Technical Information Manual

MOD. SY 403

64 CHANNEL
H.V. SYSTEM

C. A. E. N. S Y 4 0 3

H I G H V O L T A G E

S Y S T E M

U S E R' S M A N U A L

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H I G H V O L T A G E S Y S T E M

SOFTWARE VERSION 1.45
USER'S NOTE

Read this section First!

This User Note describes the major features and problems fixed since the release 1.41 of the SY403 software. It is divided in three sections, one for the problems resolved in the version 1.43 and the others for the newest software versions 1.44, 1.45.

D E C E M B E R 1 9 9 3

1. FEATURES ADDED AND PROBLEMS FIXED IN VERSION 1.43

- It is possible via CAENET to set the trip value = 0; In the software versions preceding the 1.43, the SY403 responds with an error code = % FF02 (Value out of range).

- It is possible via CAENET to set Ramp-up/Ramp-down value = 0. The same as with the terminal. In the sostware versions preceding the 1.43, the SY403 responds with an error code = %FF02 (Value out of range).

- Ramp-up/Ramp-down values set to 0, means that these parameters assume the minimum value possible that is = 1 Volt/sec.

2. FEATURES ADDED AND PROBLEMS FIXED IN VERSION 1.44

- In version preceding the 1.44, in the Connect a new Crate option the number entered must have two figures (see SY403 User Manual Ver. 1.44 § B.5). This problem has been fixed in Version 1.44.

- In version preceding the 1.44, at Power-On there is an erroneous update of the Iset Values if these values have been set via CAENET on channels different from the channel 00,08,16,24,32,40,48,56. This option has been corrected in Version 1.44.

- In version preceding the 1.44, if one sets the Vmax Software for a given channel (via H.S. CAENET), the unit does not limit the Vset values to the Vmax software, but to (Vmax Software)/100. This problem has been fixed in Version 1.44.

3. FEATURES ADDED IN VERSION 1.45

- In the Operation Code for H.S. CAENET operations of the System the following features have been added (see § 6.3.1 and Table 6.8 for the Version 1.41 existing codes.) Operations on groups are also available (see next page).

Hexadecimal Operating Code
(n is the Cannel Number: n = 0..63)

Code	Meaning
%5	Read General Status
%6	Read Hardware Vmax
%n19	Set Channel Name
%1A	Set Status Alarm
%30	Format CPU EEPROM
%31	Confirm Format CPU EEPROM
%32	Clear Alarm
%33	Lock Keyboard
%34	Unlock Keyboard
%35	Kill All Chammels
%36	Confirm Kill All Channels

Hexadecimal Operating Code
(g is the Group Number: g = 0..15)

Code	Meaning
%g1B	Set Group Name
%g40	Read Channels in a Group
%g41	Read Vmon/Status Channels in a Group
%g42	Read Imon of Channels in a Group
%g43	Read V0set/I0set of Channels in a Group
%g44	Read V1set/I1set of Channels in a Group
%g45	Read Vmax/Itrip of Channels in a Group
%g46	Read Rup/Rdwn of Channels in a Group
%g50	Add Channel to a Group
%g51	Remove Channel from a Group
%g52	Set V0set of Channels in a Group
%g53	Set V1set of Channels in a Group
%g54	Set I0set of Channels in a Group
%g55	Set I1set of Channels in a Group
%g56	Set Vmax of Channels in a Group
%g57	Set Rup of Channels in a Group
%g58	Set Rdwn of Channels in a Group
%g59	Set Trip of Channels in a Group
%g5A	Switch ON the Channels in a Group
%g5B	Switch OFF the Channels in a Group

Channel Parameters Setting

Code %n19 (Set Channel Name)

- The CAENET operating code %n19 allows to set the Channel Name up to 11 characters followed by the null terminator 0. The structure of the Wods, assuming, e.g., that "ABCDEFGHIJK" is the Channel Name, is the following:

Word	Content
2	"A","B"
3	"C","D"
4	"E","F"
5	"G","H"
6	"I","J"
7	"K",0

- If there are less than 11 characters, the name is completed with a pad of zeroes. If there are more than 11 characters, the response is an error code %FF01. If the 0 terminator is missing, or id "spurious" characters are used (e.g. "@", "?", etc.), the response is an error code %FF02.

Code %1A (Set Status Alarm)

- The CAENET operating code %1A (followed by a Word) allows to set the Status of the Alarms. The structure of the Word is the following:

Status Alarm Word Structure

Bits	Bit value = 0	Bit value = 1
0	Normal Level Low	Normal level High
1	Level Type Alarm	Pulse Type Alarm
2	OVC Alarm OFF	OVC Alarm ON
3	OVV Alarm OFF	OVV Alarm ON
4	UNV Alarm OFF	UNV Alarm ON
5..15	Don't care	Don't care

Channel Parameters Reading

Code %5 (Read General Status)

- The CAENET operating code %5 allows to read General Status. The System provides in response two words: the first is the Status Alarm Word, the second contains some information related to the front panel signals:

Status Signal Word Structure

Bits	Bit value = 0	Bit value = 1
0	Vsel: V0 selected	Vsel: V1 selected
1	Isel: I0 selected	Isel: I1 selected
2	No Kill	Kill
3	No Lock	Lock
4	No HV Enable	HV Enable
5	Don't care	Don't care
6	Password Ignore	Password Reqiured
7..15	Don't care	Don't care

Code %6 (Read Hardware Vmax)

- The CAENET operating code %6 allows to read the Hardware HVMAX of the 4 boards of the System. The response consists in four words; each word contains the HVMAX value of the corresponding board. If a board is not present, the corresponding word is meaningless.

System Opereations

Code %30, %31 (format CPU E^2PROM)

- The CAENET operating codes %30, %31 allow to format the CPU EEPROM. In order to do this a CAENET command %30 must be performed, followed by a %31 command to confirm the operation. If only a %31 is performed, the response is an error code %FF01.

Code %32 (Clear Alarm)

- The CAENET operating code %32 clears the Alarms occurred in the System.

Code %33, %34 (Lock/Unlock Keyboard)

- The CAENET operating codes %33, %34 allow respectively to Lock the Front Panel Keyboard or to Unlock it.

Code %35, %36 (Kill All Channels)

- The CAENET operating codes %35, %36 allow to kill all channels. In order to do this a CAENET command %35 must be performed, followed by a %36 command to confirm the operation. If only a %36 is performed, the response is an error code %FF01.

Group Parameters Setting

Code %g1B (Set Group Name)

- The CAENET operating code %g1B allows to set the Group Name up to 11 characters followed by the null terminator 0. The structure of the Words is the same as the Channel Name (see page 3 of these notes).

Code %g50 (Add Channel to a Group)

- The CAENET operating code %g50, followed by the Channel Number, allows to add a Channel to a Group. The new Channel is placed at the bottom of the Group.

Code %g51 (Remove Channel from a Group)

- The CAENET operating code %g51, followed by the Channel number, allows to remove a Channel from a group.

Code %g52 (Set V0set in a Group)

- The CAENET operating code %g52, followed by the V0 value, allows to set the V0set value for all Channels in a Group.

Code %g53 (Set V1set in a Group)

- The CAENET operating code %g53, followed by the V1 value, allows to set the V1set value for all Channels in a Group.

Code %g54 (Set I0set in a Group)

- The CAENET operating code %g54, followed by the I0 value, allows to set the I0set value for all Channels in a Group.

Code %g55 (Set I1set in a Group)

- The CAENET operating code %g55, followed by the I1 value, allows to set the I1 set value for all Channels in a Group.

Code %g56 (Set Vmax in a Group)

- The CAENET operating code %g56, followed by the Vmax value, allows to set the Vmax value for all Channels in a Group.

Code %g57, %g58 (Set Rup/Rdwn in a Group)

- The CAENET operating codes %g57, %g58, followed by the Rup/Rdwn values, allow to set respectively the Rup and Rdwn values for all Channels in a Group.

Code %g59 (Set Trip in a Group)

- The CAENET operating code %g59, followed by the Trip value, allows to set the Trip value for all Channels in a Group.

Code %g5A (Set ON Channels in a Group)

- The CAENET operating code %g5A allows to set ON the all Channels in a Group.

Code %g5B (Set OFF Channels in a Group)

- The CAENET operating code %g5B allows to set OFF the all Channels in a Group.

Group Parameters Reading

Code %g40 (Read Channels in a Group)

- The CAENET operating code %g40 returns a Group Name and a series of words representing the Channel Numbers for that Group. Once the Hex number %FFFFis read, the readout of the Channels in that Group is terminated.

Code %g41 (Read Vmon and Status for a Group)

- The CAENET operating code %g41 returns a certain number of series of three words representing, respectively, the Most Significant Word of Vmon, the least Significant word of Vmon and the Status Word; this is done for each Channel of that Group.

Code %g42 (Read Imon for a Group)

- The CAENET operating code %g42 returns a word representing Imon for each Channel of that Group.

Code %g43 (Read V0set and Ioset for a Group)

- The CAENET operating code %g43 returns a certain number of series of three words representing, respectively, the Most Significant Word of V0set, the least Significant word of V0set and the Word of I0set; this is done for each Channel of that Group.

Code %g44 (Read V1set and I1set for a Group)

- The CAENET operating code %g44 returns a certain number of series of three words representing, respectively, the Most Significant Word of V1set, the least Significant word of V1set and the Word of I1set; this is done for each Channel of that Group.

Code %g45 (Read Vmax and Trip for a Group)

- The CAENET operating code %g45 returns a certain number of series of two words representing, respectively, the Vmax and the Trip Word for each Channel of that Group.

Code %g46 (Read Rup and Rdwn for a group)

- The CAENET operating code %g46 returns a certain number of series of two words representing, respectively, the Ramp Up and the Ramp Down Word for each Channel of that Group.

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1.SYSTEM OVERVIEW

The CAEN 64 CHANNEL HIGH VOLTAGE SYSTEM, Model SY403, has been designed specifically to fulfil the requirements of huge experiments using a large number of channels (photomultipliers or other detector) which need individual high voltage supply .

The system is organized into "crates".Each crate is a 19" wide euro mechanics rack, it houses 64 independent H.V. channels arranged in 4 boards bearing 16 channels each (A500 series).Up to 100 crates, for a total of 6400 channels may be connected and controlled from a single point.

Each crate may be controlled locally or remotely.

Local control is performed manually through a key-pad and an LCD display located on the Front Panel.

Remote control is actuated by means of a video terminal (ANSI VT100 or compatible) plugged into an RS232C connector, which is also located on the Front Panel.In this case, a sophisticated software user interface is available, featuring symbolic names for channels, custom status displays and other features designed to help the management of a large number of channels.In order to protect the system from improper use a Password protection can be set for each channel.

Each crate houses an HIGH SPEED (H.S.)CAENET node for the remote control; it allows the possibility of linking one or more crates to an H.S. CAENET controller which acts as System control unit.

Available controllers are

- A303 H.S. CAENET PC Controller,
- C117B H.S. CAENET CAMAC Controller,
- V288 H.S. CAENET VME Controller,

The Model SY403 can also be configured as H.S. CAENET Controller itself, it permits to control a multicrate system from a single video terminal plugged in one of the crates. The communication software needed for the operation of multicrate system is built in every unit.

A sophisticated hardware protection of the supplied detector is also provided in each H.V. board. The maximum output voltage (Vmax hardware) can be fixed, through a potentiometer, at the same value common for all the channels of the board; this value can be read-out by software.Moreover for each channel is possible to set via software another output voltage maximum limit (Vmax software) .

Two voltage values (V0set, V1set) can be programmed for each channel, while it is possible to set two current limit values (I0set, I1set) common for every 8 channels of the board. Switching from one value to the other is performed via two external (NIM or TTL) input levels (VSEL, ISEL).

The maximum rate of change of the high voltage (Volt/sec), may be programmed for each channel. Two distinct values are available, depending on the sign of the change (Ramp-Up, Ramp-Down). An attempt to change the high voltage will result in a linear increase or decrease with time, being the rate determined by "Ramp-Up" or "Ramp-Down" parameter. This feature has been provided to protect those devices which could also be harmed by a sudden voltage step-up.

If a channel tries to draw a current larger than the programmed limit, it is signalled to be in "overcurrent". The system detects this state as a fault and may be programmed to react in different ways, namely:
A. CONSTANT CURRENT

The output voltage is varied to keep the current below the programmed limit. The channel behaves like a current generator.

B. KILL
The channel is switched off independently of the value of "Ramp-Down" of that channel. It is used only in situations where an accidental short circuit could cause serious physical damage to the detector.

C. TRIP
The channel is switched off. The high voltage will drop to zero at a rate determined by the value of "Ramp-Down" for that channel. The channel behaves like a current generator before being switched off.

All the relevant parameters are kept in a special non volatile memory (EEPROM) so that this information is not lost at power off.

The system may be instructed to react to a Power-on or to a Restart bringing all the channels from zero to the programmed value without the operator's intervention. If this option is selected, (see §5.2 and §4.3.1) the system will recover smoothly from a power failure or RESET , automatically restoring the status it had before the power was interrupted.
NOTE: A decrease in the voltage (more than 10% for a time • 10 ms) or any external cause (i.e. output discharge) that can produce a loss of synchronism software of the SY403 system, generate an automatic Reset.

As option the unit can be delivered with H.V. multipin connectors instead of the standard SHV ones.

2. SYSTEM COMPONENTS

The system is composed of a Main controller and up to four boards that house the H.V. channels which are plugged into the crate.The boards are available with negative or positive polarity. Boards with different polarity can be freely mixed in the crate.

2.1 Mod A503 H.V. Channels Board (3000V 3 mA)

HV channels boards are plugged into the back of the crate. Each board houses 16 H. V. channels. Up to 4 boards may be plugged into a single crate, for a maximum total of 64 H.V. channels per crate.

The maximum output voltage (Vmax hardware) can be fixed, through a potentiometer, at the same value common for all the channel of the board and this value can be read-out by software. Moreover, via software it is possible to set for each channel another output voltage maximum limit (Vmax software).

The output voltage is programmable from 0 to the maximum value in steps of 0.2 V and the maximum output current is programmable from 0 to the maximum in steps of 1 µA. Beside each H.V. connector a LED has been placed to signal when the channel is on.

2.1.1 Mod. A503 H.V. Channels Board External Components

Refer to Fig 2.1

CONNECTORS

- No. 16 "CH0..15" SHVR317580 connector;
  these are for the 16 outputs of the H.V. channels.

LEDs

- No. 16 "CH0..15" red LED;
  signalling, when alight, that the corresponding channel is on.

TRIMMERS

- No. 1 "MAXV" screwdriver trimmer;
  for the Vmax hardware setting.

2.1.2 Mod. A503 H.V. Channels Board Safeties

Vmax hardware range 0 .. +/-3000 V
common for all the H.V.channels of the board;
this value is read-out by the software.

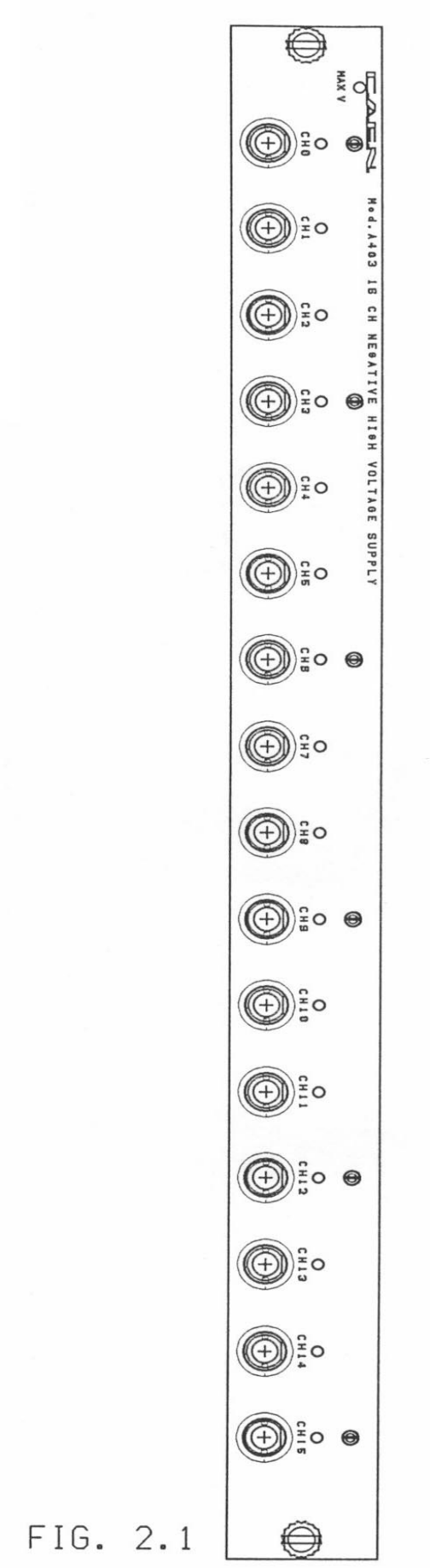
CAEN
Mod.A403 16 CH NEGATIVE HIGH VOLTAGE SUPPLY
MAX V
CH0
CH1
CH2
CH3
CH4
CH5
CH6
CH7
CH8
CH9
CH10
CH11
CH12
CH13
CH14
CH15

FIG. 2.1

2.1.3 Mod. A503 H.V. Channel Characteristics

Polarity	Positive/Negative
Output Voltage	20 to +/- 3000 V (positive/ negative polarity)
Max Current	3 mA
Voltage Set/Monitor Resolution	0.2 V
Current Set/Monitor Resolution	1μA
Vmax hardware	0 to 3000 V common for all the board channels
Vmax software	0 to 3000 V settable for each channels
H.V. Out Accuracy	+/- 1 V
Voltage Set/Monitor Accuracy	+/- 0.3% +/- 4 V
Current Monitor Accuracy	+/- 2% +/- 1 LSB
Current Set Accuracy	+/- 2% +/- 4 μA
Voltage Monitor Long Term Stability	+/- 1 V
Ramp Down	1 to 999 Volt/sec 1Volt/sec step
Ramp Up	1 to 999 Volt/sec 1Volt/sec step
Voltage Ripple	≤50 mV_{pp} (at 2.5 KV/2.5 mA)

2.2 Mod A504 H.V. Channels Board (600V 200 µA)

HV channels boards are plugged into the back of the crate. Each board houses 16 H. V. channels. Up to 4 boards may be plugged into a single crate, for a maximum total of 64 H.V. channels per crate.
The boards are available with negative or positive polarity, and the output voltage of each channel can range from 0 to +/- 3000 V.

The maximum output voltage (Vmax hardware) can be fixed, through a potentiometer, at the same value common for all the channel of the board and this value can be read-out by software.
Moreover, via software it is possible to set for each channel another output voltage maximum limit (Vmax software):

The output voltage is programmable from 0 to the maximum value in steps of 0.2 V and the maximum output current is programmable from 0 to the maximum in steps of 1 µA. Beside each H.V. connector a LED has been placed to signal when the channel is on.

2.2.1 Mod. A504H.V. Channels Board External Components

Refer to Fig 2.1

CONNECTORS

- No. 16 "CH0..15" SHVR317580 connector;
  these are for the 16 outputs of the H.V. channels.

LEDs

- No. 16 "CH0..15" red LED;
  signalling, when alight, that the corresponding channel is on.

TRIMMERS

- No. 1 "MAXV" screwdriver trimmer;
  for the Vmax hardware setting.

2.2.2 Mod. A504 H.V. Channels Board Safeties

Vmax hardware range 0 .. +/-600V
common for all the H.V.channels of the board;
this value is read-out by the software.

2.2.3 Mod. A504 H.V. Channel Characteristics

Polarity	Positive/Negative
Output Voltage	0 to +/- 600 V (positive/ negative polarity)
Max Current	200 µA
Voltage Set/Monitor Resolution	0.04V
Current Set/Monitor Resolution	10 nA
Vmax hardware	0 to 600 V common for all the board channels
Vmax software	0 to 600 V settable for each channels
H.V. Out Accuracy	+/- 0.2 V
Voltage Set/Monitor Accuracy	+/- 0.3% V +/- 2 V
Current Set Accuracy	+/- 2% +/- 600 nA
Current Monitor Accuracy	+/- 2% +/- 1 LSB
H.V. Out Long Term Stability	+/- 0.3 V
Voltage Monitor Long Term Stability	+/- 0.3 V
Ramp Down	1 to 999 Volt/sec 1Volt/sec step
Ramp Up	1 to 999 Volt/sec 1Volt/sec step
Voltage Ripple	$\leq 10\ mV_{pp}$

2.3 Main Controller

A number of basic functions are provided by this module including Power Supply, ventilation, direct control and monitoring over HV channels of the crate, manual and remote interface. It allows control of a multicrate system if it is configured as H.S.CAENET controller.

2.3.1 Power Supply

The power supply for the whole crate is housed in the Main Controller. It is capable of powering all the high voltage channels that can be plugged into the back. A switch located near the connector for the Power Cord allows the power a.c. selection. (220 Volt 50 Hz/110 Volt 60 Hz). The low voltage levels generated are: +70V, +12V, -12V, +5V and are monitored by four LEDs on the Front Panel.

2.3.2 H.V. Control

A 16-bit MC68000 microprocessor unit (MPU) is located in the Main controller and has direct control over the HV channels. All the parameters readout or modification requests coming from different sources (manual interface, video terminal, H.S. CAENET controller) are handled by this processor. The Main Controller also contains a permanent memory (EEPROM) which holds the current values of the parameters of all the channels in the crate. All this information is not lost at power off and there is no need to re-program the system at power on.

2.3.3 Control and Monitoring

A key is provided on the left hand side to turn the system on.

A switch "HV ENABLE" is provided on the Front Panel to enable/disable the high voltage output: when the switch is low (the relative LED is OFF) the HV outputs of all channels are disabled.The LAMP "H.V. ON" signals, when alight, that at least one channel is on.

Several connectors are provided on the Front Panel: one output (STATUS) and three inputs (KILL, VSEL, ISEL); The standard level (TTL or NIM) of these signals is selectable via a Front panel two position lever switch.

On the Front panel are also present a Reset push button and a Reset input, an INTERLOCK input (LEMOO 00 connector), and a two position lever switch for the INTERLOCK level setting .

2.3.4 Main Controller External Components

Refer to Fig. 2.2

CONNECTORS

- No. 2 . "KILL" LEMO 00 type,50 Ohm connector;
  two bridge connectors (for daisy chaining) for the KILL input signal.
  The relevant LED is On when the signal is True.

- No. 1 . "STATUS" LEMO 00 type, 50 Ohm connector;
  connector for the STATUS output signal
  The relevant LED is On when the signal is True.

- No. 1 . "INTERLOCK" LEMO 00 type, 50 Ohm connector;
  connector for the INTERLOCK input. It can be activated in two ways ("clamp to ground" or power connection") depending on the position of the two position lever switch (HIGH/LOW) located near the input.
  The relevant LED is On when the signal is True.

- No. 2 . "VSEL" LEMO 00 type, 50 Ohm connector;
  two bridge connectors (for daisy chaining) for the VSEL input signal.
  The relevant LED is On when the signal is True.

- No. 2 . "ISEL" LEMO 00 type, 50 Ohm connector;
  two bridge connectors (for daisy chaining) for the ISEL input signal.
  The relevant LED is On when the signal is True.

- No. 1 . "RESET" LEMO 00 type, 50 Ohm connector;
  for the RESET input signal.
  The relevant LED is On when the signal is True.

- No. 2 . "HIGH SPEED CAENET" LEMO 00 type, 50 Ohm connector;
  two bridge connectors (for daisy chaining) for the H.S. CAENET communication line.
  The relevant LED is On when the H.S. CAENET node is active.

- No. 1 "RS 232C" RS232 female connector; Serial Port:
  for the remote control: any VT100 compatible Video Terminal may be plugged into this standard RS232C port .

DISPLAYS

- No. 1 "MAIN" LAMP; it lights up when the Power is On.

- No. 1 "H.V. ON" LAMP; it lights up when at least one H.V. channel is On.

- No. 1 "H.V. EN" red LED; it lights up when the "H.V. EN" switch is On.

- No. 4 "+70,+12,-12+5" green LED; for the internal low voltage levels monitoring.

- No. 4 "RESET",KILL,"INTERLOCK","STATUS" red LED;
they light up when the corresponding signal is True.

- No. 5 "VSEL","ISEL",green LED;
they light up when the corresponding signal is True.

- No. 2 "TTL","NIM" green LED;
they indicate the standard level (NIM or TTL) of the signals STATUS,KILL, VSEL, ISEL.

- No. 1 "HIGH SPEED CAENET" red LED; it lights up when the H.S. CAENET node is active.

- No. 1 Liquid crystal display 240(W) x 64(H) dots with backlight; display for the Local control.

KEY PAD

- No. 21 keys"0..9",".","ACK"left,right,up,down, and 5 Function keys;
They allow the manual setting of the channels parameters;They are also used to set the RS232 port configuration and the H.S. CAENET node address (Crate number). The meaning of the Function keys is shown on the LCD display.

SWITCHES

- No. 1 "MAIN" Power On/Off Key;
The LAMP under the key is on when the Power is On.

- No. 1 "110/220 V"Switch; for the a.c. power selection.

- No. 1 "H.V. EN" Two position lever Switch;
it allows to enable or disable the H.V. outputs:
UP= Enable
DOWN=Disable
The relevant LED is On when the switch is On

- No. 1 "NIM/TTL" Two position lever Switch;
it allows to set the standard level of the signals STATUS, KILL, VSEL, ISEL.

- No. 1 "LOW/HIGH" Two position lever Switch; it allows to set the INTERLOCK level .

- No. 1 "RESET "push button;
by pushing this button the microprocessor is restarted and the whole system resumes its operation from the beginning.

2.3.5 Main Controller Signal Characteristics

INPUT

"KILL"	std NIM level or std TTL level on 50 Ohm impedance
"RESET"	std NIM level on 50 Ohm impedance

OUTPUT

"STATUS"	std NIM level or std TTL level on 50 Ohm impedance

2.3.6 Power Supply Characteristics

Power Requirement

220 V a.c.	50 Hz,	700 V A at 500 W power load
115 V a.c	60Hz (switch selectable)	700 V A at 500 W power load

Low Voltage Characteristics

Voltage	Maximum output current
+70.0 V	10 A
+12.0 V	3 A
-12.0 V	3 A
+5.0 V	8 A

2.3.7 Crate Characteristics

Shipping weight	11 Kg + packaging
Size	4 Eurocard units and 19" wide, rack type
Max delivered Power	500 watts
Humidity range	0 - 80%
Operating Temperature	0 - 45° C
No. of H.V Boards	4 per Crate; Pos and Neg H.V. Modules can be intermixed in the same crate
No. of H.V. Channels	Max 64 per Crate (16 channels per H.V. Board)
No. of crates	Max of 100 connected on the same H.S. CAENET Network

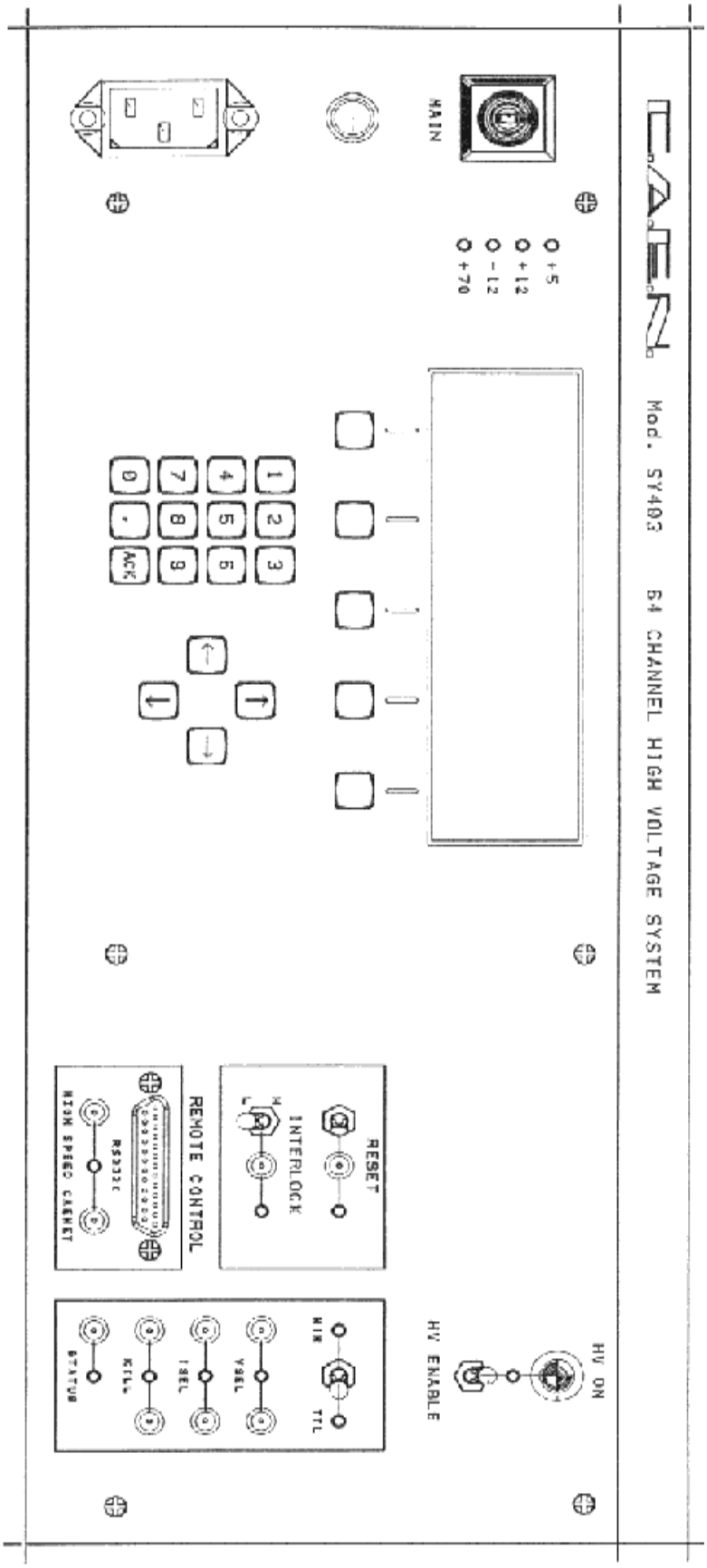
Mod. SY403
64 CHANNEL HIGH VOLTAGE SYSTEM
MAIN
+5
+12
-12
+70
RESET
INTERLOCK
REMOTE CONTROL
HV ENABLE
HV ON
TTL

FIG. 2.2

3. OPERATING MODES

3.1 H.V.Modules Insertion

HV channels boards are plugged into the back of the crate. Each board houses 16 H. V. channels. Up to 4 card boards (Board 0..3) may be plugged into a single crate, for a maximum total of 64 H.V. channels per crate.

The Board numbering start from the top slot (Board0) to the bottom slot (Board3).

3.1.1 Channel Numbering

Channel in each crate are numbered from 0 to 63.Looking from the back of the crate, the numbering starts from top left (CH00) and proceeds row wise to bottom right (CH63). If an H.V. channel board is not present, the corresponding 16 channels are said "not present". Any attempt to select an empty channel will result in a error message.

3.2 Channel Parameters

Several parameters are associated with each H.V. channel. They can be programmed and monitored in different ways:

- via Local control by using the LCD display and the Keypad;
- via Remote control through the H.S. CAENET link or through the RS232C Port;
- via the Front Panel input signals;

A brief description of the meaning of all of them is given on the following :

3.2.1 Channel Number (CH #)

It is the physical name of the channel, (CH00..CH63) it is determined by the channel position as explained in § 3.1.1; this parameter is read-out by the software and is always associated to the channels monitored both in Local and Remote control.

3.2.2 Channel Name

It is the symbolic name of the channel; It can be modified via Remote Control (the default name of the Channels are "CHANNEL00".."CHANNEL63") it may be up to 11 characters long and may contain any alphanumeric character. Via Local Control it is displayed but it is not possible to modify it.

3.2.3 Vmax Hardware

The maximum High Voltage value programmable for all the 16 channels of the H.V. Board - Expressed in Volt-. It is fixed, through a potentiometer "MAXV" (located near the CH0 H.V. connector of the H.V. Board).

H.V. Channels Board	Range
A503 (3000V 3mA)	0.. +/- 3000 V
A504 (600V 200µA)	0.. +/- 600 V

This value can be read-out by the software

3.2.4 Vmax Software

It is the maximum High Voltage value (absolute value) programmable for the channel.

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	0.. +/- 3000 V	0.20V
A504 (600V 200µA)	0.. +/- 600	0.04 V

It can be programmed via :
- Local Control;
- Remote Control.

3.2.5 V0set

First High Voltage programmed value (absolute value).

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	0.. Vmax Soft.	0.20V
A504 (600V 200µA)	0.. Vmax Soft.	0.04 V

Active when **VSEL is False.** It can be programmed via :
- Local Control;
- Remote Control.

3.2.6 I0set

First Current Limit programmed value; it is common for every 8 channels of the board .

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	1µA.. 3000µA	1µA
A504 (600V 200µA)	0.01µA.. 200µA	0.01µA

Active when **ISEL is False**. It can be programmed via :
- Local Control;
- Remote Control.

3.2.7 V1set

Second High Voltage programmed value (absolute value).

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	0.. Vmax Soft.	0.20V
A504 (600V 200µA)	0.. Vmax Soft.	0.04 V

Active when **VSEL is True**. It can be programmed via :
- Local Control;
- Remote Control.

3.2.8 I1set

Second Current Limit programmed value; it is common for every 8 channels of the board.

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	1µA.. 3000µA	1µA
A504 (600V 200µA)	0.01µA.. 200µA	0.01µA

Active when **ISEL is True** It can be programmed via :
- Local Control;
- Remote Control.

3.2.9 Ramp-up

Maximum High Voltage programmable increase rate (absolute value).When channels are switched On, or when are switched from a lower High Voltage value to an higher, the H.V. output drifts from one value to the other at the rate expressed by the Ramp-up parameter programmed for each channel.

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	1..999 Volt/sec	1 Volt/sec
A504 (600V 200µA)	1..999 Volt/sec	1 Volt/sec

It can be programmed via :
- Local Control;
- Remote Control.

3.2.10 Ramp-down

Maximum High Voltage programmable decrease rate (absolute value). When channels are switched Off, (H.V. Off see §3.2.14 or at power-down with Pon=Rdwn see §3.2.16) or when are switched from an higher High Voltage value to a lower, the H.V. output drifts from one value to the other at the rate expressed by the Ramp-down parameter programmed for each channel.

H.V. Channels Board	Range	Step
A503 (3000V 3mA)	1..999 Volt/sec	1 Volt/sec
A504 (600V 200µA)	1..999 Volt/sec	1 Volt/sec

It can be programmed via :
- Local Control;
- Remote Control.

3.2.11 Vmon

High Voltage Monitored value.(Expressed in Volt).

H.V. Channels Board	Resolution
A503 (3000V 3mA)	0.20V
A504 (600V 200µA)	0.04 V

It is monitored via :
- Local Control;
- Remote Control.

3.2.12 Imon

Current Monitored value (Expressed in µA)

H.V. Channels Board	Resolution
A503 (3000V 3mA)	1µA
A504 (600V 200µA)	0.01µA

It is monitored via :
- Local Control;
- Remote Control.

3.2.13 Trip

Maximum time an "overcurrent" is allowed to last expressed in tenth of second. If an "overcurrent" lasts more than the programmed value, the system will react in the following ways:

Trip =0..999: Trip
it will cause the channel to "Trip": After an interval of time equal to the Trip value in tenth of second, the output voltage will drop to zero at the rate specified by the Pdwn parameter (see § 3.2.16) and the channel will be put in the off state.

- Pdwn = Kill : the channel is switched off, irrespective of its Ramp down programmed value;

- Pdwn = Rdwn: the output voltage will drop to zero at the programmed rate (Ramp-down programmed value).

Trip = 1000: Constant Current
the overcurrent may last indefinitely. The channel behaves like a current generator.

It can be programmed via :
- Local Control;
- Remote Control.

3.2.14 H.V. On/Off

This is the Status On/Off of the channel; by setting this parameter On the channel is On and the H.V. output drifts from 0 to the programmed value at the programmed rate.

It can be programmed via :
- Local Control;
- Remote Control.

3.2.15 Power-on Status (Pon)

This parameter controls the behaviour of the channel at the power on (On/Off.) If this parameter is On, and if it is enabled (see § 5.2), the channel react at Power on, or after a Restart bringing the channel from 0 to the programmed value without operator intervention.

It can be programmed via :
- Local Control;
- Remote Control.

3.2.16 Power-down Status (Pdwn)

This parameter controls the behaviour of the channel in these cases:

- when the H.V. outputs of the system are disabled via the "H.V. EN" Switch;

- when an overcurrent lasts more than the programmed value (Trip = 0..999).

If one of these events occurs the channel are switched off in a way determined by the Pdwn parameter as shown in the following table:

Pdwn= Kill	the channel is switched off in less than 20 ms irrespective of its Ramp down programmed value.
Pdwn= Rdwn	the output voltage will drop to zero at the programmed rate (Ramp-down programmed value).

It can be programmed via :
- Local Control;
- Remote Control.

3.2.17 Channel Status

It is the status of the channel which can be:

Up **H.V. output Up**
The high voltage is regularly increasing towards the programmed value at the programmed rate.(Ramp-up).

Down **H.V. output Down**
The high voltage is regularly decreasing towards the programmed value at the programmed rate.(Ramp-down).

Ovv **Overvoltage**
This condition is signalled :

-When the actual value of the high voltage output is higher than the programmed value.

- When the actual value of the high voltage increase/decrease rate is higher then the programmed value (Ramp-up /Ramp-down parameter).

if the Ovv mask is ON (see § 3.3.1) the output signal STATUS becomes true;

Unv **Undervoltage**
This condition is signalled :

-When the actual value of the high voltage output is lower than the programmed value.

-When the actual value of the high voltage increase/decrease rate is lower than the programmed value (Ramp-up/Ramp-down parameter).

if the Unv mask is ON (see § 3.3.1) the output signal STATUS becomes true;

Ovc **Overcurrent**
The current limit has been reached, and the channel is now behaving like a constant current source. if the Ovc mask is ON (see § 3.3.1) the output signal STATUS becomes true;

Trip-down **The channel has tripped,**
An overcurrent has lasted longer then the allowed time.and the high voltage is decreasing towards 0 at the programmed rate (Ramp-down).

Tripped **The channel has Tripped and has been switched off.**
If the STATUS is true, it remains in that state until a "Clear Alarm" command is performed (see § 5.1) To recover from this state it is sufficient to turn that channel On again. this operation also clears the STATUS signal (if asserted).

Hvmax **The channel has reached the Vmax Hardware value.**
This means that the hardware protection circuit is active.

The channel Status is monitored via :
- Local Control;
- Remote Control.

3.2.18 Password protection status

This protection is active only via Terminal control (see §5). It is the status of the protection: if="Required" it is necessary to know the password to modify the parameters of the channel (via Terminal).

It can be programmed via Remote Control; in particular it is possible to set this parameter via H.S. CAENET link when the H.S. CAENET network is not controlled via Video Terminal. That is when the H.S. CAENET Controller is one of the following:

- A303 H.S. CAENET PC Controller,;
- C117B H.S. CAENET CAMAC Controller;
- V288 H.S. CAENET VME Controller.

3.3 H.V. Control via Front Panel Signals

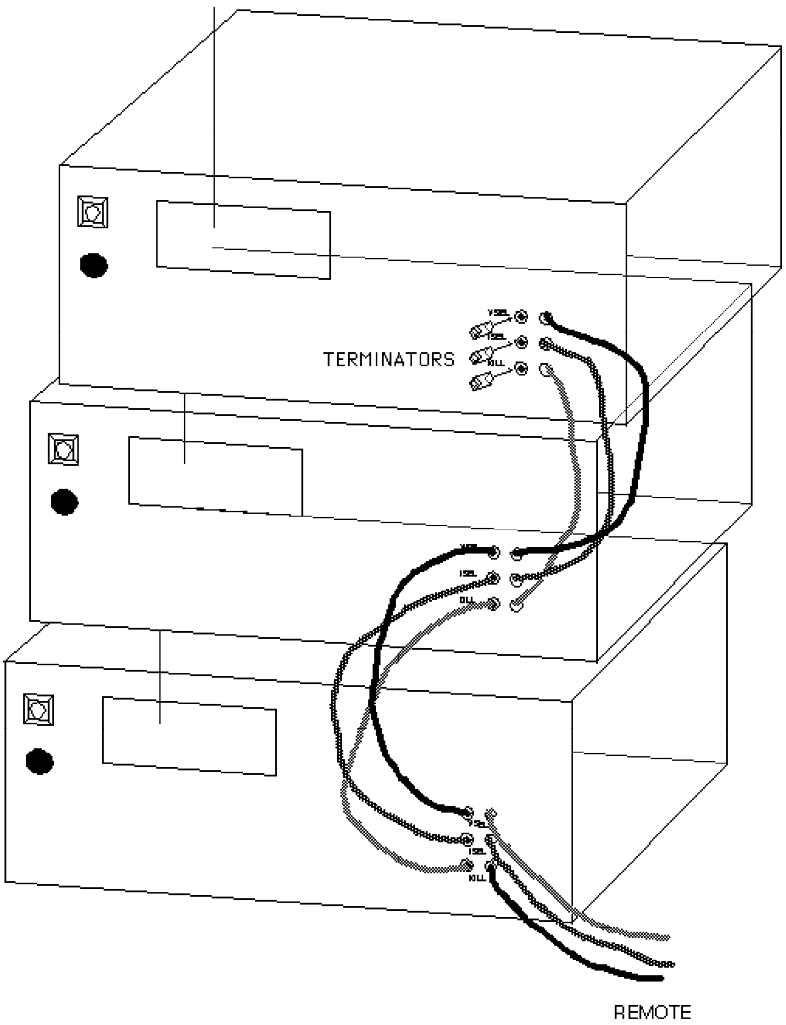

Fig. 3.1 Connecting the Main controllers

The Status output is capable of driving 50 ohm, the inputs are high impedance and each one is provided with two bridge connectors for daisy chaining (ref. to FIG.3.1). Note that the high impedance makes these inputs sensitive to noise, so the chain has to be terminated on 50 ohm on the last module; the same is needed also if one module only is used, whose inputs have thus to be properly matched. LEDs are provided for each input/output connector: they are ON when the corresponding signal is "true".

The standard level (TTL or NIM) of the signals STATUS, KILL, VSEL, ISEL is selectable via the Front panel switch "NIM/TTL".

3.3.1 STATUS (output)

It signals that an error condition has been detected in a channel. Via Software it is possible to chose:

- the error conditions that cause the Alarm; (It is possible to set a Mask for each of these three conditions Ovc,Ovv,Unv: if the mask is ON the corresponding error condition causes the Alarm);

- the level of the output when there are no error conditions (Normal Level);

- the Alarm type (Pulsed or Level). If the option chosen is "Pulsed", The STATUS output (when active) is a periodic signal (the period is about few hundred msec)

The STATUS signal is cleared (goes to the Normal level chosen) in these cases:

- If the error condition detected is an Overvoltage, the STATUS is cleared only when the channel resumes its normal operating conditions.

- If the error condition detected is an Undervoltage, the STATUS is cleared only when the channel resumes its normal operating conditions.

- If the error condition detected is an Overcurrent and the channel has not "Tripped", the STATUS is cleared only when the channel resumes its normal operating conditions.

- If the channel has "Tripped" the STATUS is cleared in these ways

    - by making a "Clear Alarm" procedure (see § 5.1);
    - by turning the channel On.

3.3.2 KILL (input)

A pulse of at least 100 msec sent into this input will switch all the crate channels off regardless of the Ramp-down or other parameters.

3.3.3 VSEL (input)

Two HV values can be programmed for each channel: V0set and V1set.They are selected by the status of VSEL:

VSEL = False	V0set selected
VSEL = True	V1set selected

When channels are switched from V0 to V1 or viceversa, the HV drifts from one value to the other at the rate programmed for each channel (Ramp-Up or Ramp-Down).

3.3.4 ISEL (input)

Two current limit values can be programmed for each channel: I0set and I1set. They are selected by the status of ISEL:

ISEL = False	I0set selected
ISEL = True	I1set is selected

3.3.5 INTERLOCK (Input)

This input allows to switch off simultaneously all the SY 403 channels, thus operating like the "KILL" input. The "Interlock" can be activated in two ways depending on the position of the two position lever switch (HIGH/LOW) located near the INTERLOCK input .

If the switch is on position "**LOW**" the channels are switched off if the ground connection in the "Interlock" input is removed.

Vice-versa if the switch is positioned on "**HIGH**" the channels are switched off if the "Interlock" input is grounded.In order to turn the channels on again you must remove the Interlock condition. Any attempt to turn the channels on without removing the Interlock condition will result unsuccessfully.

3.3.6 RESET (Input)

If a pulse of at least 30 µsec is applied to this input, the microprocessor is restarted and the whole system resumes its operation from the beginning. All the high voltage outputs are dropped to zero and put in the "OFF" state.

The system then reacts as it would react to a power on. If the system has been programmed for an automatic recovery, it will restore the status of all the channels bringing all the high voltages to their programmed values at the correct rate.

The same result is obtained by pushing the RESET push-button.

3.4 Manual Control

The manual interface houses a LCD display and 21 keys (0 - 9, ., ACK , left,right, up, down and 5 Function keys). By using this interface it is possible to set all the parameters and to know the status of all the channels in the crate. In particular permits the RS232 port configuration and the H.S. CAENET address setting.

Some of the setting operation can be disabled via Terminal (see Disable keyboard command)

3.5 Remote Control

As previously described the remote control of the Model SY403 is possible via the RS232 port and via H.S. CAENET link.

3.5.1 RS232 Port

Any VT100 compatible video terminal may be plugged into this standard RS232 C serial Port.(see Fig 3.2 for the connector pin assignment). The setting of the Port has to be made in accordance with the User terminal characteristics; the Baud rate and the communication protocol parameters can be selected via Manual control. Detailed instructions are found in chapter 4.4. A sophisticated Software runs on the MC68000 microprocessor housed in this module; it acts as an user-friendly interface, to provide straightforward access

- to all the channels parameters of the crate directly connected to the terminal.

- to all the channels parameters of all the crates linked via the H.S.CAENET Network. In this case the Crate connected directly to the terminal can be used as an H.S. CAENET Controller (see below)

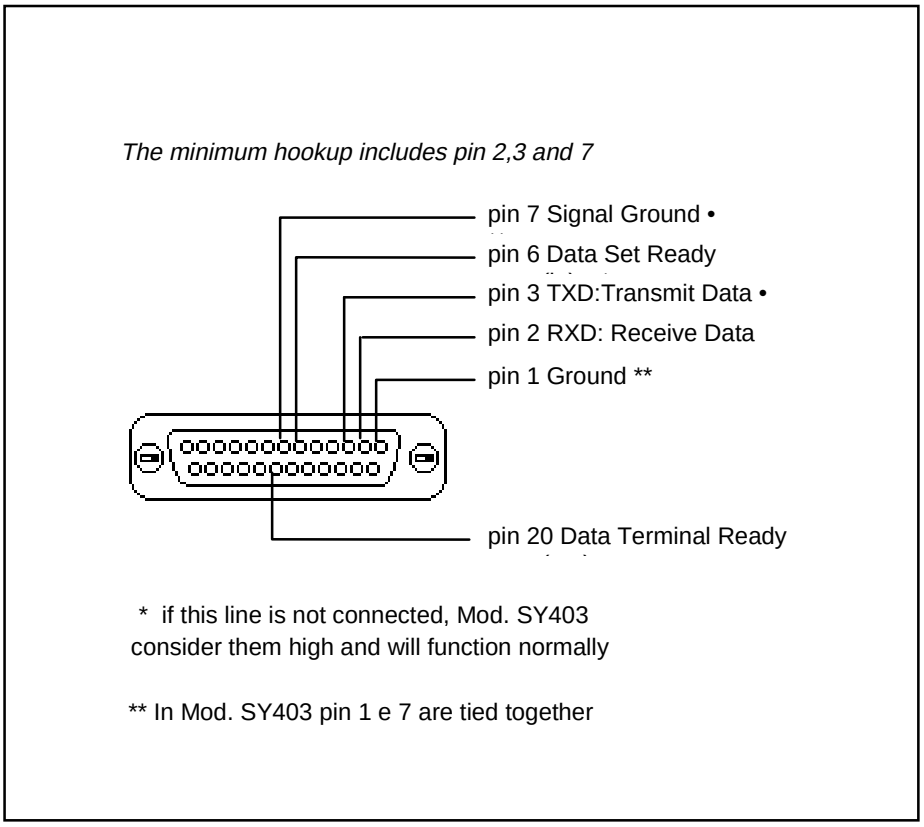

Fig 3.2 RS232 connector pin assignment

3.5.2 H.S. CAENET Operation

H.S. CAENET Network is a send and receive half duplex system; It permits asynchronous serial transmission (1MBaud rate) of data packets along simple 50 Ohm coaxial cable. Several devices (H.S. CAENET nodes) are able to share the same media to transmit and receive data. Each node is able to receive the serial data packet and store it automatically in a FIFO (RX FIFO) and transmit the data contained in another FIFO (TX FIFO).Both FIFOs are 512 byte deep.

Usually transfers between H.S. CAENET nodes take place according to the typical Master/Slaves communication:

- There is a single Master : H.S. CAENET controller
- The Slaves are daisy chained on the network, and are identified by an address code (from 0 to 99);
- the H.S. CAENET Master initiates the transmission, all the Slaves receive the data, and only the Slave addressed then accesses the serial line to transmit the data requested by the Master.
- The maximum data packet length is 512 bytes.

The address of the H.S. CAENET node of the SY403 (Crate #) is selectable via the Manual interface, and its value ranges from 0 to 99. In this way up to 100 crates may be controlled from a single point in two different ways:

- via a video terminal (the crate directly connected to the terminal is the H.S. CAENET Controller) In this case, the software available permits to operate to each SY403 in the H. S. CAENET network as if they were directly connected to the terminal.

- or via one of the following CAEN H.S. CAENET Controllers:

  - A303 H.S. CAENET PC Controller,;
  - C117B H.S. CAENET CAMAC Controller;
  - V288 H.S. CAENET VME Controller.

Video terminal and the Controllers cannot be used simultaneously.

To avoid reflections it is necessary to terminate the H.S.CAENET line on a 50 • impedance. This is accomplished in these ways:

- If the H.S.CAENET Controller is one of the crates :
by inserting a 50 • impedance terminator in one of the two LEMO 00 type connectors (IN/OUT) in the last and in the first crate of the chain.

- If the H.S.CAENET Controller is not one of the crates :
by inserting a 50 Ω impedance terminator in one of the two LEMO 00 type connectors (IN/OUT) of the last crate of the chain.

4. MANUAL OPERATION SOFTWARE VERSION 1.41

A single Crate can be operated manually through the 21 keys and the LCD display which are located in the Front Panel. The relative software runs in the MC68000 microprocessor housed in the Main Controller and provides the operator with a set of menus which allows him to solve most of his problems quickly and easily. The meaning of the 5 Function keys located near the bottom of the display is shown in the display itself. Some of the setting operation can be disabled via Terminal (see Disable Keyboard command § 5.4.1)

The following table resumes all the possible keyboard operations:

Operation	Keyboard enabled
program channels parameters	Yes
monitor channels parameters	don't care
configure the RS232 Port	don't care
set the H.S. CAENET address of the Node	Yes
select the cause and the type of the Alarm.	Yes

The following figure shows the Menu structure of the software.

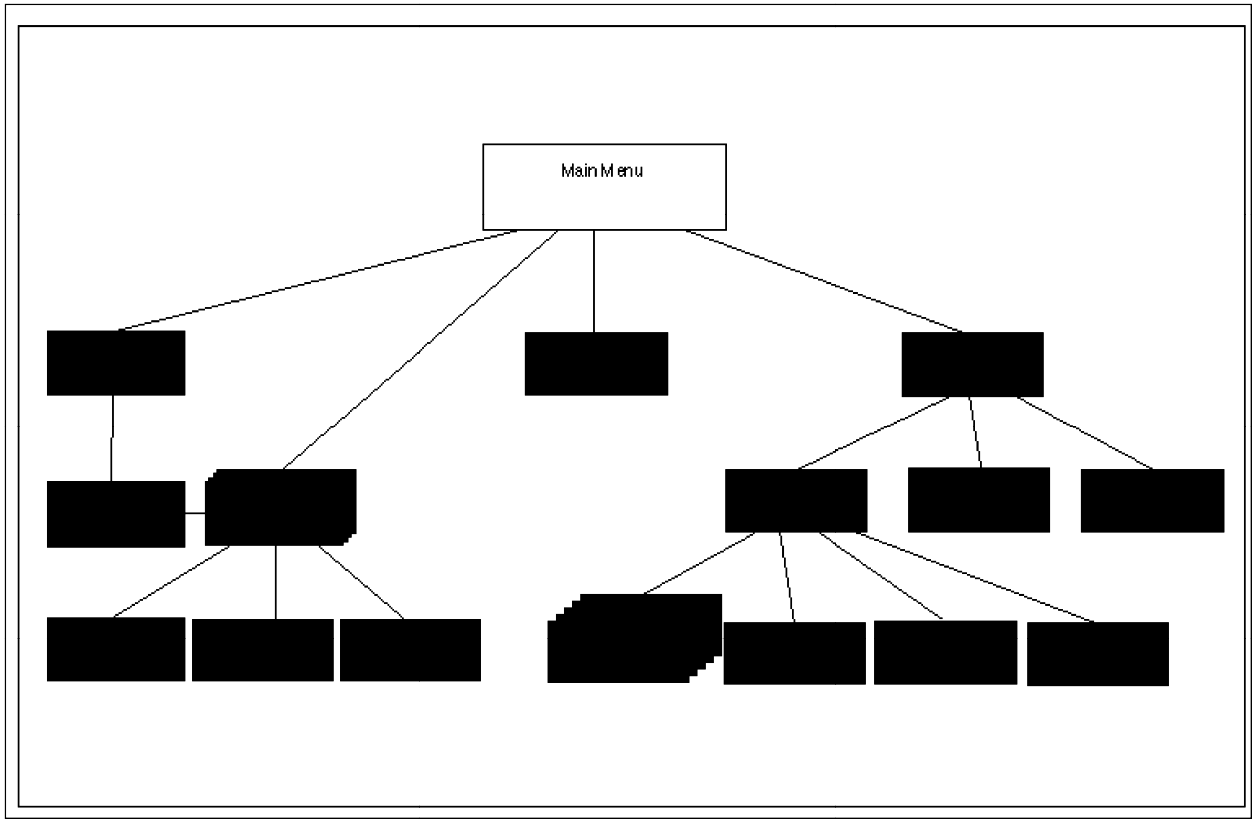

Fig. 4.1 Manual operation Menu Structure

4.1 Main Menu

At power on, the display starts displaying on the screen "C.A.E.N SY403"; then pressing any key will appear the top-level Menu: the Main Menu. The version running in the Main Controller is indicated on the top right of the display, near the software version is shown the actual H.S. CAENET address of the SY403 (Crate #). The following figure shows the Main menu:The submenu selections are shown in correspondence of the Function keys: (Note that display will vary slightly from that shown with new software releases).

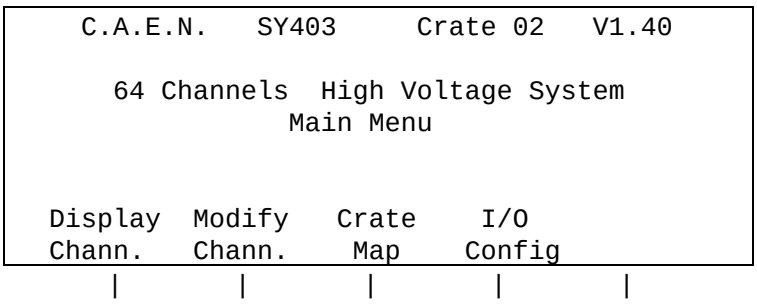

Fig. 4.2 Main Menu

The operator selects the submenu by pressing the Function key corresponding to the option. The Meaning of the options are:

Display Channel
Shows the status of the channel identified by its number (CH#).

Modify Channels
Modify the various channels parameters.

Crate Map
Display the status of the H.V. Channels Board inserted in the SY403 crate.

I/O Configuration

- Modify the RS232 Port configuration.
- Set the H.S. CAENET address (Crate #).
- Select the Alarm type.

The channels Parameters showed in the following are expressed in these units:

Vmon	Volt
Imon	µA
HVmax	Volt
V0set	Volt
I0set	µA
SVmax	Volt
Rup	Volt/sec
Rdwn	Volt/sec
Trip	Tenth of second

4.2 Display Channel Option

This option is selected by pressing the Function key corresponding to the Main Menu Option "Display Chann." It is actuated by two level Menu:

1th level: **Display Channel Status Menu.**
It permits the channel number selection

2th level: **Status of Channel Menu**.
It shows the Channel Status. In this submenu an option allows to enter directly in the Modify Channel Menu without no need to return to Main Menu.

4.2.1 Display Channel Status Menu

The Display Channel Status Menu allows to choose the channel to be monitored by entering the Channel number The Channel Name are also shown in this Menu.

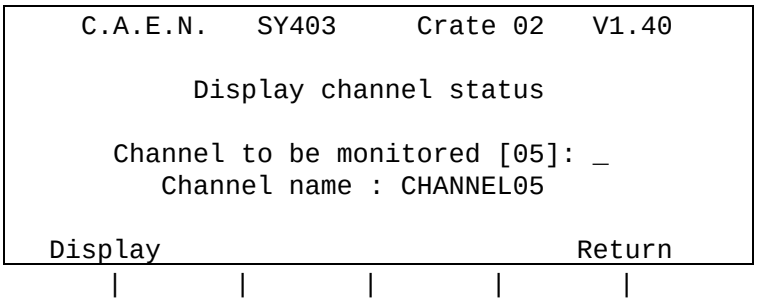

Fig. 4.3 Display Channel Status Menu.

COMMANDS

Channel to be monitored [#]:
use the numeric keypad to enter the number of the channel to be monitored.Its Channel Name is automatically displayed.

Display
Go to next menu: Status of Channel Menu, where is shown the status of the channel entered; If no channel number has been entered the following submenu will show the status of the channel corresponding to the number in the brackets.

Return
Return to Main Menu.

Ack key
Same as Display.

4.2.2 Status of Channel Menu

This option is selected by pressing the Function key "Display "in the Display Channel Status Menu.

The Status of Channel Menu allows to monitor five parameters (Vset, Iset, Vmon, Imon, Status) of the channel previously selected. Vset and Iset are the High Voltage and Current limit programmed values (V0/1sel, I0/1sel) actually selected by the external signals VSEL and ISEL. The Channel Name are also shown in this Menu.

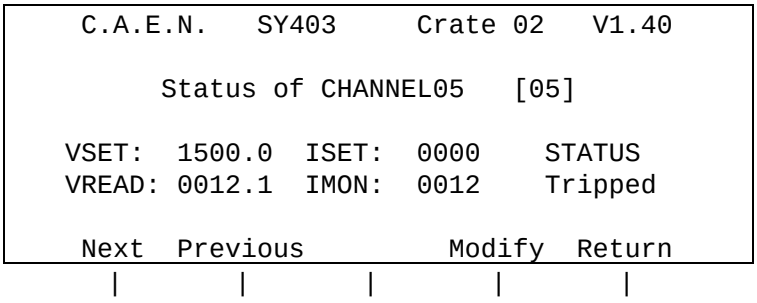

Fig. 4.4 Status of channel Menu.

COMMANDS

Next
Show the Status of the Next channel.

Previous
Show the Status of the Previous channel.

Modify
Go to the Modify Channel Menu:

Return
Return to Main Menu.

4.3 Modify Channels Option

This option is selected

- in Main Menu:
by pressing the Function key corresponding to the Option "Modify Chann.";

- in Status of Channels Menu:
by pressing the Function key corresponding to the Option "Modify ".

It is composed of a two level Menu:

1th level **Modify Channels Status Menu.**
It is structured in four pages: each page shows different parameter of a group of four channels.

First Page	V0set, I0set, Status (1);
Second Page	V1set, I1set, Status (1);
Third Page	Vmax (Soft), Rup, Rdwn;
Fourth Page	Trip,Pon,Pdwn:

(1): Status On/Off of the channel : it is the H.V. On/Off of the channel (see § 3.2.14)

In each page the Channel Name and the Channel # of the channels under control are also shown. The highlight bar indicates the Current Parameter. If the Keyboard is enabled, the Current Parameter is affected by the Modify command (Change/Edit).

Use the Arrow keys to move the highlight bar to the parameter which has to be modified; the Up and Down arrow keys permit to scroll the channels on the display, showing another group of four channel. It is possible to modify all the parameters displayed except the Channel Name.

2th level It is active only if the Keyboard is enabled.It is composed of three different menus:

- **Edit Parameters Menu**
In this menu it is possible to edit the parameter value and to modify it by using the numeric keypad.

- Change Parameters Menu
In this menu it is possible to enter a new parameter value by using the numeric keypad.

- Change CH# Menu
This menu permits to select another group of channels by entering the number of one of the channels of that group.

4.3.1 Modify Channels Status Menu

The following figures show the three Pages of the menu, press the More key to switch between the pages.

```
  CHANNEL    V0SET    I0SET  STATUS  CH#

CHANNEL28   0000.0   0000   Off     28
CHANNEL29   0000.0   0000   Off     29
CHANNEL30   0000.0   0000   Off     30
CHANNEL31   0000.0   0000   Off     31

  More    Edit    Change Display Return
    |       |       |       |       |
```

Fig. 4.5 Modify Channel Status Menu: First page

```
  CHANNEL    V1SET    I1SET  STATUS  CH#

CHANNEL28   0000.0   0000   Off     28
CHANNEL29   0000.0   0000   Off     29
CHANNEL30   0000.0   0000   Off     30
CHANNEL31   0000.0   0000   Off     31

  More    Edit    Change Display Return
    |       |       |       |       |
```

Fig. 4.6 Modify Channel Status Menu: Second page

```
  CHANNEL    VMAX      RUP   RDWN  CH#

CHANNEL28     3000    100   100    28
CHANNEL29     3000    100   100    29
CHANNEL30     3000    100   100    30
CHANNEL31     3000    100   100    31

  More    Edit    Change Display Return
    |       |       |       |       |
```

Fig. 4.7 Modify Channel Status Menu: Third page

```
  CHANNEL     TRIP    PON  PDWN    CH#

CHANNEL28     inf.   Off  Kill     28
CHANNEL29     inf.   Off  Kill     29
CHANNEL30     inf.   Off  Kill     30
CHANNEL31     inf.   Off  Kill     31

  More    Edit    Change Display Return
    |       |       |       |       |
```

Fig. 4.8 Modify Channel Status Menu: Fourth page

COMMANDS

If the Keyboard is disabled **Change** and **Edit** are not available.

If the Keyboard is enabled **More, Display, Return, Change** are always active, while **Edit** is active only when the Current Parameter is one of the following: V0set, I0set, V1set, I1set,Vmax, Rup, Rdwn, Trip.

More
Switch between the pages.

Edit (This Command is available if the Keyboard is enabled)
Go to the Edit Parameter Menu.The value of the Current Parameter can be edited and modified; This command is active when the Current Parameter can have different values (V0set , I0set, V1set, I1set,Vmax, Rup, Rdwn, Trip), it is not active when the Current Parameter shares only two values (Status, Pon, Pdwn); for these parameters only the Change command is used.

Change (This Command is available if the Keyboard is enabled)
Change the value of the current parameter.
Pressing the Change key the value of the Current Parameter is changed:

- if the Current Parameter can take only two different values (Status, Pon, Pdwn) by pressing the Change key it toggles between the two values, for example if the Current Parameter is Status (Status On/Off of the channel) and its value is Off, pressing "Change" the value becomes On and vice versa;

- If the Current Parameter can take different values (V0set, I0set, V1set, I1set,Vmax, Rup, Rdwn, Trip) the display will show the Change Parameter Menu (The same result is achieved by pressing one of the numeric keys).

- if the Current Parameter is the CH # the display will show the Change CH # Menu.

Display
Return to the Display Menu.

Return
Return to Main Menu.

Up and Down arrow keys
Permits to scroll the channels on the display, showing another group of four channels.

Numeric keys
- If the Current Parameter can take different values (V0set, I0set, V1set, I1set,Vmax, Rup, Rdwn, Trip), by pressing the numeric key corresponding to the most significant figure of the new Parameter value, the display will show the Change Parameter Menu (the corresponding number is displayed as the most significant figure of the value).

4.3.2 Edit Parameter value Menu

This Menu is active if the Keyboard is enabled; it is selected by pressing the "Edit"Function key in the Modify Channel Status Menu.

The Edit Parameter Menu allows to edit and modify the Current Parameter. By pressing the "Edit" key the highlight bar disappeared, and a blinking cursor appears under the first character of the value. The cursor indicates the **Current Figure** of the parameter; use the left and right arrow keys to move the cursor along the figures.

On writing a new value and pressing the Ack key or "Return" the Current Parameter will take this new value; if the Ack key is entered without having giving any change the parameter value remains the old one.

By using the Up and Down arrow keys it is possible to increment/decrement the Current Figure

- pressing the Up arrow key the Current Figure of the Parameter value of all the channels is incremented by the minimum step possible

- pressing the Down arrow key the Current Figure of the Parameter value of all the channels is decremented by one by the minimum step possible

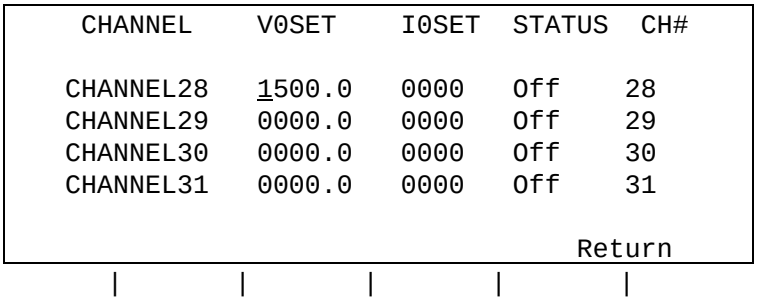

Fig. 4.9 Edit Parameter Menu.

COMMANDS

Up and Down Arrow keys
Increment/decrement by the minimum step possible the Current Figure of the Current Parameter. The cursor indicates the Current Figures.

Return
The Current Parameter will take the value; and the display returns to the previous menu.If the Return key is pressed without having giving any change the parameter value remains the old one.

Ack key
The Current Parameter will take the value; and the display returns to the previous menu.If the Ack key is pressed without having giving any change the parameter value remains the old one.

4.3.3 Change Parameter value Menu

If the Keyboard is enabled this option is available in the Modify Channel Status Menu when the Current Parameter can assume several values (V0set, I 0set, V1set, I1set, Vmax, Rup, Rdwn, Trip). It is selected in two ways:

- by pressing the "Change" Function key;

- by pressing the numeric key corresponding to the most significant figure of the new Parameter value;

The Change Parameter value Menu allows to enter the new parameter value.

By pressing the Change key the highlight bar disappeared, the actual parameter value is cleared and a blinking cursor appears under the most significant figure of the value.

If a numeric key has been pressed, the corresponding number is displayed as the most significant figure of the value.

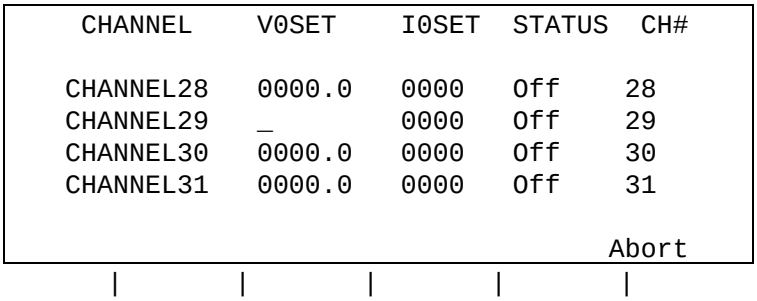

Fig. 4.10 Change Parameter value Menu.

COMMANDS

Abort
The operation is aborted: the parameter value remains the old one, the display returns to the previous menu.

Ack key
The Current Parameter will take the value; and the display returns to the previous menu. If the Ack key is pressed without having giving any change the parameter value remains the old one.

4.3.4 Change Channel Number Menu

This Menu is active if the Keyboard is enabled.

It is available in the Modify Channel Status Menu. when the Current Parameter is the Channel Number CH#; It is selected in two ways:

- by pressing the "Change"Function key

- by pressing the numeric key corresponding to the most significant figure of the new Channel Number.

The Change Channel Number Menu allows to select another group of four channels by entering the number of one of the channels of this group.

By pressing the Change key the highlight bar disappeared, the actual Channel Number is cleared and a blinking cursor appears under the first character of the value. If a numeric key has been pressed, the corresponding number is displayed as the most significant figure of the Channel number.Use the numeric keypad to enter the new CH# . If the channel entered is not present in the crate an error message is displayed.

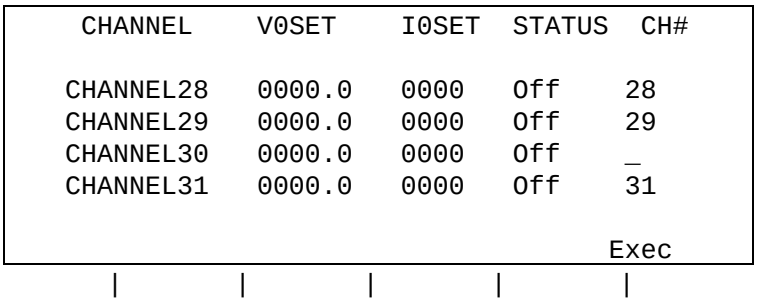

Fig. 4.11 Change Channel Number Menu.

COMMANDS

Exec

The display returns to the previous menu showing the new group of four channels that contains the CH# entered. if the Exec key is pressed without having giving any change the group displayed remains the old one.

Ack key

The display returns to the previous menu showing the new group of four channels that contains the CH# entered. if the Ack key is pressed without having giving any change the group displayed remains the old one.

4.4 Crate Map Option

This option is selected by pressing the Function key corresponding to the Main Menu Option "Crate Map.".This option is used to display the crate configuration (see Fig. 4.12). On the display a screen named "Crate Map" will appear. In four lines are reported the kind of HV Boards inserted in the four slots of the crate .

The following Board characteristics are displayed:

- The Max Output voltage;
- The Max Current;
- The Polarity;
- the Vmax hardware.

If a slot is empty, the message " Board not present" will be displayed.

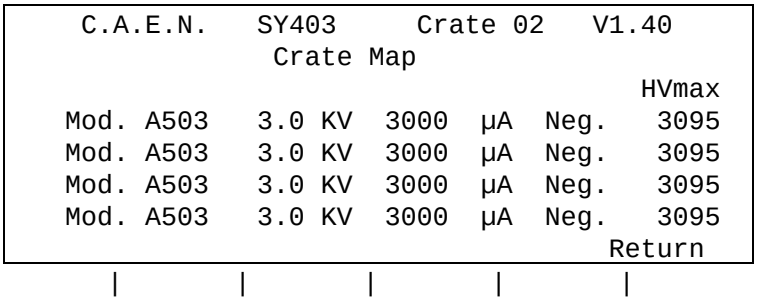

Fig. 4.12 Crate Map Menu

COMMANDS

Return
Return to Main Menu.

4.5 I/O Configuration Option

This option is selected by pressing the Function key corresponding to the Main Menu Option "I/O Config.". The display shows the I/O Configuration Menu that allows to modify the RS232 Configuration or the CAENET configuration.

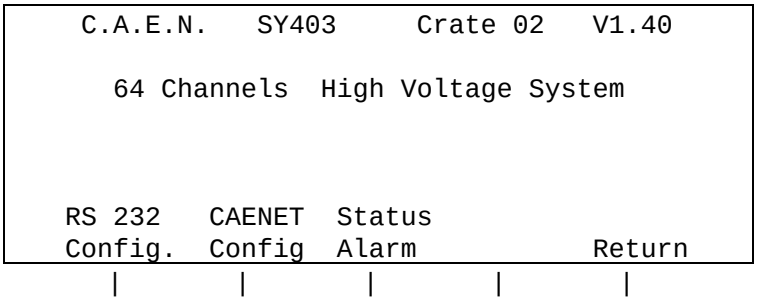

Fig. 4.13 I/O Configuration Menu

COMMANDS

RS232 Configuration
Go to the RS232 Configuration Menu that permits to modify the RS232 Port configuration.

CAENET Configuration
Go to the CAENET Configuration Menu where it is possible to set the H.S. CAENET address (Crate#).

Status Alarm (STATUS output signal configuration)
Go to the Status Alarm Configuration Menu where it is possible to set the error condition that cause the Alarm and the "STATUS" signal characteristic

Return
Return to Main Menu.

4.5.1 RS232 Configuration Option

This option is selected by pressing the Function key corresponding to the I/O Configuration Option "RS232 Config." It is actuated by two level Menu:

1th level: **RS232 Configuration Menu**.
It shows the value of the RS232 parameters.

2th level: at this level belong four submenus :

- **Baud Rate Selection** composed of 4 pages

- **Parity Selection**

- **Character length Selection**

-**Stop bits number Selection**

4.5.1.1. RS232 Configuration Menu

The RS232 Configuration Menu shows the value of the RS232 parameters.

```
C.A.E.N.   SY403     Crate 02   V1.40

        RS232 configuration

  Baud rate = 9600    no Parity
  8 bits/character    1 Stop bit

Baud   Parity  Bits #  Stop #  Return
  |       |       |       |       |
```

Fig. 4.14 RS232 Configuration Menu

COMMANDS

Baud
set the RS232 Baud rate; go to submenu: Baud Rate Selection Menu.

Parity
set the RS232 Parity; go to submenu: Parity Selection Menu.

Bits #
set the RS232 Character length; go to submenu: Character length Selection.Menu.

Stop #
set the RS232 Stop bits number; go to submenu: Stop bits number Selection.Menu.

Return
Return to I/O Configuration Menu.

4.5.1.2. RS232 Baud Rate Selection Menu

The following figures show the structure of the four pages of the menu, press the More key to switch between the pages.

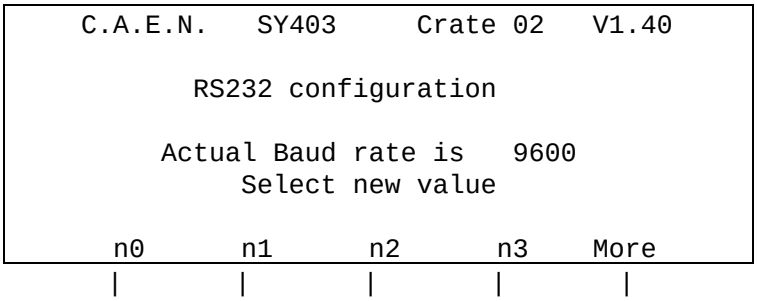

Fig. 4.15 Structure of the Baud Rate Selection Menu (four pages)

COMMANDS

no..n3
By pressing the appropriate Function key the Baud rate is modified and the display returns to the previous menu.

The following table shows the different values of n0..n3 in the four pages:

Page	n0	n1	n2	n3
1	4800	7200	9600	19200
2	50	75	110	134.5
3	150	300	600	1200
4	1800	2000	2400	3600

More
Switch between the pages.

4.5.1.3. RS232 Parity Selection Menu

This menu permits to set the RS232 Parity value.

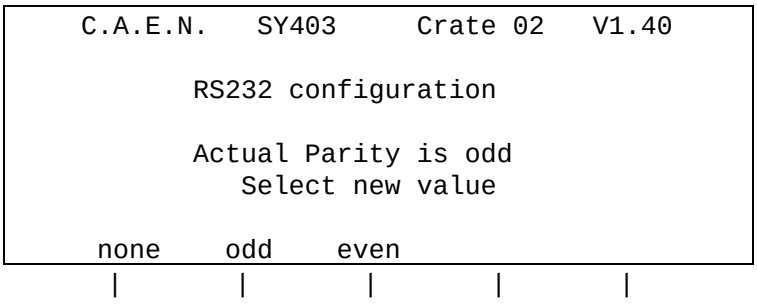

Fig. 4.16 Parity Selection Menu.

COMMANDS

none,odd,even

By pressing the appropriate Function key the corresponding Parity value is set and the display returns to the previous menu.

4.5.1.4. RS232 Character Length Selection Menu

This menu allows to set the RS232 Character length.

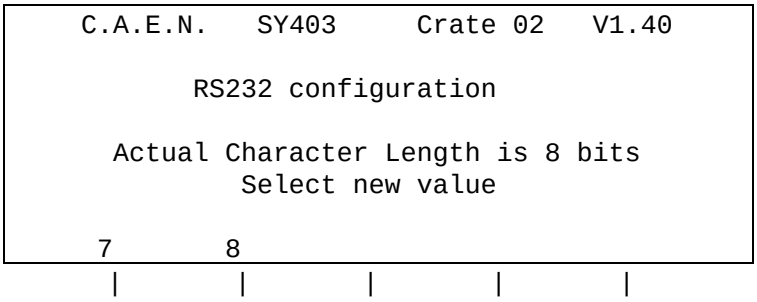

Fig. 4.17 Character Length Selection Menu

COMMANDS

7,8

By pressing the appropriate Function key the RS232 character length is set to the corresponding value and the display returns to the Previous menu.

4.5.1.5. RS232 Stop Bits Number Selection Menu

This menu permits to set the RS232 number of Stop bits value

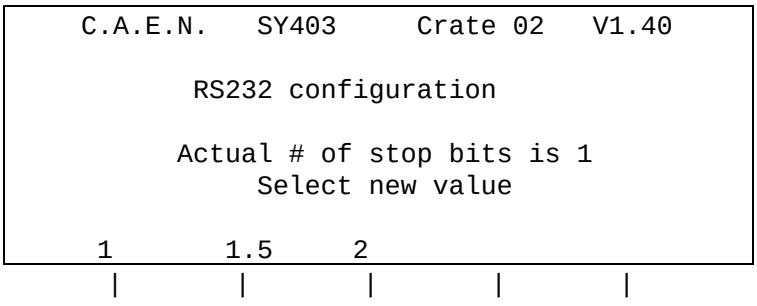

Fig. 4.18 Stop Bits Number Selection Menu

COMMANDS

1,1.5,2

By pressing the appropriate Function key the stop bits number is set to the corresponding value and the display returns to the previous menu.

4.5.2 CAENET Configuration Option

This option are selected by pressing the Function key corresponding to the I/O Configuration Option "CAENET Config." It shows the H.S. CAENETY address of the SY403 (Crate #).

If the keyboard is enabled It allows to set the address of H.S. CAENET node housed in the Module(Crate #), the address can range from 0 to 99.

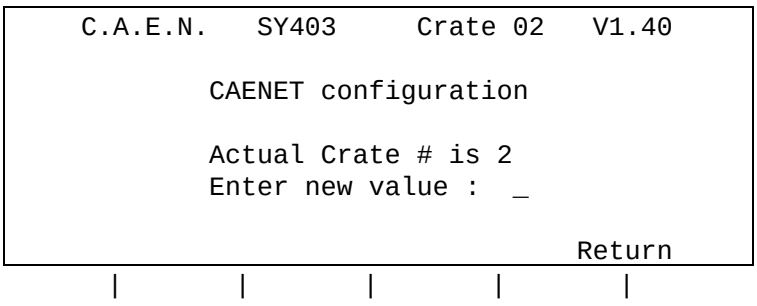

Fig. 4.19 CAENET Configuration Menu

COMMANDS

Enter new value: (This option is available if the Keyboard is enabled)
Use the numeric keypad to enter the new value of the H.S.CAENET address (Crate #).

Return
Return to I/O Configuration Menu.

Ack key
The H.S.CAENET address (Crate #) will take the value entered; and the display returns to the Main Menu. if the Ack key is pressed without having giving any change the Crate # value remains the old one.

4.5.3 Status Alarm Configuration option

This option are selected by pressing the Function key corresponding to the I/O Configuration Option "Status Alarm." It allows to chose the error conditions which cause an Alarm, and the Alarm signal (STATUS signal) characteristics.

Five options can be selected;

- the Normal Level of the Alarm signal STATUS (High/Low);
  This is the STATUS level when the signal is not active;

- the type of the Alarm signal (Level/Pulsed); If the option chosen is "Pulsed" The STATUS output (when active) is a periodic signal (the period is about few hundred msec);

- a Mask (On/Off) for each of these three error conditions Ovc,Ovv,Unv: if the mask is ON the corresponding error condition on at least one channel sets the Alarm.

The highlight bar indicates the Current Parameter. If the Keyboard is enabled, the Current Parameter is affected by the Change command.

Use the Arrow keys to move the highlight bar to the parameter which has to be modified; The change command causes the parameter to toggle between its two values; for example if the Alarm Type value is "Pulsed", pressing the Change Key the value becomes "Level" and viceversa.

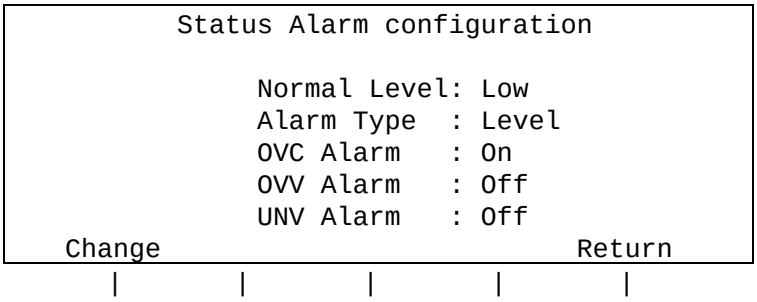

Fig. 4.20 Status Alarm Configuration Menu

COMMANDS

Change: (This option is available if the Keyboard is enabled)
By pressing the Change key the Current Parameter toggles between the two values that can assume.

Return
Return to I/O Configuration Menu.

5. TERMINAL OPERATION SOFTWARE VERSION 1.41

A multicrate system can be controlled by a VT100 compatible terminal plugged into the RS232 port located on the Front Panel as described in § 3.5.

The relative software runs on an MC68000 microprocessor housed in the Main Controller and provides the operator with a set of menus which allows him to solve most of his problems quickly and easily.

It allows to control all the Crate on the same H.S. CAENET network and for each Crate it is possible

- to program and monitor all the channel parameters described in the chapter 3;
- to arrange the Crate channels in different Groups, and to program common parameter values for all the channels belonging to the Group, with a single operation. It is possible to have up to 16 Groups. To the first Group (GROUP00) belong all the channels of the Crate;
- to "kill" all the channels of the Crate;
- to reset the Status output signal;
- to set for each channel a Password protection to avoid an improper channel parameters setting;
- to restore the default Factory configuration of all the channels parameters;
- To select the cause and the type of the Alarm;

5.1 Main Menu

At power on, appears on the screen "C.A.E.N SY403"; then pressing any key will appear the top level menu, the "Main Menu" and the operator can then select the next action. The software version is indicated on the top right of the screen. (Note that screens will vary slightly from that shown in the following with new software releases).

A submenu selection can then be made by pressing the key correspondent to the first letter of the option (highlighted letter).

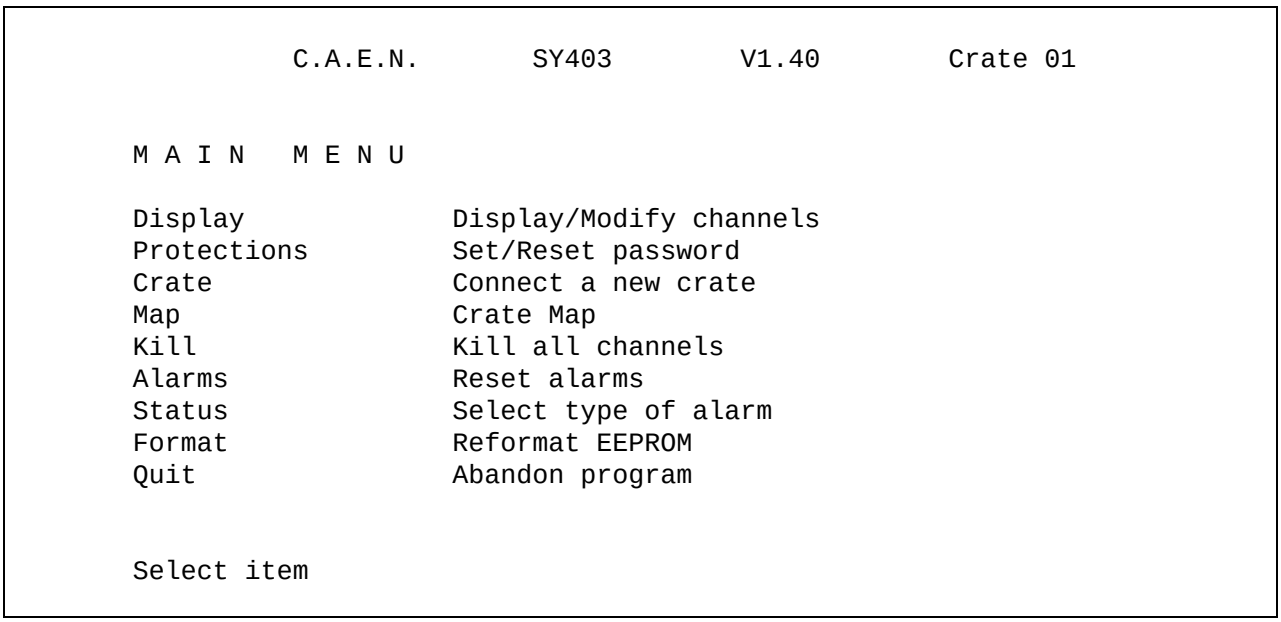

Fig 5.1 Main Menu

OPTIONS

D Display Display/Modify channels
Shows the status of one or more channels Grouped according to symbolic names. Allows viewing and eventually modifies the parameter of a single channel or a Group of channels having a common symbolic name.

P Protections Set/Reset password
Protects the system from misuse and allows to disable the Keyboard .

C Crate Connect a new Crate
It allows to select which SY403 on the H.S. CAENET network has to be controlled via H.S. CAENET.

M Map Crate Map
It allows to display the Crate configuration.

K Kill Kill all channels
All H.V. channels of the Crate are switched off.

A Alarms Reset alarms
Resets the STATUS output signal.

S Status Select type of Alarm
It allows to chose the error conditions which cause an Alarm, and the Alarm signal (STATUS signal) characteristics. The Status command is available only when the Password is disabled; if the Password is enabled this command is not shown

F Format Reformat EEPROM
This command restores in the permanent memory (EEPROM) the default factory configuration of the channels parameter. The Format command is available only when the Password is disabled; if the Password is enabled this command is not shown (Format sets the Password to the default factory Password).

5.2 Display/Modify Channels Option

This option is selected on entering the letter "D" in the Main Menu.The screen will show the parameters values of the channels of the last Group displayed. If this option is selected on a Model just shipped from the factory or after a Format command the screen will show the status of the GROUP00 that contains all the channels present in the Crate. The default factory configuration of the system is the following:

- the symbolic name of the Groups are GROUP00 .. GROUP15;

- to the GROUP00 belongs all the channels (the GROUP00 configuration is fixed);

- no channels belong to the other Groups.

Each screen contains 16 channels, the remaining channels will be shown on the other pages by typing the letter "P".(Page command). By entering the letter "M" (More command) the screen will show the other parameters of the same channels.

On the top of the screen are also shown the following parameters:

- the status On/Off of the "H.V. EN" switch;

- which High Voltage and Current limit programmed value (V0/1sel, I0/1sel) are actually selected by the external signals VSEL and ISEL.

- the H.S. CAENET address of the crate connected (Crate XX where XX is the Crate #);

In the first screen for each channel are shown the following parameters:

Channel, Vmon, Imon, HVmax, V0set (V1set), I0set (I1set), Hv, Status, CH#

Channel is the Channel Name.

HVmax is the Vmax Hardware.

Hv is the status "On"/"Off" of the channel; by setting this parameter On, the channel is switched On.

By pressing the letter "V"(V/Isel command) on the screen are displayed the other two set values for the current and voltage, for example, if V0set and I0set are displayed, pressing "V" the screen will show V1set and I1set and viceversa.

In the second screen for each channel are shown the following parameters:

Channel, SVmax, Rup, Rdwn, Trip, Pon, Pdwn, Password, On/Off, CH#

SVmax is the Vmax Software; if the SVmax value programmed is less then the actual Vset value, the Vset take this value.

Password is the status of the protection :

- If the Password is enabled:

  - if The Channel Password parameter = "Required" it is not possible to modify the channels parameter;

  - if The Channel Password parameter is blank it is possible to modify all the channels parameters except the password and the On/Off parameter.

- If the Password is disabled it is possible to modify every value of the channel parameters regardless of its Password Parameter.

On/Off is the status of the Power-on enable:

- if ="Enabled" the channel react at power on following the status of the Pon parameter;

- if there is a blank field at the power on the channel is Off regardless the status of the Pon parameter.

in the following pages are shown the structure of the two screens for the GROUP00 and for a generic Group TEST1 that contains 3 channels.The SY403 connected is in the following conditions:

- the H.V. Enable is On;

- V0sel and I0sel are actually selected by the external signals VSEL and ISEL;

- the SY403 Crate number is 01.

On the bottom of the screen are shown some of the Commands available; the operator selects the command by typing the key correspondent to the first letter of the Command itself (highlighted letter). The highlight bar indicates the **Current Parameter** and the **Current Channel**:

- The **Current Parameter** is affected by the Modify command shown on the bottom of the screen (Change/Edit), (In particular it is possible to Modify the Channel Name).

- The **Current Channel** is affected by the Modify Group configuration command shown on the bottom of the screen (Add,Insert,Replace,Delete).These commands are not available for the GROUP00, because its configuration is fixed.

Use the Arrow keys to move the highlight bar to the parameter which has to be modified.

- The 4 commands **Add, Insert, Replace** and **Delete** allow to modify the Group configuration adding or removing channels; they are not available for the GROUP00 because its configuration is fixed. If the Group displayed does not have any channel, only the commands Add and Insert are present.

- The **Edit** command is available when the Current Parameter can take different values (Channel, V0/1set , I0/1set,SVmax , Rup, Rdwn, Trip).

- The **Page** command is shown when there are more than 16 channels in the Group.

- The **Switch** command allows to switch between this screen and the Group operation screen.

The Parameters showed on the screen are expressed in the following units:

Vmon	Volt
Imon	µA
HVmax	Volt
V0set	Volt
I0set	µA
SVmax	Volt
Rup	Volt/sec
Rdwn	Volt/sec
Trip	Tenth of second

```
                C.A.E.N.        SY403        V1.41
GROUP00      Hv_En is: On     V0-SEL     I0-SEL      Crate 01       Page 0

Channel       Vmon      Imon     HVmax   V0set      I0set      Hv   Status   Ch#
CHANNEL00    0000.00   0000.00   0675   0500.60    0100.41   Off             00
CHANNEL01    0499.88   0000.00   0675   0500.64    0100.41    On             01
CHANNEL02    0500.04   0000.00   0675   0500.68    0100.41    On             02
CHANNEL03    0499.84   0000.00   0675   0500.56    0100.41    On             03
CHANNEL04    0000.00   0000.00   0675   0500.56    0100.41   Off             04
CHANNEL05    0000.00   0000.00   0675   0500.56    0100.41   Off             05
CHANNEL06    0000.00   0000.00   0675   0500.56    0100.41   Off             06
CHANNEL07    0000.00   0000.00   0675   0400.56    0100.41   Off             07
CHANNEL08    0000.00   0000.00   0675   0500.56    0050.20   Off             08
CHANNEL09    0000.00   0000.00   0675   0500.56    0050.20   Off             09
CHANNEL10    0100.52   0000.01   0675   0100.56    0050.20    On             10
CHANNEL11    0000.00   0000.00   0675   0500.56    0050.20   Off             11
CHANNEL12    0000.00   0000.00   0675   0500.56    0050.20   Off             12
CHANNEL13    0000.00   0000.00   0675   0500.56    0050.20   Off             13
CHANNEL14    0000.00   0000.00   0675   0500.56    0050.20   Off             14
CHANNEL15    0000.00   0000.00   0675   0500.56    0050.20   Off             15



Quit Edit Change Update Page More Switch V/Isel
```

Fig. 5.2 GROUP00 screen 1 of page 0 (Current Par. = Channel, V0set, I0set)

```
                C.A.E.N.        SY403        V1.41
GROUP00      Hv_En is: On     V0-SEL     I0-SEL      Crate 01       Page 0

Channel     SVmax  Rup  Rdwn  Trip    Pon  Pdwn  Password   On/Off     Ch#
CHANNEL00    0600  020  020  010.0    Off  Kill  Required  Enabled     00
CHANNEL01    0600  020  020  010.0    Off  Kill  Required  Enabled     01
CHANNEL02    0600  020  020  010.0    Off  Kill  Required  Enabled     02
CHANNEL03    0600  020  020  010.0    Off  Kill  Required  Enabled     03
CHANNEL04    0600  020  020  010.0    Off  Kill  Required  Enabled     04
CHANNEL05    0600  020  020  010.0    Off  Kill  Required  Enabled     05
CHANNEL06    0600  020  020  010.0    Off  Kill  Required  Enabled     06
CHANNEL07    0600  020  020  010.0    Off  Kill  Required  Enabled     07
CHANNEL08    0600  020  020  010.0    Off  Kill  Required  Enabled     08
CHANNEL09    0600  020  020  010.0    Off  Kill  Required  Enabled     09
CHANNEL10    0600  020  020  010.0    Off  Kill  Required  Enabled     10
CHANNEL11    0600  020  020  010.0    Off  Kill  Required  Enabled     11
CHANNEL12    0600  020  020  010.0    Off  Kill  Required  Enabled     12
CHANNEL13    0600  020  020  010.0    Off  Kill  Required  Enabled     13
CHANNEL14    0600  020  020  010.0    Off  Kill  Required  Enabled     14
CHANNEL15    0600  020  020  010.0    Off  Kill  Required  Enabled     15



Quit Edit Change Update Page More Switch
```

Fig 5.3 GROUP00 screen 2 of page 0 (Current Par. = Channel, SVmax, Rup, Rdwn, Trip)

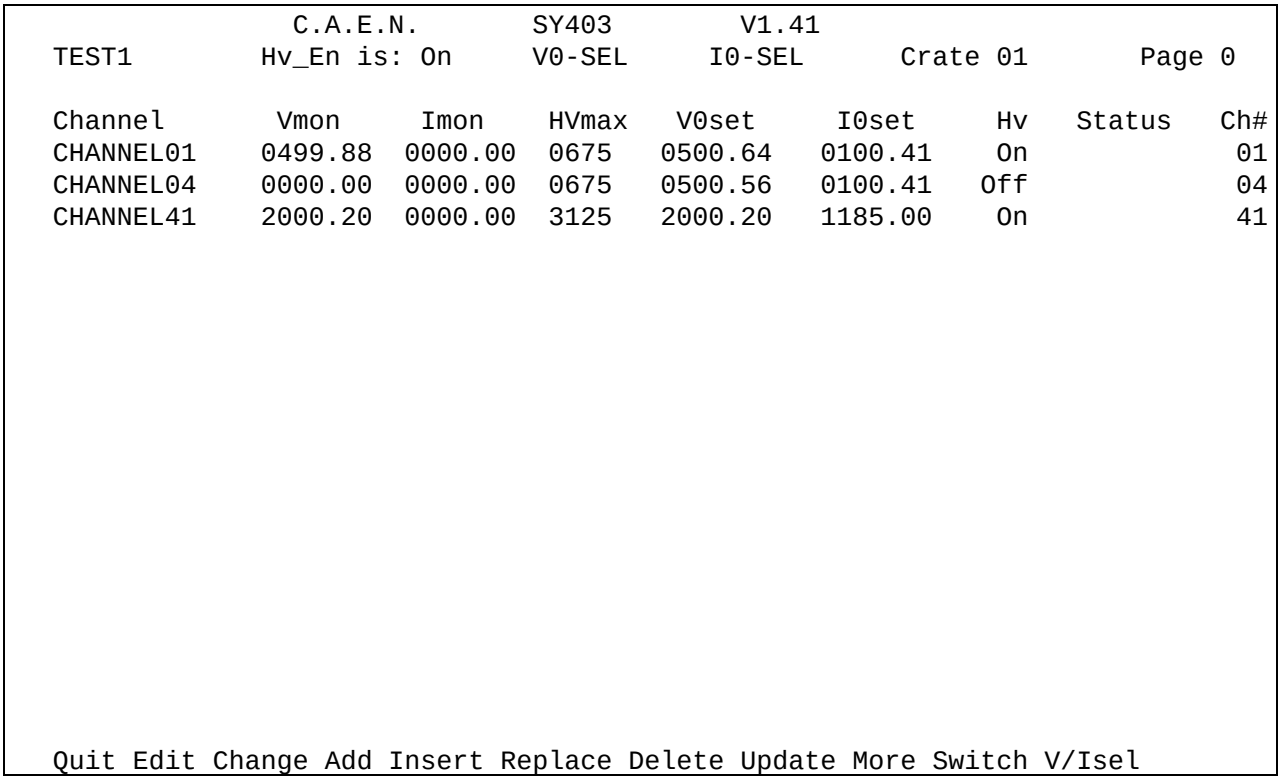

Fig. 5.4 Group TEST1: screen 1 of page 0 (Current Parameter = Channel, V0set, I0set)

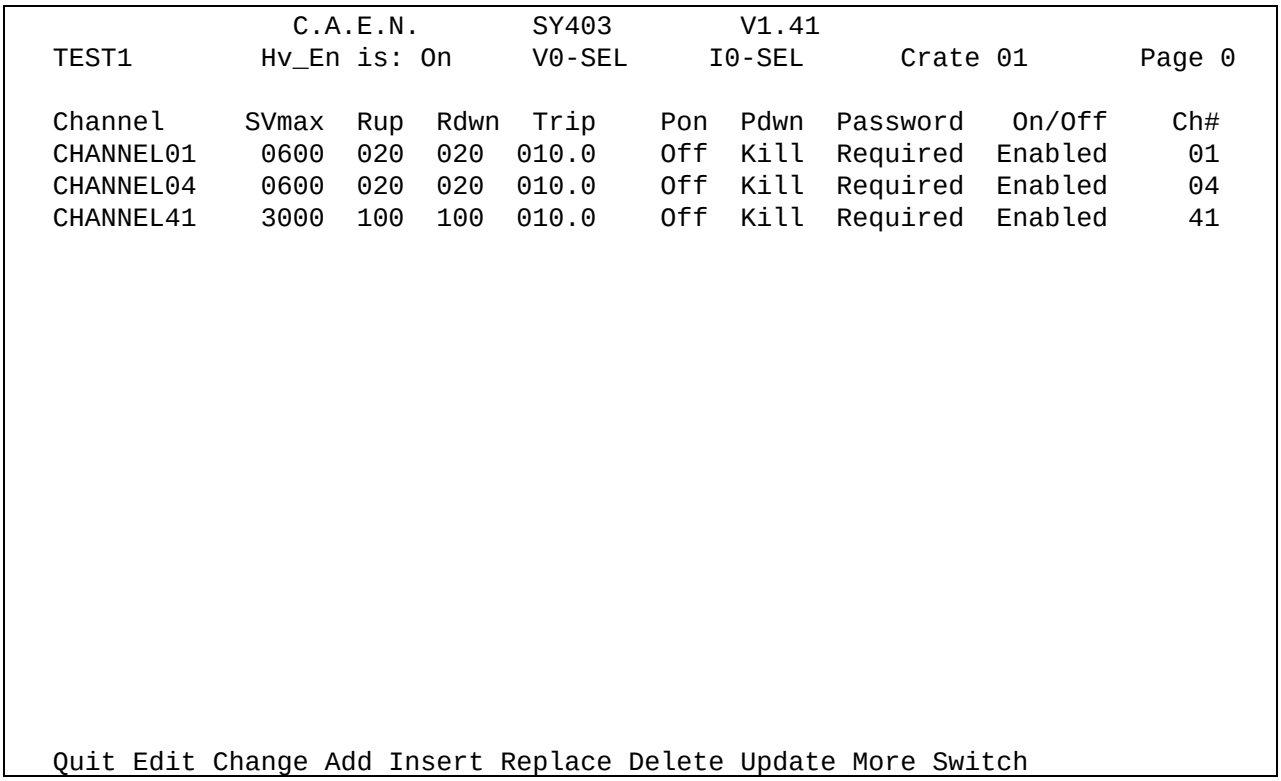

Fig 5.5 Group TEST1: screen 2 of page 0
(Current Parameter = Channel, SVmax, Rup, Rdwn, Trip)

COMMANDS

Q Quit
Return to Main Menu.

E Edit
Go to the **Edit Parameter Screen**.The value of the Current Parameter can be edited and modified. This command is active when the Current Parameter can have different values (Channel, V0set, I0set, V1set, V0set, SVmax, Rup, Rdwn, Trip), it is not active when the Current Parameter can assume only two values (Hv, Pon, Pdwn, Password, On/Off); for these parameters only the Change command is available.

C Change
Change the value of the current parameter.

Entering the "C" key the value of the Current Parameter is changed:

- if the Current Parameter can take only two different values (Hv, Pon, Pdwn, Password, On/Off) it toggles between this two values, for example if the Current Parameter is Hv and its value is Off, entering "C" the value becomes On and vice versa;

- If the Current Parameter can take different values (Channel, V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip) the display will show the **Change Parameter Screen** where the previous value are cleared and a new one has to be typed (the same result is achieved by pressing one of the numeric key).

A Add channel (Command not available for the GROUP00)
Go to the **Add Channel Screen.** Add a channel to the Group.

I Insert channel (Command not available for the GROUP00)
Go to the **Insert Channel Screen**. Insert a new channel under the Current Channel in the Group.

R Replace channel (Command not available for the GROUP00)
Go to the **Replace Channel Screen**. Replace the Current Channel with a channel which will be selected in the Replace Channel screen.

D Delete channel (Command not available for the GROUP00)
Remove the Current Channel to the Group.

U Update

Refresh Screen.

P Page

Show the next Status page with other 16 channels of the Group, the Page command is available when there are more than 16 channels in the Group.

M More
Show the next screen of the same page.

The parameters shown in the two screens are the following:

screen 1: Channel, Vmon, Imon, HVmax, V0set (V1set), I0set (I1set), Hv, Status;

screen 2 : Channel, SVmax, Rup, Rdwn, Trip, Pon, Pdwn, Password, On/Off.

S Switch screen
Go to the **Group Operation Screen** where it is possible:

- to modify the parameters of the entire Group displayed;

- to show the Status of another Group.

To return to the previous screen it is sufficient to enter another time the "S" key.

V Vsel Isel 0/1 selection
Show the other two set values for the current and voltage, for example, if V0set and I0set are displayed, by pressing "V" the screen will show V1set and I1set and viceversa.

1,0 Set a two values parameter
If the Current Parameter can assume only two values (Hv, Pon, Pdwn, Password, On/Off), it is possible to use the keys "1" and "0" to set the two different values (instead of use the "C" key Change Command). The following table shows the usage of the keys:

Key	Hv	Pon	Pdwn	Password	On/Off
"0"	Off	Off	Kill	...	...
"1"	On	On	Rdwn	Required	Enabled

Numeric keys
- If the Current Parameter can take different values (V0set, I0set, V1set, I1set,Vmax, Rup, Rdwn, Trip) by entering the number corresponding to the most significant figure of the new Parameter value, the display will show the Change Parameter Screen. The corresponding number is displayed as the most significant figure of the value.

5.2.1 Edit Parameter Screen

This option is selected on entering the letter "E" in the Status Display Screen. In this Screen it is possible to modify the value of the Current Parameter previously selected.

By pressing the "Edit" key the highlight bar disappears, and a blinking cursor appears under the first character of the value (No command is available on the bottom of the screen). The cursor indicates the **Current Figure** of the parameter; use the left and right arrow keys to move the cursor along the figures.

On writing a new value and pressing "return " the Current Parameter will take this new value; if a "return "is entered without having giving any change the parameter value remains the old one.

If the Current Parameter is different from the Channel Name, by using the Up and Down arrow keys it is possible to increment/decrement the Current Figure

- pressing the Up arrow key the Current Figure of the Parameter value of all the channels is incremented by the minimum step possible

- pressing the Down arrow key the Current Figure of the Parameter value of all the channels is decremented by one by the minimum step possible

COMMANDS

Up and Down Arrow keys
Increment/decrement by the minimum step possible the Current Figure of the Current Parameter. The cursor indicates the Current Figures.

Ctrl - Z
Clear any modification and restore the old parameter value.

Refer to this paragraph for the usage of the various **Edit** screens named in the following of the chapter:

- **Edit Channel Screen**
- **Edit Group Name Screen**

```
              C.A.E.N.        SY403        V1.40
GROUP00    Hv_En is: On        V0-SEL     I0-SEL      Crate 01       Page 0

Channel     SVmax  Rup  Rdwn  Trip    Pon  Pdwn  Password   On/Off    Ch#
CHANNEL00    3000  100  100  010.0    Off  Kill  Required  Enabled     00
CHANNEL01    2500  100  100  010.0    Off  Kill  Required  Enabled     01
CHANNEL02    3000  100  100  010.0    Off  Kill  Required  Enabled     02
CHANNEL03    3000  100  100  010.0    Off  Kill  Required  Enabled     03
CHANNEL04    3000  100  100  010.0    Off  Kill  Required  Enabled     04
CHANNEL05    3000  100  100  010.0    Off  Kill  Required  Enabled     05
CHANNEL06    3000  100  100  010.0    Off  Kill  Required  Enabled     06
CHANNEL07    3000  100  100  010.0    Off  Kill  Required  Enabled     07
CHANNEL08    3000  100  100  010.0    Off  Kill  Required  Enabled     08
CHANNEL09    3000  100  100  010.0    Off  Kill  Required  Enabled     09
CHANNEL10    3000  100  100  010.0    Off  Kill  Required  Enabled     10
CHANNEL11    3000  100  100  010.0    Off  Kill  Required  Enabled     11
CHANNEL12    3000  100  100  010.0    Off  Kill  Required  Enabled     12
CHANNEL13    0444  444  100  010.0     On  Kill  Required  Enabled     13
CHANNEL14    3000  100  100  010.0    Off  Kill  Required  Enabled     14
CHANNEL15    3000  100  100  010.0    Off  Kill  Required  Enabled     15
```

Fig. 5.6 Edit Parameter Screen
(the SVmax of CHANNEL 01 is edited)

5.2.2 Change Parameter Screen

This option is available in the Status Display Screen when the Current Parameter can assume several values (Channel, V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip); It is selected in two ways:

- by pressing the "C" key ;

- by entering the number corresponding to the most significant figure of the new value;

In this screen it is possible to enter the new parameter value: Entering the "C" key the previous value of the Current Parameter is cleared and a new one has to be typed. The highlight bar disappeared, the actual parameter value is cleared and a blinking cursor appears under the first character of the value. If a number has been entered (instead of the letter "C") the number is displayed as the most significant figure of the value No command is available on the bottom of the screen.

On writing a new value and pressing "return " the Current Parameter will take this new value; if a return is entered without having giving any new value, the parameter will maintain the old one

```
              C.A.E.N.        SY403        V1.40
GROUP00    Hv_En is: On         V0-SEL     I0-SEL      Crate 01       Page 0

Channel     SVmax  Rup  Rdwn  Trip    Pon  Pdwn  Password   On/Off    Ch#
CHANNEL00    3000  100  100  010.0    Off  Kill  Required  Enabled     00
CHANNEL01    25    100  100  010.0    Off  Kill  Required  Enabled     01
CHANNEL02    3000  100  100  010.0    Off  Kill  Required  Enabled     02
CHANNEL03    3000  100  100  010.0    Off  Kill  Required  Enabled     03
CHANNEL04    3000  100  100  010.0    Off  Kill  Required  Enabled     04
CHANNEL05    3000  100  100  010.0    Off  Kill  Required  Enabled     05
CHANNEL06    3000  100  100  010.0    Off  Kill  Required  Enabled     06
CHANNEL07    3000  100  100  010.0    Off  Kill  Required  Enabled     07
CHANNEL08    3000  100  100  010.0    Off  Kill  Required  Enabled     08
CHANNEL09    3000  100  100  010.0    Off  Kill  Required  Enabled     09
CHANNEL10    3000  100  100  010.0    Off  Kill  Required  Enabled     10
CHANNEL11    3000  100  100  010.0    Off  Kill  Required  Enabled     11
CHANNEL12    3000  100  100  010.0    Off  Kill  Required  Enabled     12
CHANNEL13    0444  444  100  010.0     On  Kill  Required  Enabled     13
CHANNEL14    3000  100  100  010.0    Off  Kill  Required  Enabled     14
CHANNEL15    3000  100  100  010.0    Off  Kill  Required  Enabled     15
```

Fig. 5.7 Change Screen (the SVmax of CHANNEL 01 is changed)

COMMANDS

Ctrl - Z
Clears any modification and restores the old parameter value

Refer to this paragraph for the usage of the various **Change** screens named in the following of the chapter:

- Change Channel Screen, Change Group Name Screen

5.2.3 Add Channel Screen

This option is selected on entering the letter "A" in the Status Display Screen of a Group different from GROUP00.

In this screen it is possible to add a new channel to the Group under the Current Channel. On entering the letter "A" in the Status Display Screen appears the message "Add channel" following by one channel row displaying the channel parameters as shown in the following figure.

Use the Commands displayed on the bottom of the screen to select a new channel or press the Up and Down arrow keys; then pressing "return", the channel selected is added to the Group under the Current Channel previously selected.

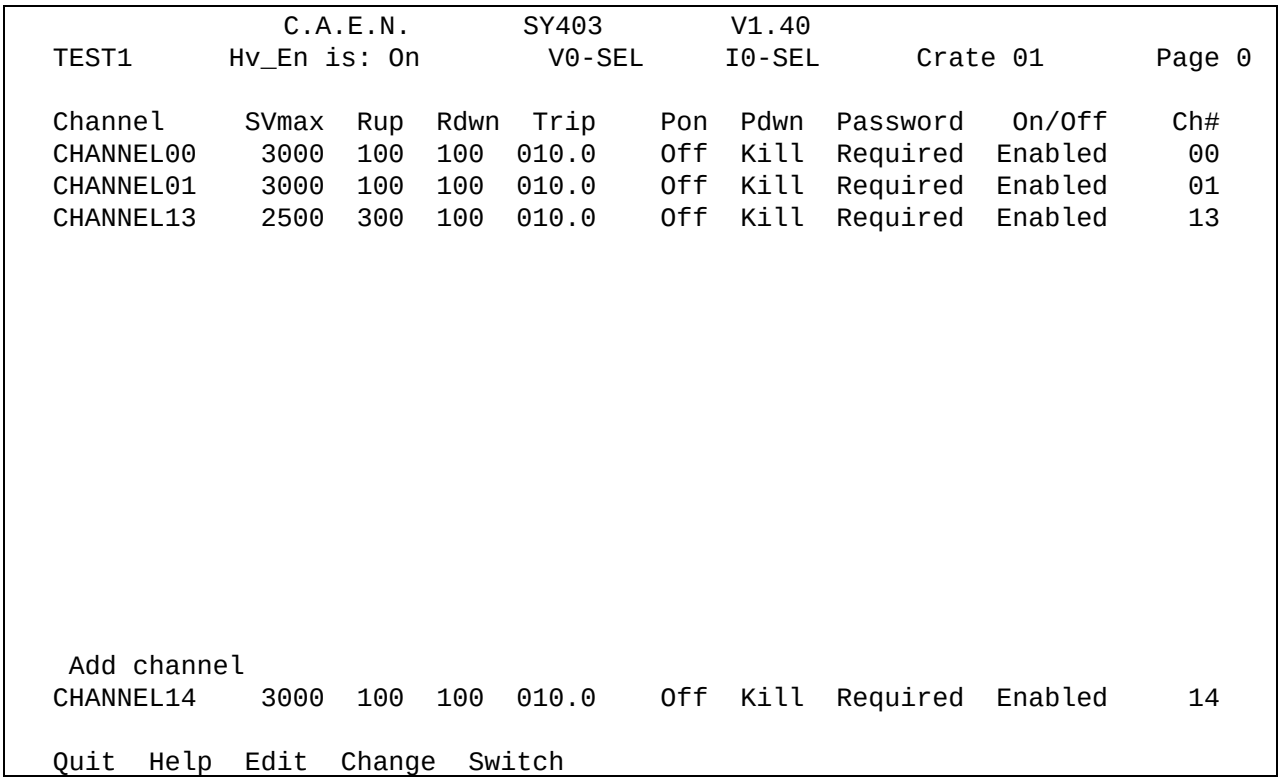

Fig. 5.8 Add Channel Screen

COMMANDS

Q Quit
Return to Previous screen without Group changes.

E Edit
Go to the **Edit Channel Screen** where The Channel Name can be edited and modified; the highlight bar disappears, and a blinking cursor appears under the first character of the value (No command is available on the bottom of the screen). On writing a new Channel Name and pressing "return " the Channel Name will take this new value; if a "return"i s entered without having giving any change the Name remains the old one.

C Change
Go to the **Change Channel Screen** where the previous Channel Name are cleared and a new one has to be typed; the highlight bar disappeared, the actual parameter value is cleared and a blinking cursor appears under the first character of the value. (No command is available on the bottom of the screen). On writing a new value and pressing "return " the Channel Name will take this new value; if a return is entered without having giving any new value the Name will maintain the old one

U/D Up and Down arrow key
The Up and Down arrow keys allows to scroll the channels up and down in the row ordered by the Channel Number.

For the Change Channel screen and Edit Channel screen refer to the operation described in §5.2.1 and 5.2.2.

5.2.4 Insert Channel Screen

This option is selected on entering the letter "I" in the Status Display Screen of a Group different from GROUP00.

In this screen it is possible to insert a new channel to the Group over the Current Channel. On entering the letter "I" in the Status Display Screen appears the message "Insert channel" following by one channel row displaying the channel parameters as shown in the following figure.

Use the Commands displayed on the bottom of the screen to select a new channel or press the Up and Down arrow keys; then pressing "return" the channel selected is added to the Group over the Current Channel previously selected.

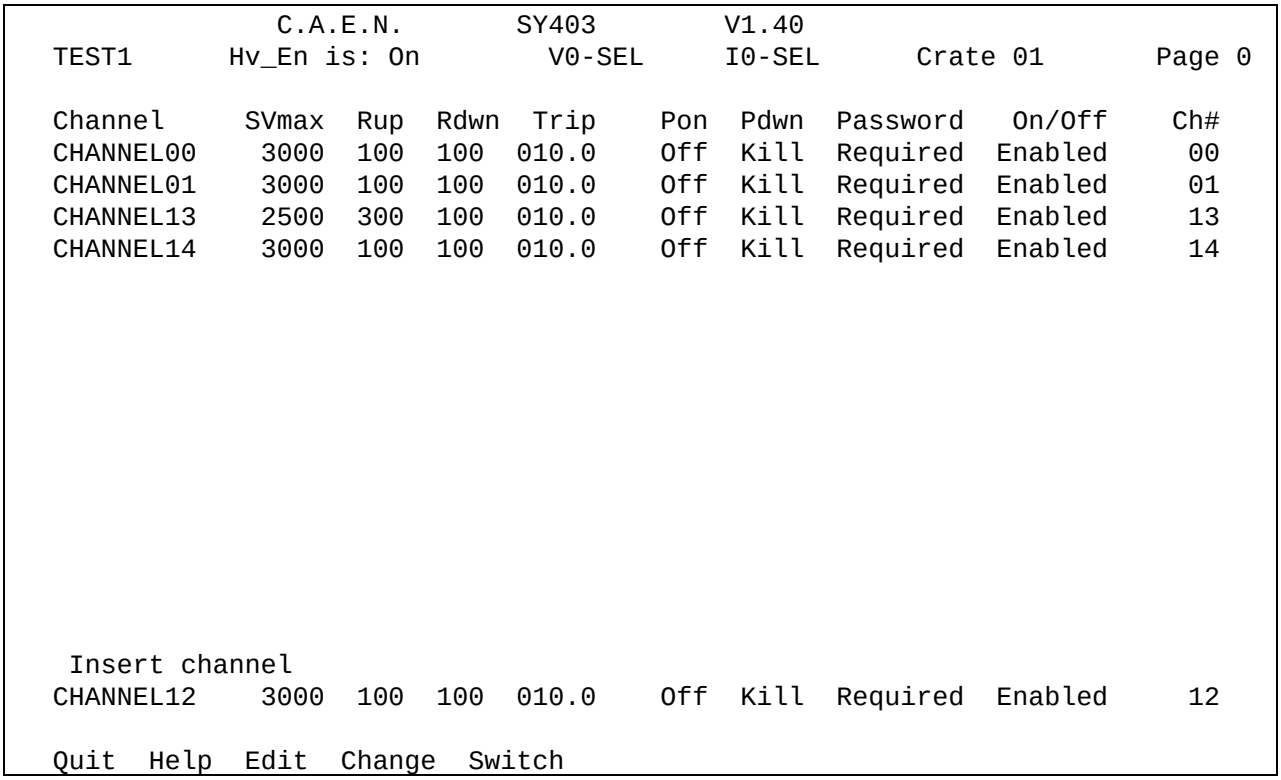

Fig. 5.9 Insert Channel Screen

COMMANDS

Refer to § 5.2.3

5.2.5 Replace Channel Screen

This option is selected on entering the letter "R" in the Status Display Screen of a Group different from GROUP00.

In this screen it is possible to replace the Current Channel with a new channel. On entering the letter "R" in the Status Display Screen appears the message " Replace channel" following by one channel row displaying the channel parameters of the Current Channel.

Use the Commands displayed on the bottom of the screen to select a new channel or press the Up and Down arrow keys; then pressing "return" the channel selected replaces the Current Channel previously selected.

```
                C.A.E.N.        SY403        V1.40
TEST1         Hv_En is: On     V0-SEL     I0-SEL       Crate 01        Page 0

Channel        Vmon    Imon   HVmax     V0set    I0set     Hv    Status     Ch#
CHANNEL00     0000.1   0000    3124     1000.0    3000    Off                00
CHANNEL01     0000.0   0000    3124     0025.0    3000    Off                01
CHANNEL13     0000.0   0000    3124     0444.0    3000    Off                13









 Replace channel
CHANNEL13     0000.0   0000    3124     0444.0    3000    Off                13

Quit  Help  Edit  Change  Switch
```

Fig. 5.10 Replace Channel Screen

COMMANDS

Refer to § 5.2.3

5.3 Group Operation Option

The Group operation Option is selected by entering the "S" key in the Status Display screen of each Group. appears a screen (**Group Operation Screen**)where it is possible:

- to modify the parameters of the entire Group displayed;

- to show the Status of another Group.

To return to the previous screen it is sufficient to enter another time the "S" key.

In the bottom of the screen some of the available commands are shown; the operator selects the command by typing the key correspondent to the first letter of the Command itself.

Use the left and right Arrow Keys to move the highlight bar along the row on the bottom of the screen. By operating on the fields characterized by the letters "X" it is possible to modify the corresponding parameter of all the channel. (The highlight bar indicates the **Current Parameter:** it may be the Group Name, or a field that corresponds to the parameter value of all the channels).

- If the Current Parameter is the Group Name it is possible to modify it (Change /Edit command) or to show another Group of channel (using the Replace command or the Up and Down arrow keys).

- If the Current Parameter can assume only two values (Hv, Pon, Pdwn, Password, On/Off) use the keys "1","0" to set the two values as shown in §5.2.

- If the Current Parameter can take different values (V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip), the Change commands allows to enter in the "X" field a value that is taken by all the channels.

- The Edit commands permits to increment the Current Parameter values of all channels by the same quantity.

- The commands **Quit**, **Page** and **More** have the same usage as in §5.2.

The Structure of the two screens are shown the following page.

```
                C.A.E.N.        SY403        V1.40
GROUP00       Hv_En is: On      V0-SEL      I0-SEL       Crate 01       Page 0

Channel       Vmon     Imon   HVmax      V0set    I0set     Hv    Status     Ch#
CHANNEL00    0000.1    0000    3124      1000.0    3000    Off                00
CHANNEL01    0000.0    0000    3124      0025.0    3000    Off                01
CHANNEL02    0000.0    0000    3124      1000.0    3000    Off                02
CHANNEL03    0000.3    0000    3124      1000.0    3000    Off                03
CHANNEL04    0000.0    0000    3124      1000.0    3000    Off                04
CHANNEL05    0000.2    0000    3124      1000.0    3000    Off                05
CHANNEL06    0000.0    0000    3124      1000.0    3000    Off                06
CHANNEL07    0000.0    0000    3124      1000.0    3000    Off                07
CHANNEL08    0000.0    0000    3124      1000.0    3000    Off                08
CHANNEL09    0000.0    0000    3124      1000.0    3000    Off                09
CHANNEL10    0000.0    0000    3124      1000.0    3000    Off                10
CHANNEL11    0000.0    0000    3124      1000.0    3000    Off                11
CHANNEL12    0000.0    0000    3124      1000.0    3000    Off                12
CHANNEL13    0000.0    0000    3124      0444.0    3000    Off                13
CHANNEL14    0000.4    0000    3124      1000.0    3000    Off                14
CHANNEL15    0000.0    0000    3124      1000.0    3000    Off                15

GROUP00                                  XXXX.X    XXXX    XXX

Quit  Edit  Change  Replace  Page  More  Switch  V/Isel
```

Fig. 5.11 Group Operation Screen of GROUP00 page 0 (Current Parameter = Group Name)

```
                C.A.E.N.        SY403        V1.40
GROUP00     Hv_En is: On         V0-SEL      I0-SEL       Crate 01       Page 0

Channel      SVmax  Rup  Rdwn  Trip     Pon  Pdwn  Password   On/Off     Ch#
CHANNEL00     3000  100  100  010.0     Off  Kill  Required  Enabled      00
CHANNEL01     3000  100  100  010.0     Off  Kill  Required  Enabled      01
CHANNEL02     3000  100  100  010.0     Off  Kill  Required  Enabled      02
CHANNEL03     3000  100  100  010.0     Off  Kill  Required  Enabled      03
CHANNEL04     3000  100  100  010.0     Off  Kill  Required  Enabled      04
CHANNEL05     3000  100  100  010.0     Off  Kill  Required  Enabled      05
CHANNEL06     3000  100  100  010.0     Off  Kill  Required  Enabled      06
CHANNEL07     3000  100  100  010.0     Off  Kill  Required  Enabled      07
CHANNEL08     3000  100  100  010.0     Off  Kill  Required  Enabled      08
CHANNEL09     3000  100  100  010.0     Off  Kill  Required  Enabled      09
CHANNEL10     3000  100  100  010.0     Off  Kill  Required  Enabled      10
CHANNEL11     3000  100  100  010.0     Off  Kill  Required  Enabled      11
CHANNEL12     3000  100  100  010.0     Off  Kill  Required  Enabled      12
CHANNEL13     2500  300  100  010.0     Off  Kill  Required  Enabled      13
CHANNEL14     3000  100  100  010.0     Off  Kill  Required  Enabled      14
CHANNEL15     3000  100  100  010.0     Off  Kill  Required  Enabled      15

GROUP00       XXXX  XXX  XXX  XXX.X     XXX  XXXX  XXXXXXXX  XXXXXXX

Quit  Edit  Change  Replace  Page  More  Switch
```

Fig. 5.12 Group Operation Screen of GROUP00 page 1 (Current Parameter = Group Name)

COMMANDS

Q Quit
Return to Main Menu.

E Edit
This command is active when the Current Parameter is one of the following:

Group Name, V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip:

- If the Current Parameter is the Group Name, Go to the **Edit Group Name Screen.** The value of the Group Name can be edited and modified;

- If the Current Parameter is one of these: V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip, go to the **Increment/Decrement Parameter Screen**:the highlight bar disappears, and a blinking cursor appears under the first "X" of the field that corresponds to the most significant figure of the Parameter value. The cursor indicates the **Current Figure** of the Current Parameter. Use the left and right arrow keys to move the cursor along the "X" field; and use the Up and Down arrow keys to increment/decrement the **Current Figure**:

  - pressing the Up arrow key the Current Figure of the Parameter value of all the channels is incremented by the minimum step possible;

  - pressing the Down arrow key the Current Figure of the Parameter value of all the channels is decremented by the minimum step possible.

Then Pressing "return" the display returns to the previous screen.

C Change
This command is active when the Current Parameter is one of the following:
Group Name, V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip:

- If the Current Parameter is the Group Name, go to the **Change Group Name Screen** where the Group Name is cleared and a new one has to be typed;

- If the Current Parameter is one of these: V0set, I0set, V1set, I1set, SVmax, Rup, Rdwn, Trip, go to the **Change Group Parameter Screen**: the highlight bar and the "X" disappear, and a blinking cursor appears under the first position of the field; (the same result is achieved by pressing one of the numeric key). On writing a new value and pressing "return" The Current Parameter of all the channels will take this new value.

R Replace Group
Go to the **Replace Group Screen**, which allows to enter the name of the Group to be displayed.
This command is active when the Current Parameter is the Group Name

By entering the letter "R" the highlight bar disappeared, the actual Group name is cleared and a blinking cursor appears under the first character of the name. On writing the Name of another Group and pressing "return " the screen will show the Group Operation Screen of of this Group (To enter in the Status Display screen of the new Group it is sufficient to press the "S" key).

If the name typed does not correspond to one of the Group existent the screen will prompt an error message: " The Group <Group Name > is unknown : retry".

P Page

Show the next Status page with other 16 channels of the Group. The Page command is available when there are more than 16 channels in the Group.

M More

Show the next screen of the same page of the Group Operation screen:
The parameters shown in the two screen are:

screen 1: Channel, Vmon, Imon, HVmax, V0set (V1set), I0set (I1set), Hv, Status;

screen 2 : Channel, SVmax, Rup, Rdwn, Trip, Pon, Pdwn, Password, On/Off.

S Switch screen
Go to the Status display screen of the Group.

1,0 Set a two values Parameter
If the Current Parameter can assume only two values (Hv, Pon, Pdwn, Password, On/Off), use the key "1" and "0" to set the two different values. By pressing the keys all the channels take the same parameter value.

Key	Hv	Pon	Pdwn	Password	On/Off
"0"	Off	Off	Kill	...	...
"1"	On	On	Rdwn	Required	Enabled

U/D Up and Down arrow key
If the Current Parameter is the Group Name The UP and Down arrow keys allows to select another Group of channels.

- By pressing the Up key the Group which follows the actual Group is selected;

- By pressing the Down key the Group which precedes the actual Group is selected.

Numeric keys
- If the Current Parameter can take different values (V0set, I0set, V1set, I1set,Vmax, Rup, Rdwn, Trip) by entering the number corresponding to the most significant figure of the new Parameter value the display will show the **Change Group Parameter Screen** where the corresponding number is displayed as the most significant figure of the value.

5.4 Protection option

This option is selected on entering the letter "P" in the Main menu. If the Password is enabled the system ask the Password; if the password is correct the "Set Protections" menu is shown.

Four options can be selected; the operator selects the Command by typing the key correspondent to the first letter of the option itself. They allow:

- to Enable Disable the Password protection;

- to change the Password itself;

- to disable the Front Panel Keyboard setting.

The meaning of the Password protection is:

- If The Password is **enabled**:

  - if The Channel Password parameter = "Required" t is not possible to modify the channels parameter.

  - if The Channel Password parameter is blank it is possible to modify the channels parameter
    except the Password and the On/Off parameter.

- If the Password is **disabled**:

  - it is possible to modify every value of the channel parameters regardless of the Password Parameter of the channel;

  - in particular it is possible to disable the Password for each channel, (the channel Password is enabled when the word "Required" is shown in the Password field):

    - first it is necessary to move the highlighted bar to the Password field

    - when the Password is the Current Parameter, the operator just only have to type the "C" key;

    - after this operation the Password field becomes blank.

- the Lock option allows to disable some of the setting operation via Keyboard (see § 4).

5.4.1 Disable Password and Keyboard

```
            C.A.E.N.       SY403        V1.40        Crate 01



     Set Protections

     Change              Change  password

     Disable             Disable password

     Lock                Disable Keyboard

     Quit                Abandon program

     Select item
```

Fig 5.13 Set Protection Menu (Password and Keyboard Enabled)

COMMANDS

Q Quit
Return to the Main Menu .

C Change
Change the Password:

- first the system asks the old Password;
- if the Password is correct then asks the new Password;
- to confirm the change the system asks another time the new Password: if the operator do not types the new Password the system maintains the old one.

D Disable
Disable the Password; the screen shows another menu where the "Disable" option is changed in the "Enable" option:

L Lock
Disable the Keyboard; the screen shows another menu where the "Lock" option is changed in the "Unlock" option:

5.4.2 Enable Password and Keyboard

```
            C.A.E.N.       SY403        V1.40        Crate 01



    Set Protections

    Change              Change  password

    Enable              Enable password

    Unlock              Disable Keyboard

    Quit                Abandon program

    Select item
```

Fig 5.14 Set Protection Menu (Password Disabled)

COMMANDS

E Enable

Enable the Password; the screen shows another menu where the "Enable" option is changed in the "Disable" option.

U Unlock

Enable the Keyboard, the screen shows another menu where the "Unlock" option is changed in the "Lock" option.

5.5 Connect a New Crate Option

This option is selected on entering the letter "C" in the Main menu. It allows the operator to select which SY403 on the H.S. CAENET Network has to be acted upon via "H.S. CAENET". If the "C" key is entered, the terminal asks for the number of the crate that the operator wants to control. Near the word "CRATE" the number of the crate physically connected to the terminal is reported in square brackets.

If the Crate selected can be reached via CAENET, the MAIN MENU will be displayed, and all the information will from then on refer to crate number indicated on the top right of the screen. If no one SY403 in the network has the Crate number entered, the reply "Remote crate not responding" will be obtained, and no action will be taken.

```
          C.A.E.N.       SY403        V1.40        Crate 01


     M A I N   M E N U

     Display             Display/Modify channels
     Protections         Set/Reset password
     Crate               Connect a new crate
     Map                 Crate Map
     Kill                Kill all channels
     Alarms              Reset alarms
     Status              Select type of alarm
     Format              Reformat EEPROM
     Quit                Abandon program


     Enter the crate number to be connected  [01]: _
```

Fig 5.15 Connect a New Crate Menu

5.6 Crate Map Option

This option is selected on entering the letter "M" in the Main menu. It is used to display the Crate configuration (see figure below).

Entering the "M" key on the display a screen named "Crate Map" will appear. In four lines the four slots of the crate are reported, indicating the kind of the HV Board inserted in them . The following Board characteristics are displayed:

- The Max Output voltage;
- The Max Current;
- The Polarity.

If a slot is empty, the message " Board not present" will be displayed. As indicated in the last line, it is sufficient to press any key to go back to the Main Menu.

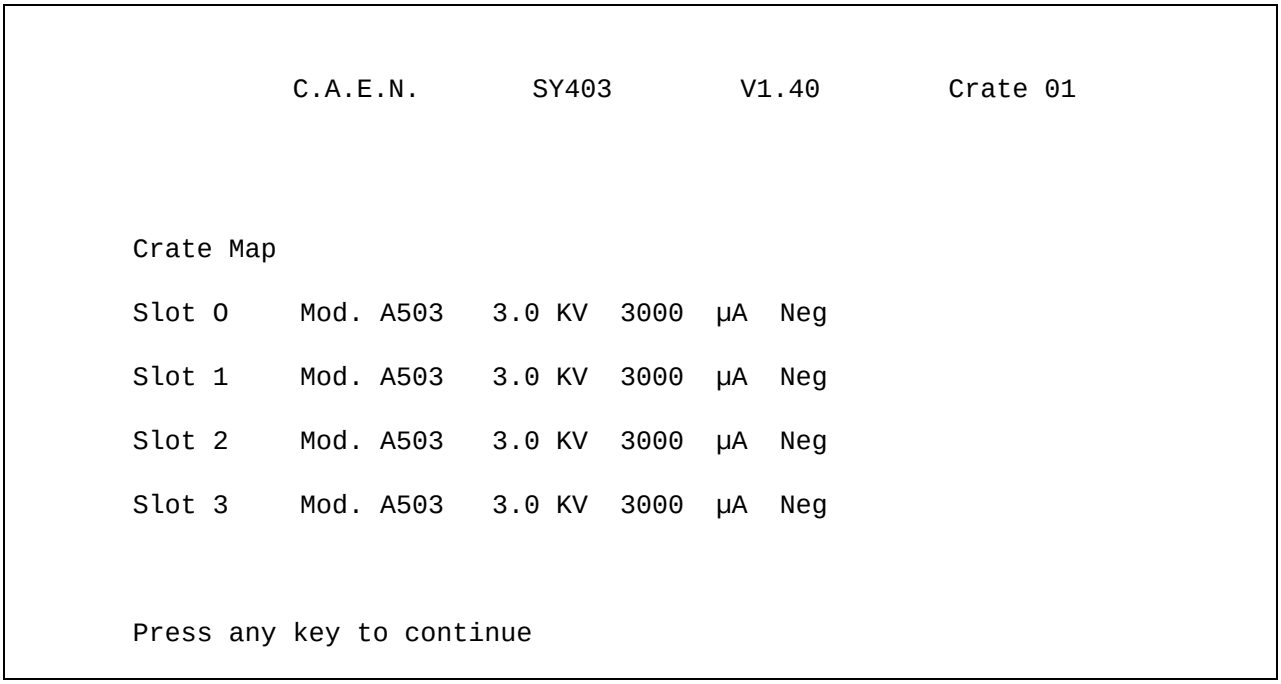

Fig 5.16 Crate Map Screen

5.7 Select Alarm Mode Option

This option is selected on entering the letter "S" in the Main menu.It allows to chose the error conditions which cause an Alarm, and the Alarm signal (STATUS signal) characteristics.The Status command is available only when the Password is disabled.

Five options can be selected;

- the Normal Level of the Alarm signal STATUS (High/Low); This is the STATUS level when the signal is not active;

- the type of the Alarm signal (Level/Pulsed); If the option chosen is "Pulsed" The STATUS output (when active) is a periodic signal (the period is about few hundred msec);

- a Mask (On/Off) for each of these three error conditions Ovc,Ovv,Unv: if the mask is ON the corresponding error condition on at least one channel sets the Alarm.

The operator selects the Command by typing the key correspondent to the first letter of the option itself. The option selected toggles between its two values; for example if the Alarm Type value is "Pulsed", entering "B" the value becomes "Level" and viceversa.

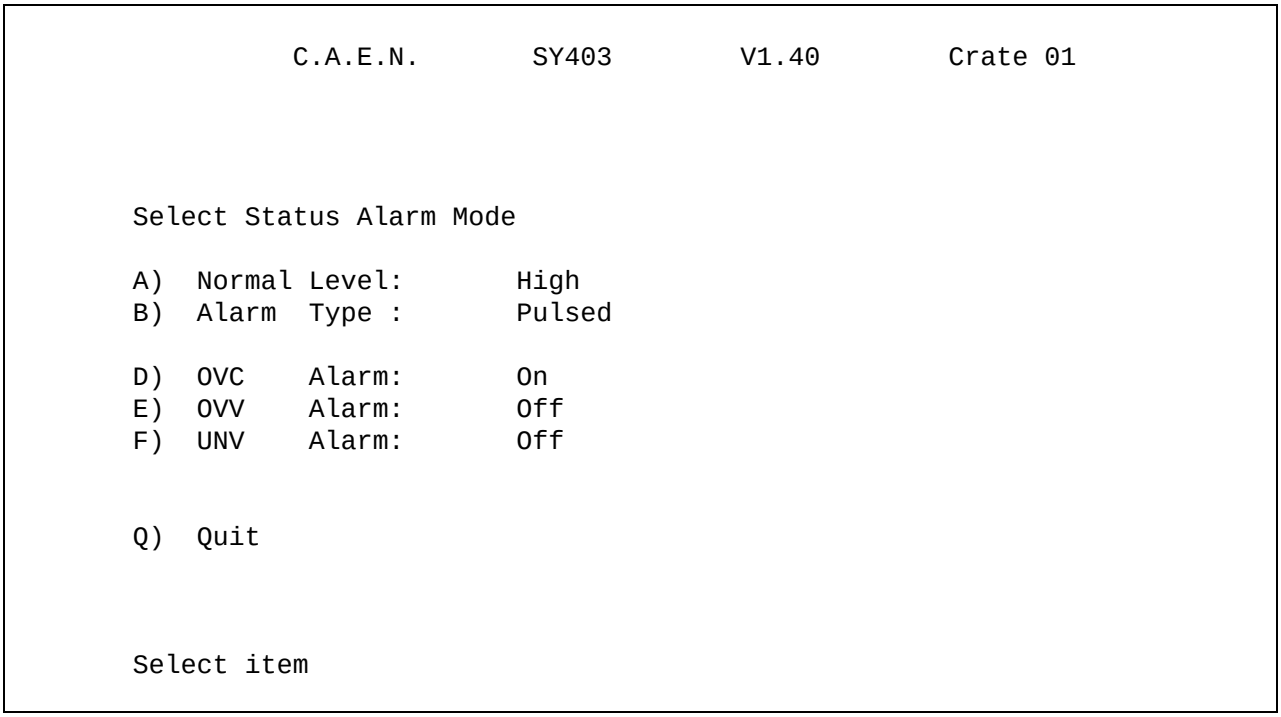

Fig 5.17 Select Status Alarm Mode Menu

COMMANDS

A Normal Level (High/Low)
Select the level of the STATUS output when no error condition is present.

B Alarm Type (Pulsed/Level)
Select the Type of the STATUS output when an error condition is present.

D OVC Alarm (On/Off)
Select the Alarm Mask for the Overcurrent condition.

E OVV Alarm (On/Off)
Select the Alarm Mask for the Overvoltage condition.

F UNV Alarm (On/Off)
Select the Alarm Mask for the Undervoltage condition.

Q Quit
Return to the Main Menu.

6. H.S. CAENET OPERATION

The Model SY403 is provided with an H.S. CAENET node through which it can be controlled by the following H.S. CAENET Controllers:

Mod. C117B -
H.S. CAENET CAMAC Controller
Mod. V288 -
H.S. CAENET VME Controller
Mod. A303 -
H.S. CAENET PC Controller.

NOTE: the address number of the SY403 (Crate#) must be the only one in the line in which you wish to insert the module. Due to high transmission speed of the data in line it is necessary to terminate this line on a 50 • impedance at the end to avoid reflections.

Via H.S. CAENET it is possible to modify all the channel parameters regardless of its Password protection Status (enabled/disabled) selected via Terminal (see § 5.2 and 5.4)
In particular it is possible to modify the status of its Password Parameter.

6.1 Using the H.S. CAENET VME Controller (Mod. V 288)

The Mod. SY403 can be controlled remotely via VME through the Mod. V 288 H.S. CAENET VME Controller.

The Model V288 has been designed to control an H.S. CAENET node through the VME bus.
It is composed of a collection of registers, for the operation control, and two memory buffer for the data packet transmitted and received, arranged in a FIFO logic 16 bit wide 256 word deep.

In the memory buffer for the received data are also stored some error messages generated by the V288 itself when the H.S. CAENET operation has failed (see Table 6.15)

Standard VME cycles allow the user to perform the required control and setting operations on each Mod.SY403 in the network, according to the typical MASTER/SLAVE communication protocol, where the VME controller assumes the MASTER function.

The module operations can be software controlled in polling mode or can be handled via interrupt facility. It houses a VME ROAK INTERRUPTER that generates a VME interrupt (if enabled) as soon as the data packet (or the error message) is stored in the receive buffer.

The Mod. V288 registers are described in the Table 6.1

Table 6.1: Mod V288 Registers

NAME	TYPE	ADDRESS	FUNCTION
Transmit Data Buffer	Write only	Base Address + 00	Transmit data storage
Receive Data Buffer	Read only	Base Address + 00	Receive data storage
Status Register	Read only	Base Address + 02	After an H.S.CAENET operation has been performed, This register indicates whether the operation is valid or not FFFE= valid operation FFFF= no valid operation
Transmission Register.	Write only	Base Address + 04	By writing into this register the Transmit Data buffer content is transmitted on the cable
Reset Register	WRITE only	Base Address + 06	Module's Reset
Interrupt Vector Register	WRITE only	Base Address + 08	Interrupt vector programming register

6.1.1 Transmit Data Buffer

(Base Address + 0 write access)
This is the buffer which is loaded with the data packet to transmit, it is arranged in a FIFO logic 16 bit wide; (the data packet transmitted is composed of 16 bit words as shown in Tab 6.2).

6.1.2 Receive Data Buffer

(Base Address + 0 read access)
This is the buffer where the Mod.V288 automatically stores the data packet received from the SY403 or, if the H.S. CAENET operation has failed, stores an error code. It is arranged in a FIFO logic 16 bit wide; (the data packet received is composed of 16 bit words as shown in Tab 6.3).

6.1.3 Status Register

(Base Address + 2 read only)
The content of this register indicates if the previous H.S. CAENET operation is valid or not.

Status Register = %FFFF

No valid operation;
Status Register = %FFFE

Valid operation.

After one of the following operation the user is recommended to read the Status Register:

- **write data in the Transmit Data buffer**: it indicates if the datum written has been stored or not in the Transmit Data Buffer; a "No valid operation" means that the Transmit Data Buffer is not available for data storage. This may happen in these cases:

  - if the H.S. CAENET node is active (it is transmitting a previous data packet or it is receiving the Slave response data packet);

  - if the Transmit Data Buffer is full (the maximum number of data stored is 256)

- **write in the Transmission Register** (Start data packet transmission): it indicates if the Start Transmission command has been recognized by the Mod. V288; a "No valid operation" means that the H.S CAENET node is not able to transmit data. This may happen if the H.S. CAENET node is active (it is transmitting a previous data packet or it is receiving the Slave response);

- **read data from the Receive Data Buffer:** it indicates if the data read is valid or not.

6.1.4 Transmission Register

(Base Address + 4 write only)
By writing at this location the H.S.CAENET node enters in the transmit mode: the data stored in the Transmit Data Buffer are transmitted on the cable. If this operation is performed with the Transmit Data Buffer empty, an error message is stored in the Receive Data Buffer (error %FFFD see Table 6.15

6.1.5 Reset Register

(Base address + 6, write only)
An access in writing to this location causes the V288 to enter in restart mode; this causes the following operations:

- the buffers are cleared;
- every interrupt pending is cleared;
- every data transfer is aborted;
- the V288 does not accept any command.

It remains in this status for about 3 msec.
The module can be reset also by pressing the Front Panel Push button.

6.1.6 Interrupt Vector Register

(Base address + 8, write only)
The value written in this 8 bit register is the STATUS/ID that the V288 INTERRUPTER places on the VME data bus during the Interrupt Acknowledge Cycle
.

6.1.7 V288 Addressing Capability

The module works in A24 mode; this means that the module address must be specified in a field of 24 bits.

The Address Modifiers used by the module are

AM = %39 : Standard user data access
AM = %3A : Standard user program access
AM = %3D :Standard supervisor data access
AM = %3E :Standard supervisor program access

The module's Base address is fixed by dip switches located on the board (see Fig 6.1)

6.1.8 V288 Data transfer capability

The registers and the buffers are accessible in D16 mode.

6.1.9 V288 INTERRUPTER Capability

The V288 module houses a VME ROAK INTERRUPTER D08(o) type.This means that :

- it responds to 8 bit, 16 bit and 32 bit interrupt acknowledge cycles providing an 8-bit STATUS/ID on the VME data lines D00..D07.

- it removes its interrupt request when the VME MASTER reads the V288 STATUS/ID during the Interrupt Acknowledge Cycle (ROAK: Release On Acknowledge).

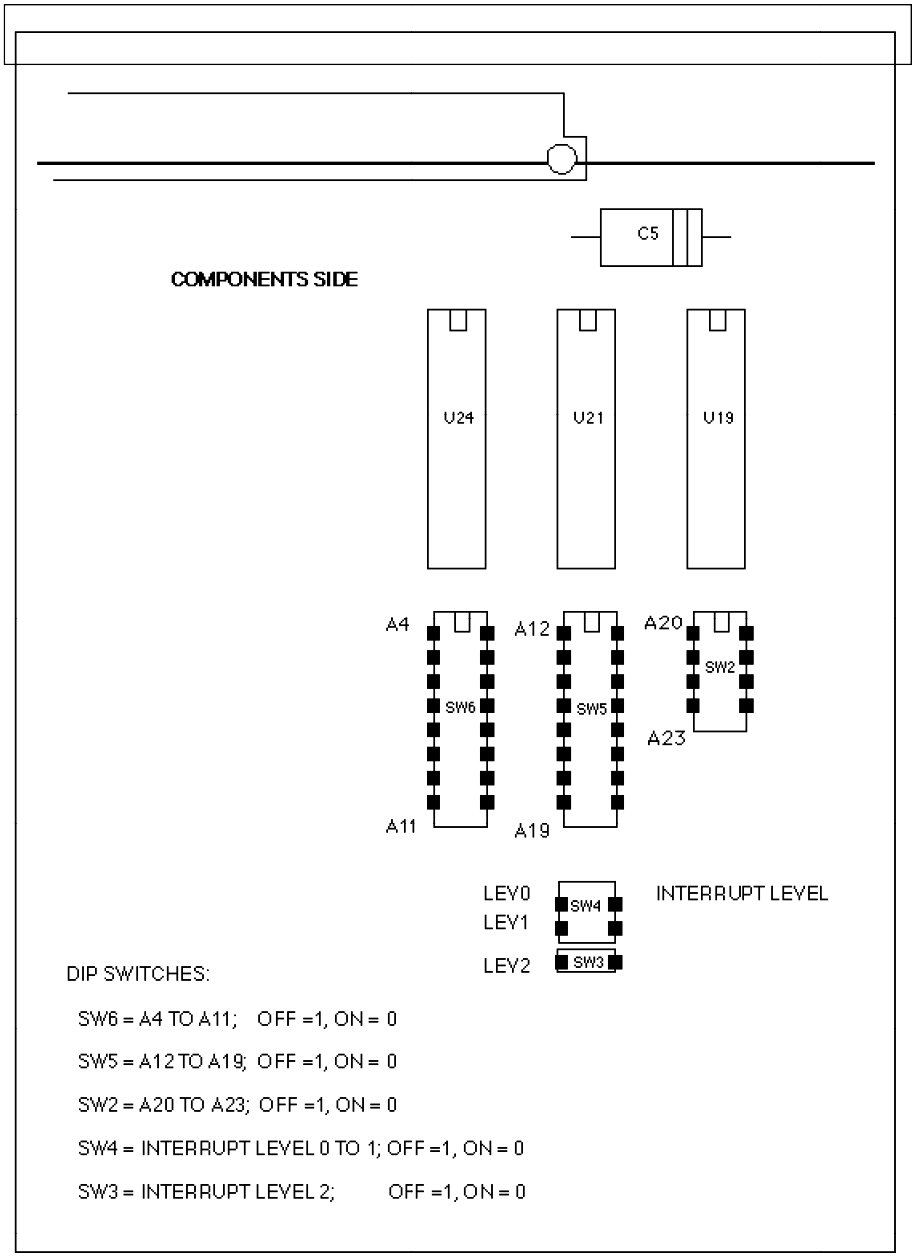

Fig 6.1 V288 dip switches setting

6.1.10 V288 Interrupt Level

The interrupt level corresponds to the value set on the two dip-switches SW4,SW3 as described in
Fig. 6.1

6.1.11 Master to Slave data composition (V288 case)

The Master to Slave data have to be written in the Transmit Data Buffer, by performing subsequent write accesses as follows.

Table 6.2: Master to Slave data composition

Order	Operation	Address	Datum (HEX)	Meaning
1	Write	Base Ad. + 0	%0001	H.S. CAENET Controller identified code
2	Write	Base Ad + 0	%00XX	Crate Number
3	Write	Base Ad + 0	Code	Code of the operation to be performed
4	Write	Base Ad + 0	Set	Eventual set value

As soon as the data pack has been stored in the Transmit Data Buffer, it can be transmitted on the cable by performing a Write operation on the Transmission Register.
The operation codes are shown in Tab. 6.8.
After any transmission, in the V288 Receive Data Buffer the user reads the Slave response or a V288 error message (for example if the V288 does not receive any Slave response within a period of 500 msec it stores the code %FFFF in the Receive Data Buffer, see Table 6.15).

6.1.12 Slave to Master data composition (V288 case)

The answer data coming from the Mod. SY403 or a Mod. V288 error message is automatically stored into the V288 Receive Data buffer and therefore is available to the user. As soon as the data pack is stored in this buffer, a VME interrupt (if enabled) is generated.
The following Table shows the structure of the SY403 data packet:

Table 6.3: Slave to Master data composition

Order	Operation	Address	Datum	Meaning
1	Read	Base Ad + 0	Error Code	Error code
2 to 25	Read	Base Ad + 0	value	Eventual Parameter value

The Error codes are described in Tab. 6.15.

6.1.13 V288 - SY403 communication sequence

- write the data packet in the Transmit Data Buffer; in the packet is contained the H.S. CAENET address of the SY403 (Crate #), (see Tab 6.2 for the data structure).

for each data:
- write the data in the Transmit Data Buffer
- read the Status Register :
- if Status Register =%FFFE
  {
  the data is stored in the buffer.
  }
- else
  {
  error.
  }

- Transmit the data packet:
- Access in write the Transmission Register:
- read the Status Register :
- if Status Register = %FFFE
  {
  the V288 H.S. CAENET Node enters in the transmit mode and the data packet stored is transmitted on the cable.
  }
- else
  {
  error
  }

- Wait for the SY403 response
- if the Interrupt is enabled
  {
  wait for V288 interrupt
  }
- else
  {
  - read the Receive data buffer
  - read the Status Register :
  - if Status Register = %FFFF discard the data and repeat the two read operation
  - if Status Register = %FFFE accept the data read: it may be the first data of the SY403 response data packet or a V288 error message; go to the Read Response section
  }

- Read response
- read the Receive data buffer
- read the Status Register :
- if Status Register = %FFFE accept the data read: and repeat the two read operation
- if Status Register = %FFFF discard the data read and exit: the Receive Data Buffer is empty .

6.2 Using the H.S. CAENET CAMAC Controller (Mod. C 117B)

The Mod. SY403 can be controlled remotely via CAMAC through the Mod. C 117B H.S. CAENET CAMAC Controller.

The Model C 117B has been designed to control an H.S. CAENET node through the CAMAC bus. It houses two memory buffer for the data packet transmitted and received, arranged in a FIFO logic 16 bit wide 256 word deep.

In the memory buffer for the received data are also stored some error messages generated by the C117B itself when the H.S. CAENET operation has failed (see Table 6.15).

The standard CAMAC functions listed in Table 6.4 allow the user to perform the required control and setting operations on each Mod. SY403 in the network according to the typical MASTER/SLAVE communication protocol, where the CAMAC controller assumes the MASTER function.

As soon as the data packet (or the error message) is stored in the receive buffer, a LAM signal is generated (if enabled).

X response is generated for all valid function.
Q response is generated for each valid function unless is otherwise specified (see Table below).

Table 6.4 Mod. C 117 B CAMAC Functions

F(0) N	Reads the data stored in the mod. C 117 B Receive Data buffer. Q response while the buffer contains data.
F(8) N	Tests the LAM line. Q response if LAM is true.
F(9) N	Resets the module (clears buffer and LAM; disables the LAM line).
F(16) N	Stores the data into the Mod. C 117 B Transmit Data buffer. Q response until the buffer is full (256 16-bit words).
F(17) N	Transfers data to the serial line.
F(24) N	Disables the LAM line.
F(26) N	Enables the LAM line.
C, Z	Same as F(9) N.

6.2.1 Transmit Data Buffer (F(16) N Function)

This is the buffer which is loaded with the data packet to transmit, it is arranged in a FIFO logic 16 bit wide; (the data packet transmitted is composed of 16 bit words as shown in Tab 6.5).
The data are stored in this buffer by performing one or more F(16) N Functions with the data to be written asserted on the WRITE lines W<1..16>.

The Q response to the F(16) N Function indicates if the datum has been stored or not in the Transmit Data Buffer;

- Q=1 means that the data has been stored in the Transmit Data Buffer

- Q=0 means that the Transmit Data Buffer is not available for data storage. This may happen in these cases:

  - if the H.S. CAENET node is active (it is transmitting a previous data packet or it is receiving the Slave response data packet);

  - if the Transmit Data Buffer is full (the maximum number of data stored is 256)

6.2.2 Receive Data Buffer (F(0) N Function)

This is the buffer where the Mod.C117B automatically stores the data packet received from the SY403 or, if the H.S. CAENET operation has failed, stores an error code. It is arranged in a FIFO logic 16 bit wide; (the data packet received is composed of 16 bit words as shown in Tab 6.6).
The data contained in the Receive Data buffer are read by performing F(0) N Functions. The required data are present on the READ, line R<1..16>.
The Q response indicates if if the data read is valid or not.

- Q=1 means valid data;

- Q=0 means no valid data.

6.2.3 Start Transmission (F(17) N Function)

By performing an F(17) N Function the H.S.CAENET node enters in the transmit mode: the data stored in the Transmit Data Buffer are transmitted on the cable. If this operation is performed with the Transmit Data Buffer empty, an error message is stored in the Receive Data Buffer (error %FFFD see Table 6.15).
The Q response indicates if the Start Transmission command has been recognized or not by the Mod. C117B;

- Q=1 means that the Transmit command has been successfully recognized and that a valid response can be read in the Receive Data Buffer within a period of 500 msec.(the C117 waits up to 500 msec for a Slave response, after this it stores in the Receive Data Buffer the error code %FFFF, see Table 6.15)

- Q=0 means that the H.S CAENET node is not able to transmit data. This may happen if the H.S. CAENET node is active (it is transmitting a previous data packet or it is receiving the Slave response);

6.2.4 C117B Reset

The C117 B can be resetted in these ways:

- by performing an F(9) N Function;
- by performing a C Command;

- by performing a Z Command;
- by pushing the Front Panel push button.

After one of these operations the C117B enters in restart mode; this causes the following operations:

- the buffers are cleared;
- the LAM is cleared;
- the LAM is disabled;
- every data transfer is aborted;
- the C117B does not accept commands.

It remains in this status for about 3 msec.

6.2.5 Master to Slave data composition (C117B case)

The MASTER-to-SLAVE data have to be written into the Transmit Data buffer by performing subsequent F(16) N functions as follows:

Table 6.5: Master to Slave data composition

Order	CAMAC Function	W16 to W1 (HEX)	Meaning
1	F(16) N	%0001	H.S. CAENET Controller identified code
2	F(16) N	%00XX	Crate Number
3	F(16) N	Code	Code of the operation to be performed
4	F(16) N	Set	Eventual set value

After the required F(16) N functions have been performed, it is necessary to carry out an F(17) N function in order to transfer the stored data to the addressed module.The operation codes are shown in Tab. 6.8.

As soon as the response data packet is stored into the C117b Receive Data buffer a LAM signal is generated (if enabled).
The LAM is cleared whenever the last datum has been read.

If the LAM has not been enabled after the F(17) N function the F(0) N function must be repeated until a Q=1 response is obtained; The readout is over when Q=0 (Q STOP readout operation).

In the C117 B Receive Data Buffer the user reads the SY403 response or a C117 B error message (for example if the C117 B does not receive any Slave response within a period of 500 msec it stores the code %FFFF in the Buffer, see Tab. 6.15).

6.2.6 Slave to Master data composition (C117B case)

The answer data coming from the Mod. SY403 or a Mod. C 117 B error message is automatically stored into the C117 B Data buffer and therefore is available to the user. As soon as the data pack is stored in this buffer, a LAM (if enabled) is generated.
The following Table shows the structure of the SY403 data packet:

Table 6.6: Slave to Master data composition

Order	CAMAC Function	Datum	Meaning
1	F(0) N	Error Code	Error code
2 to 25	F(0) N	value	Eventual Parameter value

The Error codes are described in Tab 6.15.

6.2.7 C117B-SY403 communication sequence

- write the data packet in the Transmit Data Buffer; in the packet is contained the H.S. CAENET address of the SY403 (Crate #), (see Tab 6.5 for the data structure).

for each data:

- perform an F(16) N Function
- if Q=1
  {
  the data is stored in the buffer.
  }
- else
  {
  error.
  }

- Transmit the data packet:

- perform an F(17) N Function
- if Q=1
  {
  the C117B H.S. CAENET Node enters in the transmit mode and the data packet stored is transmitted on the cable.
  }
- else
  {
  error
  }

- Wait for the SY403 response

- if LAM is enabled
  {
  wait for C117B LAM : when LAM is asserted go to the Read response section
  }
- else
  {
  - perform an F(0) N Function
  - if Q=0 discard the data and repeat the operation
  - if Q=1 accept the data read: it may be the first data of the SY403 response data packet or a C117B error message; go to the Read Response section
  }

- Read response

- perform an F(0) N Function
- if Q=1 accept the data read and repeat the operation
- if Q=0 discard the data read and exit: the Receive Data Buffer is empty .

6.3 Master to Slave data packet description

The MASTER-to-SLAVE data Packet described in the § 6.1.1 and 6.2.5 has the following structure:

Table 6.7: Master to Slave data composition

Order	Datum (Hex)	Meaning
1	%0001	H.S. CAENET Controller identified code
2	%00XX	Crate Number
3	Code	Code of the operation to be performed
4	Set	Eventual set value

6.3.1 Code of the operation

In the following Table are shown the various operation Codes available.

Table 6.8: hexadecimal code of the operation
(n is the Channel number: n = 0..63)

Code	Meaning
%0	Module identifier
%3	Read H.V. Boards characteristics
%n01	Read Channel n Status
%n02	Read Channel n parameter values
%n10	Set Channel n V0set value
%n11	Set Channel n V1set value
%n12	Set Channel n I0set value
%n13	Set Channel n I1set value
%n14	Set Vmax software value
%n15	Set Channel n Ramp-up value (Rup)
%n16	Set Channel n Ramp-down value (Rdwn)
%n17	Set Channel n Trip value
%n18	Set Channel n Flags values (Pon, On/Off, Pdwn, Password, H.V.)
%00FF	Read Busy Status

6.3.2 Parameters Setting

The following tables describe the structure of the word 4 of the data packet for the Set operations.

Code %n10..Code %n17

Table 6.9: Word 4 structure for the set operation Code %n10..Code %n17

Code	Word4 Content
%n10	V0set value
%n11	V1set value
%n12	I0set value
%n13	I1set value
%n14	Vmax soft. value
%n15	Rup value
%n16	Rdwn value
%n17	Trip value

The Parameters values must be expressed in the following units:

Table 6.10:Parameters Units

Parameter	**A503** (3000V 3mA)	**A504** (600V 200µA)
V0set value	tenth of Volt	hundredth of Volt
V1set value	tenth of Volt	hundredth of Volt
I0set value	µA	hundredth of µA
I1set value	µA	hundredth of µA
Vmax soft. value	Volt	Volt
Rup value	Volt/sec	Volt/sec
Rdwn value	Volt/sec	Volt/sec
Trip value	tenth of second	tenth of second

Code %n18

Table 6.11: Code %n18 Set Channel n Flags values (Pon, On/Off, Pdwn, Password, H.V.)

Word	Content
4	Mask & Flag

The **Mask** bits indicate which parameter must be modified:

The **Flag** bits indicate which value the parameters must assume.

- if Mask bit =0 the corresponding parameter maintains the old value

- if Mask bit =1 The corresponding parameter will take the value indicated in the corresponding Flag bit

the following Table shows the structure of the Mask & Flag word.

Table 6.12: Mask & Flag word structure

Bits	Meaning
0..2	Don't care
3	H.V. flag
4	Password flag
5	Pdwn flag
6	On/Off flag
7	Pwon flag
8..10	Don't care
11	Mask H.V.
12	Mask Password
13	Mask Pdwn
14	Mask On/Off
15	Mask Pwon

The correspondence of the Flag bits values with the Parameters values is shown in the following Table:

Table 6.13: Flag bits and Parameters values

Flag bit	Hv	Pon	Pdwn	Password	On/Off
"0"	Off	Off	Kill	...	...
"1"	On	On	Rdwn	Required	Enabled

Note that the channel Password parameter can be modified regardless of the Password protection Status (enabled/disabled) selected via Terminal (see § 5.4).

6.4 Slave to Master data packet description

The answer data coming from the Mod. SY403 or from the H.S. CAENET Controller has the following structure.

Table 6.14: Slave to Master data composition

Order	Datum (HEX)	Meaning
1	Error Code	Error code
2 to 25	value	Eventual Parameter value

6.4.1 Error Codes description

The Error codes are described in the following Table:

Table 6.15: Error Codes

Datum (Hex)	Meaning
%0	Successful operation.
%FF00	Module Busy; it has tried to effect an operation while the module is performing a previous operation.
%FF01	Code not recognized or message incorrect.
%FF02	Value out of range.
%FF03	Channel not present. (for Set commands only)
%FFFD	No data to be transmitted; it has tried to start a transmission with the Transmit data Buffer empty. (H.S. CAENET Controller error message).
%FFFE	The H.S. CAENET Controller identifier is incorrect. (H.S. CAENET Controller error message).
%FFFF	The addressed module does not exist. This message are generated after a period of 500 msec. (H.S. CAENET Controller error message).

6.4.2 Parameters Reading Slave Response

Code %0 Module identifier

The response contains in the low byte the ASCII code of the string of characters identified by the name of the Module plus the version of the software running on the Main Controller.

Table 6.16: Module identifier Data Packet Structure

Word	Contents
2	"S"
3	"Y"
4	"4"
5	"0"
6	"3"
7	" "
8	"V"
9	"1"
10	"."
11	"4"
12	"1"

Code %n01 Read Channel n status 0<n<63

The response contains:

Table 6.17: Channel status Data Packet Structure

Word	Contents
2	Most significant word of Vmon
3	Least Significant word of Vmon
4	Imon
5	Status

The values of Vmon ad Imon are expressed in the following units:

Table 6.18: Parameters units

Parameter	**A503** (3000V 3mA)	**A504** (600V 200µA)
Vmon	tenth of Volt	hundredth of Volt
Imon	µA	hundredth of µA

The word 5 (Status) contains the status of the Channels as shown bellow

Table 6.19: Channel Status

Bits	bit value = 0	bit value = 1
0..1	Don't care	Don't care
2	Channel not Present;	Channel present
3.. 7	Don't care	Don't care
8		H.V. max
9		Trip
10		Overvoltage
11		Undervoltage
12		Overcurrent
13		Down
14		Up
15	Channel Off	Channel On

Code %n02 Read Channel n Parameter values

The words 2 to 7 represents a field that contains the Channel name as a string; It accommodates the characters of the Channel Name followed by the null terminator 0 which marks the end of the string(Only the bytes that precede the 0 are valid data, the byte comprised from the 0 to end of the field are "don't care"; see the Table below where the Channel name is "TESTCH1")

Table 6.20: Channel Parameters Packet Structure

Word	Contents
2	"T","E"
3	"S","T"
4	"C","H"
5	"1",0
6..7	don't care
8	Most significant word of V0set
9	Least significant word of V0set
10	Most significant word of V1set
11	Least significant word of V1set
12	I0set value
13	I1set value
14	Vmax software value
15	Ramp-Up value (Rup)
16	Ramp-down value (Rdwn)
17	Trip value
	Flag

Table 6.21: Parameters units

Parameter	Units	
	A503 (3000V 3mA)	**A504** (600V 200µA)
V0set value	tenth of Volt	hundredth of Volt
V1set value	tenth of Volt	hundredth of Volt
I0set value	µA	hundredth of µA
I1set value	µA	hundredth of µA
Vmax soft. value	Volt	Volt
Rup value	Volt/sec	Volt/sec
Rdwn value	Volt/sec	Volt/sec
Trip value	tenth of second	tenth of second

The word 18 contains the values of the channel flags

Table 6.22: Flag Structure

Bits	Bit value= 0	Bit value =1
0..10	Don't care	Don't care
11	Hv = Off	Hv = On
12	Password =" "	Password ="Required"
13	Pdwn= Kill	Pdwn= Rdwn
14	On/Off = ".."	On/Off= "Enabled"
15	Pwon = Off	Pwon = On

Code %n03 Read Boards characteristics

The Response contains the characteristics of the H.V. Channels Boards inserted in the crate slots

Table 6.23: Channel Parameters Packet Structure

Word	Contents	Units
2	Max Output Voltage Board 0	Volt
3	Max Output Voltage Board 1	Volt
4	Max Output Voltage Board 2	Volt
5	Max Output Voltage Board 3	Volt
6	Max Current Board 0	µA
7	Max Current Board 1	µA
8	Max Current Board 2	µA
9	Max Current Board 3	µA
10	Vset/Monitor resolution Board 0	mV
11	Vset/Monitor resolution Board 1	mV
12	Vset/Monitor resolution Board 2	mV
13	Vset/Monitor resolution Board 3	mV
14	Iset/Monitor resolution Board 0	hundredth of µA
15	Iset/Monitor resolution Board 1	hundredth of µA
16	Iset/Monitor resolution Board 2	hundredth of µA
17	Iset/Monitor resolution Board 3	hundredth of µA
18	No. of significant figure after decimal point for Vset/Monitor Board0	==
19	No. of significant figure after decimal point for Vset/Monitor Board1	==
20	No. of significant figure after decimal point for Vset/Monitor Board2	==
21	No. of significant figure after decimal point for Vset/Monitor Board3	==
22	No. of significant figure after decimal point for Iset/Monitor Board0	==
23	No. of significant figure after decimal point for Iset/Monitor Board1	==
24	No. of significant figure after decimal point for Iset/Monitor Board2	==
25	No. of significant figure after decimal point for Iset/Monitor Board3	==

If some Boards are not present, the response always contains 25 words, and the words corresponding to the missing Boards must be considered "don't care".

Code %00FF **Read BUSY Status**

Table 6.24: Read Busy Status response

Word	Contents
2	Busy status

Busy status = %FF00 Module Busy
Busy status = %2 Module Ready

6.4.2 Parameters Setting Slave Response

Codes %n10..%n16 **Parameters Setting**

After a Set Command The SY403 responds in this way:

- If The Set operation is correct it responds with an error code = 0, and it is Busy for about 20msec;

- if it is Busy (for a precedent Set operation) it responds with an error Code = %FF00 Module Busy.

C. A. E. N. S Y 4 0 3

H I G H V O L T A G E

S Y S T E M

A P P E N D I X A :

S O F T W A R E E X A M P L E S

C.A.E.N.

A P R I L 1 9 9 2

APPENDIX A SOFTWARE EXAMPLES

The detail of using the Mod.V288 to communicate with the Mod. SY403 are explained by means of complete examples:

- VMECAENET.H:

Declaration for communication via VME with the Mod. V288

- VMCAENET.C :

Caenet Package for V288 Module

These two listings describes the function and general design of a driver for the Mod V288; all the possible errors are handled, included the VME Buserror.

VMESY403.C :

Demonstration on the use of Caenet Routines in communication

between V288 module and SY403 High Voltage System

This example is to be used as guides in creating a communication software between the V288 and SY403 module

```
/************************************************************************/
/*                                                                      */
/*             ------       C . A . E . N .   SpA       ------          */
/*                                                                      */
/*    VMCAENET.H - Declarations for communication with V288 Module      */
/*                                                                      */
/************************************************************************/

#ifndef   uchar
#define   uchar                        unsigned char
#endif
#ifndef   ushort
#define   ushort                      unsigned short
#endif

/* Constants for vme_cycles routines */
#define   BYTE                                    1
#define   WORD                                    2
#define   LWORD                                   4

/*
  Errors returned by caenet_read and caenet_write; the positive ones
  are depending from V288 Module and not from CAENET network
*/
#define   TUTTOK                                  0
#define   E_NO_Q_IDENT                            1
#define   E_NO_Q_CRATE                            2
#define   E_NO_Q_CODE                             3
#define   E_NO_Q_DATA                             4
#define   E_NO_Q_TX                               5
#define   E_NO_Q_RX                               6
#define   E_LESSDATA                              7
#define   E_BUSERR                                8

/* Number of iterations before deciding that V288 does not answer */
#define   TIMEOUT                                -1

#define   Q                          (ushort)0xfffe
#define   V288                                    1

/* Registers of V288 Module */
#define   STATUS                     (v288addr+0x02)
#define   TXMIT                      (v288addr+0x04)

#define   LOBYTE(x)                (uchar)((x)&0xff)
#define   HIBYTE(x)       (uchar)(((x)&0xff00) >> 8)

/*
  Interface between the user program and V288; these functions are defined
  in file Vmcaenet.c
*/
int  caenet_read();
int  caenet_write();

/* Declarations of Global Variables defined in the user program */
extern  unsigned       v288addr,craten;
extern  ushort                   code;
```

```
/*************************************************************************/
/*                                                                       */
/*             ------       C . A . E . N .   SpA       ------           */
/*                                                                       */
/*    VMCAENET.C - Caenet Package for V288 Module                        */
/*                                                                       */
/*************************************************************************/

#include "vmcaenet.h"


/***-------------------------------------------------------------------

  Read_data

    -------------------------------------------------------------------***/
int read_data(datovme)
ushort *datovme;
{
ushort q=0;
vme_read(v288addr,datovme,WORD);
vme_read(STATUS,&q,WORD);
return((q == Q) ? TUTTOK : TIMEOUT);
}

/***-------------------------------------------------------------------

  Wait_resp

    -------------------------------------------------------------------***/
int wait_resp(datovme)
ushort *datovme;
{
int i=0;
ushort q=0;
while(i!=TIMEOUT && q!=Q)
     {
      vme_read(v288addr,datovme,WORD);
      vme_read(STATUS,&q,WORD);
      i++;
     }
return((i == TIMEOUT) ? TIMEOUT : TUTTOK);
}

/***-------------------------------------------------------------------

  Send_comm

    -------------------------------------------------------------------***/
int send_comm(vmeaddress,datovme)
unsigned int vmeaddress;
ushort datovme;
{
int i=0;
ushort q=0;
while(i!=TIMEOUT && q!=Q)
     {
```

```
      if(!vme_write(vmeaddress,&datovme,WORD))
         return E_BUSERR;
      vme_read(STATUS,&q,WORD);
      i++;
     }
return((i == TIMEOUT) ? TIMEOUT : TUTTOK);
}

/***---------------------------------------------------------------------

  Caenet_read: Called by user programs to load "byte_count" bytes from
               CAENET into the buffer pointed by "*dest_buff".

               The VME address of V288, the CAENET crate number and the
               CAENET code are found in global variables.

               Caenet_read returns TUTTOK = 0 if everything has worked;
               It returns one from seven different errors (defined as
               positive constants in Vmcaenet.h) if it has received one
               error which strictly depends from V288 Module;
               It returns a negative error (depending from the CAENET slave
               module) if the CAENET communication has not worked.

     Remember: Module V288 can return three "general" negative errors
               related to the CAENET network that this routine does not
               handle separately from the "slave specific" ones.

    ---------------------------------------------------------------------***/
int caenet_read(dest_buff,byte_count)
uchar *dest_buff;
int byte_count;
{
int i,esito;
ushort mstident=V288,datatemp;
short dato;

if((esito=send_comm(v288addr,mstident)) == TIMEOUT)
   return E_NO_Q_IDENT;
else if(esito == E_BUSERR)
   return esito;

/* Transmit Crate Number */
if((esito=send_comm(v288addr,(ushort)craten)) == TIMEOUT)
   return E_NO_Q_CRATE;
else if(esito == E_BUSERR)
   return esito;

/* Transmit Code       */
if((esito=send_comm(v288addr,(ushort)code)) == TIMEOUT)
   return E_NO_Q_CODE;
else if(esito == E_BUSERR)
   return esito;

/* Start Transmission        */
if((esito=send_comm(TXMIT,mstident)) == TIMEOUT)
   return E_NO_Q_TX;
else if(esito == E_BUSERR)
   return esito;
```

```
if(wait_resp(&dato) == TIMEOUT)
   return E_NO_Q_RX;

if(dato == TUTTOK)                          /* Test on the operation     */
   for(i=0;i<byte_count;i+=2)
      {
       if(read_data(&datatemp) == TIMEOUT && i<byte_count-1)
          return E_LESSDATA;
       dest_buff[i]   = HIBYTE(datatemp);
       dest_buff[i+1] = LOBYTE(datatemp);
      }
return dato;
}

/***-------------------------------------------------------------------------

 Caenet_write: Called by user programs to transfer "byte_count" bytes to
               CAENET from the buffer pointed by "*source_buff".

               The VME address of V288, the CAENET crate number and the
               CAENET code are found in global variables.

               Caenet_write returns TUTTOK = 0 if everything has worked;
               It returns one from seven different errors (defined as
               positive constants in Vmcaenet.h) if it has received one
               error which strictly depends from V288 Module;
               It returns a negative error (depending from the CAENET slave
               module) if the CAENET communication has not worked.

     Remember: Module V288 can return three "general" negative errors
               related to the CAENET network that this routine does not
               handle separately from the "slave specific" ones.

    ------------------------------------------------------------------------***/
int caenet_write(source_buff,byte_count)
uchar *source_buff;
int byte_count;
{
int i,esito;
ushort mstident=V288,datatemp;
short dato;

if((esito=send_comm(v288addr,mstident)) == TIMEOUT)
   return E_NO_Q_IDENT;
else if(esito == E_BUSERR)
   return esito;

/* Transmit Crate Number */
if((esito=send_comm(v288addr,(ushort)craten)) == TIMEOUT)
   return E_NO_Q_CRATE;
else if(esito == E_BUSERR)
   return esito;

/* Transmit Code       */
if((esito=send_comm(v288addr,(ushort)code)) == TIMEOUT)
   return E_NO_Q_CODE;
else if(esito == E_BUSERR)
```

```
   return esito;

/* Transmit data       */
for(i=0;i<byte_count;i+=2)
   {
    datatemp=(ushort)source_buff[i]<<8 | source_buff[i+1];
    if((esito=send_comm(v288addr,datatemp)) == TIMEOUT)
       return E_NO_Q_DATA;
    else if(esito == E_BUSERR)
       return esito;
   }

/* Start transmission                */
if((esito=send_comm(TXMIT,mstident)) == TIMEOUT)
   return E_NO_Q_TX;
else if(esito == E_BUSERR)
   return esito;

if(wait_resp(&dato) == TIMEOUT)
   return E_NO_Q_RX;

return dato;
}
```

```
/************************************************************************/
/*                                                                      */
/*             ------       C . A . E . N .   SpA       ------          */
/*                                                                      */
/*    VMESY403.C - Demonstration on the use of Caenet Routines in       */
/*                 communication between V288 module and SY403 High     */
/*                 Voltage System  Version 1.06                         */
/*                                                                      */
/*                 06/05/91  -  Created                                 */
/*                 10/14/91  -  Updated      System Software Version 1.08  */
/*                 11/15/91  -  Updated      System Software Version 1.27  */
/*                 04/01/92  -  Updated      System Software Version 1.40  */
/*                                                                      */
/************************************************************************/


#include  <stdio.h>
#include  <strings.h>
#include  "vmcaenet.h"

#ifndef   uchar
#define   uchar                         unsigned char
#endif
#ifndef   ushort
#define   ushort                      unsigned short
#endif

#define   ESC                                   0x1b
#define   CR                                    0x0d
#define   BLANK                                 0x20

#define   EUROCOM                          0xff000000

#define   IDENT                                    0
#define   READ_STATUS                              1
#define   READ_SETTINGS                            2
#define   READ_LIMITS                              3

#define   V0SET                                    0
#define   V1SET                                    1
#define   I0SET                                    2
#define   I1SET                                    3
#define   VMAX                                     4
#define   RUP                                      5
#define   RDWN                                     6
#define   TRIP                                     7

#define   ISPRESENT(x)  (ch_read[(x)].status&(1<<2))
#define   MAKE_CODE(ch,cod)      (((ch)<<8) | (cod))

/*
  The following macro transforms the V288 input address in a "good"
  VME address for Standard Accesses by Eltec CPU board
*/
#define  UPDATE(addr)  ((unsigned int)EUROCOM + addr)

/*
  The following structure contains all the useful information about
```

```
  the settings of a channel
*/
struct hvch
{
 char   chname[12];
 long   v0set;
 long   v1set;
 short  i0set;
 short  i1set;
 short  vmax;
 short  rup;
 short  rdwn;
 short  trip;
 ushort flag;
};

/*
  The following structure contains all the useful information about
  the status of a channel
*/
struct hvrd
{
 long   vread;
 short  iread;
 ushort status;
};

/*
  The following structure contains all the useful information about the
  voltage and current limits of every board
*/
struct vi_max
{
 short  vmax[4];
 short  imax[4];
 short  resv[4];
 short  resi[4];
 short  decv[4];
 short  deci[4];
};

/*
  Globals
*/
int                         y;              /* File conio.c needs it */
unsigned      v288addr,craten;
ushort                   code;              /* Caenet code           */
struct vi_max          max_vi;

/***---------------------------------------------------------------------------

  Makemenu

    ---------------------------------------------------------------------***/
int makemenu()
{
int c;
clrscr();
```

```
highvideo();
puts("                    - MAIN MENU -      \n\n\n ");
normvideo();
puts(" [0] - Read Module Identifier ");
puts(" [1] - Channels  0..15 Monitor ");
puts(" [2] - Channels 16..31 Monitor ");
puts(" [3] - Channels 32..47 Monitor ");
puts(" [4] - Channels 48..63 Monitor ");
puts(" [5] - Parameter Setting       ");
puts(" [6] - Speed test              ");
puts("\n\n [7] - Quit ");
while((c=getch()-'0') < 0 && c > 7);
return c;
}

/***---------------------------------------------------------------------

  Read_Ident

    ---------------------------------------------------------------------***/
void read_ident()
{
int i,response;
char sy403ident[12];
char tempbuff[22];
code=IDENT;                                  /* To see if sy403 is present */
if((response=caenet_read(tempbuff,22)) != TUTTOK && response != E_LESSDATA)
  {
   printf(" Caenet_read: Error number %d received\n",response);
   puts(" Press any key to continue ");
   getch();
   return;
  }
for(i=0;i<11;i++)
    sy403ident[i]=tempbuff[2*i+1];
sy403ident[i]='\0';
printf(" The module has answered : %s\n",sy403ident);
puts(" Press any key to continue ");
getch();
}

/***---------------------------------------------------------------------

  Get_limits

    ---------------------------------------------------------------------***/
int get_limits()
{
int response;

code=READ_LIMITS;
if((response=caenet_read(&max_vi,sizeof(struct vi_max))) != TUTTOK)
  {
   printf(" Caenet_read: Error number %d received\n",response);
   puts(" Press any key to continue ");
   getch();
  }
return response;
```

```
}

/***---------------------------------------------------------------------

  Ch_monitor

    ---------------------------------------------------------------------***/
void ch_monitor(group)
int group;
{
int                     i,
                        caratt='P',
                        response,
                        chs=(group-1)*16;
static float            pow10[]={ 1.0, 10.0, 100.0};
float                   scalei,scalev;
ushort                  channel;
static int              page=0;
static struct hvch      ch_set[16];        /* Settings of 16 chs.   */
static struct hvrd      ch_read[16];       /* Status   of 16 chs.   */

scalev=pow10[max_vi.decv[group-1]];
scalei=pow10[max_vi.deci[group-1]];
clrscr();
highvideo();
if(!page)
   puts
(" Channel     Vmon     Imon    V0set    I0set    V1set    I1set   Flag    Ch# ");
else
   puts
(" Channel     Vmax     Rup    Rdwn     Trip     Status    Ch# ");
normvideo();

gotoxy(1,23);
puts(" Press 'P' to change page, any other key to exit ");

while(caratt == 'P') /* Loops until someone presses a key different from P  */
     {

/* First update from Caenet the information about the channels */
      for(i=0;i<16;i++)
         {
          channel=(uchar)(chs+i);
          code=MAKE_CODE(channel,READ_STATUS);
   if((response=caenet_read((char *)&ch_read[i],sizeof(struct hvrd))) != TUTTOK)
            {
             gotoxy(1,22);
             printf(" Caenet_read: Error number %d received\n",response);
             puts(" Press any key to continue                        ");
             getch();
             return;
            }
          code=MAKE_CODE(channel,READ_SETTINGS);
   if((response=caenet_read((char *)&ch_set[i],sizeof(struct hvch))) != TUTTOK)
            {
             gotoxy(1,22);
             printf(" Caenet_read: Error number %d received\n",response);
             puts(" Press any key to continue                        ");
```

```
             getch();
             return;
            }
         }

/* Then test if this group is present in the sistem */
      if(!ISPRESENT(0))
        {
         gotoxy(1,22);
         puts(" Sorry, this group is not present ");
         puts(" Press any key to continue                          ");
         getch();
         return;
        }

/* If the group is present, display the information */
      if(!page)                                    /* Page 0 of display */
         for(i=0;i<16;i++)
            {
             gotoxy(1,i+5);
             printf(" %9s",ch_set[i].chname);
             gotoxy(12,i+5);
             printf
("%07.2f  %07.2f  %07.2f  %07.2f  %07.2f  %07.2f  %4x     %2d \n",
ch_read[i].vread/scalev,ch_read[i].iread/scalei,ch_set[i].v0set/scalev,
ch_set[i].i0set/scalei,ch_set[i].v1set/scalev,ch_set[i].i1set/scalei,
ch_set[i].flag,chs+i);
            }
      else                                         /* Page 1 of display */
         for(i=0;i<16;i++)
            {
             gotoxy(1,i+5);
             printf(" %9s",ch_set[i].chname);
             gotoxy(14,i+5);
             printf
("%4d     %3d     %3d    %05.1f       %4x     %2d \n",
ch_set[i].vmax,ch_set[i].rup,ch_set[i].rdwn,ch_set[i].trip/10.0,
ch_read[i].status,chs+i);
            }

/* Test the keyboard */
      if(_gs_rdy(0) != -1)                    /* A key has been pressed */
         if((caratt=toupper(getch())) == 'P') /* They want to change page */
           {
            highvideo();
            page = !page;
            clrscr();
            if(page == 0)
               puts
(" Channel     Vmon    Imon    V0set    I0set    V1set    I1set    Flag    Ch# ");
            else
               puts
(" Channel     Vmax     Rup    Rdwn     Trip     Status    Ch# ");
            normvideo();
            gotoxy(1,23);
            puts(" Press 'P' to change page, any other key to exit ");
           }
```

```
     }  /* End while */
}

/***--------------------------------------------------------------------------

  Par_set

    ------------------------------------------------------------------------***/
void par_set()
{
float        input_value,
             scale;
static float pow10[] = { 1.0, 10.0, 100.0};
ushort      channel,value;
int         i,
            response,
            par=0;
char        choiced_param[10];
static char *param[] =
{
 "v0set", "v1set", "i0set", "i1set", "vmax", "rup", "rdwn", "trip"
};

clrscr();
printf("\n\n Channel: ");                    /* Choice the channel */
scanf("%d",&i);
channel=(uchar)i;
puts(" Allowed parameters (lowercase only) are:");
for(i=0;i<8;i++)
    puts(param[i]);
while(!par)
     {
      printf("\n Parameter to set: ");        /* Choice the parameter */
      scanf("%s",choiced_param);
      for(i=0;i<8;i++)
          if(!strcmp(param[i],choiced_param))
            {
             par=1;
             break;
            }
      if(i==8)
         puts(" Sorry, this parameter is not allowed");
     }
printf(" New value :");                       /* Choice the value         */
scanf("%f",&input_value);

switch(i)                                     /* Decode the par.          */
  {
   case V0SET:
       code=MAKE_CODE(channel,16);
       scale=pow10[max_vi.decv[channel/16]];
       input_value*=scale;
       value=(ushort)input_value;
       break;
   case V1SET:
       code=MAKE_CODE(channel,17);
       scale=pow10[max_vi.decv[channel/16]];
       input_value*=scale;
```

```
        value=(ushort)input_value;
        break;
    case I0SET:
        code=MAKE_CODE(channel,18);
        scale=pow10[max_vi.deci[channel/16]];
        input_value*=scale;
        value=(ushort)input_value;
        break;
    case I1SET:
        code=MAKE_CODE(channel,19);
        scale=pow10[max_vi.deci[channel/16]];
        input_value*=scale;
        value=(ushort)input_value;
        break;
    case VMAX:
        code=MAKE_CODE(channel,20);
        value=(ushort)input_value;
        break;
    case  RUP:
        code=MAKE_CODE(channel,21);
        value=(ushort)input_value;
        break;
    case RDWN:
        code=MAKE_CODE(channel,22);
        value=(ushort)input_value;
        break;
    case TRIP:
        code=MAKE_CODE(channel,23);
        input_value*=10;                        /* Trip is in 10-th of sec  */
        value=(ushort)input_value;
        break;
   }

if((response=caenet_write(&value,sizeof(ushort))) != TUTTOK)
   {
    printf(" Caenet_write: Error number %d received\n",response);
    puts(" Press any key to continue ");
    getch();
   }
}

/***-------------------------------------------------------------------------

   Speed_test

     -------------------------------------------------------------------***/
void speed_test()
{
int i,response;
ushort channel;
char sy403ident[12],loopdata[12];
char tempbuff[22];
code=IDENT;                                     /* To see if sy403 is present */
if((response=caenet_read(tempbuff,22)) != TUTTOK && response != E_LESSDATA)
   {
    printf(" Caenet_read: Error number %d received\n",response);
    puts(" Press any key to continue ");
    getch();
```

```
   return;
  }
for(i=0;i<11;i++)
    sy403ident[i]=tempbuff[2*i+1];
sy403ident[i]='\0';

puts(" Looping, press any key to exit ... ");
/* Loop until one presses a key */
while(_gs_rdy(0) == -1)
     {
      if((response=caenet_read(tempbuff,22)) != TUTTOK && response != E_LESSDATA)
        {
         printf(" Caenet_read: Error number %d received\n",response);
         puts(" Press any key to continue ");
         getch();
         return;
        }
      for(i=0;i<11;i++)
          loopdata[i]=tempbuff[2*i+1];
      loopdata[i]='\0';
      if(strcmp(sy403ident,loopdata))    /* Data read in loop are not good */
        {
         printf(" Test_loop error: String read = %s\n",loopdata);
         puts(" Press any key to continue ");
         getch();
         return;
        }
     }  /* end while */
getch();
}

/***---------------------------------------------------------------------------

  Esci

    ---------------------------------------------------------------------***/
void esci()
{
clrscr();
deinit_buserr();                    /* "Kill" my Bus Error Handler       */
exit(0);
}

/***---------------------------------------------------------------------------

  Main Program

    ---------------------------------------------------------------------***/
void main(argc,argv)
int argc;
char **argv;
{

if(argc != 3)
  {
   puts(" Usage: vmesy403 <v288 vme address (in hex)> <sy403 Caenet number (in
hex)>");
   exit(0);
```

```
  }
sscanf(*(++argv),"%x",&v288addr);
sscanf(*(++argv),"%x",&craten);

v288addr=UPDATE(v288addr);                      /* For Eltec E-6 VME board */
init_buserr();                                  /* To handle Bus Error     */

if(get_limits() != TUTTOK)            /* Get information about the boards */
   esci();

/*
  Main Loop
*/
for(;;)
    switch(makemenu())
       {
     case 0:
        read_ident();
        break;
     case 1:
        ch_monitor(1);
        break;
     case 2:
        ch_monitor(2);
        break;
     case 3:
        ch_monitor(3);
        break;
     case 4:
        ch_monitor(4);
        break;
     case 5:
        par_set();
        break;
     case 6:
        speed_test();
        break;
     case 7:
        esci();
        break;
     default:
        break;
       }
}
```

C. A. E. N. S Y 4 0 3

H I G H V O L T A G E

S Y S T E M

A P P E N D I X B :

S O F T W A R E B U G S

C.A.E.N.

A P R I L 1 9 9 2

APPENDIX B SOFTWARE BUGS AS OF APRIL 1992

This appendix contains the software bugs recognised in the Ver. 1.41 as of April 1992

B.1 Change Channel name bugs

In the following screen of the Terminal operation:

- **Change Parameter Screen** (when the Current Parameter is the Channel Name)
- **Change Channel Screen**

If a return is entered without having giving any new value, the parameter will not maintain the old one but the symbolic name (Channel name) becomes blank.

B.2 Change V0set/V1set bugs (H.V. Board A503 only)

In the **Change Parameter Screen** (§5.2.2) if the Current Parameter is **V0sel** or **V1sel** of an H.V. Board **A503** (3000 V 3 mA) it is not possible to restore the old value:

- If a Return is entered without having giving any new value, the parameter will NOT maintain the old one but assumes a value ten times greater.
- If a Ctrl-Z is entered , the parameter will NOT restore the old value but assumes a value ten times greater.

B.3 Edit Parameter bugs

In the **Edit Parameter screen** (§5.2.1) the **Ctrl-Z** commands works only if the Current Parameter is the **Channel Name**

B.4 Commands showed but inactive

In the following screen of the Terminal operation:

- **Add Channel Screen**
- **Insert Channel Screen**
- **Replace Channel Screen**

the commands **Switch** and **Help** are displayed but they are not active

B.5 Connect a New Crate bugs

In the Connect a New Crate Option (§ 5.5) the number entered **must have two figures**:

assume for example that the Crate that the operator wants to control has Crate # =7; the number to be entered must be 07.

If the number is 7 this results in an error message : " Invalid Number: reenter correct value"

B.6 H.S. CAENET Operation bugs

If one of the SY403 in the H.S. CAENET Network has the **Crate # = 0** the Network communications do not work.

Do not use Crate # = 0.

B.7 Normal Level of the Alarm signal (STATUS)

The Normal level indicated on the display and on the Terminal is not correct: if is "High" the actual signal level is low and viceversa.

C. A. E. N. S Y 4 0 3

H I G H V O L T A G E

S Y S T E M

A P P E N D I X C :

I N S T A L L A T I O N

P R O C E D U R E S

C.A.E.N.

A P R I L 1 9 9 2

APPENDIX C INSTALLATION PROCEDURE

C.1 When a New System is Received

When a new SY403 system is received, please remember:

- to verify the integrity of the package and the mechanical status of the unit;

- to check the correct power a.c. selection (220 /110 Volt). The line voltage indicator is located on the Front Panel near the connector for the Power Cord.

Note: The unit is set to AC 110 Volts/60 Hz when shipped to U.S.A. ; to AC 220 Volts/50 Hz for all the other countries. The voltage may be changed by following the instructions in § C.6.

C.2 Power Up Procedure

1. Before connecting the Power Cable, check that :

-.the "MAIN" key on the front panel is in vertical position (switch off);

- the "HV ENABLE" switch on the front panel is in the low position (OFF).

2. Connect one end of the AC line cord to the AC receptacle on SY403's Front Panel and the other end to a properly grounded AC outlet;

3. Lock the power cord connector on the SY403 Front Panel.

4. Power up the SY403 by turning to right the "MAIN" key.

C.3 At Power On

1. The "MAIN" Lamp lights up.

2. On the display the writing " C.A.E.N. SY403" appears.

3. The 4 green LEDs "+70,+12,-12+5"on the front panel are "ON".

4. As soon as the unit is powered, and during all the subsequent operations, the fan inside the crate has to be on; if the typical noise is not heard, the risk of overheating is present, and the unit has to be turned off immediately.

5 If a Terminal is connected to the RS232 Port, on the screen the writing " C.A.E.N. SY403" appears.

C.4 At H.V. On

1. Check that, when at least one HV channel is turned "ON" (i.e. set to physically put a H.V. level on its output connector), the HV ON light on the Front panel turns on: this happens when, and only if, the HV ENABLE switch is set to the high position (ON).

C.5 At Power Off

1. the +70 Volt tension takes 3-4 minutes to go to zero

C.6 Connect Terminal

1. The Mod.SY403 may be connected to an ASCII terminal via an RS232 cable. An IBM compatible Personal computer running a VT100 terminal emulation program can be used instead of a Terminal.

2. The factory default configuration of the RS232 Port is listed below:

Table C.1: Factory default configuration of the RS232 Port

Parameter	Factory Default Setting
Baud Rate	9600
Parity	none
Character length	8
Number of Stop Bits	1

3. The pin assignment of the RS232 connector is shown in the following figure

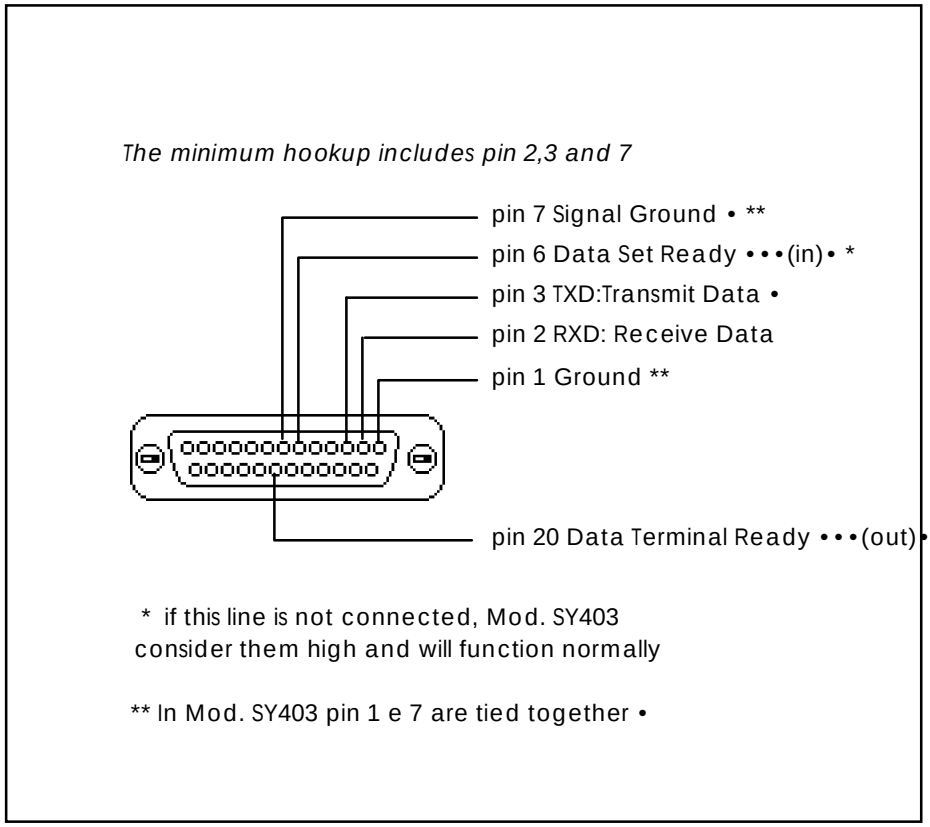

Fig C.1 RS232 connector pin assignment

C.6 Changing the Operating Voltage

The unit is set to AC 110 Volts/60 Hz when shipped to U.S.A.; to AC 220 Volts/50 Hz for all the other countries. The operating voltage indicator is visible through the window in the Front Panel voltage selector as shown in the following figure.

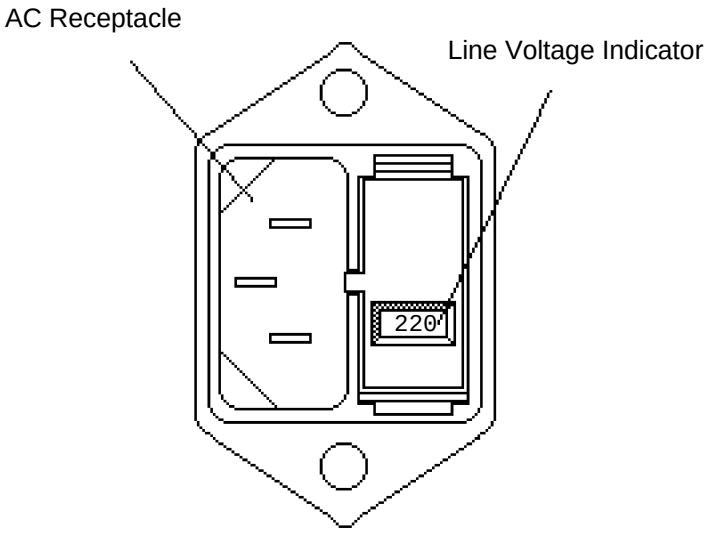

Fig C.2: Operating Voltage Indicator

The AC line voltage that will be used to operate with the Mod SY403 must match the number indicated in the window. If the voltage to be used does not meet this requirement, use the following procedure to change the selected AC voltage.

1. Disconnect the Power Cord.

2. Gently extract the fuse and voltage selector box with a flat-tipped screwdriver.

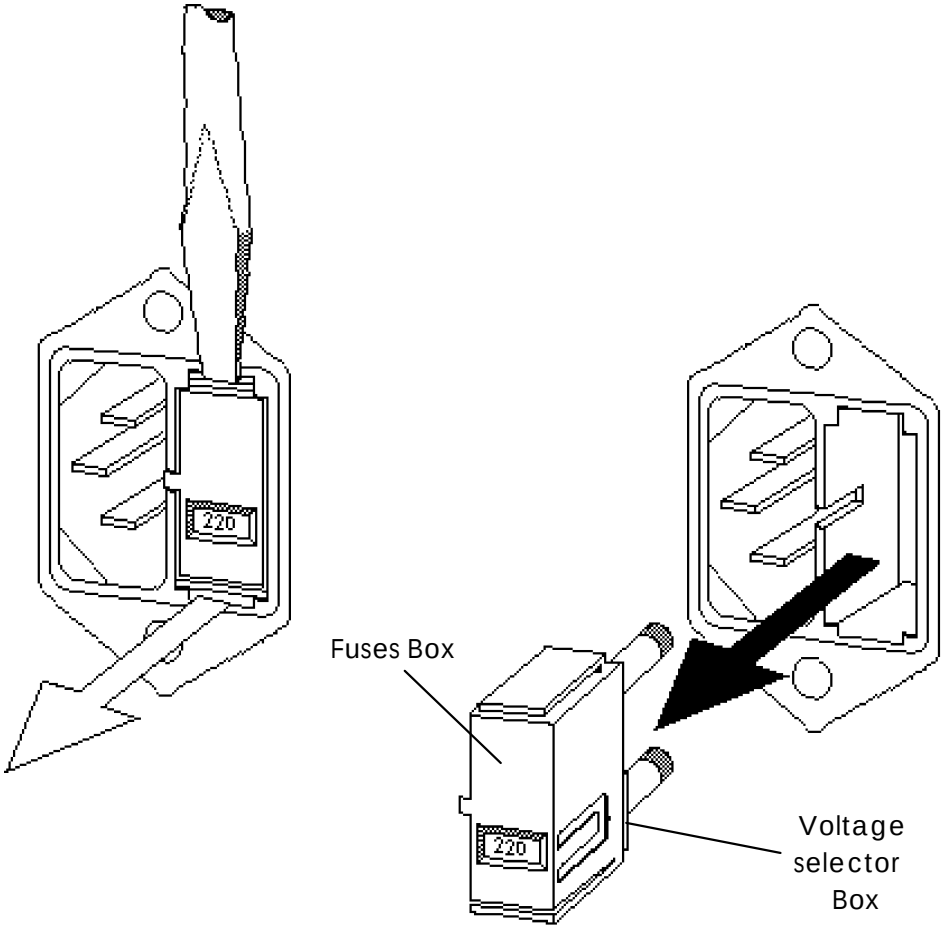

Fig C.3

3. Pull out the voltage selector Box out of its slot.

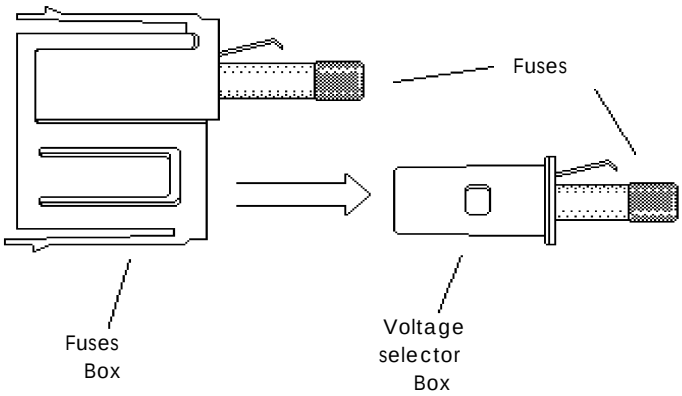

Fig C.4

4. Select the correct insert position of the voltage selector Box, and then insert the Box back into its slot.

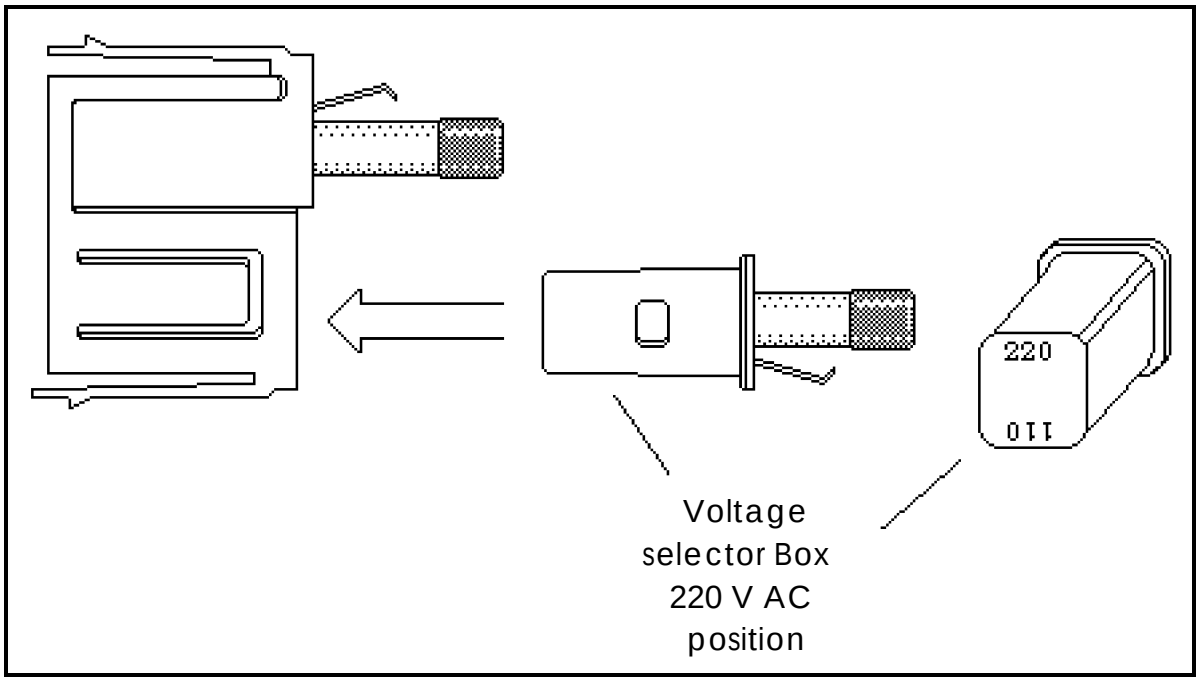

Fig C.5

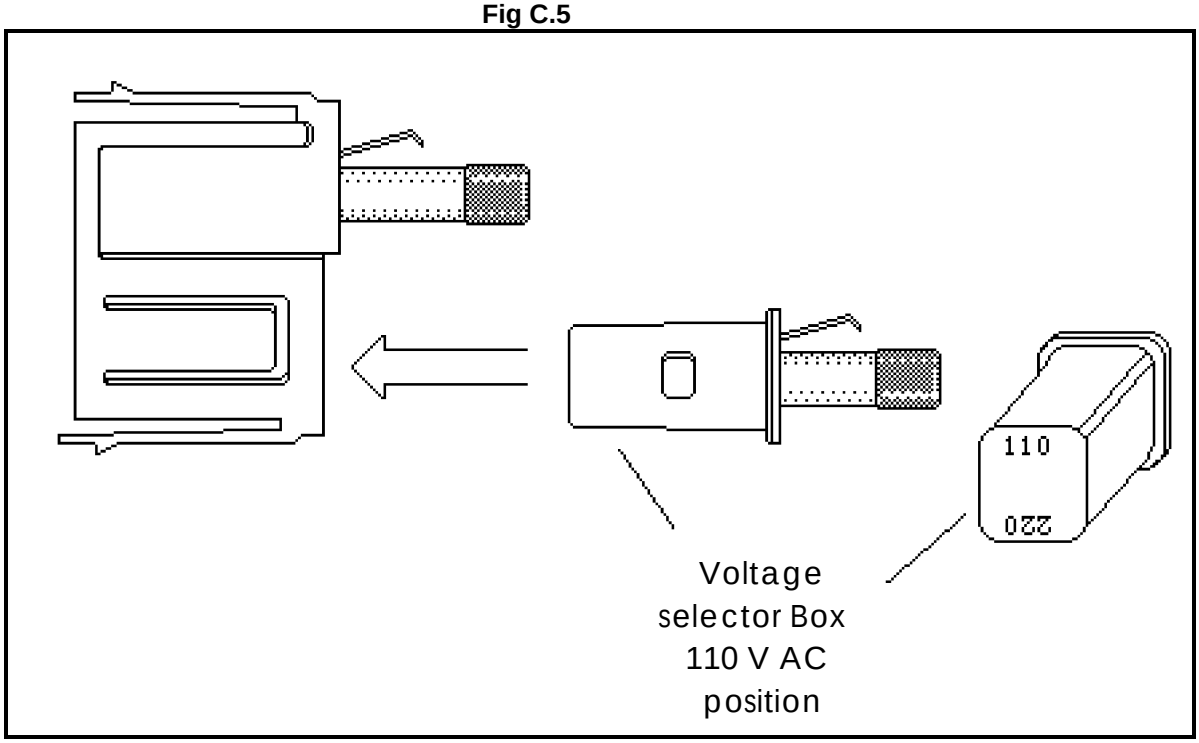

Fig C.6

5. Insert the Fuses Box back in the SY403 Front Panel.

6. The correct voltage will now appear in the window..

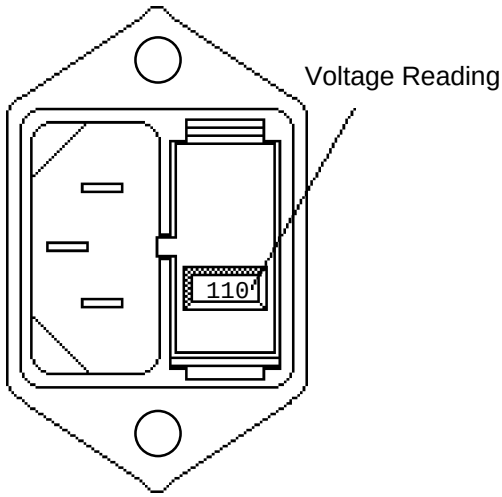

Fig C.7

C.7 Fuse Replacement

The line fuses are contained in the Fuses Box:

Perform the following procedure to replace the line fuses.In one fuse is blown, replace it with one of the same size and rating:

1. Disconnect the Power Cord.

2. Gently extract the fuse and voltage selector box with a flat-tipped screwdriver.

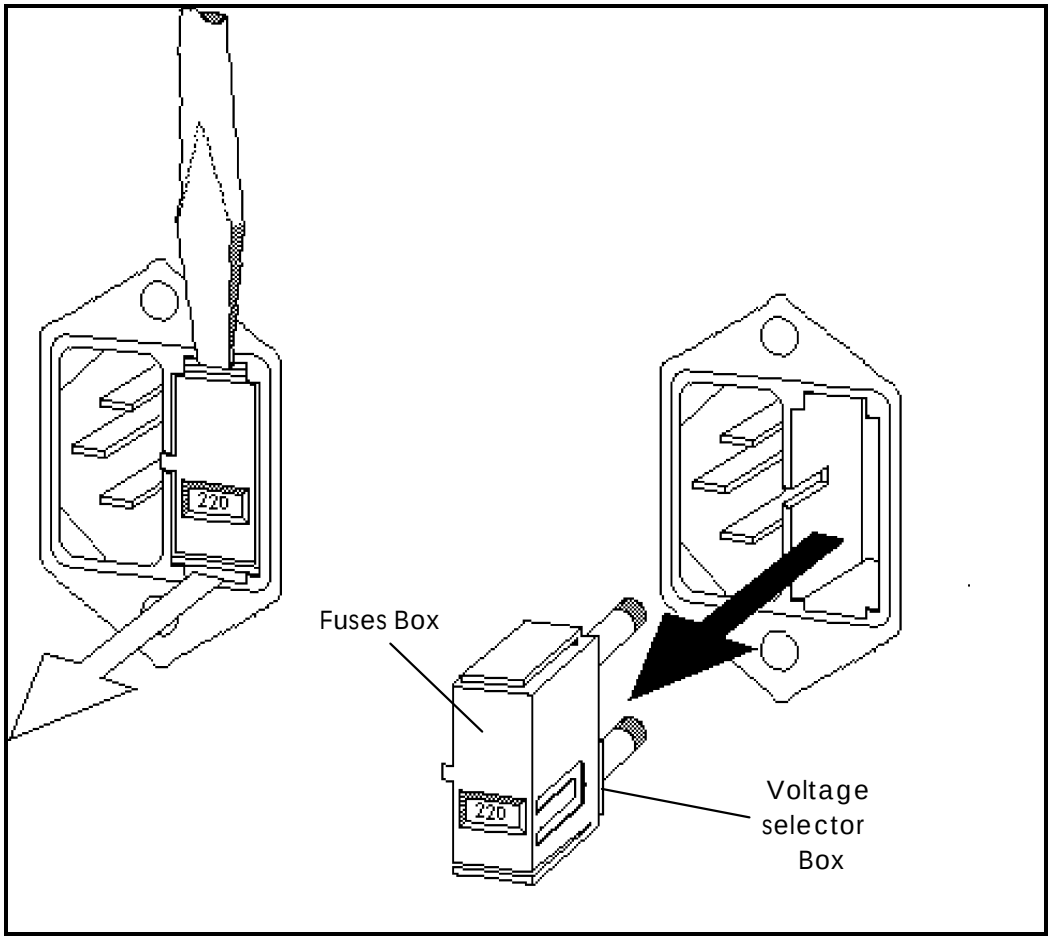

Fig C.8

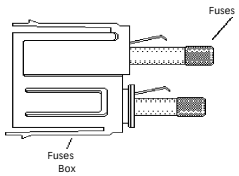

Fig C.9

3. Check to determine whether the fuses are intact. If one fuse is blown, install a new fuse. (Replace only with fuse of correct voltage, current and type ratings).

- For 110 Volts/60 Hz uses two 10 A fuses;

- For 220 Volts/50 Hz uses two 6.3 A fuses.

4. Insert the Fuses Box back in the SY403 Front Panel.

C.8 Safety Warnings and Operation Suggestion

1. The internal components lay-out is such that any risk of electrical shock is prevented, even touching the unit when powered, PROVIDED that the side, top and bottom shields are not removed. Failure to obey this rule could expose the customer to shocks from the 110/220 V mains line, which runs unshielded inside the System.

2. Watch that the air flow is sufficient to prevent over-heating and fires.

3. Never connect any load to any output when the HV is enabled.

4. Be sure that the RS 232 cable is properly tied to the crate.

5. Never insert any HV Board when the System is ON.

6. Always fix the HV Boards to the crate using the two Fixing screws.

8. Before any Board is removed, switch the SY403 off and wait at least two minutes to avoid damage to the Board itself.

NOTE:
Factory warranty does not cover faults originated by an action not complying with the above warnings.

C. A. E. N. S Y 4 0 3

H I G H V O L T A G E

S Y S T E M

A P P E N D I X D :

H A R D W A R E P A S S W O R D C O N T R O L

C.A.E.N.

A P R I L 1 9 9 2

APPENDIX D HARDWARE PASSWORD CONTROL

As shown in the chapter 3 (§3.2.18) for each channel it is possible to set via software a password protection. In any case, if for some reason the Password is not known, and it is necessary to act on the System, it is possible to disqualified via hardware the Password protection.

A switch (SW4) located on the SY403 Front Panel Control Board allows to disable the password at the subsequent switching on of the Crate

Use the following procedure to disable the password via hardware.

1. Disconnect the Power Cord.before removing the Front Panel (Do not reconnect the cable until the Front Panel has been reinstalled)

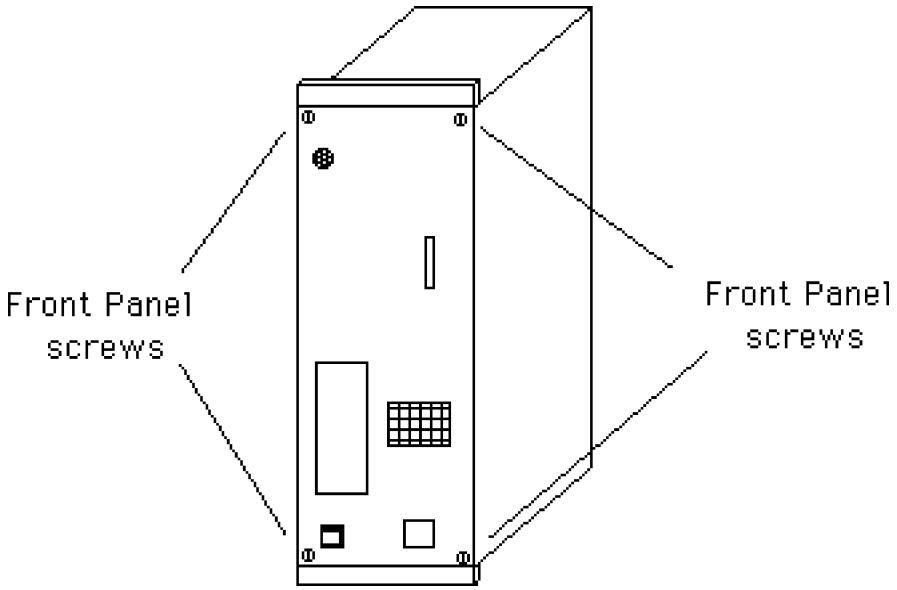

Fig D.1

2. Unscrew the 4 Front Panel screws and pull out the Front Panel

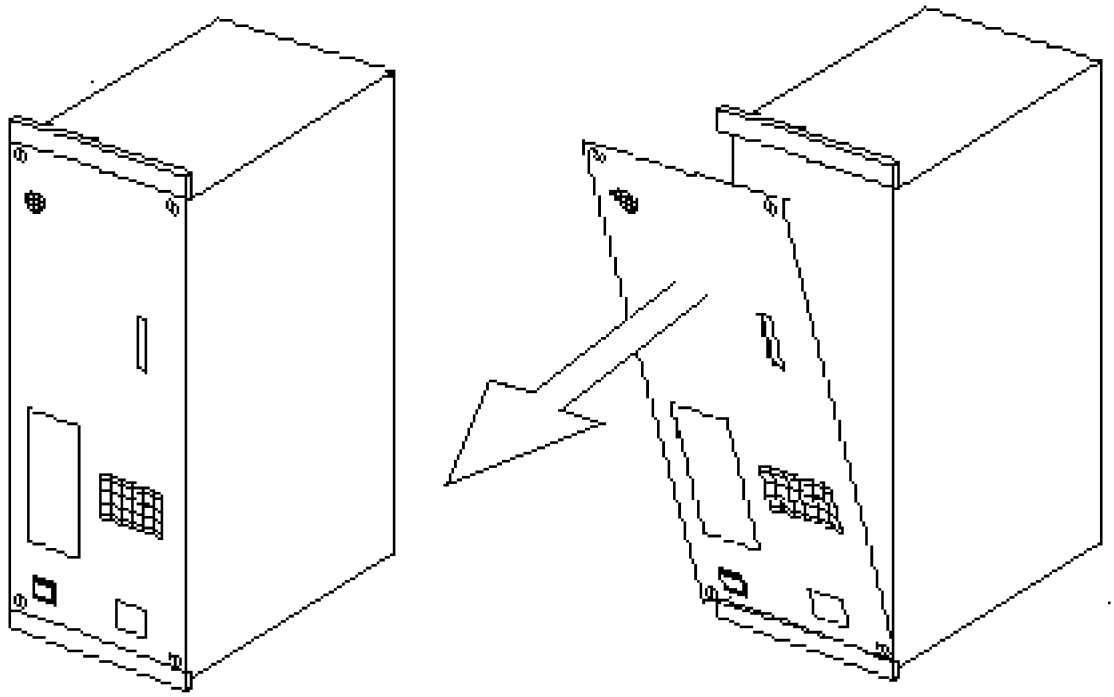

Fig D.2

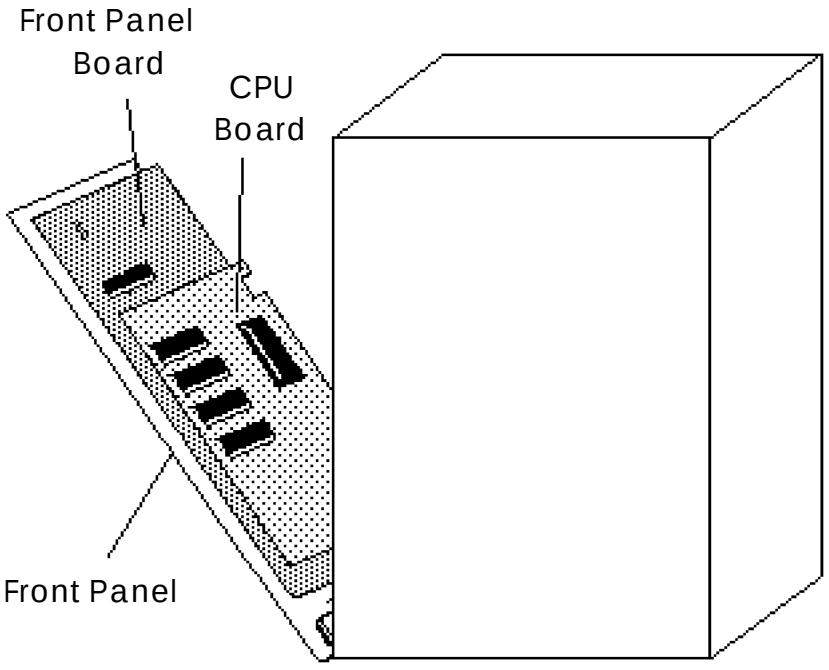

Fig D.3

4. The switch SW4 allows to qualifie /disqualifie the Password

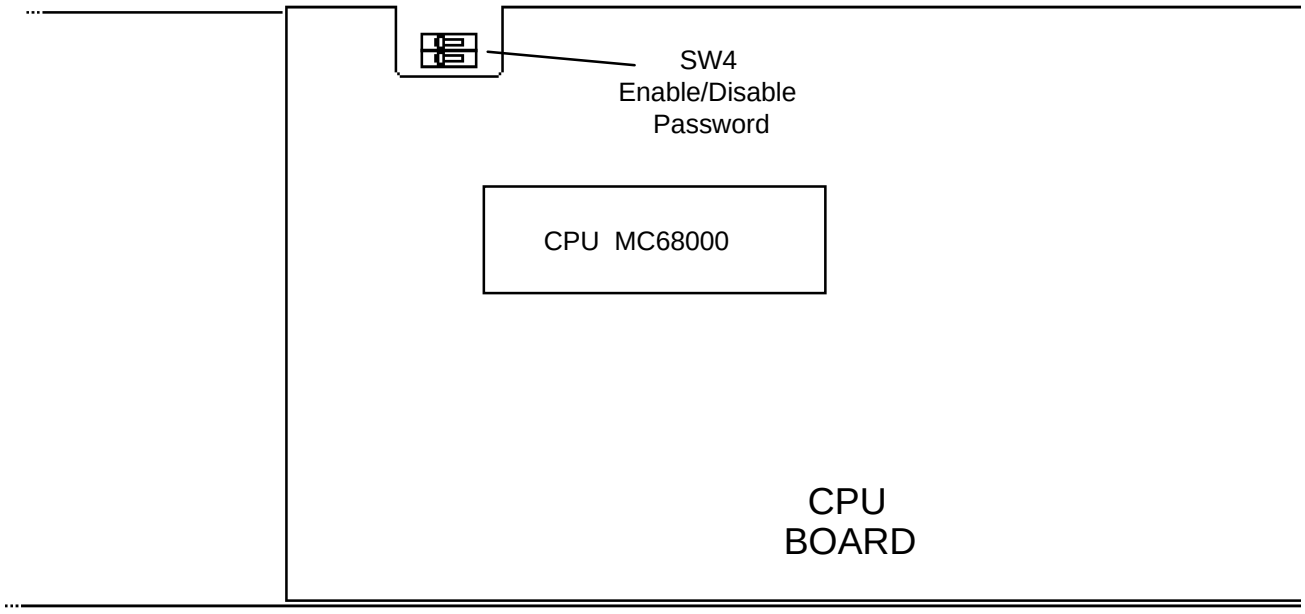

Fig D.4

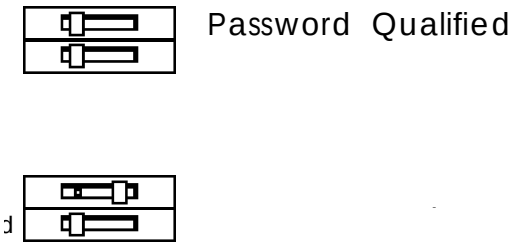

Fig D.5 Dip Switch SW4 setting

5. Reinstall the Front Panel.

6. Connect the power cord.

7.Turn On the System

8. The Password protection is now disabled.and it is not possible to enable it. The operation described in § 5.4 does not modify the Password status which remains "Disabled" until the switch SW4 is in the Password disqualified position.