Collider Run II Shot Setup Documentation

Created by Brian Drendel 3-24-04
Last Edit by Brian Drendel 3-18-05
Send suggestions and comments to drendel@fnal.gov.

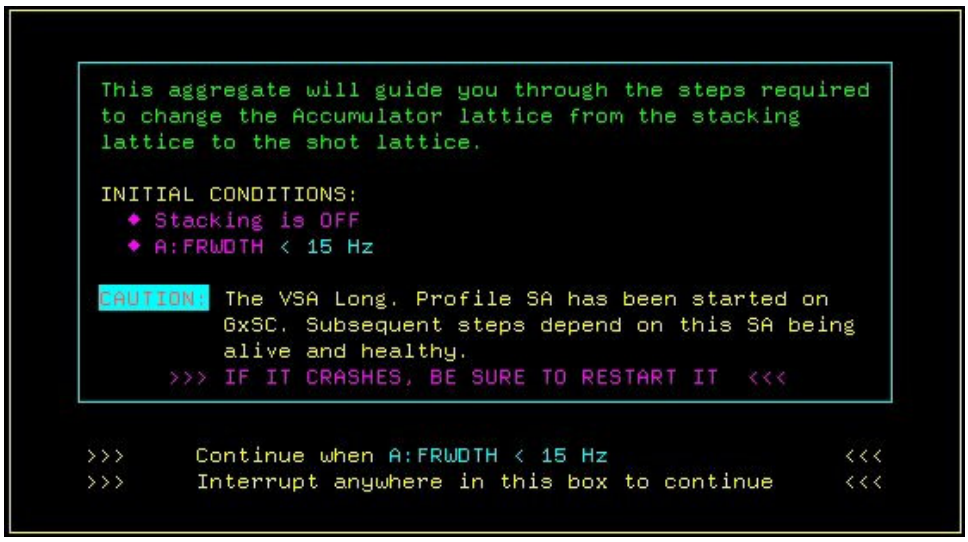
Sequencer: Pbar

Collider Aggregate: **Run II Switch to Shot Lattice**

Previous Aggregate: Run II Start Reverse Protons

Purpose of this Aggregate: The previous aggregates had the Pbar Sequencer operator cool the core frequency width to 15Hz. This aggregate will ramp Accumulator bus supplies to put us on the shot lattice.

::: INSTRUCT 200 .



::: SHOT_LOG COMMENT .

Enters the following comment into the Pbar portion of the shot scapbook at http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=scrap03.

Time- Accumulator switch to Shot Lattice. The Stack size is ##.#####. - Sequencer

::: ALARM_LIST PBar 44 .

Bypasses D59 list "ACC ANLG"

Click on thumbnail image to view a full-sized version.

::: WAIT_FOR SECS 5 .

::: ALARM_LIST PBar 49 .

Bypasses D59 list "A Q SHNT"

Click on thumbnail image to view a full-sized version.

::: WAIT_DEVICE A:FRWDTH .

Waits for A:FRWDTH to get to 14 +/- 1 Hz.

```
COMMAND: WAIT_DEVICE
nominal      15
A:FRWDTH     7.65      Hz
tolerance    .05       tries needed   5
```

::: CHECK_DEVICE A:FRWDTH SETTING .

Verifies that A:FRWDTH is 15 +/- 0.05 Hz. Displays this information in the message window at the bottom of the sequencer.

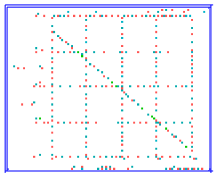
::: INSTRUCT 204 .

```
When you continue from this instruct all of the core
cooling will be turned OFF.

A new instruct will then appear telling you to start
ramping to the Shot lattice. There will be another
instruct telling you how to verify the stochastic
cooling setup for the shot lattice.

◆ Bring up P36 CORE_M_&_B subpage 21 now so that you
  can quickly make the required cooling adjustments
  when ramping is complete.

◆ You will know ramping is complete when A:RMPSEQ = 31.

>>> Once you have continued from this instruct, do   <<<
>>> not delay carrying out the procedure of the next <<<
>>> two instructs.                                   <<<

>>>     Interrupt anywhere in this box to continue     <<<
```

::: FTP RmpToShotLat 0 D

::: AUTO_PLOT Shot Lattice .

Starts a FTP on your console of A:LQ (1170-1270 amps) and A:IBEAMB (0ma - current stack size) over A:RMPSEQ (0-32).

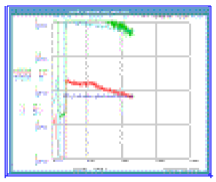


::: INSTRUCT 205 .

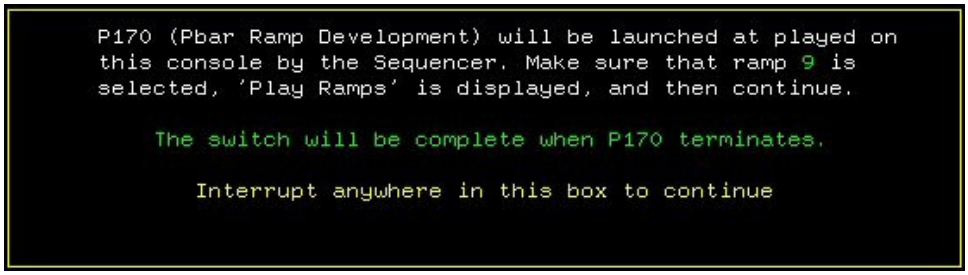
```
You will be prompted to start a new Fast Time Plot of EMT3HN,
EMT3VN, FRWDTH, and CENFRQ with limits appropriate to the Shot
Lattice. Start this plot on an adjacent console, likely #2, and NOT
the 'SA' window! Keep an eye on this plot to ensure that transverse
emittances decrease and FRWDTH approaches its target, currently 22.
For large stacks in particular, it is okay if FRWDTH is not at its
goal, but it should be within a few Hz.

            Interrupt anywhere in this box to continue
```

::: AUTO_PLOT Core Emit Shot L .

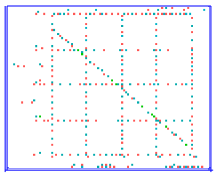
Starts a FTP on the console of the operator's choice that contains A:EMT3HN (0-2 pi-mm-mrad), A:EMT3VN (0-2 pi-mm-mrad), A:CENFRQ (628920-628940 Hz) and A:FRWDTH (0-36 Hz) over time (0-1800 sec).



```
::: SETIT_DEVICE A:VSARST = 0        .
      Turn off thermostat.
::: SET_SEQ FILE 33                  .
      File #33 turns off 2-4 Momentum cooling
      A:CPPS01 TURN DEVICE OFF                                    ok
      A:CPPS01 DIG_ALARM DISABLE                                  ok
      A:CPTW01 ANA_ALARM DISABLE                                  ok
      A:CPTW01 DIG_ALARM DISABLE                                  ok
      A:CPHV01 ANA_ALARM DISABLE                                  ok
::: CTLIT_DEVICE A:CH1PS1 OFF        .
::: CTLIT_DEVICE A:CH2PS1 OFF        .
::: CTLIT_DEVICE A:CH3PS1 OFF        .
::: CTLIT_DEVICE A:CV1PS1 OFF        .
::: CTLIT_DEVICE A:CV2PS1 OFF        .
::: CTLIT_DEVICE A:CV3PS1 OFF        .
::: CTLIT_DEVICE A:CPPS01 OFF        .
::: CTLIT_DEVICE A:CMPS01 OFF        .
::: CTLIT_DEVICE A:CPTW01 OFF        .
::: CTLIT_DEVICE A:R2LLAM OFF        .
::: INSTRUCT 203                     .
```




```
::: SEQ_PGM REQUEST Shot Lattice     .
::: STEP_MOTOR A:CH1T2 145           .
::: STEP_MOTOR A:CH2T2 220           .
::: STEP_MOTOR A:CH3T2 225           .
::: STEP_MOTOR A:CV1T2 200           .
::: STEP_MOTOR A:CV2T2 162           .
::: STEP_MOTOR A:CV3T2 204           .
::: STEP_MOTOR A:CMTM01 237          .
::: STEP_MOTOR A:CMTM01 236          D
::: INSTRUCT 207                     D
::: WAIT_DEVICE A:RMPSEQ             .
      Wait for A:RMPSEQ (PA1917 Ramp Sequence Parameter) to go from 0 to 31.   When at
      A:RMPSEQ arrives at 31, we have completed our ramp to the shot lattice.
::: SETIT_DEVICE A:RLLFS0 =628930    .
      Sets the A:RLLFSO (ARF Synth Frequency) parameter to the core center frequency
628930 Hz.
::: SHOT_LOG IMAGE                   .
      Pastes a copy of the "shot lattice" FTP (started above)into the Pbar portion of
      the shot scapbook at http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=scrap03
```



```
::: COPY_SCREEN LCL SA              .
      Screen copy of the local SA window.
::: CHECK_DEVICE A:RLLFS0 READING   .
      Displays present value of A:RLLFSO in the message window on the sequencer.
::: SETIT_DEVICE A:RCETA  = .025    .
      ETA parameter set to 0.025?
::: SETIT_DEVICE V:APSLAT = 2       .
      Sets V:APSLAT state to "stacking lattice."
::: SETIT_DEVICE A:VSARST = 1       .
      Tells VSA to restart measurement.
::: WAIT_DEVICE A:VSAAVG            .
      Waits for A:VSAAVG to be 1 for 15 consecutive samples.

::: SETIT_DEVICE A:R2LLAM = 1.65    .
::: CHECK_DEVICE A:CENFRQ READING   .
      Checks that A:CENFRQ is 628030 +/- 5 Hz and displays a notice in the message
      window of the sequencer.
::: SET_DEVICE A:CNFRQU A:CENFRQ    .
      Sets A:CNFRQU (Accumulator center revolution frequency unstacking parameter)to
      the current value of A:CENFRQ.
::: SET_DEVICE A:R2DDS1 A:CNFRQU    .
      Sets stabilizing RF frequency to the core center frequency.
::: SET_DEVICE A:CNFRQU *= 2        .
::: SET_DEVICE A:R2CWFR A:CNFRQU    D

::: CTLIT_DEVICE A:R2LLAM ON        .
::: SET_DEVICE A:RLLFS0 A:CENFRQ    .
::: SET_DEVICE A:RLLFS1 A:CENFRQ    .
::: CHECK_DEVICE A:RLLFS0 READING   .

::: CUSTOM COOL_GAIN                .
      Sets core cooling PIN attenuators to values obeying an equation mult(i)*
      (A:IBEAMB)+offset(i).  The constants "offset" and "mult" are stored in a table
      maintained by the AD\Pbar department.  Custom cooling gain usually undershoots
      cooling power for larger stacks.
::: CTLIT_DEVICE A:CH1PS1 ON        .
::: CTLIT_DEVICE A:CH2PS1 ON        .
::: CTLIT_DEVICE A:CH3PS1 ON        .
::: CTLIT_DEVICE A:CV1PS1 ON        .
::: CTLIT_DEVICE A:CV2PS1 ON        .
::: CTLIT_DEVICE A:CV3PS1 ON        .
::: SETIT_DEVICE D:FFTLOF =299.807  .
::: SETIT_DEVICE A:FFTLOF =300.197  .
::: SPECTRUM_LOAD 2  29             .
      Loads P41 file 29 (Shot Lattice Display) into spectrum analyzer 2.  This can be
      viewed on CATV Pbar channel 28.
::: SETIT_DEVICE A:CMPA01 = 22      D
::: SPECTRUM_LOAD 1  22             .
      Loads P41 file 22 (4-8 momentum schottky at 5.5 GHz) into spectrum analyzer 1.
      This can be viewed on CATV Pbar channel 20 and will be used to center the 4-8
      momentum pickups on the beam.
::: SETIT_DEVICE A:C48RFQ =628928   .
      Core 4-8 momentum reference frequency.
::: SETIT_DEVICE A:C48RPS =-45.97   .
```

```
      Core 4-8 momentum reference position.
::: SETIT_DEVICE A:VSARST =3        .
      Initial centering of core 4-8 momentum pickup arrays.
::: WAIT_FOR SECS 20                .
::: INSTRUCT 208                    .
```

```
::: WAIT_DEVICE A:VSARST            .
      Wait for A:VSARST to go to zero.
::: CTLIT_DEVICE A:CMTW01 RESET     .
::: CTLIT_DEVICE A:CMTW02 RESET     .
::: CTLIT_DEVICE A:CMTW01 ON        .
::: CTLIT_DEVICE A:CMTW02 ON        .
::: CTLIT_DEVICE A:CMPS01 ON        .
::: SETIT_DEVICE A:RLLEXF =628724. D
::: SETIT_DEVICE A:RLLEXF =628726. .
      Sets the accumulator extraction orbit frequency.
::: SETIT_DEVICE A:RCFRV0 =628930. .
      Dfrev0

::: SETIT_DEVICE A:VSAFWM =100      .
      Sets maximum accumulator frequency width.
::: SETIT_DEVICE A:VSAFWD =25       .
      Sets desired accumulator frequency width.
::: SETIT_DEVICE A:VSAFWD =29       D
::: SETIT_DEVICE A:DTMHVE =10       .
      Sets H-V emittance difference for VSA thermostating.
::: SETIT_DEVICE A:R4FSRL = 25      .
      Sets ARF4 frequency skew limit.
::: SETIT_DEVICE A:VSARST =5        .
      Momentum thermostating enabled.   Keeps A:FRWDTH at A:VSAFWD.
::: CHECK_DEVICE A:CENFRQ READING   .
      Checks A:CENFRQ and displays the value in the sequencer message box.
::: INSTRUCT 212                    .
```

```
Look at the value of A:CENFRQ in the message window below.
Verify that A:CENFRQ = 628930 ± 4 Hz.
 If A:CENFRQ is not within this tolerance, you must
 do the following:
 ◆ Set V:APSLAT to 1 and then back to 2.
 ◆ If A:CENFRQ is now within tolerance set
   A:R2CWFR = 2*A:CENFRQ
 ◆ Set A:RLLFS0 = A:CENFRQ
 ◆ Set A:RLLFS1 = A:CENFRQ

>>>     Interrupt anywhere in this box to continue     <<<
```

::: INSTRUCT 211 .

```
   If the stack size is ≥160 mA, please relax the core
longitudinally by manually settting A:VSAFWD = 27. This sets the
desired frequency width, A:FRWDTH, to 27.

   This is a temporary test to determine the optimum width as a
function of stack size.
                                                    eh - 12 Aug 03

            Interrupt anywhere in this box to continue.
```

ok INSTRUCT 209 .

```
    This is a good time to view the emittance plot. If neither the
transverse emittances nor FRWDTH are at their optimum values or on
their way there, check signal suppression by running P192.

Similarly, the tunes can be checked at this point via P43. The
nominal shot lattice tunes are H = 0.6960 - 0.6965
                               V = 0.6840 - 0.6845.

             Interrupt anywhere in this box to continue
```

Collider Aggregate: **Run II Switch to Shot Lattice** has been completed.
Next Aggregate: Run II Finish Reverse Protons