1MRS 750178-ESD
Version C
Replaces version B

Issued 97-10-15
Checked P.S.
Approved S.S.

SPC_ modules

for SMS 010
User's Guide
SMS 010 SPC_ library

Data subject to change without prior notice

Contents **Page**

CONTENTS Page

1. INTRODUCTION TO SPC_

1.1 What is a SPC_ module?

Names of the format 'SPC_ module' are relay module names included in some SPAx unit, e.g. SPAJ 140 C. In this User's Guide, a relay module will be presented as it is used in the SMS-BASE program. Especially the SPCJ 4D29 module, which is a largely used module is used as an example in this User's Guide. The other SPC_ modules have almost the same menu structure in SMS-BASE as SPCJ 4D29, which in practice means that what is said in this guide is generally applicable to all SPC_ modules. For the details and technical data of a particular relay, please refer to its specific user's guide.

If you wish to install the SPAJ 140 C relay on your SMS 010 system, please read the SMS-BASE 2.0 User's Guide. It is also for training purposes possible to install a "safe" **version of SPAJ 140 DEMO that does not permit sending of the edited relay settings or resetting of registers and output relays to any module**. The name of this relay module is 'SPAJ 140 DEMO'.

Most of the user operations are illustrated in this guide by pictures of the screens on the PC. This enables the procedures described in the guide to be tried out and followed simultaneously on the PC screen.

Note that the screen contents can always be printed for reference using <PrintScreen> or the 'Report F7' function offered when editing the module parameter blocks , (not to mix with 'F4=REPORT' program, at the station level).

1.2 Man-machine communication conventions

The screen layout and the use of some of the keys have been largely standardized. Some of the most common ones are listed below:

Key	Function
Guidance	All the SMS-BASE screens provide guidance for the operator.
Key	Available keys and their functions are stated at the bottom of the screen.
Selection	A selection from a menu is made using an <arrow key> and confirmed by pressing <Enter>.
Undo	<Esc>
Help	is displayed at the bottom of the screen.
New screen	Scroll between consecutive screens using <PgUp> and <PgDn>.

2. THE MAIN MENU

The following procedure starts the SMS-BASE program assuming that it is already installed on the system, and that an application structure example is installed, (or that a new one has been created);

C - C:\>	
U - C:\>cd SMS\BASE <Enter>	Change to the SMS-BASE directory
C - C:\SMS\BASE>	
U - C:\SMS\BASE\SMSBASE <Enter>	Start the program SMS-BASE

2.1 Working procedure

SMS-BASE in conjunction with an SM/____ product enables the user to collect and view the data of SPACOM relays, to edit settings and download the new settings to the relay. Each of these operations is carried out according to a given procedure presented in this section.

The connection and use of a modem is described in the SMS-BASE User's Guide and therefore this manual assumes that the communication between the relay and the PC takes place in the station with the PC connected directly to the relay, or over a fiber optic bus in the station.

When using SMS-BASE with an SM/____ product, the procedure for collecting and viewing SPAJ 140 C data by making selections from the menus is:

1. Select 'Organisation'
2. Select 'Station'.
3. Select 'Object/Bay', e.g. the switchgear bay of a protected line.
4. Select 'Unit', i.e. one of the units in the 'Object/Bay', e.g. SPAJ 140 C, then select the module SPCJ 4D29.
5. Acquire the desired data by selecting 'Receive parameters'.
6. View the data by selecting 'Edit parameters and monitor data/Monitor recorded and measured data'.

Omit step 5, if you only wish to view data which has already been acquired.

Steps 1 to 5 are the same for loading and viewing the settings of an SPAJ 140 C relay. The menu item selected followed by <Enter> leads into step 6 'Edit parameters and monitor data' which opens 'Select block to be edited'. 'Select block to be edited' provides options of blocks for '..setting..' or 'Configuration..' etc. On the following screens, the monitored values are shown in the part marked 'Present values'.

The description of the procedure for editing settings is a continuation of the procedure for viewing settings with the exception that editing is done in the part of the screen marked 'New values' instead of 'Present values'. After the new settings have been saved, they have to be downloaded to the relay by selecting 'Send and receive parameters'.

2.2 Selecting the Unit/Relay

Every data handling operation starts by selecting a relay and its module, the actual procedure depending on the number of levels in the application structure:

In Brief:
The standard procedure for selecting a protection unit of relay is:

1 Select 'Organisation'.
2 Select 'Station'.
3 Select 'Object/Bay', e.g. the switchgear bay of a protected line.
4 Select 'Unit', i.e. one of the units in the 'Object/Bay'.
5 Select 'Module/Part', i.e. a module in the unit.
- Undo by pressing <Esc>.

The following screen appears upon starting SMS-BASE:

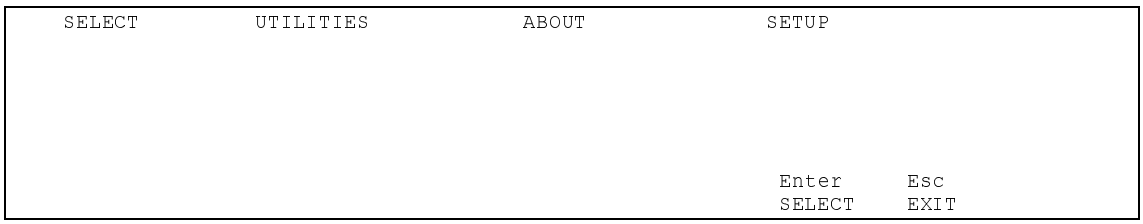


Fig. 2.2.A SMS-BASE main menu, after acknowledging the start-up info-screen.

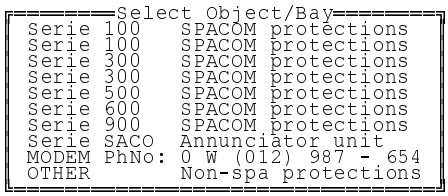
The system proposes the 'SELECT' option on the top line.

1 & 2 Select 'Organization' and 'Station'

- Confirm the selection of the 'Organization' by pressing <Enter>. Select 'Station' and confirm by <Enter>.

3. Select 'Object/Bay', e.g. the switchgear bay of a protected line.

- The following box appears on the screen:

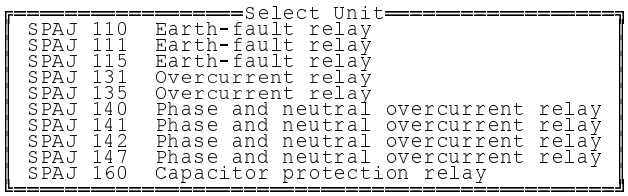


The names of the bays can be chosen to suit the application. They are edited by selecting 'UTILITIES' and 'Alter application structure'. The corresponding procedure is explained in the SMS-BASE User's Guide. A protection device is selected from those in the box using <up-arrow> and <down-arrow>.

- Confirm the selection of 'Series 100 ...' by pressing <Enter>.

4. Select 'Unit', i.e. one of the units in the 'Object/Bay'.

- The following box appears on the screen:



- Confirm the selection of relay 'SPAJ 140 C ...' by pressing <Enter>.

5. Select 'Module/Part', i.e. a module in the unit.

- The screen now changes to:

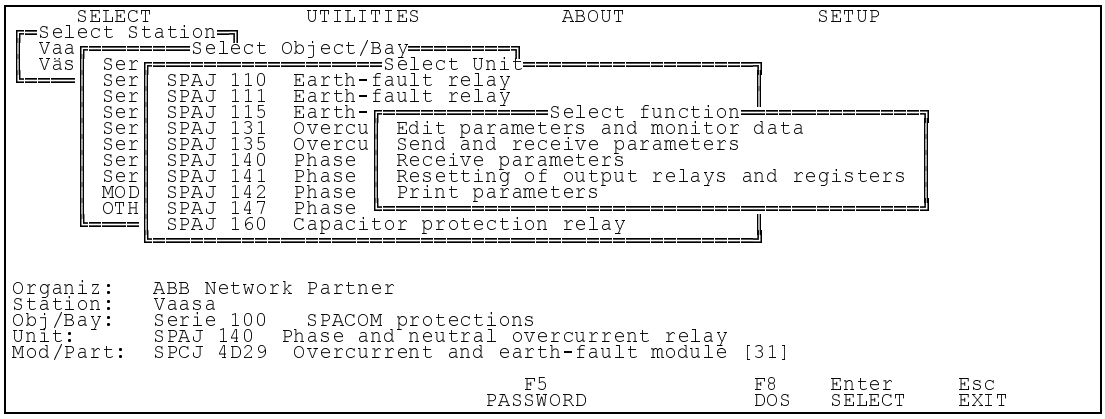


Fig. 2.2.B 'Organization', 'Station', 'Object/Bay', 'Unit' and 'Module/Part' are selected.

In this case, the module 'SPCJ 4D29 ...' is automatically selected, because the relay 'SPAJ 140 C...' only has a single module. Five different operations can be selected from the 'Select function' menu, of which the one at the head of the list 'Edit parameters and monitor data' will be explained first. On the screen shown in Fig. 2.2.B, 'Mod/Part: SPCJ 4D29 Overcurrent and earth-fault module [31]' is in the lower half. The number '31' is the slave number installed for the module. Refer to the SMS-BASE User's Guide for the procedure for changing the slave number in the application structure. (Also section 2.4.11 in this User's Guide).

2.3 Viewing measured and recorded data

Before using the viewing operation for the first time, it is recommended to first read the 'General notes'.

In Brief:
The procedure is:

1 Select 'Edit parameters and monitor data'.
2 Select 'General notes'
2.1 Exit by pressing <Esc>.

---

1. Select 'Edit parameters and monitor data'.

- Select 'Edit parameters and monitor data' and confirm by pressing <Enter>.
- The screen now changes to:

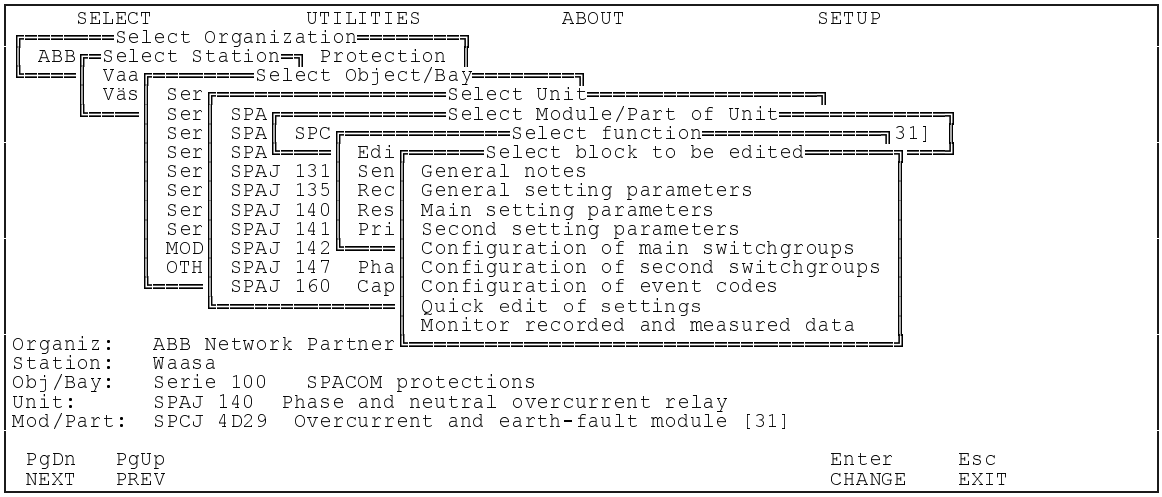


Fig. 2.3.A Select the block to be edited for the SPCJ 4D29 module.

2. Select 'General notes'.

The 'SPCJ 4D29..' screen shows:

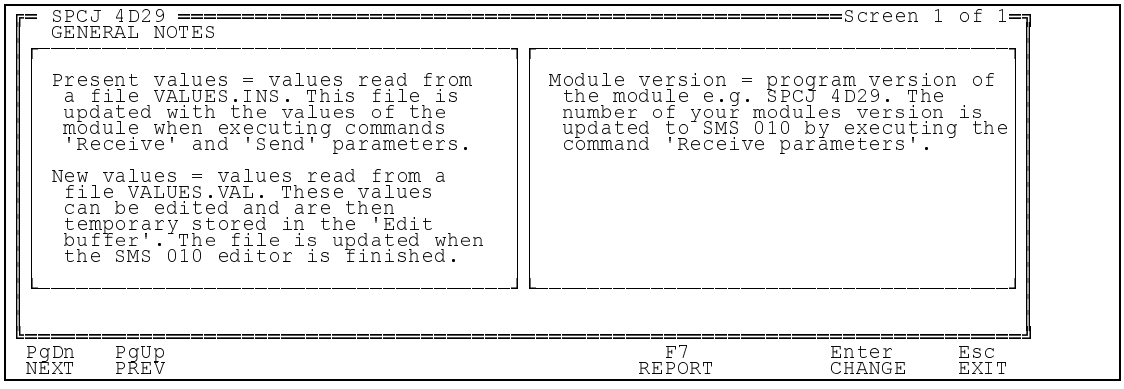


Fig. 2.3.B General notes for SPCJ 4D29

Return to 'Select block to be edited' by <Esc>.

Once the relay module has been selected, the data stored in the module can be viewed by selecting 'Monitor recorded and measured data'. The procedure for the acquisition, ('Receive parameters'), of data from the relay will be presented later.

In Brief:
The procedure for viewing protection data is:

1 Select 'Edit parameters and monitor data'.
2 Select 'Monitor recorded and measured data' and wait 5-20 s for calculation.
2.1 Browse through the screens using the <PgUp> and <PgDn> keys.
2.2 Exit by pressing <Esc>.

---

2. Select 'Monitor recorded and measured data'

- Select 'Monitor recorded and measured data'.

- The operations being carried out by the PC can be followed on the third line from the bottom of the screen. Normally these messages only inform the user that the computer is working. The time for starting the 'Monitor recorded and measured data' activity depends on the computer performance.

- All nine data blocks in 'Monitor recorded and measured data' starts with a list of contents.

- The five 'Monitor recorded and measured data' screens are now listed:

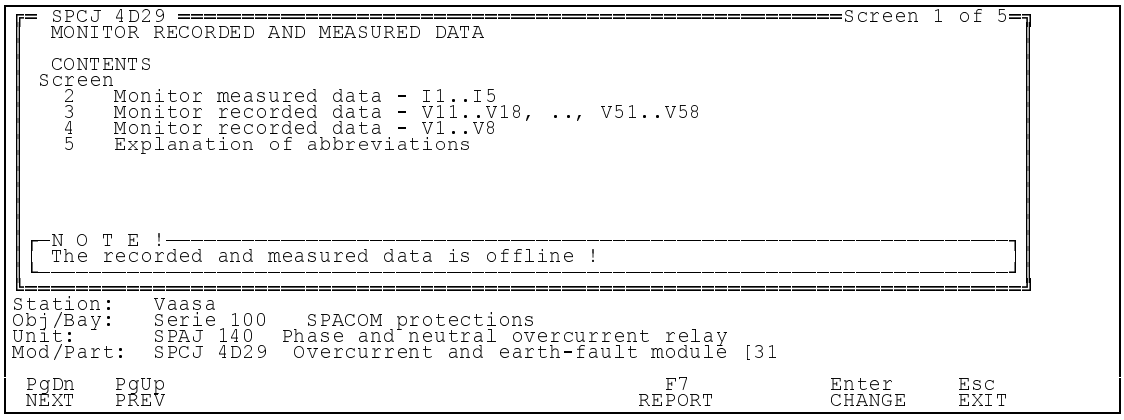


Fig. 2.3.C List of 'Monitor recorded and measured data' screens.

2.1 Browse through the screens using the <PgUp> and <PgDn> commands.

SPAJ 140 C can store the primary system values both prior to and during a fault. This data has to be transferred to the PC before it can be viewed. They appear in the 'Monitor recorded data' section of screens 3 and 4. The currently valid load currents and digital signals are viewed on screen 2.

Screen 4 displays the latest primary system and input unit values. At the time of transfer the values are less than 1 s old.

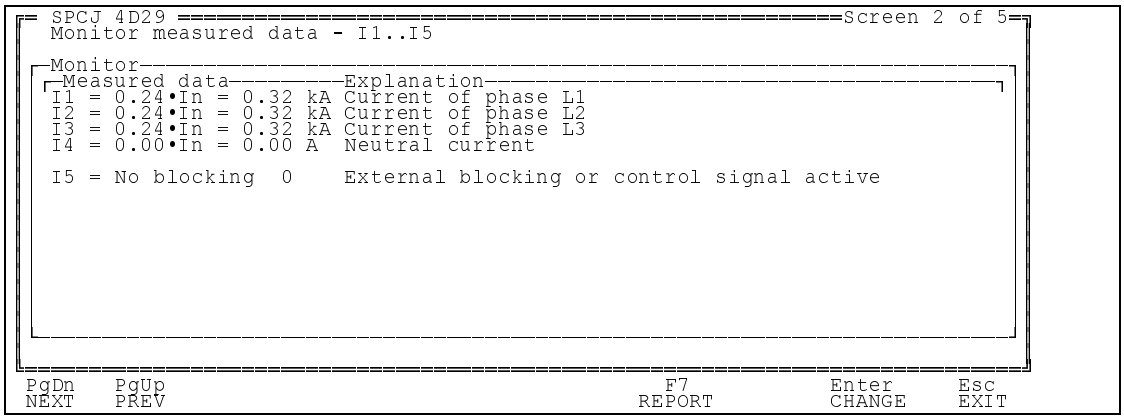


Fig. 2.3.D Recorded currents and times displayed by selecting 'Monitor recorded and measured data'.

Screen 3 displays the currents and times recorded during a fault. The currents are listed both as primary system and input unit values.

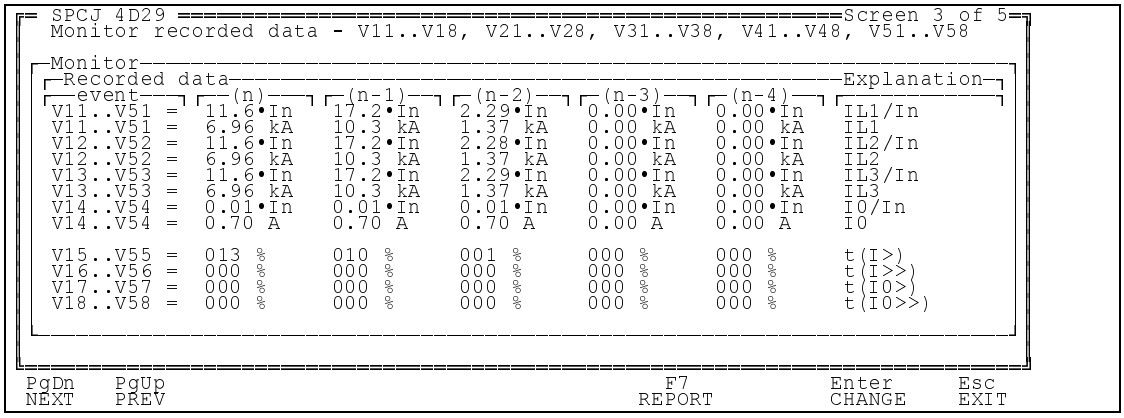


Fig. 2.3.E Summary of primary system and input unit measured data.

Screen 4 displays the number of starts and which phases and which stages of the protection picked up during a fault:

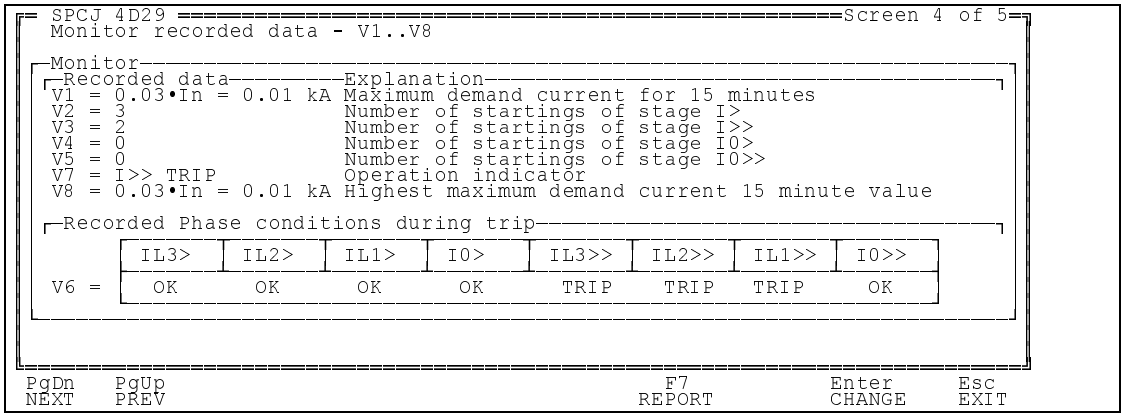


Fig. 2.3.F Recorded data displayed by selecting 'Monitor recorded and measured data'.

Screen 5 gives the legend for used abbreviations.

2.2 Exit by pressing <Esc>.

- The following window is displayed upon pressing <Esc>:

```
╔═══════Select block to be edited═══════╗
║ General notes                         ║
║ General setting parameters            ║
║ Main setting parameters               ║
║ Second setting parameters             ║
║ Configuration of main switch groups   ║
║ Configuration of second switch groups ║
║ Configuration of event codes          ║
║ Quick edit of settings                ║
║ Monitor recorded and measured data    ║
╚═══════════════════════════════════════╝
```

Fig. 2.3.G List of the 'SPCJ 4D29..' module operations

2.4 Acquisition, viewing and editing of settings

All the items except from the first and last block in the 'Select block to be edited' screen concern the setting of 'SPCJ 4D29..' settings. The new settings are all transferred, (by the 'Send and receive parameters' command), every time to make sure that settings always belong to the same set. This is necessary, because many parameter settings are related. This Section comprises the acquisition, viewing and editing of protection settings.

The procedure for the selecting of 'Block to be edited' is the same as for 'Monitor recorded and measured data'.

The parameters can be edited by selecting between predefined values or by giving new values. The parameter to be edited is first marked by the cursor and below on the screen is the allowed range and parameter explanation showed. <Enter> opens the editing mode. If there are only two, in some case more, values to choose among the values will toggle or a list of alternatives is presented. When the parameter contain a value, the operator will have to give the new value manually. Before you can continue with next parameter you must leave the editing mode for previous parameter by <Enter> which will confirm the value, if it is within the range. <Escape> cancels the changes or interrupts the setting of the chosen parameter.

Also refer to the relay manual for more details about the parameters, ranges, settings etc.

2.4.1 General setting parameters

Screen 2 of 'General setting parameters' displays the settings for the operating time of the breaker back-up protection and for the switching between main and second sets of settings. The first screen lists the contents of the 'General setting parameters' screens. It also gives the version of the relay module, which corresponds to your module after executing the command 'Receive parameters' for the first time.

```
╔═ SPCJ 4D29 ═══════════════════════════════════════════Screen 1 of 3═╗
  GENERAL SETTING PARAMETERS
                                                  ┌──────────────────┐
                                                  │ Module version: 056 C │
  CONTENTS                                        └──────────────────┘

 Screen
  2   General setting parameters      - S61, V150
  3   Explanations of abbreviations
╚═══════════════════════════════════════════════════════════════════╝
Station:   Vaasa
Obj/Bay:   Serie 100   SPACOM protections
Unit:      SPAJ 140  Phase and neutral overcurrent relay
Mod/Part:  SPCJ 4D29  Overcurrent and earth-fault module [31

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.1.A Contents of the 'General setting parameters' screens

The last set of settings acquired is shown on the left of screen 2 and the edited set on the right (Fig. 2.4.1.B). The right hand half is also useful to obtain an explanation for the various parameters. Use the arrow keys to move the cursor.

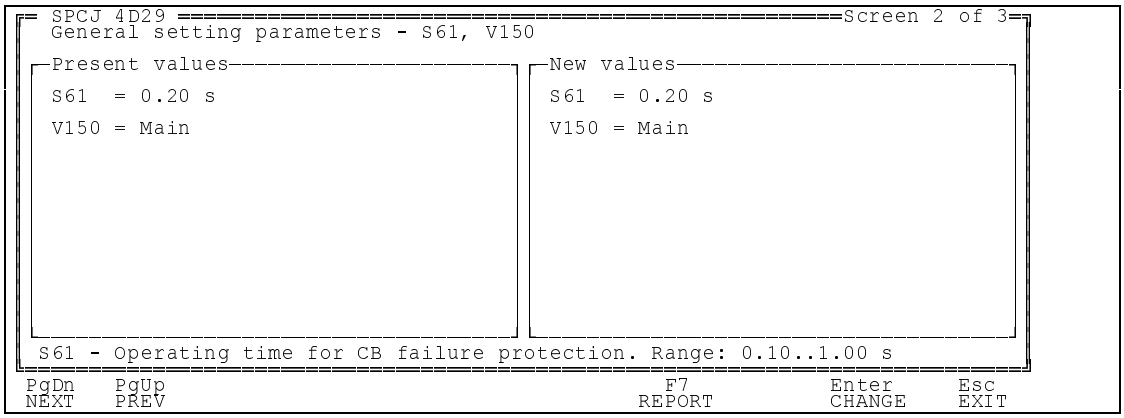


Fig. 2.4.1.B Screen 2 of 'General setting parameters'

The explanations of the parameters on screen 2 of 'General setting parameters' appear on screen 3.

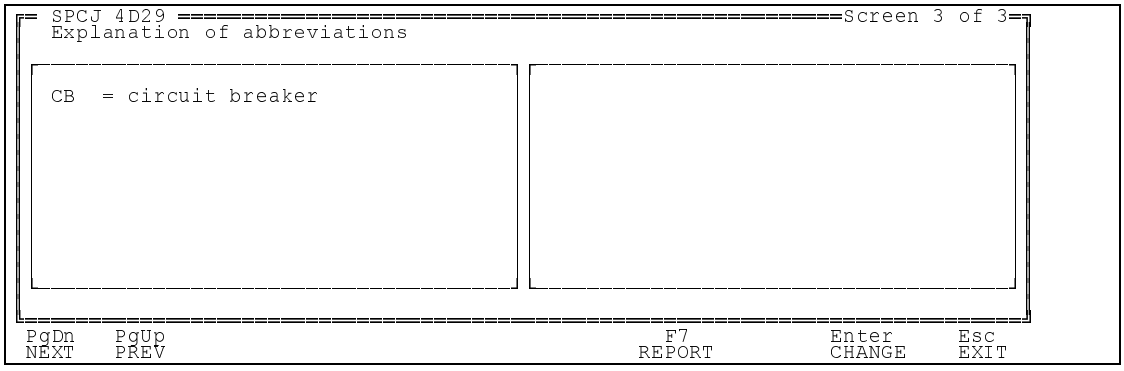


Fig. 2.4.1.C Explanation of abbreviations used on screen 2.

2.4.2 Main setting parameters

The main settings for the overcurrent protection stages I> and I>> and the earth-fault protection stages Io> and Io>> are displayed on screen 2 of 'Main setting parameters'. Switch group SGF1 on screen 3 determines the operating time characteristics of the low-set stages I> and Io>.

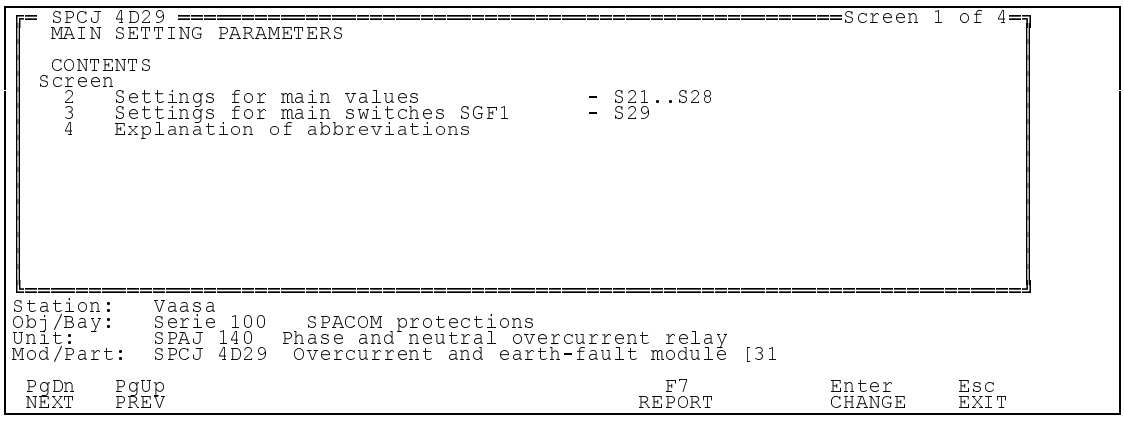


Fig. 2.4.2.A Contents of the 'Main setting parameters' screens.

Descriptions such as 'Disabled' and 'Normal inv.' occur on screen 2 which vary according to correspond to the settings of the corresponding switch groups:

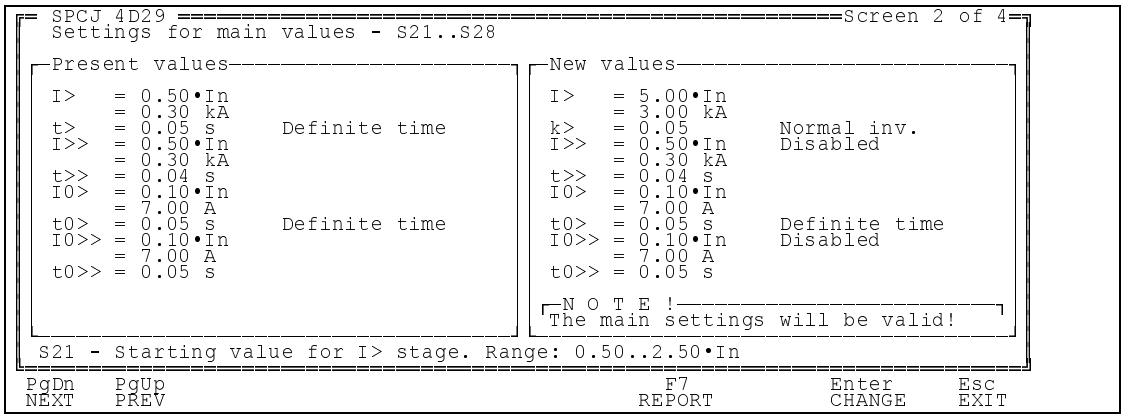


Fig.2.4.2.B Main values settings on screen 2 of 'Main setting parameters'.

The switch group SGF1 settings can be changed switch by switch, select by <Enter>, or directly by giving the checksum of the 'Switch mask'.

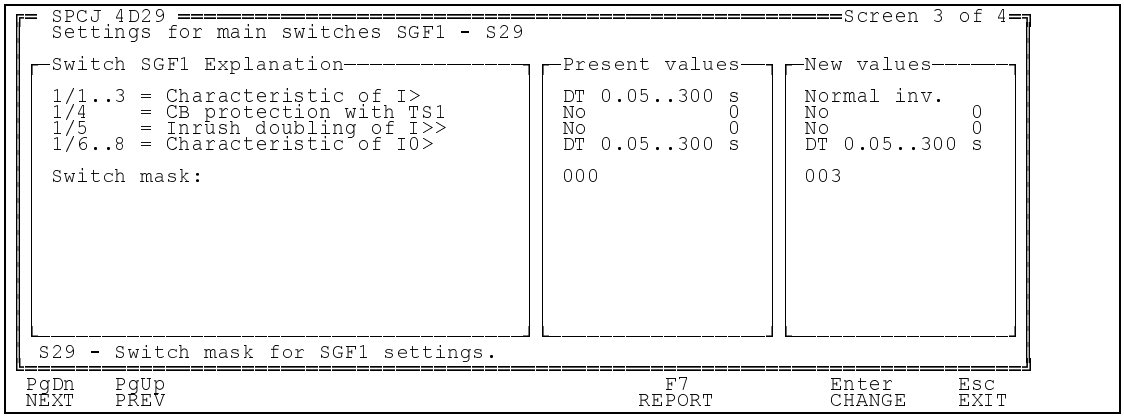


Fig. 2.4.2.C Main settings for SGF1 switches.

The explanations of the parameters on screens 2 and 3 of 'Main setting parameters' appear on screen 4.

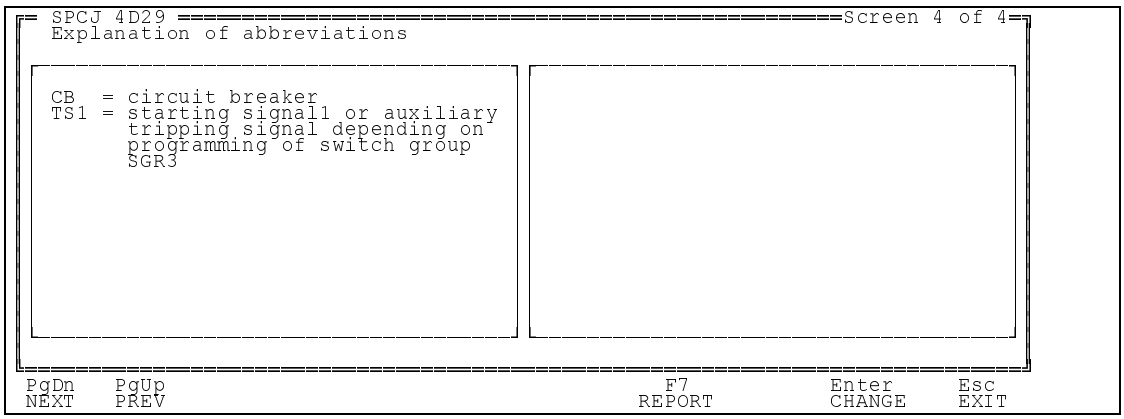


Fig. 2.4.2.D Explanation of abbreviations used on screens 2 and 3.

2.4.3 Second setting parameters

The parameter group showed when selecting 'Second setting parameters' is the same as in Section 2.4.2. This second settings parameter set can be made the active set of parameters by changing the setting of parameter V150 as explained in section 2.4.1.

```
SPCJ 4D29 ================================================Screen 1 of 4
SECOND SETTING PARAMETERS

CONTENTS
Screen
  2   Settings for second values          - S41..S48
  3   Settings for second switches SGF1   - S49
  4   Explanation of abbreviations

Station:   Vaasa
Obj/Bay:   Serie 100   SPACOM protections
Unit:      SPAJ 140  Phase and neutral overcurrent relay
Mod/Part:  SPCJ 4D29  Overcurrent and earth-fault module [31

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.3.A Contents of the 'Second setting parameters' screens

2.4.4 Configuring main switchgroups

The screens accessed upon selecting 'Configuration of main switch groups' are SGF2, SGB and SGR1..3.

```
SPCJ 4D29 ================================================Screen 1 of 7
CONFIGURATION OF MAIN SWITCH GROUPS

CONTENTS
 Screen
  2   Main settings for switches SGF2                          - S30
  3   Main settings for switches SGB                           - S31
  4   Main settings for output relay matrix switches SGR1      - S32
  5   Main settings for output relay matrix switches SGR2      - S33
  6   Main settings for output relay matrix switches SGR3      - S34
  7   Explanation of abbreviations

Station:   Vaasa
Obj/Bay:   Serie 100   SPACOM protections
Unit:      SPAJ 140  Phase and neutral overcurrent relay
Mod/Part:  SPCJ 4D29  Overcurrent and earth-fault module [31

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.4.A Contents of the 'Configuration of main switch groups' screens.

```
SPCJ 4D29 ================================================Screen 2 of 7
Main settings for switches SGF2 - S30

┌Switch SGF2 Explanation──────────┐ ┌Present values─┐ ┌New values──────┐
│                                 │ │               │ │                │
│ 2/1 = Reset of I> start indication │ Automatic 0   │ Automatic 0    │
│ 2/2 = Reset of I>> start indication │ Automatic 0   │ Automatic 0    │
│ 2/3 = Reset of I0> start indication │ Automatic 0   │ Automatic 0    │
│ 2/4 = Reset of I0>> start indication │ Automatic 0   │ Automatic 0    │
│ 2/5 = Operation of I>> stage    │ Operating 0   │ Blocked   1    │
│ 2/6 = Operation of I0>> stage   │ Operating 0   │ Blocked   1    │
│ 2/7 = I>> start sig. to AR1 or SS3 │ No        0   │ No        0    │
│ 2/8 = Earth-fault start sig. to AR3 │ I0>       0   │ I0>>      1    │
│                                 │               │                │
│ Switch mask:                    │ 000           │ 176            │
│                                 │               │                │
└─────────────────────────────────┘ └───────────────┘ └────────────────┘
 S30 - Switch mask for SGF2 settings. Range: 000..255

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.4.B Main settings for SGF2 switches.

The note at the bottom of screen 3 monitors the state of switch SGB/5 in the second switch group to ensure that it agrees with the main switch SGB/5.

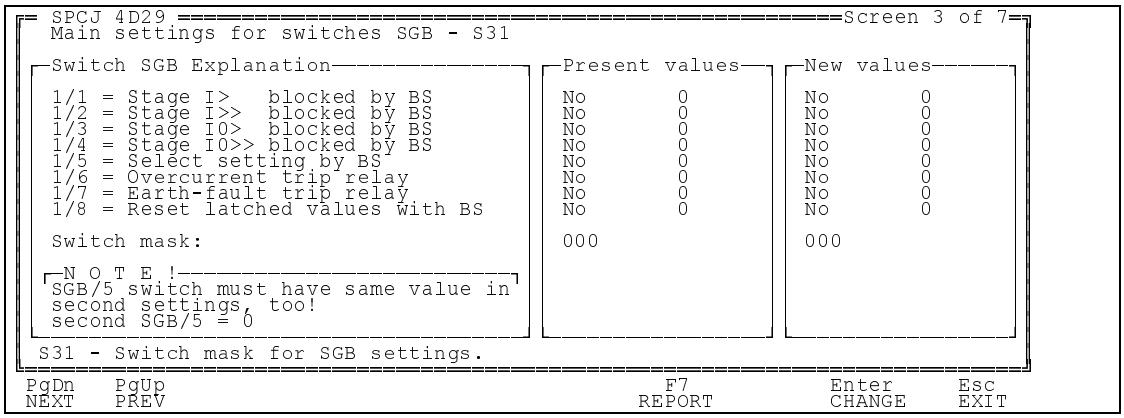


Fig. 2.4.4.C Main settings for SGB1 switches.

Screens 4 to 6 contain the settings for the tripping and signalling relays. A setting is changed by selecting a switch and pressing <Enter>. The settings of the entire switch group can be changed in a single operation using the switch mask.

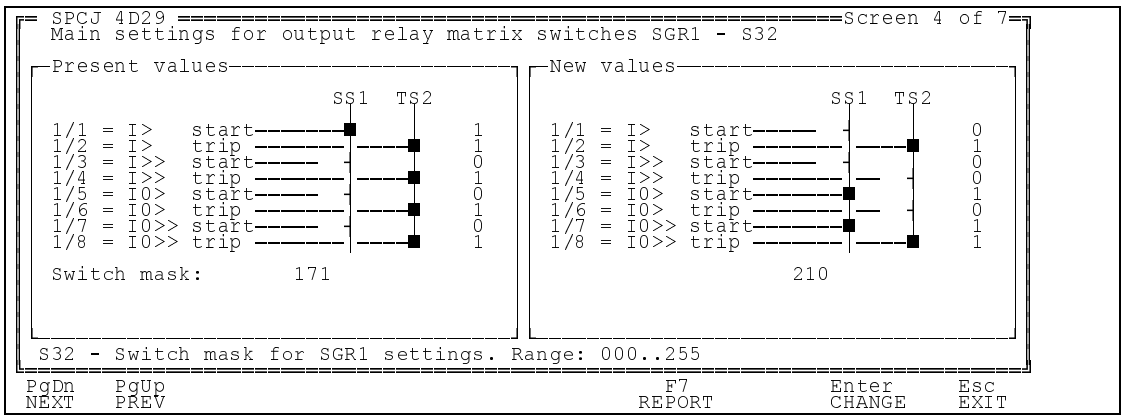


Fig. 2.4.4.D Main settings for SGR1 switches.

The ■ sign marks connecting of signals.

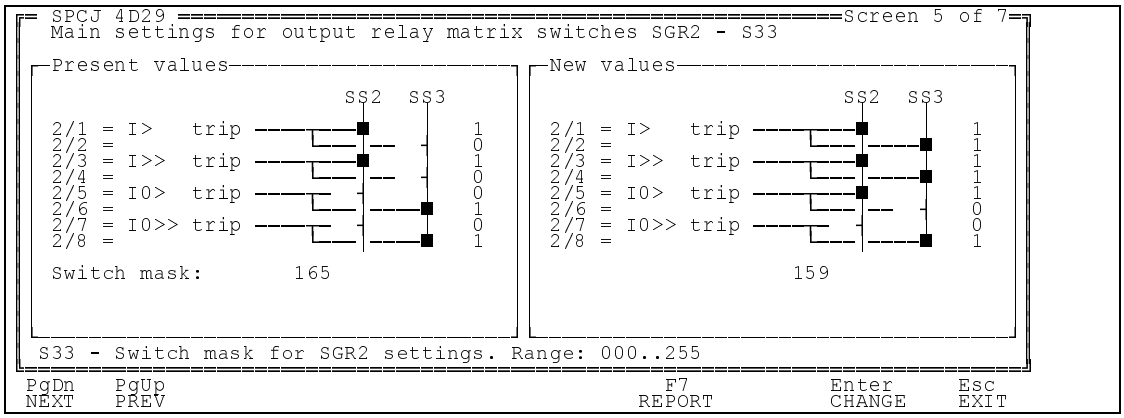


Fig. 2.4.4.E Main settings for SGR2 switches.

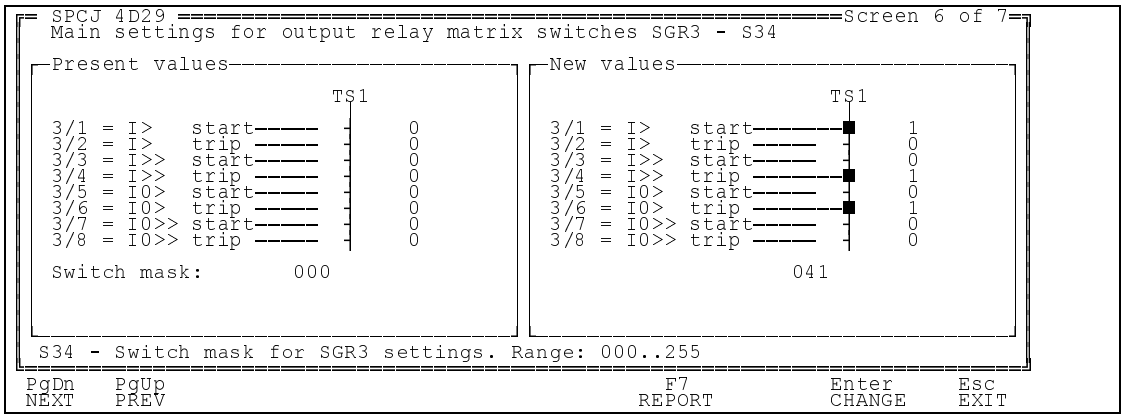


Fig. 2.4.4.F Main settings for SGR2 switches.

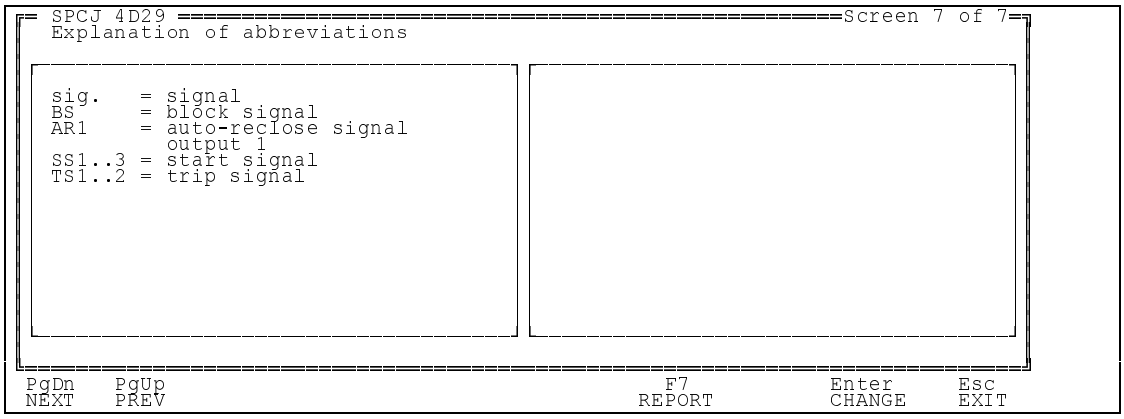


Fig. 2.4.2.G Explanation of abbreviations used on screens 1 to 7.

2.4.5 Configuring second switch groups

The group of parameters when selecting 'Configuration of second switch groups' is the same as in Section 2.4.4. They can be made the active set of parameter settings by changing the setting of V150 as explained in Section 2.4.1.

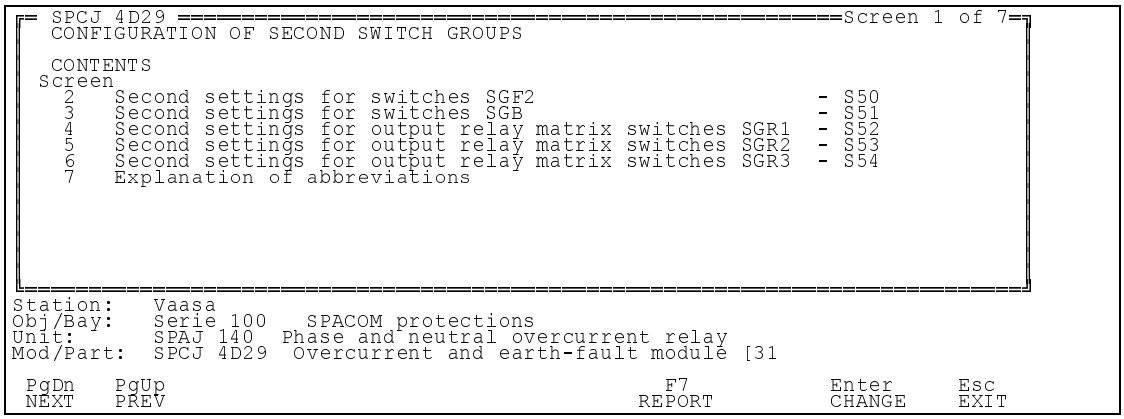


Fig. 2.4.5.A Contents of 'Configuration of second switch groups' screens.

2.4.6 Configuring event codes

Screens 2, 3 and 4 are used for selecting events that should be reported by appearance. (The events may be continuously polled by a data communicator, SRIO 500M or SRIO 1000M or SACO 100M, and reported to the REPORT program). This is done by selecting 'Report' for a particular function and setting it to Report, ('1'), for its status to be reported or to No, ('0'), if no report is desired.

```
SPCJ 4D29 ================================================Screen 1 of 5
CONFIGURATION OF EVENT CODES

CONTENTS
Screen
  2   Configuration of overcurrent events      - V155
  3   Configuration of earth-fault events      - V156
  4   Configuration of output signal events    - V157
  5   Explanation of abbreviations

Station:   Vaasa
Obj/Bay:   Serie 100   SPACOM protections
Unit:      SPAJ 140  Phase and neutral overcurrent relay
Mod/Part:  SPCJ 4D29  Overcurrent and earth-fault module [31

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.6.A Contents of 'Configuration of event codes' screens.

The configuration of overcurrent, earth-fault and output signal events on screens 2 to 4:

```
SPCJ 4D29 ================================================Screen 2 of 5
Configuration of overcurrent events - V155

Event-Explanation--------------------  Present values---  New values-------
E1  = I>  start on                     Report 1          Report 1
E2  = I>  start off                    No     0          Report 1
E3  = I>  trip  on                     Report 1          Report 1
E4  = I>  trip  off                    No     0          Report 1
E5  = I>> start on                     Report 1          Report 1
E6  = I>> start off                    No     0          Report 1
E7  = I>> trip  on                     Report 1          Report 1
E8  = I>> trip  off                    No     0          Report 1

Event mask:                            085               255

V155 - Event mask for overcurrent events.

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.6.B Configuration of overcurrent events.

```
SPCJ 4D29 ================================================Screen 3 of 5
Configuration of earth-fault events - V156

Event-Explanation--------------------  Present values---  New values-------
E9  = I0>  start on                    Report 1          Report 1
E10 = I0>  start off                   No     0          No     0
E11 = I0>  trip  on                    Report 1          Report 1
E12 = I0>  trip  off                   No     0          No     0
E13 = I0>> start on                    Report 1          Report 1
E14 = I0>> start off                   No     0          No     0
E15 = I0>> trip  on                    Report 1          Report 1
E16 = I0>> trip  off                   No     0          No     0

Event mask:                            085               085

V156 - Event mask for earth-fault events.

 PgDn   PgUp                                    F7          Enter     Esc
 NEXT   PREV                                  REPORT        CHANGE    EXIT
```

Fig. 2.4.6.C Configuration of earth-fault events.

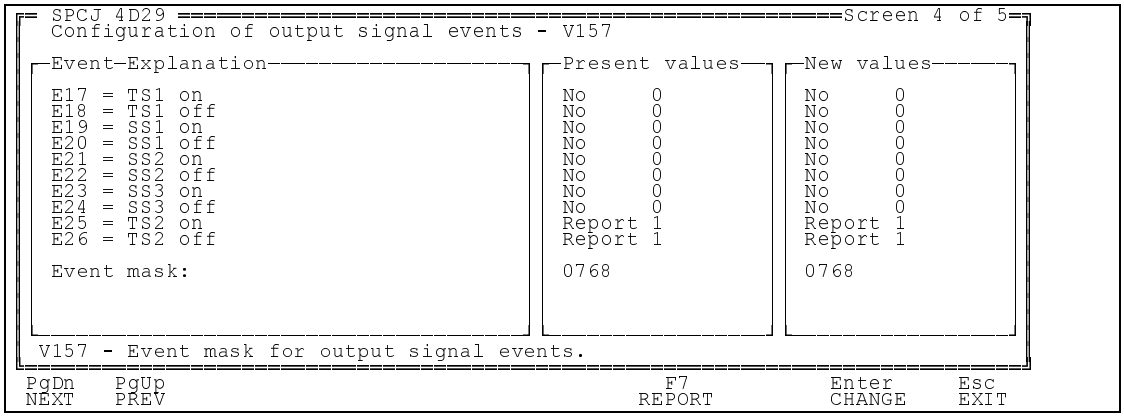


Fig. 2.4.6.D Configuration of output signal events.

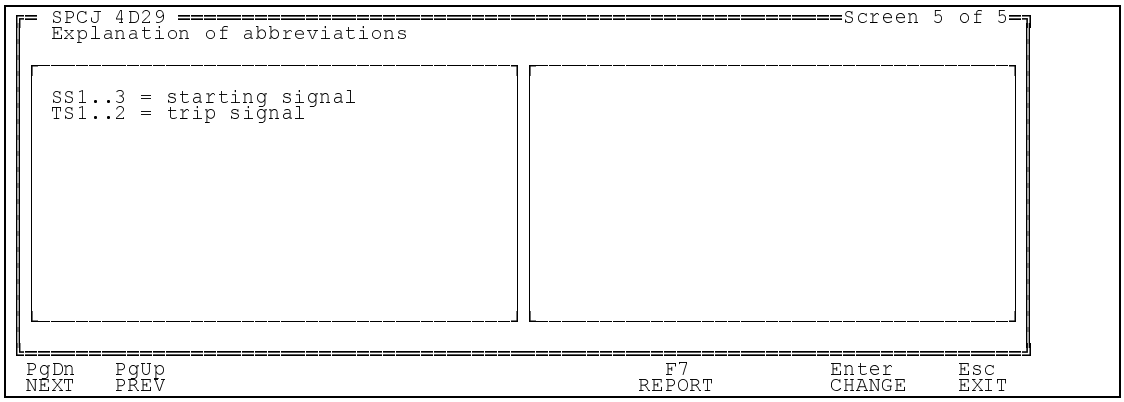


Fig .2.4.6.E Explanation of abbreviations used on screens 2 to 4.

2.4.7 Quick edit of settings

The 'Quick edit of settings' comprises the same settings as those explained in sections 2.4.1 to 2.4.6. This facility is developed for the experienced operator who does not need an explanation for every setting, but the parameter explanations and ranges are, however, showed as usual at the bottom line on the screen. Furthermore the screens contain both main and second settings, which makes comparison fast and easy. Screens 2 and 3 contain the same settings, one being expressed in per unit values and the other in primary system values. Screen 4 is for configuring events configuration and for general settings.

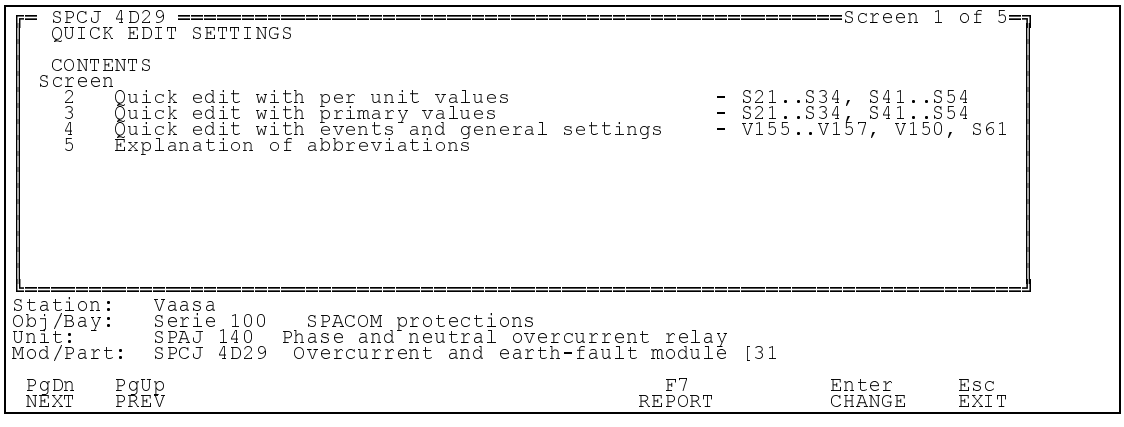


Fig. 2.4.7.A Contents of 'Quick edit' screens.

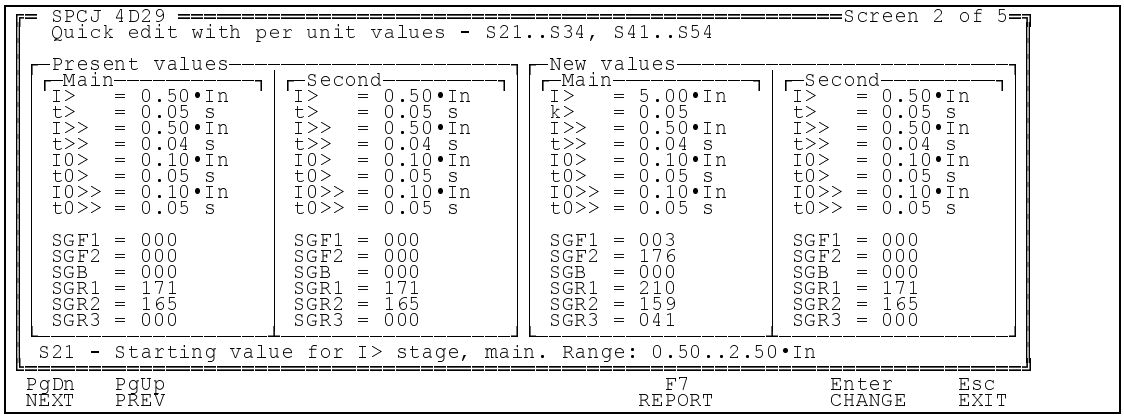


Fig. 2.4.7.B Quick edit in per unit values.

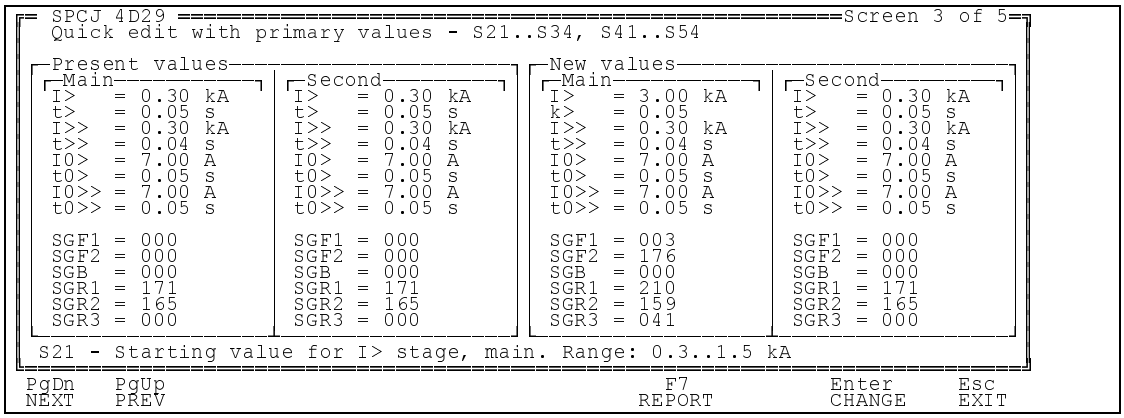


Fig. 2.4.7.C Quick edit in primary system values.

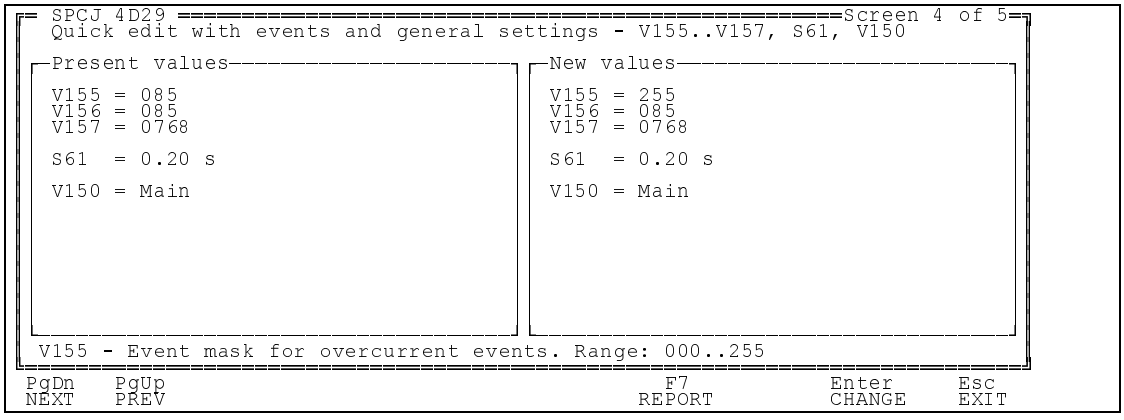


Fig. 2.4.7.D Quick edit of events and general settings.

After the parameter setting is finished, they are saved in the application structure by answering <Y> at the saving question. The settings can then be sent over to the module by 'Send and receive parameters', see section 2.4.9 'Editing and transferring data'.

2.4.8 Data acquisition

The data acquisition procedure is the same when using a telephone modem as with a direct connection to the SPA loop. Start with a direct connection and add the extra functions for operation via a modem later on. Refer to Appendix C of the SMS-BASE User's Guide for details of connecting a modem.

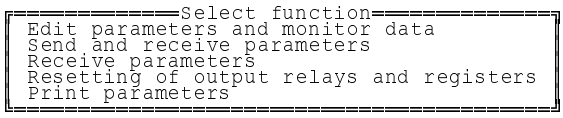
In Brief:
The data acquisition procedure is:

1 Select 'Organisation'.
2 Select 'Station'.
3 Select 'Object/Bay', e.g. the switchgear bay of a protected line.
4 Select 'Unit', i.e. one of the units in the 'Object/Bay'.
5 Select 'SPCJ 4D29...', i.e. the module in the unit.
6 Select 'Receive parameters' to collect data, after which the PC:
  6.1 makes a list of variables to collect.
  6.2 verifies that the right relay replies.
  6.3 collects one variable at a time.
  6.4 stores the values in the file 'VALUES.INS'. Operations 1 to 5 were explained earlier in this document.

---

5. Select 'SPCJ 4D29, i.e. the module in the unit.

- The following box appears on the screen:



6 Select 'Receive parameters' to collect data.

- Select 'Receive parameters'.
- An automatic sequence starts which can be followed in a window on the screen.

6.1 The PC makes a list of variables to collect.

- The message 'Reading module configuration file' is displayed while the PC compiles the list.

6.2 The PC verifies that the right relay replies.

- The message 'Asking from module it's type' is displayed while the PC waits for the module to reply.
- This is the first time that the communication link has had to operate in this Section. Should no communication be possible, refer to the SMS-BASE User's Guide for a step by step description of how to test the link to the relay module.

6.3 The PC collects one variable at a time.

- The PC displays the information on the data acquisition procedure:

```
Copying values from module to file

Copying now:   S49
Messages sent: 15    Retries: 0
```

Fig. 2.4.8.A Reading parameters from module to PC

The SPA identity for every variable is displayed, e.g. S45, the number of messages that have been sent and the number of retries so far. At a data transfer rate of 2400 Baud, approx. 7 telegrams per second are transferred. The number of 'Retries' indicates the quality of the link. The PC makes three attempts to transfer a telegram and then presents the user with the following alternatives:

- **'Skip'** Omit this variable. Select this alternative if the protection does not support a variable for some reason.
- **'Retry'** Make three more attempts.
- **'Quit'** Discontinue the operation. Select this alternative if the link does not function.

6.4 The PC stores the values in the file 'VALUES.INS'.

- When the list is complete, the user is requested to either update (default when pressing <Enter>) or compare the values of the variables with the data in the 'VALUES.INS' file.

```
============================Select============================

 Update data base with the received values . . . . . . . . 1
 Compare received values and data base values. . . . . . . 2
 Compare received values and update data base. . . . . . . 3
 Update data base but not edit values. . . . . . . . . . . 4
 Exit without updating or comparing values . . . . . . . . 5

 Select action (1/2/3/4/5): 1
```

Fig. 2.4.8.B Select method for saving/comparing or abandon received data.

When alternatives 1 and 3 are selected, the values of all the variables from the relay are stored in the files 'VALUES.INS' and 'VALUES.VAL'. Alternative 4 only stores them in the file 'VALUES.INS'. Since there is only one of these files for the data belonging to each relay, the existing data are overwritten by the new data.

If the user chooses to compare the data base values with the values from the relay, a list of values is displayed which can be scrolled if necessary.

```
=COMPARISON OF VALUES=========================================================
                                                    Received    Edited
F        Type designation of the module             SPCJ 4D29   SPCJ 4D29
V205     Firmware version                           056 C       056 C
S30      Switch mask for SGF2 settings, main set    0.00        176
S29      Switch mask for SGF1 settings, main set    0.00        003
S31      Switch mask for SGB settings, main set     255.        000
S32      Switch mask for SGR1 settings, main set    255.        210
S33      Switch mask for SGR2 settings, main set    255.        159
S34      Switch mask for SGR3 settings, main set    255.        041
S21      Starting value for I> stage, main set      2.50        5.00
S24      Operating time for I>> stage, main set     300.        0.04
S25      Starting value for I0> stage, main set     0.80        0.10
S28      Operating time for I0>> stage, main set    300.        0.05
S50      Switch mask for SGF2 settings, second set  255.        000
S49      Switch mask for SGF1 settings, second set  0.00        000
S51      Switch mask for SGB settings, second set   255.        000
S52      Switch mask for SGR1 settings, second set  255.        171
S53      Switch mask for SGR2 settings, second set  255.        165
S54      Switch mask for SGR3 settings, second set  255.        000
S41      Starting value for I> stage, second set    2.50        0.50
S44      Operating time for I>> stage, second set   300.        0.04
Press space bar to continue, Esc = Quit
```

Fig. 2.4.8.C Comparison of received and edited values.

This completes the acquisition of the 'SPCJ 4D29...' module data, which can be viewed in the 'VALUES.INS' file as described earlier in this Section.

2.4.9 Editing and transferring data

Settings of the 'SPCJ 4D29..' module can be changed from a remote location using SMS-BASE. This function can be used, for example, to change protection settings without having to travel to the station concerned or to prepare a set of new settings, which only takes a short time to download to the protection during a visit to the station.

Settings are edited in the right-hand half of the screens and correspond to the values in the 'VALUES.VAL' file.

In Brief:

The procedure for editing and transferring data is:

1 Select 'Edit parameters and monitor data' to change settings.

2 Select 'Send and receive parameters' to transfer new settings to the relay.

- **2.1** Enter the station password, after which the PC
- **3.1** makes a list of variables to edit.
- **3.2** verifies that the right relay replies.
- **3.3** transfers one variable at a time from the 'VALUES.VAL' file.
- **3.4** collects one variable at a time.
- **3.5** stores the values in the 'VALUES.INS' file.

---

1 Select 'Edit parameters and monitor data' to change settings.

- Select 'Edit parameters'.
- Select the appropriate screen and the desired variable in the right-hand half using the arrow keys.
- Start and terminate editing a value by pressing <Enter>. Press <Esc> to reject an edited value.
- Use the numerical keys to enter values and <.> as a decimal point. Confirm by pressing <Enter>.
- The permissible range is displayed on the comment line at the bottom of the screen. Values outside this range will not be accepted.
- Exit 'Edit parameters'.

2 Select 'Send and receive parameters' to transfer new settings to the relay.

- Select 'Send and receive parameters'.
- Enter the station password.

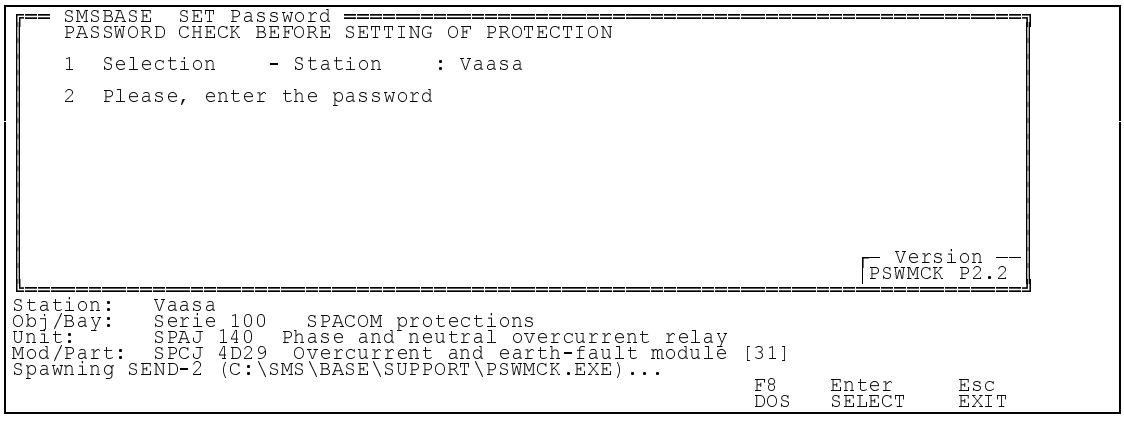


Fig. 2.4.9.A Give the password for the station Vaasa.

- Enter the relay module password. The password is asked for only if other than default.

```
╔═══════════════════════════════╗
║ Remote setting password:      ║
╚═══════════════════════════════╝
```

Fig. 2.4.9.B The remote password is found in the relay module.

- Steps 3.1 to 3.5 are the same as for data acquisition and are performed automatically. The PC displays 'Copying values from file to module' while transmitting data and 'Copying values from module to file' while receiving data.

2.4.10 Resetting the output relays and registers

The tripping and signaling relays and the registers of the 'SPCJ 4D29..' relay can be reset remotely by SMS-BASE. This function is used in the case of an unmanned station, for example, to reset the relay after it has signaled a fault without having to travel to the station.

In Brief:

The procedure for resetting output relays and registers is:

1 Reset the protection using 'Resetting of output relays and registers'.
1.1 Enter the station and module passwords after which the PC:
1.2 makes a list of variables to reset.
1.3 verifies that the right relay replies
1.4 sends the SPA telegram.

---

1 Reset the protection using 'Resetting of output relays and registers'.

- Select 'Resetting of output relays and registers'.
- Enter the station password.

```
╔═══ SMSBASE  SET Password ═══════════════════════════════════════════════╗
   PASSWORD CHECK BEFORE SETTING OF PROTECTION
   1  Selection    - Station    : Vaasa
   2  Please, enter the password
                                                          ┌ Version ──┐
                                                          │PSWMCK P2.2 │
╚═══════════════════════════════════════════════════════════════════════╝
Station:   Vaasa
Obj/Bay:   Serie 100   SPACOM protections
Unit:      SPAJ 140  Phase and neutral overcurrent relay
Mod/Part:  SPCJ 4D29  Overcurrent and earth-fault module [31]
Spawning SEND-2 (C:\SMS\BASE\SUPPORT\PSWMCK.EXE)...
                                                    F8     Enter     Esc
                                                    DOS    SELECT    EXIT
```

Fig. 2.4.10.A Give the password for station Vaasa.

- State the relay password. The password is asked for only if other than default.

```
╔═══════════════════════════════╗
║ Remote setting password:      ║
╚═══════════════════════════════╝
```

Fig. 2.4.10.B The remote setting password is found in the module.

- Steps 1.2 to 1.4 are the same as for data acquisition and are performed automatically.

2.4.11 Setting slave address and baudrate

The settings for slave address and baudrate can be set from the front of the SPACOM relays, although SMS-BASE does not consider them as parameters to be set. This is a deliberate restriction to prevent communication parameters from being changed by mistake. When they are changed, they have to be changed in the PC as well in the module before any communication can take place.

SMS-BASE provides three possibilities of changing the slave address:

The first is to change the address in the address register of the relay module from the module front panel by the push buttons. Then you will also have to change the address of the slave in the SMS-BASE application structure at the module level by ‘UTILITIES’/’Alter application structure’.

The second is to select 'UTILITIES/'Alter additional configurations'/'SPACOM address' which enables both the current address and the new address to be entered, (described thoroughly in the SMS-BASE User's Guide). By using ‘Receive parameters’ or ‘Send and receive parameters’ will the changing of slave address take place, as well as in the module as in the SMS-BASE application structure.

The third is to set the address by selecting a terminal emulator or the SPA-terminal emulator from the 'UTILITIES' menu. In this case, the procedure is as follows.

The terminal emulators available in SMS-BASE can also be used to change the slave address and baudrate. The corresponding SPA telegrams are written manually using the emulator.

Change only one parameter at a time and check that the communication can be re-established.

In Brief:
The procedure for changing the communication parameters is:

1 Go to the SMS-BASE main menu.
2 Select 'UTILITIES'.
3 Select 'Terminal emulator'.
3.1 Set the parameters for communicating with the terminal.
3.2 Verify that the right relay replies.
4 Change the slave address parameter, (V200).
4.1 Check if you can establish contact to the new address.
5 Change the baudrate parameter, (V201).
5.1 Check the new baudrate.
6 Change the communication parameters in the application structure.

Steps 1, 2 and 3 are described in the SMS-BASE User's Guide.

The example below assumes that the following changes have to be made:

	BEFORE	**AFTER**	**"SPA identity"**
Slave address	31	17	V200
Baudrate	9600	4800	V201

The format of SPA telegrams is given in the SMS-BASE User's Guide.

4 Change the slave address parameter

- Set the terminal emulator to ’string mode’.
- Press <F3> to change the mode.

- Write	">31WV200:17:XX"	and send it with <Enter>
	Notice that the quotation marks should not be included. They are just string delimiters.	
- Receive	’>31WV200:17:XX’	The command sent
	’<31A:XX’	’A’ in reply for ’Acknowledge’

4.1 Check that the new address functions.

- Request the relay type as a precaution.

- Write	">17RF:XX"	Press <Enter> to send.
- Receive	’>17RF:XX’	The instruction sent.
	’<17D:SPCJ 4D29:XX’	’D’ in reply for ’data’

5 Change the baudrate

- Set the terminal emulator to ’string mode’.
- Press <F3> to change the mode.

- Write	">17WV201:4800:XX"	Press <Enter> to send.
- Receive	’>17WV201:4800:XX’	The instruction sent.
	’<17A:XX’	’A’ in reply for ’acknowledgment’

5.1 Check that the new baud rate functions.

- Set the terminal emulator to 4800 Baud.
- Set the terminal emulator to ’string mode’.
- Press <F3> to change the mode.

- Request the relay type as a precaution.

- Write	">17RF:XX"	and send it with <Enter>
- Receive	’>17RF:XX’	The command sent
	’<17D:SPCJ 4D29:XX’	’D’ in reply for ’Data’

6 Change the communication parameters in the application structure.

- Change the slave address of the module and the baudrate setting in the communication parameter settings, (‘Alter application structure’/’<C>‘ at station level), in order to make the relay module in the application structure to agree with the settings in the relay.

3. SPECIAL CASES

The relays and modules distributed with the SM/SPA_ disk are all designed according to the same basic principles as for the ordinary SM/SPA_ relays and modules, but some special cases earns to be mentioned separately.

3.1 Measuring transformers

The setting of measuring transformers are done from 'UTILITIES'/'Alter additional configuration'/'Modify'/'Transducer data. For all modules except from SPCJ 4D28 are the settings done from In, Io, Un and Uo. The In2 and Io2 settings are this far used only by SPCJ 4D28. Regardless of whether the SPCJ 4D28 is alone in the relay, (SPAJ 144 C), or together with other modules, (e.g. SPAA 341), is the setting of measuring transformers and relay inputs always done by the same variables, i.e. In2 and Io2 groups.

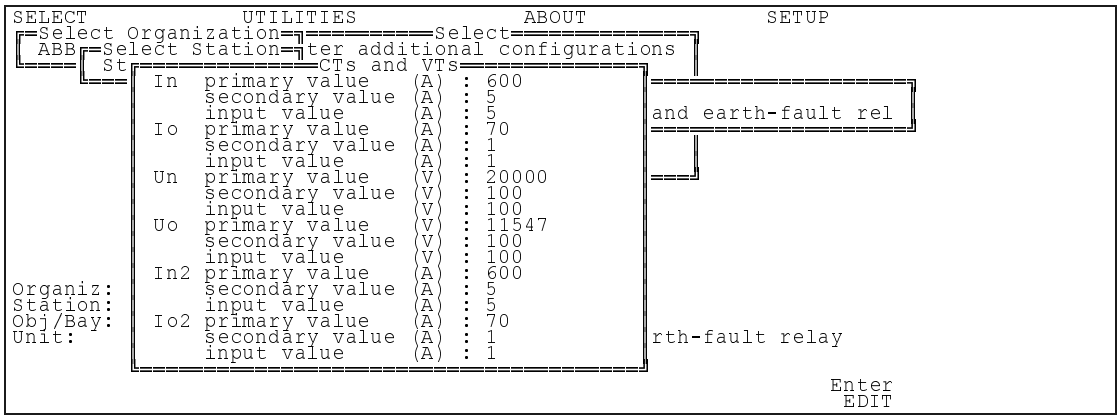


Fig.3.1.A Setting of the measuring transducers and relay inputs

3.1.1 SPCJ 4D28

The SPCJ 4D28 module is rather similar to the SPCJ 4D29 module described in section two, (compare figure 3.1.1.A with figure 2.3.A on page 7), except from the setting of the current measuring transformers.

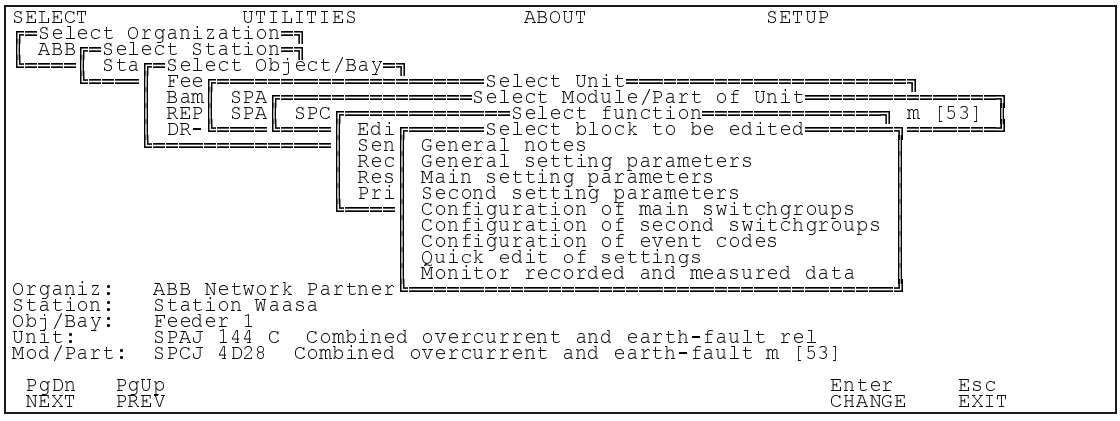


Fig. 3.1.1.A Selecting block to be edited for SPCJ 4D28

By first selecting ‘General notes’ is the information in figure 3.1.1.B showed. The setting of the measuring transformers is especially pointed out.

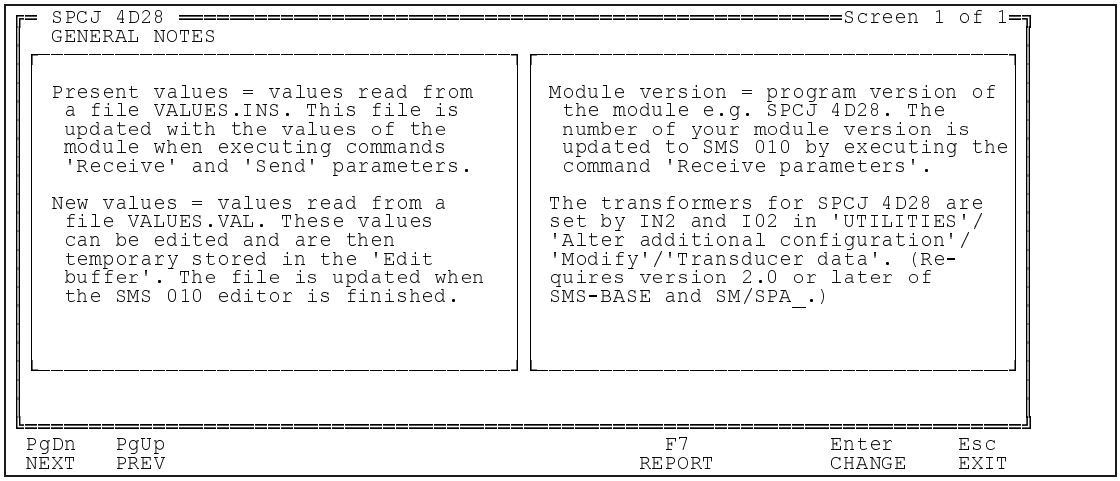


Fig. 3.1.1.B The ‘General information’ screen for SPCJ 4D28

All ‘Select block to be edited’ that uses measuring transformers shows at the ‘Abbreviations used’ screen similar type of information about the setting of the measuring transformers as in figure 3.1.1.B.

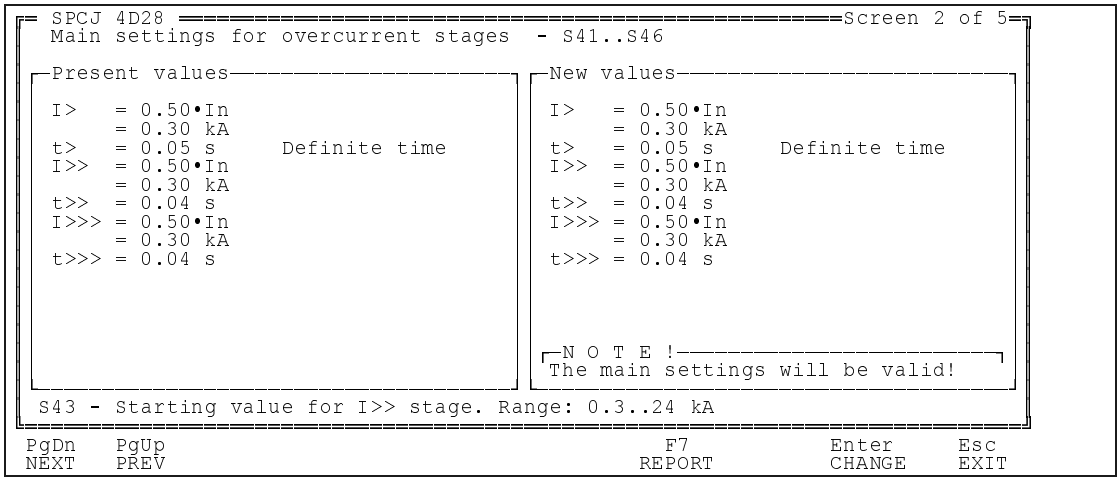


Fig. 3.1.1.C Setting of some parameters for SPCJ 4D28

The parameters in the example figure 3.1.1.C, (but valid also for other modules), can be set two ways, either directly as unit values or as primary values which calculates backwards to form the unit values. The measuring transformer settings doesn’t have to be correct if using the setting by unit values. Correspondingly, when setting the parameters by giving calculated primary vales, have the measuring transformers to be correct, otherwise will the corresponding unit value be wrong. The unit value is the one that is send over to the module by ‘Send and receive parameters’, the primary values are not send, these are showed to the user for his convenience.

Supposing the user is using the SMS-BASE version 1.1 with SPCJ 4D28 installed from SM/SPA_ v. 2.0 will the result, (an error message), be as in figure 3.1.1.D, (“FILE ERROR: C:\SMS\BASE\MODULES\SPCJ\ 4D28_3.CNF (press a key)"), but only for those ‘Select block to be edited’ alternatives that use transformer settings for the displaying of the calculated primary values. The other ‘Select block to be edited’ alternatives are still accessible. The situation is fortunately easily corrected by upgrading the SMS-BASE program to version 2.0 or higher.

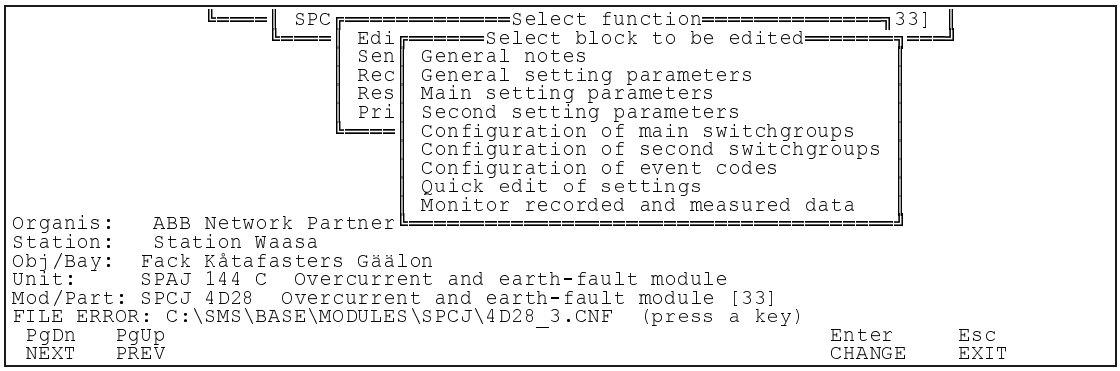


Figure 3.1.1.D Error message; SPCJ 4D28 in SM/SPA_ v. 2.0 requires SMS-BASE v. 2.0 or higher

3.1.2 SPCD 2D55 and SPCD 3D53

The measuring transformers are not used at all for the modules SPCD 2D55 and SPCD 3D53, (SPAD 346 relay). Instead are ratio in percent used, (figure 3.1.2.B).

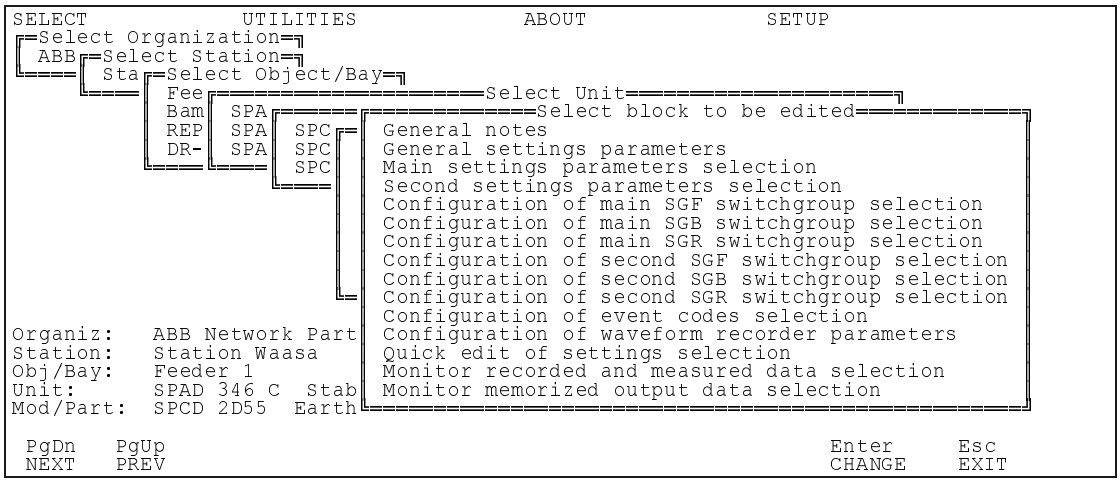


Figure 3.1.2.A Selecting block to be edited for SPCD 2D55

Figure 3.1.2.B displays an example of, when 'Main settings parameters selection' is selected and stepping forward to screen 2, the usage of the ratio in percent.

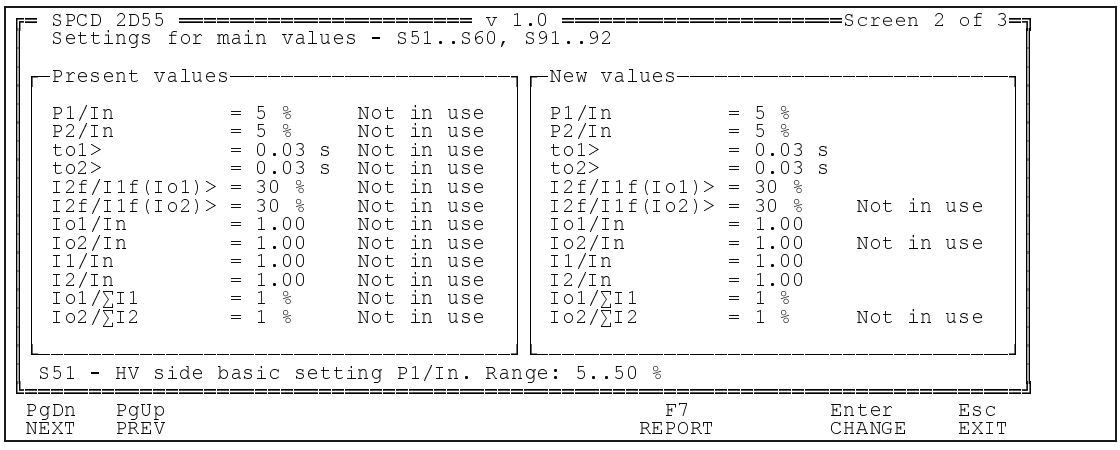


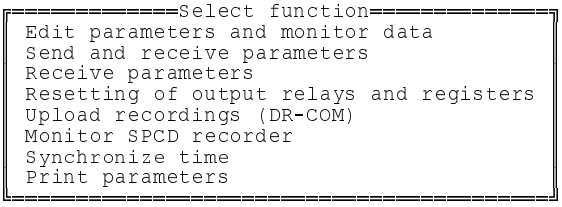
Figure 3.1.2.B Setting main parameters for SPCD 2D55

3.2 Internal disturbance recorders in SPCD 2D55 and SPCD 3D53

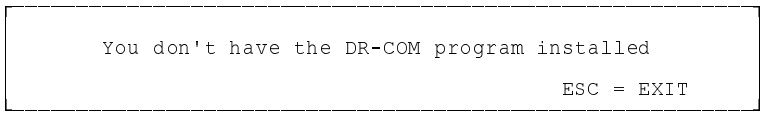
The relay modules SPCD 2D55 and SPCD 3D53 contain ***internal disturbance recorders*** and are therefore provided with three extra-ordinary functions compared to regular SM/SPC_ modules:

- **Upload recordings (DR-COM)**
- **Monitor SPCD recorder**
- **Synchronize time**

Below is showed the 'Select function' menu for the SPCD 2D55 and SPCD 3D53 modules.
(The picture is a window cut from the 'Module/Part of Unit' level in the SMS-BASE application structure).



1. '**Upload recordings (DR-COM*)**' starts the DR-COM program for the particular module. The DR-COM can also be started on 'Organisation' level, but then are all the disturbance recorders within the 'Organisation' included in the uploading of recordings from the disturbance recorders. If the DR-COM program isn't installed will following message pop up:



2. '**Monitor SPCD recorder**' shows e.g. the actual recorder time settings, registrations in memory, (providing that you are properly connected to the SPCD module, of course).

3. '**Synchronize time**' synchronizes the time in the SPCD module with the time taken from the PC.

*) About the DR-COM program. Below is a short introduction, but for more information, refer to the DR-COM User's Guide.

The **DR-COM program**, (RS 881 016-AA), is a program especially developed for manual or automatic uploading and handling of recordings, from disturbance recorders, by now from the SPCD 2D55, SPCD 3D53 and the optional SPCR modules 8C19 and 8C27. DR-COM provides with graphical evaluation and data storing in COMTRADE format that can be evaluated by REVAL. The SMS 010 software for these SPCR 8C19 and SPCR 8C27 modules is **SM/SPCR** , (RS 881 015-AA). The SPCR 8C.. modules can be located in any empty slot in a SPACOM relay, using the internal measuring signals of the "host relay". If there are no empty slots can the disturbance recorder be housed in an empty relay shell, though equipped with measuring transformers, taking the measured currents, (serial) and voltages, (parallel) from the protection relay. Then will not the internal signals from the protection relay be available, but the currents and voltages are still acquirable.

The DR-COM STATION that is showed in the unit selection window when using 'UTILITIES'/'Alter application structure' and adding relays/data units is to be inserted and used in the SMS-BASE application structure, while it contains the settings for the DR-COM program. Since the DR-COM station is a support function for the DR-COM program, the DR-COM program has to be installed as well when you intend to use the DR-COM program functionality.