RF Setup

PROCEDURE:

1. Reconfigure the LFB *(if changing total gap voltage)*
2. Reconfigure the Low Group Delay Woofer *(if changing total gap voltage)*
3. Enter Station Gap Voltages (by hand or with loading EPICSconfigs)
4. Change Comb Filter Settings *(if changing total gap voltage)*
5. May need to change the woofer setup
6. May need to change the Power Balance Feedback Setup
7. Check collision phase for luminosity
8. May need to alter the bucket pattern to keep charge/bucket similar for luminosity

SUMMARY OF SETTINGS for RF stations:

"snapshots" of the RF setup can be taken from the SCP with "PEP_RF_SNAPSHOT.edl" from PEP-II Tune Panel -> EPICS Display Panel -> PEP RF Setup. These snapshots of relevant parameters are then regularly saved to the MCC E-log for reference.

1. RECONFIGURE THE LFB (if changing the total gap voltage)

MANUAL OPTION:

- To load the proper configuration, go to the SAVE/RESTORE panel for the HER/LER EPICS LFB.
- Either select Gold setup 0, Gold setup 1, or User defined. If using a user defined file name, enter it in the file name line (you **must** hit RETURN while the mouse is in the filename field, or else the filename will **not** be loaded).
- Hit "Restore" and exit this panel.
- Next, go to "PEP-II HER LFB Control" panel and hit "Stop" and "Run" to restart the LFB with the new settings.

Note: You can access the LFB configuration directory from any UNIX AFS (flora) machine. Just change directory to /nfs/mccfs0/u1/lfb/lfb/tbl/

2 . RECONFIGURE THE LOW GROUP DELAY WOOFER (LGDW) (if changing the total gap voltage)

MANUAL OPTION:

- From HER LFB panel, select LGDW.
- Select "HER SETUP"
- Select "HER SAVE/RESTORE"
- In text field enter the appropriate file and press RETURN while the mouse is in the text field.
- Select "RESTORE" to load file

(You should not need to STOP and RUN the LFB to pick up LGDW changes?)

Note: You can access the LGDW configuration directory from any UNIX AFS (flora) machine. Just change directory to /nfs/mccfs0/u1/lfb/lgdw/dl/sr/HER/ or .../LER/

3. STATION GAP VOLTAGE

The stations' gap voltage may be entered either manually on the EPICS panel or with loading an EPICS config.

MANUAL OPTION:

Just do it.

Spreadsheet from Dan VanWinkle on how to keep 16 MV when we lose one RF station. (May 2007). All values are in KV.

Station	Voltage	If 2 Cav Park	If 4 Cav Park	Park HR81 7 /13
HR41	1200	0	1400	1350
HR46	1100	1350	1400	1360
HR81	2100	2150	2400	0
HR83	2200	2200	0	2400
HR85	2200	2200	2400	2400
HR21	1200	1350	1400	1200
HR22	1200	1350	1400	1400
HR23	1200	1350	1400	1400
HR24	1200	1350	1400	1350
HR25	1200	1350	1400	1350
HR26	1200	1350	1400	1400
Total	16000	16000	16000	15660

Total Voltage
4 Cavity stations at 2400 KV or 600 KV/Cav
2 Cavity stations at 1200 KV or 600 KV/Cav

System's limitations notes

Station	Parameter	Limit	Comment	Date
HR21	Gap Voltage	1100 KV	Cavity 1 window air side arc	06/04/2007

EPICS CONFIG LOAD:

SCP config files for use in the parking of a given HER RF station exist. The configuration region is called HER_GAPV (SCP path INDEX -> CONFIG -> MISC CONFIG -> EPICS CONFIG -> HER GAP VOLT) and the NORMAL directory has setups for parking each station. *Configs for 2007 are still in the works* These new configuration files save the following parameters for each RF station in HER:

1. Desired gap voltage
2. LFB woofer link state (ON/OFF); meaning woofer is turned on or off. This does not load LFB configurations, it just tells the given RF station to woof or not.

4. COMB FILTER SETTING (if changing the total gap voltage).

For each different gap voltage, a new comb filter coefficient per station's Comb-2 module is needed. Use the "**Comb Filter Freq.**" Matlab function to set up the comb filter coefficients. (The Matlab function can be found on the "RF GUI Invasive" INDEX -> High Energy Ring Panel -> HER RF -> RF Matlab and GUI Panel)

The Comb Filter Freq. function will:

- Check for no circulating beam in the machine.
- Get Gap Voltage total from EPICS.
- Calculate new comb filter coefficient and enter it into the inactive bank on the Comb-2 modules.
- Activate the inactive bank.

Note 1: To back out of the changes made by this program; just make the new inactive bank active. (For all Comb-2 modules)

Note 2: There is no need to save Comb-2 configuration files since the Matlab function can be run anytime one needs new comb filter coefficients.

BACKGROUND COMB FILTER INFO:

My Q: What do comb filters do?

Dmitry A: "Comb filters provide feedback gain at the synchrotron sidebands so that the effective impedance of the RF cavity is reduced. These filters are adjusted to peak at the synchrotron frequency using several coefficients. If the gap voltage changes, the synchrotron frequency moves. Then the comb filter does not peak at the right frequency and the feedback gain at Fs is reduced." (Fs = synchrotron frequency)

5. MAY NEED TO CHANGE THE WOOFER SETUP (EPICS "FEEDBACK" PANEL FOR EACH STATION).

MANUAL OPTION:

When changing the woofer complement two things are important: number of stations and the regions. In 2004: "The system is tuned to have two stations in 8 and one in 12 woofing. So, if you park 12-3 you need to turn on woofer on 12-1. You can press "woofer on" with beam without aborting. The only issue is that if you end up *with too many woofers running, the system might become unstable* longitudinally and abort." Furthermore, the order of preference for woofing stations is 12-3, 8-5, 8-3, 8-1, and 12-1. The stations configured to woof are the 4-cavity stations: 8-1, 8-3, 8-5, 12-1, and 12-3. ***Summary: woof with two stations in Region 8 (8-5, 8-3, 8-1) and one in Region 12 (12-3) (in preferred order).*** In 2007: **??**

EPICS CONFIG LOAD:

This step is handled by the EPICS config load of the gap voltages, comb filter set, and LFB woofer link ON/OFF in the previous step.

BACKGROUND WOOFER INFO:

My Q: What does a woofer really do? My guess: Since the LFB system has a limited bandwidth and is setup to handle higher-frequency, higher order modes, the woofer somehow removes lower frequency noise from the RF stations. Without any woofing, would I see longitudinal motion aborts?

Dmitry A: "Pretty close. LFB is actually quite wideband and handles both high and low frequency modes. However the growth rates of the low frequency modes (close to RF frequency and driven by the RF cavity impedance) are very high. Without woofer, LFB would not have enough gain to stabilize the machine at high currents. We send the low-frequency part of the feedback signal to the RF stations which act as a high-gain kicker."

6. MAY NEED TO CHANGE THE POWER BALANCE FEEDBACK SETUP

MANUAL OPTION:

If the parked station was the reference station for the feedback loop, either turn off the loop or select a new reference station. See http://www.slac.stanford.edu/grp/ad/op/PowerBalance further help.

EPICS CONFIG LOAD: There is no such option at this time.

7. CHECK COLLISION PHASE FOR LUMINOSITY

8. MAY NEED TO ALTER THE BUCKET PATTERN TO KEEP CHARGE/BUCKET SIMILAR FOR LUMINOSITY IF OPERATING AT REDUCED CURRENTS.