

# HTS Leads Installation Reports



FERMILAB  
Technical  
Division

7500 A HTS Power Leads for the  
LHC DFBX:  
Installation of the Current Leads

Doc. No.  
Rev. -  
Rev. Date: Feb. 17, 2004  
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Box "B"



FERMILAB  
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 20

Signed

*Wayne E. John*

Date

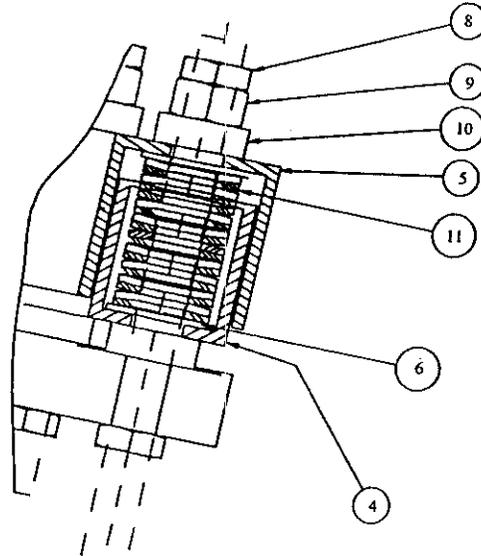
7-13-05



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**7500 A HTS Power Leads for the  
LHC DFBX:  
Installation of the Current Leads  
at Meyer Tool & Manufacturing**

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**Figure 1.31b** An installed Belleville washer assembly.

- 1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.  
 1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.  
 1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.81 B 16.31 C 15.96 D 15.64 E 15.51 F 15.35

- 1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.01 B 14.51 C 14.16 D 13.84 E 13.71 F 13.55

- 1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A  B \_\_\_\_\_ C \_\_\_\_\_ D \_\_\_\_\_ E \_\_\_\_\_ F \_\_\_\_\_

A  B \_\_\_\_\_ C \_\_\_\_\_ D \_\_\_\_\_ E \_\_\_\_\_ F \_\_\_\_\_

Lead DFLX \_\_\_\_\_

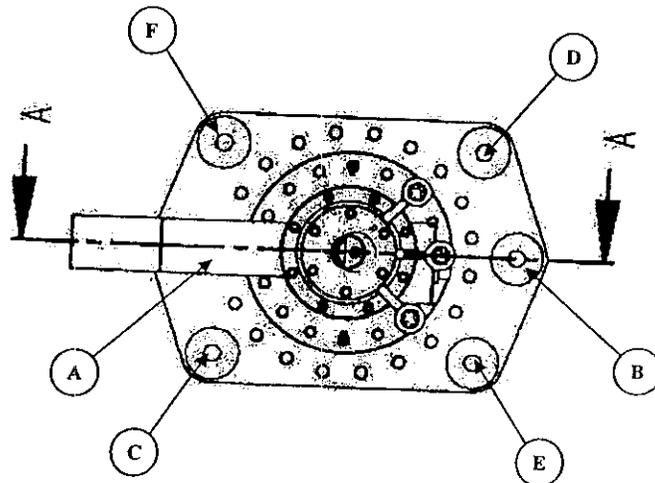


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A ✓ B ✓ C ✓ D ✓ E ✓ F ✓  
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 A     B     C     D     E     F      
 A     B     C     D     E     F    



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

1.29.5 Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.21 B 14.49 C 14.19 D 14.02 E 13.74 F 13.59

1.29.6 Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

1.30 Reduce compression of Belleville washer assemblies.

1.30.1 Remove the Teflon centering ring from the installed power lead.

1.30.2 Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

1.31 Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

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Installation of the LHC HTS Current Leads

Lead: DFLX 17

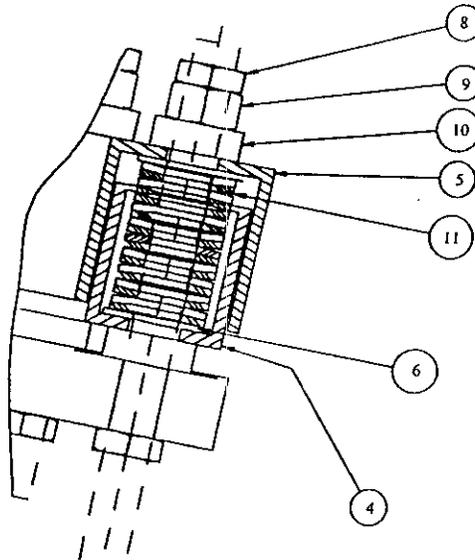
Signed

*Wayne E. Job*

Date 7-13-05



### 7500 A HTS Power Leads for the LHC DFBX: Installation of the Current Leads at Meyer Tool & Manufacturing



**Figure 1.31b** An installed Belleville washer assembly.

- 1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.
- 1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.
- 1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.79 B 15.24 C 15.78 D 15.32 E 15.61 F 15.74

- 1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.99 B 13.44 C 13.98 D 13.52 E 13.81 F 13.94

- 1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

Lead DFLX \_\_\_\_\_

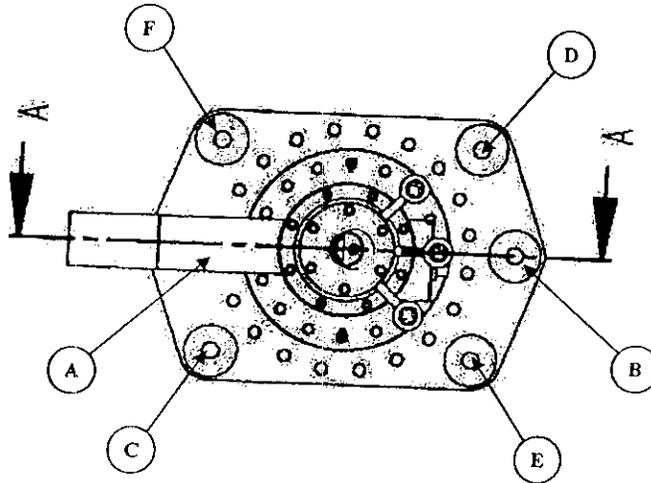


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A   ✓   B   ✓   C   ✓   D   ✓   E   ✓   F   ✓    
 A   ✓   B   ✓   C   ✓   D   ✓   E   ✓   F   ✓    
 A   ✓   B   ✓   C   ✓   D   ✓   E   ✓   F   ✓    
 A   ✓   B   ✓   C   ✓   D   ✓   E   ✓   F   ✓    
 A    B   ✓   C    D   ✓   E    F     
 A    B    C    D    E    F   



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 13.93 B 13.36 C 13.88 D 13.44 E 13.78 F 13.95

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Lead DFLX



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Box "B"



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Installation of the LHC HTS Current Leads

Lead: DFLX 16

Signed

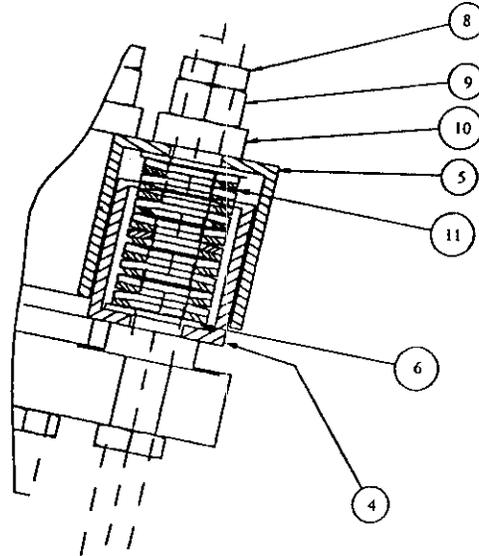
*Wayne S. Johnson*

Date

7-13-05



### 7500 A HTS Power Leads for the LHC DFBX: Installation of the Current Leads at Meyer Tool & Manufacturing



**Figure 1.31b** An installed Belleville washer assembly.

- 1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.
- 1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.
- 1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.63 B 15.36 C 16.03 D 15.84 E 15.56 F 15.57

- 1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.83 B 13.56 C 14.23 D 14.04 E 13.76 F 13.77

- 1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

Lead DFLX \_\_\_\_\_





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Box "B"



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Installation of the LHC HTS Current Leads

Lead: DFLX 07

Signed Wayne S. Jobe

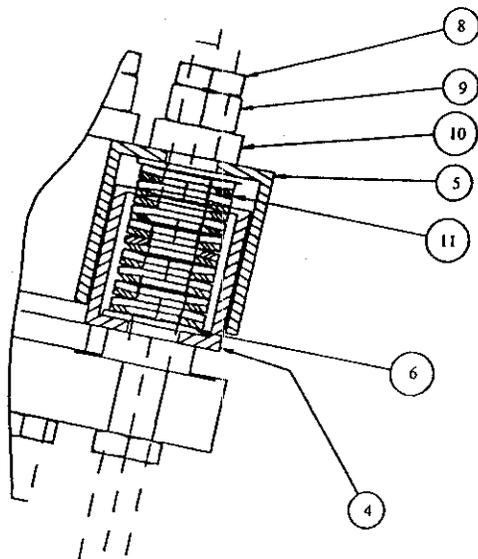
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**Figure 1.31b** An installed Belleville washer assembly.

- 1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.
- 1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.
- 1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.93 B 15.76 C 15.98 D 15.49 E 16.18 F 15.97

- 1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.13 B 13.96 C 14.18 D 13.69 E 14.38 F 14.17

- 1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

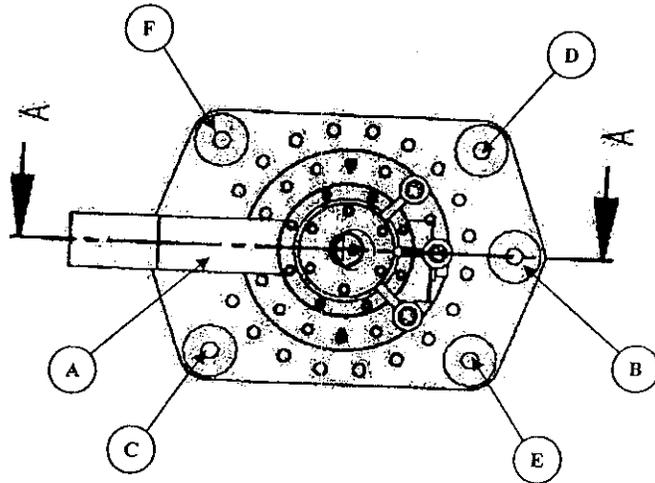
A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

Lead DFLX



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A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

1.29.5 Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.04 B 13.89 C 14.04 D 13.33 E 14.25 F 13.73

1.29.6 Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

1.30 Reduce compression of Belleville washer assemblies.

1.30.1 Remove the Teflon centering ring from the installed power lead.

1.30.2 Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

1.31 Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.



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Installation of the LHC HTS Current Leads

Lead: DFLX 20

Box "B"

Signed

Wayne E. Johnson

Date

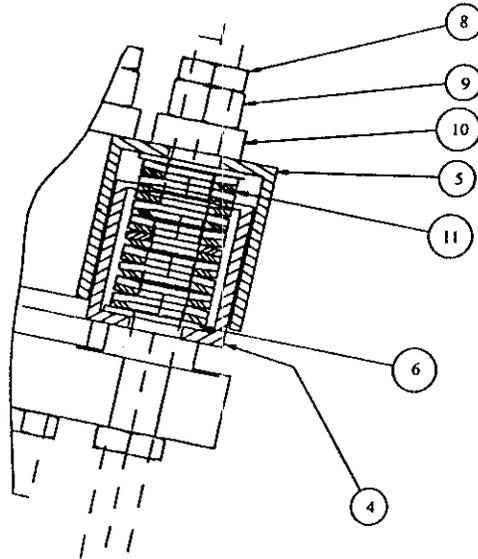
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**Figure 1.31b** An installed Belleville washer assembly.

- 1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.
- 1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.
- 1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.81 B 16.09 C 15.76 D 15.81 E 15.88 F 15.60

- 1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.01 B 14.29 C 13.96 D 14.01 E 14.08 F 13.80

- 1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓  
A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

Lead DFLX \_\_\_\_\_

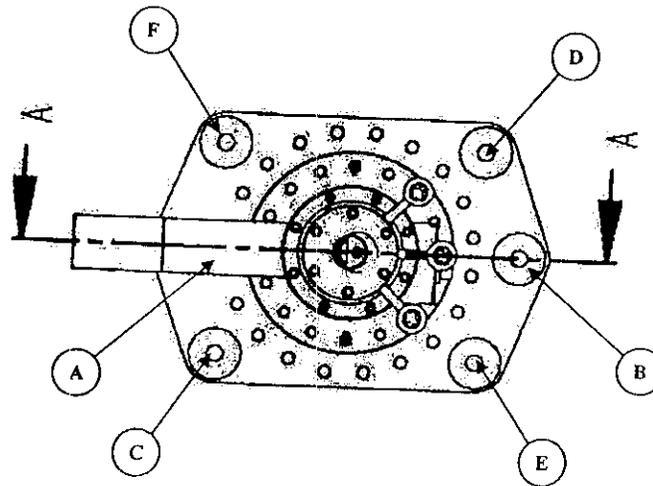


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A ✓ B ✓ C ✓ D ✓ E ✓ F ✓  
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 A ✓ B ✓ C ✓ D ✓ E ✓ F ✓  
 A ✓ B     C ✓ D     E ✓ F ✓  
 A     B     C     D     E     F      
 A     B     C     D     E     F    



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

1.29.5 Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.04 B 14.32 C 14.02 D 13.90 E 13.97 F 13.80

1.29.6 Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

1.30 Reduce compression of Belleville washer assemblies.

1.30.1 Remove the Teflon centering ring from the installed power lead.

1.30.2 Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

1.31 Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Lead DFLX



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Installation of the LHC HTS Current Leads

Lead: DFLX 17

Box "B"

Signed

*Wayne E. Johnson*

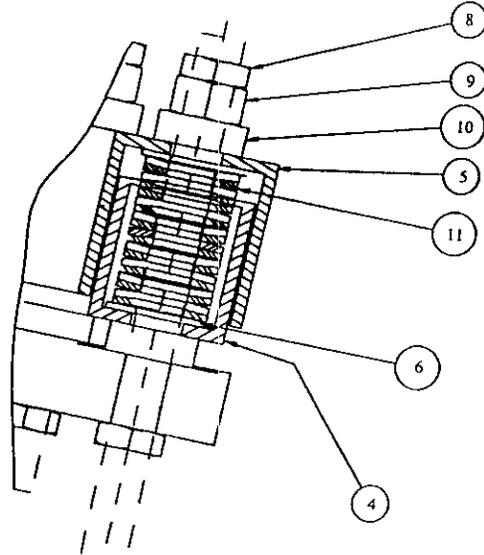
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**Figure 1.31b** An installed Belleville washer assembly.

- 1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.
- 1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.
- 1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A ~~14.27~~ B 15.68 C 15.42 D 15.68 E 15.59 F 15.14  
15.60

- 1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.80 B 13.88 C 13.62 D 13.88 E 13.79 F 13.34

- 1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓  
 A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

Lead DFLX \_\_\_\_\_

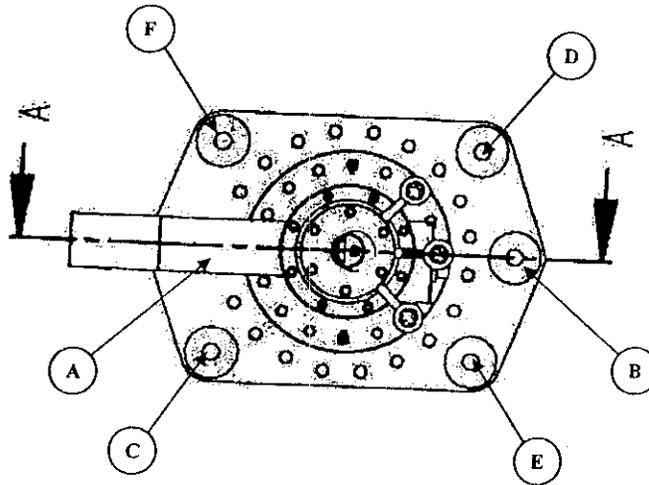


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A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

1.29.5 Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 13.92 B 13.86 C 13.62 D 13.99 E 13.82 F 13.68

1.29.6 Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

1.30 Reduce compression of Belleville washer assemblies.

1.30.1 Remove the Teflon centering ring from the installed power lead.

1.30.2 Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

1.31 Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Lead DFLX \_\_\_\_\_



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**Installation of the LHC HTS Current Leads**

**Lead: DFLX 07**

Box "B"

Signed

*Wayne E. Johnson*

Date

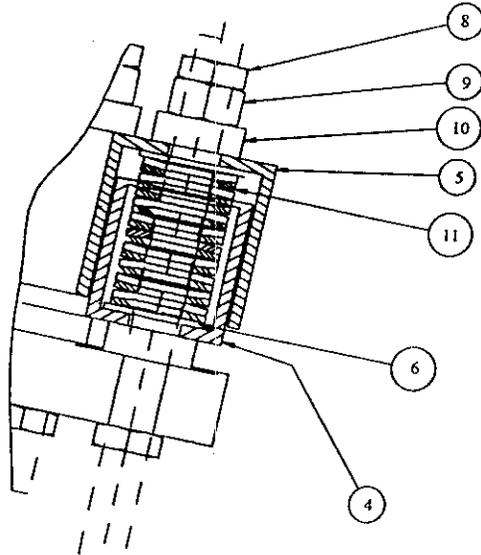
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**Figure 1.31b** An installed Belleville washer assembly.

1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 16.24 B 16.42 C 16.26 D 15.83 E 16.51 F 15.78

1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.44 B 14.62 C 14.46 D 14.03 E 14.71 F 13.98

1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A  B  C  D  E  F   
A  B  C  D  E  F

Lead DFLX \_\_\_\_\_

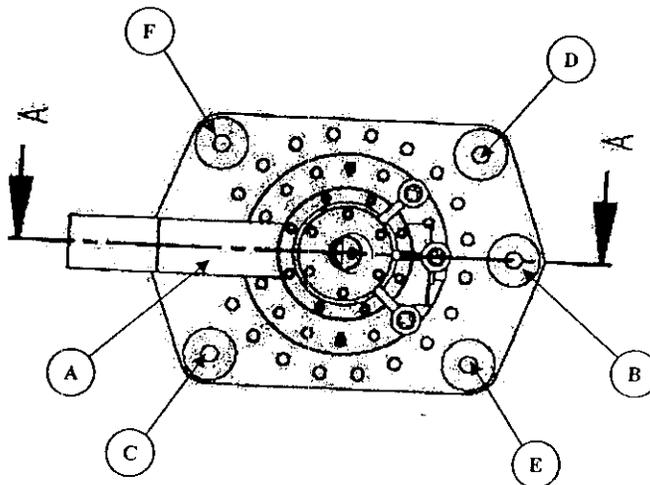


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A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F   
 A  B  C  D  E  F



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

1.29.5 Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.16 B 14.70 C 14.25 D 14.21 E 14.71 F 13.88

1.29.6 Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

1.30 Reduce compression of Belleville washer assemblies.

1.30.1 Remove the Teflon centering ring from the installed power lead.

1.30.2 Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

1.31 Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Lead DFLX \_\_\_\_\_



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Installation of the LHC HTS Current Leads

Lead: DFLX 16

Box "B"

Signed Wayne E. John

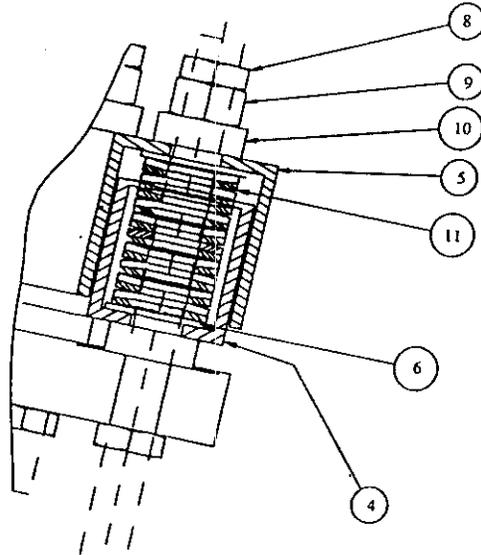
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**Figure 1.31b** An installed Belleville washer assembly.

1.29 Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

1.29.1 Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

1.29.2 Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.95 B 16.15 C 15.41 D 15.69 E 15.83 F 15.94

1.29.3 For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.15 B 14.35 C 13.64 D 13.89 E 14.03 F 14.14

1.29.4 Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓  
A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

Lead DFLX \_\_\_\_\_

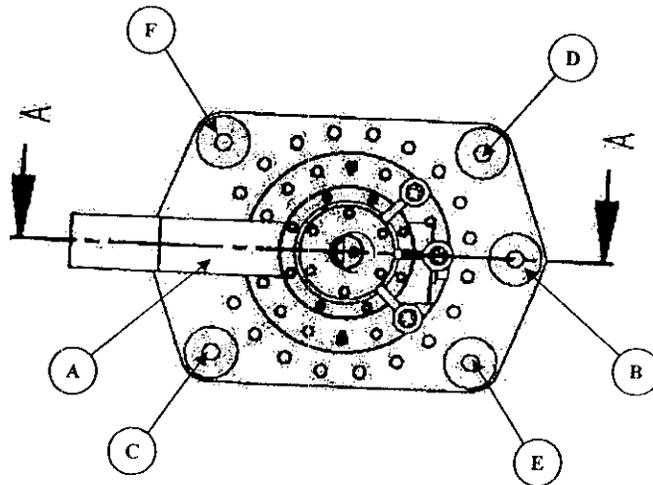


FERMILAB  
Technical  
Division

**7500 A HTS Power Leads for the  
LHC DFBX:  
Installation of the Current Leads  
at Meyer Tool & Manufacturing**

Doc. No.  
Rev. 1  
Rev. Date: May 24, 2004  
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- A ✓ B ✓ C ✓ D ✓ E ✓ F ✓
- A ✓ B ✓ C ✓ D ✓ E ✓ F ✓
- A ✓ B ✓ C ✓ D ✓ E ✓ F ✓
- A ✓ B     C     D ✓ E ✓ F ✓
- A     B     C     D     E     F
- A     B     C     D     E     F



**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

1.29.5 Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.09 B 14.29 C 13.62 D 13.88 E 14.04 F 14.27

1.29.6 Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

1.30 Reduce compression of Belleville washer assemblies.

1.30.1 Remove the Teflon centering ring from the installed power lead.

1.30.2 Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

1.31 Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

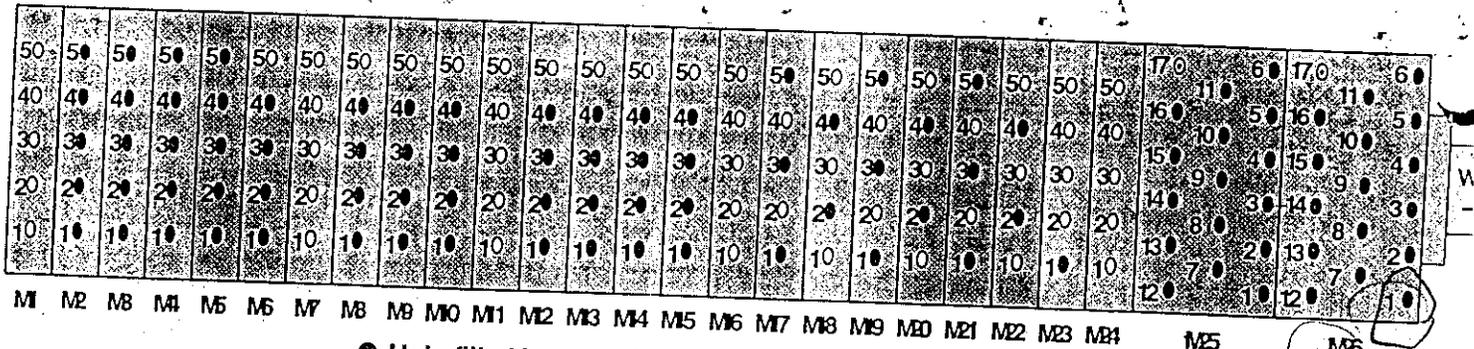
Lead DFLX

Q3 connector (non-ip, or non-lead end) for Q3-DFBX connection. Completed 11-20-04

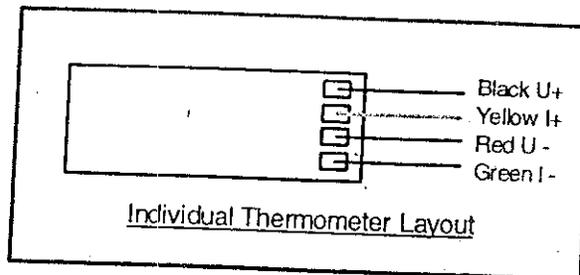
Module	Pin	CERN Label	Description
M26	1	TT8332 I+	Q2b RTD, primary Wire color: Yellow
M26	2	TT8332 I-	Q2b RTD, primary Wire color: Green
M26	3	TT8332 U+	Q2b RTD, primary Wire color: Black
M26	4	TT8332 U-	Q2b RTD, primary Wire color: Red
M26	5	TT8342 I+	Q2b RTD, redundant: Wire color: Yellow
M26	6	TT8342 I-	Q2b RTD, redundant: Wire color: Green
M26	11	TT8342 U+	Q2b RTD, redundant: Wire color: Black
M26	10	TT8342 U-	Q2b RTD, redundant: Wire color: Red
M26	9	TT8313 I+	Q3 RTD, primary Wire color: Yellow
M26	8	TT8313 I-	Q3 RTD, primary Wire color: Green
M26	7	TT8313 U+	Q3 RTD, primary Wire color: Black
M26	12	TT8313 U-	Q3 RTD, primary Wire color: Red
M26	13	TT8323 I+	Q3 RTD, redundant: Wire color: Yellow
M26	14	TT8323 I-	Q3 RTD, redundant: Wire color: Green
M26	15	TT8323 U+	Q3 RTD, redundant: Wire color: Black
M26	16	TT8323 U-	Q3 RTD, redundant: Wire color: Red
M26	17	Empty	No connection

Note:  
Pin numbers of module M26 are not listed in numerical order

Hypertronics Connector Pin Locations Q3 non-lead (non-ip) end.  
VIEW: Female (pin) solder cup side



- Hole filled in grey: Wire soldered to pin.
- ⊙ Hole with dot in center: Pin exists but no wire soldered to it.
- Hole filled in white: No pin. Hole is drilled out.



Jan W.  
Technician(s)

1-21-04  
Date

LHC DFBX Instrument Duct Assembly

Device Serial No. MOX2003-0  
Notes: