

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 Start Reverse Protons

Previous Aggregate: [Run II Start Shot Setup](#)

Purpose of this Aggregate: The previous aggregate prepared the AP1 and AP3 beam lines for 8 GeV operation. This aggregate enables 8 GeV beam for the Main Injector portion of the tune-up, and configures Accumulator cooling. To prepare for 8 GeV beam, this aggregate toggles the P67 abort masks from 120 GeV to 8 GeV operation, sets the \$16/\$2D 8 GeV tune-up event to 2 turns/35 bunches, sets V:PSHOOT to 4 to allow the Main Injector to start 8 GeV tune-up on \$2D, and clears the Pbar software beam switch. This aggregate also has the Pbar Sequencer operator wait for the stacktail to pull the beam over into the core. When this is done, the stacktail is turned off, power leveling is setup on the core transverse and longitudinal systems and we switch over to the 4-8GHz core momentum system. The VSA program should still be running on SC, and the Pbar Sequencer operator should still be trying to cool the Accumulator frequency width A:FRWDTH to 15Hz.

::: INSTRUCT 210 .

```
This aggregate steps one through tuning up the Main Injector, P1,
P2, AP1, and AP3 lines as well as injection into the Accumulator
with reverse protons. Completing this tune up gives high assurance
that the Pbar transfer efficiency from the Accumulator to the MI
will be maximized.
```

```
Interrupt anywhere in this box to continue.
```

::: 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-- Beginning Reverse Proton Tune Up in Pbar and MI. The Stack size is ###.####. - Sequencer

::: INSTRUCT 213 D

Proton Torpedo SA instruct is bypassed.

::: START_PGM P194 D

Starts Proton Torpedo SA (keeper is Budlong). Command is bypassed.

::: CTLIT_DEVICE D:BSC925 OFF .

Closes AP3 Beam Stop

::: ABORT_MASK AP1_120_PS ENABLED .

The P67 abort for 120 GeV power supplies is masked since we will be running 8 GeV beam.

::: ABORT_MASK AP1_8_PS DISABLED .

The P67 abort for 8 GeV power supplies is unmasked to prepare for 8 GeV operation.

::: ABORT_MASK PBAR_SOFT ENABLED .

The P67 software abort is unmasked.

::: EVENT 88 TRIGGER .

Triggers a TCLK event \$81, which is a Debuncher beam permit system reset event.

::: BOOST_INTENSITY EVT16 2 .

Booster event \$16 is set to 2 turns 35 bunches.

Run II Start Reverse Protons

::: SETIT_DEVICE V:PSHOOT =4 .
V:PSHOOT having a state of 4 means "Ready for Main Injector Tune up." The **Main Injector Shot Transfer Line Tuneup** aggregate waits for PSHOOT to be set to 4 before starting its beam line tune-up.

::: BEAM_SWITCH PBAR_SOURCE ON .
Turns on the Pbar beam switch to allow 8GeV beam for Main Injector tune-up.

::: ACKNOWLEDGE .



::: CTLIT_DEVICE A:SPPS01 OFF .
Turns off the Accumulator stacktail pin switch. Once all of the beam that was in the stacktail is swept over into the core, the stacktail can be turned off.

::: SET_SEQ FILE 28 .

File #28 turns off the Accumulator stacktail high level amps.

```
A:SPAH11 TURN DEVICE OFF      ok
A:SPAH12 TURN DEVICE OFF      ok
A:SPAHD1 TURN DEVICE OFF      ok
A:SPAHD2 TURN DEVICE OFF      ok
A:SPAHD3 TURN DEVICE OFF      ok
A:SPAHD4 TURN DEVICE OFF      ok
```

::: SET_SEQ FILE 94 .

File #94 enables core power leveling. Power Leveling (no relation to Pbar Expert Tony Leveling) automatically adjusts the cooling attenuation to obtain a target power setting. After power leveling has been enabled, attempts to adjust the cooling power by moving the pin attenuator from a parameter page or P34 will fail, because the power leveling will readjust the pin attenuators to reach its target power. The power levels are determined by the diode settings for each cooling band. The more negative the diode voltage, the higher the power. The diode settings are not obvious to the casual observer and what diode settings correspond to what power settings are determined by Pbar experts. File #94 first sets the diode values for the three horizontal and vertical cooling bands.

```
A:CH1D1 SET DEVICE            -2.1      ok
A:CH2D1 SET DEVICE            -2.5      ok
A:CH3D1 SET DEVICE            -2.4      ok
A:CV1D1 SET DEVICE            -2.4      ok
A:CV2D1 SET DEVICE            -3.0      ok
A:CV3D1 SET DEVICE            -2.7      ok
```

File #94 also sets the diode settings for both the 2-4GHz and 4-8GHz core momentum systems.

```
A:CMPAD1 SET DEVICE           -3.0      ok
A:CPPAD1 SET DEVICE           -3.34     ok
```

File #94 then enables power leveling on the core horizontal and vertical systems by issuing on commands to the diodes.

```
A:CH1D1 TURN DEVICE ON       ok
A:CH2D1 TURN DEVICE ON       ok
A:CH3D1 TURN DEVICE ON       ok
A:CV1D1 TURN DEVICE ON       ok
A:CV2D1 TURN DEVICE ON       ok
A:CV3D1 TURN DEVICE ON       ok
```

File #94 then enables power leveling on the core 2-4GHz and 4-8GHz momentum systems by setting the diode parameter polarity positive.

```
A:CMPAD1 SET POSITIVE        ok
A:CPPAD1 SET POSITIVE        ok
```

::: CHECK_DEVICE A:CH1D1 ON .

Verifies that power leveling is enabled for core horizontal band one cooling.

Run II Start Reverse Protons

```
::: CHECK_DEVICE A:CH2D1 ON .
    Verifies that power leveling is enabled for core horizontal band two cooling.
::: CHECK_DEVICE A:CH3D1 ON .
    Verifies that power leveling is enabled for core horizontal band three cooling.
::: CHECK_DEVICE A:CV1D1 ON .
    Verifies that power leveling is enabled for core vertical band one cooling.
::: CHECK_DEVICE A:CV2D1 ON .
    Verifies that power leveling is enabled for core vertical band two cooling.
::: CHECK_DEVICE A:CV3D1 ON .
    Verifies that power leveling is enabled for core vertical band three cooling.
::: CHECK_DEVICE A:COMPAD1 POSITIVE .
    Verifies that power leveling is enabled for the core 4-8GHz momentum cooling.
::: CHECK_DEVICE A:CPPAD1 POSITIVE .
    Verifies that power leveling is enabled for the core 2-4GHz momentum cooling.
::: SET_SEQ FILE 30 .
    File #30 turns on the 4-8GHz momentum cooling and sets the 2-4GHz momentum
    cooling pin attenuator such that very little power is in the 2-4GHz system.
    A:CPPA01 SET DEVICE          29.5          ok
    A:COMPA01 SET DEVICE         20           ok
    A:CMTW01 RESET DEVICE                ok
    A:CMTW02 RESET DEVICE                ok
    A:CMTW01 TURN DEVICE ON              ok
    A:CMTW02 TURN DEVICE ON              ok
    A:CMPS01 TURN DEVICE ON              ok
    A:CMPS01 DIG_ALARM ENABLE           ok
    A:CMTW01 DIG_ALARM ENABLE           ok
    A:CMTW02 DIG_ALARM ENABLE           ok
::: CTLIT_DEVICE A:CMTW01 ON .
    Turns on one of the two core 4-8 momentum TWTs. An "on" command was already
    issued to this device in file 30 above, but is issued again for redundancy. The
    CTLIT command issued here not only issues and "on" command to the device, but
    also waits for a short period of time and then verifies that the device is in the
    "on" state.
::: CTLIT_DEVICE A:CMTW02 ON .
    Turns on one of the two core 4-8 momentum TWTs. An "on" command was already
    issued to this device in file 30 above, but is issued again for redundancy. The
    CTLIT command issued here not only issues and "on" command to the device, but
    also waits for a short period of time and then verifies that the device is in the
    "on" state.
::: CHECK_DEVICE A:ISHTST READING .
    Verifies that the accumulator injection shutter is in the closed position (value
    =2) and displays the results in the message window at the bottom of the
    sequencer.
::: CHECK_DEVICE A:ESHTST READING .
    Verifies that the accumulator extraction shutter is in the closed position (value
    =2) and displays the results in the message window at the bottom of the
    sequencer.
::: CHECK_DEVICE A:R2HLSC ON .
    Verifies that ARF2 HLRF is on.
::: CHECK_DEVICE A:R3HLGS ON .
    Verifies that the ARF3 gap is shorted. ARF3 is used during studies to move the
    beam. From a parameter page, A:R3HLGS will show an "S" in the polarity bit when
    it is shorted. If it is not shorted, the Pbar Sequencer operator can go to P8
    ARF1 <1>. Note that the A:R3LLT2 timer must be enabled for you to drive the
    cavity short in. Pbar experts should be consulted before driving the cavity
    short in.
::: ALARM_LIST PBAR 38 .
    Bypasses the "CORE HOR" alarm list.
```

Run II Start Reverse Protons



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

ok ACKNOWLEDGE



Collider Aggregate: Run II Start Reverse Protons has been completed.

Next Aggregate: [Run II Switch to Shot Lattice](#)