

Collider Run II Shot Setup Documentation

Created by Brian Drendel 3-24-04

Last Edit by Brian Drendel 3-25-05

Send suggestions and comments to drendel@fnal.gov.

Sequencer: Pbar

Collider Aggregate: Run II Start Shot Setup

Previous Aggregate: None

Pre-cool the Core: We want to cool the core frequency width to 15Hz longitudinally before switching to the shot lattice. When the stack is large, we turn off stacking before starting shot setup in order to start the cooling process. The idea is to time there termination of stacking such that we do not stop stacking too early where we would lose valuable stacking time, and at the same time do not stop stacking too late where Pbar would delay the shot setup while trying to cool to 15Hz. The cooling process can be speeded up by using the 4-8GHz momentum cooling as outlined in <http://www-bdnew.fnal.gov/pbar/organizationalchart/drendel/TuningGuide/ShotsWith4>

Preparing to Start Shot Setup: This aggregate is run to begin the shot setup process for Pbar. The Pbar sequencer requires two dedicated MCR consoles plus two MCR comfort displays. Normally, CNS1 is used to run the Pbar sequencer, CNS101 is used for the Pbar life-o-meter, CNS2 is used for emittance plots and the Pbar longitudinal display, and CNS102 is used for the Pbar Radiation Detector Display.

When to Start this Aggregate? The Shot Scrapbook (<http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=scrap03&load=no>) contains data and screen captures collected from all of the sequencers during the shot setup. Each shot setup has a separate shot scrapbook chapter. The chapter is incremented by the Tevatron sequencer, so it is important to wait to start this aggregate until after the Tevatron has started the new shot scrapbook chapter.

Purpose of this Aggregate: The **Run II Start Shot Setup** aggregate is the first aggregate issued for Pbar when doing a shot setup. This aggregate stops stacking, starts comfort display and emittance plots, checks Accumulator BPMs, toggles state devices, loads a TLG with reverse proton events, starts momentum thermostat, sets up the unstacking display on SA#2, sets up the AP1 and AP3 lines for 8 GeV beam, and toggles alarm lists.

::: INSTRUCT 200 .

```

    This aggregate and the following 8:
Run II Start Reverse Protons,
Run II Switch to Shot Lattice,
Run II Finish Reverse Protons,
Run II Continue Shot Set Up,
Run II Prepare to Load Pbars,
Run II Load Collider Pbars,
Run II Revert to Stack Lattice,
Run II Return to Stacking provide the means for setting up the Pbar
source to do pbar transfers to the Main Injector and/or Tevatron.

Each aggregate's title describes the activities contained within the
aggregate. Instructions provided along the way hopefully make the
process fairly painless under normal circumstances.

***Scan the most recent Pbar/Shots log books for anything that
may affect the shot set-up.***

Interrupt anywhere in this box to continue.

```

::: SHOT_LOG COMMENT .

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

● **Time- Starting Pbar Shot Set Up; the stack size is ##.####. - Sequencer**

::: BEAM_SWITCH Pbar_Source Off .

To avoid taking beam to Pbar while switching from 120GeV stacking mode to 8GeV shot mode, we take the software beam switch.

::: NOTIFY Start .

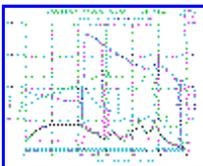
Sends a Channel 13 Notify message to http://www-bd.fnal.gov/cgi-bin/notify_mes.pl?ch13=text.

::: CTLIT_DEVICE D:Q731 OFF D

The command is bypassed. We used to turn off the AP2 line quadrupole power supply D:Q731 for shot setup, there used to be overheating problems with certain magnets, that would require periodic flushing of their LCW lines. Turning the device off was intended to extend the time between flushes.

::: START_PGM SA1144 .

Starts the Stack-o-meter SA (keeper is David Sutherland) on comfort display console 101. If this plot dies, it can easily be restarted as follows. From CNS1, do a CNTL-SHIFT-4 to get to the CNS101 comfort display. Go to P69 and then click PLOT!! under the lifetime category.

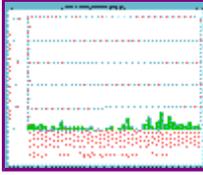


Pbar Life-o-Meter. Click on thumbnail to view full-sized image.

::: START_PGM SA1127 .

Pbar Radiation Detector Display (keeper is Tony Leveling) on comfort display 102. This SA can be used during the beam line tune-up to verify that radiation levels are not high enough to cause a radiation trip. The program emulates the actions of the radiation detector cards. It updates every 60 seconds and takes a 15 minutes rolling average of the radiation losses and normalizes each radiation detector so that a value of 1 corresponds to the radiation trip level. The parameters for the individual radiation detectors can be found on D106 ACC/DEB < 1> to < 3>. G:RA{#####} is an integrating real-time read back of the radiation detector. Every 60 seconds, which is not concurrent with the supercycle, G:RA{#####} is reset to zero and starts integrating all over again. G:RD{#####} takes the number of G:RA{#####} before it is reset and keeps that value until G:RA{#####} is reset again. When doing the reverse proton tune-up later in the shot, if any radiation detector gets near to 1 on the plot, the beam switch should be taken to avoid a radiation trip. If the SA1127 plot dies, it can be restarted by reissuing

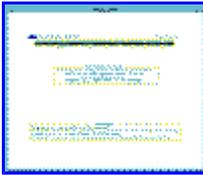
this command, or manually through Acnet page P151. A screen capture of SA1127 is shown below.



Pbar Radiation Detector Display. Click on thumbnail to view full-sized image.

::: **START_PGM P162**

Starts the Accumulator BPM TBT Page P162 (keeper is Keith Gollwitzer). This page, as shown below, checks the status of the Accumulator BPM houses and issues resets to any house that is not online. This allows plenty of time for the BPM houses to reboot before they are need in the beam line tune-up. Upon completion, this application will self terminate and the window will close on its own.



Accumulator BPM page. Click on thumbnail to view full-sized image.

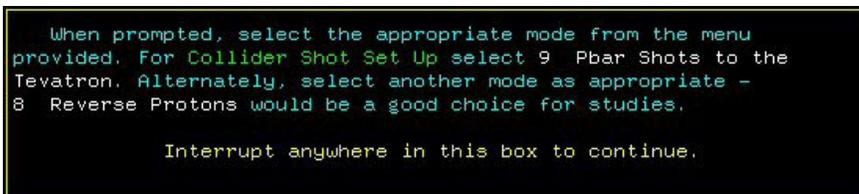
::: **WAIT_FOR SECS 30**

A 30 second delay to allow the Accumulator BPM program above to complete its BPM house check.

::: **SETIT_DEVICE V:PSHOOT =1**

Devices that start with V: are state parameters. State parameters define the operational state of a device or accelerator, allow the sequencers to be more automated, and prevent the different sequencers from getting out of sequence with each other. Often one sequencer waits at a certain spot until another sequencer changes a state parameter. V:PSHOOT is a state parameter for the Pbar transfer state. V:PSHOOT state 1 means "not ready for transfer." In the next aggregate, Pbar **Run II Start Reverse Protons**, V:PSHOOT is set to 4 ("Ready for Main Injector Tune up"). The **Main Injector Shot Transfer Line Tuneup** aggregate waits for PSHOOT to be set to 4 ("Ready for Main Injector Tune up") before starting its beam line tune-up. Later on during the shot, when the beam line tune up is complete, the **Run II Continue Shot Setup** aggregate will change V:PSHOOT to 5 ("Pbar Shot Setup Complete"). The Collider sequencer waits for V:PSHOOT to be set to 5 before loading final protons.

::: **INSTRUCT 202**



::: **SET_ENUMERATED V:APSMOD**

V:APSMOD is a state parameter representing the operational mode of the Pbar Source. The **set_enumerated** command asks the user to selected from a menu of V:APSMOD state values. Some common values for V:APSMOD include: 7 = Stacking, 8 = Reverse Protons, 9 = Pbar Shots to the Tevatron, and 12 = Pbar Shots to the Recycler. As the above instruct suggests, selecting state 9 ("Pbar Shots to the Tevatron") would be appropriate for RunII Collider Shot Setup.

::: **SET_ENUMERATED V:PBSRC**

V:PBSRC is a state parameter representing the source or Pbars for the Tevatron. The **set_enumerated** command asks the user to selected from a menu

of V:PBSRC state values. There are three choices: 1 = Pbars from Accumulator only, 2 = Pbars from Recycler only, and 3 = Pbars from both Accumulator and Recycler.

- ```

::: SET_DEVICE A:APSHOT +=1 .
 Increments the Pbar transfer series number by one. This number is
 incremented before and after any Pbar transfer from the Accumulator to the
 Tevatron or Accumulator to the Recycler.
::: ACL WAIT_FOR_READING_MATCH .
 Runs an Accelerator Command Language (ACL) script called
 WAIT_FOR_READING_MATCH that waits for "SDA Shot/Store #" (A:FILE) to read the
 same value as the Pbar transfer series number (A:APSHOT). More information
 on ACL scripts can be found at
 http://adcon.fnal.gov/userb/www/controls/clib/intro_acl.html.
::: SET_DEVICE A:SHTNUM =0 .
 Sets the "Pbar transfer series Shot #" parameter (A:SHTNUM) to zero. Later
 on during the Run II Load Collider Pbars aggregate, A:SHTNUM is incremented
 by one for every Pbar transfer. So the first transfer has A:SHTNUM = 1, the
 second transfer has A:SHTNUM = 2, ... ninth transfer has A:SHTNUM= 9.
::: SET_DEVICE V:CASPBT =1 .
 The "Pbar transfer SDA case trigger" state (V:CASPBT) is set to 1, which
 represents "Set up." The sequencer will again change this state parameters
 in the Run II Continue shot setup aggregate. Possible values for this state
 parameter include: 1 = Set up, 2 = Unstack Pbars, 3 = Transfer Pbars from
 Accumulator to Main Injector, 4 = Accelerate Pbars in the Main Injector, 5 =
 Coalesce Pbars in the Main Injector.
::: SET_DEVICE V:SETPBT =1 .
 Sets the "Pbar transfer SDA set in case" state device to 1. This state
 parameter is later set to 5 in the Run II Load Collider Pbars and the Run II
 Return to Stacking aggregates. D88 currently shows no state information
 descriptions for the different states of this parameter. set
::: CHECK_DEVICE A:APSHOT READING .
 Prints the value of the "Pbar Transfer Series Number" parameter (A:APSHOT) in
 the message window at the bottom of the sequencer in the following format.
 COM: A:APSHOT present value = #####.00000
::: CTL_DEVICE A:ISHUTO OFF .
 Turns off the accumulator injection shutter open timer. The Accumulator
 injection shutter will now not be told to open.
::: CTL_DEVICE A:ESHUTO OFF .
 Turns off the accumulator extraction shutter open timer. The Accumulator
 extraction shutter will now not be told to open.
::: CTL_DEVICE A:ISHUTC ON .
 Turns on the accumulator injection shutter close timer. The shutter open
 timer was disabled and the shutter closed timer was enabled. This ensures
 that the Accumulator Injection shutter stays closed. The Accumulator
 injection shutter position can be verified by looking at A:ISHTST. A reading
 of 1 means open and a reading of 2 means closed. The Accumulator injection
 shutter controller is located in the top of rack B17R01 at AP10 as shown
 below.

```



Click on thumbnail to view full-sized image.

- ```

::: CTL_DEVICE A:ESHUTC ON .
    Turns on the accumulator extraction shutter close timer. The shutter open
    timer was disabled and the shutter closed timer was enabled. This ensures
    that the Accumulator Extraction shutter stays closed. The Accumulator
    extraction shutter position can be verified by looking at A:ESHTST. A

```

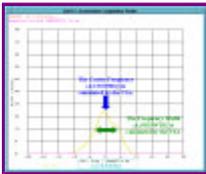
reading of 1 means open and a reading of 2 means closed. The Accumulator extraction shutter controller is located in the middle of rack B17R01 at AP10 as shown below.



Click on thumbnail to view full-sized image.

::: START_PGM SA1136 .

Accumulator Momentum profile using the VSA (keeper is Dave McGinnis). This is normally run on the SC screen of the console that runs the Pbar Sequencer, and can be restarted from P142. SA1136 calculates the center frequency (A:CENFRQ) and frequency width (A:FRWDTH) of the Accumulator beam. If the momentum cooling is being run too hard, you will see a coherent spike on the display. If bad enough, the coherent spike can be larger than the plot scale. This is in indication of an instability, and it also effects the VSA calculations (for example, it makes the frequency width artificially small). If coherent spikes are seen on the trace, you can lower the 2-4GHz momentum power until the spike goes away. A:SPIKE is a datalogged parameter that measures how bad the coherent spike is on the VSA display. Values above 20% can indicate excessive coherent spikes on the display. Below is a typical SA1136 display that is not exhibiting coherent spike problems.



Accumulator Momentum Distribution. Click on thumbnail to view full-sized image.

The VSA display can also be viewed on CATV Pbar #16 as shown here.



The hp 89440A VSA is located in the AP10 control room in rack A14R04 as shown here.



Click on thumbnail to view full-sized image.

What if the VSA plot dos not start? Occasionally the VSA will not start.

When that is the case, follow the directions in the Pbar Elog at http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=pbar04&action=view&page=19&anchor=174245&hilite=17:42:45-%20target=_top to

configure the VSA.

::: WAIT_FOR SECS 15 .

Delay to allow SA1136 to start.

::: SETIT_DEVICE A:VSAFWD =15 .

Sets the desired accumulator frequency width to 15Hz. We want to reach this frequency width before later switching to the shot lattice.

::: SETIT_DEVICE A:DTMHVE =.5 .

Sets the horizontal minus vertical emittance difference for VSA vertical thermostat. This is not currently necessary because next command puts the VSA in momentum thermostat only mode. If the VSA is in momentum and vertical thermostat mode (A:VSARST = 7), then this parameter would be used to

determine when to turn off the vertical cooling. When running in this mode, if the difference between the horizontal and vertical emittances becomes greater than A:DTMHVE, then the vertical cooling is gated off.

```
::: SETIT_DEVICE A:VSARST = 5 .
```

Puts the VSA in momentum thermostat mode. The thermostat tries to keep the frequency width A:FRWDTH (measured by the VSA above) at the desired frequency A:VSAFWD (set to 15 above). The momentum cooling is gated on as long as the frequency width is larger than the desired frequency.

```
::: ACKNOWLEDGE .
```



This acknowledge instructs the Pbar sequencer operator that the next plot should be started on this console.

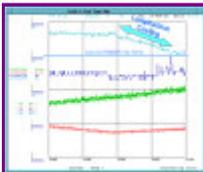
```
::: ACKNOWLEDGE .
```



This acknowledge instructs the Pbar sequencer operator not to start the Fast Time Plot on the same slot as the VSA SA is running. Normally the VSA is run on SC.

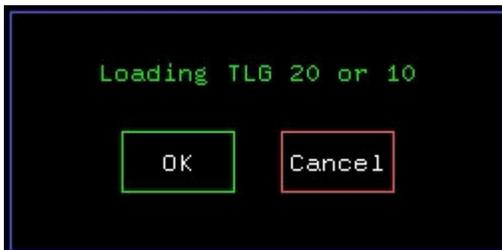
```
::: AUTO_PLOT Core Emittances .
```

Starts a Fast Time Plot that contains A:EMT3HN (0-4 pi-mm-mrad), A:EMT3VN (0-4 pi-mm-mrad), A:CENFRQ (62885-628890 Hz) and A:FRWDTH (0-20 Hz) over time (0-1200 sec). Our target A:FRWDTH is 15Hz.



Example plot showing core cooling at the beginning stages of shot setup.

```
::: ACKNOWLEDGE .
```



This acknowledge informs the Pbar Sequencer Operator that a new TLG is about to be loaded. .

```
::: LOAD_TLG 10 REPEAT .
```

Loads TLG #10. See instruct below for more information on the TLGs. TLG #10 is used for Combination Shots (Accumulator and Recycler), while TLG #20 is used for Accumulator-only shots.

```
::: WAIT_DEVICE G:TLGSEQ .
```

Waits for TLG #10 to be loaded before continuing.

```
::: INSTRUCT 204 .
```

```

A Timeline with 3 reverse proton cycles and Tevatron tune up
cycles has just been loaded. Nominally this is TLG #20. For Mixed
Pbars #10 is used.

The Timeline should be checked to ensure that a $80 precedes
the reverse proton cycles. For beam line tune up there should be
three reverse proton cycles to the Accumulator.
    NEW - read this paragraph!!
If TLG #10 is activated for Mixed Pbars, have the MI person make
sure the correct $2E ramp is loaded (it should be already).

Other TLG files to use, and will likely be loaded automatically, are
    #19 for Accumulator TBT tuneup, #9 for Mixed Pbars
    #13 to load Collider Protons (no RR cycles in this file)
    #3 to load Collider Pbars, #18 to load Mixed Pbars
    #22 for Pbars to the Recycler

Files 19 and 20 have 2 $2A modules, one for MI tune up the other
for Tevatron reverse injection. Have one or the other, NOT BOTH!,
enabled depending on programmtic needs.

Interrupt anywhere in this box to continue.

```

This instruct provides the Pbar sequencer operator with instructions to insure the proper TLG is loaded. On 3/9/05 a new instruction was added to remind the sequencer operator to have the Main Injector sequencer operator verify that the correct \$2E ramp is loaded if TLG #10 is being used in Combination Shots (Accumulator and Recycler).

```
::: ALARM_LIST PBAR 23 .
```

Bypasses the D59 alarm list entitled "PULSED" (pulsed devices).



Pbar alarm list 23 after it has been bypassed by the Pbar Sequencer. Click on thumbnail to view full-sized image.

```
::: WAIT_FOR SECS 3 .
```

```
::: ALARM_LIST PBAR 52 .
```

Bypasses the D59 alarm list entitled "ARF1".



Pbar alarm list 52 after it has been bypassed by the Pbar Sequencer.. Click on thumbnail to view full-sized image.

```
::: SET_SEQ FILE 1 .
```

File #1 first turns off the pulsed devices.

```

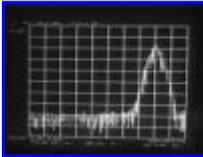
D:LNV      TURN DEVICE OFF      ok
D:PMAGV    TURN DEVICE OFF      ok
D:ISEPV    TURN DEVICE OFF      ok
D:IKIK     TURN DEVICE OFF      ok
D:EKIK     TURN DEVICE OFF      ok
D:EKIKQ    TURN DEVICE OFF      ok
D:ESEPV    TURN DEVICE OFF      ok
A:ISEP1V   TURN DEVICE OFF      ok
A:ISEP2V   TURN DEVICE OFF      ok

```

```

A:IKIK    TURN DEVICE OFF                                ok
File #1 then turns off ARF1.
A:R1L1AM TURN DEVICE OFF                                ok
A:R1L2AM TURN DEVICE OFF                                ok
A:R1HLSC TURN DEVICE OFF                                ok
File #1 then disables the A:EXTRAT Pbar extraction parameter and sets
Accumulator extraction kicker timing.
A:EXTRAT EVENT DISABLE                                  ok
A:EKIKTG SET DEVICE          13.8365                    ok
File #1 then turns off some AP2 line devices.
D:Q701    TURN DEVICE OFF                                ok
D:Q702    TURN DEVICE OFF                                ok
D:H704    TURN DEVICE OFF                                ok
::: WAIT_FOR SECS 3                                     .
::: SPECTRUM_LOAD 2 7                                   .
Downloads P41 file #7 to spectrum analyzer #2. This is the Accumulator
unstacking display which can be viewed at CATV Pbar #28.

```



Spectrum Analyzer #2 is located at AP30 in rack B33R03 as shown here.



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

```

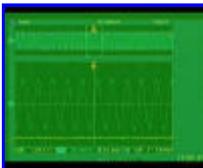
::: SEQ_PGM REQUEST AP0 Scope                           .
Starts Acnet Program P188 (keeper is Jim Budlong). The Request qualifier
tells the application to load file 13, which is used to setup the AP0 wall
current monitor scope for capturing Pbar unstacking events. The P188 window
automatically closes when the file load is complete.

```



Acnet application P188. Click on the thumbnail to view a full-sized version of the image.

The wall current monitor can be viewed on CATV Pbar #7 as shown here.



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

The wall current monitor scope is at AP0 in rack THSBSR3 as shown here. It is triggered off of the AP1 Wall Current Monitor Gate Trigger M:AP1WCS (MIBS \$79/\$7E + 14.213836), which is setup later on in this aggregate in sequencer [File 79](#).



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

```
... CHECK_DEVICE A:R2DDS1 SAVE_SET .
```

The CHECK_DEVICE command, with the SAVE_SET option, reads and saves the current value of a device. In this case, the ARF2 Stabilizing RF frequency setting is read and saved so that it can be restored when returning to stacking later.

```
... CHECK_DEVICE A:R2LLAM SAVE_SET .
```

The CHECK_DEVICE command, with the SAVE_SET option, reads and saves the current value of a device. In this case, the ARF2 Stabilizing RF frequency amplitude is read and saved so that it can be restored when returning to stacking later.

```
... CHECK_DEVICE A:DPHATT SAVE_SET .
```

The CHECK_DEVICE command, with the SAVE_SET option, reads and saves the current value of a device. In this case the horizontal damper attenuator value is saved before it is set in the next command in this aggregate.

```
... SET_DEVICE A:DPHATT =5 .
```

Sets the accumulator horizontal damper attenuator to 5.

```
... INSTRUCT 206 .
```



```
... ALARM_LIST PBAR 2 .
```

Bypasses the D59 alarm list entitled "AP1 120".



Pbar alarm list 2 after it has been bypassed by the Pbar Sequencer.. [Click on thumbnail to view full-sized image.](#)

```
... WAIT_FOR SECS 3 .
```

```
... ALARM_LIST PBAR 3 .
```

Enables the D59 alarm list entitled "AP1 8GEV".



Pbar alarm list 3 after it has been enabled by the Pbar Sequencer. [Click on thumbnail to view full-sized image.](#)

```
... WAIT_FOR SECS 3 .
```

```
... ALARM_LIST PBAR 12 .
```

Enables the D59 alarm list entitled "AP3". This list consists of two lists "AP3 DGTL" and "AP3 ANLG."



Pbar alarm list 12, 13, and 14 after they have been enabled by the Pbar Sequencer.. [Click on thumbnails to view full-sized images.](#)

```
... SET_SEQ FILE 37 .
```

File #37 turns off AP1 120Gev Supplies. All of the devices in this list are located in F23 service building.

```
M:HV100  TURN DEVICE OFF      ok
M:Q101   TURN DEVICE OFF      ok
M:Q102   TURN DEVICE OFF      ok
```

```

M:HV102  TURN DEVICE OFF          ok
M:Q103   TURN DEVICE OFF          ok
M:Q104   TURN DEVICE OFF          ok
M:Q105   TURN DEVICE OFF          ok
M:V105   TURN DEVICE OFF          ok
M:Q106   TURN DEVICE OFF          ok
M:Q107   TURN DEVICE OFF          ok
M:Q108   TURN DEVICE OFF          ok
M:Q109I  TURN DEVICE OFF          ok
M:Q109V  TURN DEVICE OFF          ok
::: WAIT_FOR SECS 5                .
::: SET_SEQ FILE 41                .
File #41 resets AP1 8 GeV devices.  This will clear any trip status before
turning these supplies on.  I:F17B3 is located in the F2 service building, and the
rest of the devices in this list are located in the F23 service building.
I:F17B3  RESET DEVICE              ok
M:HV200  RESET DEVICE              ok
M:Q201   RESET DEVICE              ok
M:HV202  RESET DEVICE              ok
M:Q203   RESET DEVICE              ok
M:Q204   RESET DEVICE              ok
M:Q205   RESET DEVICE              ok
M:V205   RESET DEVICE              ok
M:Q206   RESET DEVICE              ok
M:Q207   RESET DEVICE              ok
M:Q208   RESET DEVICE              ok
M:Q209   RESET DEVICE              ok
::: SET_SEQ FILE 42                .
File #42 turns on AP1 8 GeV devices.  I:F17B3 is located in the F2 service
building, and the rest of the devices in this list are located in the F23 service
building.
I:F17B3  TURN DEVICE ON            ok
M:HV200  TURN DEVICE ON            ok
M:Q201   TURN DEVICE ON            ok
M:VT101  TURN DEVICE ON            ok
M:VT101A TURN DEVICE ON            ok
M:Q102R  SET NEGATIVE              ok
M:Q202   TURN DEVICE ON            ok
M:HV202  TURN DEVICE ON            ok
M:Q203   TURN DEVICE ON            ok
M:Q204   TURN DEVICE ON            ok
M:Q205   TURN DEVICE ON            ok
M:HT105  TURN DEVICE ON            ok
M:V205   TURN DEVICE ON            ok
M:Q206   TURN DEVICE ON            ok
M:Q207   TURN DEVICE ON            ok
M:HT107  TURN DEVICE ON            ok
M:Q208   TURN DEVICE ON            ok
M:VT108  TURN DEVICE ON            ok
M:Q209   TURN DEVICE ON            ok
::: SET_SEQ FILE 47                .
File #47 resets AP3 line devices.  This will clear any trip status before
trying to turn the supplies on.  Devices in this list are located in AP30 (D:Q901,
D:V901, D:Q903, D:Q907, and D:Q909), F27 (D:Q913, D:Q914, D:Q916, D:Q917, and
D:Q919), and AP0 (D:H914, D:Q924, D:Q926 and D:H926).
D:Q901   RESET DEVICE              ok
D:V901   RESET DEVICE              ok
ok
D:Q903   RESET DEVICE              ok
D:Q907   RESET DEVICE              ok

```

```

D:Q909  RESET DEVICE          ok
D:Q913  RESET DEVICE          ok
D:Q914  RESET DEVICE          ok
D:H914  RESET DEVICE          ok
D:Q916  RESET DEVICE          ok
D:Q917  RESET DEVICE          ok
ok
D:Q919  RESET DEVICE          ok
D:Q924  RESET DEVICE          ok
D:Q926  RESET DEVICE          ok
D:H926  RESET DEVICE          ok

```

```
::: SET_SEQ FILE 48
```

File #48 turns on AP3 line devices. Devices in this list are located in AP30 (D:Q901, D:V901, D:Q903, D:Q907, and D:Q909), F27 (D:Q913, D:Q914, D:Q916, D:Q917, and D:Q919), and AP0 (D:H914, D:Q924, D:Q926 and D:H926).

```

D:Q901  TURN DEVICE ON       ok
D:V901  TURN DEVICE ON       ok
D:HT901 TURN DEVICE ON       ok
D:Q903  TURN DEVICE ON       ok
D:HT906A TURN DEVICE ON      ok
D:VT906 TURN DEVICE ON       ok
D:HT906B TURN DEVICE ON      ok
D:Q907  TURN DEVICE ON       ok
D:Q909  TURN DEVICE ON       ok
D:HT910 TURN DEVICE ON       ok
D:Q913  TURN DEVICE ON       ok
D:Q914  TURN DEVICE ON       ok
D:H914  TURN DEVICE ON       ok
D:Q916  TURN DEVICE ON       ok
D:Q917  TURN DEVICE ON       ok
D:VT917 TURN DEVICE ON       ok
D:Q919  TURN DEVICE ON       ok
D:Q924  TURN DEVICE ON       ok
D:Q926  TURN DEVICE ON       ok
D:H926  TURN DEVICE ON       ok
D:VT925 TURN DEVICE ON       ok

```

```
::: INSTRUCT 208
```

```

The next steps restore AP1/3 settings from a save file. Choose a
recent Shots or Pbar file made during shot set up to restore from.

```

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

```
::: SET_SEQ FILE_SR 79
```

File #79 restores AP1 line 8 GeV device settings from a D1 file. The Pbar Sequencer Operator is prompted to choose a shot setup file. Unless told otherwise, the Pbar Sequencer Operator should choose the last "Shots to Tevatron" save from the D1 category "SHOTS." In this example, "SHOTS" D1 file #1193 was chosen.

```

M:HV200 RESTORE (D1 file)    SETTING  1193    ok
M:HT100 RESTORE (D1 file)    SETTING  1193    ok
M:HT100 RESTORE (D1 file)    ANL ALARM 1193   ok
M:Q201  RESTORE (D1 file)    SETTING  1193    ok
M:VT101 RESTORE (D1 file)    SETTING  1193    ok
M:VT101 RESTORE (D1 file)    ANL ALARM 1193   ok
M:VT101A RESTORE (D1 file)   SETTING  1193    ok
M:VT101A RESTORE (D1 file)   ANL ALARM 1193   ok
M:Q102R RESTORE (D1 file)    BASIC STS 1193   ok
M:Q202  RESTORE (D1 file)    SETTING  1193    ok
M:HV202 RESTORE (D1 file)    SETTING  1193    ok
M:Q203  RESTORE (D1 file)    SETTING  1193    ok
M:Q204  RESTORE (D1 file)    SETTING  1193    ok

```

```

M:Q205 RESTORE (D1 file) SETTING 1193 ok
M:V205 RESTORE (D1 file) SETTING 1193 ok
M:HT105 RESTORE (D1 file) SETTING 1193 ok
M:HT105 RESTORE (D1 file) ANL ALARM 1193 ok
M:Q206 RESTORE (D1 file) SETTING 1193 ok
M:Q207 RESTORE (D1 file) SETTING 1193 ok
M:HT107 RESTORE (D1 file) SETTING 1193 ok
M:HT107 RESTORE (D1 file) ANL ALARM 1193 ok
M:Q208 RESTORE (D1 file) SETTING 1193 ok
M:VT108 RESTORE (D1 file) SETTING 1193 ok
M:VT108 RESTORE (D1 file) ANL ALARM 1193 ok
M:Q209 RESTORE (D1 file) SETTING 1193 ok

```

File #79 also restores AP1 diagnostics setups for SEMs, Toroids, Loss Monitors and the AP0 Wall Current Monitor.

```

M:SMA1S RESTORE (D1 file) SETTING 1193 ok
M:SMA1S1 RESTORE (D1 file) SETTING 1193 ok
M:SMA1C RESTORE (D1 file) SETTING 1193 ok
M:SMA1C1 RESTORE (D1 file) SETTING 1193 ok
D:TRSM1S RESTORE (D1 file) SETTING 1193 ok
D:TRSM1R RESTORE (D1 file) SETTING 1193 ok
D:TRSM1C RESTORE (D1 file) SETTING 1193 ok
D:TRSM1D RESTORE (D1 file) SETTING 1193 ok
M:TR109S RESTORE (D1 file) SETTING 1193 ok
M:TR109T RESTORE (D1 file) SETTING 1193 ok
M:LMHLD RESTORE (D1 file) SETTING 1193 ok
M:LMHLD S RESTORE (D1 file) SETTING 1193 ok
M:AP1WCS RESTORE (D1 file) SETTING 1193 ok
M:AP1WCT RESTORE (D1 file) SETTING 1193 ok
M:TR105S RESTORE (D1 file) SETTING 1193 ok
M:TR105T RESTORE (D1 file) SETTING 1193 ok

```

::: SET_SEQ_FILE_SR 87 .

File #87 restores AP3 line device settings from a D1 file. The Pbar Sequencer Operator is prompted to chose a shot setup file. Unless told otherwise, the Pbar Sequencer Operator should choose the last "Shots to Tevatron" save from the D1 category "SHOTS."

```

D:Q901 RESTORE (D1 file) SETTING 1193 ok
D:Q901 RESTORE (D1 file) ANL ALARM 1193 ok
D:V901 RESTORE (D1 file) SETTING 1193 ok
D:V901 RESTORE (D1 file) ANL ALARM 1193 ok
D:VS901 RESTORE (D1 file) SETTING 1193 ok
D:VS901 RESTORE (D1 file) ANL ALARM 1193 ok
D:HT901 RESTORE (D1 file) SETTING 1193 ok
D:HT901 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q903 RESTORE (D1 file) SETTING 1193 ok
D:Q903 RESTORE (D1 file) ANL ALARM 1193 ok
D:VS904 RESTORE (D1 file) SETTING 1193 ok
D:VS904 RESTORE (D1 file) ANL ALARM 1193 ok
D:HT906A RESTORE (D1 file) SETTING 1193 ok
D:HT906A RESTORE (D1 file) ANL ALARM 1193 ok
D:VT906 RESTORE (D1 file) SETTING 1193 ok
D:VT906 RESTORE (D1 file) ANL ALARM 1193 ok
D:HT906B RESTORE (D1 file) SETTING 1193 ok
D:HT906B RESTORE (D1 file) ANL ALARM 1193 ok
D:Q907 RESTORE (D1 file) SETTING 1193 ok
D:Q907 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q909 RESTORE (D1 file) SETTING 1193 ok
D:Q909 RESTORE (D1 file) ANL ALARM 1193 ok
D:HT910 RESTORE (D1 file) SETTING 1193 ok
D:HT910 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q913 RESTORE (D1 file) SETTING 1193 ok

```

```

D:Q913 RESTORE (D1 file) ANL ALARM 1193 ok
D:QS915 RESTORE (D1 file) SETTING 1193 ok
D:QS915 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q914 RESTORE (D1 file) SETTING 1193 ok
D:Q914 RESTORE (D1 file) ANL ALARM 1193 ok
D:H914 RESTORE (D1 file) SETTING 1193 ok
D:H914 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q916 RESTORE (D1 file) SETTING 1193 ok
D:Q916 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q917 RESTORE (D1 file) SETTING 1193 ok
D:Q917 RESTORE (D1 file) ANL ALARM 1193 ok
D:QS917 RESTORE (D1 file) SETTING 1193 ok
D:QS917 RESTORE (D1 file) ANL ALARM 1193 ok
D:VT917 RESTORE (D1 file) SETTING 1193 ok
D:VT917 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q919 RESTORE (D1 file) SETTING 1193 ok
D:Q919 RESTORE (D1 file) ANL ALARM 1193 ok
D:QS919 RESTORE (D1 file) SETTING 1193 ok
D:QS919 RESTORE (D1 file) ANL ALARM 1193 ok
D:VT925 RESTORE (D1 file) SETTING 1193 ok
D:VT925 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q924 RESTORE (D1 file) SETTING 1193 ok
D:Q924 RESTORE (D1 file) ANL ALARM 1193 ok
D:QS925 RESTORE (D1 file) SETTING 1193 ok
D:QS925 RESTORE (D1 file) ANL ALARM 1193 ok
D:HS925 RESTORE (D1 file) SETTING 1193 ok
D:HS925 RESTORE (D1 file) ANL ALARM 1193 ok
D:Q926 RESTORE (D1 file) SETTING 1193 ok
D:Q926 RESTORE (D1 file) ANL ALARM 1193 ok
D:QS926 RESTORE (D1 file) SETTING 1193 ok
D:QS926 RESTORE (D1 file) ANL ALARM 1193 ok
D:H926 RESTORE (D1 file) SETTING 1193 ok
D:H926 RESTORE (D1 file) ANL ALARM 1193 ok
D:QS928 RESTORE (D1 file) SETTING 1193 ok
D:QS928 RESTORE (D1 file) ANL ALARM 1193 ok
A:EKIKP RESTORE (D1 file) SETTING 1193 ok

```

File #87 also restores analog alarms limits for the core horizontal and vertical trombones.

```

A:CH1T2 RESTORE (D1 file) ANL ALARM 1193 ok
A:CH2T2 RESTORE (D1 file) ANL ALARM 1193 ok
A:CH3T2 RESTORE (D1 file) ANL ALARM 1193 ok
A:CV1T2 RESTORE (D1 file) ANL ALARM 1193 ok
A:CV2T2 RESTORE (D1 file) ANL ALARM 1193 ok
A:CV3T2 RESTORE (D1 file) ANL ALARM 1193 ok

```

::: SET_SEQ FILE 83

File #83 sets core horizontal and vertical cooling to gate off for three seconds during reverse proton events injections.

```

A:CBPON SET DEVICE 3 ok
A:CBPOFF SET DEVICE 0
ok
A:CBPON SET TIMER REFER 99 ok
A:CBPOFF SET TIMER REFER 99
ok
A:CBPON EVENT ENABLE ok
A:CBPOFF EVENT ENABLE ok

```

::: CHECK_DEVICE D:R1LLMT SAVE_SET .

The CHECK_DEVICE command, with the SAVE_SET option, reads and saves the current value of a device. In this case we read and save the value of the DRF1 MIBS Master Trigger timer (D:R1LLMT) for when we return to stacking.

::: SET_SEQ FILE 85 .

File #85 is labeled RunIIb Misc. settings. It sets up the ARF1 fanback voltage and phase read back sample and hold trigger timers both to be 1.575 seconds after a an Accumulator to Main Injector transfer event \$9A.

```
A:R1HLT1 SET DEVICE          1.575          ok
A:R1HLT1 SET TIMER REFER     9A            ok
A:R1HLT1 EVENT ENABLE
ok                                     sets
```

```
A:R1HLT2 SET DEVICE          1.575          ok
A:R1HLT2 SET TIMER REFER     9A            ok
A:R1HLT2 EVENT ENABLE          ok
```

File #85 also sets up the ARF1 Accumulator to Main Injector frequency track and hold timers to be zero seconds and 0.000211 seconds after a an Accumulator to Main Injector transfer event \$9A.

```
A:R1LLT3 SET DEVICE          0              ok
A:R1LLT3 SET TIMER REFER     9A            ok
A:R1LLT3 EVENT ENABLE
ok
```

```
A:R1LLT4 SET DEVICE          .000211       ok
A:R1LLT4 SET TIMER REFER     94           ok
A:R1LLT4 EVENT ENABLE          ok
```

File #85 also sets the A:IBMS1 sample time to be .1 seconds after an Unstack TCLK event (\$91) or a Pbar Production TCLK event (\$80).

```
A:IBMS1 SET DEVICE           .1              ok
A:IBMS1 SET TIMER REFER     91 80         ok
A:IBMS1 EVENT ENABLE          ok
```

File #85 also sets the A:IBMS1 sample time to be 1 second after an Injected Pbar synch event (\$94) or a Pbar Production TCLK event (\$80).

```
A:IBMS2 SET DEVICE           1              ok
A:IBMS2 SET TIMER REFER     94 80         ok
A:IBMS2 EVENT ENABLE          ok
```

File #85 also sets the AP3 SEM clear timer. The 14 6 errors says that the requested data has not changed. This is probably due to the fact that the \$9A event is already present and the \$E1 event is not present. As a result the timer is already in the correct configuration before the commands are run.

```
D:SMB2C ADD TIMER EVENT      9A            14 6
D:SMB2C REMOVE TIMER EVNT    E1            14 6
```

File #85 also sets the Debuncher Extraction kicker septa charge timer. It changes it from \$80 + 0.4 seconds to \$90 + 0.00001 seconds.

```
D:ESEPC SET DEVICE           .00001         ok
D:ESEPC ADD TIMER EVENT      90            ok
D:ESEPC REMOVE TIMER EVNT    80            ok
```

File #85 also changes the DRF1 Master Trigger time to trigger zero seconds after a TCLK event \$02, which goes out every five seconds. This keeps the DRF1 cavities in tune during the shot setup process. When return to stacking the DRF1 master trigger will be returned to triggering off of a MIBS \$79 event.

```
D:R1LLMT EVENT DISABLE          ok
D:R1LLTT SET TIMER REFER       02          ok
D:R1LLTT SET DEVICE           0            ok
D:R1LLTT EVENT ENABLE          ok
```

::: EVENT 91 DISABLE .

Disables Accumulator unstack cycle reset.

::: WAIT_FOR SECS 10 .

::: CTL_DEVICE M:Q102 RESET .

M:Q102 must have a history of needing multiple reset and on commands as it

was already reset (file 41 above) and issued turned on (file 42 above) earlier..

::: CTLIT_DEVICE M:Q202 ON .
The CTLIT_DEVICE command both issues and on command to M:Q102 and checks to verify that the device actually turns on. M:Q102 must have a history of needing multiple reset and on commands as it was already reset ([file 41](#) above) and issued turned on ([file 42](#) above) earlier.

::: SEQ_PGM REQUEST Acc Gap Mon .
Starts the Pbar GBIP command editor program P188 (keeper is Jim Budlong). The Request qualifier tells the application to load file 6, which is used to setup the AP10 gap monitor scope for capturing Pbar unstacking events.

The P188 window automatically closes when the file load is complete.



Acnet application P188. Click on the thumbnail to view a full-sized version of the image.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:LAM52, I:V701, I:HV703, I:H703, and I:V714. . More information on ACL scripts can be found at http://adcon.fnal.gov/userb/www/controls/clib/intro_acl.html.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:HVF11, I:HVF12, I:F17B3, I:Q701, and I:Q702.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:Q703, I:Q710, I:Q711, I:Q712, and I:Q713.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:Q714, I:F11A, I:F11B, I:QF12, and I:Q703.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:LAM52, I:V701, I:HV703, I:H703M and I:V714.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:HVF11, I:HVF12, I:F17B3, I:Q701, and I:Q702.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:Q703, I:Q710, I:Q711, I:Q712, and I:Q713.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:Q703, I:Q710, I:Q711, I:Q712, and I:Q713.

::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called COMPARE_10_DEVICES that compares ramp table values for I:Q714, I:HV703, I:H703, I:V7014, I:Q701.

::: CHECK_DEVICE D:EKIKM1 SAVE_SET .
The CHECK_DEVICE command, with the SAVE_SET option, reads and saves the current value of a device. In this case, the Debuncher extraction kicker module #1 timer is saved.

::: CHECK_DEVICE D:EKIKM2 SAVE_SET .
This is the same as the last command, only this time the Debuncher extraction kicker module #2

timer is saved.

```
::: CHECK_DEVICE D:EKIKM3 SAVE_SET .
```

This is the same as the last command, only this time the Debuncher extraction kicker module #3 timer is saved.

```
::: CHECK_DEVICE A:SCRES SAVE_SET .
```

This is the same as the last command, only this time the Accumulator stack cycle reset timer is saved.

```
::: SET_DEVICE A:SCRES +=1.8 .
```

Increments the Accumulator stack cycle reset timer by 1.8 seconds.

```
::: CHECK_DEVICE A:ISEP1V SAVE_SET .
```

The CHECK_DEVICE command, with the SAVE_SET option, reads and saves the current value of a device. In this case, the Accumulator injection septum tank #1 voltage setting is saved.

```
::: CHECK_DEVICE A:ISEP2V SAVE_SET .
```

This is the same as the last command, only this time the Accumulator injection septum tank #2 voltage setting is saved.

```
::: ALARM_LIST PBAR 76 .
```

Bypasses the D59 alarm list entitled "DEB COOL" (Debuncher Cooling). This list contains a number of other lists.



Pbar alarm list 76 after it has been enabled by the Pbar Sequencer. [Click on thumbnail to view full-sized image.](#)

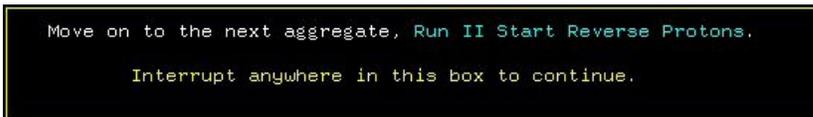
```
::: SET_SEQ FILE 92 .
```

File #92 opens the Debuncher cooling PIN switches to turn off the Debuncher cooling during the shot setup.

```
D:H1PS1  TURN DEVICE OFF           ok
D:H2PS1  TURN DEVICE OFF           ok
D:H3PS1  TURN DEVICE OFF           ok
D:H4PS1  TURN DEVICE OFF           ok
D:V1PS1  TURN DEVICE OFF           ok
D:V2PS1  TURN DEVICE OFF           ok
D:V3PS1  TURN DEVICE OFF           ok
D:V4PS1  TURN DEVICE OFF           ok

D:P1PS1  TURN DEVICE OFF           ok
D:P2PS1  TURN DEVICE OFF           ok
D:P3PS1  TURN DEVICE OFF           ok
D:P4PS1  TURN DEVICE OFF           ok
```

```
ok INSTRUCT 209 .
```



Collider Aggregate: **Run II Start Shot Setup** has been completed.

Next Aggregate: Move straight to the [Run II Start Reverse Protons](#) aggregate, which has the Pbar Sequencer operator continue to sweep beam to the core, and allows for the start of Main Injector tuneup.

How to get back to stacking: Run the [Run II Return to Stacking](#) Aggregate.