

DFBX-E 24C394 Manufacturing Travelers

Production Floor Traveler

CONTROLLED DOCUMENT



Job Order 00918-0009

REV: 0 DATE: 1/13/05
APPROVED: [Signature]
Quantity 1.00

Part Number: DFBX-E 24C394 FB Assy Revision: NS U / M EA
 Due Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc Rel Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Rel Date: 11/24/2003

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 24C394 E Feed Box Assembly-Piping Assemblies Dwg 251873
 1.1 Pull the piping assemblies shown on dwg 251873 (from subjob-0013).
 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 24C394 E Feed Box Assembly- Bus Duct Q3 End Dwg 25M857
 CUSTOMER WITNESS POINT.
 Reference: Specification M994; Dwg 25C352; 25I226 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 25I587 Bus Assembly below:

SN 251448-12 By: ECK Date: 12-14-04

- 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 24C394 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 24C394 sht 8. Record locations: (Use Romer Portable CMM or other suitable means.)

X: _____

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Date: 01/12/2005

Time - 15:51:11

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Part Number DFBX-E 24C394 FB Assy Revision NS U/M EA Quantity 1.00
Due Date 05/25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
Orig Ref Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
Plant Ref Date 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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Y: _____

Z: _____
By: ~~WJ~~ W.J. Date: ~~2/2/05~~ 12-20-04 - SEE REPORT

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: DJC Date: 2/3/05

2.10 Dwg 24C394 G Feed Box Assembly- Bus Duct Q3 End Dwg 25M857
CUSTOMER WITNESS POINT.
Reference: Specification M994; Dwg 25C394; 25I226 Sht 10; 25M587; 25H400
Bus Duct 25I857 assembles to the Q3 End of the LHe Tank.
STAMP YOUR WELDS.

- 2.10.1 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 24C394 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 DFBX-E 24C394 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 05/25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Rel Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date 11/24/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 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 24C394 sht 8. Record locations: (Use Romer Portable CMM or other suitable means.)

X: _____
 Y: _____
 Z: _____

By: W. J. Date: 12/20/05

2.11 Stage to OP30.

	30 WE	2-A WELDERS	1.00	0.00	0.13	8.00	0.00	8.00
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Operation Description Detail :

3.0 Dwg 24C394 E Feed Box Assembly

3.1 Reference drawing 24C394 Sheet 5 Section A-A. Fit up the two LHe tank Covers (dwg 251119 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	3-A ASSEMBLY	1.00	0.00	0.13	8.00	0.00	8.00
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Operation Description Detail :

4.0 Dwg 24C394 E Feed Box Assembly

(Note: Welds for DH Line, Helium Tank Piping, and CC1 Lines previously cold shocked in subjob-0010.)

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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Part Number: DFBX-E 24C394 FB Assy Revision: NS U: M EA Quantity: 1.00
 Due Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc Rel Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Rel Date: 11/24/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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- 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 24C394 E Feed Box Assembly
- 5.1 Reference drawing 24C394 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 24C394 E Feed Box Assembly-Piping Assemblies Dwg 25I873
- 6.1 Install the following piping and G10 support assemblies shown on dwg 25I873.
 1. Dwg 25I510 V Pipe and Jacket Assembly Qty 1
 2. Dwg 25M919 Crossover Line Qty 1
 3. Dwg 25I552 Pipe, XB Qty 1
 4. Dwg 25I553 Pipe, CY1 Qty 1
 5. 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: MQX2-03 By: ECK Date: 1-01-05

6. Dwg 25I503 Pipe, E1 Qty 1
7. Dwg 25I505 Pipe, LD1 Qty 1
8. Dwg 25I523 Pipe, KD2 Qty 1
9. Dwg 25I524 Pipe, CC3 Qty 1
10. Dwg 25I525 Pipe, CC2 Qty 1
11. Dwg 25I607 Center Pipe Support Qty 1
12. Dwg 25I200 G10 Support

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Job Order 00918-0009

Part Number DF BX-E 24C394 FB Assy Revisions UTM EA Quantity 1.00
 Due Date 05/25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Ref Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Ref Date 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

- 13. Dwg 25I412 G10 Support
- 14. Dwg 25I099 G10 Support
- 15. Perform weld between Top Plate Ring and the Top Plate around the MBX2 line.
per 24C394 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 3x Cernox temperature sensors on the following pipes:
 - 1. The LHe Vessel 25I575. (TT831)
 - 2. The DH Line 25I634. (TT890)
 - 3. The CY1 Line 25I553. (TT812)
- 6.5 Route 3 sets of Cernox temperature sensor wires to the Pumping Port, Cryogenic Diagnostic Assy (24C394 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 24C394 E Feed Box Assembly-Piping Assemblies Dwg 25I873
 - 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 25M919 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 25M919 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 25M919 Crossover Line Qty 1
 - 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 24C394 sheet 6 Section F-F Blank off the MQX2 instrumentation

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 Use Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc Ref Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Ref Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

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 24C394 E Feed Box Assembly- (Weld and Assembly)

Customer Witness Point.

Reference Specification M996; Dwg 25I873; 24C394

8.1 Pull the instrumentation wires from 25I873-6 (24C394 Section F-F) up through the Top Plate. Pull the staged kit for 25I831. Fit the Item 25I831-5 and 25I831-7 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: CUD Date: 1-18-05

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: CUD/MJ Date: 1-19-05

Wiring Correct Confirmed by: CUD/MJ Date: 1-19-05

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. - CUD - 1-19-05

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

Continuity Check: Pass/Fail? By: CUD Date: 1-20-05

8.8 Fit the 12 Cermaseal feedthrus to the LQX Porcupine and install the 25I831-5 connector assembly in the top hole of the Porcupine.. Tack to position.

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

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Part Number: DFBX-E 24C394 FB Assy Revision: NS U / M / EA Quantity: 1.00
 Del. Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc. Rel. Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Rel. Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

- 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: D.K. Date: 1/12/05

- 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 3 sets of Cernox temperature sensor wires to the 32 pin connector located at the Pumping Port, Cryogenic Diagnostic Assy (24C394 Sht 6 Section L-L) per the electrical schematic 251617. Solder the spare wires (wire provided by LBNL) to the connector per the electrical schematic. 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: W.J. Date: 2/25/05

- 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: W.J. Date: 2/12/05

- 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 Connector to the assembly.

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Part Number: DFBX-E 24C394 FB Assy Revision: NS U/M: EA Quantity: 1.00
 Due Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc. Rel. Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Rel. Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

- 8.21 Hipot test (in air) the 32 Pin Connector
 Cernox thermometers and spare wires (in air) 300 V; <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 :

- 9.0 Dwg 24C394 E Feed Box Assembly- Item 11 120 Amp VC Lead Splicing & Testing
 CUSTOMER WITNESS POINT.
 Reference: Specification M983; Dwg 25C394; 25C322; 25I864
 Read and follow the M983 procedure with the Traveler. Drawing 25I864 gives an overview of the position of the components 24C394 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 25I617 for wire layout)

Wire Layout Completed: DJC Date: 2/8/05

Confirmed Correct: DJC Date: 2/8/05

- 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 25I615 Detail 2)

Continuity Test: Pass Fail By: DJC Date: 2/8/05

- 9.6 Follow procedure steps 13 through 15.

Completed By: DJC Date: 2/8/05

- .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.

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Part Number: DFBX-E 24C394 FB Assy Revision: NS U / M EA Quantity: 1.00
 Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Date Rec'd: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Annual Rec'd Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

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: ECB Date: _____

9.8 Stage to OP100.

Record the Serial No. 44013A



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

Operation Description Detail :

10.0 Dwg 24C394 E Feed Box Assembly- Item 12 Qty 2 600 Amp 6-Lead Assy Splicing & Testing Qty 2

CUSTOMER WITNESS POINT.

Reference: Specification M982; Dwg 25C394; 24C353; 251864

Read and follow the M982 procedure with the Traveler. Drawing 251864 gives an overview of the position of the components 24C394 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 251617 for wire layout)

Wire Layout Completed: AJC Date: 2/08/05

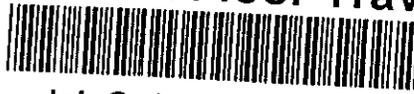
Confirmed Correct: DJC Date: 2/08/05

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 wire has been connected to the correct lead. (Reference 251615 Detail 1)

Continuity Test: Pass Fail By: DJC Date: 2/08/05

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Time - 15:51:11
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Part Number: DFBX-E 24C394 FB Assy Revision: NS U/M: EA Quantity: 1.00
Due Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
Calc Ref Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
Actual Ref Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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10.6 Follow procedure steps 13 through 15.

Completed By: RL Date: 2/9/05

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: ECB Date: _____

10.8 Repeat for second Item 12.

10.9 Wire Layout Confirmation.

Wire Layout Completed: DJC Date: 2/8/05

Confirmed Correct: DJC Date: 2/8/05

10.10 Continuity Test

Continuity Test: Pass Fail By: DJC Date: 2/8/05

10.11 Hipot Test

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

Completed By: ECB Date: _____

10.12 Stage to OP110.

Record the Serial No. (1-6) 4W013B

Record the Serial No. (7-12) 4W013C

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Job Order 00918-0009

Part Number: DFBX-E 24C394 FB Assy Revision: NS U / M EA Quantity: 1.00
 Due Date: 03/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc. Rel. Date: 03/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Rel. Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 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 24C394 E Feed Box Assembly- Item 36 600 Amp 2-Lead Assy Splicing & Testing
 CUSTOMER WITNESS POINT. Qty 1

Reference: Specification M982; Dwg 25C394; 251164; 251864

Read and follow the M982 procedure with the Traveler. Drawing 251864 gives an overview of the position of the components 24C394 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 251615 Detail 1 for wire layout)

Wire Layout Completed: DJC Date: 2/11/05

Confirmed Correct: DJC Date: 2/11/05

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 251615 Detail 1)

Continuity Test: Pass Fail By: DJC Date: 2/11/05

11.6 Follow procedure steps 13 through 15.

Completed By: DJC Date: 2/12/05

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: 0 Lead#2 Reading: 3.2

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Part Number: DF BX-E 24C394 FB Assy Revision: NS U / M EA Quantity 1.00
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 Calc Ref Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Ref Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

Completed By: _____ 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 24C394 E Feed Box Assembly- Item 6 Qty 4 HTS Leads Assy Splicing & Testing
 CUSTOMER WITNESS POINT.

Reference: Specification M985; Dwg 24C394; 251156; 251864

Read and follow the M982 procedure with the Traveler. Drawing 251864 gives an overview of the position of the components 24C394 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 251617 for wire layout)

Wire Layout Completed: A. Gc. Date: 2/07/05

Confirmed Correct: DSC Date: 2/07/05

12.4 Follow procedure steps 4 through 11.

Position: #1 Serial No. DFLX 21
 Completed By: D. Gc. W.J. Date: 2/7/05

12.5 Repeat for the remaining 5 Leads.

Position: #2 Serial No. DFLX 22
 Completed By: D. Gc. W.J. Date: 2/08/05

Position: #3 Serial No. DFLX 23
 Completed By: D. Gc. W.J. Date: 2/08/05

Position: #4 Serial No. DFLX 24
 Completed By: D. Gc. W.J. Date: 2/08/05

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

Production Floor Traveler



Job Order 00918-0009

Part Number: DF BX-E 24C394 FB Assy Revision: NS U: M EA Quantity: 1.00
 Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc. Ref. Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Ref. Date: 11/23/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DF BX-E 24C394 Feed Box Assembly								

Position: _____ Serial No. _____
 Completed By: _____ 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: ECB 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 24C394 E 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. BOX 'E'

- 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: WJ. -By: 2-17-05

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

Operation Description Detail :

- 14.0 Dwg 24C394 E Feed Box Assembly-25I575 LHe Vessel
 STAMP YOUR WELDS. GTAW-SS/LT root passes/FCAW-SS/LT covers.
- 14.1 Fit Item 31 and Item 32 Cover Plates to the LHe Tank. Reference 24C394 Sht 5 for weld details.

Production Floor Traveler



Job Order 00918-0009

Part Number: DFEX-E 24C394 FB Assy Revision: NS U/M: EA Quantity: 1.00
 Date: 01/26/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc Ref Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkèley National Lab
 Actual Ref Date: 01/24/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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Description: DFEX-E 24C394 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: G.T. Date: 2-17-05

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: ECK Date: 2-18-05

14.6 Stage to OP150.



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

Operation Description Detail :

5.0 24C394 E 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: A. J. C. Date: 2/18/05

15.2 Secure the 25C557 Bus Duct and LD3 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: W. J. Date: 2/18/05

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

Completed by: E. B. Date: _____

15.5 Stage to OP160.



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

Operation Description Detail :

16.0 24C394 E 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 00918-0009

Part Number DFBX-E 24C394 FB Assy Revision NS U / M EA Quantity 1 00
 Date: 01/12/2005 Ship Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Cds Rel Date: 03/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel Date: 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 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 24C394 E 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 00918-0009

Part Number: DFBSX-E 24C394 FB Assy Revision: 00NS U/M: EA Quantity: 1.00
 Est. Date: 05/25/2005 Sales Order Coordinator: ECB Ship Item: Y Ship Early: Y Split Ship: Y
 Calc. Est. Date: 05/11/2005 Sales Order: 000750 Customer: Lawrence Berkeley National Lab
 Actual Reel Date: 11/24/2003

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

Operation Description Detail :

- 18.0 24C394 E Feed Box Assembly-Jumper Assembly JC1
- 18.1 Reference 24C394 Section B-B: Insulate the pipe assemblies coming out of JC1 with a 10 layer MLI blanket surrounding the pipes.
 - 18.2 Install the 25I583 Thermal Shield Jumper Assembly over the pipe assemblies. GTAW-CU weld the clam shell halves.
 - 18.3 Insulate the Thermal Shield Jumper Assembly with a 30 layer MLI blanket.
 - 18.4 Fit the 25I580 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: ECB Date: 2-18-05

18.7 Stage to OP190. DJC | 2-18-05



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

Operation Description Detail :

- 19.0 24C394 E Feed Box Assembly-Jumper Assembly JC2
- 19.1 Reference 24C394 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.
 - 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: ECB Date: 2-18-05

19.7 Stage to OP200. DJC | 2-18-05

Production Floor Traveler



Job Order 00918-0009

Part Number DFBX-E 24C394 FB Assy Revision NS U / M EA Quantity 1.00
 Est. Date 05/25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc. Re. Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel. Date 11/24/2005

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
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200	AS		1.00	0.00	1.00	1.00	0.00	1.00
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3-A ASSEMBLY

Operation Description Detail :

20.0 24C352 G Feed Box Assembly-Dwg 251574 LHe Tank
 CUSTOMER WITNESS POINT

20.1 Insulate the LHe Tank, Lead Chimneys, LD3 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
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3-A ASSEMBLY

Operation Description Detail :

21.0 24C394 E 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: D. Mc Date: _____

21.2 Stage to OP220.



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

Operation Description Detail :

22.0 24C394 E 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.



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

Operation Description Detail :

23.0 24C394 E Feed Box Assembly

Production Floor Traveler



Job Order 00918-0009

Part Number DFBX-E 24C394 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 05/25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc. Rev. Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Rel. Date 01/24/2005

Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
Description	DFBX-E 24C394 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 24C394. 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 25I226-3 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 OP230.

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

Operation Description Detail :

- 24.0 24C394 E 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 24C394 E Feed Box Assembly
 - CUSTOMER WITNESS POINT**
 - STAMP YOUR WELDS**
 - 25.1 Fit the Side Plate Cover (25I125) into Vacuum Vessel Side (25I124), tack in place.
 - 25.2 Fit the two Sides Plates (25I124, 25I159) of the Feed Box Vacuum Vessel to the Vacuum Vessel Top Plate and Bottom Plate.
 - 25.3 Use the 25I858 Support Rods and adjust and postion the LHe Tank and Shield Assembly within the Vacuum Vessel. Tighten the fasteners. Insulate over the

Production Floor Traveler



Job Order 00918-0009

Part Number DFBX-E 24C394 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 06-25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Ref Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Ref Date 10-24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								

access points, 30 layers MLI.

ECK 3-10-05

- 25.4 Fit up the End Plates onto the Vacuum Vessel Assembly.
- 25.5 Break the tack welds on the Lead Chimney Flanges. Loosen the HTS Lead threaded rods.
- 25.6 Set up machinist indicators of the assembly frame on the Top Plate and Sides to monitor movement during welding.
- 25.7 Purge the Vacuum Vessel. Set up the O2 analyzer and purge the Vacuum Vessel with pure Argon gas off a dewar.
- 25.8 GTAW-SS/LT, tig weld only to seal all around. Use two welders *M* working together. Sequence welding to limit heating of vessel and cause opposing distortions.
- 25.9 Continuously monitor movement. Review results upon completion of seal pass.
- 25.10 FCAW-SS/LT. Use two welders working together. Sequence welding to limit heating of vessel and to cause opposing distortions.
- 25.11 Continuously monitor movement.
- 25.12 Fit and weld the Dwg 251139 Item 1 Jack Pads (1x) and Item 5 Mounting Pads (4x) and the Dwg 251133 Item 4 Jack Pads (2x) and Item 5 Mounting Pads (4x).
- 25.13 Major Welding Completed
 Weld Inspection: *J. Kean* Date: *3-24-05*
 Top Plate Distortion Review:
 By: *J. Kean* Date: *3-24-05*
- 25.14 Weld the Lead Chimney Flanges complete (GTAW-SS/LT).
- 25.15 Fit 251129-4 Q3 Flange to Vessel.
- 25.16 Fit 251133-2 D1 Flange to Vessel.
- 25.17 Check dimensional requirements per Sheet 4 Section D-D. Request assistance from Assembly to check dimensions to JC1 Jumper Flange.
- 25.18 Weld flanges complete.
- 25.19 Stage to OP260.



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

Operation Description Detail :

- 26.0 24C394 E 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

Production Floor Traveler

Date: 01/12/2005
 Time - 15:51:12
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Job Order 00918-0009

Part Number DFBX-E 24C394 FB Assy Revision NS U / M EA Quantity 1.00
 Due Date 05/25/2005 Sales Order Coordinator ECB Ship Item Y Ship Early Y Split Ship Y
 Calc Ref Date 05/11/2005 Sales Order 000750 Customer Lawrence Berkeley National Lab
 Actual Ref Date 11/24/2003

Description	Operation	Work Center	Operation Quantity	Setup Time	Pieces per Hour	Operation Time	Move Time	Elapsed Time
DFBX-E 24C394 Feed Box Assembly								
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 Assemble 3x-25I166 Thrust Load Bumpers. Package for shipment.								
26.8 Package with 26.7 above 4x 25I179 Brackets.								
26.7 Stage to subjob-0001.								
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.