

Date: _____

420 Area RF Waveguide Switching Check List

Ali Nassiri – RF Group

- 1st Revision: September 16, 1997
- 2nd Revision: November 12, 1997
- 3rd Revision: June 2, 2000
- 4th Revision: March 8, 2001
- 5th Revision: March 20, 2001
- 6th Revision: February 21, 2002
- 7th Revision: April 09, 2003
- 8th Revision: June 02, 2004

Before switching waveguide, read and carefully follow the instructions in the “Procedure for the Storage Ring RF Waveguide switching” on the RF Group web page. For the waveguide change over, follow the instructions below. If you encounter any problems in switching the waveguide or in bringing up any RF systems after a switch over, contact the RF Group Engineer In Charge (EIC).

1. Obtain the waveguide switch enable keys from MCR.
2. Bring down RF power to ALL 352 MHz RF systems to zero and turn off RF drive from the computer screen.
3. Shutdown ALL 352 MHz RF systems High Voltage. Leave the klystron filaments on.
4. Place ALL UVC power supplies in “Local Control”. Make sure that the UVC computer monitors display “Fault Indicator” screen and not the “Meter/Set-points” screen.
5. Place the waveguide switch and the phase shifter 120-volt enable keys in locks and enable the switched 120 VAC. This is located in RF6 panel.
6. Select the desired operating mode by inserting the MODE key into the desired mode key switch.
7. As the system is switching, observe the system status screen on the waveguide switching system PLC. After about 80 seconds, all blocks on the PLC should be green, meaning that the RF systems can now be brought back up (the slow devices in the switching action are the phase shifters which will take about 80 seconds to complete all moves, the waveguide switches are the next slowest, taking about 2 seconds, and the remaining switching occurs within 200 msec).
8. If the PLC reports that the mode switch is successful, remove the waveguide switch and the phase shifter 120VAC enable keys.
9. Make a note of the selected MODE from the PLC screen. Mode Number: _____
10. Manually turn off the Kalmus amplifiers on the RF stations that are not being used.

- 11. Verify that the Kalmus amplifiers on the selected station are on.

- 12. Verify that the UVC PS computer is left in “Fault Indicator” screen.
- 13. Place the selected UVC power supplies in “Remote Control”.

- 14. If the Storage Ring rf systems are to operated under Analog AGC gap voltage control, manual toggle switches must be correctly set to allow Analog AGC system to operate:
 - a) For rf stations supplying rf power to the storage Ring, set the local feedback control toggle switch, located on the front on the Control Logic Chassis Unit in rack #3 at each rf station, to the “**FEEDBACK OPERATE**” (up) position.

Note: This switch should be kept in the “FEEDBACK KILL” position (down) at RF stations which are in standby (diode) mode.

 - b) For rf stations supplying rf power to the Storage ring, set the “feedback Enable” toggle switches, located on the AGC Feedback Line Driver Chassis in Rack #9/A014 to the “**FEEDBACK ENABLE**” (up) position.

Note: These switches should be kept in the “FEEDBACK DISABLED” position (down) at RF stations which are in standby (diode) mode.

[Refer to the Analog Storage-Ring Voltage Regulation System Operating Procedures for more details.](#)

- 15. From the RF control panel, bring up the waveguide switch screen and make sure that it displays the correct mode for operation.
- 16. Coordinate with OPS. If ACIS shutdown verification is required, follow the Turn-On Procedure to bring the Booster and Storage Ring RF systems to their ACIS validation set point power level. If no ACIS verification is required, follow the Turn-On Procedure to bring the Booster and Storage Ring RF systems to their nominal settings.

Return the waveguide switching enable keys to the MCR. Turn control of the RF systems to the MCR crew. The MCR OPS crew is to get the RF systems ready for beam injection into the Storage Ring. The ACO is to check and determine if an ACIS shutdown validation for the selected mode of RF operation is required. The ACO's signature below indicates that they have checked the ACIS validation status.

RF Group Rep Signature: _____

Date: _____

17. Check ACIS validation status of the RF systems for the selected mode of operation.

ACIS shutdown validation is required.

ACIS shutdown validation is not required.

Signature: _____
ACO's ACIS validation status

Date: _____

Follow the procedure “Operation of the Analog Storage-Ring Gap Voltage Regulation System (Analog AGS) if the Storage ring RF system is setup with Analog AGC to control the RF gap voltage. See attached appendix.

For EPICS controlled RF Gap Voltage Controllaw only, continue with step 18.

18. From OAGapps, go to Storage Ring RF to RF controllaw Mode Change. Verify that the corrected mode is selected.

19. From OAGapps go to Storage Ring RF. Go to RF controllaw screen and press the test mode to check is the correct stations are selected for the RF controllaw.

20. From OAGapps go to Storage Ring RF and to RF phase knob screen to check if the correct stations are selected.

21. Activate RF controllaw for the selected stations after balancing RF power between RF stations.

22. From rfpnl1, go to RF Source and bring up HP 8508 VVM screen. The phase between the two RF stations should be 10 to 28 degrees. Adjust this phase if it is needed.

23. Bring the scope signal of the Booster and Storage ring RF waveforms on the monitor. The source and relative phases between RF stations could be adjusted (if it is needed) to optimize the beam injection efficiency into the Storage ring.

24. RF system is now ready for beam injection into the Storage Ring.

25. A signed copy of this checklist must be put into “RF Waveguide Mode” folder in MCR.

OPS Signature: _____

Date: _____

Appendix --- PROCEDURE FOR OPERATION OF THE ANALOG STORAGE-RING GAP VOLTAGE REGULATION SYSTEM (ANALOG AGC)

Doug Horan

PROCEDURE FOR OPERATION OF THE ANALOG STORAGE-RING GAP VOLTAGE REGULATION SYSTEM (ANALOG AGC)

5/31/2000

NOTE: STEPS 1-3 ARE TO BE FOLLOWED AFTER A WAVEGUIDE SWITCH PROCEDURE.

1. For rf stations supplying rf power to the Storage Ring, set the local feedback control toggle switch, located on the front of the Control Logic Chassis Unit in rack #3 at each rf station, to the "FEEDBACK OPERATE" (up) position.

Note: This switch should be kept in the "FEEDBACK KILL" position (down) at rf stations which are in standby (diode) mode.

2. For rf stations supplying rf power to the Storage Ring, set the "Feedback Enable" toggle switches, located on the AGC Feedback Line Driver Chassis in Rack #9/A014, to the "FEEDBACK ENABLE" (up) position.

Note: These switches should be kept in the "FEEDBACK DISABLED" position (down) for rf stations which are in standby (diode) mode.

3. Manually adjust the rf stations providing power to the S36/S37 and S38/S40 sector-pairs for approx. 25kW per cavity (see Figures 2 and 3). The preferred mod-anode voltage setpoints for each rf station under these conditions are shown below:

RF1 – 30,825V

RF2 – 36,425V

RF3 – To be determined

RF4 – To be determined

Make sure that all SR cavities are tuned and the collector interlock is released on the rf stations providing power to the SR cavities.

4. Bring up the AGC control panel screen (see Figure #1). Check the rf station status indicators to see that all permissive conditions for the operating rf stations are green. Any red indicators indicate an equipment status condition that will prevent closing the AGC loop around the rf station.
5. Adjust the S36/S37 AGC setpoint to +0.827 volts, corresponding to 4.7MV rf gap voltage.
6. Press the AGC FB "ON" pushbutton for the rf station providing power to S36/S37.
7. Press the "REMOTE FEEDBACK ENGAGE" pushbutton for the rf station providing power to S36/S37.
8. Check to see that the S36/S37 feedback card output graphical display on the AGC control panel is indicating an operating point of approx. +2.0volts. If it is, the AGC loop is operating correctly and the total rf gap voltage for S36/S37 should be regulated at 4.7MV. If the loop is not functioning correctly, press the AGC FB "OFF" pushbutton to remove loop control from the rf station.

Note: Notify the RF Group on-call technician if the AGC loop cannot be locked properly.

9. Adjust the S38/S40 AGC setpoint to +0.903 volts, corresponding to 4.7MV rf gap voltage.
10. Press the AGC FB "ON" pushbutton for the rf station providing power to S38/S40.
11. Press the "REMOTE FEEDBACK ENGAGE" pushbutton for the rf station providing power to S38/S40.
12. Check to see that the S38/S40 feedback card output graphical display on the AGC control panel is indication an operating point of approx. +2.0 volts. If it is, the AGC loop is operating correctly and the total rf gap voltage for S38/S40 should be regulated at 4.7MV. If the loop is not functioning correctly, press the AGC FB "OFF" pushbutton to remove loop control from the rf station.

Note: Notify the RF Group on-call technician if the AGC loop cannot be locked properly.

13. With both AGC loops locked, the total storage-ring rf gap voltage should be regulated at 9.4MV. This value of regulated gap voltage can be varied by adjusting the setpoint value for each AGC loop. When beam is injected into the storage ring, the AGC feedback card output voltages will increase in the positive direction, raising the rf station output power to counteract beam -loading effects and maintain 9.4MV of total rf gap voltage. Conversely, if beam is lost or dumped without the loss of rf drive, the AGC loops will remain locked and reduce the rf power from both stations back to injection levels.
14. If an MPS or ACIS action mutes the rf source signal, both AGC loops will disengage, returning the rf stations to their manually-adjusted unregulated injection power levels. To restore AGC control, press the AGC FB "ON" button for both stations. Both loops should lock at the original operating points (see steps 7 and 11 above).
15. If an rf system trips for any reason, Gap Voltage AGC control of that station will be inhibited, and the loop must be manually restarted following this procedure.
16. To shut down the Gap Voltage AGC systems, press the AGC FB "OFF" button (see figure 1) for each rf system driving the ring. This will inhibit AGC control of the rf stations and reduce their power output to the manually-adjusted/non-regulated injection levels.
17. If Gap Voltage AGC operation is no longer desired, press the AGC FB "OFF" buttons on the control screen to disengage the loop at the operating rf stations. Once the agc loops are disengaged, manually switch the local feedback control toggle switch at each rf station to the "FEEDBACK KILL" (down) position, and the "Feedback Enable" toggle switches in rack #9/A014 to the "FEEDBACKL ENABLE" (down) position.

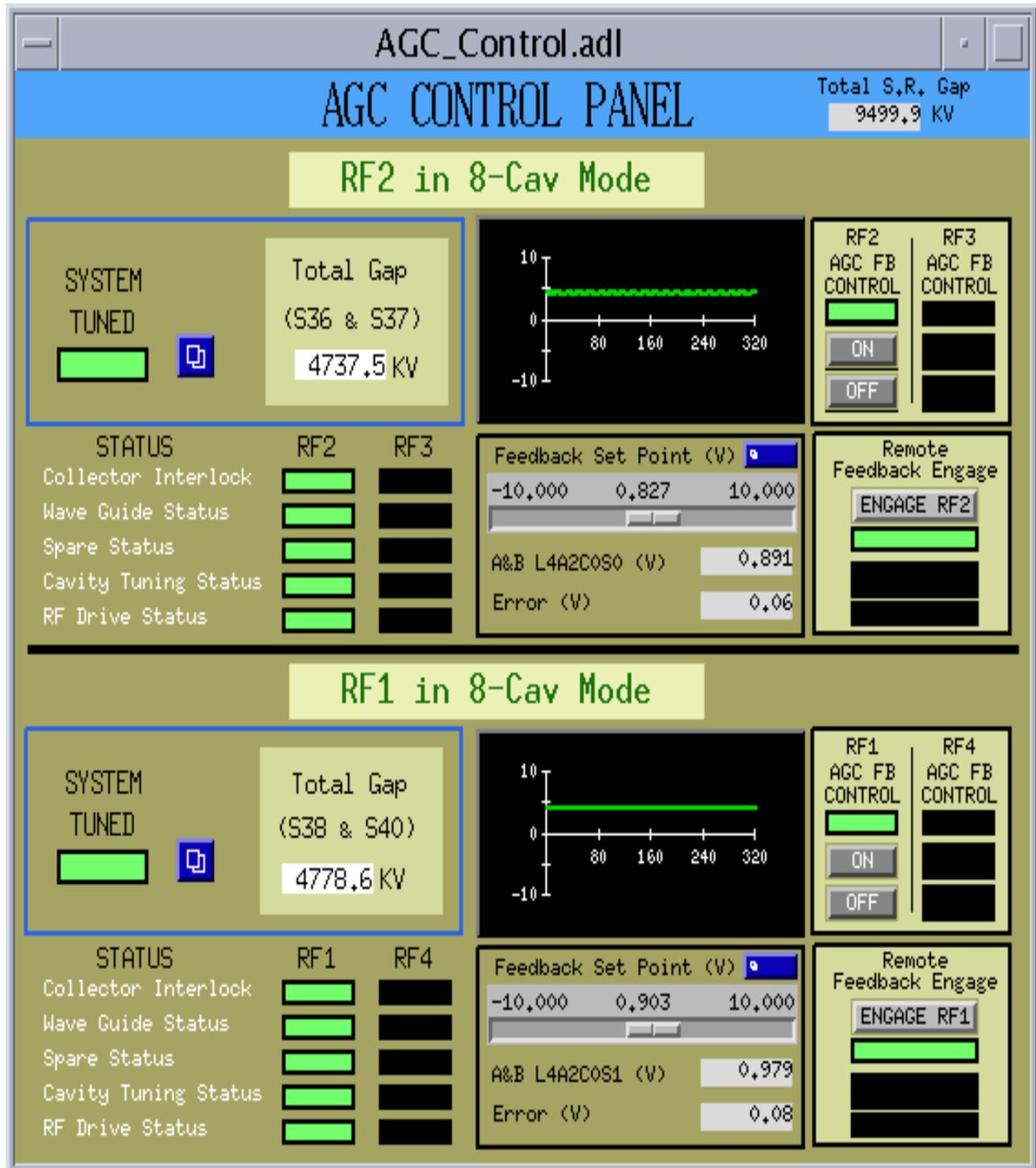


Figure 1: AGC Control Panel

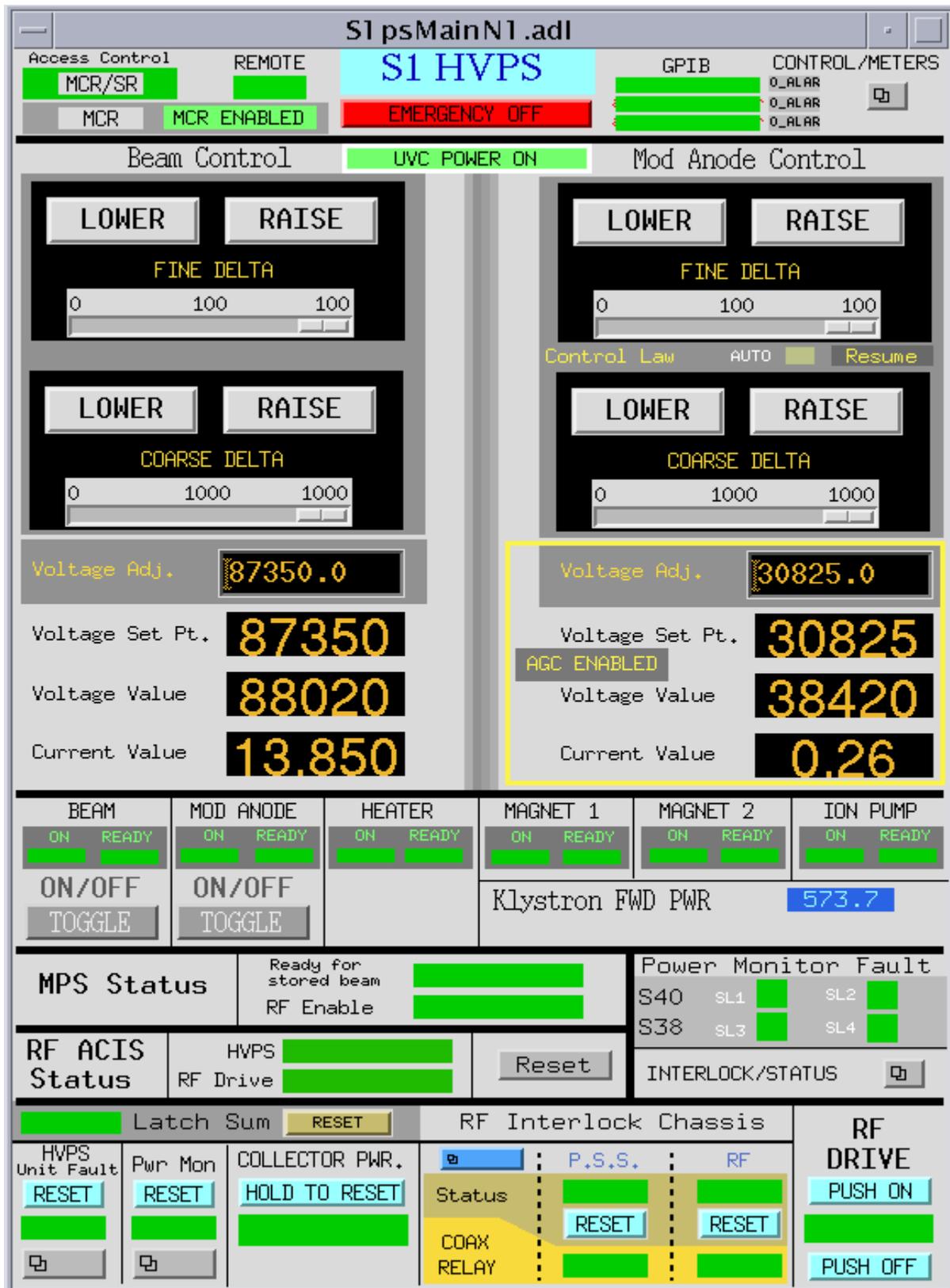


Figure 2: RF1 Station

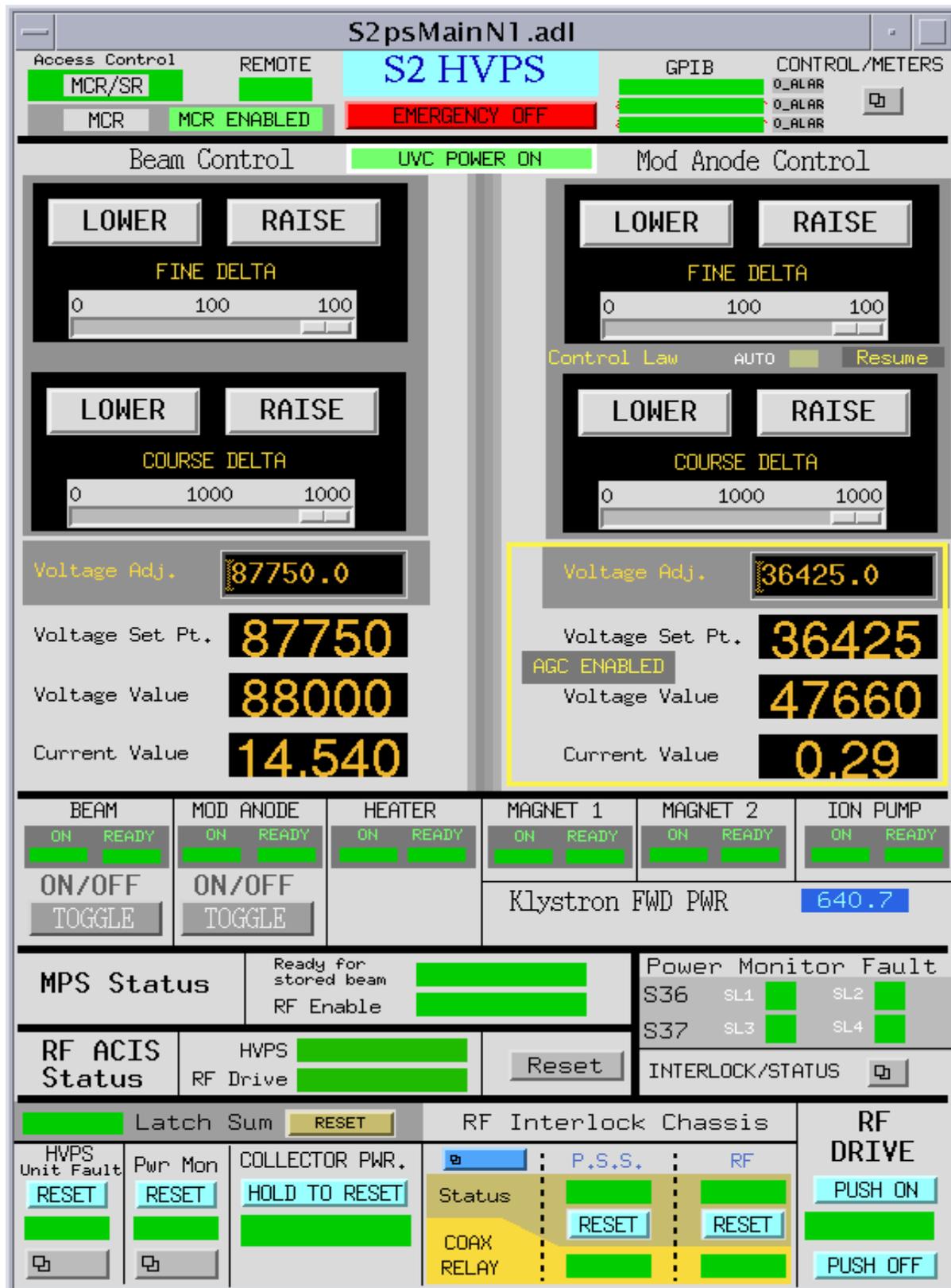


Figure 3: RF2 Station