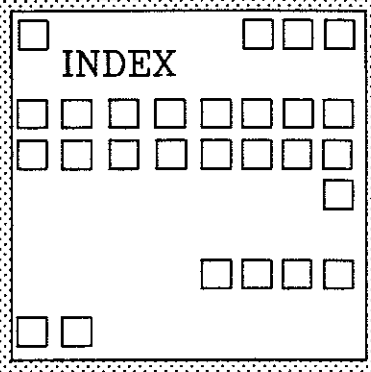
Index Panel

SLC Control Program



SLAC's Software Engineering Newsletter

June 19, 1990 | All that Fits is News to Print | Vol. 4, No. 19

Beam Pulse Accounting

June 13, 1990

Author: *Debbie Ohman* | **Subsystem:** *SLC* | **User Impact:** *Small*
Panel Changes: *Few* | **Documents:** *Yes* | **Help File:** *Yes*

Beam Pulse Accounting provides information on the number of beam pulses counted at BPMs located at strategic points around the SLC. By comparing the number of counts at each location, information will be gained as to why some pulses don't make it all the way to the IP. To accommodate pulse accounting, splitters have been added on all four electrode cables of selected BPMs. The pulse accounting units can distinguish between e-, e+ and e- scavenger beams at a BPM by gating the signal with a PDU pulse (TRIG) corresponding to each beam. The pulse will only be counted if it is above a certain intensity threshold, which can be set remotely via a DAC (AMPL). Both the beam pulses and the PDU pulses are counted with a LeCroy 2551 scaler module. The process "BPACOUNT" runs on the MCC VAX and should show up on the display of currently running processes. BPACOUNT interrogates all of the scalers on a six minute cycle. The data gathered can then be displayed using the history buffer routines.

Pulses are counted at the following locations, although currently only the scalers in the BSY and NRTL are available.

Area	Signal
CID	e^- scavenger
	e^-
Linac (Sector 1)	e^- scavenger
	e^-
	e^+
NLTR	e^- scavenger
	e^-
SLTR	e^+
NRTL	e^- scavenger
	e^-
SRTL	e^+
Positron Return Line	e^+
Positron Extract. Line	e^- scavenger
NARC	e^-
SARC	e^+
FF	e^-
	e^+
PEP NIT	e^-
PEP SIT	e^+

In addition to the hardware (scaler) counters, there are several software counters known as pseudo-scalers. The pseudo-scaler types and a brief description of each follow.

BCST	Number of actually broadcast instances of the beam code in the list.
NARC SARC	Number of times the MPG requested the north or south arc dumper to fire to dump the beam code in the list.
VETO	Number of times the veto bus data matched with the given mask for the beam produced by the beam code in the list.
VDIMV	Approximate number of times the beam code in the list was blocked specifically by a bit set in the first IDIM module's data.
RP01 RL01	Approximate number of times the beam code in the list was rejected from being broadcast because of ten hertz or one hertz rate limiting respectively.
DIM1 DIM2	Number of times the data read from the first or second of the MPG's two IDIM modules matched with the given mask (regardless of beam code). The MPG reads all rate limiting request signals through these two IDIM modules.

The Beam Pulse Accounting panels can be reached by selecting the [BEAM PULSE ACOUNT] button located on the Special Displays panel. This new panel contains two rows of region set-up buttons, [INJEC SETUP] through [PEP SIT SETUP]. Selecting one of these buttons will bring up a panel for setting TRIGS (to gate the module), and AMPLs (for the threshold settings), for the particular region. Several button macros are available from each of the TRIG and AMPL panels. The threshold correlation plot button macros allow the user to display the signal(s) from each channel vs. the AMPL VDES step variable. One may use this to determine where the threshold for the Beam Pulse Accounting module should be set. The timing correlation plot displays the same signal information using the TRIG TDES as the step variable. With this one can determine when to trigger the beam Pulse Accounting module. The free run Correlation Plot macro is used for looking at the signal information vs. time.

On the last row of buttons on this panel is the [HISTRY BUFFER SETUP] button for selecting the Pulse Accounting History Plotting Set-up panel. Three selections should be made on this panel before proceeding to the history buffer panel. Select one of the data types, [SIX MIN DATA] through [WEEK DATA] select one of the machine regions,

INJECTOR through PEP NIT, and select one signal type, E − through AUXIL CHAN 3. Selecting HIST PLOTS then brings up the general purpose history plotting panel from which displays can be made.

Also on the last row of the Beam Pulse Accounting panel is the PSEUDO SCALER HSTBUF button for selecting the Pseudoscaler History Plots panel. The pseudo-scaler history plots panel differs from the real scalers history plots panel in that six minute data is selected by default when the panel is entered. This time interval can be changed using the buttons at the bottom of the panel. All that is necessary to create a plot is to select one of the pseudo- scaler types, buttons SCLP BCST BEAM10 through SCLP UNIT 92 DIM2. The general history plotting panel is available from the HIST PLOT PANEL button. This need only be used for changing some of the default settings such as plotting scales and step times.

Slow Feedback Enhancements

June 13, 1990

Author: *Ed Miller* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

The current version of the Slow Feedback Process includes several fixes and enhancements which have been incorporated recently.

1. RMAT support: Launch loops can now be set up to use orbit calculations based on the DIMAD model (R-matrices) as well as the COMFORT model (TWSS-parameters). This allows loops to properly do orbit corrections in regions of the machine with cross plane coupling

2. Need for loop single-shot eliminated: A long-standing error in the slow feedback program resulted in the failure of some scheduled loops to make any corrections after a new FEEDBACK process was started. Such loops could be "fixed" by single-shotting them. This problem has been corrected, and such single-shot fixes should no longer be necessary.

3. Group-trim fix: Most launch loops share the same correctors with at least one other launch loop; for instance, the x-position and x-angle loops typically use the same pair of XCOR's. For each execution, the program was supposed to sum the magnet corrections needed by all loops using the same correctors, then send the total change to the magnets at once, rather than wasting network bandwidth by sending multiple changes to the magnets. Because of a program error, only the last of the changes was made in the case where more than one loop with the same correctors needed a change. This program error has now been corrected. Note that this may not have been a very obvious problem in practice, since each loop would in fact get a chance to make its magnet changes provided the other loops which share the same magnets didn't require a change during the same execution pass.

Slow Energy Feedback Enhancement

June 12, 1990

Author: *Ken Fairfield* **Subsystem:** *Linac* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

In the past, the *Slow Energy Feedback*, used for the NARC loop, PEP electron and positron beams, and the scavenger beam, controlled the sub-booster phases in an adjacent pair of sectors: it "kinked" the two sectors. In addition, even though the *control devices* for each of the energy feedback loops are available in the database, the choice of which sectors were kinked for each loop were hard-coded in the FORTRAN and would not be affected, for instance, by a DBEDIT.

Two enhancements have been made to the Slow Energy Feedback:

1. Either pairs or quads of individual klystrons (2 or 4 tubes) may now be used for the "kink" as an alternative to the previous method using the sub-boosters in two sectors.

2. The slow energy feedback code now accesses the database to determine the control devices for each loop and chooses the correct method, kinked tubes versus kinked sectors, based on those devices.

Kinking the phases of pairs or quads of klystrons is the typical method used by operators for multi-knobs that tweak the beam energy. The new slow energy feedback does essentially the same thing as the multi-knobs and, in the case of the PEP beams for instance, uses the same klystrons that are assigned to the multi-knobs. The only restrictions on kinking klystrons is that either 2 or 4 klystrons must be used for the kink (not three or six, etc.), and that those klystrons must all be in the same sector.

For those loops which kink sub-booster phases, there is no change in the control method.

In all cases, the control devices may now be changed, e.g. by a DBEDIT, without the need to restart the FEEDBACK process: it is merely necessary to toggle the loop OFF and then back to REQ or SCHED. When the loop is toggled, the database is accessed and the new list of control devices found there will be used.

Cater Version 3.3

June 13, 1990

Author: *S. Castillo, R. Johnson* **Subsystem:** *Cater* **User Impact:** *Some*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

A new Version of the Cater software has been put in production. Following is a list of the new or enhanced features included in Cater 3.3:

1. A new field has been added to the hardware solution form. This field provides information on the status of documentation needed for Maintenance calls. Valid entries for this field include:

   Yes -indicating that the necessary documentation is current and available.

   No -meaning that the required documentation is either not current or is missing.

   Unknown -indicating that it is not known whether documentation is needed or if the documentation is current. "Unknown" is the default value for the documentation field.

   Do not need -for when the documentation is not necessary for the system being worked on.

The status of the documentation is specified when one enters a solution for a reported problem. The valid entries (Yes, No, etc.) are made in the documentation field, and the details, if any, are entered in the solution description section. To indicate a change in the status of the documentation, e.g. from "Unknown" to "Yes", one may either enter a new solution for the problem, or modify the documentation field of an existing solutions.

The document field has also been added to the Hardware Report form. Thus the documentation status may be included in the search criteria for hardware problems. For example, one may ask for all the hardware problems which were reported during the last month for which the documentation status is "No".

The Cater database has been modified so that all solutions entered prior to this version of Cater have "Unknown" in the documentation field.

2. A new "canned" documentation report has also been added to the list of existing reports. It compiles a list of all the *solved* hardware problems which have a documentation status of "Yes". The report is sorted by problem number, area, the problem report time, status of the problem, and the amount of the lost beam time.

   This is report number 22 on the "Canned" report menu.

3. This version of cater also fixes a few miscellaneous bugs including one that caused the initials of the person who solved a problem to be excluded from the solution report.

Diagonal Beam-Beam Deflection Scans

June 7, 1990

Author: *Nan Phinney* **Subsystem:** *Final Focus* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

As an additional diagnostic tool, the Final Focus deflection scan software has been extended to allow diagonal beam scans in addition to the standard scans in x and Y. The diagonal scans provide a tool for investigating the residual skewness of the beams which may not be apparent in their x and y projections. At least initially, they will not be used for routine setup but only for detailed machine physics studies.

A diagonal or U scan is selected using the (New) third column of scan buttons on the Beam Scan Panel. The user may select any angle between +90 and −90 degrees with the Enter U Scan Angle button, where 0 degrees is equivalent to an x scan. The beam is moved along the specified angle using both the x and y dither coils for the selected scan beam. Deflections are calculated both in and out of the plane of the scan, and labelled as U for in-plane and V for out-of-plane.

Diagonal deflection scans are also supported by the Automated Optimization software such as waist scans which are used to tune the beams. The user may select to measure the U scan width as a function of X or y waist position, Eta knob, or Skew Quad setting, and if desired, Accept Best Value. The emittance calculation software, however, requires data from standard x and y plane scans.

BPMS Crate & Channel Timing Display

June 15, 1990

Author: *Gregory White* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *Yes* **Help File:** *Yes*

A new display has been added to the BPMO DIAGNOSTICS panel to show all BPMS units with their crate and channel values, for a given micro and MUXS setting. The panel has also been rearranged with the Next Page and Prev Page buttons included.

The button [DISPLY BPMS BY MUX] is located on the right-hand-side of the rearranged panel. It will prompt for a micro name and MUXS setting (the latter may be given as "*", meaning all). The most recent answers to these prompts are maintained as defaults. Responding with CTRL-C to either input will cleanly abort.

BPMS unit numbers are displayed as a sorted list (ascending) and, if all MUXS were requested, arranged in MUXS setting groups (also ascending). If two BPMPs service a BPMS, needing two channels, the second value will be displayed below the first, otherwise this position will be blank. As the number of display items may be larger than the screen size, it may be necessary to press Next Page to see all the requested items.

New Phase Trim Permit Button

June 14, 1990

Author: *Bob Hall* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *One* **Documents:** *No* **Help File:** *Yes*

A new [PHASE TRIM PERMIT] button has been added to the Special Klystron Functions panel. This button may be toggled to enable or disable automatic asynchronous phase trimming as well as periodic Paranoia phase trimming for a klystron or subbooster. Phase trim requests from a panel will continue to cause a trim to occur regardless of the toggle state of this button.

Index Panel

SLC Control Program

SLAC's Software Engineering Newsletter

July 19, 1990 | All that Fits is News to Print | Vol. 4, No. 20

Beam Emittance and Skew Calculations with Wires

June 28, 1990

Author: *Sanchez, Hendrickson* **Subsystem:** *Accelerator* **User Impact:** *Some*
Panel Changes: *Few* **Documents:** *Yes* **Help File:** *None*

Emittance and Skew calculation software has been recently released to support the new linac wire scanners.

Emittance calculations using four (or three) wires are supported for LI02 and LI28. Sets of four wires in these micros are separated by a 45 degree betatron phase advance. By scanning with any three of these units, the X or Y beam emittance is calculated using the fitted beam width-squared at each point and the associated R matrices. It is not necessary to vary upstream quadrupole settings. After the single scans are performed and fit, the beam emittance and values for the alpha and beta functions are calculated with a least-squares fit using the single scan data. This calculation utilizes data from four wires if available. The alpha and beta values are always calculated at the Z position of the first of the four wires, even if this wire is offline. In addition to the combined fit, if four wires were scanned, for each combination of three wires the software calculates the beam emittance, alpha and beta. In this case there are four combinations of scanners resulting in four additional calculated values for emittance, alpha and beta.

Emittance measurement for both X and Y planes for a given beam and micro may be selected from the

MEAS EMIT X & Y

button on the LI02 and LI28 wire scan panels. After the scans and calculation are performed a display is generated. This display indicates the micro and beam measured. The composite emittance, alpha and beta values are listed first with associated errors. In addition, for each wire scanner, the fitted width-squared and errors are output. If four wires were scanned, a second page of the display is produced listing emittance values and errors for each three-wire combination. The display for the most recent emittance measurement may be regenerated later from the same SCP in which the measurement was taken by pushing the

DISP EMIT

button. After the emittance measurement is complete, the scan data for the individual wires is put into correlation plot variables to allow further analysis and display. Gaussian fit parameters are written into the WIRE database for each wire scanned and calculated emittance parameters are written into the WIRE database for the first wire of the set. These are available for History Buffer Plots.

Beam skew calculations are supported for wire scanners which include an X wire, a Y wire and a diagonal (U or V) wire. This includes scanners in LI02 and LI28 as well as additional units which will be installed later. The skew angle of the beam is calculated by performing a single scan in each of the three planes.

From the wire scanner panels, the [MEAS SKEW] button initiates a skew angle calculation for the currently selected unit. After the three planes are scanned, a display is generated indicating the beam and wire, the calculated X, Y and U or V beam widths, the calculated skew angle and its propagated error. The skew angle is the angle of the major axis of the beam ellipse relative to the X axis. In addition a "Skew Parameter" is calculated which quantifies the skewness of the beam, incorporating both the skew angle and the "roundness" of the beam. This skew parameter is defined as:

$$S = \frac{(\text{major\_width}^2 - \text{minor\_width}^2)}{(\text{major\_width}^2 + \text{minor\_width}^2)} \times \sin(2 \times \text{skew\_angle})$$

where major_width and minor_width are the widths of the major and minor axes of the beam ellipse.

The display for the most recent skew angle calculation may be regenerated by selecting the [DISP SKEW] button from the same SCP which performed the measurements. Scan data for each plane is put into correlation plot variables for further analysis. The skew angle and other parameters are saved into the WIRE database after a successful measurement.

Support for wire scanner emittance and skew calculations has been added to correlation plots. Four-wire emittance calculation results are available under the PHYS correlation plot pseudo-primary. The micro names allowed are LI02 and LI28. Associated pseudo-secondaries are X_EMIT, X_BETA, X_ALPHA, Y_EMIT, Y_BETA, Y_ALPHA. Wildcards supported are X*, Y* and ALL*, which result in calculations for X emittance, Y emittance or both. Four wire scans are performed for each requested plane for each data point.

Skew calculations are supported under the WSCN primary. The user should enter the micro name and WIRE unit number for any wire which supports X, Y and diagonal (either U or V) scan planes. Supported pseudo-secondaries are as follows. SKEWANGL is the calculated angle of the major axis of the beam spot ellipse with the horizontal. SKEWMJSQ and SKEWMNSQ are the squares of the beam size along the calculated major and minor axes of the beam spot ellipse. SKEWPARM is the skew parameter which will equal zero for upright or round beams. Wildcards associated with the Skew calculation are S* and ALL*. S* provides all Skew results and ALL* provides Skew results in addition to fits for X, Y and diagonal scans. Three wire scans are performed for each requested Skew calculation.

Autosave of Emittance Setup Parameters

July 10, 1990

Author: *Michael Glaviano* **Subsystem:** *SCP* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

Emittance setup parameters are now saved to the database as they are changed. This avoids the loss of changes one has made to the setup. These parameters are associated in the database with measurement devices which include profile monitors (primary PROF) and wire scanners (primary WIRE.) To avoid possible confusion, the explicit (manual) save of a window's parameters (from the Select Window panel) has been disabled. The autosave feature is activated automatically and requires no user action.

New Option for Klystron Golding

June 19, 1990

Author: *Bob Hall* | **Subsystem:** *Accelerator* | **User Impact:** *Small*
Panel Changes: *None* | **Documents:** *No* | **Help File:** *None*

A new option has been added to the UPDATE GOLD ONLY button on the Klystron Golding Panel. This option will allow one to update the gold phase for just one klystron instead of updating klystrons over a range of sectors. The old options for updating klystrons or subboosters for a range of sectors remain available.

New Klystron Features

June 29, 1990

Author: *Bob Hall* | **Subsystem:** *Accelerator* | **User Impact:** *Small*
Panel Changes: *Few* | **Documents:** *No* | **Help File:** *Yes*

Two new features have been added to klystron panels. The first is the addition of two new choices available from the HSTA Mode button. Along with the previously existing three choices for the state of a klystron or subbooster (ON, OFF, or MAINT,) two new options may be selected: TBR (To Be Replaced) and ARU (Awaiting Run Up). Previously, the MAINT state had been used to indicate these two conditions. The TBR and ARU states may now be selected to give a better indication of the status of a klystron or subbooster. These new states will appear on all displays on which the maintenance state can appear, including the Klystron Status Display.

Also, the button [DECODE HDSC BITS] has been added to the Klystron Diagnostics panel. This button may be pressed to display a description of each hardware descriptor (HDSC) bit along with an indication of which of these bits are set for the currently selected unit. The display is very similar to that produced when selecting the existing DECODE STATUS BITS and DECODE DSTA BITS buttons, which are also on the same panel.

Delay in reporting Klystron Phase Error

July 6, 1990

Author: *Bob Hall* | **Subsystem:** *Accelerator* | **User Impact:** *Small*
Panel Changes: *None* | **Documents:** *No* | **Help File:** *None*

In order to eliminate spurious phase mean errors, the logic for reporting "phase out of tolerance" has been modified. After changing the klystron, the PIOP takes 30-60 pulses to recalculate a new phase. In the past, this would immediately be reported as a phase mean error, causing the klystron to turn red briefly on the Klystron Status Display.

With the new software, a yellow "Desired Phase Change" is shown on displays for up to 20 seconds after a change has been made while the klystron phase value is out of tolerance. This allows time for the PIOP to update or for the klystron to be trimmed back into tolerance. Only if the klystron is still out of tolerance more than 20 seconds after the requested change will a phase mean error be reported.

Modified Klystron Auto Trim Function

July 9, 1990

Author: *Bob Hall* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *One* **Documents:** *No* **Help File:** *Yes*

The Klystron Auto Trim function has been modified to use a "touch up" logic similar to that used by the Magnet Auto Trim. For a "touch up", a device is not trimmed if the phase value is too far out of tolerance or the phase jitter is too large. This logic is used for micro asynchronous trims as well as for periodic Paranoia trims. As before, phase trim requests from the SCP are implemented regardless of how far the device is out of tolerance.

If it is desirable to have auto trim for some device do unconditional trim instead of using "touch up" logic, the AUTO TRIM FUNCTN button on the Special Klystron Function Panel may be toggled from "touch up" to "trim." This toggle has no effect if auto trimming is already disabled.

Slow Feedback Updates

July 18, 1990

Author: *Ed Miller* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *Yes*

Several fixes and enhancements have been recently incorporated in the Slow Feedback process.

- In the past, it has been possible to specify a CONFIG change for a feedback group from the SCP panel. However, because of a program error, the affected loops had to be turned OFF then ON to pick up the change. This error has been corrected, so you should be able to dispense with this arcane bit of knowledge.

- The two summary displays selectable from the feedback panels, 'Active Unit Disply' and 'Summary Disply' are somewhat compromised in their usefulness because information on so many loops is presented. This has now been ameliorated to an extent by eliminating from these two displays most REQUEST-ONLY loops that are not classified as normally SCHEDULED (for either control or monitoring). Now, the only times such loops will appear on the display is if either they have recently (typically within 5 minutes) been run or they are a member of the currently selected group.

- The classification of feedback loops for the SDS display has been corrected and modified.

  1. Previously, the classifications 'NO BEAM' and 'REQ ONLY' were inadvertently reversed. This has been corrected.

  2. Previously, all loops in a miscellaneous failed state were labelled as 'OUT LIMS'. Now only those whose command is outside limits will be labelled as 'OUTCLIM'; others will be labelled simply as 'BAD'.

  3. Previously, loops which were in a good state were labelled as 'IN LIMS'; now they will be labelled simply 'GOOD'.

  4. Those loops labelled as 'REQ ONLY' or 'OFF' will now be displayed in one of two colors: YELLOW if they are normally SCHEDULED (for either control or monitoring) and WHITE otherwise.

Slow Feedback History Plot Improvements

July 11, 1990

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

A few minor improvements have been made to the slow feedback history plots. There is now a NEXT LOOP button on the history plot panel. This makes it easier to look at the same history plot for all the loops in a group. Also the SIGNAL history plot is now auto-scaled instead of having its scale determined by the signal limits.

Last, but not least, all of the SLOW FEEDBACK panels now have help available for all their buttons.

Machine Operating Mode History

July 18, 1990

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

The state of the accelerator operating mode (SLC, PEP, etc.) as set on the operations maintenance panel is now saved in the history buffer. One may look at it by selecting the mode history panel from the operations maintenance panel. The vertical axis is labeled with the mode names.

Additionally, the currently selected mode is now indicated on the summary display.

Index Panel

SLC Control Program

SLAC's Software Engineering Newsletter

July 25, 1990 | **All that Fits is News to Print** | Vol 4, No. 21

Online Gold Configurations

July 12, 1990

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

New software has recently been released in support of online 'Gold Configurations.' This software will eventually replace the SLC GOLD CONFIGS book. This initial release has complete support for all types of configurations except for BPM reference orbits.

A gold configuration is simply a configuration file that has been given special status for a particular machine region (usually by the area physicist.) It is usually the 'best known' configuration number that has been saved. It generally is used as a starting point for tuning up part of the machine, or as a standard for checking the state of part of the machine.

Only one gold configuration is permitted at a time for a particular region (although one does not have to be defined; the gold configuration for a region can be 'NONE'.). The gold configuration must be a previously saved NORMAL configuration number. A SCRATCH configuration is not allowed to be the gold configuration for a region; however, the SCP supports moving configuration numbers from SCRATCH to NORMAL (see CONFIG INDEX).

The main panel for working with gold configurations is the GOLD CONFIG INDEX which is off the CONFIG INDEX.

Following is a list of functions available from the Gold Configuration panel.

- CHOOSE NEW GOLD allows the gold configuration number to be re-defined for a region. The selected region is offered as a default. A valid NORMAL configuration number must be chosen as the gold configuration. ('NONE' is an acceptable alternative to a configuration number.)
- LOAD GOLD CONFIG acts just like the 'LOAD CONFIG' button on the CONFIG INDEX panel, except that it offers the gold configuration for the selected region as a default.

- DISPLY GOLD HISTRY displays information for each time the gold configuration was changed. The most recent entries are listed first. The top entry is the current gold configuration.
- DISPLY GOLD INDEX displays the gold configuration number for all regions of the machine.
- DISPLY GOLD SUMMRY is just like 'DISPLAY GOLD INDEX' except that it only displays the most frequently used regions for your viewing pleasure. If you wish to change which regions are the 'most frequent', edit the file SLCCNF:CONFIG_SUMMARY.CNF
- DISPLY GOLD CONFIG is just like the 'DISPLY CONFIG' button on the CONFIG INDEX, except that it automatically displays the gold configuration for the selected region.

Additional points to note include:

- The 'DISPLAY INDEX' function on the 'CONFIG INDEX' panel will note the gold configuration by preceding it with a 'G' and highlighting it in magenta.
- The 'DISPLY LOADED CNFGS' function on the same panel has been clarified and now shows if the loaded configuration is the gold configuration.
- Deleting gold configurations is not permitted by the software.
- Gold BPM reference orbits are only supported in a limited fashion at this time, but future enhancements are planned. More information is available on creating and using gold BPM reference orbits from Dan Van Olst at Ext. 3475.

Steering Improvements

July 18, 1990

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

Several new features have been added to the steering package. They were introduced to help steer through the LI29-LI30 collimators, but should be useful in other regions also.

New RMS Weighting Methods

There are now five variants of coupled RMS steering which involve changing the weights on the terms whose RMS is being minimized. These are selected with the RMS STEER TYPE button on the bottom of the steering diagnostic panel. The possible methods and their effects are listed below.

CONSTant
All BPMs have an equal, constant weight in the RMS that steering minimizes. This is the default and what RMS steering has always done in the past.

SIGMA
When multiple BPM readings are averaged an RMS is calculated. This RMS is used to weight the BPM reading in the minimization. Hence BPMs with a small RMS will count more in the minimization procedure.

BETA
The BPM reading is weighted by one over the beta function at the BPM. That is a BPM with a small beta will have a large weight and hence will count more in the minimization procedure.

e^+e^- DIFFerence
At this setting, if two beams are being steered, steering will try to correct both the difference between the electron and positron orbits and the absolute electron orbit instead of separately minimizing the electron and positron orbits. The relative weight given to the difference as opposed to the absolute orbit is set with the RMS STEER WEIGHT button.

Minimize CORRector strengths:
At this setting, the corrector strengths are minimized in addition to the BPM readings. The relative weight given the BPMs and correctors is set with the RMS STEER WEIGHT button. Details of how this weight is used are available in the help for that button.

Note that the first 3 methods were written by Leonard Wiggins several years ago but were never debugged. They have now been debugged and the last two methods added. It is the 'minimize corrector strengths' method which works well in the LI29–30 collimator region steering.

The power steering system can setup to use these new weighting methods and one has been implemented for the LI29–30 region.

▪ Two Beam Calculated Trajectory Display

When you steer one beam you normally get a display showing the measured and calculated (prediction of what the orbit will be after the steering corrections are applied) trajectories. However when steering two beams the display shows the measured trajectories for the two beams. It was quite difficult to get a display of the calculated trajectories.

Now when you are steering two beams there is a TRAJ PLOT TYPE button in the lower left hand corner of the STEERING panel. This toggles between CALCulated and MEASured and determines which type of trajectory will be displayed.

▪ Power Steering Can Default Devices to off

The power steering system now allows one to include devices (BPMs and correctors) which start out turned off. This allows one to include BPMs whose reading will be displayed but which will not be used in the steering calculation. It also allows one to include many correctors with only a few set up to be used by steering. The operator can then go to the BPM SETUP panel and turn on some of the other correctors if needed.

▪ Power Steering Now Defaults to Two Beam Steering

In regions where there are both positrons and electrons, power steering now sets up to steer both beams. In the past it defaulted to steering just the electron beam and the operator normally had to toggle it to do 2 beams.

Enhancements to Printer Control Facility

July 18, 1990

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

A number of enhancements are being made in the SCP printer control facility. The major changes are (1) the addition of buttons for saving and restoring print configurations and (2) the merging of the separate graphics and text output selection switches into a single switch which can do both selections.

- Three buttons have been added for saving and restoring the print configuration of a SCP. These are most useful within button macros, to assure the proper state during and after button macro execution. [SAVE CURRNT CONFIG] will save the current SCP print configuration. [RESTOR SAVED CONFIG] will restore the previously saved configuration. [RESTOR STNDRD CONFIG] will restore a 'standard' configuration, which is basically the initial SCP configuration with all the toggles forced to their normal default states.

  Authors of button macros are encouraged to use these new buttons (on the auxiliary print control panel) in the following manner:

  1. *Save Current Config* – save current state so it can be restored at end of button macro procedure.
  2. *Restore Standard Config* – put print control panel into a reasonably well-defined state before making your changes.
  3. Your specific button macro code. If you are running in COLLECT, specify your own collect name, so you won't conflict with the current collect file of the SCP, if any.
  4. *Restore Saved Config* – to put the print control state back to where it was before button macro was started.

- The separate text and graphics output selection switches have been combined as a single switch. This new switch will ordinarily select a common destination for both text and graphics output. A new toggle button [OUTPUT SELECT TOGGLE] has been added which can be used to change the meaning of the output select switch. The three positions of this toggle are 'BOTH' (for selecting a common output destination for text and graphics), 'TEXT' (for selecting text destination only), and 'GRPH' (for selecting graph destination only). Note that some common cases where graph and text output must be different are handled automatically even though this toggle is in its normal 'BOTH' position. For instance, selecting output to the MCC Color printer will change only the graphics output, leaving text output unchanged (since printing of text files on this printer is not supported).

- A few miscellaneous changes have been made as well. The IMPEP2 printer has been added to the list of standard accessible printers. The choice of Unified Graphics types has been expanded to include TEKEMUL (which can be used on Imagens as well as the standard IMGN300 type) and TALARIS (though currently there are no Talaris printers directly accessible from the SLC cluster).

Note that the changes above will require changes to existing button macro files. At the time of release, all existing files will be modified to work with the changed panels. Authors of these files are encouraged to further modify (if necessary) those button macros which COLLECT output, supplying a collect name within the button macro procedure.

Cater Numbers in SDS

July 12, 1990

Author: *Ralph Johnson* **Subsystem:** *All* **User Impact:** *Some*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

A new feature has been added to the SDS system so that cater numbers can be included for devices which are set to the acknowledged or deferred state.

- When a device is toggled to acknowledged or deferred state the user will be prompted for a cater number. Any current cater number for the device will be replaced by the entry. If one enters only a carriage return the current cater number will be retained.
- When a problem is cleared the cater number will be removed for the selected device.
- When one displays acknowledged or deferred problems the SDS Severity column is replaced by a SDS cater # column.

PEP in Summary Status Display

June 28, 1990

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

The Summary Status Display above the operations consoles has been modified to include a column for PEP. To provide room for the new column the scavenger/extraction and E+/EP02 columns were merged into a single SCAV & E+ column. At present there is only one summary in the PEP column. We will add more as signals from the NIT/SIT lines, etc. become available in the VAX.

New Summary Display Status

July 2, 1990

Author: *Ralph Johnson* **Subsystem:** *Accelerator* **User Impact:** *Some*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

The following status has been added to the INJECTOR, OBSTRUCTIONS box on the Summary Status Display: PEP/SP Burst State, PEP/SP Fid-2 State, and the PEP/SP Fid-3 state. These are database items ILCK,LI00,2, channels "PEP 1", "PEP 2", and "PEP 3".

They are only included in the summary when the machine is operating in the PEP mode and will be excluded for all other operating modes. They presently appear in the list at the end of the LI00 items.

TMIT History Plots

July 12, 1990

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

There are new buttons on the feedback loop select panel and the feedback history plot panel to plot TMIT history data. These are plots of average TMITs for all the BPMs in the selected feedback group.

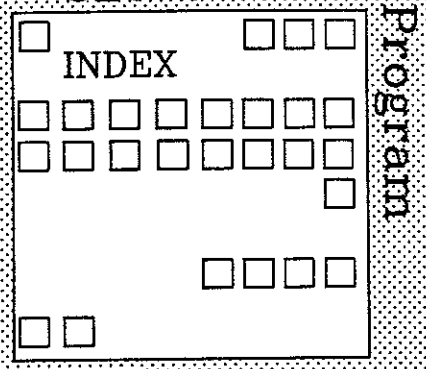
Operator Rate Limit Status on VAX

June 15, 1990

Author: *G. Smith, J. Silva* **Subsystem:** *MPG* **User Impact:** *None*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

The status for the MCC Operator Rate Limit hardware button which is located between COWs 4 and 5 has been added to the 'LINAC RATE LIMIT' panel.

Index Panel



SLAC's Software Engineering Newsletter

August 2, 1990 | All that Fits is News to Print | Vol 4, No. 22

DIGITAL STATUS

July 25, 1990

Author: *Ken Underwood* **Subsystem:** *Touch Panel Displays* **User Impact:** *Small*
Panel Changes: *Many* **Documents:** *No* **Help File:** *None*

The functionality of the UPDATE PANEL button located on all updating digital status touch panels has been enhanced to force the micro(s) to update the database. Previously, pressing this button caused the touch panel to be updated immediately with data from the database that could have been several seconds old. Now, pressing this button will send a request to the micro(s) associated with that touch panel to immediately update the database. The touch panel is then updated with the current digital status. This should greatly improve the real-time response of such activities as monitoring doors and "emergency off buttons" while searching areas of the SLC.

When operating in *unforced* mode, it takes about 6 seconds for a change in digital hardware status to be reflected on the touch panels. The "forced" response time when using the new button should be about 1 second. This improvement, however, comes at a cost. Every 6 seconds, the micro independently checks all digital input and output bits. Only if a bit has changed state, does the micro go through the considerable effort of determining the current status of all digital devices and then updating the database. Pressing this new button forces the micro to update the current status of the digital system regardless of whether any bits have changed state. The frequent pressing of this button can have a significant impact on other jobs in the micro as well as SLCNET traffic.

Slow Feedback Bug Squashed

July 27, 1990

Author: *Ed Miller* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

Certain rather unpleasant behavior of Slow Feedback was recently observed and reported; fortunately there was sufficient evidence of the crime still around to identify the problem and correct it. Perhaps you have seen other evidence of the same problem, which has been lurking in the code for about 2 years. What was seen in this case: a group single shot ('SCO') resulted in magnet changes (big ones) in the launch loops for the group even though the GAIN for these loops were set equal to zero

which should have ensured no changes in the control devices. What happened? Well, it turns out the code mistakenly ignored a failure in the 'C' (calculate command) stage, and proceeded anyway to the 'O' (output to control device) stage–with the unfortunate consequence that unrelated BDES values (from a previous loop) were written to the control magnets of the current loops.

New Configuration Display

July 24, 1990

Author: *Daniel Van Olst* **Subsystem:** *Configurations* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *None* **Help File:** *Yes*

A new 'DISPLAY CONFIG' button has been provided on the configuration index. This button which has an additional designation '(RED)' will only display items in the selected region whose setpoints are different from the configuration values i.e. only those item which would normally show up in red or yellow text.

The existing 'DISPLAY CONFIG' button has been modified with the designation '(ALL)' since it displays the entire configuration.

Similar changes have been made to the gold configuration panel, so it is easily possible to display all the red or yellow items against the gold configuration for the selected region.

There have been many questions regarding the color-coding of the configuration displays. Online help files have been enhanced to clarify how this color-coding is determined.

Wire History Plots

July 30, 1990

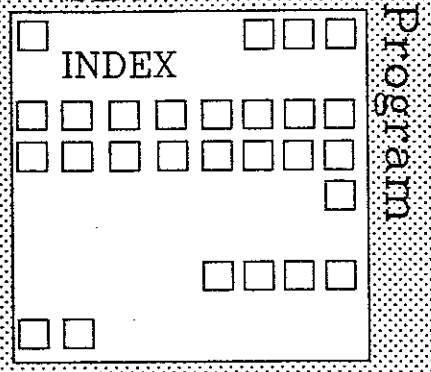
Author: *Ralph Johnson* **Subsystem:** *All* **User Impact:** *Some*
Panel Changes: *Few* **Documents:** *NO* **Help File:** *None*

Buttons have been added to the wire scanner panels to select a wire history plot panel. There are several choices of predefined plots on this panel including plots of Emittance, Skew, Alpha-Beta, Size, and Position. There are also buttons to select and plot parameters as specified by micro, unit, and secondary. The predefined plots are all auto scaled although one may specify the Y scaling for a specific plot.

Data is saved for all occurrences of the following secondaries: SZEX, SZEY, SZEU, SZPX, SZPY, SZPU, SKAE, SKAP, SKPE, SKPP, PSEX, PSEY, PSEU, PSPX, PSPY, PSPU. Data is saved for the first unit in LI02 and LI29 for the following secondaries: EMEX, EMEY, BTEX, BTEY, ALEX, ALEY, EMPX, EMPY, BTPX, BTPY, ALPX, and ALPY.

Index Panel

SLC's Software Engineering Newsletter



August 16, 1990 | All that Fits is News to Print | Vol 4, No. 23

HOLY COW!! A New COW

August 13, 1990

Author: *T. Himel, M. Glaviano* **Subsystem:** *Operators console* **User Impact:** *Medium*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

A new cow has been installed in the control room. It is called COW10. Its hardware is different from the old COWs, but the user interface is basically the same. The hardware consists of an Ann Arbor terminal and two VAXstation 2000's. We expect in the future to replace the VAXstations with Xwindows terminals which will have larger screens. The software uses the Xwindows standard, so a wide variety of manufacturers' hardware can be used to run it.

To use the new COW, simply log on to the Ann Arbor terminal (you can use the new COW10 account or any other account).

```
$ SCP 10
```

When the touch panel display comes up, use the track ball to select a button and then press the leftmost button on the track ball. After that it works just like any other COW with a few exceptions.

1. Blinking bars on the touch panel which are usually used to let you know that you are being prompted for input are displayed in red and do not blink.
2. The SDS displays now use reverse video instead of blinking to indicate new problems on both the old and new cows.
3. Knobs are not supported yet.
4. After you click the track-ball, the cursor is changed to a watch to indicate that the SCP is busy. When the SCP actually starts processing the button you have pressed, it is highlighted with a green square around it. When the SCP is all done, the highlight is removed and the cursor changes back to an arrow.
5. While the SCP is busy (and the cursor is displayed as a watch), you can click on another button. Only one such click is remembered and it is the last one you did. This is slightly different than on the old COWs which remember one button push and it is the first one you did.
6. The middle button on the track ball presently does nothing. Later it will be used for knobs.

7. The right button on the track ball gives a short cut for hitting the RETURN or INDEX buttons. When you click the right button the cursor will move to the RETURN button unless it is already on the RETURN button in which case you will be taken to the index panel. The net result of this is that if you click on the right button twice you are taken to the INDEX panel and if you click on the right and then the left button you return to the previous panel. All of this happens without moving the trackball! In a future release this type of control will be extended. These two buttons will be used for entering zeros and ones. By entering the ASCII code for "jump", the COW will jump over the moon. Actually, this procedure has not been fully specified yet. Would Morse code be better?

Wire Scan Software Modifications

August 15, 1990

Author: *Hendrickson, Sanchez* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

Several modifications have been recently made to the wire scan software.

1. When a wire scan is performed, BPM data is taken for a list of BPM units for each scan point. This data is used to normalize wire scan data to the beam intensity. In previous version of the software, the first BPM measured was used for normalization, and if this BPM did not read out reasonably, data fitting was not performed and the scan failed. In the new software, data for two BPM units is checked, and the unit which has the "best" data is used for normalization. This should decrease the number of failed wire scans.
2. It is now possible to save the user-selected scan ranges into the database. When the one selects the [SAVE SCAN RANGES] button from the scan options panel, the user-selected scan ranges for the currently selected micro are saved into the WIRE or BSCN primary of the database. These database ranges are the default scan ranges for any new SCP which performs scans in the same micro. Any existing SCPs may be updated to use the database default scan ranges for the current micro by selecting the [REINIT SCAN RANGES] button on the scan options panel. When the user selects the [REINIT DB VALUES] button on the scan options panel, the scan ranges and all other database values are updated for both wire and beam scans in all micros.
3. A count of successful wire scans is maintained in the database. Each time a wire scan is successfully performed, the NSCN secondary in the WIRE primary for the associated micro and unit is incremented. This is expected to be used in evaluating wire scanner hardware problems.
4. The wire emittance calculation in correlation plots (PHYS primary) has been modified to work correctly when one of the four associated wires is offline. Previously, the emittance calculation worked from the wire scan panel with only three wires, but the correlation plots calculation did not complete.

5. Modifications to wire emittance scans have reduced conflicts between wire scanners in the same micro. Previously, problems occurred because the previous scanner was still returning to PARK when the next scan began. In the new software, multiple wire scans are performed by scanning downstream units first. In addition, when scanning a downstream wire (or the same wire twice in a row), the software waits until the previous wire has finished moving before beginning the scan. These modifications apply to scans from the wire panels and from correlation plots scans.
6. Operator control of the plane to calculate for emittance has been added. It is controlled by TOGGLE EMIT PLANE on the relevant panels which can be cycled through `X ONLY`, `Y ONLY`, or `BOTH`. It will then scan and calculate only for the chosen plane(s), performing the correct park look-aheads.
7. The maximum number of retries permitted for each scan has been put under operator control via the NUMBER OF RETRYS button on the SCAN OPTIONS PANEL. This number affects both the emittance and skew measurement software.

Energy Fast Feedback Enhancement

August 12, 1990

Author: *Nan Phinney* **Subsystem:** *Linac* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

The Fast Feedback which stabilizes the energy of the beams at the end of the Linac measures the energy of both the electron and positron beams. In normal operation, it then uses phase shifters in sector 27 and 28 to correct the energy of the electron beam. The software has been upgraded to allow the feedback to be switched to controlling the energy of the positron beam rather than the electron beam. The controlled beam may be switched by changing the CTRLBEAM parameter on the feedback scratch panel for the NARCENGY loop. This is not intended to be used during normal running but is available for special experiments.

Sector 29 Collimator Multiknobs Panel

August 6. 1990

Author: *Glenn HortonSmith* **Subsystem:** *LINAC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

Multiknobs now exist for moving the sector 29 collimators. They can be found on a new panel available from the sector 29 collimator panel. There are knobs for changing the spacing or position of each pair of jaws.

There is also a new "ALLCOLL" multiknob which widens all jaws in sectors 28 through 30. It is available on a button from both the sector 29 and the sector 30 collimator multiknob panels.

PEP Reference Orbits Available from Difference Orbits Panel

August 6, 1990

Author: *Glenn HortonSmith* **Subsystem:** *NIT/SIT* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *Yes*

The Operator Difference Orbit panel has been expanded to include PEP NIT and SIT difference orbits. This will eventually be made obsolete by an upcoming generalized gold orbit facility, but for now, gold reference orbits may be obtained from the DIFF ORBIT panel, which is reachable from the Operator Maintenance index.

Feedback TMIT Calculation Fixed

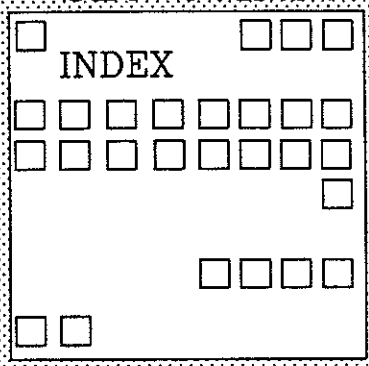
August 15, 1990

Author: *Ed Miller* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

An egregious error in the calculation of average TMITs from a set of BPMs has been reported, investigated, and corrected. The most obvious manifestation of this error was that Slow Feedback loops which were known to have no beam were recording substantial TMIT values. A less obvious manifestation was misreporting of the TMIT values for some loops which did have beam. The misreporting could result in values which were either too high or too low, and could vary from measurement to measurement in a capricious (but not really random) way. This software bug, which has been present back to the beginning of recorded history, is no longer with us.

Index Panel

SLC Control Program



SLAC's Software Engineering Newsletter

August 24, 1990 | All that Fits is News to Print | Vol. 4, No. 24

New e^+ System MPS Displays

August 23, 1990

Author: *Daniel Van Olst* **Subsystem:** *e^+ System* **User Impact:** *Moderate*
Panel Changes: *Several* **Documents:** *No* **Help File:** *No*

Ten new displays have been created to aid in determining the cause of an e^+ MPS trip. All these displays are located on the "E+ MPS PANEL". Once this panel is selected, The summary display is generated automatically and indicates which displays to go to for tracking down a fault. Each of the subsidiary displays has an associated panel for resetting any faults. Note that it may be necessary to press an interlock reset to force a display to reflect the mixing logic of its inputs.

These displays are similar to the existing Arc MPS displays. However, the ARC MPS system has only one output, while the e^+ MPS system has four (LI19 TIU, LI20 TIU, RATE LIMIT, and HLAM/KICKER permit.) Please Cater all problems, or contact Dan Van Olst directly.

Wire and Beam Scan Software

August 22, 1990

Author: *Linda Hendrickson* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

Several minor modifications have been recently made to the wire and beam scan software.

1. Wire and beam scans are no longer allowed when the machine is rate-limited to 1 pps. This change was required due to BPM problems at this low beam rate.
2. Negative scan step sizes are now allowed for wire and beam scans. This allows users to request scans in both directions.
3. When the machine is running at 120 pps, wires sometimes cannot scan at a fast enough speed. The wire scan software has been modified so that, when the desired wire speed is at least 10 percent more than the maximum allowed, the software will scan only on time slot 1 at an effective beam rate of 60 pps.
4. The auto beam collide software has been modified to calculate luminosity and Z's per hour using the actual beam rate, including 10 pps rate limiting. Previous software used the nominal beam rate, resulting in calculated luminosity which was higher than the actual value. In addition, the normalized Z's per hour calculation now normalizes its calculation to a beam intensity of 10^{10} particles and to 120 pps so that this number is independent of the current beam rate.

GPIB Data Available from Correlation Plots

August 27, 1990

Author: *Lou Sanchez-Chopitea* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *Yes* **Help File:** *None*

In order to facilitate development of automated tuning procedures using remote scopes or other GPIB readable devices, the Correlation Plot PHYS variables have been expanded to allow the user to specify a DCL script file to be executed for each data sample. This script makes it possible to execute a sequence of commands to set up a remote scope for a particular measurement and then read out a measured value such as rise time or pulse height. At the end of the script, the value of interest is returned to the Correlation Plots as data for the current sample.

The user selects a desired sample variable by entering PHYS followed by micro and the 8 character mnemonic for the script of interest. Help for micro lists all micros either with existing scripts or with other PHYS variables like Final Focus Energy or Emittance measured from wire scans. Help for variable name lists all scripts or other variables in the selected micro. The variable names are limited to 8 characters but may be shorter.

These script files are in a special directory `SLCPHYS` and have file names such as `LI00_CIDBUNCH.COM` (the _ is required). Typically they will use the standard Camac diagnostic program CAMCOM to execute a sequence of GPIB commands, although they may in fact invoke any procedure which outputs a single real number. The casual user will not be expected to know or understand the file contents which will be setup in advance by operations and other GPIB wizards. There is as yet no mechanism for passing any error bars on the measured value back to the Correlation Plots, or to flag a bad measurement apart from an unreasonable value ($> 10^{37}$).

For more details on the setup of the script files see `DOC$GUIDE:CRR_PHYS_SCRIPTS.LATEX`.

Scope Setup Macros

August 29, 1990

Author: *Shane Cooper* **Subsystem:** *SLC* **User Impact:** *Large*
Panel Changes: *Many* **Documents:** *Yes* **Help File:** *Yes*

Several new panels have been created to allow the operators to quickly recall commonly used setups for scopes. The included scopes are:

hp1, fast positron, cid plic, wta plic, rtl plic, 4×6 plic

The panels for cid plic, wta plic, rtl plic, and the 4×6 plic scopes are called SAVE SETUP and RECALL SETUP and are accessed from the main panel for each scope. The hp1 and the fast positron scope panels act as gateways to the main panel for these scopes.

The setup buttons invoke button macros for performing the desired operations. The manual methods for setting up these scopes have also been retained. Help is available for all the buttons, and is descriptive enough to inform the operator of the type of setup being used.

These panels contain additional functions including the ability to set the beam prompt, change intensities, and to plot at MCC.

An extensive memo describing the details of the setup operation including a complete functional chart is available from the author.

Error Propagation in Emittance Software

August 28, 1990

Author: *Mike Glaviano*
Subsystem: *SLC*
User Impact: *Small*
Panel Changes: *None*
Documents: *None*
Help File: *None*

For quite some time there have been occasional problems with floating point exceptions during the emittance calculation step. These have been associated with the propagation (via the transfer matrices) of the calculated error values between the stepped quad and the profile monitor, and they have occurred only when the user has *manually* entered the A, B, and C of the beam width parabola. Since in this case the error calculations are meaningless, the code has been changed to no longer try to propagate the values between the quad and the monitor. Instead the software issues an informational message telling you that error values won't be propagated. Errors will continue to be propagated normally if you actually do the data acquisition via the emittance software.

Damping Ring Klystrons on All Sector Displays

August 27, 1990

Author: *Bob Hall*
Subsystem: *SLC*
User Impact: *Small*
Panel Changes: *None*
Documents: *No*
Help File: *None*

Information for damping ring klystrons is now available for several displays on the All Sector Klystron Displays panel when the Z-plot Display Type is toggled to NUMERIC. Damping ring klystron information has been added to all numeric displays on this panel for all displays that can have full range Z-plots when the Z-plot Display Type is toggled to GRAPHIC. The graphic Z-plots for these full range displays will continue to only show information for sectors LI00–LI30.

Rehydration of Damping Ring Diagnostic Scope

August 24, 1990

Author: *Jon Shade*
Subsystem: *Damping Rings*
User Impact: *Large*
Panel Changes: *Few*
Documents: *No*
Help File: *Yes*

A new front-end panel has been created for the Damping Ring Diagnostic Scope. In order to switch the scope to a new signal, one merely has to press the given preset button. There are 24 button macros for directing the scope at each of the 3 parts of the 8 available signals. The macros only assume that the proper beam code is in the prompt.

There is ample help for the buttons describing the presets they recall, and the global help for the panel includes a table of useful beam codes.

Index Panel

SLC Control Program

SLAC's Software Engineering Newsletter

September 13, 1990 | All that Fits is News to Print | Vol. 4, No. 26

Monitor Resolution in Emittance Measurement

September 6, 1990

Author: *Michael Glaviano* **Subsystem:** *SCP* **User Impact:** *small*
Panel Changes: *some* **Documents:** *no* **Help File:** *yes*

It is now possible to include a *resolution parameter* pertaining to the profile monitor or wire scanner in the calculation of sigma matrix in the emittance package. This resolution number is expressed in units of millimeters. If provided and activated, resolution numbers (one for each plane) are squared and subtracted from the C parameter of the A, B, C of the beam sigma versus quad strength parabola. Resolution may be used in either the case where A, B, and C are generated as a result of measurements or the case where these parameters are manually entered. Resolution numbers are used only in the thin lens approximation of emittance calculation. The square of a resolution number must be less than the C parameter from which it is subtracted; otherwise the resolution number is set to zero and a message is issued.

The resolution numbers are entered through the "XY RES" button on the emittance panel. To activate the use of these numbers one must also toggle the "USE RESOLU" button to "YES".

To accommodate these two new buttons, the emittance panel has been slightly rearranged.

Currently resolution numbers are specific to a given SCP and are lost whenever emittance is initialized, *e.g.* when a new monitoring device is selected. Following the next database install, these parameters will be saved in the database.

Slow Feedback Automatic Low Rate Shutoff

September 4, 1990

Author: *Ed Miller* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

When the beam rate is reduced to less than 10 pps, there is a problem getting enough BPM readouts in a reasonable period of time to support many Slow Feedback loops. To ameliorate this difficulty, some groups of feedback loops which are normally scheduled, will not be run at such low beam rates.

Under low beam rate conditions, the RUN/NO-RUN decision is made as follows:

1. All ONE-SHOTS will RUN (but with only a single reading of BPMs)

2. SCHEDULED groups which are only Sampling and do not contain any control loops will not RUN. (These will soon be labeled by a new SAMPle state)
3. SCHEDULED groups which contain control loops will RUN (but only with a single reading of BPMs) unless the group has been specifically designated (in the database) to be suppressed at low beam rates.

Loops which do not run because of this automatic suppression at low beam rate will have a Feedback loop status message which so indicates; they will be classified on the summary display as being in a "NO-BEAM" condition.

BPM Software Update

September 12, 1990

Author: *Linda Hendrickson* **Subsystem:** *BPM* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

Several minor modifications have been recently made to the BPM software.

1. The BPM Zplot and Data displays headers now show the time slot on which the measurement has been taken. In addition, the beam code, particle type and bunch have been added to the header on the BPM values text display.
2. A software bug affecting BPM averaging has been corrected. Previously if the user measured BPMs with averaging activated and then selected a different BPM measurement definition, averaging was automatically turned off but the panel incorrectly indicated that averaging was still on. In addition, BPM special displays never used BPM averaging. The panel now correctly shows the current state of averaging and averaging is also fully supported for special displays.
3. Display ranges in the special PYIELD and PEPYLD toroid displays have been modified to measure the extraction line electrons in EP01 on the same pulses as the positrons in the return line are measured. This will reduce jitter in the calculation of positron yields.

New IP Feedback Watchdog

September 13, 1990

Author: *Nan Phinney* **Subsystem:** *Final Focus* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

The software which monitors the Fast Feedback micros and their devices has been broken up into separately scheduled watchdogs for each type of feedback and a new watchdog has been added to monitor beams at the IP.

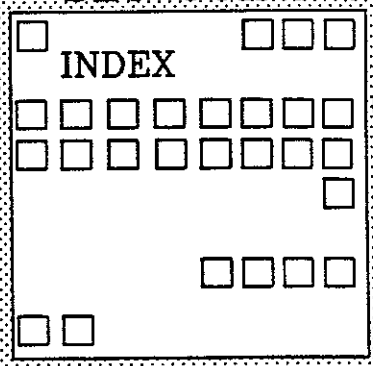
The IP watchdog checks that the FB69 feedback is in the correct state. In addition, it updates the calculated Z per hour value in the database using intensities measured in FB69, current beam rate at the IP, and the last measured deflection scan widths. If either beam intensity goes to zero, or the rate goes to zero, then the ZPHR value will go to zero. This should make the deflection luminosity history plots more useful and distinguish clearly between periods when the beam is missing and periods when the operators have merely not pushed the Auto collide button for several minutes.

Along with maintaining the TMTX, TMTY, LUMM, and ZPHR values, the IP watchdog also keeps a running total of integrated Z's in a new IPBM secondary INTZ. This plot will be available from the IPBM History Panel.

Index Panel

SLAC's Software Engineering Newsletter

SLC Control Program



September 20, 1990 | All that Fits is News to Print | Vol. 4, No. 27

New Sample State for Slow Feedback

September 17, 1990

Author: *Ed Miller*
Subsystem: *SLC*
User Impact: *Modest*
Panel Changes: *Several*
Documents: *No*
Help File: *Yes*

The Slow Feedback software has been modified and enhanced to provide better control of the execution of the loops.

Previously, the action of each Slow Feedback was primarily controllable by the HSTA state (OFF, REQUEST or SCHED) and a pair of timer intervals (SAMPLE-ONLY and SAMPLE-UPDATE). While these controls (and some others, such as GAIN) made it possible to achieve most operational objectives, some things were awkward to do and were prone to error. For example, the only way to switch a group (or single loop) from SAMPLE-UPDATE to SAMPLE-ONLY (or vice versa) was to manipulate the SAMPLE-UPDATE times for each loop. Similarly, the best method to keep a loop from controlling the beam was to set its GAIN to zero.

With the new version of the Feedback software, it should no longer be necessary to manipulate SAMPLE times or GAINs to achieve control objectives. It should also be easier to do GROUP ONE-SHOTs or to move a GROUP from controlling to sample-only (or vice-versa) without unwanted execution of some loops in the GROUP.

Major Features of the New Scheme

- The number of control (HSTA) states (and corresponding NORMAL states) for each loop has been expanded from three to four; these are (in hierarchical order from 'low' to 'high') OFF, REQUEST, SAMPLE and FEEDBACK. The meaning of these states are: OFF–do not run; REQUEST–run only for single-shot execution; SAMPLE–run at scheduled intervals for sampling only; FEEDBACK–run at scheduled intervals for sampling and (if needed) control.
- The NORMAL state for each loop is now used for more than just informational purposes–a loop cannot be put into a state higher than its normal state without some additional deliberate effort.
- Each loop has an additional HSTA indicator which may limit its execution– the CTRL indicator. If this indicator is not set for a loop, it will never be allowed to control the beam.

Details of the New Features

- The HSTA control state for an individual loop may be changed (from the TEST AND RUN panel) in a manner similar to the method previously used. However, an attempt to change the state above its NORMAL state will lead to a prompt asking you if you really want to change it. Also, if the loop does not allow control (HSTA CTRL indicator not set), then the FEEDBACK state will not be an option for that loop.
- The HSTA control state for all loops in a GROUP may be changed with a single button GRP ALL HSTA STATE on the GROUP SELECT panel. (Previously, a similar function was supported by three buttons–GROUP ALL OFF, REQ and SCHED.) This new button offers five choices: OFF, REQUEST, SAMPLE, FEEDBACK and NORMAL. The NORMAL choice will set each loop in the group to its NORMAL state. The other choices set all loops in the group to the indicated state with the following exceptions: (1) a loop will not be moved to a state higher than its NORMAL state (or its current state, if that is higher than NORMAL); (2) a loop which does not have the CTRL indicator set will never be moved to the FEEDBACK state.
- For loops which have the CTRL indicator set in their HSTA, the states OFF, REQUEST and FEEDBACK operate the same as the previous states OFF, REQUEST and SCHED. If such a loop is in the new SAMPLE state, it is scheduled to execute every SAMPLE INTERVAL seconds and do only the signal measurement. Such a loop in the FEEDBACK state is scheduled to run every FEEDBACK INTERVAL seconds and both measures the signal and (if necessary) controls the beam. Note that a loop in FEEDBACK will also be scheduled to execute every SAMPLE INTERVAL seconds (unless SAMPLE INTERVAL is zero or an integral multiple of FEEDBACK INTERVAL) for signal measurement only.
- When doing GROUP ONE-SHOT (SCO), any loop which is not OFF will be executed, (as was the case previously). However, any loop which does not have the HSTA CTRL indicator set will only do the signal measurement execution.
- It is expected that the settings of the NORMAL states and the CTRL indicator will be the responsibility of those who commission the loops. Thus buttons to set these are located on the DIAGNOSTICS panel.

Some Recommendations for Setting Loop Controls

- Loops which should never control the beam should have the HSTA CTRL indicator off. Don't rely on setting GAIN = 0 for this purpose.
- Groups which will have any loops which are scheduled should normally be set up with the same FEEDBACK INTERVAL for every loop in the group. Typically the SAMPLE INTERVAL should be an integral multiple of the FEEDBACK INTERVAL (or zero, if the group is never to be scheduled for sample-only purposes). Ordinarily it should not be necessary to specify non-zero time intervals for some and zero time intervals for other loops in a group–use the HSTA state, NORMAL state, and HSTA CTRL indicator to make such distinctions. Note that if the loop NORMAL states are properly set, it should be possible to move a group from FEEDBACK to SAMPLE (or vice-versa) with a single button push and without causing a loop to run at a state higher than it is normally supposed to be run.

Gaussian Areas Added to Correlation Plots

September 20, 1990

Author: *Hendrickson, Sanchez* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *No* **Documents:** *No* **Help File:** *Yes*

Correlation plot software has been modified to calculate the gaussian area whenever a gaussian fit is performed. This area is displayed with the gaussian fit parameters on correlation plots. The calculated area is the area of the fitted curve with the background subtracted:

$$Area = \sqrt{2\pi} \times Height \times Width$$

If required, the actual integrated area under the curve may be added in the future.

In addition, correlation plot pseudo-secondaries have been added to the display of the gaussian areas for wire scans and for video digitizer scans. This was requested to help diagnose problems with non-linearities in profile monitors and wire scanners. For the WSCN primary, new secondaries available are X_AREA and Y_AREA. For the DTIZ primary, the new pseudo-secondaries are XAREA and YAREA.

Area Under Gaussian Added to Emittance Display

September 19, 1990

Author: *Michael Glaviano* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

The emittance package now makes the various secondary variables used in the emittance calculation available for display. These are variables that are associated with the gaussian fit of the square of the beam width to the quad strength. They include the offset, peak, mean, width squared, and area of the gaussian.

To see these parameters, press the NEXT PAGE button on the Emittance Measurement panel after you have done an emittance measurement and displayed the results.

Summary Status

September 19, 1990

Author: *Ralph Johnson* **Subsystem:** *SLC* **User Impact:** *Some*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

The Summary Status software has been modified to write a message to the Errorlog whenever a device is set to either "DEFERRED" or "ACKNOWLEDGED" through one of the SDS control panels. The message will contain the device type (primary,) micro, unit number, and the channel, as well as its new status, *i.e.* DEFERRED or ACKNOWLEDGED.

Redisplay of Auto Collide Data

September 19, 1990

Author: *Nan Phinney* **Subsystem:** *Final Focus* **User Impact:** *Small*
Panel Changes: *One* **Documents:** *No* **Help File:** *None*

By popular request, a button has been added to redisplay the results of the last Auto Collide procedure done on a particular SCP. Various problems with printing the display have also been fixed.

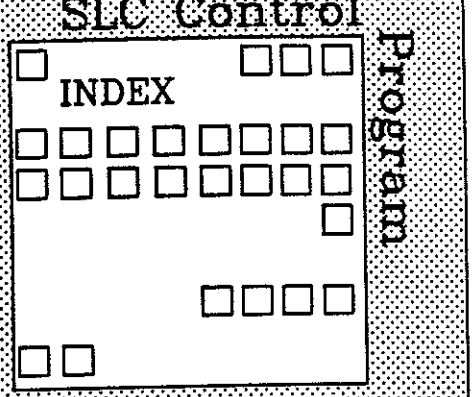
NOHARDWARE Job Removed

September 20, 1990

Author: *Sanchez, Hendrickson* **Subsystem:** *Micro* **User Impact:** *Small*
Panel Changes: *No* **Documents:** *No* **Help File:** *No*

The NOHARDWARE micro job has been removed from the system as its functionality is no longer required. Operators should not expect to see the usual messages generated by this software.

Index Panel



SLAC's Software Engineering Newsletter

October 5, 1990 **All that Fits is News to Print** Vol. 4, No. 28

BPM RMS Displays

October 3, 1990

Author: *Linda Hendrickson* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

In order to help diagnose beam jitter, BPM software has been enhanced to calculate and display the RMS of the deviations of BPM readings with respect to the average of several pulses. The RMS data for X, Y, and TMIT are available for display in both z-plot and tabular formats.

From the BPM measurement panels, the user may toggle the [ABS/ RMS/ DIFR] button to "RMS" and start taking data to generate the display. If BPM averaging is not already on, the number of points averaged is automatically set to 10. The user may set this by selecting the [ENTER N AVG] button. The maximum allowed number of points to average over is 20. However, for Arc micros such as CA11 if more than 10 points are taken, data acquisition may timeout and generate error messages . BPM averaging is automatically turned off when a new BPM definition is selected.

Two Display Screens on Cow 10

September 28, 1990

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

The SCP software has been enhanced to allow COWs to have two display screens. So far COW 10 is the only one to which we have added the hardware to take advantage of this. The user interface is quite simple. A new button [OUTPUT DISPLY SCREEN] has been added to the bottom of the INDEX panel. Note that this button only shows up on COWs which have two display screens. It is used to toggle back and forth between display screen 1 and display screen 2. When you look at any display on the SCP it will show up on the screen you have selected.

Both screens can have updating displays and each will properly update at its own rate. Both displays remain sensitive to context changes in the SCP. For example if you are looking at the LI04 ALL MAGNET display and go to an LI06 magnet touch panel, it will automatically change to displaying the LI06 magnets. This happens whether or not it is on the currently selected display screen. Hence it makes no sense to try to look at two different displays from the same system (*e.g.* 2 magnet, or 2 klystron, or 2 BPM) on the two screens. You also cannot steer using one screen while looking at BPMs on the other as the steering software will turn off the BPM acquisition that the display is using. Any other combination is fair game and should work.

A few other details to note:

- The HALT DISPLAY (ALL) button stops the displays on both screens.
- The PRINT ALL TEXT button will print the text display that you currently have selected.
- The PRINT GRAPH DISPLY button will print the display which was most recently refreshed on a screen that you had selected. That is if you put a klystron display up on screen 1 and then put a magnet display up on screen 2 and then select screen 1 and hit PRINT GRAPH DISPLY, the magnet display from screen 2 will be printed. If you then put a new klystron display on screen 1 and hit PRINT GRAPH DISPLY, then the klystron display will be printed.

IDOM Initialization

October 1, 1990

Author: *Ken Underwood* **Subsystem:** *SLC* **User Impact:** *None*
Panel Changes: *None* **Documents:** *Yes* **Help File:** *No*

The Isolated Digital Output Modules (IDOM) have never been initialized following a crate power up. This usually presented considerable operational difficulties in restoring the state of the machine following crate power up. Although most digital control systems could benefit from power up initialization of the IDOMs, there are a few specialized systems that must not be reinitialized. The IDOM output bits can not be arbitrarily set to the last requested states, only selected bits controlling specified devices can be safely restored.

The digital control job in the micro has been enhanced to support initialization of selected digital control device output bits whenever a crate is powered up. Whether a device is considered for initialization is based upon the last requested state of each component of the device and two bits in the device class primary which enable or disable initialization. Additionally, bit 16 must be set in the primary CSTR secondary CRTD for the desired micro and crate, indicating the presence of IDOMs in that crate.

Since all devices associated with a particular class are very similar in nature, the enable/disable initialization feature is controlled by the device class primary DODD, secondary SEV. All states in the device class may be enabled or disabled for initialization and yet any specific state for the class may be overridden. The software currently will not initialize any digital output bits unless specifically enabled.

New Gold Values on Positron Yield Displays

October 3, 1990

Author: *Daniel Van Olst* **Subsystem:** *BPM* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

The positron yield displays have been expanded to include two new columns. The first column shows the calculated yield between important toroids in the positron production system. The adjacent column shows the "Gold" yield between the same two toroids taken from data when the overall yield was 0.9 to the South RTL. These incremental yields (or subyields) allow operations to identify exactly where in the system the losses are occurring.

Subyields are calculated across the target, through the positron capture section, up to the West Turn Around, through the Return Line, up to the East Turn Around, through Sector 1 to the South LTR, through the LTR, and through the South Damping Ring to the South RTL. In the near future, these yields will also be calculated by the BPM Sampler every few minutes and stored in the history buffers.

Currently the PYIELD and PEPYIELD displays have subyield toroids specified. The EYIELD display can also be set up to calculate subyields if needed.

Correlation Plots and Wire Scan Software

October 5, 1990

Author: *Linda Hendrickson* **Subsystem:** *CRR* **User Impact:** *Small*
Panel Changes: *No* **Documents:** *No* **Help File:** *Online*

In an ongoing effort to help diagnose problems with wire scanners and profile monitors, correlation plots software has been modified to calculate the integrated area under the curve whenever a gaussian fit is performed. The integrated area within three sigma from the fitted center of the curve is calculated using the trapezoidal method with the background subtracted. The area is not calculated if the X coordinates do not extend to 3 sigmas on either side of the center. The integrated area and the calculated gaussian area are displayed along with the gaussian fit parameters. A previous software error in the calculated gaussian area has been corrected.

In addition, correlation plot pseudo-secondaries have been added to display the integrated area, the beam intensity and the normalized gaussian area for wire scans. The normalized gaussian area is the calculated gaussian area, available previously, normalized to a beam intensity of 10^{10}. For the WSCN (wire scanner) primary, new secondaries include X_INAREA, X_TMIT, X_NAREA, *etc.*

4-to-a-Page Plots of Feedback History Data

October 3, 1990

Author: *Ralph Johnson* **Subsystem:** *Feedback* **User Impact:** *Some*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

The Feedback History panel has been rearranged to include buttons for 4-to-a-page displays of history plots for the X and Y position and angle loops of the currently selected feedback group. If the group does not have a position and angle loop one gets a "not found" message. Supported plots are Signal (SGNL), Command (CMND), and Signal-Setpoint (SGNL-SETP).

Summary Displays

October 3, 1990

Author: *Ralph Johnson* **Subsystem:** *All* **User Impact:** *Some*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

There is now a machine protection summary display in addition to the general summary displays located above the operations consoles. It includes only machine protection and personel protection devices. One can also look at this display on the scp from the Special Displays panel.

The Summary Message window has also been modified to show a message whenever a device state is changed from "error" to "ok".

Timing Displays

October 3, 1990

Author: *Ken Underwood* **Subsystem:** *Timing* **User Impact:** *None*
Panel Changes: *Few* **Documents:** *None* **Help File:** *None*

A new timing display has been added to the North and South Damping Ring RF Systems. The display request button [DISPLY RF TIMING] can be found on the RF control touch panels as well as the RF TRIG touch panels. Pressing this button will display the timing values for a selected set of TRIGs for any beam code in which at least one of the TRIGs is activated.

Ion Chambers Estimates Before Beam Reset

October 3, 1990

Author: *Daniel Van Olst* **Subsystem:** *Analog Status* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

A new analog display has been added to provide a quick summary of the critical ion chamber systems throughout the SLC, in particular the Positron system and Linac collimator ion chambers which are responsible for most Machine Protection trips. The display shows the current ion chamber readings and beam rate, the trip levels as entered in the database, and if appropriate, estimates of what the readings will be at 120hz. This should help operations determine if the ion chamber readings are low enough to permit 120hz running without actually raising the rate and waiting for a trip.

This button is marked [EST SLC IC AT 120] and is available on the EP01 Extraction Tune panel off the Operator Maint Index. It is also on the E+ Extraction Line Rate Limit Panel and on the LI30 Collimator Ion Chamber Panel.

Analog Status Index

October 1, 1990

Author: *Sandra Bes*
Panel Changes: *Many*
Subsystem: *SLC*
Documents: *No*
User Impact: *Small*
Help File: *None*

The Analog Status Panel has been reorganized. There is now an Analog Status Index to take you to separate panels for the Analog displays in the different regions of the SLC. There are individual panels for CID, Damping Rings, Linac, Positron System, Arcs, Final Focus, and Miscellaneous. There are also "Next Region" and "Last Region" buttons on each panel to jump easily from one system to another. Please report problems via Email to userid BES on the Vax.

Button Macro Cleanup

October 3, 1990

Author: *Terri Lahey*
Panel Changes: *None*
Subsystem: *Button Macros*
Documents: *No*
User Impact: *Small*
Help File: *No*

To facilitate maintenance of Button Macros when there are software changes, it is important to eliminate obsolete macros from the system. Currently, the macro directory contains a large number of test macros that were created for experimenting with the system as well as many macros which have later been supplanted by software improvements. This makes it extremely tedious to determine which if any macro needs to be updated when software or panels are changed.

As a first pass, all macros which have not been used during the 1990 run will be deleted and moved to an Obsolete directory. A special exception will be made for macros which are called directly from a touch panel. After the macro cleanup, the source files will be kept as a backup until the end of the run. Please contact Terri Lahey for easy restoration of any missing macros. Unclaimed macros will be deleted when the run is over.

Cater Version 3.4

October 1, 1990

Author: *Susan Castillo*
Panel Changes: *None*
Subsystem: *PEP*
Documents: *No*
User Impact: *None*
Help File: *No*

Version 3.4 of Cater software has been put in production. The changes in this version were in response to Cater problems 15740 and 14759 as reported by PEP users.

- The help file for specifying PEP micros has been modified to list the micros as RE02, RE04, *etc.* instead of REG02, REG04, *etc.*
- PEP problems and reports will now be printed on the IMPEP2 printer located on the second floor of the PEP building.

Index Panel

SLC Control Program

SLAC's Software Engineering Newsletter

October 12, 1990 | All that Fits is News to Print | Vol. 4, No. 29

BPM Gold Reference Orbits

October 8, 1990

Author: *Daniel Van Olst* **Subsystem:** *SLC* **User Impact:** *Moderate*
Panel Changes: *Many* **Documents:** *No* **Help File:** *Yes*

The gold configuration software has been significantly expanded to include BPM reference orbits. This provides for easier and more understandable use of BPM reference orbits, and extends its functionality to other software within the control system.

Different regions of the machine belonging to the same BPM measurement definition (such as the NRTL, LINAC, NARC and FF in the EXT_ELEC measurement definition) usually have different gold reference orbits. The new software allows for the separate regions comprising a single gold reference orbit to include BPM data taken at different times.

These gold reference orbits may be used for monitoring orbits throughout the accelerator. They are also used as the reference for the computation of RMS orbit deviations as shown on the new BPM RMS history plots and the SLC Orbit Summary Display (see related articles in this issue of Index Panel).

Basic Information

The BPM Gold reference orbit facility is reached via the BPMO GOLD PANEL button located off of the BPM REF ORBITS panel. As with the existing Gold Configuration facility for magnets and timing, you are able to perform the following functions:

LOAD GOLD REF	CHOOSE NEW GOLD	DISPLY GOLD HSTORY	DISPLY GOLD INDEX	DISPLY GOLD CONFIG

Similar to the magnet gold configurations, the BPM gold configuration must be an existing NORMAL configuration (or 'NONE'). A reference orbit may be moved from SCRATCH to NORMAL on the BPMO REF ORBITS panel. No more than one gold is permitted for each reference orbit index.

A function has been provided to update just a portion of a BPM gold reference, to allow more specific tracking of various areas of the machine (see below for more information).

Additional Features and Warnings

The database contains a *default reference* for each BPM measurement definition. This default reference is the configuration that is loaded automatically if you select a BPM difference display and do not specifically load another reference orbit. This *default reference* is now set to the Gold reference when a new Gold is chosen, and the buttons MAKE CALIB PUBLIC, PARTL UPDATE PUBLIC, and UPDATE PUBLIC DEFLTS on the BPM CAL Panel have no effect on the *default reference.*

A new function, available through the [UPDATE GOLD PARTL] button, takes the existing gold reference orbit, makes a new reference orbit from it, and allows part of the new reference orbit to be over-written from the last BPM data measured. You are then prompted if you wish to make the new, *composite* reference orbit the gold reference orbit. This will allow just part of the Gold reference to be updated. For instance, if the NRTL orbit has been changed, you can make a new gold reference from the old gold and data just taken for DR13.

Caution should be exercised when updating partial gold orbits since any continuous range of micros may be updated in the gold configuration resulting in an inconsistent mix of different orbits taken at different times. Comments should be very detailed as to the region name and the reason it was updated. Good comments are also important as the title for the new gold is chosen by the SCP to indicate the old reference number and the region updated.

Currently partial updates may only occur from just-taken BPM data, not previously saved reference orbits. Partial updates from previously saved references orbits may be supported in the future if needed.

An important point to bear in mind with the Gold BPM references is that the designated gold for a machine region is used by the BPM Sampler to compute difference orbit RMS values for history plotting and the SLC Orbit Summary. If the gold reference orbit is changed, the values shown on these displays will change. Excessive changing of the gold orbits will make these displays difficult to interpret and less useful.

The buttons [DISPLY GOLD VS. Z] and [DISPLAY GOLD VALUES] on the BPM GOLD panel are similar to the BPM vs. Z and BPM VALUES DISPLY buttons on the BPM MEASUREMENT panel. They do, however, require that the gold be loaded to be used. If the gold is not loaded when one of these buttons is pressed, the SCP will prompt the user if it is OK to load the gold reference.

Restrictions

Currently both the high and low intensity injected e- measurement definitions (SLC L INJECT E- and SLC H INJECT E-) use the same configuration index. This means that (for now at least) these two measurement definitions are only allowed one gold reference. A slightly stickier problem is gold references for the 9999 ring turns. Currently, there is no way to specify a gold for the NDR and SDR 9999 turns. In both cases, the user may select another reference as needed for difference displays. These problems will be resolved in the near future.

Redesigned BPMO Reference Orbit Panel

October 09, 1990

Author: *Daniel Van Olst* **Subsystem:** *SLC* **User Impact:** *Moderate*
Panel Changes: *Many* **Documents:** *No* **Help File:** *Yes*

The BPM reference orbit panel has been redesigned to streamline its operation. In particular, LOAD and SAVE functions should be easier to perform and less prone to causing confusion.

The primary change has been in the way the regions are selected. Each measurement definition implicitly has a BPM configuration *region* associated with it. Previously, the selected region would be changed automatically when a new measurement definition was chosen on the BPM measurement panel. However, the region could be changed on the BPM reference panel without changing the measurement definition. This has resulted in load and save operations taking place with unintended measurement definitions.

On the new BPM reference orbit panel the region selection buttons have been replaced with measurement definition buttons. These will work as region select buttons, since changing a measurement definition also selects the appropriate configuration region.

One may select a configuration region different from the implicit one for a measurement definition by going to the [SELECT NONDEF REGION] panel, off of the BPM REFERENCE ORBIT panel. On this panel the configuration region may be changed without changing the measurement definition.

If you wish to select a region not represented on the BPM reference orbit panel (for instance, one of the PEP regions) go to the appropriate BPM startup panel and select the desired measurement definition. The desired region will then be selected automatically when you return to the BPM reference orbit panel.

There have also been some improvements in the DISPLY LOADED REF button. There are now two buttons, [DISPLY LOADED vs. Z] and [DISPLY LOADED VALUES] which equate to the BPM VS. Z and the BPM VALUES DISPLAY buttons on the BPM MEASUREMENT PANEL. A SELECT RANGE button has also been provided.

History of Orbit RMS Values

October 5, 1990

Author: *Lou Sanchez-Chopitea* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

History plots are now available for tracking variations in the RMS of the orbits of the production electron and positron beams from the north and south RTLs through the Final Focus regions. The BPM Sampler has been upgraded to include a calculation of the orbit RMS values for selected regions as a part of the normal BPM sampling every 6 minutes. When the BPM data is read and stored in a file for further analysis, the Sampler has the option of computing the RMS of the X and Y readings and storing the RMS values in the database where they can be recorded by the history buffers.

RMS values are stored under the special Linac and Sources Beam database area, primary LSBM and micro VX00. Data for the production electron beam is in unit 1, for positrons in unit 2. Both absolute RMS (secondaries RMSX and RMSY) and RMS with respect to the Gold Reference Orbit (RMDX and RMDY) are computed. Separate values are kept for RTLs, LI02-LI04, LI05-LI10, LI11-LI19, LI20-LI27, LI28-LI30, ARCs, incoming FFs, IP, and outgoing FFs.

A new RMS History Panel, is available off of the Special Display Panel to facilitate access to this data. Special displays have been provided to plot e^+ and e^- X and Y RMS with respect to the Gold Reference Orbit. These plots are 4 to a page for rapid viewing. If needed, a similar panel could provide easy access to the history of absolute RMS.

SLC Orbit Summary Display

October 8, 1990

Author: *Dan Van Olst* **Subsystem:** *SLC* **User Impact:** *Large*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

A new summary display has been written to provide Operations with a quick overview of the orbit RMS values throughout the machine. This display is designed for the new Continuously Updating Display monitors being installed at MCC. It may also be brought up on any console from the SLC ORBIT SUMMARY button on the Special Display Panel.

The display has a diagram of the SLC showing color-coded paths of the three SLC bunches: positron (Cyan), production electron (Magenta) and scavenger electron (Yellow). Data for each bunch is also color-coded. Orbit RMS values are shown for the production electron and positron bunches in the RTLs, Linac, ARCs and Final Focus. These are the RMS values with respect to the Gold Reference orbits calculated by the BPM Sampler (see related article in this issue of Index Panel). They are updated every 6 minutes.

Also shown on the display are a few important machine parameters including the currents of the three bunches in the Linac, plus the currents at the IP and estimated Z's per hour. The production electron and positron currents in the Linac are the intensities measured by the North and South RTL feedback loops. The scavenger electron intensity is read from the last toroid before the target, PT01 376. The IP parameters are the same as the data in the familiar Luminosity history summary. They are updated by the deflection scans or by the IP feedback watchdog.

History Plots of Toroid Data

October 7, 1990

Author: *Nan Phinney* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

A new Toroid History Panel is available from the Special Displays Panel to provide easy access to the History plots of Toroid data throughout the machine. Of particular interest are the Toroid readings throughout the Positron system which monitor the efficiency of positron production.

These toroids are read out by the BPM Sampler as part of the standard data acquisition and the values are stored in the database where they can be put in the history buffers. In the near future, the Sampler will be enhanced to add a calculation of critical toroid yield ratios which will also be available in the history buffers.

Beam Pulse History

October 10, 1990

Author: *Ralph Johnson* **Subsystem:** *SLC* **User Impact:** *Some*
Panel Changes: *One* **Documents:** *No* **Help File:** *None*

A new button, COUNTS SUMMARY PLOT, on the beam pulse accounting panel selects a history plot of the hourly pulse count totals for four areas of SLC: CID e-, NRTL e-, NARC e-, and NFF e+/e-. These counts are all plotted on the same graph to make it apparent where beam losses have occurred.

Invariant Emittance at the IP

October 9, 1990

Author: *Nan Phinney* **Subsystem:** *Final Focus* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

The Emittance calculation at the IP now shows the invariant emittance for easier comparison with Linac emittance measurements. These values are displayed when the CALC WAIST FITS button is pushed. They are also stored in the history buffers and displayed with the WAIST EMIT PLOTS button on the IP History Plots panel.

Note that the old emittance history plots have units of 10^{-10} while the invariant emittance has units of 10^{-5} so users will have to either rescale the Y axis or select a time base which includes only the older calculation if they want to look at details of the old emittance history. With the new scale, all old values will appear to be zero.

Beam Sigma Plotting

October 10, 1990

Author: *Helen Jarvis* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *Yes*

A new display from the OPTICS panel provides plots of beam sigmas for a selected region of the machine. On the OPTICS panel off of the MODEL APPLICATIONS panel toggle the SELECT TWISS PARAM button to SIGMA and then press the PLOT TWISS PARAM button. You will be prompted to enter X and Y invariant emittances and a value for the energy spread. These values along with the beta and eta functions are used to calculate the beam size or SIGMA (in units of mm). Note that the emittance and energy spread values are assumed to remain constant throughout the selected region.

Improved Button Macros for Rate Changing

October 6, 1990

Author: *Glenn A. Horton-Smith* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

The six button macros for changing rate and time-slot have been combined and reorganized. The SLC 120 HZ MACRO now undoes the "long term 10 Hertz" modifications as well as establishing the correct beam code patterns. Any MPS rate limits will cause the "short term 10 Hertz" style rate limit, where electrons load the positrons in sector 1. The SLC 10HZ MACROs establish the "long term" mode, where electrons do not load the positrons in sector 1. This mode is preferable whenever 120 pps running is not anticipated in the next five minutes or so.

There are currently two SLC 10HZ MACROs: 10HZ TS1 and 10HZ TS4. They differ only in the time slot they send the beam to the BSY. You can switch from either mode to 120Hz and from 120Hz to either 10Hz mode without any problems. The public BPM definitions are often set to read on only time slot one, so you may not be able to read BPMs if you switch to TS4.

The 10HZ TS4 MACRO is where the SLC 120Hz MACRO used to be, so those who have memorized the Beam Rate Control Panel should be warned.

Rate Limit Status Panel

October 6, 1990

Author: *Glenn A. Horton-Smith* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

The beam rate throughout the machine may be limited by a number of devices and conditions such as the EP01 PICs, the FARC IN status, the operator rate limit button, and (coming shortly) the sector 30 collimator PICs. The Rate Limit Panel provides information about what is limiting the beam rate. It is available from the Linac Index and from the Beam Rate Control Panel.

The panel indicates the status on each rate limiting input to the MPG. It also has more detailed information about the inner workings of the Linac PLIC module, including the "PPYY RELAY", which stops all beam codes if it is opened. The relay will open if there are too many large PLIC pulses in a row. It can be closed again from this panel.

Index Panel

SLC Control Program

SLAC's Software Engineering Newsletter

October 18, 1990 | All that Fits is News to Print | Vol. 4, No. 30

Changes to the Positron East Turn-Around Slow Feedback Loop

October 17, 1990

Author: *Ed Miller* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

The energy control mechanism for the ETA (Positron East Turn-Around) slow feedback loop has been modified. Previously, the energy was controlled with the phases of klystrons 20-3c and 20-4a. It will now by controlled by the drive of the klystron 20-4a. It is expected that the new method of control will have a greater range than did the previous method.

The signal and command variables will now be displayed in units of Mev rather than as a phase in degrees as was done previously. The zero of the signal scale is defined as the nominal energy of the beam as given by the gold orbit. The command variable is somewhat arbitrarily defined as

$$\text{Command} = \text{MaxSlope} \times \text{DRVR}$$

where DRVR is the value of the klystron drive, and can vary from 0 to 100 percent; MaxSlope is a value that can be set with the first SCRATCH variable for this loop–the initial setting is 4.0 Mev/%. This value should be at least as large as the greatest slope of the curve of energy vs. drive for this klystron in order to avoid possible over-correction by the feedback loop. If there is a need to put limits on the DRVR value, this can be readily done by putting limits on the command variable. For instance, to limit the DRVR to the range 70 - 80%, the command limits should be 280 - 320 Mev (assuming a value of 4.0 Mev/% for MaxSlope).

Note that since the MaxSlope value is typically an overestimate of the slope of the energy vs. drive curve at the current operating point, the feedback correction will typically be an under-correction to the observed energy signal error.

CID Timing Displays

October 12, 1990

Author: *Ken Underwood* **Subsystem:** *Injector* **User Impact:** *None*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

Two new displays on the CID PULSER Panel show the current beam rate and timing values of a set of CID timing devices. The [DISPLY GUN/RF TIMING] button displays the Gun and RF timing. The [DISPLAY MTG TIMING] button displays the Master Trigger Generator, PEP, and scope timing. A text print button has also been added to print these displays.

New SDS Display Monitors

October 12, 1990

Author: *Glaviano, Himel, Millsom* **Subsystem:** *Summary Displays* **User Impact:** *Medium*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

There are four new color monitors mounted high in the control room for displaying any SDS summary display. The hardware is different from the old displays. These are high resolution (1280 × 1024) DEC VT1300 Xwindows terminals instead of COW type monitors (512 × 512) run by MATROX boards. However they are controlled just like the old monitors. Namely you go to the SDS control panel (off of the Special Display Panel,) select a display type, select a monitor, and hit the DISPLY ONTO MONITR button.

New Wire History Data

October 17, 1990

Author: *Susan Castillo* **Subsystem:** *Final Focus* **User Impact:** *None*
Panel Changes: *None* **Documents:** *No* **Help File:** *None*

Several new values from wire scans are now being stored in the database where they may be history buffered. These include the average Intensity for the scan, TMIT, and the integrated AREA from the Gaussian fits. Buttons to display these history plots will be added to the Wire History Plot Panel. Also, the value of position for wires has been corrected.

In addition, the normalized slope from beam scans is now calculated and stored in the database for use by the IP Fast Feedback.

MPG Improvements for Beam Ratelimiting

October 15, 1990

Author: *Tony Gromme* **Subsystem:** *SLC* **User Impact:** *Little*
Panel Changes: *None* **Documents:** *None* **Help File:** *None*

Several modifications have been recently made to the MPG (Master Pattern Generator) software for improved handling of beam ratelimiting operation:

- For making the transition from ratelimited mode to non-ratelimited mode, a beam code can be defined as a "jump start" beam code by setting (through a database edit) the hex 40000000 bit in its XTNT mask (primary BEAM, secondary XTNT). This bit will cause the "jump start" beam code to be broadcast just once as soon after the transition as the "jump start" beam's Tmask allows.
- A single Tmask has been added to define timeslots on which the north & south Arc single-beam dumpers may be allowed to let beam through. This Tmask (primary MPG, micro MP00, secondary SBTM) at present contains only one bit, which can be moved (toggled) between timeslots 1 and 4 by a button near the upper left corner of the beam rate control panel.
- Pseudoscalers, used in Beam Pulse Accounting, can be made to increment when all (as opposed to any) bits in the given mask compare nonzero. This option is selected by setting the %SCLPALLB = hex 0010 bit in the pseudoscaler's HSTA. This option will help in separating the counts of beam pulses lost due to multiple concurrent ratelimiting requests.

Index Panel

SLC Control Program

SLAC's Software Engineering Newsletter

November 5, 1990 | All that Fits is News to Print | Vol. 4, No. 31

New Luminosity Summary Display

October 31, 1990

Author: *Debbie Ohman*
Panel Changes: *One*
Subsystem: *SLC*
Documents: *Yes*
User Impact: *Moderate*
Help File: *No*

A new Luminosity Summary display will soon be available for the updating display monitors in MCC. It is selected using the LUMM DISPLY button on the CUD CONTROL PANEL. The display consists of one plot with four curves showing electron and positron intensity at the IP, Z's per hour, and integrated Z's for the previous 4 hour period. The data scrolls from left to right across the plot with the most recent data on the rightmost edge of the plot.

To avoid redrawing the entire display for each point, a portion of the plot on the right hand side is reserved for the most recent data. The new data is plotted point by point until the curve reaches the right axis, at which time all curves are shifted to the left. The amount of shift is equal to $\frac{1}{8}^{\text{th}}$ of the total time interval on the horizontal axis. The process then repeats with the most recent data again being added to the right.

The display is drawn using a new display utility which may be used to build displays of other parameters in the future as a need is identified.

Updating BPM Gold Orbit from Previously Saved Orbits

November 1, 1990

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

It is now possible to update part of a BPM gold orbit from a previously saved BPM reference configuration.

In the first release of the BPM Gold Orbit software, updates were only permitted from recently acquired BPM data. Now, you can take your favorite NORMAL BPM orbit saved at any time in the past, and use it to update (overwrite) a range of micros in a copy of the current BPM gold configuration.

The same button is used as before (UPDATE GOLD PARTL on the BPM GOLD REFERENCE ORBIT panel). While saving a gold orbit, you will be asked if you wish to update the gold from a previously saved configuration, or from recent BPM data. If you choose to update from a previously saved configuration, you will be asked for a normal configuration number.

For more information on choosing BPM gold reference orbits, see HELP on the BPM GOLD REFERENCE ORBIT panel.

Wire Scanner Update

November 1, 1990

Author: *Sanchez & Hendrickson* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

There have been a number of improvements to the wire scan software.

Skew scans:

The skew scan displays have been updated to include the beam intensity (TMIT) measured on each wire scan. In addition, there is a graph of the calculated beam ellipse, with the wire measurements on each of the three axes, X, Y, and U superimposed. Since the beam size measured by the wire is a projection onto the axis of the scan, the wire measurements typically extend past the edges of the calculated ellipse. The display may be printed in graphics or text mode.

For the Final Focus WS4 wires, the software also reports the effective angular divergences at the IP. This calculation is now reported even if there is insufficient data for the full skew measurement.

Beamstrahlung Readout for WS4 Wires

The wire scan software has been modified to allow the WS4 scanners in FF11 and FF01 to use the flux from the beamstrahlung monitors as the signal for the Gaussian fit. The beamstrahlung data option may be toggled on or off from the scan options panel, accessible from the wire scan panels.

LI02 Scan Changes

In order to reduce conflicts in LI02 wire scans where all scanners use the same downstream Ion chamber readout, the wire scan software has been modified to wait for each wire to reach its PARK position before the next wire may be scanned. This is selectable by setting a WIRE HSTA bit in the database. In addition, in an effort to reduce beam trips, a 2 second wait is added after scanning LI02 wires. This may be modified as more is learned about avoiding trips.

Additional Emittance Calculation

Mark Woodley has added an alternate emittance calculation developed by Chris Adolphsen to the Emittance Measurements Summary Display. This is to facilitate comparison between the two methods.

Improvements to Saving Injection Gold Configurations

October 26, 1990

Author: *Michael Glaviano* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

The software for saving Injection Gold Orbit has been modified to exclude offline or bad BPMs. Now both the hardware status (HSTA) and the status of the data from each BPM are checked at the time a Gold Orbit configuration is saved. If either status is bad, the BPM is flagged as such in the saved configuration file. This will result in the injection software ignoring that BPM during subsequent calculations.

If a configuration is displayed (from the injection panel) and the data field for a BPM is filled with asterisks, it is an indication that that BPM was not good (in the sense described above) when the gold orbit was saved. Also if the words "BAD GOLD" appear on any button on the BPM SETUP panel off of the INJECTION panel, the associated BPM will not be used in any injection calculations regardless of how its HSTA is set in the database.

All Toroid Display Group

November 1, 1990

Author: *Linda Hendrickson* **Subsystem:** *SLC* **User Impact:** *Small*
Panel Changes: *Few* **Documents:** *No* **Help File:** *No*

In order to read out all toroids in the SLC on the same beam pulse, a display group with an associated public BPM definition has been added. The public BPM definition is currently being used by the BPM Sampler for history buffer plots of toroid data. In the future, the BPM Special PYIELD and EYIELD displays may be modified to use the new display group.

The public BPM definition for "All TOROID Only" may be accessed from the BPM Calibration panel. It is only intended for reading out Toroid data; when BPM data is read or calibrated, the results may be unpredictable.

Index Panel

SLC Control program

SLAC's Software Engineering Newsletter

November 9, 1990 | All that Fits is News to Print | Vol. 4, No. 32

History Buffer Comparative Plots

November 7, 1990

Author: *Gregory R. White*
Subsystem: *SLC*
User Impact: *Small*
Panel Changes: *Few*
Documents: *Forthcoming*
Help File: *Yes*

A facility to plot more than one history buffered device over a common time axis is now available from the SCP.

The control panel for History Buffer Correlations may be reached with the [HISTRY BUFFER CORREL] button available from any existing History Plots panel from which a time range can be selected

Each device to be plotted is entered as a "dependent variable". Between one and three dependents may be defined which are labeled as A, B, and C. The buttons corresponding to each dependent variable are arranged on the row to the right of the variable label.

There are two ways of assigning a device name to a dependent variable:

- [ATTACH LAST HSTB] button assigns the name of the last device plotted from any panel in the existing history plots facility.
- [ENTER DEVICE NAME] button initiates a request for a device name. The input format consists of primary, micro, unit, secondary, and channel. These parameters may be entered individually or together on the same line, space delimited. The channel will always be requested; if it is not applicable simply hit return when prompted. Hitting return in response to any of the above parameters other than the channel will cause the definition to be cleared.

Time Axis

The common time range for all the dependent variables must be selected from an existing History Plots panel prior to going to the History Buffer Correlations panel.

Scaling

Auto or manual scaling can be toggled independently for all dependents. A minimum or maximum range value entered for manual scaling, will be rejected if it is inconsistent with the existing opposite end of the range. This is a fact that may become irritating if not noted.

Manual scaling in History Correlations behaves slightly differently from the existing History Plots facility. Here, the MIN and MAX bounds are marginally adjusted if doing so would include all the data points.

Swapping Dependent Definitions

The device names assigned to dependents can be swapped using the DPNDNT <=> DPNDNT button. Either (or both) of these dependents may be null when they are swapped. This function does not swap the scaling specified for the dependents; this is so that loci may be compared under fixed scaling factors.

Available Charts

A number of chart types are available to present the data from selected devices over a common time span. Chart types are cycled using the CHART TYPE button. Currently the chart types are:

- **Stripchart** - plots as many dependents as have been defined, horizontally stacked on the screen. The time axis is written once on the bottom plot
- **Overlay** - plots 1 or 2 devices overlayed (if a third is defined it is ignored).

Within the limitations of the chart-type, all dependents defined will be plotted. For instance, if A, B, and C are defined and an Overlay requested, then A and B will be plotted. If A and C are defined and Stripchart requested, then two plots, one above the other will be plotted.

Data Acquisition and Plotting

Unlike regular history plots, no chart is plotted until the PLOT CORREL button is pushed (though if the time range is changed the chart will automatically update).

Planned Enhancements

The following enhancements are planned for the next release of the History Correlations facility:

- Add plots of the type $[A + (n * B)]$ and $[A/(n + B)]$.
- Add A vs. B correlation plot with suitable statistics.
- Enhance the dialog for entering a device name.

New Check Phase Klystron HSTA Mode State

November 7, 1990

Author: *Bob Hall* **Subsystem:** *Linac* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *Yes*

When work is being done which affects a klystron phase detector, there is a need to indicate this condition on klystron displays. When the new "check phase" (CKP) state appears for a unit on the Klystron Status Display and other klystron displays, this indicates that the optimum phase needs to be re-measured by Operations before using the klystron.

The new "check phase" state may be entered when pressing the HSTA Mode button on klystron panels. Along with the previously existing five choices for the state of a klystron or subbooster (ON, OFF, MAINT, TBR, or ARU), the new option CKP (Check Phase) may be entered in response to the prompt. Entering this new CKP state will cause the letters CKP to appear in yellow on the Klystron Status Display and other klystron displays to indicate the status of the unit.

CAMAC Crate Profiles from DEPOT

November 5, 1990

Author: *Patrick Clancey* **Subsystem:** *CAMAC* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *None* **Help File:** *Yes*

DEPOT is a SPIRES database maintained on VM which includes the description, location history, and maintenance history of all equipment which have been formally identified. It also includes the Crate Profiles for the SLC control system – the theoretical description of what module SHOULD occupy which slot in which CAMAC or Multibus crate.

Using Depot, one may display the Functional Crate Profile, together with the current inventory of a control system Micro or CAMAC crate. The command for querying the database from VAX is:

CRATE *micro/crate*

where *micro* is a formal name of micro such as DR12, or LI02 and *crate* is the crate number such as CR03. It should be noted that the crate argument is optional and if it is not included, then the "/" should also be omitted. Examples of valid commands include:

```
Crate DR13
Crate LI02/CR02
```

The CRATE command lists the crate profile alongside the inventory of the modules actually listed as occupying the crate.

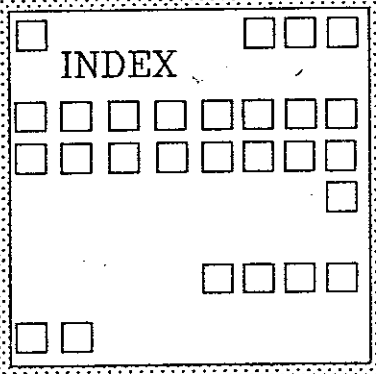
The information is extracted from the Depot database on VM, mailed to your VAX account, saved in a file (microcrate.PRF – eg: DR13.PRF or LI02CR02.PRF for the above examples) and the file is then typed on your terminal.

More detailed information about systems and individual modules may be obtained by logging on to VM and typing the command "GIME DEPOT". Then enter the database by typing the command "DEPOT". There is extensive online help for most operations.

For additional help, suggestions, or documentation contact Patrick Clancey (CLANCEY@SLACVM) ext. 2339.

Index Panel

SLC Control Program



SLAC's Software Engineering Newsletter

November 15, 1990 | All that Fits is News to Print | Vol. 4, No. 33

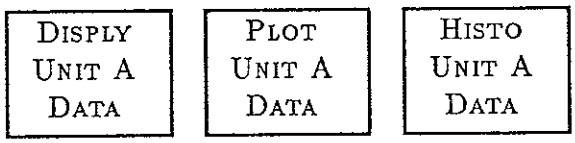
Enhancements to BPM Buffered Data Acquisition

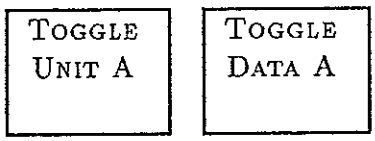
November 14, 1990

Author: *Alex Grillo*
Subsystem: *SLC*
User Impact: *Small*
Panel Changes: *Few*
Documents: *No*
Help File: *Yes*

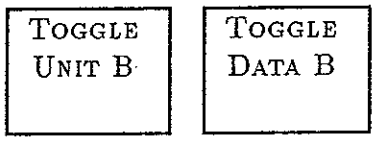
Several enhancements have been added to the BPM Buffered Data Acquisition panel. The principal additions are the capability to plot one data item versus another, and the option of dumping the collected data to a file in MATLAB format. Also, a help file was created for the entire panel so that there is now help for all of the old buttons as well as the new ones.

To display a two dimensional plot, the respective data items to display must first be selected. The old buttons to "Toggle Unit" and to "Toggle Data" are still present and function the same way they did before. They have just been relabeled as "Toggle Unit A" and "Toggle Data A". The "A" suffix has also been added to the old "Display ...", "Plot ...", and "Histo ..." buttons. This is to indicate that the data displayed by these buttons is the data selected by the "A" toggles. The renamed but functionally unaltered buttons are:





Two buttons were added to select data for the second dimension of the 2-D plot:



These buttons function identically to the Unit A variety. If the button [PLOT UNIT B vs A] is selected, a two dimensional plot will be made with the "B" data plotted along the vertical axis and the "A" data plotted along the horizontal axis.

Another button exists to control the new plot. Selecting [ENTER PULSE OFFSET] prompts for a Pulse Offset to be entered. For each measurement of Unit A to plot, a corresponding measurement of Unit B is found which was made on a beam pulse different than the Unit A beam pulse by the value of Pulse Offset. A typical use of this offset would be to set Unit A to a scavenger electron beam intensity and Unit B to a positron beam intensity. By setting the offset to 1 (for 120 Hz operation), the plot of Unit B vs Unit A will compare the intensity of each positron bunch with the intensity of the electron bunch which initially made it. The Pulse Offset is initialized to zero but its current value is displayed on the button. Keep in mind that this offset refers to beam pulses and not "Pulse I.D.".

The other functionality added was an option to dump the collected data to a file in MATLAB format rather than ASCII. A button was added [TOGGLE FILE FORMAT] to allow selection of either the new MATLAB format or the original ASCII format. The MATLAB file consists of 1-D vectors for each of the data items selected. They are appropriately labeled for MATLAB to assign variable names to them. Refer to the help file for a list of the labels used.

Another button was added to aid in plot reading. The button [TOGGLE PLOT LINES] will control the use of lines to connect adjacent points on either the plot of Unit A vs time or the plot of Unit B vs A. This avoids having to go to the HandyPak panel to control that function.

To make room for the new buttons, several of the existing buttons were moved and the button [SPEAR BPM MEAS] was eliminated. Hopefully, everyone will find the new layout convenient.

One last item is that a Reset of HandyPak is now made before each of the display operations is done so that the display will not be left in some strange state from a previously used panel.

EDITDBS

November 12, 1990

Author: *Lawrence Searcy* **Subsystem:** *Database* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *Yes* **Help File:** *Yes*

Several new features have been added to the The EDITDBS command. In addition, some of the default responses to the questions have been changed, and the code has been improved to run faster.

EDITDBS will now allow you to look at a database file if you do not want to reserve it. When you answer "no" to the "Do you want to reserve this?" prompt, it will ask,"Do you want to look at it?". If you answer "Yes", it will present you with a read-only (unmodifiable) version of the file in the EVE editor. This will allow you to look at the file but will ignore any modifications you try to make. The read-only format will also allow you to exit EVE normally with a Ctrl-Z.

It is also possible to look at the differences between your edited file and the original database file after you have finished editing your copy. If you skip over the editing session you will not be prompted to do this. This will allow you to see how you have modified the database file.

The default response to some of the questions have been changed. The default for "Do you want to do a TESTDBGEN?" has been changed to "no". EDITDBS will ask you if you want to make a new Miniedit file if it finds the Miniedit file in the current directory. The default for this has also been changed to "no".

After DBGENing, EDITDBS used to automatically check with CMS to see if you had the file reserved before giving you the replacement prompt. It will no longer do this if you have reserved the file in the current session.

One **Important** note for the casual user: EDITDBS will allow you to make multiple reservations of a file. This is because EDITDBS only looks in your current directory for the file before assuming that you have not reserved it. If you reserve it, change working directories and then re-enter EDITDBS, it will assume that you have not reserved the file and will give you the reservation prompt. Fortunately, CMS will tell you if you already have reserved the file and will ask you if you want to continue. You should generally answer "no". If you do so, EDITDBS will clean up and drop you out so that you can put the file in your current directory.

For additional information type $EDITDBS.

Video Distribution System

November 14, 1990

Author: *Ken Underwood* **Subsystem:** *Video* **User Impact:** *Small*
Panel Changes: *Many* **Documents:** *Yes* **Help File:** *Yes*

The Video Distribution software has been upgraded to support the manual distribution hardware. There are also several changes to the VCAM transmit frequency selection as well as the addition of a **SHADOW** touch panel button to display the current settings. The touch panel **HELP** has been updated to reflect these changes. These changes and the yet to be specified second stage improvements are described in more detail in the file DOC$DESIGN:RF_VIDEO_MODS.

The basic flaw in the original implementation of the video distribution system control was the lack of support of the several manual video distribution systems. The VCAM maintenance touch panels were used to display video on these manual systems. This confused the automated video distribution software because it was unaware of these changes.

All requests for the manual and automated video distribution systems are now monitored and coordinated by the software. Since there is no way to actually monitor or control any of the manual systems, they are all considered to be just one system. Consequently, you may experience some conflicts if more than one person is trying to set up a manual distribution system.

The algorithm for selecting a transmit frequency for a VCAM module has been modified. You may select a specific frequency or allow the software to automatically select one for you. If you do select a frequency then that frequency will always be used for any VCAM, so set the frequency selection back to **AUTO** when you are finished. For the automatic select the software will try to find a transmit frequency in the following order:

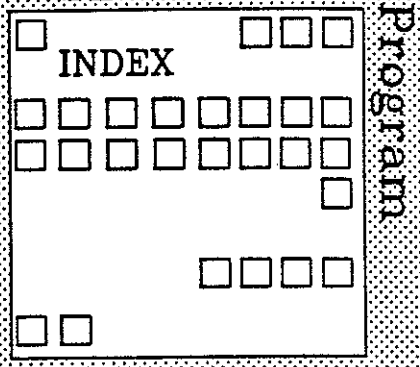
1. If the VCAM is already transmitting on a frequency, then keep the same frequency.
2. If any online frequency is unused, then allocate that frequency.
3. If the current distribution system is already using a frequency, then reuse that frequency.
4. Prompt the user for the frequency to use.

This frequency selection scheme will permit the absolute selection of a high quality video channel when necessary, while minimizing the degree of user intervention with automatic frequency selection.

The current default setting for the distribution system, cable, channel, and monitor can be displayed on the touch panels. Those panels that reference the video distribution system and have space available, will be modified to display this information.

Index Panel

SLC's Software Engineering Newsletter



December 5, 1990 | All that Fits is News to Print | Vol. 5, No. 34

Turbo CATER

December 3, 1990

Author: *R. Sass, S. Castillo* **Subsystem:** *CATER* **User Impact:** *Substantial*
Panel Changes: *None* **Documents:** *None* **Help File:** *No*

A new version of the CATER software (V3.5) with substantial performance improvements has been released. The most important user benefit of this version is the much improved speed with which problems are searched in the Compose-it-Yourself reporting facility.

Since its initial release several years ago, the structure of the CATER database has remained essentially unchanged. Some users may have noticed that with the increase in the number of entries (currently about 17,000,) generating reports with the Compose-it-Yourself facility has slowed down considerably. To speed up retrievals and take advantage of new features in the database software (Rdb), the CATER database has been restructured, additional indexes have been added, and the way CATER formulates it's queries has been optimized. This has resulted in lightning fast database searches and report generation.

Experience the difference, fasten your seat belt, put on your gloves, and take it for a spin.

ACCESS Procedures

November 30, 1990

Author: *Ken Underwood* **Subsystem:** *All* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

The ACCESS procedures have undergone substantial revision to improve the user interface, decrease the startup response time, block multiple invocations of the same procedure, and redefine the overall structure. Please note that the functionality of these procedures has NOT changed, only the organization of the command procedures has changed.

The user interface has changed to address two problems associated with using the command procedures. The keyboard input buffer frequently contains leftover characters. In the past, if the first character was not a "Y" then the procedure would cancel the request with a message to that effect. Because of the rapid clearing of the terminal screen, this message was missed while the user assumed that the ACCESS procedure was running successfully.

The commands have been changed now to accept only "Y" or "N", and reprompt for any other character. In addition, a Ctrl-Y will abort the procedure. For an "N" or Ctrl-Y response, a log file will be artificially created with a message that the request was aborted. For the "Y" response the procedure will be submitted to the SLCBATCH queue which will create the usual log file. A 5 second wait has been added to the user interface to give users a chance to read any messages that have been issued.

The ACCESS procedures contained a duplicate reference to the command procedures that setup all of the logical names and symbols necessary to run a SCP. This reference has been removed and should result in a considerable decrease in startup time.

Multiple invocations of the same ACCESS procedure were a frequent source of operational problems. The ACCESS procedure will now check for the existence of another process with identical name. If one is already running then this invocation will be aborted.

Previously, all of the ACCESS procedure files contained both ACCESS program data as well as the necessary commands for setting up and running each program. In the new version of the ACCESS procedure software, the program data and the commands have been saved in separate files. The program data files retain the original documentation which has been converted from DCL comments to ACCESS comments.

The commands have been moved to a new command procedure file called ACCESS.SUBMIT which gets submitted to the batch queue from the touch panel along with the name of the ACCESS data file to be processed.

History Buffers

November 30, 1990

Author: *Ralph Johnson* **Subsystem:** *All* **User Impact:** *Some*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

The History Buffer weekly and long term data saving has been turned off for the duration of the downtime. Daily data taking will continue so that the last 24 hours of all data will always be available. Turning off the updating was done to save some disk space and to freeze the data for the "last machine week" in uncompressed format. This will provide the opportunity to study the details of beam parameters at the end of the run as well as the accelerator cool down period. If there is a need to save data over a period greater than 24 hours during the downtime, please contact Ralph Johnson (ext. 2558).

The last weekly data for all devices except analogs (asts) covers the week ending Wednesday, November 21, 23:59 pm. This provides uncompressed data for the last week preceding the shutdown.

The last weekly data for analog (asts) devices covers the week ending Sunday, November 25, 23:59 pm. This provides uncompressed data (including temperatures) for the week which includes the shutoff and the cool down of the accelerator.