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SLC Control Program

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Fast Fbck Calibration Results Update

April 11, 1994

Author: *Stephanie Allison* **Subsystem:** *Fast Feedback* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *Yes* **Help File:** *Yes*

The following enhancements have been made to the implementation of fast feedback calibration results using the [PUT CALIB TO DB] button:

1. Implementing calibration results from a subset of actuators is now allowed. In the past, the user was forced to calibrate ALL actuators. Now, the user is warned of all the actuators that are not included in the calibration and is given the option to proceed. The values currently used by the feedback loop are then retained for these actuators.

2. When only one beam is available during the calibration of a multiple-beam loop, the values currently used by the feedback loop are retained for all states associated with the missing beam. The user is warned of the states with no beam and is given the option to proceed.

3. Calibration results are not used for actuator/state pairs where the the state is not affected by the actuator setting (model value is 0.0). The following are examples:

- The state and actuator are in different planes (X or Y) and the loop is not coupled.
- The state is informational only and is not used in feedback control (no-control state).
- The actuator is derived from the value of other actuators (no-calc actuator) instead of directly from the states.
- Either the actuator or the state, but not both, are associated with a time-slot difference calculation.

4. When calibration results are implemented, the matrices taking measurements to states and states to measurements are no longer automatically recalculated from the model and the values used during calibration are retained. Calibration now only affects state/actuator

matrices, and the unexpected side-effect of new measurement/state matrices (if the model has been rerun recently) is no longer experienced. The PUT RMAT MODEL TO DB button is still available for updating ALL matrices from the model.

FAST FEEDBACK PANEL REARRANGEMENT

April 7, 1994

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

The fast feedback main panel has been rearranged in order to address many complaints from users who cannot find their fast feedback loops now that there are so many of them.

The new arrangement has six groups of loops: GUN, INJECTION, LINAC, EAST END, DIAGNOSTIC and MISCELLANEOUS. You first select a group from the top of the feedback panel (the default is LINAC). All loops from the selected group appear in the buttons below the group list. At this point you may select the loop of interest in the usual manner. There are less than 24 loops in each group and there is no paging within groups. The loop paging button has been removed from the panel.

The summary and setpnt displays (whose contents were controlled by the toggle-display-type button) now show only, and all, loops of the currently selected group. The toggle-type button has been removed from the panel.

It is hoped that this new arrangement will be easier to use and that it will also solve the problem of interesting loops (such as IPCOLLID) not fitting on the feedback summary display. The distribution of loops within each group is database-driven and regrouping is possible at any time.

FFTB PCs: Processes needed on MCC VAX

April 15, 1994

Author: *T. Lahey, R. MacKenzie* **Subsystem:** *FFTB PCs* **User Impact:** *None*
Panel Changes: *None* **Documents:** *Yes* **Help File:** *Yes*

Currently there are three PCs used by Final Focus Test Beam: Alignment (PC01), KEK Quad Table (PC02), and KEK Beam Size Measurement (PC03).

For successful integration of these PC into the control system, three processes must be running on the MCC VAX:

1. **AMSS** : general AMS server allows processes to connect
2. **FFTB_DBS** : Database server allows PC to get/put database
3. **A_SERVER** : server to Route SCP messages to PCs

To confirm that these VAX processes are running, check the [MICROS STATUS DISPLY] from network index panel.

If any of the VAX processes is MISSING, then restart them with WARMSLCX.

Always restart AMSS before FFTB_DBS and A_SERVER. If you restart FFTB_DBS, then RESET the FFTB PCs from the [FFTB PC IPL & STAT] panel on either the Network Index or FFTB Index. Reset the PC and set it online with [RESET ...... PC] [...... PC ONLINE] where ...... is one of 3 PCs: Alignment PC, KEK Table PC, and KEK Beam Size Measurement PC.

From an FFTBSCP, IPL time on the Micro Status Display is the time that the PC last connected to the database (i.e. was RESET). This time must be after the time that FFTB_DBS was restarted.

FF Sextupole Orbit Monitoring

April 21, 1994

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

Sextupole Orbit Monitoring consists of new sample-only Slow Feedback Loops that monitor the alignment of the Final Focus.

Because of the optics between certain pairs of sextupoles in the Final Focus, the sum of the beam positions at a pair of sextupoles should be independent of incoming oscillations. If the sum is not constant, it signals a problem with the Final Focus optics (assuming that the monitoring hardware and software are functioning correctly).

Sextupole Orbit Monitoring is implemented with 2 groups of 8 Slow Feedback loops. One group monitors electrons and the other group monitors positrons. Each loop monitors one pair of sextupoles in one axis (X or Y). The beam position at the sextupoles is determined by taking BPM measurements at the two BPMs closest to each sextupole in the pair. The beam position at the sextupoles is computed by linearly extrapolating from the beam positions at the BPMs.

The signal for a Sextupole Orbit Monitoring Loop is the sum of the beam positions at the two sextupoles monitored by loop. The setpoint and tolerances for the loop are used to define the acceptable range for the signal; if the signal goes outside this range, the Sextupole Orbit Monitoring Software will log warnings in the error log.

The easiest way to view the history plots for the beam position sums, as well as the individual beam positions at each sextupole, is to go to the FF SEXTUPOLE ORBIT HISTORY PLOTS panel (INDEX to Special Disply to Lumm Histry Plots to SxtOrb Histry PANEL).

Some experience with these loops will be required before the proper settings for setpoints and tolerances can be accurately determined. Until then, the tolerance range for Sextupole Orbit Monitoring Loops will be fairly large.

After more experience has been gained, the Sextupole Orbit Monitoring loops will be added to the CUD STATUS display.

Slow Feedback PMON Watchdog

April 21, 1994

Author: *Karey Krauter* **Subsystem:** *Slow Feedback* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *Online*

A new slow feedback watchdog loop has been added, called the PMON Watchdog. This watchdog looks at the readback voltages of the AMPL's hooked up to the outputs of PMON hardware. If an AMPL readback voltage differs too greatly (exceeds the number in the PMON tolerance register) from the value in its corresponding PMON output voltage register, then the AMPL readback voltage is copied into the PMON output voltage register. The action is recorded in the error log as a PMON_AMPL_UPDATE message.

Two PMON cards are looked at: one at CID which has four AMPL's hooked up to it (AMPL, LC00, units 33/34/35/36), and one in the GUN LAB which has two AMPL's hooked up to it (AMPL, CL01, units 1/2).

When the CID PMON AMPL unit 33 is under fast feedback control (c.f. the POLR ASYM loop) this watchdog still makes sure the corresponding CID PMON CP RIGHT output voltage register is updated. If an AMPL readback STATus indicates readback failure then no action is taken on the corresponding PMON output voltage register.

At this time this new watchdog's normal state is OFF, eagerly awaiting a sign that someone loves it by turning it to SAMPLE. Its periodicity is every two minutes.

Matlab 4.1.1 has hit the Vax!

May 16, 1994

Author: *Keith Jobe* **Subsystem:** *N/A* **User Impact:** *Varies*
Panel Changes: *None* **Documents:** *Yes* **Help File:** *Yes*

The new version of Matlab is now available from the SLC VAX cluster mainframe computers. This version is a "major" release of Matlab, and has a significant number of new features and changes in the graphical interface. Unlike prior releases of Matlab, this release has broken a large fraction of the previously debugged scripts and functions developed by the SLC physicists and operations support personnel.

While the scripts and functions are being debugged, the old version (version 3.5h) will remain as the system "default" version for a while. To define the new version, enter:

```
mcc> MATLAB__4
```

and to run it, enter:

```
mcc> MATLAB
```

Both versions of Matlab are licensed to allow an unlimited number of users to run on the two major mainframes (MCC and SLC). The limited use licenses which allow a few users to run on the cluster workstations have not been upgraded to version 4 yet. Separate licenses also exist for operation on the SUN/UNIX workstations without any of the SLC extensions or database access routines. Please contact Bob Boeninger (BOE@SLAC.STANFORD.EDU) if you want more information regarding the SUN Matlab.

This is a new version of Matlab, the various standard SLC ".M" files, and additions will take their authors a while to debug. Please be patient and try to contact the author of the code when problems are uncovered.

Manuals for the new version of Matlab are available from Software Engineering upstairs in MCC. Those users with the Macintosh version of Matlab will probably not need a new manual since the manual sets are almost identical.

Note: Consistent with the Matlab help files and documentation, all Matlab commands in this article (such as `GET(0)`) are shown upper case. Note, however, that the commands must be entered using lower case characters (as `get(0)`) to work.

The major changes and incompatibilities are:

- Matlab graphics are now "object oriented." Specifically, this means that any changes in the attributes of a graph must now be done after the graphical object is created. For example, the command: `PLOT(SINC(-10:.03:10));` is followed by `AXIS([0 PI -INF INF])`. This will zoom the plot into the X-values of 0-π. Note the use of `INF` to extend the graph to the limiting datum. This sequencing also applies to the `SUBPLOT` command, which has a new format for it's arguments.

- The `DRAWNOW` command forces the graphics buffer to appear immediately. This is only required for command files where you are witnessing the analysis of the data. Typically, the rendering of a plot is deferred to the next user input prompt or `PAUSE` command, thus allowing any changes in the plot's rendering to proceed the actual drawing of the image.

- The continuation character is now definitely "**...**". Version 3.5 and earlier would accept either "**...**" or "**..**". Many of our files will be broken by this simple error.

- Matlab automatically senses for the presence of a X-Terminal type display, and uses it by default. If you *do not* want the X version of Matlab, enter `mcc> SET DISPLAY/DELETE` prior to evoking Matlab. Note that without a display or graphical interface defined, any graphics generated will not be seen or displayed, yet the PRINT family of commands will generate the expected pictures.

- Dumb terminal support: The Matlab command `TERMINAL` will present the user with a list of terminal types, and the command `TERMINAL VERSA` roughly replaces the old `VERSA` and `RETRO` commands. Graphs will appear, but do not expect any of the snazzy graphical user interface features to work.

- The `GLOBAL` command is changed. A variable becomes global when it is so declared, but is only visible to functions and scripts which explicitly declare the variable global. By Matlab convention, global variables should be UPPER-CASE names.

- Matlab now stores data in a variety of new ways, allowing a saving of disk space when saving large matrices of integer data. These files may not be readable by the old version of Matlab. The routines which save data to disk from the SCP have not been changed to use this feature, and will remain compatible with version 3 of Matlab for the present.

Printing: The usual SLC-type modifications have been applied to the Matlab print support – ignore the documentation on PRINT in the Matlab Reference Guide. These changes are required by the wealth of printer types available - Matlab presumes that the printer type and print command is fairly stable. The usual (Matlab 3.5) commands `PRINT`, `PRINTB`, `PRINTOUT`, `PRINTER_SET`, `PRINTCLEAR`, and `PRINT_WHERE` are supported.

Matlab aficionados might want direct access to the native Matlab PRINT command to generate EPS files, and will find it renamed as `PRINTM`.

The list of printers is smaller since Matlab insists on using Postscript level 1 or 2, and will not generate the Tektronix 4014 language for printing (a sad good-by to VM based Imagen printers). Your default printer may be defined in your login file by setting the symbol `MATLAB_PRINTER` to the printer name as seen from inside Matlab using the `PRINTER_SET` command. (Matlab 3.5 used a logical name to store this information.) For example, you might want to add the following to your own `LOGIN.COM` file:

```
$ MATLAB_PRINTER :== MCC$PRINT
```

User customization may be done in several ways.

1. Commands in the current directory (`[]`), followed by commands in your Matlab sub-directory (`[username.MATLAB]`) are used prior to the commands in any of the Matlab Toolboxes or SLC support packages. The special Matlab directory may be created with the `mcc> CREATE/DIR [username.MATLAB]` command from DCL.

2. You may have a local "startup" file called `my_startup.m`. If you have several such files, the version in your current directory will be used before the version in your `[.matlab]` subdirectory. Do not use the filename "startup.m" as described in the documentation, since this will circumvent some SLAC-specific startup code.

3. You may add a directory to the Matlab search path using the Matlab command `PATH(PATH,disk:'[directory]')`. The command `PATH` used by itself returns the current search path.

4. You may place your code in a production directory, allowing more direct and wider access to the routines than the above methods. Please see a Matlab expert prior to adding any new functions to the production directory.

Some of the snazzy new features are:

- Try `HELP`. The help is grouped by functions. Try `HELP GRAPHICS` and `HELP PLOT` for example.

- `WHICH <command>` returns the location of the command file you specified. See also `CD`, `PWD`, and `UIGETFILE`.
- Direct file read of binary files of user data (see `FOPEN`, `FREAD`).
- Colormapped plots and images (try `[X,Y]=MESHGRID(-3:.125:3); Z=PEAKS(X,Y); MESHC(X,Y,Z)`.
- Try `DEMO`. Try this *only* if you have some time to kill.
- After you plot something, explore the graph's objects with the commands `GET(GCF)` and `GET(GCA)`. To change something, try `SET(GCA,'VISIBLE','OFF')`. GCF means get current figure handle, GCA for axis.
- Matlab now supports M-file debugging. Try `HELP DBSTOP` for information.
- The command `AXIS` is different from `AXES`. The latter allows multiple scales on the same plot.
- Matlab supports a version of a movie, where multiple frames are displayed in a defined order. The `DEMO` displays this. This feature is known to break on X-displays with insufficient memory.
- `WHITEBG` toggles the background color to white. It does considerably more with various arguments.

WARMSLC becomes WARMSLCX

May 9, 1994

Author: *Ron Chestnut* **Subsystem:** *.COM files* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *with ?*

In order to better provide for the common good and establish order and justice for all, the older version of some .COM files are being replaced with newer versions. These have coexisted for over 18 months now. The new versions work fine.

The only impact on operations is the WARMSLC command file, which is now replaced by the WARMSLCX command file. The difference in invocation is the use of the slash, i.e.:

WARMSLC zzzzzz RESTART

becomes

WARMSLCX zzzzzz /RESTART

Coincident with the publication of this article, the invocation of WARMSLC will remind you to use WARMSLCX. Be sure to fix any private .COM files which invoke WARMSLC now.