) ÷ Leak value) = MDL						
OPERATOR'S LAST NAME	SCALE UNITS BEFORE HELIUM PROBE	SCALE UNITS WHILE ENCLOSURE FLOODING	MDS	Response	Background	Leak Value	MDL
						____ x E^{-8}	____ x E^{-}__

JR
HGa →
0469

Inspector

Date

3.5 Prepare the outside of the Vacuum Vessel (ME-390133) for painting. Clean using Ethyl Alcohol (Fermi stock 1920-0550) and Kimwipes (Fermi stock 1660-2500) or equivalent.

Technician(s) _____ Date 4-10-04

3.6 Mask the Stainless Steel Components of the Vacuum Vessel for painting.

Technician(s) _____ Date 4-10-04

3.7 Prime the Vacuum Vessel using Rust-o-leum (Fermi stock 1825-4000).

Technician(s) _____ Date 4-10-04

3.8 Verify that the Screws (MA-393036) will thread easily into the appropriate holes in the Vacuum Vessel (ME-390133). If necessary, tap out holes with M10 – 1.5 Tap. Move Vacuum Vessel (ME-390133) to Table.

Lead Person _____ Date 4/10/04

3.9 Paint the Vacuum Vessel using Flambeau Red (Fermi stock 1825-3710).

Technician(s) _____ Date 4-10-04

4.0 Piping Assembly

Note(s):

Do not use a Strap Wrench on the Pipes.

4.1 Place the Cold Mass Assembly on the Insertion Rail System.

Technician(s) _____ Date 10-14-04

4.2 Clean the Pipe Supports with Ethyl Alcohol (Fermi stock 1920-0550) and Kimwipes (Fermi stock 1660-2500) or equivalent.

Technician(s) _____ Date 10-14-04

4.3 Install Cold Mass Insulation per Q3 Cold Mass Magnet Insulation Installation (ME-390527).

Technician(s) _____ Date 10-14-04

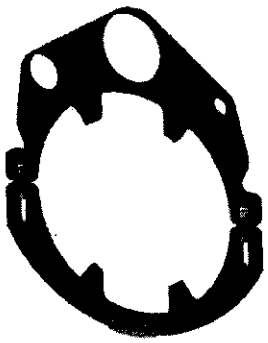
TRR UEFED #1689

4.4 Install the Pipe Supports (MD-390092) (~~Qty. 2)~~ 3 on the Cold Mass per Q3 Cryostat Assembly Internal Piping (ME-390213).

Note(s):

A Tie Bar may be disconnected, if necessary, from the Fixed Support Assembly to install the central two pipe supports.

PIPE SUPPORT ASSEMBLY



Technician(s) _____ Date 10-14-04

4.5 Install Pipe Anchor (MC-390486) on the Cold Mass per Q3 Cryostat Assembly - Internal Piping (ME-390213).

Technician(s) _____ Date 10-14-04

4.6 Using Pipe Supports (MD-390092) as a template, cut the blankets around the Pipe Support Feet and slit blankets circumferentially at the Pipe Supports.

Technician(s) _____ Date 10-14-04

4.7 Remove Pipe Supports (MD-390092), Pipe Anchor (MC-390486) and blankets. Wrap blankets in plastic bag to keep clean for later use. Label blankets as they are removed for later positioning.

Technician(s) _____ Date 10-14-04

4.8 Install Pipe Supports (MD-390092) and Pipe Anchor (MC-390486) to same locations as in step 4.4 and 4.5 respectively.

Technician(s) _____ Date 10-14-04

4.9 Clean the Cold Mass and the Retainer Clips (MA-390103) with Ethyl Alcohol (Fermi stock 1920-0550) and Kimwipes (Fermi stock 1660-2500) or equivalent.

Technician(s) _____ Date 10-15-04

4.10 Weld the Retainer Clips (MA-390103) to the Cold Mass Outer Shell as per the Q3 Cryostat Internal Piping Assembly (ME-390213).

Weldor(s) _____ Date 10/16/04

4.11 Install Q3 Installation Tie Rod Assembly (MC-390638) and Tie Bar Retaining Clamp (MB-390136) as per Q3 Cryostat Internal Piping Assembly (ME-390213).

Technician(s) _____ Date 10/18/04

4.12 Clean the Q3 Heat Exchanger Outer Shell (MD-390385), Q3 Pumping Line (MB-390224) and the Q3 Cool Down Line (MB-390225) with Ethyl Alcohol (Fermi stock 1920-0550) and Kimwipes (Fermi stock 1660-2500) or equivalent.

Technician(s) _____ Date 10/18/04

4.13 Clean the Pumping Line End Flange (MB-390032), the Cool Down Line End Flange (MB-390033) and the Heat Exchanger Corrugated Tube Flange (MB-390030) with Ethyl Alcohol (Fermi stock 1920-0550) and Kimwipes (Fermi stock 1660-2500) or equivalent.

Technician(s) _____ Date 10/16/04

4.14 Slide the Heat Exchanger Outer Shell (ME-390385) through all five supports.

Note(s):

Ensure the cross over hole in the Heat Exchanger Pipe is lined up with the elbow on the End Dome.

Technician(s) _____ Date 10/16/04

4.15 Position the Q3 Pipe Anchor (MC-390486).

Technician(s) _____ Date 10-18-04

4.16 Position the Heat Exchanger Weld Connector Adapter (MC-390278).

Technician(s) _____ Date 10/16/04

4.17 Position the Heat Exchanger Outer Shell (ME-390385).

Technician(s) _____ Date 10/16/04

4.18 Position the Q3 Cool Down Line (MB-390225).

Technician(s) _____ Date 10-18-04

4.19 Weld the Heat Exchanger Corrugated Tube Flange (MB-390030) to the Heat Exchanger Outer Shell (ME-390385) as per Q3 Heat Exchanger Assembly (ME-390214).

Weldor(s) _____ Date 10/19/04

4.20 Weld the Cool Down Line End Flange (MB-390033) to the Q3 Cool Down Line (MB-390225) as per Q3 Cryostat Internal Piping Assembly (ME-390213).

Weldor(s) _____ Date 10/16/04

4.21 Assemble the Q3 Heat Exchanger Corrugated Tube Assembly (ME-390216).

Technician(s) _____ Date 10/18/04

4.22 Insert the Q3 Heat Exchanger Corrugated Tube Assembly (ME-390216).

Technician(s) _____ Date 10/18/04

4.23 Position Q3 Heat Exchanger Corrugated Tube Assembly (ME-390216).

Technician(s) _____ Date 10/18/04

4.24 Position the Heat Exchanger Flat End Cap (MD-390178).

Technician(s) _____ Date 10/18/04

4.25 Purge the Assembly using Argon (Ar) gas.

Technician(s) _____ Date 10/19/04

4.26 Weld the Heat Exchanger Outer Shell (ME-390385 of Q3 Heat Exchanger Assembly ME-390214) to the Heat Exchanger Weld Connector Adapter (MC-390278) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Weldor(s) _____ Date 10/19/04

4.27 Weld the IP End Dome 90° Elbow (MC-390220 of Non-IP End Dome Weldment MD-390219) to the Heat Exchanger Weld Connector Adapter (MC-390278) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Weldor(s) _____ Date 10/19/04

4.28 Weld the Heat Exchanger Flat End Cap (MD-390178) to the Outer Shell Weldment (MD-390385) as per Q3 Heat Exchanger Outer Shell Weldment (ME-390385).

Weldor(s) _____ Date 10/19/04

4.29 Position the Q3 Heat Exchanger Corrugated Tube Assembly (ME-390216).

Technician(s) _____ Date 10/19/04

4.30 Weld the Q3 Heat Exchanger Corrugated Tube Assembly (ME-390216) to the Outer Shell Weldment (ME-390385) as per Q3 Heat Exchanger Assembly (ME-390214).

Weldor(s) _____ Date 10/19/04

4.31 Weld the Cool Down Line (MC-390225) and the Heat Exchanger Outer Shell (ME-390385) to the Q3 Pipe Anchor (MC-390486) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Weldor(s) _____ Date 10/19/04

4.32 Weld the Q3 Pipe Anchor (MC-390486) to the Q3 Cold Mass Assembly (ME-390528) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Weldor(s) _____ Date 10/19/04

4.33 Weld the Pumping Line End Flange (MB-390032) to the Corrugated Tube Assembly (ME-390216) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Weldor(s) _____ Date 10/16/04

4.34 Insert the Q3 Pumping Line (MB-390224).

V. Bice — Technician(s) — Date 10/19/04

4.35 Insert Q3 4.5k Intercept Line Pipes (MB-390226) as per Q3 Heat Exchanger Assembly (ME-390214).

V. Bice — Technician(s) — Date 10/19/04

4.36 Weld the Pumping Line End Flange (MB-390032) to the Q3 Pumping Line (MB-390224) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Charanjit Sood — Weldor(s) — Date 10/16/04

4.37 Position the Q3 Pumping Line (MB-390224).

V. Bice — Technician(s) — Date 10/19/04

4.38 Purge the Cold Mass Assembly, using Argon, including the Q3 4.5k Intercept Line Pipes (MB-390226).

V. Bice — Technician(s) — Date 10/19/04

4.39 Weld the Q3 Pumping Line (MB-390224) to the Q3 Pipe Anchor (MC-390486) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Weldor(s) _____ Date 10/19/04

4.40 Ensuring that the Q3 4.5k Intercept Line Pipes (MB-390226) have been purged, weld the Intercept Line Pipe Stops (MA-390379) as per Q3 Cryostat Assembly Internal Piping (ME-390213).

Bob Williams

Weldor(s) _____ Date 10/19/04

4.41 Prepare Cold Mass Assembly for Pressure Test at 363 psi.

Technician(s) _____ Date 11/1/04

4.42 Verify Cold Mass Assembly is ready for Pressure Test at 363 psi.

Responsible Authority/Physicist T. Page Date 11/1/04

4.43 Perform a Pressure Test of the Cold Mass Assembly at 363 psi Nitrogen per Section 5034 of the Fermilab ES&H Manual and UG-100 of the Code.

Warning:

The test is to be performed after normal working hours and only personnel directly involved with the test will be present.

Responsible Authority/Physicist T. Page Date 11/1/04

4.44 Leak Check the Cold Mass Assembly. (This will include the Outer Shell (MD-390385)).

Part No.		DETERMINATION OF DETECTABLE LEAK							
PART NO. LQXA 007 LQXC01 Cold MASS		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					
11-8-04	GAw	38X1	38X1	2	68X1	38X1	2.85×10^{-8}	1.9×10^{-9}

D. GAw
~~Technician(s)~~ INSPECTOR

11-8-04
Date

4.45 Leak check Q3 4.5k Intercept Lines (MB-390226).

Part No.	DETERMINATION OF DETECTABLE LEAK						
	M.D.S. ÷ ((Response – Background) ÷ Leak value) = MDL						
OPERATOR'S LAST NAME	SCALE UNITS BEFORE HELIUM PROBE	SCALE UNITS WHILE ENCLOSURE FLOODING	MDS	Response	Background	Leak Value	MDL
	40X1	40X1	2	40X5	40X1	2.85 xE-8	5 xE-10

D. GAw
~~Technician(s)~~
INSPECTOR

11-8-04
Date

PART NO. Cool Down		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				
11-8-04	GAw	36X1	36X1	2	40X1	36X1	2.85×10^{-8}	5×10^{-10}

PART NO. Pump Down		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				
11-8-04	GAw	36X1	36X1	2	40X5	36X1	2.85×10^{-8}	5×10^{-10}

MOVE STEP 5.8 TO HERE

5.0 Shield Assembly

5.1 Lift the Cold Mass Assembly and place the (IP End) Q3 End Section (ME-390439) and (Non-IP End) Q3 End Section (ME-390439) on the Insertion Rails. Lower the Cold Mass back onto the rails ensuring the holes in the Shield Sections line up with Support Rollers.

Technician(s) _____ Date 11/9/04

TRR# 1689

INSTALL threads (threaded rods)

5.2 Insert the Mid Section (ME-390435) and the Support Bands (MD-390083).

Technician(s) _____ Date 11/9/04

5.3 Assemble the bottom half of the shield. Leave all bolts loose. Spray all screw threads with Molybdenum.

Technician(s) _____ Date 11/9/04

5.4 Assemble the Cooling Tubes (MD-390437) to the Bottom Half of the Shield.

Technician(s) _____ Date 11/10/04

5.5 Lift the Cold Mass and place the Shield Inner and Outer MLI Blankets (ME-390489 & ME-390490) onto the Insertion Rails in the correct orientation.

Note(s):

Place the Outer Blanket (ME-390490) on the Rails first.

Technician(s) _____ Date 11/11/04

5.6 Lower the Cold Mass onto the rails. Ensure the slits in the blankets line up with Support Rollers.

Technician(s) _____ Date 11/11/04

5.7 Install the Cold Mass MLI Blankets per (ME-390527) and in the same position as Step 4.6.

Technician(s) _____ Date 11/11/04

5.8 Install the Cold Mass Insulation Mounting Lug Blankets (MC-390496).

Technician(s) _____ Date 11/9/04

5.9 Cut and install the pipe MLI blankets per Q3 Piping Assembly Insulation Installation (ME-390545).

Technician(s) _____ Date 11/12/04

5.10 Install the Upper Shield per Q3 Thermal Shield Assembly (ME-390436). Spray all screw threads with Molybdenum.

Technician(s) _____ Date 11/12/04

5.11 Install the Shield Blankets (ME-390489 & ME-390490).

Technician(s) _____ Date 11/12/04

6.0 Cold Mass Insertion into the Vacuum Vessel

6.1 Install Green Putty between the Vacuum Vessel and the Insertion Rails.

Technician(s) _____ Date 11-12-04

6.2 Install the Cold Mass Pull-in Tooling.

Technician(s) _____ Date 11/12/04

6.3 Mount the Pneumatic Winch to floor on the West side of the Vacuum Vessel.

Technician(s) _____ Date 11/12/04

6.4 Connect the cable to the Pull-in Tooling.

Technician(s) _____ Date 11/12/04

6.5 Pull the Cold Mass Assembly into the Vacuum Vessel.

Technician(s) _____ Date 11-12-04

6.6 When the Cold Mass is fully inserted, install the Suspension System Adjusting Screws (MB-390039).

Technician(s) _____ Date 11/12/04

6.7 Adjust the Suspension System Adjusting Screw (MB-390039) as needed to center the Cold Mass in the Vacuum Vessel.

Technician(s) _____ Date 11/30/04

HGQ-0510 HGQ 0509

6.8 Install Conflat Flanges (MA-390374) w/ Copper Gaskets (MA-390375) and Bolt Set (MA-390376) to Cryostat as per Q3 Cryostat General Assembly (ME-390132).

Technician(s) _____ Date _____

Done in IB#1 This Time! SVG

6.9 Install Target Holders (Right, MD-390539), (Left, MD-390540) and (MD-390211) as per Q3 Cryostat General Assembly (ME-390132).

Technician(s) _____ Date 11-30-04

6.10 Install Reference Socket Cup (MA-390426) as per Q3 Cryostat General Assembly (ME-390132).

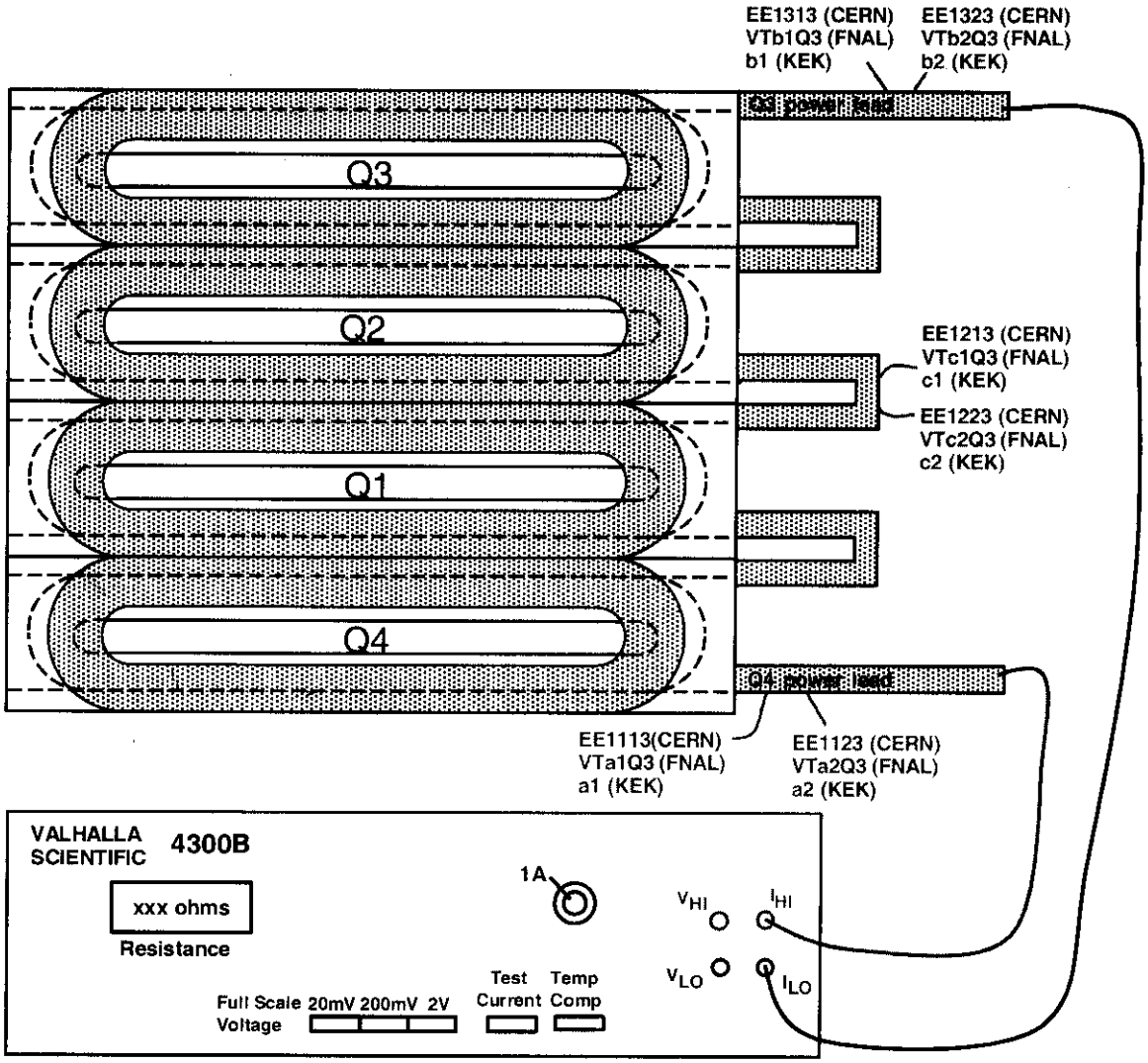
Technician(s) _____ Date 11-30-04

7.0 Final Electrical Inspection

7.1 Perform an electrical inspection on each of the Individual Quadrants and the Cold Mass. Refer to the Valhalla and Leader Free Standing Coil Measurement Procedure (ES-292306).

To measure the Resistance of a Q3 Cold Mass:

1. Use Valhalla Scientific 4300B digital micro-ohmmeter.
2. Set Test Current to 0.1 amp.
3. Set Scale to 2V full scale.
4. Turn temperature compensation on.
5. Turn test current off.
6. Connect I_{HI} to Q4 inner power lead as shown in figure.
7. Connect I_{LO} to Q3 inner power lead as shown in figure.
8. Turn test current on.
9. Connect V_{HI} and V_{LO} to voltage taps as shown in resistance table.
10. To measure Total with leads, connect V_{HI} to Q4 power lead and V_{LO} to Q3 power lead.
11. Read resistance and record in traveler.



(Q3) Resistance				Nominal 3.35 to 3.45 Ω	
Voltage Tap Serial Numbers				Total Resistance	
Connect	Fermi	CERN	KEK		
V_{HI}	VTa1Q3	EE1113	a1	3.426 Ω	1612
V_{LO}	VTc1Q3	EE1213	c1		1512
V_{HI}	VTc1Q3	EE1213	c1	3.426 Ω	1512
V_{LO}	VTb1Q3	EE1313	b1		1412
V_{HI}	VTa1Q3	EE1113	a1	6.852 Ω	1612
V_{LO}	VTb1Q3	EE1313	b1		1412

		Total Resistance with Leads
		Nominal 6.75 to 6.85 Ω
V_{HI}	Q4 Power Lead	6.873 Ω
V_{LO}	Q3 Power Lead	

Technician(s) _____ Date 12/1/04

Check resistance of Redundant Voltage Taps.

Q3 Redundant Voltage Taps				Nominal 3.35 to 3.45 Ω	
Connect	Fermi	CERN	KEK	Resistance	
V_{HI}	VTa2Q3	EE1123	a2	3.426 Ω	1622
V_{LO}	VTc2Q3	EE1223	c2		1522
V_{HI}	VTc2Q3	EE1223	c2	6.851 Ω	
V_{LO}	VTb2Q3	EE1323	b2		

Technician(s) _____ Date 12/1/04

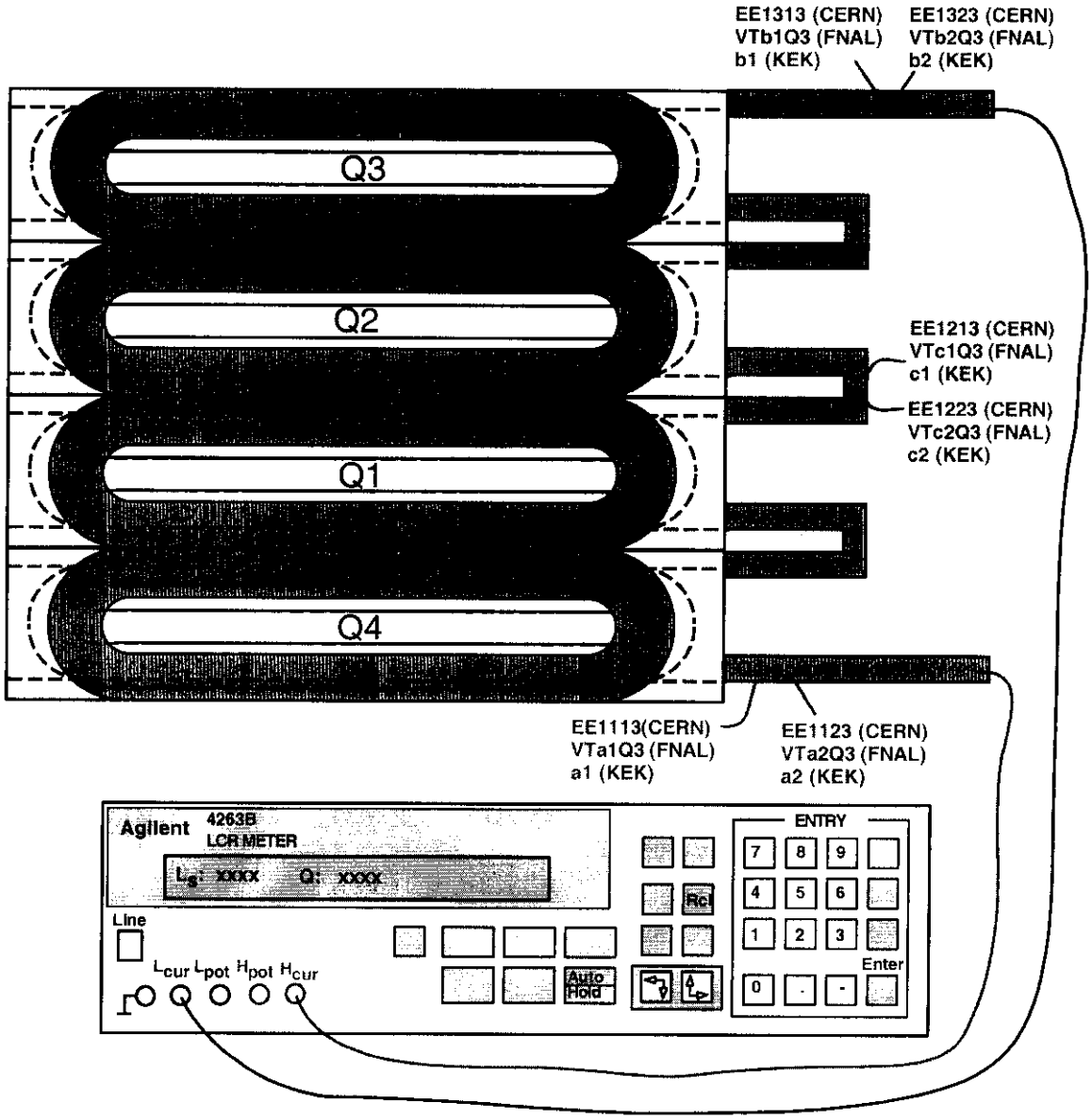
To measure Ls and Q of a Q3 Cold Mass:

1. Use Agilent 4263B LCR Meter.
2. Turn power on by pushing line button. Wait 30 seconds until display screen is lit.
3. Recall program #1. To do this, push recall (Rcl), then push #1, then push Enter.
4. Push Auto/Hold button to release hold.
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.
6. Connect H_{cur} to Quadrant 4 power lead as shown in figure.
7. Connect L_{cur} to Quadrant 3 power lead as shown in figure.
8. Connect H_{pot} and L_{pot} buttons to voltage taps as shown below.

To measure Q3:

- To measure Quadrants 1&4, connect H_{pot} to VTa1 (EE1113 for Q3), and L_{pot} to VTc1 (EE1213 for Q3).
- To measure Quadrants 2&3, connect H_{pot} to VTc1 (EE1213 for Q3), and L_{pot} to VTb1 (EE1313 for Q3).
- To measure total, connect H_{pot} to VTa1 (EE1113 for Q3), and L_{pot} to VTb1 (EE1313 for Q3).

9. Read Ls and Q from display and record in traveler.



(Q3) Inductance				Nominal 15 to 16 mH	
Voltage Tap Serial Numbers				Total Inductance	
Connect	Fermi	CERN	KEK		
H_{POT}	VTa1Q3	EE1113	a1	15.117 mH	1612
L_{POT}	VTc1Q3	EE1213	c1		1512
H_{POT}	VTc1Q3	EE1213	c1	15.126 mH	1512
L_{POT}	VTb1Q3	EE1313	b1		1412

				Nominal 30 to 32 mH	
				Total Inductance	
H_{POT}	VTa1Q3	EE1113	a1	30.237 mH	1612
L_{POT}	VTb1Q3	EE1313	b1		1412

(Q3) Q-Factor				Nominal 1.0 to 1.2
Voltage Tap Serial Numbers				Total Q
Connect	Fermi	CERN	KEK	
H_{POT}	VTa1Q3	EE1113	a1	1.1
L_{POT}	VTc1Q3	EE1213	c1	
H_{POT}	VTc1Q3	EE1213	c1	1.1
L_{POT}	VTb1Q3	EE1313	b1	

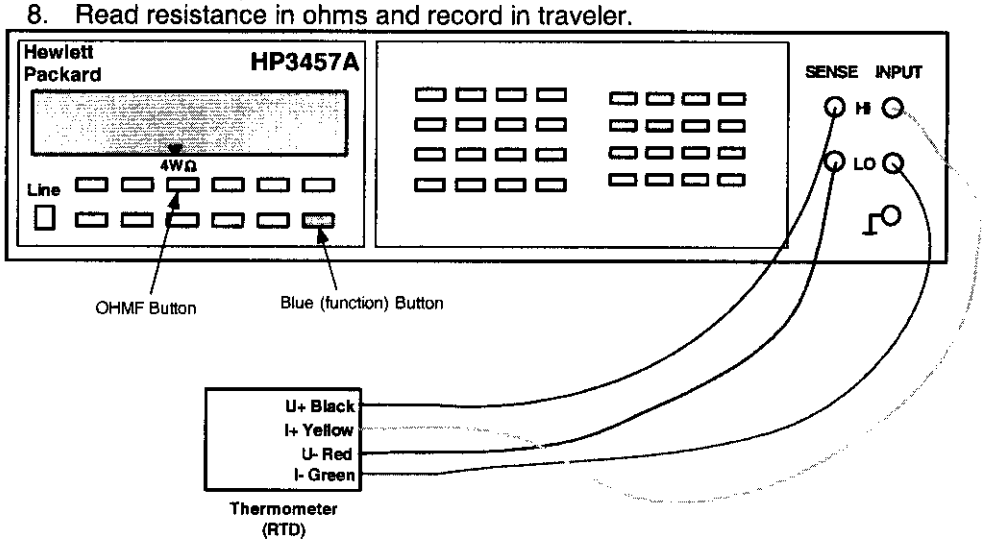
				Nominal 1.0 to 1.2
				Total Inductance
H_{POT}	VTa1Q3	EE1113	a1	1.1
L_{POT}	VTb1Q3	EE1313	b1	

Technician(s)

Date 12/1/04

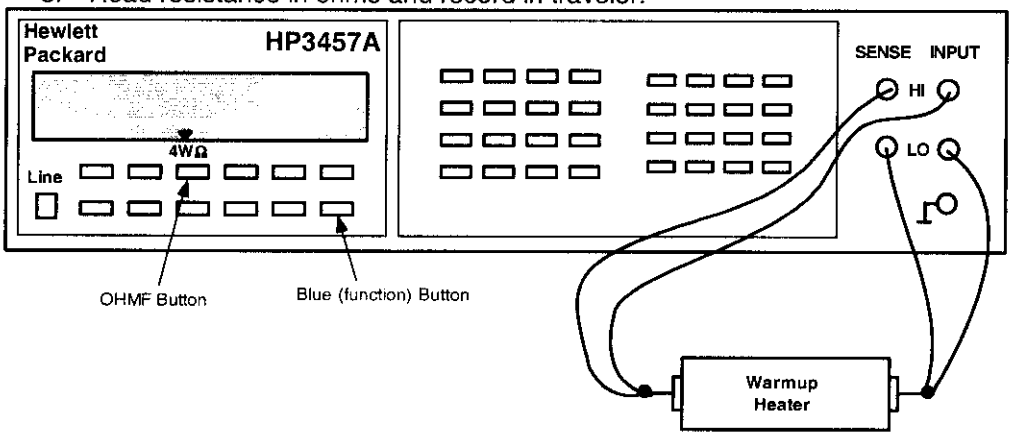
To measure the resistance of a Thermometer (RTD):

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 4WΩ (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 4WΩ (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.



Q3 - RTD's and Cryogenic (warm-up) Heaters				
Temperature of Building (± 5°): 65°				
Component	**Fermi**	**CERN**	**Range**	**Resistance**
Q3 RTD, primary	TaQ3	TT8313	**60 to 70 Ω**	70.974 Ω
Q3 RTD, redundant	TbQ3	TT8323	**60 to 70 Ω**	76.479 Ω
Q3 Cryogenic (warm-up) Heater (LE) - wire at top (CERN #1 I+)	W1aQ3	EH8313+	**16 to 18.5 Ω**	17.9509 Ω
Q3 Cryogenic (warm-up) Heater (LE) - wire at bottom (CERN #1 I-)	W2aQ3	EH8313-		
Q3 Cryogenic (warm-up) Heater (Non-LE) - wire at top (CERN #2 I+)	W1bQ3	EH8323+	**16 to 18.5 Ω**	17.5527 Ω
Q3 Cryogenic (warm-up) Heater (Non-LE) - wire at bottom (CERN #2 I-)	W2bQ3	EH8323-		

Technician(s) _____ Date 12/1/04

Using the Hewlett Packard HP3457A digital multimeter, measure the Protection (Strip) Heater Resistance for Q3.

Q3 Protection (Strip) Heater Resistance					
Fermi	**CERN**	**KEK**	**Description**	**Limit**	**Resistance**
H1aQ3	**YT1113+**	**HA1**	**Circuit A**	**28 to 32 Ω**	30.423 Ω
H2aQ3	**YT1113-**	**HA2**			
H1bQ3	**YT1123+**	**HB1**	**Circuit B**	**28 to 32 Ω**	30.404 Ω
H2bQ3	**YT1123-**	**HB2**			

Technician(s) _____ Date 12/1/04

7.2 Using the HP4284A, connect power thru the corrector Power Leads (H3B and H3A to measure Q3-H3 or V3B and V3A to measure Q3-V3 or B3B and B3A to measure Q3-V3 or B6B and B6A to measure Q3-B6).
Connect the Sense Leads as shown in table below and record resistance.

MCBXA Corrector Coil Taps				
Component	FermiLab Label	CERN Label	Range	Resistance
Q3 - H3	VTH3	EE8123	_____ Ω	Ω
	H3B	N/A		
Q3 - V3	VTV3	EE8113	_____ Ω	Ω
	V3B	N/A		
Q3 - V3	VTB3	EE8313	_____ Ω	Ω
	B3B	N/A		
Q3 - B6	VTB6	EE8613	_____ Ω	Ω
	B6B	N/A		

Technician(s) _____ Date _____

Using the HP4284A, connect power thru the corrector Power Leads (A2B and A2A to measure Q3-A2).
Connect the Sense Leads as shown in table below and record resistance.

MQSX Corrector Coil Taps				
Component	FermiLab Label	CERN Label	Range	Resistance
Q3 - A2	VTA2	EE8223	_____ Ω	Ω
	A2B	N/A		

Technician(s) _____ Date _____

Using the HP4284A, connect power thru the corrector Power Leads (A3B and A3A to measure Q3-A3 or A4B and A4A to measure Q3-A4 or B4B and B4A to measure Q3-B4).
Connect the Sense Leads as shown in table below and record resistance.

MCSOX Corrector Coil Taps				
Component	FermiLab Label	CERN Label	Range	Resistance
Q3 - A3	VTA3	EE8323	_____ Ω	Ω
	A3B	N/A		
Q3 - A4	VTA4	EE8423	_____ Ω	Ω
	A4B	N/A		
Q3 - B4	VTB4	EE8413	_____ Ω	Ω
	B4B	N/A		

Technician(s) _____ Date _____

8.0 Final Preparations

8.1 Prepare the Power Leads to be cut by measuring and marking the appropriate cutoff location as per Q3 Module Assembly (ME-369900). Remove any Kapton insulation from the end of the lead to approximately 4 inches beyond the cutoff mark. Clamp the Leads, individually, using the "Lead Clamp Block Tooling".

Technician(s) _____ Date 11/30/04

8.2 Cut the Power Leads as per Q3 Module Assembly (ME-369900).

Technician(s) _____ Date 11/30/04

8.3 Fuse the Ends of the Leads.

Weldor(s) _____ Date 11/30/04

8.4 Remove Clamps when fusing is complete and it is safe to do so.

Technician(s) _____ Date 11/30/04

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

Technician(s) _____ Date 11/30/04

9.0 Production Complete

9.1 Process Engineering verify that the LHC Q3 Cryostat Assembly Traveler (5520-TR-333730) 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:

John J. Szostak
Process Engineering/Designee

APR 11 2005
Date

12/1/04

THIS REPLACES PAGE 24 STEP 7.2

Corrector Assembly	Corrector Element	Readout	Labels	Power Labels	Resistance
MQSX	MQSX	A2A	EE8223	A2A, A2B	.05Ω
		EE8223	A2B		7.61
		A2A	A2B		7.66
MCBXA	MCBXV	V3A	EE8113	V3A, V3B	.01Ω
		EE8113	V3B		17.36Ω
		V3A	V3B		17.37Ω
	MCBXH	H3A	EE8123	H3A, H3B	.01Ω
		EE8123	H3B		21.26Ω
		H3A	H3B		21.27Ω
	MCTX	B6A	EE8613	B6A, B6B	
		EE8613	B6B		
		B6A	B6B		
	MCSX	B3A	EE8313	B3A, B3B	
		EE8313	B3B		
		B3A	B3B		
MCSOX	MCOSX	A4A	EE8423	A4A, A4B	
		EE8423	A4B		
		A4A	A4B		
	MCOX	B4A	EE8413	B4A, B4B	
		EE8413	B4B		
		B4A	B4B		
	MCSSX	A3A	EE8323	A3A, A3B	
		EE8323	A3B		
		A3A	A3B		13.36Ω

11-Mar-2005, Jamie Blowers JB

It is not understood why this electrical inspection form was not filled out completely. This magnet, however, was inspected again in the Shipping traveler (TR-333731). It is apparent that some of the data from the Shipping traveler do not match up with the data in this form. It is believed that this is a result of the difference in measurement technique between ICB personnel and IB1 personnel (this form was done by ICB personnel while the Shipping inspection was done by IB1 personnel).

The bottom line is that the persons who are in a position to judge the electrical inspection data were pleased with what they saw from the LQXC01 shipping traveler, and so this magnet is just fine.

TD - Engineering Fabr tion Component Kit List

ORIGINAL

Process Engineering

Component Serial No. LQXC01

Kit submitted by: John Szostak Ext. 2003

Fermi ID No. 02943C

Date submitted: 9-Sep-04

Need date: 15-Sep-04

Deliver to: ICB

Use with Traveler No. 333730

Job No. 248

M&S task number: 300 1.1.1.3.4

Drawing Title: **Q3 CRYOSTAT GENERAL ASSEMBLY**

Drawing No. **ME-390132** **Rev. E**

Material Control

Parts available

Verified by: M. Schmidt

Fermi ID No. 04223N

Date submitted to stockroom: 14-Sep-04

Parts issued

Issued by: [illegible]

Fermi ID No. 4223

Date issued: 9/24/04

Parts received by E&F: [illegible]

Fermi ID No. 4895

Date received by E&F: 9/24/04

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
1	ADJUSTING SCREW	MB	390039	C	EA	8	IB4 Bin	8	✓	81596	119 pcs.
2	VACUUM VESSEL ASSEMBLY	ME	390133	E		ICB HAS			✓		
3	TARGET HOLDER	MD	390211	B	EA	4	R10,1,1	4	✓	74751	54 pcs.
4	Blank Non-Rotatable Conflat Flange, 4.62" OD 304 SS	MA	390374	*	EA	8	R8,3,4	8	✓	78987	136 pcs.
5	COPPER GASKET	MA	390375	*	EA	8	IB4 Bin	8	✓	78429	147 pcs.
6	BOLT SET, HEX HEAD, 5/16 - 24 x 1.25 w/ WASHER	MA	390376	*	EA	80	IB4 Bin	80	✓	72306	1364 pcs.
7	WASHER .656" ID x 1.38" OD x .13" THK, STN STEEL	MA	390377	*	EA	8	IB4 Bin	8	✓	77866	138 pcs.
8	REFERENCE SOCKET CUP (Furnished by CERN)	MA	390426	*	EA	8	R1,3,5	8	✓	77884	144 pcs.
9	VINYL FLANGE COVER FOR 75 MM FLANGE	MA	390491	*	EA	6	IB4 Bin	6	✓	78835	219 pcs.
10	VINYL FLANGE COVER FOR 114 MM FLANGE	MA	390492	*	EA	4	IB4 Bin	4	✓	78836	215 pcs.

ORIGINAL

TD - Engineering Fabr tion Component Kit List

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
11	VINYL FLANGE COVER FOR 134 MM FLANGE	MA	390493	*	EA	7	IB4 Bin	7	✓	78837	298 pcs.
12	VINYL FLANGE COVER FOR 201 MM FLANGE	MA	390494	*	EA	1	IB4 Bin	1	✓	78834	89 pcs.
13	ALIGNMENT FIDUCIAL COVER	MA	390495	*	EA	8	IB4 Bin	8	✓	78957	222 pcs.
14	TARGET HOLDER, RIGHT	MD	390539	*	EA	2	R8,S1,L3	2	✓	79556	35 pcs.
15	TARGET HOLDER, LEFT	MD	390540	*	EA	2	R8,S1,L5	2	✓	79555	35 pcs.
16	M16-2 x 70.0 mm LG HEX SHCS, 18-8 STN STEEL	MA	393021	*	EA	8	IB4 Bin	8	✓	77840	173 pcs.
17	M6 FLAT WASHER, 18-8 STN STEEL	MA	393024	*	EA	32	IB4 Bin	32	✓	78891	560 pcs.
18	M10-1.5 x 25mm LG HEX SHCS 18-8 STN STEEL	MA	393036	*	EA	24	IB4 Bin	24	✓	77899	450 pcs.
19	M6-1.0 x 35mm LG HEX SHCS 18-8 STN STEEL	MA	393045	*	EA	16	IB4 Bin	16	✓	78886	288 pcs.
20	M8 x 30mm LG HEX SPRING PIN 18-8 STN STEEL	MA	393048	*	EA	8	IB4 Bin	8	✓	78887	158 pcs.
21	M10 LOCK WASHER, 18-8 STN STEEL	MA	393220	*	EA	24	IB4 Bin	24	✓	80024	572 pcs.
22	STD. SPRING PIN SLOTTED M4 x 20mm LG. PLAIN STEEL	MA	393360	*	EA	16	R2,2,3	16	✓	81763	280 pcs.
	INSULATED SHIELD AND PIPING ASSEMBLY	ME	390212	A		1					
23	Q3 SHIELD MLI INNER BLANKET	ME	390489	*	EA	1	Site 38	1	✓	79571	9 pcs.
24	Q3 SHIELD MLI OUTER BLANKET	ME	390490	*	EA	1	Site 38	1	✓	79572	9 pcs.
	Q3 THERMAL SHIELD ASSEMBLY	ME	390436	C	EA	1					
25	SUPPORT BAND	ME	390083	A	EA	4	P/N	4	✓	77146	72 pcs.
26	RETAINER	MA	390086	*	EA	16	IB4 Bin	16	✓	78914	290 pcs.

ORIGINAL

TD - Engineering Fabr tion Component Kit List

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
27	ALUMINUM SPACER	MA	390373	*	EA	32	BIN ~~P/N~~	32	✓	76874	72 pcs.
28	RETAINING WASHER	MA	390378	*	EA	240	IB4 Bin	240	✓	76875	4348 pcs.
29	Q1 & Q3 SHIELD MID-SECTION SECTION	ME	390435	*	EA	2	P/N	2	✓	79383	28 pcs.
30	Q3 COOLING TUBE WELDMENT	MD	390437	A	EA	2	P/N	2	✓	79281	18 pcs.
31	Q3 END SECTION	ME	390439	*	EA	4	P/N	4	✓	79622	36 pcs.
32	COOLING PIPE BRACKET	MD	390783	*	EA	4	IB4	4	✓	81981	104 pcs.
33	BUTTON HEAD CAP SCREW, M5 x 16.0 LG.	MA	393028	*	EA	240	IB4 Bin	240	✓	79003	4369 pcs.
	Q3 INTERNAL PIPING ASSEMBLY	ME	390213	B	EA	1					
* 34	PUMPING LINE END FLANGE	MB	390032	B	EA	1	IB4 Bin	1	✓	77210	60 pcs.
* 35	COOLDOWN LINE END FLANGE	MB	390033	B	EA	1	IB4 Bin	1	✓	77208	43 pcs.
36	Q1 / Q3 PIPE SUPPORT ASSEMBLY	MD	390092	A	EA	3	P/N	3	✓	76617	42 pcs.
37	RETAINING CLIP	MA	390103	*	EA	12	IB4 Bin	12	✓	76785	216 pcs.
38	TIE BAR RETAINING CLAMP	MB	390136	*	EA	4	IB4 Bin	4	✓	77132	69 pcs.
39	Q3 PUMPING LINE	MB	390224	*	EA	2	P/N	2	✓	80217	9 pcs.
40	Q3 COOLDOWN LINE	MB	390225	A	EA	1	P/N	1	✓	81655	9 pcs.
41	Q3 4.5K INTERCEPT LINE TUBE	MB	390226	*	EA	3	Site 38	3	✓	81303	27 pcs.
42	WELD CONNECTOR ADAPTER	MC	390278	*	EA	1	R1,S1,L3	1	✓	79471	14 pcs.
43	INTERCEPT LINE PIPE STOP	MA	390379	A	EA	6	IB4 Bin	6	✓	78894	155 pcs.

ORIGINAL

TD - Engineering Fabr tion Component Kit List

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
44	Q1 / Q3 PIPE ANCHOR	MC	390486	*	EA	1	R8,S1,L4	1	✓	79387	15 pcs.
45	Q3 COLD MASS ASSEMBLY	ME	390528	A		ICB HAS					
46	Q3 PUMPING LINE NON-IP END EXTENSION SPOOL	MD	390650	*	EA	1	R10,1,3	1	✓	81004	9 pcs.
47	Q3 COOLDOWN LINE NON-IP END EXTENSION SPOOL	MC	390663	*	EA	1	R7,1,2	1	✓	81008	9 pcs.
48	4.5K INTERCEPT LINE NON-IP END EXTENSION WELDMENT	MD	390679	*	EA	3	R1,3,2	3	✓	81267	9 pcs.
49	M6 x 45.0mm LG HEX SHCS, 18-8 STN STEEL	MA	393017	*	EA	4	IB4 Bin	4	✓	77846	28 pcs.
50	M6 HEX NUT, 18-8 STN STEEL	MA	393022	A	EA	4	IB4 Bin	4	✓	78236	30 pcs.
51	M6 FLAT WASHER 18-8 STN STEEL	MA	393024	*	EA	4	IB4 Bin	4	✓	78891	560 pcs.
52	M6 LOCK WASHER 18-8 STN STEEL	MA	393026	*	EA	4	IB4 Bin	4	✓	77850	28 pcs.
	Q3 HEAT EXCHANGER ASSEMBLY	ME	390214	A	EA	1					
53	CORRUGATED TUBE FLANGE	MB	390030	A	EA	1	IB4 Bin	1	✓	77207	52 pcs.
	OUTER SHELL WELDMENT	MD	390385	A	EA	1					
54	FLAT END CAP	MD	390178	*	EA	1	R1,2,3	1	✓	79644	14 pcs.
55	PIPE	MD	390215	*	EA	1	P/N	1	✓	79499	9 pcs.
56	EXTENSION SPOOL	MD	390659	*	EA	1	R10,1,3	1	✓	81007	9 pcs.
57	EXTENSION WELD FITTING	MD	390661	*	EA	1	IB4 Bin	1	✓	80832	13 pcs.
	CORRUGATED TUBE ASSEMBLY	ME	390216	A	EA	1					
58	CORRUGATED TUBE SUPPORT	MC	390028	*	EA	6	R9,S1,L4	6	✓	78144	61 pcs.

ORIGINAL

TD - Engineering Fabr tion Component Kit List

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
59	CORRUGATED TUBE RESTRICTOR	MC	390029	A	EA	1	R9,S1,L4	1	✓	77724	52 pcs.
60	CORRUGATED TUBE WELDMENT	ME	390395	A	EA	1	P/N	1	✓	79283	9 pcs.
61	EXTENSION ADAPTER	MD	390658	*	EA	1	R7,1,4	1	✓	81006	9 pcs.
	Q3 PIPING ASSEMBLY INSULATION INSTALLATION	ME	390545	A	EA	1					
62	Q1 / Q3 MLI END BLANKET	ME	390542	*	EA	1	Site 38	1	✓	79877	23 pcs.
63	Q1 / Q3 MLI MID BLANKET	ME	390543	*	EA	1	Site 38	1	✓	79879	13 pcs.
	Q1 & Q3 INSTALLATION TIE ROD ASSEMBLY	MC	390638	*	EA	2					
64	Q1 & Q3 INSTALLATION TIE-ROD SHORT THREADED ROD	MA	390639	*	EA	2	R2,2,2	2	✓	81098	16 pcs.
65	JAM NUT (LH)	MA	393046	*	EA	4	IB4 Bin	4	✓	80074	78 pcs.
66	STD ANSI HEX THIN JAM NUT 1/2-13 UNC	MA	393225	*	EA	8	IB4 Bin	8	✓	80073	188 pcs.
67	STD HEX COUPLING NUT 1/2-13 UNC (RH-LH)	MA	393226	*	EA	4	IB4 Bin	4	✓	80075	72 pcs.
68	THREADED ROD 1/2-13 UNC - 24 x 6 FT LONG	MA	393227	*	EA	2	R7,2,4	2	✓	80061	36 pcs.
69	THREADED ROD 1/2-13 UNC - 24 (LH) x 3 FT LONG	MA	393228	*	EA	2	R1,2,3	2	✓	80072	34 pcs.
	Q3 SUSPENSION SYSTEM INSTALLATION	ME	390528	*	EA	1					
70	TIE BAR SHIM, 6.4 mm	MB	390118	*	EA	4	~~IB4 Bin~~ ICB Hardware			ICB HAS	19 pcs.
71	TIE BAR SHIM, 2.4 mm	MB	390119	*	EA	4	~~IB4 Bin~~	→		ICB HAS	18 pcs.
72	TIE BAR SHIM, 0.8 mm	MB	390120	*	EA	4	~~IB4 Bin~~ ICB Hardware			ICB HAS	18 pcs.
73	SUSPENSION MTG BRACKET	MD	390279	*	EA	4	R9,S1,L1	4	✓	77180	56 pcs.

ORIGINAL

TD - Engineering Fabrication Component Kit List

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
74	Q1 / Q3 TIE BAR ASSEMBLY	MC	390400	*	EA	2	P/N	2	✓	77976	28 pcs.
75	Q3 COLD MASS WELDED ASSEMBLY	ME	390529	B		ICB HAS					
76	M8 x 50.0 mm LG SHCS 18-8 STN STEEL	MA	393020	*	EA	12	IB4 Bin	12	✓	77847	18 pcs.
77	M8 HEX NUT, 18-8 STN STEEL	MA	393023	*	EA	12	IB4 Bin	12	✓	78890	136 pcs.
78	M8 FLAT WASHER, 18-8 STN STEEL	MA	393025	*	EA	12	IB4 Bin	12	✓	76745	898 pcs.
79	M8 LOCK WASHER, 18-8 STN STEEL	MA	393027	*	EA	12	IB4 Bin	12	✓	76744	921 pcs.
	FIXED SUPPORT ASSEMBLY	ME	390041	C	EA	1					
80	SUSPENSION SYSTEM SUPPORT RING ASSEMBLY	ME	390043	B	EA	1	NT02409	1	✓	76906	12 pcs.
81	SUSPENSION SYSTEM SUPPORT PIN	MB	390047	B	EA	2	R8,S2,L1	2	✓	76914	72 pcs.
82	SUSPENSION SYSTEM SUPPORT PIN SHIM - 1mm	MA	390275	A	EA	8	IB4 Bin	8	✓	76911	20 pcs.
83	SUSPENSION SYSTEM SUPPORT PIN SHIM - 0.5mm	MA	390276	*	EA	8	IB4 Bin	8	✓	76910	32 pcs.
84	SUSPENSION SYSTEM SUPPORT PIN BOLTS	MA	390277	*	EA	8	IB4 Bin	8	✓	76913	280 pcs.
85	TWO PIECE CLAMP ON COLLAR	MA	390321	A	EA	4	IB4 Bin	4	✓	76912	64 pcs.
86	SUSPENSION SYSTEM SUPPORT PIN SHIM 0.13 mm	MA	390480	*	EA	8	R2,S2,L4	8	✓	79121	273 pcs.
87	SUSPENSION SYSTEM SUPPORT SHIM 0.25 mm	MA	390481	*	EA	12	R2,S2,L4	12	✓	79122	417 pcs.
	SLIDING SUPPORT ASSEMBLY	ME	390042	C	EA	1					
88	SUSPENSION SYSTEM SUPPORT RING ASSEMBLY	ME	390043	B	EA	1	NT02409	1	✓	76906	12 pcs.
89	SUSPENSION SYSTEM SUPPORT PIN	MB	390047	A	EA	2	R8,S2,L1	2	✓	76914	72 pcs.

ORIGINAL

TD - Engineering Fabrication Component Kit List

	Description	Dwg Size	Number	Rev	Unit	Quantity Required	Location	Quantity Issued	E&F Verified	Routing Form Number	Spares Number / Comment
90	SUSPENSION SYSTEM SUPPORT PIN SHIM - 1mm	MA	390275	A	EA	8	IB4 Bin	8	✓	76911	20 pcs.
91	SUSPENSION SYSTEM SUPPORT PIN SHIM - 0.5mm	MA	390276	*	EA	8	IB4 Bin	8	✓	76910	32 pcs.
92	SUSPENSION SYSTEM SUPPORT PIN BOLTS	MA	390277	*	EA	8	IB4 Bin	8	✓	76913	280 pcs.
93	SUSPENSION SYSTEM SUPPORT PIN SHIM 0.13 mm	MA	390480	*	EA	8	R2,S2,L4	8	✓	79124	273 pcs.
94	SUSPENSION SYSTEM SUPPORT SHIM 0.25 mm	MA	390481	*	EA	12	R2,S2,L4	12	✓	79122	417 pcs.
Q3 MAGNET INSULATION INSTALLATION		ME	390527	B	EA	1					
95	MOUNTING LUG BLANKET	MC	390496	*	EA	8	Site 38	8	✓	79873	207 pcs.
96	Q1/Q3 END BLANKET	ME	390521	*	EA	2	Site 38	2	✓	79874	22 pcs.
97	Q1/Q3 MID BLANKET	ME	390522	*	EA	1	Site 38	1	✓	79875	13 pcs.

Traveler Title:	Specification No:	Revision:	DR No:
Q2 LQXB Cryostat Final Assembly Traveler	5520-TR-333644	D	HGQ-0469

Step No:	Drawing No:	Routing Form No:	Serial No:	Rework ID:
3.5	390206		LQXB06	0

Discrepancy Description:

During the building process, the leak check ticket for the vacuum vessel was lost.

Originator: Steve Gould

Date: 7/9/2004

Cause of Nonconformance:

Someone misplaced the leak check ticket.

Responsible Authority: Thomas Page

Date: 7/9/2004

Disposition:

Use vessel. All the vessels passed leak check.

Responsible Authority: Thomas Page

Date: 7/9/2004

Corrective Action to Prevent Recurrence:

Remove leak check tickets prior to performing any work on components. No traveler revision required.

Responsible Authority: Thomas Page

Date: 7/9/2004

Corrective Action/Disposition Verified By: John Szostak

Date: 7/27/2004

Will Configuration be affected?: ☐ YES ☑ NO

Identified problem area:

☐ Material ☐ Manpower ☑ Method ☐ Machine ☐ Measurement

Reviewed By: Bob Jensen

Date: 7/28/2004

Traveler Title:	Specification No:	Revision:	DR No:
LHC Q3 LQXC Cryostat Final Assembly Traveler	5520-TR-333730	None	HGQ-0509

Step No:	Drawing No:	Routing Form No:	Serial No:	Rework ID:
6.8	ME-390132		LQXC01	0

Discrepancy Description:

One end of the assembly piping and shields seems to be lower in the vessel than the rest of the magnet assembly.

Originator: Damon Bice

Date: 11/20/2004

Cause of Nonconformance:

The shield was sagging at the ends of the magnet. The cause is unknown.

Responsible Authority: Thomas Page

Date: 11/22/2004

Disposition:

We loosened the screws on the shield and lifted the ends of the shield up by 6 mm. We then tightened the screws and the shield stayed in place. It appears the sag was taken out of the shield ends. A laser tracker measurement of the pipes and shield is in progress.

Responsible Authority: Thomas Page

Date: 11/22/2004

Corrective Action to Prevent Recurrence:

Ensure the shield is not sagging prior to the final tightening of the shield screws. (TRR No. 1689)

Responsible Authority: Thomas Page

Date: 11/22/2004

Corrective Action/Disposition Verified By: John Szostak

Date: 1/19/2005

Will Configuration be affected?: ☐ YES ☑ NO

Identified problem area:

☐ Material ☐ Manpower ☑ Method ☐ Machine ☐ Measurement

Reviewed By: Bob Jensen

Date: 1/20/2005

Traveler Title:	Specification No:	Revision:	DR No:
LHC Q3 LQXC Cryostat Final Assembly Traveler	5520-TR-333730	None	HGQ-0510

Step No:	Drawing No:	Routing Form No:	Serial No:	Rework ID:
6.8	ME 390133		LQXC01	0

Discrepancy Description:

During the lowering of the cold mass in the vaccuum vessel, 2 of the lug bolts froze inside the vacuum vessel.

Originator: Damon Bice

Date: 11/20/2004

Cause of Nonconformance:

Lugs galled up.

Responsible Authority: Thomas Page

Date: 11/22/2004

Disposition:

Try using the impact wrench to remove the lugs. If this does not work, use the recipricating saw and cut the lugs out of the vacuum vessel.

Responsible Authority: Thomas Page

Date: 11/22/2004

Corrective Action to Prevent Recurrence:

There is no corrective action that can be taken at this time.

Responsible Authority: Thomas Page

Date: 11/22/2004

Corrective Action/Disposition Verified By: John Szostak

Date: 1/19/2005

Will Configuration be affected?: ☐ YES ☑ NO

Identified problem area:

☑ Material ☐ Manpower ☐ Method ☐ Machine ☐ Measurement

Reviewed By: Bob Jensen

Date: 1/20/2005

Revision Request Control Number: 1689

Specification Number: 5520 - TR - 333730 Current Revision: NONE

Traveler or Document Title LHC Q3 LQXC Cryostat Final Assembly Traveler

Step #/Description of Revision:

4.4 Modified Step. Changed Qty of Pipe Supports (MD-390092) from 2 to 3 per LQXC01.
5.1 Added Step. "Install the Threaded Rods (Tie Rod Assembly) (MC-390638).See copy of step 19.9 (Q3 Module Assembly Traveler, TR-333729) in designated book, for the distance between the Suspension Rings. Record the previously recorded measurements below." per TR-333730, LQXC01 and Tom Page.
5.8 Moved Step. "Install the Cold Mass Insulation Mounting Lug Blankets(MC-390496)." per TR-333730, LQXC01 and Tom Page. New Step 5.2.
5.10 Modified Step. Added "Ensure the shield is not sagging prior to the final tightening of the shield screws." New Step 5.11. DR No. HGQ-0509.
7.2 Modified Step. Added Picture of Corrector Bus Leads. Modified Table.

John Szostak	Jim Rife	12/3/2004
Originator	Responsible Authority	Date
Revision Incorporated into the Traveler:	John Szostak	12/15/2004
	Revision Incorporated By	Date
Process Engineering Final Review:	Bob Jensen	12/15/2004
	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 initialed 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.

Revision Request Control Number: 1711

Specification Number: 5520 - TR - 333730 Current Revision: A

Traveler or Document Title LHC Q3 LQXC Cryostat Final Assembly Traveler

Step #/Description of Revision:

1.6 Added Step. "Protect the bellows during all stages of production." DR No. HGQ-0500.
3.4 Modified Step. Changed to "Attach the Leak Check sticker for the Vacuum Vessel Assembly (ME-390133) per ES-107240 to the table below." Per DR No. HGQ-0469.
4.41 Added Step. "Install the Fiducial Mounting Blocks (MB-390808) per Q3 Cold Mass Welded Assembly (ME-390529)."
4.42 Added Step. "Weld the Fiducial Mounting Blocks (MB-390808) per Q3 Cold Mass Welded Assembly (ME-390529)."
4.45 Modified Step. Added more Leak Check boxes for all three 4.5k Intercept Line Leak Checks. Added picture showing locations of each and numbering.
4.46 Added Step. "Leak check the Cooldown Line (MD-390225)." per production request.
4.47 Added Step. "Leak check the Pumping Line (MB-390224)." per production request.
8.5 Removed Step. "Install the Vinyl Flange Covers (MA-390491),(MA-390492), (MA-390493), (MA-390494), & the Alignment Fiducial Covers (MA-390495)." Moved to Shipping Traveler per production request.

John Szostak	Jim Rife	1/26/2005
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):

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