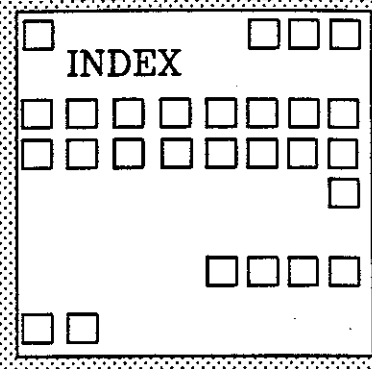
Index Panel

SLC Control Program



SLAC's Software Engineering Newsletter

May 20, 1992 | All that Fits is News to Print | Vol. 6, No. 6

Correlation Plot Support for Fast Feedback

May 8, 1992

Author: *Leeann Yasukawa* | **Subsystem:** *Correlation Plots* | **User Impact:** *Small*
Panel Changes: *None* | **Documents:** *None* | **Help File:** *Online*

The Correlation Plot facility has been enhanced to support the "new" fast feedback system. It may now be used to step the setpoint of a state controlled by fast feedback and to sample values for any fast feedback element. When a fast feedback loop is stepped, any variable can be sampled to see the effect of changing the setpoint of a loop. For instance, a BPM downstream of the feedback loop might be sampled when a fast feedback loop's setpoint is stepped. Also, fast feedback measurements can be sampled when any other item is stepped. For instance, a state variable may be sampled over time.

Any state element setpoint can be stepped as long as the associated loop is in Feedback mode. Any loop element can be sampled as long as the loop is in Feedback or Compute mode.

Step and Sample Variables

The only valid item which can be stepped in Fast Feedback is a state's setpoint (SETP). Valid items which can be sampled are any of the loop's measurement, controller, or actuator element values (VALU). Also the controller task's actuator setting (CMND) can be sampled.

Input

The inputs to correlation plots to step or sample elements are **Primary**, **Loopname**, **Element name**, and **Pseudosecondary**. All entries may be entered on a single line with either blanks or commas between them, or they may be entered one at a time. The first entry must always be the primary which is FBCK. The remaining entries do not necessarily need to be in the order of Loopname, Element name and Secondary although each entry is verified in the order that it is entered and subsequent entries depend on previous ones. For instance, an element name cannot be verified unless the primary FBCK is entered with a valid loopname since the loopname will determine which elements are valid.

Help

At any time in the input process, help is provided for a list of the items available which may be chosen. For instance, if the primary FBCK is entered, a ? may be entered for a list of valid loopnames. If the primary is entered with a valid loopname, a ? will give a list of valid state element names. If a list of measurement or actuator element names is desired, M? and A? may be entered respectively.

In general, a '?' will give a list of valid items for the first unknown entry. If a specific list is desired, L?, M?, S?, or A? may be entered at any time for lists of loopnames, measurement elements, state elements or actuator elements. Secondaries are much more limited. If the feedback state is stepped, the only valid secondary is SETP. If a feedback element is sampled, the valid secondaries are VALU for all elements or CMND for state elements only.

Once the step and sample variables are determined and before data acquisition begins, the feedback loop is checked to ensure it is in the proper state. If it is not, a message is displayed and the data acquisition is aborted.

New Fast Feedback Setpoint Display

April 28, 1992

Author: *Phyllis Grossberg* **Subsystem:** *Fast Feedback* **User Impact:** *Small*
Panel Changes: *One* **Documents:** *No* **Help File:** *Yes*

A new Setpoint Display button is available from the main fast feedback select panel. This button provides a summary of the setpoints of up to eight controlled states for all feedback loops.

Feedback loop names are displayed in yellow; state labels are displayed in white; and setpoint values are displayed in green. An effort was made to display as much information as possible on one page. Nonetheless, for some applications, paging may be required to view all feedback loops.

Beam Code 10 KLystron Data

May 6, 1991

Author: *Keith Jobe* **Subsystem:** *Klystron* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

Klystron support code has been modified to allow database updates only on beam code 10. Specifically, klystrons which have the `:HSTA: 0200` bit set will only update their database values for phase and amplitude on beam code 10.

This feature is needed immediately for the North Compressor Klystron, which fires at three distinct powers: Normal operation, Beam-Dumper mode, and Low-Power mode. The latter two are associated with dumping beams, while only the first mode (using Beam Code 10) is used for operations. This allows the klystron's history buffers and phase trims to operate only during the device's "normal" mode of operation.

New Wire Emittance Display

May 1, 1992

Author: *P.Emma, L.Yasukawa* **Subsystem:** *WIRE* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *Yes*

A new graphic emittance display has been created for 4-wire scanner 2-dimensional phase space analysis. The left side of the display summarizes the horizontal plane and the right side the vertical. Measured quantities are displayed numerically on the top half of the display and graphically on the bottom half.

The top half of the display shows the measured values and errors (GREEN), with nominal values in parenthesis (CYAN), of the following quantities: normalized emittance, bmag, bmag times normalized emittance, alpha and beta (at the first wire), sigmas of each wire, and average intensity. The bottom half of the display is a graphic view of *normalized* phase space at the first wire of the 4-wire set. In this *normalized* phase space a one sigma envelope of a perfectly matched beam with nominal emittance is represented by a circle of unity radius (shown in dark BLUE). The actual measured beam envelope is represented by a GREEN ellipse. The wire data used to fit the ellipse is shown as double width color coded lines projected back onto the phase space at the first wire. Therefore the angle between these lines represents the betatron phase advance between wires. The lines are double width to indicate the uncertainty in the wire scanner beam size measurements. The fit quality is indicated graphically by how well the ellipse passes between the double width lines at the tangent points. This is also indicated numerically by the chi-squared. In cases where the fit produces a negative emittance the graphic display cannot show the GREEN ellipse. Instead it shows a YELLOW circle of area proportional to the value of bmag times emittance.

This display replaces the `CEA` and the `OLD` type displays when using the [MEAS EMIT] and the [DISP EMIT] buttons from any WIRE CONTROL panel with 4 wire emittance. There is a new [DISP EMIT DIAG] button on each of these control panels to view the `CEA` and `OLD` type displays.

To accommodate the new button, several buttons on the panel were rearranged including placement of the [MEAS SKEW] [RECALC SKEW] [DISP SKEW] buttons on the same line.

History Buffers Data Filtering

April 7, 1992

Author: *Ralph Johnson* **Subsystem:** *All* **User Impact:** *Some*
Panel Changes: *No* **Documents:** *No* **Help File:** *No*

Some data point filtering has been added when subtracting values in two data sets for difference plots such as BACT-BDES. Data points with timestamps which differ by more than 1 minute are now discarded. If more than 5 such points are discarded an error message is generated. This will correct a problem that has occasionally occurred in magnet DIFF plots which resulted in the plot showing artificial spikes.

More Variables for Buffered BPM Acquisition

April 24, 1992

Author: *Nan Phinney* **Subsystem:** *BPM* **User Impact:** *Small*
Panel Changes: *Many* **Documents:** *No* **Help File:** *Yes*

To facilitate diagnosis of stability problems, the BPM buffered data acquisition has been expanded to allow up to 50 units (previously 8). Units 1 through 10 are on the normal **BPM Buffer Acq** Panel; units 11 through 50 on the **More Buffer Units** Panel. Three new functions have been added to make it easier to deal with so many units. On the **Buffer Acq** panel, the **Select Unit A or B** button allows the user to enter a button number to be used for either the A or B variable without toggling through all the units. On the **More Buffer Units** Panel, the **Enter Unit Range** button allows the user to fill several buttons with sequential units. The user is prompted for the starting button number, number of units to fill, and first unit. The buttons are then filled automatically. A **Clear All Buttons** function is also provided to reset after a complicated acquisition.

One restriction on the choice of BPMs for buffered acquisition is that all of the units chosen must be read on a single pulse. This means that in sectors with multiplexed BPMs, only units on the same multiplexer setting (and only one setting) may be selected. A button to select the diagnostic **DISPLAY BPMS by MUX** has been added to the **More Buffer Units** panel to assist in selecting a valid set of units.

New DR13 Compressor Amplitude Feedback

May 15, 1992

Author: *Tom Himel* **Subsystem:** *Feedback* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

There is a new slow feedback loop which controls the E_NOLOAD of the DR13 compressor klystron. This cures the long-term problem of klystron amplitude changing and thus requiring manual adjustment by the operators. This loop does an E_NOLOAD fast-time-plot, analyzes it in exactly the same way as the E_NOLOAD calculation in the SCP does and then adjusts the klystron drive via AMPL.DR13.10.VDES to keep the E_NOLOAD constant. It has been commissioned and works. Shortly it will be extended to the DR03 compressor also.

Betatron Phase Advance History Plots and Displays

May 8, 1992

Author: *Tom Himel* **Subsystem:** *Linac* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *Yes*

Adaptive cascaded fast feedback continuously calculates the transfer matrices between the various loops in the linac. Since changes in these transfer matrices reflect changes in the linac (such as focusing strength errors due to klystron phase errors), their values may be useful as a diagnostic.

There are now displays to let one see the characteristics of the transfer matrices. From the LINAC INDEX go to the new LINAC SPECIAL DISPLAYS panel. From their you can look at a display which shows the betatron phase advances between the loops and the determinant of the transfer matrix. You can also look at history plots of the phase advance. The help for the panel gives details.

Note that the display simply shows the values of numbers in the LSBM primary of the database. These numbers are filled in by a new slow feedback watchdog which normally runs once every six minutes.