

# MQXB

Job No.:



335

Project/Task No.



300/1.1.3.1.8

Series:



MQXB

Serial No:



MBX2 CG001

Rework ID:



0

Specification No.:



333757

Revision:



None

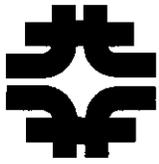
**Place Face Down For Scanning!!!**

# MBX2 CG001-0

**MQXB**

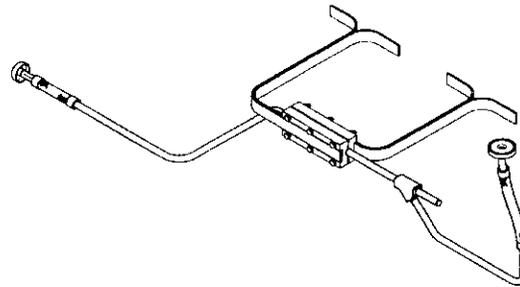
**LHC DFBX  
Instrument Duct  
Weldment & Wiring  
Assembly  
(DFBXCNG)  
333757 /Rev. None**

**MBX2 CG001-0**



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

**LHC DFBX INSTRUMENT DUCT (MBX2)  
WELDMENT & WIRING  
ASSEMBLY**



**Reference Drawing(s):  
LHC DFBX Instrument Duct  
Weldment & Wiring Assembly  
ME-418181**

**Project # / Task #: 300/1.1.3.1.8**

**Job #: 335**

**Released by: Bob Jensen**

**Magnet/Device Series: MQXB**

**Date: 1/15/04 9:01:25 AM**

**Scan Pages: 18**

**Prepared by: B. Jensen**

<b>Title</b>	<b>Signature</b>	<b>Date</b>
<b>TD / E&amp;F Process Engineering</b>	<b>Bob Jensen</b> Bob Jensen / Designee	<b>1/9/04</b>
<b>TD / D&amp;T Assembly</b>	<b>Dan Eddy</b> Dan Eddy / Designee	<b>1/12/04</b>
<b>TD / D&amp;T Fabrication Manager</b>	<b>Fred Lewis</b> Fred Lewis / Designee	<b>1/9/04</b>
<b>TD / D&amp;T Project Engineer</b>	<b>Clark Reid</b> Tom Peterson / Designee	<b>1/13/04</b>

**Revision Page**

<u>Revision</u>	<u>Step No.</u>	<u>Revision Description</u>	<u>TRR No.</u>	<u>Date</u>
None	N/A	Initial Release	N/A	1/9/04

**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 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 Personnel shall perform all tasks in accordance with current applicable ES&H guidelines and those specified within the step.

2.0 Parts Kit List

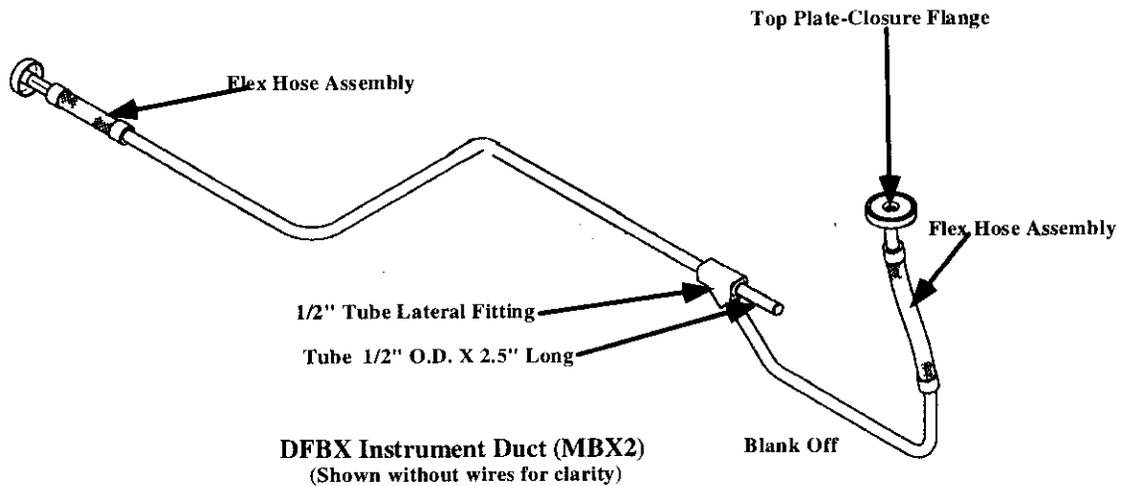
- 2.1 No Parts Kit required.

3.0 Assembly & Welding

3.1 Acquire the following components and complete the assembly by welding components together in accordance with Dwg ME-418181.

Note: All components must be thoroughly cleaned with Isopropyl Alcohol (Fermi stock 1920-0300) or approved equivalent prior to welding.

MB-418174	Top Plate - Closure Flange	1 ea
MC-418167	Flex Hose Assembly (MQX2)(1 of 2)	1 ea
MB-418169	1/2" Tube Lateral Fitting	1 ea
MB-418168	Flex Hose Assembly (MBX2)(2 of 2)	1 ea
MB-418176	D1 Interconnect Flange	1 ea
Item #6	Tube, 1/2" O.D. x 0.049" x 2 1/2" long	1 ea
Item #6	Blank-Off	1 ea

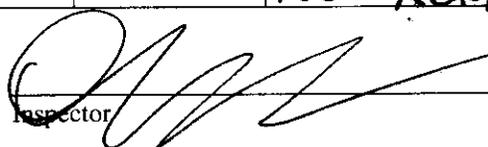


Note: Clark Reid took the conduit piping parts and drawings to the village weld shop where they were welded up as an assembly. Tom Peterson, March 19, 2004

3.2 Perform a Vacuum Leak Check of the DFBX Tube Assembly and record results below.

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			
	MASSONJIC						
		NO LEAK					

Col b  
Shocks  
11-18-03

Inspector:  Date: 11-18-03



4.0 Wire Harness Assembly

4.1 Process and assemble the following wire packages in accordance with Dwg ME-418181.

Note: Each individual wire must be labeled prior to assembly as per attached spreadsheet. Labeling should be half way from D1 Interconnect Flange to the end of the wire bundle. Labeling should be half way from Top Plate-Closure Flange and end of wire bundle and installed after wire bundle is inserted into Instrument Duct. (See Step X.X)

Note: ~ 1 twist/ 3 in –individual cables are 12 feet in length prior to twisting.

Item	Color	Gauge	Description	Wire Count	Spares	Completed by Technician
#10	Red	20	Quench Protection Twisted	4 wires (2 twisted pairs)	1 pair	DW
#11	Orange	26	Warm-Up Heaters Twisted	4 wires (2 twisted pairs)	2 wires	DW
#12	Orange	26	Dipole Voltage Taps Twisted	6 wires (3 wires twisted)		DW
#13	Gold	30	Temperature Sensors	8 wires (2 pairs)	1 wire	DW

The below list is for labeling of the wires.

MBX2		Technician	Technician
CERN Label	Description	Top Plate Closure Flange	D1 Interconnect Flange
EE111	Voltage Tap	DW	DW
EE112	Voltage Tap	DW	DW
EE131	Voltage Tap	DW	DW
EE132	Voltage Tap	DW	DW
EE151	Voltage Tap	DW	DW
EE152	Voltage Tap	DW	DW
YT111+	Cryo Heaters	DW	DW
YT111-	Cryo Heaters	DW	DW
YT112+	Cryo Heaters	DW	DW
YT112-	Cryo Heaters	DW	DW
EH831+	Warm-up Heaters	DW	DW
EH831-	Warm-up Heaters	DW	DW
EH832+	Warm-up Heaters	DW	DW
EH832-	Warm-up Heaters	DW	DW
TT831	RTDS	DW	DW
TT832		DW	DW

DW  
Technician(s)

1-23-04  
Date

4.2 Assemble the wire packages and secure into a bundle.

Jan W  
Technician(s)

1-23-04  
Date

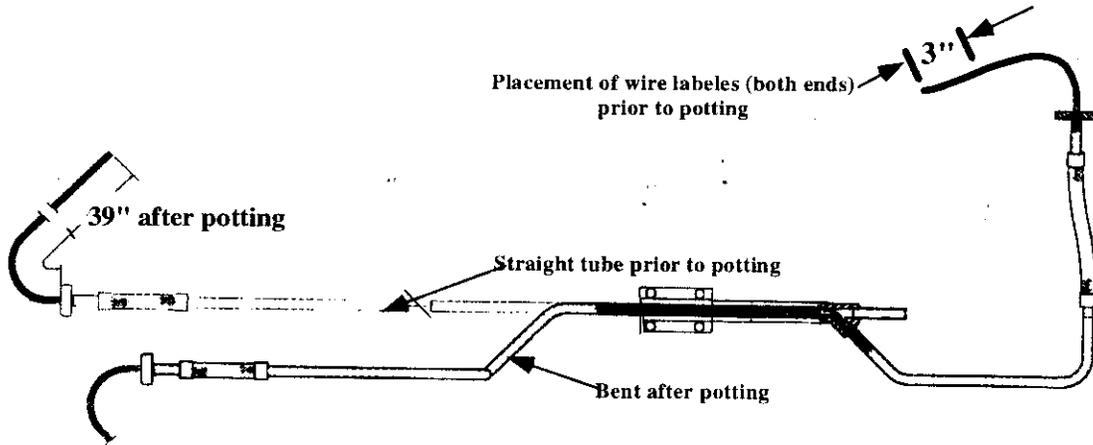
4.3 Install wire package into DFBX Duct Assembly.

Jan W  
Technician(s)

1-23-04  
Date

4.4 Labels on individual wire on both ends should be 3 inches from the end of the wires prior to potting. Also, put tape around wire bundle after labeling.

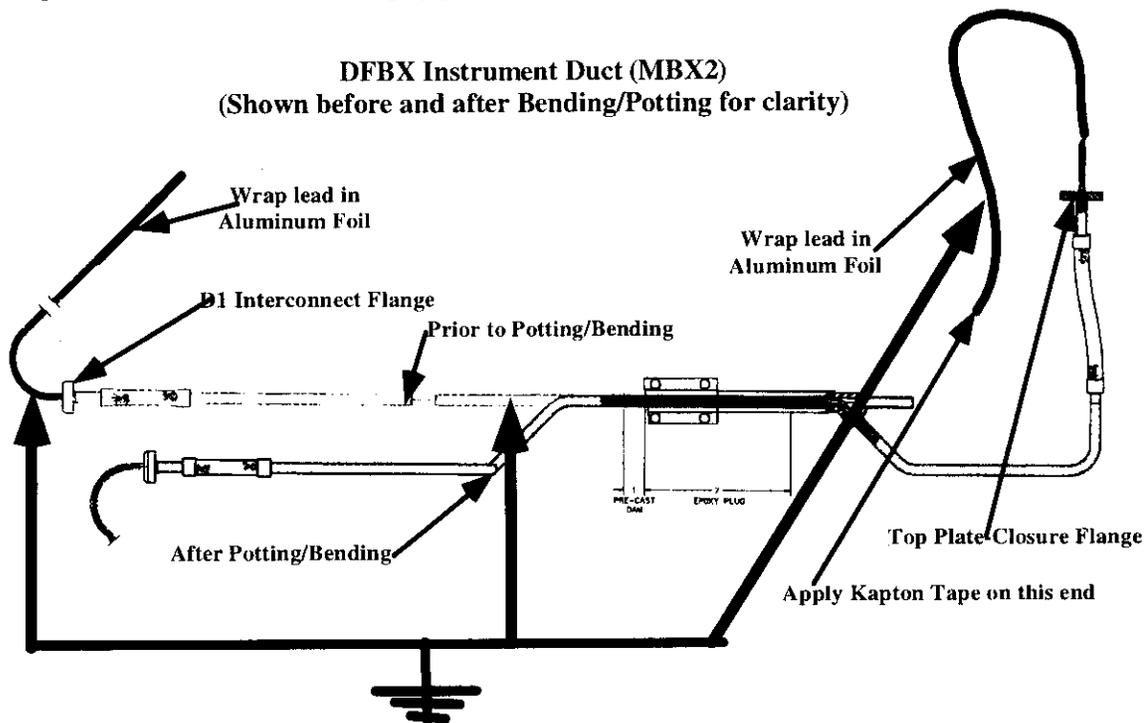
Note: See Step 4.1 for labeling spreadsheet.



Jan W  
Technician(s)

1-23-04  
Date

4.5 Prepare the wire bundle for hipotting by performing the following:



- 4.5.1 Check for continuity between all wire and for shorts between RTD wires
- 4.5.2 Place Kapton Tape on wire ends to prevent shorting.
- 4.5.3 Wrap entire lengths of excess wire extending out from both ends of the tube with aluminum foil.
- 4.5.4 Wrap wire around both ends of the tube extending over the foil to make a connection between foil and tube.
- 4.5.5 Follow Hipot Form until all Hipots are completed (See Step 4.5).
- 4.5.6 If wire(s) fail Hipot, determine which one(s) are bad, remove from the tube and install new one(s).
- 4.5.7 After Hipot is determined good, remove aluminum foil and attach wire.
- 4.5.8 Put glass tape around the labels on the non-connector end to protect them.

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Jan W.  
Technician(s)

1-23-04  
Date

4.6 Electrically check the wire bundle by performing a hipot and record results below.

Hipot	All Others Grounded	All Other Floating	Trip Voltage	5.0 Kv/Current	Comments
VTAPS	X			.04 uA	
VTAPS		X		.04 uA	
RTD's (to 300V)	X			.01 uA	
RTD's (to 300V)		X		.01 uA	
CRYO HEATERS (Warm-Up Heaters)	X			.04 uA	
CRYO HEATERS (Warm-Up Heaters)		X		.04 uA	
Strip Heaters (Potted In Pairs)					
Pair #1	X			.04 uA	
Pair #2	X			.04 uA	
Strip Heaters (Potted In Pairs)					
Pair #1		X		.04 uA	
Pair #2		X		.04 uA	
Spare VTAP Wire(2)	X			.04 uA	
Spare VTAP Wire (2)		X		.04 uA	
Spare Heater Wires (1 pair)	X			.04 uA	
Spare Heater Wires (1 pair)		X		.04 uA	
Spare RTD Wire (1)	X			.01 uA	
Spare RTD Wire (1)		X		.01 uA	

Jan W.  
Technician(s)

1.23.04  
Date

5.0 Material Development Lab

5.1 Prepare DFBX Instrument Duct for Pre-Cast Dam and Epoxy Plug. Process Pre-Cast Dam and Epoxy Lug in accordance with ME-418181 and other approved methods.

Note: Ensure proper Wire Bundle Length of 39" is maintained from Wire Bundle ends and DFBX Instrument Duct Weldment Assy as per Dwg ME-418181.

Note: Dave Burk at the Materials Testing and Development Lab in the village processed the pre-cast epoxy dam and epoxy plug for all the conduits.

Tom Peterson, March 19, 2004

6.0 Final Assembly

6.1 Move wire labels on both ends to ~ half way between wire ends and flanges.

6.2 Check each wire for continuity including spares.

Jan [Signature]  
Technician(s)

1-23-04  
Date

6.3 Perform a hipot check .

Hipot	All Others Grounded	All Other Floating	Trip Voltage	5.0 Kv/Current	Comments
VTAPS	X			.04 uA	
VTAPS		X		.04 uA	
RTD's (to 300V)	X			.01 uA	
RTD's (to 300V)		X		.01 uA	
CRYO HEATERS (Warm-Up Heaters)	X			.04 uA	
CRYO HEATERS (Warm-Up Heaters)		X		.04 uA	
Strip Heaters (Potted In Pairs)					
Pair #1	X			.04 uA	
Pair #2	X			.04 uA	
Strip Heaters (Potted In Pairs)					
Pair #1		X		.04 uA	
Pair #2		X		.04 uA	
Spare VTAP Wire(2)	X			.04 uA	
Spare VTAP Wire (2)		X		.04 uA	
Spare Heater Wires (1 pair)	X			.04 uA	
Spare Heater Wires (1 pair)		X		.04 uA	
Spare RTD Wire (1)	X			.01 uA	
Spare RTD Wire (1)		X		.01 uA	

Tom W  
Technician(s)

1-23-04  
Date

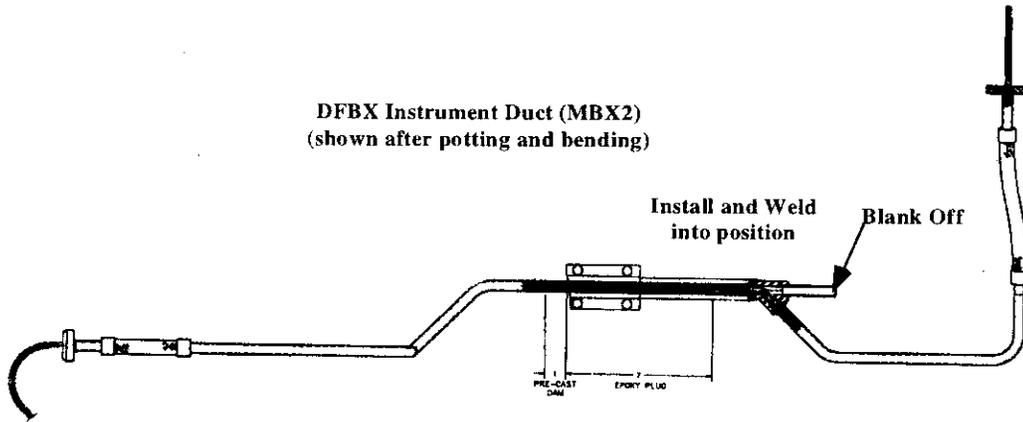
6.4 Bend the DFBX Instrument Duct Assembly as per Dwg ME-418181.

C.E. H... 2707  
Technician(s)

01.23.04  
Date

6.5 Acquire the Blank Off (Item #7 -- Dwg ME-418181) and weld onto tube.

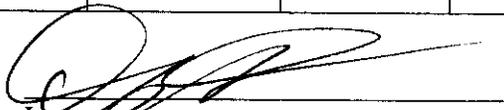
Note: All components must be thoroughly cleaned with Isopropyl Alcohol (Fermi stock 1920-0300) or approved equivalent prior to welding.



Note: Clark Reid took the conduit piping parts and drawings to the village weld shop where they were welded up as an assembly. Tom Peterson, March 19, 2004

6.6 Perform a Vacuum Leak Check of the DFBX Tube Assembly and record results below.

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			
1-20-04	Massensick	64x1	64x1	57D Leak = 1.86x10 <sup>-8</sup>			
				32x5	54x1		

  
Inspector

1-20-04  
Date

6.7 Electrically check the wire bundle by performing a hipot and record results below.

Note: See Step 4.4 for proper preparations for Hipot.

Hipot	All Others Grounded	All Other Floating	Trip Voltage	5.0 Kv/Current	Comments
VTAPS	X			.04uA	
VTAPS		X		.04uA	
RTD's (to 300V)	X			.01uA	
RTD's (to 300V)		X		.01uA	
CRYO HEATERS (Warm-Up Heaters)	X			.04uA	
CRYO HEATERS (Warm-Up Heaters)		X		.04uA	
Strip Heaters (Potted In Pairs)					
Pair #1	X			.04uA	
Pair #2	X			.04uA	
Strip Heaters (Potted In Pairs)					
Pair #1		X		.04uA	
Pair #2		X		.04uA	
Spare VTAP Wire(2)	X			.04uA	
Spare Heater Wires (1 pair)	X			.04uA	
Spare RTD Wire (1)	X			.01uA	

Jan W  
Technician(s)

1.21.04  
Date

6.8 Prepare the DFBX Instrument Duct/Wiring Assembly for shipment by performing the below:

6.8.1 Tape the wire bundle to the Instrument Duct Tube on both ends.

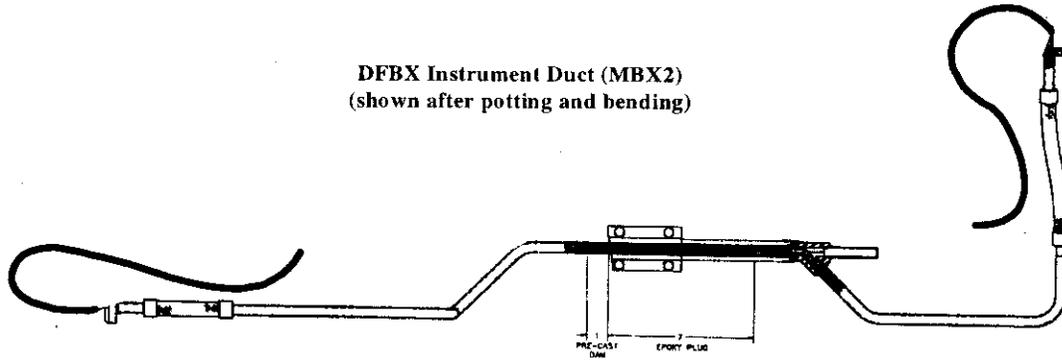


Figure 1

Tom W  
Technician(s)

1-21-04  
Date

7.0 Production Complete

7.1 Process Engineering verify that the LHC DFBX Instrument Duct Assembly 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:

This conduit was delivered to Meyer Tool on Dec 9, 2003,  
brought back to Fermilab on Jan 15, 2004, in order  
to finish some work, which was done Jan 20-23.  
Then this conduit was returned to Meyer Tool on  
Feb 3, 2004. Tom Peterson

  
Process Engineering/Designee

1/15/04  
Date