

DFBX-A 24C351 Manufacturing Travelers

Production Floor Traveler

Date: 01/26/2005
 Time - 10:03:25
 Page # 1

CONTROLLED DOCUMENT



Job Order 00918-0034

REV: 11 DATE: 1/26/05
 APPROVED: [Signature]
 Quantity 1.00

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Ref Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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10 WE	1.00	0.00	1.00	1.00	0.00	1.00
2-A WELDERS						

Operation Description Detail :

- 1.0 Dwg 24C351 A Feed Box Assembly-Piping Assemblies Dwg 251872
- 1.1 Pull the piping assemblies shown on dwg 251872
- 1.2 Stage to OP20.



20 WE	1.00	0.00	0.06	16.00	0.00	16.00
2-A WELDERS						

Operation Description Detail :

- 2.0 Dwg 24C351 A Feed Box Assembly- Bus Duct Q3 End Dwg 25M857
 CUSTOMER WITNESS POINT.

Reference: Specification M994; Dwg 24C351; 251872 Sht 10; 25M587; 25H400
 Bus Duct 25M857 assembles to the Q3 End of the LHe Tank.

- 2.1 Remove the 25M857 MQX1 Pipe from the crate.
- 2.2 Enter the serial number of the 251587 Bus Assembly below:

SN 251448-9 By: ECK Date: 2-16-05

- 2.3 Remove the protective pipe (Item 3) cover from the conductors. Remove the protective Teflon tube (Item 9) from the conductors.
- 2.4 Clean for welding with acetone and isopropyl alcohol the end of the weld neck flange on the Bus Duct and the area on the LHe Tank end plate.
- 2.5 Place a protective plastic sleeve in the LHe Tank end plate hole.
- 2.6 Carefully insert the conductors through the LHe Tank end plate hole, feeding the bus conductors through the Cable Looms to their intended splice location. Reference 24C351 sht 10 Detail N. Leave slack in the assembly so the piping portion of the Bus Duct can be fit to the LHe Vessel.
- 2.7 Fit the Bus Duct to the LHe vessel. Move the Tie Down Ring back out of the way. Assemble the Lambda Plug Flange to the LHe Tank end plate by using 4 clamps in the end plate bolt circle to clamp the Lambda Plug Flange to the LHe Tank. Bolts may be lubricated with a small amount of Krytox or Apiezon vacuum grease. Note the horizontal run of the Bus Duct must be supported during and after this assembly Remove the plastic sleeve from the end plate hole.
- 2.8 After assembly confirm that the Bus Duct is in positional location and level to the Top Plate per 24C351 sht 8. Record locations: (Use Romer Portable CMM or other suitable means.)

X: _____ SEE EBC FOR ACTUAL #A

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Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab				
Actual Rel Date	01/25/2005	Operation	Setup	Pieces	Operation	Move	Elapsed		
	Operation	Work Center	Quantity	Time	per Hour	Time	Time	Time	Time
Description	DFBX-A 24C351 Feed Box Assembly								

Y: _____

Z: _____

By: W.J. Date: 2/17/05

2.9 Complete the assembly of the bus conductors in the Cable Looms and confirm that the conductors are all long enough to reach and complete their splices.

Confirmed By: G.K. Date: 2/18/05

2.10 Dwg 24C351 A Feed Box Assembly- Bus Duct Q3 End Dwg 25M857

CUSTOMER WITNESS POINT.

Reference: Specification M994; Dwg 24C351; 25I872 Sht 10; 25M587; 25H400

Bus Duct 25I857 assembles to the Q3 End of the LHe Tank.

STAMP YOUR WELDS.

10.1 From the inside of the LHe Tank, attach 4x-Omeagalabel BU-100/38 temperature monitors on the Lambda Plate Housing at 4 equally spaced locations. These are for LBNL record. Attach thermocouple wire to the same area and bring the readout outside the LHe Tank where it can be monitored during welding.

2.10.2 Reference Dwg 24C351 Sht 4 Zone A3 for weld detail.

2.10.3 From the outside of the LHe Tank, proceed to weld the Lambda Plug Flange to the LHe Tank end plate in the following manner.

A. WPS GTAW-SS/LT. Monitor the temperature indicators at all times.

Temperature not to exceed 40C (104F).

B. Tack weld the Flange at 4 equally spaced locations, 1" long x .06" fillet leg. Allow 4 tacks to cool to room temperature before proceeding. Check alignment.

C. Repeat step 5.3.2 for 4 more fillet tacks. Move clamps as needed. Check alignment.

D. Repeat step 5.3.2 for 4 more fillet tacks. Move clamps as needed. Check alignment.

E. Remove clamps and confirm that the Ring can be installed.

F. Complete the welding by repeating step 5.3.2 until the weld is complete.

G. Check alignment.

H. Install the Retaining Ring, tighten the 12 bolts in a star pattern to 25 ft-lb torque. Bolts may be lubricated with a small amount of Krytox or Apiezon vacuum grease

I. Tack weld the bolt heads to the Retaining Ring to prevent their loosening.

J. Remove the Omegalable temperature monitors and forward them to the project engineer for inclusion in the data package.

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Part Number	Revision	NS	U / M	EA	Quantity	1.00		
Due Date	Sales Order Coordinator	ECB	Ship Item	Y	Ship Early	Y	Split Ship	Y
Calc Ref Date	Sales Order	000750	Customer	Lawrence Berkeley National Lab				
Actual Rel Date	01/25/2005							
Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time	

Description DFBX-A 24C351 Feed Box Assembly

- K. Remove the thermocouple wire.
- 2.10.4 Confirm that the Bus Duct is in positional location and level to the Top Plate per 24C351 sht 8. Record locations: (Use Romer Portable CMM or other suitable means.)

X: _____
 Y: _____ SEE EBC FOR ACTUAL # 12
 Z: _____

By: W.J. Date: _____

2.11 Stage to OP30.



30	WE	1.00	0.00	0.13	8.00	0.00	8.00
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2-A WELDERS

Operation Description Detail :

3.0 Dwg 24C351 A Feed Box Assembly

- 3.1 Reference drawing 24C351 Sheet 5 Section A-A. Fit up the two LHe tank Covers (dwg 25I119 and 25M802) to the LHe tank. Seal weld the covers to the LHe tank, minimum of .045" fillet or groove welds.

3.2 Stage to OP40.



40	AS	1.00	0.00	0.13	8.00	0.00	8.00
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3-A ASSEMBLY

Operation Description Detail :

4.0 Dwg 24C351 A Feed Box Assembly

(Note: Welds for DH Line, Helium Tank Piping, and CC1 Lines previously cold shocked in subjob-0015.)

4.1 Cold Shocking: Cold Shock per MTM-MP-1040.

1. Spray with liquid nitrogen the weld between the LHe Tank and Chimney. Use a thermocouple to monitor temperature. Achieve a temperature of ~ -280 F (100K) at the joint.
2. Use the heat gun to warm the joint back up to ~ 70 F.
3. Repeat 20 times for each Chimney.
4. Do above in a rotation, 1st person sprays to achieve cold temperature, moves on to next Chimney, 2nd person warms joint back to room temperature.

4.2 Install the pressure test clamp between the Top Plate and LHe Tank.

- 4.3 Perform a safety check. Confirm that all ports that will see pressure are safely flanged or welded closed. Confirm that all bellows are properly restrained (no squirm protection is required) at end points.

4.4 Perform pneumatic pressure test utilizing nitrogen gas per MTM-MP-1105 to

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Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab				
Actual Rel Date	01/25/2005	Operation	Setup	Pieces	Operation	Move	Elapsed		
	Operation	Work Center	Quantity	Time	per Hour	Time	Time	Time	
Description	DFBX-A 24C351 Feed Box Assembly								

63.6 psig. Forward the test report to the project engineer.

4.5 After the pressure test. Remove clamp. Evacuate the LHe tank assembly and vacuum leak test per MTM-MP-1110. Acceptance criteria 1x10⁻⁹ std cc/sec helium. BAG all bellows (one at a time). Include the LHe Tank to Bellows and the Bellows to Chimney Tube welds in bag. Flood the bag with helium gas. Forward the test report to the project engineer.

4.6 Stage to OP50.



50 WE	1.00	0.00	0.13	8.00	0.00	8.00
2-A WELDERS						

Operation Description Detail :

5.0 Dwg 24C351 A Feed Box Assembly

5.1 Reference drawing 24C351 Sheet 5 Section A-A. Remove the two LHe tank Covers (dwg 25I119 and 25M802) from the LHe tank.

5.2 Stage to OP60.



60 WE	1.00	0.00	0.03	40.00	0.00	40.00
2-A WELDERS						

Operation Description Detail :

6.0 Dwg 24C351 A Feed Box Assembly-Piping Assemblies Dwg 25I872

6.1 Install the following piping and G10 support assemblies shown on dwg 25I872.

1. Dwg 25I510 V Pipe and Jacket Assembly Qty 1
2. Dwg 25M918 Crossover Line Qty 1
3. Dwg 25I526 Pipe, XB Qty 1
4. Dwg 25I209 Pipe, E1 Qty 1
5. Dwg 25I218 Pipe, CC1 Qty 1
6. Dwg 25I301 MQX2, Instrumentation Line Qty 1

Customer Witness Point. Install 25I226-14 (25I301 Pipe, MQX2). Weld to Top Plate at MQX port (24C362 Section G-G). Be careful of instrumentation wires. Follow M996 procedure up to step 4.2.7.

Record SN: MQX2-05 By: ECK Date: 3-1-05

7. Dwg 25I438 Pipe, LD2 Qty 1
8. Dwg 25I507 Pipe, CC2 Qty 1
9. Dwg 25I508 Pipe, CC3 Qty 1
10. Dwg 25I509 Pipe, KD2 Qty 1

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Due Date	06/14/2005	Sales Order Coordinator	ECB	Ship Item	Y	Ship Early	Y
Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab		
Actual Rel Date	01/25/2005	Operation	Quantity	Setup	Time	Pieces	Operation
		Work Center				per Hour	Time
							Move
							Time
							Elapsed
							Time
Description	DFBX-A 24C351 Feed Box Assembly						

- 11. Dwg 25I600 Center Pipe Support Qty 1
- 12. Dwg 25I093 G10 Support
- 13. Dwg 25I4094 G10 Support
- 14. Dwg 25I412 G10 Support
- 15. Perform weld between Top Plate Ring and the Top Plate around the MBX2 line.
per 24C351 Section F-F.
- 6.2 Pre-insulate piping with 10 layers of MLI as appropriate.
- 6.3 Identify new welds with tags for cold shocking in OP70.
- 6.4 Following LBNL procedure install the 5x Cernox temperature sensors on the following pipes:
 - 1. The LHe Vessel 25I574. (TT831)
 - 2. The DH Line 25I637. (TT890)
 - 3. The CY1 Line 25I548. (TT812)
 - 4. The XB Line 25I545. (TT819a, TT819b)
- 6.5 Route 5 sets of Cernox temperture sensor wires to the Pumping Port, Cryogenic Diagnostic Assy (24C395 Sht 6 Section L-L)
- 6.7 Perform continuity testing of the temperature sensors. Use reports from LBNL, Forward reports to the project engineer.
- 6.8 Stage to OP70.

	70 AS	1.00	0.00	0.13	8.00	0.00	8.00
	3-A ASSEMBLY						

Operation Description Detail :

- 7.0 Dwg 24C351 A Feed Box Assembly-Piping Assemblies Dwg 25I872
 - 7.1 Cold shock per MTM-MP-1020 the new welds tagged in OP60 on the following lines:
 - 1. Dwg 25I510 V Pipe and Jacket Assembly Qty 1
 - 2. Dwg 25M918 Crossover Line Qty 1
 - 3. Any other weld identified by the welder in OP60.
 - 4. Forward reports to the Project Engineer.
 - 7.2 Pressure test the spools with new welds to:
 - 1. Dwg 25I510 V Pipe and Jacket Assembly Qty 1 364 PSIG (JACKET ONLY!)
 - 2. Dwg 25M918 Crossover Line Qty 1 364 PSIG
 - 3. Any other line with a new weld identified by the welder in OP60.
 - 4. Forward reports to the Project Engineer.
 - 7.2 HMSLD leak test the spools with new welds to:
 - 1. Dwg 25I510 V Pipe and Jacket Assembly Qty 1
 - 2. Dwg 25M918 Crossover Line Qty 1

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Due Date	06/14/2005	Sales Order Coordinator	ECB	Ship Item	Y	Ship Early	Y	Split Ship	Y
Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab				
Actual Rel Date	01/25/2005	Operation	Quantity	Setup	Pieces	Operation	Move	Elapsed	Time
	Operation	Work Center	Quantity	Time	per Hour	Time	Time	Time	Time
Description	DFBX-A 24C351 Feed Box Assembly								

- 3. Any other line with a new weld identified by the welder in OP60.
- 4. Forward reports to the Project Engineer.
- 7.3 Reference Dwg 24C351 sheet 6 Section F-F Blank off the MQX2 instrumentation line and the Q3 end and the Top Plate end. HMSLD test the MQX2 line weld to the top plate and the and the Porcupine Mounting Ring to Top Plate weld. Forward the test report to the Project Engineer.
- 7.4 Stage to OP80.



80 AS 1.00 0.00 0.06 16.00 0.00 16.00
3-A ASSEMBLY

Operation Description Detail :

8.0 Dwg 24C351 A Feed Box Assembly- (Weld and Assembly)

Customer Witness Point.
Reference Specification M996; Dwg 251872; 24C351

8.1 Pull the instrumentation wires from 251872-7 (24C351 Section F-F) up through the Top Plate. Pull the staged kit for 251831. Fit the Item 251831-5 and 251831-7 the Top Plate. Protect wires from high frequency. Wind the bundles for feedthru holes A through L counterclockwise 4 twists and insert the bundles through the appropriate hole in the LQX Diagnostic Assy. Pull the thermometer wires thru the top hole of the porcupine.

8.2 Perform a continuity check of wires to check received condition.
Continuity Check: Pass/Fail? By: CED Date: 3-23-05

8.3 Solder the wires to the connector pins per wiring diagram.

8.4 Perform a continuity check of wires. Complete a test report and forward to the project engineer.

Continuity Check: Pass/Fail? By: CED Date: 3-23-05
Wiring Correct Confirmed by: CED Date: 3-25-05

8.5 Mix a batch of Stycast 2850MT (blue). De-gas by placing in container and with quartz window, evacuate. The Stycast is de-gassed when it stops bubbling.

8.6 Encapsulate the soldered connections in the de-gassed Stycast 285MT(blue). Allow the epoxy to cure.

8.7 Perform a continuity check of wires. Complete a test report and forward to the project engineer.

Continuity Check: Pass/Fail? By: CED Date: 3-30-05

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Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship y
Calc Ref Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
Actual Rel Date 01/25/2005

	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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Description DFBX-A 24C351 Feed Box Assembly

8.8 Fit the 12 Cermaseal feedthrus to the LQX Porcupine and install the 251831-5 connector assembly in the top hole of the Porcupine. Tack to position.

8.9 Hipot test (in air) the LQX Porcupine feedthrus as follows.

- Voltage Taps (in air) 5000 V; I<5 micro amps
 - Quench Protection Heaters (in air) 5000 V; I<5 micro amps
 - Warm up Heaters (in air) 2500 V; I<7 micro amps
 - Cold mass thermometers (in air) 300 V; I<2 micro amps
- Print out the test reports.

8.10 Weld 12x feedthrus to porcupine

8.11 Weld 251831 connector to porcupine

8.12 Weld the Porcupine to the Connector Ring.

8.13 Perform a continuity check of wires. Complete a test report and forward to the project engineer.

Continuity Check: Pass/Fail? By: DJC A.K Date: 4/1/05

8.14 Hipot test (in air) the LQX Porcupine feedthrus as follows.

- Voltage Taps (in air) 5000 V; I<5 micro amps
 - Quench Protection Heaters (in air) 5000 V; I<5 micro amps
 - Warm up Heaters (in air) 2500 V; I<7 micro amps
 - Cold mass thermometers (in air) 300 V; I<2 micro amps
- Print out the test reports.

8.15 Solder the 5 sets of Cernox temperature sensor wires to the 32 pin connector located at the Pumping Port, Cryogenic Diagnostic Assy (24C351 Sht 6 Section L-L) per the electrical schematic 251636. Solder the spare wires (wire provided by LBNL) to the connector per the electrical schematic (See Ed Bonnema for instrumctions the wiring schematic is not clear 1/26/05.).
Route the spare wires to the D1 End.

8.15 Perform continuity testing of the temperature sensors and the spare wires.
Forward reports to the project engineer.

Continuity Check: Pass/Fail? By: WT Date: 4/8/05

8.16 Mix a batch of Stycast 2850MT (blue). De-gas by placing in container and with quartz window, evacuate. The Stycast is de-gassed when it stops bubbling.

8.17 Encapsulate the soldered connections in the de-gassed Stycast 285MT(blue).
Allow the epoxy to cure.

8.18 Perform continuity testing of the temperature sensors and the spare wires.
Forward reports to the project engineer.

Continuity Check: Pass/Fail? By: D.K Date: 4/8/05

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Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab		
Actual Rel Date	01/25/2005	Operation	Setup	Pieces	Operation	Move	Elapsed
	Operation	Work Center	Quantity	Time	per Hour	Time	Time

Description DFBX-A 24C351 Feed Box Assembly

- 8.19 Hipot test (in air) the 32 Pin Connector
 Cernox thermometers and spare wires (in air) 300 V; I<2 micro amps
 Print the report and forward it to the project engineer.
- 8.20 Weld the 32 Pin Connetor to the assembly.
- 8.21 Hipot test (in air) the 32 Pin Connector
 Cernox thermometers and spare wires (in air) 300 V; I<2 micro amps
 Print the report and forward it to the project engineer.
- 8.22 Stage to OP90.



90	AS	1.00	0.00	0.13	8.00	0.00	8.00
3-A ASSEMBLY							

Operation Description Detail :

- 10 Dwg 24C351 A Feed Box Assembly- Item 11 120 Amp VC Lead Splicing & Testing
 CUSTOMER WITNESS POINT.
 Reference: Specification M983; Dwg 25C351; 25C322; 25I864
 Read and follow the M983 procedure with the Traveler. Drawing 25I864 gives an overview of the position of the components 24C351 Sht 10 Detail N gives an overview of the conductor locations.
- 9.1 Install Item 11 the 120 AMP VC Power Lead in the Feed Box. Lubricate the M8 bolts for the CF flange with vacuum grease. Torque to standard CF flange seal value.
- 9.2 Cover the bottom of the LHe Vessel with a plastic sheet.
- 9.3 Follow procedure steps 1 through 3 for all ten 120 AMP leads. (Reference 25I613 for wire layout)

Wire Layout Completed: A.K. Date: 4/13/05

Confirmed Correct: A.K. Date: 4/13/05

- 9.4 Follow procedure steps 4 thorough 11 for all 10 leads.
- 9.5 Step 12 . Perform a electrical continuity test to verify that the correct bus wire has been connected to the correct lead. (Reference 25I613 Detail 2)

Continuity Test: Pass Fail By: A.K. Date: 4/14/05

- 16 Follow procedure steps 13 through 15.

Completed By: A.K. Date: 4/14/05

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Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
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Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
Description	DFBX-A 24C351 Feed Box Assembly						

9.7 Perform the Hipot Electrical Performance Test per the Procedure. Make sure that the free ends of the Voltage Tap wires are not grounded.
TAPE OFF THE AREA AND PUT UP HIGH VOLTAGE SIGNS.
INFORM THE AREA SUPERVISOR THAT THE TEST IS TAKING PLACE.
Complete the test per the procedure for each of 10 leads in the 120 AMP Power Lead.

Print out hipot test (in air) results and forward to project engineer.

Completed By: A.K. Date: 4/1/05

9.8 Stage to OP100.

Record the Serial No. _____



100 AS 1.00 0.00 0.13 8.00 0.00 8.00
3-A ASSEMBLY

Operation Description Detail :

10.0 Dwg 24C351 A Feed Box Assembly- Item 12 Qty 2 600 Amp 6-Lead Assy Splicing & Testing Qty 2

CUSTOMER WITNESS POINT.

Reference: Specification M982; Dwg 25C351; 24C353; 251864

Read and follow the M982 procedure with the Traveler. Drawing 251864 gives an overview of the position of the components 24C351 Sht 10 Detail N gives an overview of the conductor locations.

10.1 Install Item 12 the 600 AMP 6-Lead Power Lead in the Feed Box. Lubricate the M8 bolts for the CF flange with vacuum grease. Torque to standard CF flange seal value.

10.2 Cover the bottom of the LHe Vessel with a plastic sheet.

10.3 Follow procedure steps 1 through 3 for the 2 leads. (Reference 251613 for wire layout)

Wire Layout Completed: A.K. Date: _____

Confirmed Correct: A.K. Date: _____

10.4 Follow procedure steps 4 thorough 11 for both leads.

10.5 Step 12 . Perform a electrical continuity test to verify that the correct bus

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Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
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Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
Description DFBX-A 24C351 Feed Box Assembly							

wire has been connected to the correct lead. (Reference 251613 Detail 1)

Continuity Test: Pass/Fail By: A.K. Date: _____

10.6 Follow procedure steps 13 through 15.

Completed By: A.K. Date: _____

10.7 Perform the HiPot Electrical Performance Test per the Procedure. Make sure that the free ends of the Voltage Tap wires are not grounded.
TAPE OFF THE AREA AND PUT UP HIGH VOLTAGE SIGNS.
INFORM THE AREA SUPERVISOR THAT THE TEST IS TAKING PLACE.
Complete the test per the procedure for each of leads in the 600 AMP Power Lead.

Print out hipot test (in air) results and forward to project engineer.

Completed By: A.K. Date: _____

10.8 Repeat for second item 12.

10.9 Wire Layout Confirmation.

Wire Layout Completed: A.K. Date: _____

Confirmed Correct: A.K. Date: _____

10.10 Continuity Test

Continuity Test: Pass/Fail By: B.J.C. Date: _____

10.11 Hipot Test

Print out hipot test (in air) results and forward to project engineer.

Completed By: A.K. Date: _____

10.12 Stage to OP110.

Record the Serial No. (1-6) _____

Record the Serial No.(7-12) _____

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 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
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Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-A 24C351 Feed Box Assembly								



110 AS 1.00 0.00 0.13 8.00 0.00 8.00
 3-A ASSEMBLY

Operation Description Detail :

11.0 Dwg 24C351 A Feed Box Assembly- Item 32 600 Amp 2-Lead Assy Splicing & Testing
 CUSTOMER WITNESS POINT. Qty 1

Reference: Specification M982; Dwg 25C351; 251164; 251864

Read and follow the M982 procedure with the Traveler. Drawing 251864 gives an overview of the position of the components 24C351 Sht 10 Detail N gives an overview of the conductor locations.

11.1 Install Item 36 the 600 AMP 2-Lead Power Lead in the Feed Box. Lubricate the M8 bolts for the CF flange with vacuum grease. Torque to standard CF flange seal value.

11.2 Cover the bottom of the LHe Vessel with a plastic sheet.

11.3 Follow procedure steps 1 through 3 for the 2 leads. (Reference 251613 Detail 1 for wire layout)

Wire Layout Completed: A. K. Date: _____

Confirmed Correct: DJC Date: _____

11.4 Follow procedure steps 4 thorough 11 for both leads.

11.5 Step 12 . Perform a electrical continuity test to verify that the correct bus wire has been connected to the correct lead. (Reference 251613 Detail 1)

Continuity Test: Pass Fail By: DJC Date: _____

11.6 Follow procedure steps 13 through 15.

Completed By: A. K. Date: _____

11.7 Perform the Hipot Electrical Performance Test per the Procedure. Make sure that the free ends of the Voltage Tap wires are not grounded.

TAPE OFF THE AREA AND PUT UP HIGH VOLTAGE SIGNS.

INFORM THE AREA SUPERVISOR THAT THE TEST IS TAKING PLACE.

Complete the test per the procedure for each of leads in the 600 AMP Power Lead.

Lead#1 Reading: _____ Lead#2 Reading: _____ SEE EBR FOR REPORT

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Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-A 24C351 Feed Box Assembly								

Completed By: D. K. Date: _____

11.8 Stage to OP120

Record the Serial No. _____



120 AS 1.00 0.00 0.13 8.00 0.00 8.00
 3-A ASSEMBLY

Operation Description Detail :

12.0 Dwg 24C351 A Feed Box Assembly- Item 8 Qty 4 HTS Leads Assy Splicing & Testing
 CUSTOMER WITNESS POINT.

Reference: Specification M985; Dwg 24C351; 251156; 251864

Read and follow the M982 procedure with the Traveler. Drawing 251864 gives an overview of the position of the components 24C351 Sht 10 Detail N gives an overview of the conductor locations.

- 12.1 Install Item 6 the HTS-Lead Power Lead in the Feed Box. Lubricate the Threaded Rods bolts for the CF flange with vacuum grease. Torque to drawing requirements.
- 12.2 Cover the bottom of the LHe Vessel with a plastic sheet.
- 12.3 Follow procedure steps 1 through 3 for the leads. (Reference 251613 for wire layout)

Wire Layout Completed: D. K. Date: _____

Confirmed Correct: D. K. DJC Date: _____

12.4 Follow procedure steps 4 through 11.

Postion: _____ Serial No. _____
 Completed By: D. K. Date: _____

12.5 Repeat for the remaining 5 Leads.

- Postion: _____ Serial No. 19 SEE REPORT FROM EOE
 Completed By: D. K. Date: _____
- Postion: _____ Serial No. 10
 Completed By: D. K. Date: _____
- Postion: _____ Serial No. 30
 Completed By: D. K. Date: _____
- Postion: _____ Serial No. 27
 Completed By: D. K. Date: _____

Production Floor Traveler



Job Order 00918-0034

Part Number	DFBX-A 24C351 FB Assy	Revision	NS	U / M	EA	Quantity	1.00
Due Date	06/14/2005	Sales Order Coordinator	ECB	Ship Item	Y	Ship Early	Y
Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab		
Actual Rel Date	01/25/2005	Operation	Quantity	Setup	Time	Pieces per Hour	Operation Time
	Work Center						Move Time
Description DFBX-A 24C351 Feed Box Assembly							

Position: _____ Serial No. _____
 Completed By: J.K. Date: _____

12.6 Perform the HiPot Electrical Performance Test per the Procedure. Make sure that the free ends of the Voltage Tap wires are not grounded. TAPE OFF THE AREA AND PUT UP HIGH VOLTAGE SIGNS. INFORM THE AREA SUPERVISOR THAT THE TEST IS TAKING PLACE. Complete the test per the procedure for each HTS Power Leads.

Print out hipot test (in air) results and forward to project engineer.

Completed By: J. RL Date: _____

12.7 Stage to OP130



130 AS 1.00 0.00 1.00 1.00 0.00 1.00
 3-A ASSEMBLY

Operation Description Detail :

13.0 Dwg 24C351 A Feed Box Assembly

- Forward test reports to the project engineer.
- 13.1 Clean the interior of the LHe Tank for cryogenic service.
- 13.2 Install Item 9 25I162 LHe Diagnostic Assembly.

Record the Serial No. A

- 13.3 Re-confirm the continuity of all Power Lead splices.
- 13.4 Re-confirm the continuity of all Voltage Taps for all Power Leads.
- 13.5 Stage to OP140.

Completed: J. RL -By: _____



140 WE 1.00 0.00 1.00 1.00 0.00 1.00
 2-A WELDERS

Operation Description Detail :

4.0 Dwg 24C351 A Feed Box Assembly-25I575 LHe Vessel

- STAMP YOUR WELDS. GTAW-SS/LT root passes/FCAW-SS/LT covers.
- 14.1 Fit Item 35 and Item 36 Cover Plates to the LHe Tank. Reference 24C351 Sht 5 for weld details.

Production Floor Traveler



Job Order 00918-0034

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-A 24C351 Feed Box Assembly								

14.2 Root pass both Cover Plates.

14.3 Dye penetrant test the root pass of the Cover Plates. Forward test report to project engineer.

Completed By: MSJ Date: 4/22/05

14.4 Complete the Cover Plate welding.

14.5 Dye penetrant test the cover pass of the Cover Plates. Forward test report to project engineer. (DYE PEN BY CONAM.)

Completed By: MSJ Date: 5/5/05

14.6 Stage to OP150.



150 AS 1.00 0.00 1.00 1.00 0.00 1.00
 3-A ASSEMBLY

Operation Description Detail :

15.0 24C351 A Feed Box Assembly-Dwg 25I575 LHe Tank
 Forward test reports to the project engineer.

15.1 Cold shock per MTM-MP-1040 the new welds from OP150 and OP160.

Complete a test report and forward to the project engineer.

Completed by: [Signature] Date: _____

15.2 Secure the 25I557 Bus Duct and LD pipes and the LHe Tank for pressure test.

Constrain the system to protect all bellows.

15.3 Check lead chimney straightness and bellows offsets. Complete inspection report.

Requirements: Lead chimney bellows offsets < 1mm

PASS/FAIL Completed by: [Signature] Date: _____

15.4 Photograph the lead chimney bellows, chimneys and helium vessel. Forward disk with photos to project engineer.

Completed by: [Signature] Date: _____

15.5 Stage to OP160.



160 AS 1.00 0.00 1.00 1.00 0.00 1.00
 3-A ASSEMBLY

Operation Description Detail :

16.0 24C351 A Feed Box Assembly-Dwg 25I575 LHe Tank
CUSTOMER WITNESS POINT

Forward test reports to the project engineer.

16.1 Reference Specification M989 Figure A-2. With LHe Tank at atmospheric pressure. Perform Bus Ducts pressure test to (364psig) hold for for 10 minutes.

16.2 Reference Specification M989 Figure A-2. Pressure Test LHe Tank and Bus Ducts

Production Floor Traveler



Job Order 00918-0034

Part Number	DFBX-A 24C351 FB Assy	Revision	NS	U / M	EA	Quantity	1.00
Due Date	06/14/2005	Sales Order Coordinator	ECB	Ship Item	Y	Ship Early	Y
Calc Rel Date	05/31/2005	Sales Order	000750	Customer	Lawrence Berkeley National Lab		
Actual Rel Date	01/25/2005						
Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
Description	DFBX-A 24C351 Feed Box Assembly						

together at (63.6 psig) for 10 minutes.

16.3 Reference Specification M989 Figure A-3. Leak test to MTM-MP-1110 the LHe Vessel and Bus Duct Assembly. (Acceptance criteria 3×10^{-9} atm-cc/sec of helium). BACKFILL WITH HELIUM GAS.

16.4 Stage to OP170.



170 AS	1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY						

Operation Description Detail :

17.0 24C351 A Feed Box Assembly

CUSTOMER WITNESS POINT

Forward test reports to the project engineer.

17.1 LHe Tank/Bus Duct Assembly: Reference Appendix Figure A-4 with the LHe Tank/Bus Duct Assembly backfilled with helium gas at atmospheric pressure. Perform the following HiPot Tests.

TAPE OFF THE AREA AND PUT UP HIGH VOLTAGE SIGNS.

INFORM THE AREA SUPERVISOR THAT THE TEST IS TAKING PLACE.

17.1.1 600 AMP 2 Wire Leads (0.65 kV, I<7 microamp)

17.1.2 600 AMP 6 Wire Leads (0.65 kV, I<7 microamp)

17.1.3 120 AMP 10 Wire Leads (0.65 kV, I<7 microamp)

17.1.4 HTS Leads (1.4kV, I<15 microamp)

17.2 Print out the results and forward to the project engineer.

17.3 LQX (Porcupine) Instrumentation Line: With the Instrumentation Line back filled with helium gas at atmospheric pressure, perform the following Hipot Tests.

17.3.1 Voltage Taps (1.4kV, I<15 micro amps)

17.3.2 Quench Protection Heaters (1.4kV, I<15 micro amps)

17.3.3 Warm up Heaters (0.65 kV, I<7 micro amps)

17.3.4 Cold Mass Thermometers (200V, I<2 micro amps)

17.4 Print out the results and forward to the project engineer.

17.5 Stage to OP180.

Production Floor Traveler



Job Order 00918-0034

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-A 24C351 Feed Box Assembly								



180	WE	1.00	0.00	1.00	1.00	0.00	1.00	
2-A WELDERS								

A

Operation Description Detail :

18.0 24C351 A Feed Box Assembly-Jumper Assembly JC1

18.1 Reference 24C351 Section B-B: Insulate the pipe assemblies coming out of JC1 with a 10 layer MLI blanket surrounding the pipes.

18.2 Install the 25I193 Thermal Shield Jumper Assembly over the pipe assemblies. GTAW-CU weld the clam shell halves. Install the two thermal straps to the E1 line and Jumper Shield.

OK

18.3 Insulate the Thermal Shield Jumper Assembly with a 30 layer MLI blanket.

18.4 Fit the 25I168 Enclosure Jumper Clamshells over the Shield Jumper. (Use backing strips at seams.) Protect the MLI during welding. Weld seams.

18.5 Fit 25I580-3 Flange to Enclosure Jumper. Confirm location and parallelism/perpendicularity of flange per Section B-B. Protect the MLI during welding. Weld Flange complete.

18.6 Confirm location and parallelism/perpendicularity of flange per Section B-B. Forward inspection report to project engineer.

Confirmed by: *W. J.* Date: _____

18.7 Stage to OP190.



190	WE	1.00	0.00	1.00	1.00	0.00	1.00	
2-A WELDERS								

Operation Description Detail :

19.0 24C351 A Feed Box Assembly-Jumper Assembly JC2

19.1 Reference 24C395 Section K-K: Insulate the pipe assemblies coming out of JC2 with a 10 layer MLI blanket surrounding the pipes.

19.2 Install the 25I586 Thermal Shield Jumper Assembly over the pipe assemblies. GTAW-CU weld the clam shell halves. Install the two thermal straps to the E2 line and Jumper Shield.

19.3 Insulate the Thermal Shield Jumper Assembly with a 30 layer MLI blanket.

19.4 Fit the 25I577 Enclosure Jumper Clamshells over the Shield Jumper. (Use backing strips at seams.) Protect the MLI during welding. Weld seams.

19.5 Fit 25I577-3 Flange to Enclosure Jumper. Confirm location and parallelism/perpendicularity of flange per Section K-K. Protect the MLI during welding. Weld Flange complete.

19.6 Confirm location and parallelism/perpendicularity of flange per Section K-K. Forward inspection report to project engineer.

Confirmed by: *W. J.* Date: _____

Production Floor Traveler



Job Order 00918-0034

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-A 24C351 Feed Box Assembly								

19.7 Stage to OP200.



200 AS	1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY						

Operation Description Detail :

**20.0 24C351 A Feed Box Assembly-Dwg 25I574 LHe Tank
 CUSTOMER WITNESS POINT**

20.1 Insulate the LHe Tank, Lead Chimneys, LD and Bus Duct Pipes with 10 layers of MLI. Reference Specification M-990. NOTE: In locations where pipes pass through support assemblies the insulation is to be wrapped with kapton tape for protection from abrasion during thermal cycling.

20.2 Insulate with MLI all pipes within the thermal shield with 10 layers of MLI and outside the thermal shield with 30 layers MLI per Specification M-990

6.7b prior.

20.3 Stage to OP210.



210 AS	1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY						

Operation Description Detail :

21.0 24C351 A Feed Box Assembly-

21.1 Confirm the minimum clearance from any pipe to any other is ≥ 12 mm (.47"). Document piping assembly with photos. Forward disk to project engineer.

Confirmed by: A.R. Date: _____

21.2 Stage to OP220.



220 AS	1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY						

Operation Description Detail :

22.0 24C351 A Feed Box Assembly

22.1 Install the copper thermal intercept block assembly (provided by Fermilab) to the MQX2 line.

22.2 Solder the thermal strap to the shield.

22.3 Stage to OP240.

Production Floor Traveler



Job Order 00918-0034

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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Description DFBX-A 24C351 Feed Box Assembly



230	WE		1.00	0.00	1.00	1.00	0.00	1.00
2-A WELDERS								

Operation Description Detail :

23.0 24C351 A Feed Box Assembly

- 23.1 Pull 25I858 Base Plate Assy kit. Pull the 25I079 Thermal Shield Assy kit.
- 23.2 Reference 25I858. Assemble the 4x-Stantions to the Bottom Plate. Tack weld the nuts. Insulate the stantions to prevent shine thru.
- 23.3 Reference 25I079. Pre-assembly the Thermal Shield. Reference Pipe, EX. Install the Pipe, EX assembly to the Shield assembly, positioning location to 24C351. Rivet and solder the thermal straps to the shield to hold them in place.
- 23.4 Assemble the Thermal Shield Assembly and Baseplate Assemble together.
- 23.5 Install the assembly under the LHe Tank. Position the Bottom Plate correctly in relation to the Feed Box Assy. Feed the two 25I858-1 Support Rods through the Stantions and the LHe Tank brackets. Install the hex nuts and loosely position everything. Don't tighten the fasteners and nuts on the Support Rods until after fit up of the Vacuum Vessel Sides.
- 23.6 Assemble the 2x Shield Access Covers to the Shield Assy.
- 23.7 Reference 25I872-4 Pipe, EX. Complete the EX line where it had to be cut apart to allow assembly. Cold shock the new welds, pressure test and leak test the EX line. Forward the test reports to the project engineer.
- 23.8 Stage to OP240.



240	AS		1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY								

Operation Description Detail :

24.0 24C351 A Feed Box Assembly

- 24.1 Reference Specification M990. Insulate the Thermal Shield with 30 layers of MLI.
- 24.2 Stage to OP250.



250	WE		1.00	0.00	1.00	1.00	0.00	1.00
2-A WELDERS								

Operation Description Detail :

25.0 24C351 A Feed Box Assembly

CUSTOMER WITNESS POINT
 STAMP YOUR WELDS

- 25.1 Fit the Side Plate Cover (25I125) into Vacuum Vessel Side (25I124),

Production Floor Traveler



Job Order 00918-0034

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-A 24C351 Feed Box Assembly								



260 AS	1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY						

Operation Description Detail :

26.0 24C351 A Feed Box Assembly

Install the following remaining subassemblies to the Top Plate.

- ✓ 26.1 25I171 DH Relief Valve Assembly
- ✓ 26.2 25I868 2x-Tooling Balls
- ✓ 26.3 25M820 Alignment Plate (Tack weld in place, see 24C352 sheet 11)
- ✓ 26.4 25I339 Helium Port Relief Valve Assembly
- ✓ 26.5 25I910 Rough Port Assembly
- ✓ 26.6 24C352-28 4x-Hoist Rings
- 26.7 25I851 Helium Guard Assembly
- 26.8 Assemble 3x-25I166 Thrust Load Bumpers. Package for shipment.
- 26.9 Package with 26.7 above 4x 25I179 Brackets.
- 26.10 Stage to subjob-0006.

 Total Times - 0.00 151.00 0.00 151.00

End Of Report

* Represents Sub-Contract days, these days are not included in the column total.

Production Floor Traveler

Date: 01/26/2005
 Time - 10:03:29
 Page # 20



Job Order 00918-0034

Part Number DFBX-A 24C351 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06/14/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/31/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 01/25/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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Description DFBX-A 24C351 Feed Box Assembly



260 AS	1.00	0.00	1.00	1.00	0.00	1.00
3-A ASSEMBLY						

Operation Description Detail :

26.0 24C351 A Feed Box Assembly

Install the following remaining subassemblies to the Top Plate.

- 26.1 251171 DH Relief Valve Assembly
- 26.2 251868 2x-Tooling Balls
- 26.3 25M820 Alignment Plate (Tack weld in place, see 24C352 sheet 11)
- 26.4 251339 Helium Port Relief Valve Assembly
- 26.5 251910 Rough Port Assembly
- 26.6 24C352-28 4x-Hoist Rings
- 26.7 251851 Helium Guard Assembly
- 26.8 Assemble 3x-251166 Thrust Load Bumpers. Package for shipment.
- 26.9 Package with 26.7 above 4x 251179 Brackets.
- 26.10 Stage to subjob-0006.

Total Times -	0.00	151.00	0.00	151.00
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End Of Report

* Represents Sub-Contract days, these days are not included in the column total.