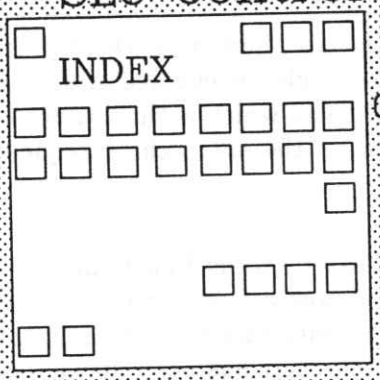
Index Panel

SLC Control Program



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Automatic Device Checking in Micros

March 22, 1989

Author: *N. Spencer, T. Lahey*
Panel Changes: *Few*
Subsystem: *SLC*
Documents: *Yes*
User Impact: *Moderate*
Help File: *Yes*

In order to improve the response time of the control system, the micro software has been upgraded to to have the micros themselves asynchronously check the state of devices and signal changes of states to the VAX. This feature has been in place for some time for crate and digital status and is now being extended to analog devices. Moving the checking functions to the micros allows them to be run more frequently without excessively loading the system. As a result, the klystron and super summary displays will be able to respond more quickly to status changes. Additionally, the SCP displays will be generated faster as they will no longer have to force a check request to the micros.

The initial release of the software includes upgrades to two micro jobs. The test job which has been used by Paranoia to verify that a micro is alive and well has been expanded to provide monitoring and statistics on other jobs in the micro. The klystron job has three new auto cycling functions: a terse check of important parameters to be run frequently (about every five seconds), a full check of all analog parameters (about every 60 seconds), and an auto trim function (to replace the Paranoia klystron trim). Full details about the klystron job are described in a separate article below.

Initial Release

A new micro image with the upgraded Test and Klystron software was installed in all Linac, Damping Ring micros during the March 29 maintenance day after an announcement at the 8 a.m. meeting. Cycling times for these jobs are specified in the database and may be turned on or off on a per-micro basis. SCPs and VAX programs will still explicitly talk to the micros if requested by the operator or if the micro checking is disabled. General system utilities are also included to support other auto checking functions in the future.

Initially, the Klystron jobs will check the most important klystron parameters (e.g. phase mean and jitter, amplitude mean and jitter) every five seconds. These parameters are used by the Klystron Summary Display (a.k.a. Klystron Population Display). All other klystron parameters are checked at a 60 second interval. The VAX database is updated whenever a change of state is detected or at least every five minutes. Metering and other filtering logic has been included to prevent an oscillating device from forcing too many updates.

The Test job will monitor other micro obs every few seconds and update their status and statistics in the VAX database as appropriate. It also has a frequently updating terse check function and a slower full check function with more complete information.

The Klystron Summary Display and Paranoia have been modified to no longer issue requests to the micro if auto checking is enabled. Initially, there are no changes to the SCP klystron displays except for the PIOP Data Display which is three times faster due to code improvements in the micro. After a few days of running experience, the micro check requests will be removed from the klystron Sector and Zplot displays.

Activating Auto Checking

The Cluster Status Panels may be used to activate or deactivate auto checking in the micro or the VAX. What is now a BAR or OFF, becomes OFF, VAX (meaning that the VAX will request the checks), and MICRO (meaning that the micro will automatically check). This new option is supported for each micro subsystem that has been upgraded, for now only klystrons. In general, all micros should be left in MICRO checking mode except when problems are encountered or during initial commissioning.

Documentation

For more information, the functional requirements specification is in the file DOC$FUNC_REQ:CS-DB-0307.LATEX. A detailed software design specification for the first phase, is available on the SLC cluster (DOC$:[DESIGN]ASYNCH_DB_PHASE1.LATEX).

Acknowledgements

The people who worked on this project are Nancy Spencer, Terri Lahey, Bob Hall, and Helen Kirby. Thanks to Tom Himel and Nan Phinney for guidance, and Miguel Flores for his assistance.

New Micro Statistics Displays

March 22, 1989

Author: *Helen Kirby* **Subsystem:** *SLC* **User Impact:** *None*
Panel Changes: *Few* **Documents:** *No* **Help File:** *Yes*

There are new SCP panels to access displays of auto checking statistics. These displays may be used as diagnostics to monitor how well the micro jobs perform the auto checking and updating of the database. They also show the requested checking parameters and give timing statistics.

These new SCP displays are accessible from the Cluster Status Panel. A new button called "AUTO CHECK DISPLY" leads you to the new display panels. After choosing a group of micros, the "AUTO CHECK STATUS" button gives a display of the statistics on micro checking (e.g. time of last database update, time of the last check of devices, elapsed time of last check of devices). The "AUTO CHECK PARAMS" button displays the requested parameters for auto micro checking (e.g. rates on how often to check the devices). The color code of these statistics and parameters indicate the health of the micro checking:

1. GREEN: micro function is checking as requested
2. YELLOW: micro function is not checking devices
3. RED: a problem exists.

Plots from the history buffer system will be available soon.

See HELP on the SCP for more information on the displays and color coding.

Klystron Auto Checking

March 22, 1989

Author: *Bob Hall*
Panel Changes: *Few*
Subsystem: *SLC*
Documents: *Yes*
User Impact: *Moderate*
Help File: *No*

This article contains a detailed description of how the micros perform the auto checking function for the the klystrons, e.g. how the micro determines when to report new values to the VAX for use in SCP displays. New values will be sent to the VAX by a micro's klystron job if any parameter has changed significantly from the old value stored in the VAX. Three classes of mechanisms are used for determining whether a significant change has occured.

The first class involves digital items. For the following digital items, any change from the old value stored in the VAX will cause new klystron values to be sent to the VAX:

1. Digital status
2. Software/Hardware identification
3. Status
4. Status word (other than those parts of the status word that are associated with phase mean, amplitude mean, phase jitter, and phase mean)

The second class of mechanisms involves checking whether a new analog value differs appreciably from the old value stored in the VAX. If the difference exceeds the tolerance value, new klystron values will be sent to the VAX. Following is the list of each analog item in this class along with the associated tolerance value:

1. Klystron beam voltage (peak, current value, kV): 2.0
2. Sampled beam voltage (kV): 2.0
3. Klystron beam current (peak, current value, A): 2.0
4. Sample beam current (A): 2.0
5. PAD temperature (°C): 2.0
6. MKSU temperature (°C): 2.0
7. Peak held RF drive (%): 0.2
8. Peak held forward RF: 0.5
9. Peak held reflected RF: 0.25
10. Focus magnet readback (A): 0.1
11. Klystron delta water temperature (°C): 0.2
12. Klystron input water temperature (°C): 0.5
13. PAD RF mixer gain constant: 5.0

14. PAD RF amplitude pedestal: 0.2
15. Perveance from peak: 0.5
16. Klystron accelerator rate: 3.0
17. Klystron modulator rate: 3.0
18. PIOP lost trigger rate: 0.0
19. PAD phase mean / (database PAD phase mean tolerance x 0.25) = 0.625
20. PAD amplitude mean / (database PAD amplitude mean tolerance x 0.25) = 0.625
21. PAD phase jitter / (database PAD phase jitter tolerance x 0.5) = 0.1
22. PAD amplitude jitter / (database PAD amplitude jitter tolerance x 0.5) = 0.1

The last class of mechanisms is used for klystron and waveguide vacuums, where the range of analog values is very large. For these two items, new klystron values will be sent to the VAX if there is a difference of more than a factor of two between the new value and the old value stored in the VAX.

Wire Scan and Beam Scan Update

March 29, 1989

Author: *Linda Hendrickson* **Subsystem:** *SCP* **User Impact:** *Small*
Panel Changes: *One* **Documents:** *No* **Help File:** *No*

Several changes have been made recently to wire scan and beam scan software.

1. When beam-beam deflection scans are done, the beamstrahlung data is now fitted to a gaussian if data is available. These fits are now displayed on the auto-collide display in place of the out-of-plane fits which were formerly available. The fitted beamstrahlung data is also available in correlation plots.

2. The average beam intensities are now available on the auto-collide and auto-position displays. In addition, capability is now provided to normalize beam-beam deflection data and beamstrahlung data to TMITs in addition to wire data.

3. Luminosity and Z rate calculations are now available on the auto-collide display. In addition, when the auto-collide function is run, the luminosity is saved into the IPBM database in the LUMM secondary.

4. The Toggle BSCN Fits button has been removed from the scan options panel. This button allowed the user to select whether to compensate for changes in incoming beam angles. The new version of the software always compensates for the incoming angles.

5. Selection of BPM measurement definitions has been improved so that the software will first look for an existing BPM definition. If none is found, the software will automatically select the appropriate global BPM measurement definition. After entering a new SCP the user can now take wire or beam scans without first selecting a BPM definition.

6. A new capability is available but not yet in production for wire scans to guess which wire the beam is on based on the normalized flux. The normalized flux is calculated as the area under the fitted gaussian normalized to the TMIT (in E10 units). The normalized flux and probable wire are displayed on the auto-position display, and in addition when a single scan is run the user is warned if the beam

is on the wrong wire.

7. Another modification ready to go into production is that when a button is pushed to insert or withdraw a wire, the user must verify his selection with a DO YOU REALLY WANT TO DO THIS prompt.

TRIM/PRTB Buttons for Feedback

March 29, 1989

Author: *Uzi Arkadir* **Subsystem:** *Feedback* **User Impact:** *Moderate*
Panel Changes: *Few* **Documents:** *No* **Help File:** *None*

Two new buttons have been added to the Feedback Diagnostics Panel: [MAGNET ADJUST METHOD] and [KLYSTN ADJUST METHOD]. They define the method of adjusting the correctors and the phase shifters, respectively, and can be toggled to TRIM or PRTB.

PRTB—the new option—speeds up considerably the execution of slow feedback loops, thus making it possible to schedule them within smaller time slots.

DLWG Temperature Tolerance Ignored

March 30, 1989

Author: *Miguel Flores* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

When klystrons are turned off or put into maintenance mode, the new analog status "ignore" feature is enabled for associated DLWG temperature channels. When a klystron is turned on, the ignore feature is disabled. With the ignore feature enabled, DLWG temperatures that are out of tolerance (for example, because the klystron is off) will not cause the status display boxes to turn red. The on-off-maintenance mode of the klystron is set with HSTA button on the klystron sector panels.

PSK Timing Corrected

March 30, 1989

Author: *Miguel Flores* **Subsystem:** *Accelerator* **User Impact:** *Small*
Panel Changes: *None* **Documents:** *No* **Help File:** *No*

The recent mix-up of PSK timing has been sorted out. The PSK time is determined by subbooster and klystron timing. A set of values in the database define the desired PSK times. When a subbooster is *activated*, its time is set to the standard time (PDUT) plus the current database value for PSK time for the particular beam code. The desired PSK times in the database are otherwise not used for running the accelerator.

The problem was that PSK times in the database were not saved in the timing configurations. Hence, if you saved a configuration, adjusted the PSK time (which both changes the PSK time in the database and changes subbooster and klystron timings), and then reloaded the configuration, the PSK time in the database and the klystron and subbooster timings would be inconsistent. Then a subsequent subbooster *activation* would mess up the timing for that sector.

We have fixed the problem by making all timing configurations with linac subboosters and klystrons save the database PSK times.

Phase Summary Display

March 30, 1989

Author: *Ralph Johnson*
Subsystem: *SLC*
User Impact: *Some*
Panel Changes: *One*
Documents: *No*
Help File: *Yes*

There is now an SLC PHASE SUMMARY display which can be selected by a button on the special displays panel. This shows a graphical representation of the SLC along with the current values of various phases.

The top half of the display consists of a graph of the difference between the head and tail phase detectors for each sector (2–30). The last point is the MDL feedback loop command.

There is a help file which lists the database names for all of the values.

The SLC Commissioning Calendar does not appear this week as the operating schedule is being determined on a daily basis.