

PROJECT

ECI-5

Ericsson C-9000 70cm 280W PA controller interface

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ECI-5 is a single microcontroller interface that is capable of live monitoring and alarming various unwanted Power Amplifier (P.A.) states via onboard Relay, or thru serial port. ECI-5 is based on a slightly modified CX-13 pcb. For the purpose to control up to 5 P.A.'s, the 5th I2C bus was added on board. Onboard FLASH cpu can be easily uploadet with new software via SPI bus, at any time.

Oboard 2x 40chr LCD display and keyboard are used only for brief monitoring, while major controlling and maintenance power is on serial port. This port (19200 BPS 8N1) can be connected directly on to any VT100 compatible terminal, or to PC COM port using simple terminal software, or LAN, WLAN for remote access. Also on to AX25 TNC like devices, etc. System uses simple ASCII line commands for controlling. Communication port uses 3 wire cable (RxD, TxD and GND).

Board produces Beeps at keyboard pressing, plus software has anti_breach function build in, thus allowing use of any kind of buttons. Functions on 4 buttons of ECI-5 keyboard are:

button	function (v1.00)
DOWN	display all temperatures & alarms on LCD
UP	display all PWR & SWR and alarms on LCD
F	display interface info
M	clear Alarm history

F+Pwr_ON	TOTAL RESET (rewrites all variables with factory defaultls)

ECI-5 software runs as complex multitasking operating system, where some crucial tasks like triggering alarm flags runs independetly in own processes. System runs on 4MHz cpu clock and is still capable to download data, calculate, and finally trigger alarms for up to 5 P.A.'s in less than 1/3 of second. While same time monitoring onboar Keyboard, maintaining serial communication direction PC, terminal, WLAN or AX25 modem .. and also displaying main data on 2x40chr. LCD. To grab, calculate and display all posible data via RS232 it takes less than 2s for all five power amplifiers. Software also generates segment driving voltages for LCD (from cca -2.5 up to +2.5v). Therefore any 2x 40 Hitachi compatible LCD will work errorless, plus LCD Contrast is adjusted via software, not using any trimmer resistors. If the LCD has an LED background light, the intensity of light can be adjusted via software too (three steps, plus off).

ECI-5 software has wide range of automatics build in. Like, after Flash upload it automatically detect 1st run and initializes system variables with default values. If there is an I2C error (or P.A. not connected) it will

report I2C bus error, but not triggering other alarms on this device, even they exists due to missing or false data flow from P.A.'s, etc. User can determine how many of amplifiers would like to controll, up to max. five. Software automaticly readjust LCD and RS232 printouts on to desired number of informations.

Comands via serial port are single letter and are case sensitive - only UPPER CASE letters are valid ! There is no system prompt, and no response on false command entry built in. Comand 'H'elp will display main menu with brief explanation, folowing by **variable setting** (on few of them). There is no group Save command available. Each seting must be saved alone. System will operate errorless without saving new limits, too. But their curent values are lost after power failure or system restart. System restarts everytime with values from internal EEPROM.

Folowing ECI-5 commands are available:

[A] PA temperature limit [50deg.C]

Sending letter 'A' to the ECI-5 interface, new menu is displayed. Using '-' character user can decrease, while using '+' increase PA temp. limit. Value will be displayed in a single line, live. After use 'S' to save adjusted value folowed by '9' to exit in to main menu.

[B] SU temperature limit [39deg.C]

Sending letter 'B' to the ECI-5 interface, new menu is displayed. Using '-' character user can decrease, while using '+' increase PowerSupply temp. limit. Value will be displayed in a single line, live. Use 'S' to save adjusted value folowed by '9' to exit in to main menu.

[C] check status

After executing 'C' comand system asks user if the previously stored alarms shall be kept in Alarm report. If the answer is 'Y' new alarms are added to the old ones. Any other comand character will execute **clearing process** that will delete Alarm history like:

```
< CHECK STATUS > View OLD + NEW Alarms (Y/N) -> Alarm history DELETED

PA  PWR   SWR   ERP   C u r e n t   FAN   PA   SU   Err  ALARMS
-----
1:  0W    ---   0%   46 46 46 46   -   19c  21c  ---  000000
2:  0W    ---   0%   46 46 46 46   -   19c  21c  ---  000000
3:  0W    ---   0%   46 46 46 46   -   19c  21c  ---  000000
4:  0W    ---   0%   46 46 46 46   -   19c  21c  ---  000000
5:  0W    >10   0%   FF FF FF FF   1   0c   0c  I2C  100000
-----
ALARM setting:      98%   L:28h H:6Eh           50c   39c  TRIG:  !! !
```

Check status comand prints out Power Amplifier data in a single line per amplifier. Available column's are: P.A. number, PWR readout (peak), SWR readout (>10 if I2C error exists), ERP concerning to SWR, P.A. transistor curents (RAW HEX value) amplifier fans status, P.A. temperature, Power Supply temperature, I2C bus error and flags of DETECTED ALARMS. Last line contains user limits on specific items, plus active Trigering pointers showing (up) what alarm flags they monitor. If any of the alarm flags above Trigering pointers goes up ('1'), Alarm process will be executed and TX is dissabled. Its PTT line need to goes thru ECI-5 alarm relay. Alarm flags remain active till user

executes manual clearing command, either via serial port or onboard keyboard (button M). That way alarm statuses (flags) remain visible for analyzing by user, after TX goes off. Check status command can be executed at any time.

[D] number of amplifiers [5]

With help of '-' and '+' characters adjust the number of Power Amplifiers in the system. Allowed values are from 1 to 5. Use 'S' to store new setting followed by '9' to exit in to main menu.

[E] SWR limit [1.3:1 ERP 98%]

With help of '-' and '+' characters adjust SWR (ERP) for triggering alarm. Values are displayed live - on fly, like at other adjustments. Allowed are values from SWR 1.0:1 (100% ERP), up to >10:1 (30% ERP). Use 'S' to store new setting followed by '9' to exit in to main menu.

[F] ALARM flags [011010]

Toggle Alarm flags with help of number keys ranging from '1' to '6' characters. An '0' present unactive trigger, while '1' present active LIVE trigger. And additional line is displayed as help on identifying of trigger flags. Use 'S' to store new setting followed by '9' to exit in to main menu.

[G] info

Display software info.

[H] help

Display index of available commands with adjusted parameters.

[I] min.current [28h]

Using '-' or '+' characters adjust lower CURRENT limit of P.A. transistors for triggering alarm. Allowed are raw HEX values from 00h (0 dec), up to FFh (255 dec). Value will be displayed on a fly in a single line. After use 'S' to save adjusted value followed by '9' to exit in to main menu.

[J] max.current [6Eh]

Using '-' or '+' characters adjust upper CURRENT limit of P.A. transistors for triggering alarm. Allowed are raw HEX values from 00h (0 dec), up to FFh (255 dec). Value will be displayed on a fly in a single line. After use 'S' to save adjusted value followed by '9' to exit in to main menu.

[K] LCD contrast [13]

Using '-' or '+' characters adjust LCD driving voltage (kontrast). Allowed are values from 1 to 30. Value will be displayed on a fly in a single line. After use 'S' to save adjusted value followed by '9' to exit in to main menu.

[L] LCD backlight [0]

Using '-' or '+' characters adjust LCD backlight voltage (LED backlight only). Allowed are values from 0 to 3. Value 0 switches backlight OFF, values 1 to 3 defines three light densities. Value will be displayed on a fly in a single line. After use 'S' to save adjusted value followed by '9' to exit in to main menu.

[M] clear Alarm history

Use 'Y' character to clear Alarm history.

Folowing comands are for system test purposes and can be freely executed.

[R] restore from eeprom

Use 'Y' character to restore all variables. All variables are copied from EEprom in to system RAM and became immediatly active.

[U] factory defaults

Use double 'Y' characters (Y following by another Y) to restore factory defaults & restart. All variables are copied in to EEprom & system RAM, after ECI-5 will restart. Restarting is is equal to physical switching power OFF and back ON.

[W] C-9000 hex DUMP

Hexadecimal dump of available C-9000 data for all on system installed amplifiers. If all values per line are shown as FFh, it means lost of I2C communication or broken line.

[X] EEPROM hex DUMP

Hexadecimal dump of internal EEprom area (user variables setings).

[@] restart ECI-5 system

Use double 'Y' characters (Y following by another Y) to restart ECI-5 interface. All variables remains as written in EEprom. Restarting is is equal to physical switching power OFF and back ON.

Any command that need to be confirmed by 'Y' character is executed only if confirmation is sent to the interface. Sending any other character will cancle execution.

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