

ACCELERATOR DIVISION DEPARTMENTAL PROCEDURE

PROTON SOURCE DEPARTMENT

ADDP-LR-9002

LOW ENERGY LINAC 7835 RF PROCESSING REFERENCE

PREPARED BY _____ DATE _____

APPROVED BY _____ DATE _____
Head of Linac

APPROVED BY _____ DATE _____
Proton Source Department Head

REVISION NO. ____ REVISION ISSUE DATE _____

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1.0 PURPOSE AND SCOPE

A vacuum test should be performed on the tube within thirty (30) days of receipt unless it is equipped with an operating ion pump.

To do the vacuum test, one applies 2 kV between the grid and the cathode. A leakage current of $< 10 \mu\text{Amps}$ is acceptable.

A vacuum test should be performed on tubes in storage every six (6) months if they do not have an operating ion pump.

2.0 INTRODUCTION

This procedure was created in January 10, 1990. Until now, only hardcopies were available. This ADDP-LR-9002 is an electronic version of this procedure.

3.0 INITIAL 7835 BREAK-IN PROCEDURES

3.1 Filament Break-In Procedure

Notes: the 7835 should be connected in the gas test configuration and the water leakage current can be measured now or after the gas test is performed.

- A. Turn the filament on to about 2,000 Amp. Allow approximately 5 minutes to elapse before raising the current above the 2,000 Amp. level.
- B. Raise the filament in 1,000 Amp. (or less) steps every 2 or 3 minutes until 6800 Amp. typical operating levels is reached.
- C. Allow the filament to operate at this level for about 15 to 30 minutes without anode voltage or drive power to allow time for the getter to pump any released gas.

3.2 Perform a Gas Test on the Tube

- A. After the filament has been operating at full level for at least 5 minutes, apply -45 V anode voltage.

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- B. Turn ON the grid supply and adjust for a current of 50 Amps DC.
- C. Read the gas current on a current meter connected in series with the -45 V Anode Supply.
- D. Record gas current values for at least 5 minutes. The 5 minutes value minus the water leakage value is the final reading for the tube. A final value of less than 20 μ Amps is acceptable.

*** Typical time for step 2 is about 15 minutes ***

3.3 Filament Break-In Procedure

Note: The filament may have to be turned off in order to reconnect the filament resistors and make the tube ready to receive driver power.

- A. Apply the RF drive at 20% of its normal value (35 KW) for about 30 minutes.

Note: If an ion pump is on the tube, one should make sure the ion pump current remains < 100 mamps at all times.

- B. Increase the drive in 10% steps approximately every 15 to 30 minutes until full power is reached.

Note: If an ion pump is on the tube, one should make sure the ion pump current remains < 100 mamps at all times.

STEP	POWER (KW)	TIME (minutes)
1	35	30
2	55	15
3	75	15
4	95	15
5	115	15
6	125	15
7	145	15
8	165	15
9	175	15

*** Typical time for step 3 is about 2.5 hours ***

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3.4 Power RF Operation Break-In Procedure

Note: If at any time during this procedure excessive blocking, crowbaring or arcing should occur, one should reduce the anode voltage until the tube operation is once again stable.

A. Raise the anode voltage slowly until about 10 Amps. Of peak anode current is reached. Operate at this level for about one hour.

B. Increase the anode current in 10 Amp. (peak) steps allowing the tube to operate at each level for about 45 to 60 minutes. Continue this until full power output is obtained. One must periodically check to see if the filament current is set properly for the power being generated.

*** Typical time for step 4 is about 20 hours ***

3.5 Full Power Seasoning

A. Allow the tube to operate at full power (3.5 to 5.0 MW) for at least 48 hours.

B. Make the final log book entry for the operating parameters of the tube at the conclusion of the break-in period. At least the following should be recorded.

Filament Current
Forward Power
Reverse Power
Anode voltage (peak)
Anode Current (peak)
Drive Power

*** Typical time for step 4 is about 20 hours ***

The Break-In Procedure approximate times

Filament Break-In	30 minutes
Gas test	15 minutes
RF Drive Break-In	2.50 hrs
Power RF Operation Break-In	20 hrs
Full Power Operation	48 hrs
Total Break-in time	71 hrs 15 min.

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