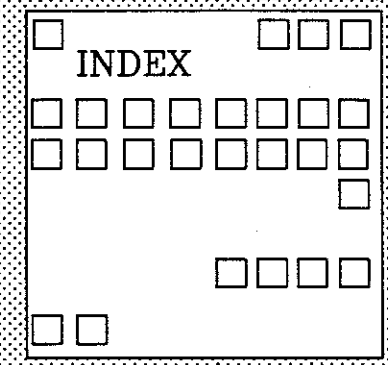
Index Panel

SLC Control Program



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New Fast Feedback Knobs

April 25, 1991

Author: *Lee Patmore* **Subsystem:** *Fast Feedback* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *Yes* **Help File:** *Yes*

Have you ever wanted to put the setpoint of a feedback loop on a knob so you could vary it to try to optimize the beam? Well, now you can (if it is a new fast feedback loop).

To use the new knobs, just go to the new FFBK SELECT panel. Select the loop you want to work on. Then go to the STATE panel and select the state (*e.g.* beam position, angle, or energy) you want to adjust. Then hit one of the ASSIGN SETPNT KNOB n buttons. Turn the knob and *voilá* the beam moves. Be careful, the knobs are fairly sensitive.

Other items worthy of note:

1. A RESTORE KNOB button has been added to the panel. This button will restore the setpoint to the value it had at the time you assigned the knob.
2. The loop must be in feedback for the knobs to work. A warning message is issued when you assign or turn the knob if this is not the case.
3. The position and angle states of a loop are defined at a certain position in the accelerator (in slow feedback lingo, this is the *fit point*). To find this location hit the DISPLAY VECTOR button available on the STATE or FFBK SELECT panels. For each state the primary (usually BPMS), micro, and unit where it is defined are given. For example, the fit point for the LI27 loop is BPMS LI27 701.
4. The knobs for the various states are orthogonal. So, for example, adjusting the electron position should not affect the positron beam. This is only true if no correctors are saturated. Some coupling occurs when some correctors are at their maximum (or minimum) settings.

New Fast Feedback Improvements

May 16, 1991

Author: *Fast Feedback Team* **Subsystem:** *Fast Feedback* **User Impact:** *Large*
Panel Changes: *Few* **Documents:** *Yes* **Help File:** *Yes*

Since its initial release two months ago, many improvements have been made to the new fast feedback system.

- The SUMMARY DISPLAY available from the lower left-hand corner of the FFBK SELECT panel can be used to do a quick check on the status of all the loops. Its format is fully described in the help text. Particularly useful is the center bar graph which shows the present state (Feedback, Compute, Sample, Off) of each loop. Any loop not in its *normal* state (as set in the database by your friends in the software group) has an extra magenta bar whose height shows the normal state. This can be used to tell which loops we think are working and should be on.
- The LOOP STATUS DISPLAY available from most of the feedback panels gives more details on the status of a single loop. Particularly useful is the status text (*e.g.* BAD-MEAS or GOOD) given in the upper right corner which can be used to determine whether a loop is functioning properly. This status text is now color coded according to the normal conventions (green = good, red = bad...). Another improvement is that the micro is told to update the database before the display is generated. This ensures one an up-to-date status. In contrast, the SUMMARY DISPLAY does not do this so its information may be up to 60 seconds old (the cycling time of feedback's asynchronous data base updating). Finally, bugs in the determination of the status have been fixed so we believe this display is now completely accurate (knock on wood).
- The action of the DISPLAY VECTOR button available on the bottom of the FFBK SELECT panel and on many other panels has been improved. This display can be used to tell what devices a loop uses. It now first lists the actuators (correctors and phase shifters) used by the loop, followed by the states (*e.g.* beam position, angle, or energy) the loop measures, followed by the items measured (*e.g.* x from a BPM). The present values of all these vector elements are also given and the color of a line indicates the status.
- The RESET ACTUATORS button available on the bottom of the FFBK SELECT panel now works for any HSTA (*e.g.* Feedback or Off) of the loop. Pressing this button results in all the actuators being set to the values they had at the time the loop's GOLD ORBIT was saved. If the loop is not in feedback mode you are first prompted for confirmation before the action is taken. The RESET ACTUATORS button can be used to recover the beam if feedback trashes it (God forbid).
- Feedback controls a magnet by directly writing to its DAC. It did not previously update BDES. Hence when feedback was turned off, its magnets would be red (when feedback is on, the magnets are in a special feedback state and show white (like no-control magnets) on the magnet displays). Now whenever the HSTA is changed from feedback to anything else, feedback sets the BDES of each magnet to the current value of BACT. In this way, the magnets are left green.
- The Fourier Transform (FFT) display available from the PLOT panel has been fixed so it no longer shows the negative frequencies.
- The PLOT panel now allows selection of manual/auto scaling separately for the x and y axes.

- The time it takes to do a calibration has been reduced to a few minutes. It is now also possible to take the results of a calibration (which measures how each state changes as each actuator is varied), calculate all of the matrices that feedback uses and save them to the database. This is done with the PUT CALIB TO DB button on the FEEDBACK DIAGNOSTICS AND CALIBRATION panel. It submits a batch job which takes several minutes to do the work (sort of like model calculations are handled by COMFORT). When it is done it issues an informative message and the loop will actually be using the new matrices.
- We have started optimizing the software on the micro to reduce CPU usage so the loops will be able to run faster.
- On the ACTUATOR panel you can set limits indicating the total range allowed for the actuator. Now if you enter a number outside the hardware range for the actuator, a value of 98% of the hardware range is used. This prevents the controller from asking for actuator settings which cannot be set.
- Special software for the scavenger energy loop has been completed. This allows it to control the energy by setting AMPLs of the fast feed forward hardware which in turn move fast phase shifters which change the LI17 and LI18 subbooster phases. Shortly there will be a document to explain the intricacies of Fast Feed Forward Plus Fast FeedBack (FFFPFFB).
- When you load a new feedback GOLD CONFIGURATION (from the GOLD ORBIT panel of course) you normally want the beam to follow that gold orbit. Hence you normally want all the setpoints to be zero. Feedback now prompts you if there are any non-zero set-points and asks if you want them zeroed. This allows for a new and easier tuning method. Namely, you can now knob the setpoints to get the beam where you desire and then save and load a gold orbit asking it to zero the setpoints. In many cases this will be easier than turning off the loop, adjusting actuators and then re-golding the loop.
- When you save a GOLD ORBIT (from the GOLD ORBIT panel) you usually want to load and use that configuration. To make this easier, the SAVE GOLD ORBIT button now asks you if you want to load the configuration you just saved. If you answer yes, it will do it.

There are now a total of a dozen fast feedback loops in operation. Another 3 are likely to be commissioned in the coming week. Use the SUMMARY display and DISPLAY VECTOR buttons to get the current status of all loops and to find out which ones are operational. Operators should try to keep the loops in their normal state (so there are no magenta bars showing). If a loop needs to be left off, please file a feedback exception report so we can fix the problem. Note that loops can be left on when there is no beam in a region. They should start up properly when the beam comes back.

VDUs and TRBRs Now Supported for Timing Configurations

April 25, 1991

Author: *Daniel Van Olst* **Subsystem:** *Configurations* **User Impact:** *Small*
Panel Changes: *No* **Documents:** *No* **Help File:** *Yes*

Timing delays for database primaries VDU and TRBR are now supported by the timing configurations facility.

The timing value for a TRBR in a configuration file is with respect to TREF (since TNOM is beam code related it is not applicable to TRBRs).

The situation for VDUs is more complicated. When saving a VDU configuration, not only is the delay value for the VDU saved, but in addition the delays of the DUPCD (such as a TRIG) associated with the VDU are saved on all its (DUPCD'S) active beam codes. For example, consider saving a timing configuration for the South Damping Ring which includes VDU # 1 in the micro DR12 with an associated DUPCD, TRIG DR12 310. Not only will the delay for the VDU be saved, but also the delays for TRIG DR12 310 will be saved for all the beam codes it is active on. (These delays are tagged in the save file with the appropriate beam codes).

For all other items in a timing configuration, the beam code used for a save or a load is the one selected on the BEAM CODE button on the SCP. However, for DUPCD lines associated with a VDU, the beam code used is the one the line is tagged with.

This will ensure that when loading a configuration, a VDU and its associated DUPCD will be restored to their states at the time of the configuration save. One unfortunate side effect is that timing configurations are no longer confined to one beam code. However, the only items in a configuration file which use beam codes other than the one selected by the BEAM CODE button are the DUPCD lines associated with a VDU. Error messages are issued if loading a configuration results in changing beam codes to other than the one selected by the BEAM CODE button; in addition the configuration display has been upgraded to clarify what is going on.

The delay saved for a VDU in particular is just the delay for the VDU itself. This is different than (for instance) the delay saved for a TGAS, which is the delay of the TGAS plus the delay of the DUPCD associated with the TGAS, with respect to the DUPCD's standard activate time.

This unfortunately means that depending on the device type, there are now 4 ways to reference timing information in configuration files. This is summarized in the following table.

DUPCD (TRIG, SBST, etc.)	with respect to TREF + TNOM
TRBR	with respect to TREF
TGAS	with respect to TREF + TNOM + PDUT (the "standard activate time" of the associated DUPCD)
VDUs	with respect to TREF + TNOM + PDUT + OFFSET (the total delay for the associated DUPCD)

Lattice Matching Updates

May 9, 1991

Author: *Stephanie Allison* **Subsystem:** *OPTICS* **User Impact:** *Yes*
Panel Changes: *Yes* **Documents:** *No* **Help File:** *Yes*

Updates to the lattice matching software as a result of initial testing are now in production. Changes include:

1. All real numbers are displayed on panel buttons with as many places after the decimal point as possible.
2. When entering a new function for a selected fit point location on the MATCHING SETUP panel, the function value to be matched now defaults to the design value at that location if the user does not supply an input.
3. On the VARIABLE SELECT panel, the user can now display the KMOD values and limits for all the quads in the selected model section. This information may be helpful in evaluating the resulting KMOD values from COMFORT before implementing the match.
4. When a match is implemented, and the matching run was performed using initial conditions derived from wire or profile monitor measurements, the Twiss parameters for the marker pointer at the beginning of the selected model sub-system are now updated in the database, overwriting any values put there by an earlier modelling run or by the user through the MODEL MARKER POINTS panel. This forces the beginning marker point to have Twiss parameters that are consistent with all the downstream devices in the chosen model sub-system.

If the user is not running from the logical beginning of the system, model discontinuities will result between model sections before and after the initial marker point; this will adversely affect the ability to steer the machine. Warning message are output during match implementation if model discontinuities will result, the user is then given a chance to abort the implementation. It is recommended that model sections going from the beginning to the end of the system be chosen before lattice matching is done. Another alternative is to do a regular modelling run from the OPTICS panel with the entire logical model sub-system selected after all lattice matching is finished.

Next Unit or Channel for History Plots

April 29, 1991

Author: *Nan Phinney* **Subsystem:** *Magnets, Analogs* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

To facilitate scanning of history buffers, NEXT UNIT and PREV UNIT buttons have been added to the Diagnostic and History Plot panels for Magnets and other Analog Control devices. These buttons will toggle through all units of the selected primary and micro and wrap to the first or last unit at the end of the list. A valid single unit must be selected before the toggle is used. On the History Plot panel, the currently selected unit is now displayed. The NEXT UNIT or PREV UNIT may also be used to check CAMAC assignments or for other single unit diagnostic displays. The selected display is refreshed after each toggle.

For scanning analog status history plots, four new buttons have been added to the Analog Status Diagnostic panel. The NEXT MICRO and PREV MICRO buttons toggle through all the micros in the selected subsystem, wrapping to the first or last micro at the end of the micro list. When a new micro is selected with these buttons or with the SELECT MICRO or display range buttons, if

the currently selected channel does not exist in that micro, the first valid channel is automatically selected. The NEXT CHANNEL and PREV CHANNEL buttons toggle through all channels of the subsystem in the selected micro, wrapping to the first or last channel when the list is exhausted.

X-COW Speed Improvement

May 16, 1991

Author: *Tom Himel* **Subsystem:** *Displays* **User Impact:** *Medium*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

In most respects the X-COW is faster than a network COW. The main exception to this has been the drawing of sideways text such as that used to write the unit numbers on a BPM graphics display. This has now been optimized so it is at least an order of magnitude faster.

This was done by writing these text strings in slightly smaller upright letters placed one below the other rather than using the sideways letters. This allows a standard "hardware" font to be used for the letters rather than the much slower method of drawing the letters as a series of vectors.

This change does not effect X-CALFs. It also does not effect the appearance of the print graphics displays.

BPM Configurations ALL* Support

April 25, 1991

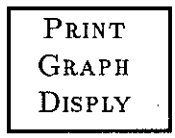
Author: *Daniel Van Olst* **Subsystem:** *Configurations* **User Impact:** *None*
Panel Changes: *None* **Documents:** *No* **Help File:** *N/A*

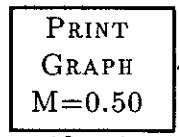
The BPM configuration templates describe which units are included in a BPM reference orbit save. The configuration software has been modified to allow including all BPMs in a region by specifying ALL* for the BPM list in the template files. Hence, template changes will no longer be required when new BPMs are added or removed from the database.

Print Graph Button Displays Magnification

May 21, 1991

Author: *Ed Miller* **Subsystem:** *SCP* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *Yes*

The standard button for printing graphics, 

has been modified to display the currently specified magnification for printed graphics, for example: 

. The magnification will be displayed on this button only if a non-standard value of magnification (or of aspect ratio) has been selected for the SCP. These two parameters may be specified from the Auxiliary Print Control panel. Please note that the values for magnification and aspect ratio are applied only at the time the graph is sent to the printer. Thus, in the COLLECT mode, the values in effect when the 'Print Collect' button is used apply, not those at the time the 'Print Graph' button is used.