# RF Group Cross training

TL Smith – 11-20-2009

## Troubleshooting in the Linac / Par – Part 1

Technician individual written / verbal responses for each question; what are the hands-on successive troubleshooting steps required. Written and verbal responses are evaluated during the cross training after each question:

## Problem #1 – Operational complaint

**(Harmonic Par will not provide output power – switching to back-up system)**

Need to fix this without interrupting Operations!

What do you do first? & next & next & so on?

1) How do you know what the complaint really is?

Talk to Operations verbally to find specifics (problem in system #2 – this case)

Look up written data log to find out more specifics.

Check to be sure that the back-up system #1 is currently operating correctly.

2) Do we need an approved work request to work on this problem & why or why not?

Yes – the back-up system belongs to operations, part of the machine.

Approved work request for this test is #26396.

3) Do we need to have permission from Ops to work on this problem right now, since we already have an approved work request?

Yes – Ops must be notified when we are starting and finished with this work.

4) What EPIC screens to you need to bring up to help find this problem?

1) RF panel, Linac/Par, Operator Par RF, Harm Tube Amp (Shows System 1 now operating).

2) RF Panel, Linac/Par, Harmonic RF, HLRF, HLRF System #2

5) What do you need to turn on to verify this problem?

The HLRF System #2 tube high voltage – This work must be done thru EPICs while Operations has control of system #1. If you try to do this manually at the Henry tube amp front panel you will hang up the IOC & disrupt operations.

6) What drawings do you need & where do you find them?

Start with the Harm line drawing hanging on wall (with any updates in red).

Additional par drawing packages are located in the yellow bin separated into groupings with large binding for ease of troubleshooting when moving around to make measurements.

7) Where do you make the measurement?

In the Par hallway by the Henry tube amp #2.

8) What equipment do you need to verify & correct this problem?

Spectrum analyzer

"Par RF Test Rack" (roll around) – generator, 5W amplifier.

9) How do you set up the equipment to make the measurement?

Connect spectrum analyzer to system #2 500W amp 50dB coupler on tube amp front panel and bring "Par RF Test Rack" into place.

10) How does the “Par RF Test Rack” work & how do you set it up for this measurement?

Internally has the rf amplifiers and power supplies to run at 5W @ 117MHz, 20W @ 9.77MHz, 500W @ 117MHz, & 1KW @ 9.77MHz with an internal patch panel to easily connect combinations of these amp / power supplies.

Set up for 117Mhz from the generator to the 5W amp to the output.

Test locally using the 2KW attenuator load attached to the test rack before attaching to system #2 rf input. Use data sheet on side of test rack to understand expected generator levels & power supplies voltages and currents.

11) When performing this test what level to you expect to see on the spectrum analyzer that is connected to the system #2 500W 50dB coupler on front panel?

The 500W amplifier typically puts out around 200 to 300W when the Henry RF output is 1 to 2KW. 200W is +53dBm, and you have ~ 50dB of coupling. Therefore you should see (with some cable losses) ~ +3dBm on the spectrum analyzer with an RF of around 1KW out of the Henry tube amp. (approx. -7 dBm on the generator should correspond to the tube amp at ~1KW RF out).

12) Is the 500W amplifier DC power supply at the proper voltage and drawing normal current at this time?

Voltage is ok, current is lower than normal.

13) Does the system #2 500W amplifier look good or bad?

The amp does not appear to have an output, so the problem is not the tube amp.

The problem could be the amp itself (transistors) or the input or output cable. DC power supply has proper voltage.

14) What do you do next?

Do visual inspection.

In a real case the transistors would most likely be bad and we would replace with a back up 500W amp. We will now re-connect the 500W RF drive cable (trouble inserted for test purposes) & retest to see if system is working.

15) System is now working, what do you do next?

Put system #2 back in normal operating condition as a current back-up system, do not interfere with operations.

Make sure log book is properly filled out.

Call MCR and give system back to operations.

Make sure screen access control is in MCR (not “All Access”).

# Work Order Request System

## WORK REQUEST NO: 26396

| | | | |
|---|---|---|---|
| **Badge Info:** | 39324 - Smith, Terry L. - ASD-RF | | |
| **Submission Date:** | 11/04/2009 14:56 | **Estimated Duration:** | 0 Day(s) 2 hours |
| **Component:** | | | |
| **Work Description:** | test harmonic par back-up system for rf group technicians. | | |
| **Type of Work - Risk:** | | | |
| **Safety Concerns:** | proper ppe | | |
| **Priority:** | **As Time Permits** | **Machine:** | **Par** |
| **Status:** | **APPROVED** | | |
| **Requested Start Date:** | 11/20/2009 10:00 | **Scheduled Date:** | |
| **Rss Component?:** | NO | | |
| **Designated Group:** | ASD-RF | | |
| **Systems Affected:** | RF | | |
| **Systems Required:** | NONE | | |
| **Access To Secured Area Required:** | NO ACCESS | | |
| **Beam Off Required:** | NO | | |
| **Shielding Change/Removed:** | NO | | |
| **Realignment Required:** | NO | | |
| **Loto Requirement:** | NOT REQUIRED | | |
| **Schedule Period:** | ONGOING | | |
| **Comments:** | Coordinate with MCR....-SP | | |

**Approved by:** Pasky, Stanley J. on: 11/05/2009 07:45

Print WRQ Details Report | Print WRQ Details with LOTO

Main Menu
Query Request
Submit Request
Modify Request

Click here to send comments or suggestions to WRQ Administrator | Click here to Log Out