Correcting the Accumulator Extraction Energy and Phase

Setup Plots

Make a plot of I:VDQ28 (MIRF 2.5 MHz phase detector) vs. time. This can be done from a FTP or SDA's plot viewer.

- To get an FTP triggered at the right time, restore FTP file Pbar 9. Trigger the plot on a $9A + 1.5 sec. Plot I:VDQ28 and set the vertical scale from -45° to 15°. Set the time base from 1.5 to 1.9 sec.
- To view the SDA plot: open the view called MIRF_Phase_RR_SW.xml, select a transfer (or transfers) from case 7 (Transfer Pbars from Accum to MI for RR). The resulting plot looks like the figure below:

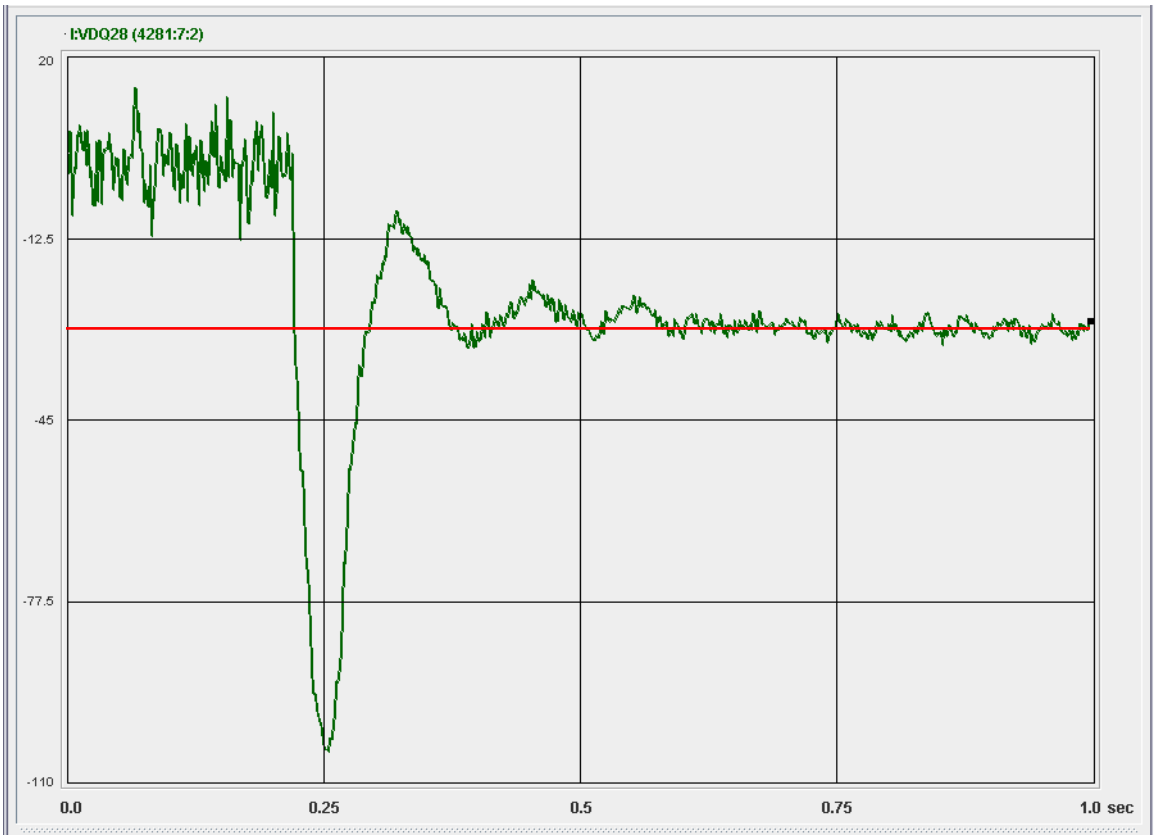


Figure 1. The above figure shows a pure energy error. In general, there may be a phase error as well. The phase error is the value of I:VDQ28 – baseline (shown in red) when beam arrives.

Energy Error

1. Estimate the phase excursion.

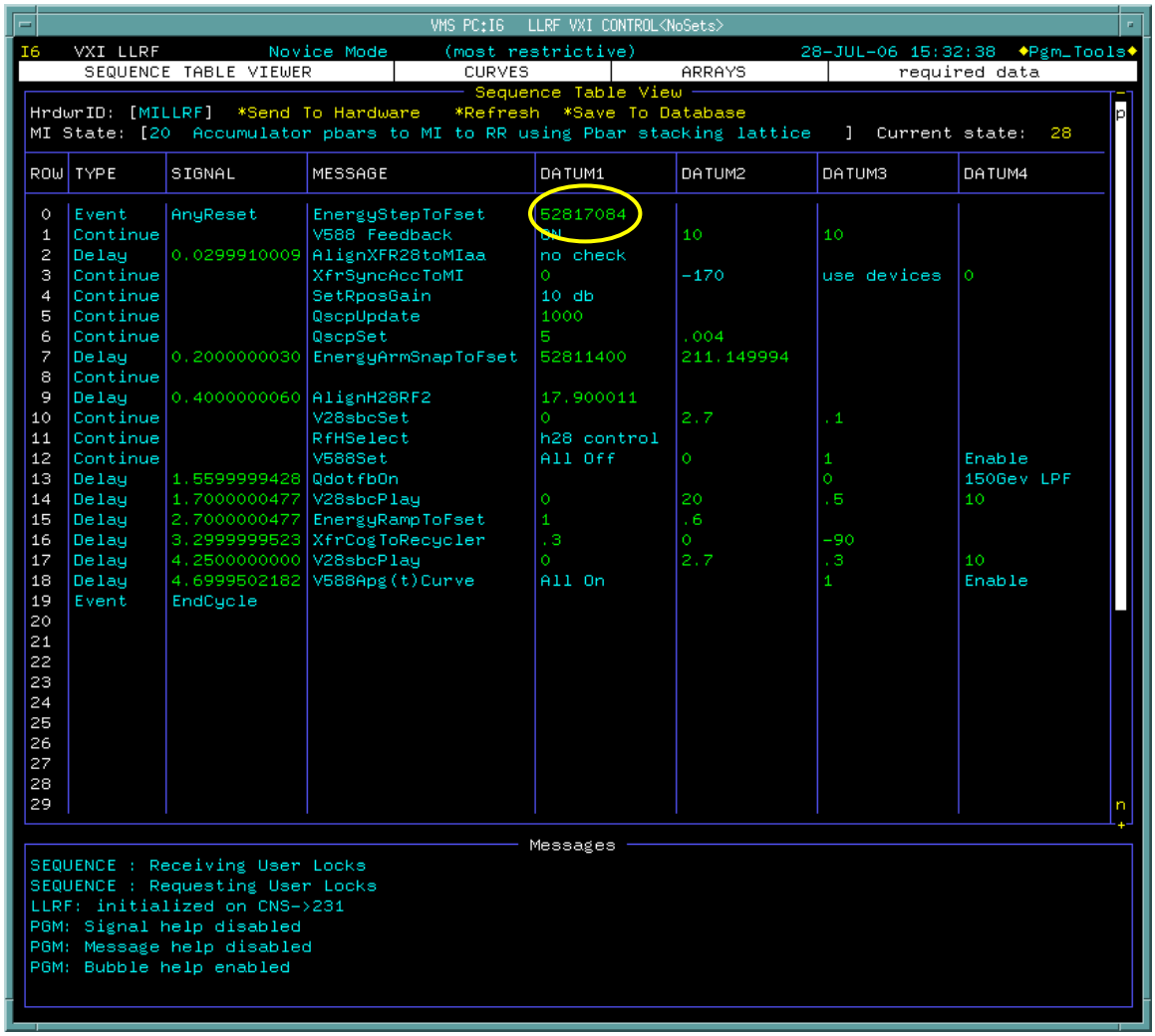
   The phase excursion is how far the phase detector swings from the baseline on the first oscillation. In Figure 1 above the phase swing is about -76°.

2. Estimate the change to A:RLLEXF required to correct the error.

   The change required is approximately –1 Hz per +15° of phase swing. Therefore, the correction required above is:

$$\Delta\ \text{A:RLLEXF} = \frac{-1\,\text{Hz}}{15^\circ} \bullet\ -76^\circ = 5\,\text{Hz}$$

3. Before the markers on the longitudinal display have been frozen, change A:RLLEXF by the amount calculated in step 2.
4. Change the MIRF capture frequency:
   - Open I6
   - Load state 20
   - Change the DATUM1 number in row 0 by 84 × the number calculated in step 2. The number to change is circled in the figure below. After the change has been made, interrupt on *Send to Hardware.



5. When transfers are complete, update the value for A:RLLEXF in the "Fast Rec Shots & Tuneup" aggregate of the Pbar Ops Sequencer (Mode 19).

Phase Error

1. Estimate the value of I:VDQ28 at the moment beam arrives in the Main Injector.

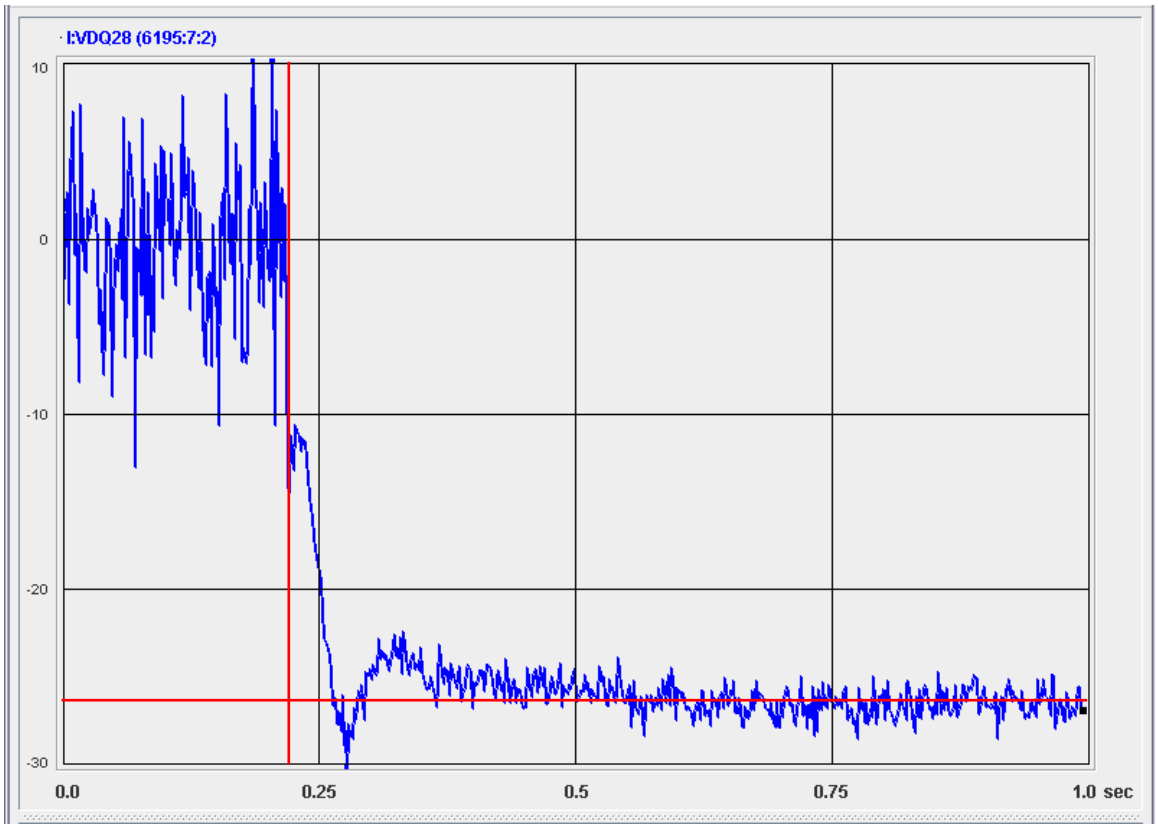


Figure 2. This plot shows a nearly pure phase error of approximately 12° to 15°. The phase baseline and the beam arrival time are indicated by the red lines.

2. *Subtract* the phase error measured in step 1 from the present value of A:R4MIPS. Thus, to correct the phase error shown in Figure 2, the value of A:R4MIPS should be decreased by approximately 12°.

3. When transfers are complete, update the value for A:R4MIPS in the "Fast Rec Shots & Tuneup" aggregate of the Pbar Ops Sequencer (Mode 19).