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OPERATION MANUAL

SRC-4

MICRO PROCESSOR 50/60 HZ RECTIFIER CONTROLLER

AND DATA LOGGER

DIFFERENTIAL INPUT MODEL

Ref:c:\mydocu~1\manuals\ SRC-4.DOC

INTRODUCTION:

The microprocessor rectifier controller and data logger has been designed by corrosion engineers to control the output of cathodic protection rectifiers and log data at programmed intervals. The SRC-4 can operate in constant current, constant voltage or autopotential modes. The stored data can be retrieved remotely, and the program can be changed or modified via a PC and a modem. The SRC-4 sends a setup string to the modem each time it is rebooted or following a power failure.

The SRC-4 has an internal memory capability of 128K bytes of RAM storage expandable to 2M bytes. The unit stores, the date, time, output voltage, output current, and structure -to-electrolyte potential of all active references at the programmed logging interval.

The SRC-4 can be programmed to store data on intervals of 1 minute to 24 hours (1440 minutes).

The front panel is equipped with a RS232C port for local or remote communication, with PC's , printers etc.

The SRC-4 has four differential input circuits for monitoring structure-to-electrolyte potentials. The SRC-4 responds to the lowest potential sensed and adjusts the output accordingly. In *autopotential mode,* the SRC-4 can be programmed to interrupt the current flow prior to measuring the reference-to-structure potential to eliminate errors due to IR drop.

The SRC-4 is equipped with fuse protection software. If the current output of the rectifier exceeds a value that would exceed 50 mV across the current measurement shunt, an interrupt is created which sets the firing angle of the SCR's to 174 electrical degrees (minimum power) then ramps the current back up. If the condition persists the SRC-4 will continue to adjust the current and an interrupt will be generated every time the voltage drop across the shunt exceeds 50 mV.

When the SRC-4 is making a major adjustment of power output, the display screen and keyboard are frozen to allow the SRC-4 to maximize the use of the processor for power adjustment. The screen and keyboard are released following the major adjustment in power output.

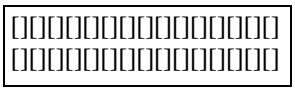
The SRC-4 has three modes of operation as follows:

- Mode 1, the structure-to-electrolyte potential is measured over two half cycles with the power applied (20 milliseconds)

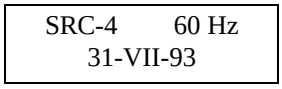
- Mode 2, the structure-to-electrolyte potential is measured for two milliseconds, twice between output pulses of the rectifier. This will give an IR drop free reading if the circuit does not contain inductance or capacitance.

- Mode 3, the structure-to-electrolyte potential is measured after a programmed wait period after the current is halted.

THE START UP SCREENS:



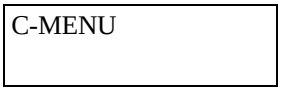
The LCD display is tested then the following screen appears:



This screen displays the software version:

The SRC-4 **tests for a modem and sends a setup string to the modem. If a modem is not connected to the** SRC-4 **it displays the following message** MODEM OFF. **If it detects a modem and receives a response after sending the setup string it displays the following message:** MODEM OK.

NOTE: The SRC-4 sends a setup string to the modem every time the unit is booted by pressing 3C, after power is restored following a power failure, or after signing off from a modem communication.

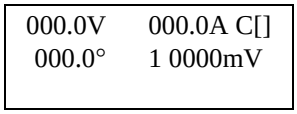


When this screen appears you have 5 seconds to press **C** to access the parameter and test menus. If you do not press **C** within 5 seconds the unit reverts to operation if programmed.

If the following screen appears the program has been lost due to discharge of the memory back up capacitor and the parameters must be re-entered. Any stored data in the memory will have been lost.

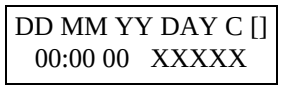
THE DISPLAY SCREEN:

The SRC-4 is normally left with the following screen displayed:



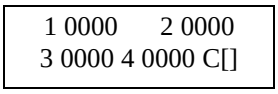
This screen displays the output voltage, output current, the firing angle of the SCR'S in electrical degrees and the reference exhibiting the lowest structure-to-electrolyte potential.

If **C** is pressed a new screen appears:



This screen displays the date and time as well as the memory position in hexadecimal format.

If **D** is pressed the data in memory can be exported To a PC, printer or CORRAUDIT AMS-1. If **E** is pressed the event log can be exported to the same equipment. If **A** is pressed the **SRC-4** will shut the rectifier off until **B** is pressed to restore operation. This is a handy feature for undertaking tests and recording the depolarization of the structure.



This screen displays the structure-to-electrolyte potential of all active references.

If **C** is pressed the unit reverts to the operation screen, showing the rectifier output.

PROGRAM SCREENS:

To access the program and test screens press 3C simultaneously on the keyboard, the SRC-4 will reboot and go through the first four screens. When C-MENU appears press C within 5 seconds to access the program menus.

A new screen will appear:

```
A-PAR B-TEST
C-CLK 3E-ERASE
```

Press A **for parameters:**

```
0001 MIN LOG TIME
C-HANGE F-NEXT
```

Press C **to toggle log time. The available logging intervals are:**

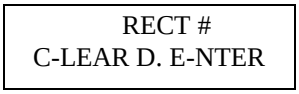
1	minute		240	"	(4 hours)
2	"		360	"	(6 hours)
3	"		720	"	(12 hours)
40	"		1440	"	(24 hours)
5	"				
6	"				
10	"				
20	"				
30	"				
60	"	(1 hour)			
120	"	(2 hours)			
180	"	(3 hours)			

When you have selected the appropriate logging interval. Press **F** next screen:

```
STORE EVENTS Y
C-HANGE F-NEXT
```

Press C **to toggle event storage N=NO and Y=YES, then press F for next screen:**

Press C **clear the display and enter the rectifier number, up to five digits may be used, do not include a decimal point:**



If you make a mistake press **C** to clear the entry then reenter the number. When correct, press **E** to enter the value in memory, the display will then revert to the previous screen, if the entry is correct press **F** for next screen, if you made a mistake press **C** again to clear the entry and follow the steps again.

The following operation parameters must be entered for proper operation of the SRC-4.

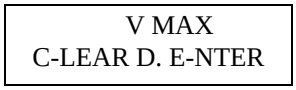
Enter the required minimum output voltage of the rectifier:

Press **C** to change the minimum output voltage, at the next screen enter the minimum output voltage, include a decimal point by pressing **D**.

If you make a mistake, press **C** to clear the entry and re-enter the number,. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the maximum output voltage of the rectifier:

Press **C** to change the maximum output voltage. At the next screen enter the minimum output voltage, include a decimal point by pressing **D**.



If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the minimum output current of the rectifier:

Press **C** to change the minimum output current. At the next screen enter the minimum output voltage, include a decimal point by pressing **D**.

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the maximum output current of the rectifier:

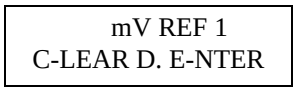
Press **C** to change the maximum output current. At the next screen enter the minimum output voltage, include a decimal point by pressing **D**.

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

The SRC-4 can accept any type of reference electrode and will automatically display the reference-to-structure value on the display as though a copper-copper-sulfate reference electrode was in use. To enable this feature the value of the reference electrode to copper-copper-sulfate must be entered as well as the sign.

Enter the reference electrode calibration for reference number 1:

Press **C** to change the reference electrode calibration. At the next screen enter the potential difference between the reference electrode to be used and a copper-copper-sulfate reference electrode, do not include a decimal point.

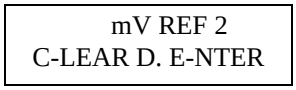


If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

When the unit reverts to the previous screen a "+" sign and an **A** will appear in the upper right hand corner of the screen. If the reference electrode to be used is "+" to copper-copper-sulfate press **F** for next screen, if the reference electrode is "-" to copper-copper-sulfate press **A** to toggle to "-", then press **F** for next screen.

Enter the reference electrode calibration for reference number 2:

Press **C** to change the reference electrode calibration. At the next screen enter the potential difference between the reference electrode to be used and a copper-copper-sulfate reference electrode, do not include a decimal point.

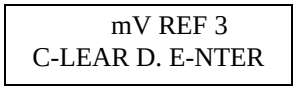


If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

When the unit reverts to the previous screen a "+" sign and an **A** will appear in the upper right hand corner of the screen. If the reference electrode to be used is "+" to copper-copper-sulfate press **F** for next screen, if the reference electrode is"-" to copper-copper-sulfate press **A** to toggle to "-", then press **F** for next screen

Enter the reference electrode calibration for reference number 3:

Press **C** to change the reference electrode calibration. At the next screen enter the potential difference between the reference electrode to be used and a copper-copper-sulfate reference electrode, do not include a decimal point.

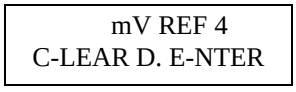


If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

When the unit reverts to the previous screen a "+" sign and an **A** will appear in the upper right hand corner of the screen. If the reference electrode to be used is "+" to copper-copper-sulfate press **F** for next screen, if the reference electrode is "-" to copper-copper-sulfate press **A** to toggle to "-", then press **F** for next screen

Enter the reference electrode calibration for reference number 4:

Press **C** to change the reference electrode calibration. At the next screen enter the potential difference between the reference electrode to be used and a copper-copper-sulfate reference electrode, do not include a decimal point.



If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the

previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

00000 mV REF 4 +A
C-HANGE F-NEXT

When the unit reverts to the previous screen a "+" sign and an **A** will appear in the upper right hand corner of the screen. If the reference electrode to be used is "+" to copper-copper-sulfate press **F** for next screen, if the reference electrode is "-" to copper-copper-sulfate press **A** to toggle to "-", then press **F** for next screen.

NOTE:

If a reference electrode is not connected to any of the four reference inputs, enter 9999 as the reference electrode calibration to turn the reference electrode off.

Enter the minimum structure-to-electrolyte potential to be maintained in autopotential mode as a four digit number:

00000 mV P/S MIN
C-HANGE F-NEXT

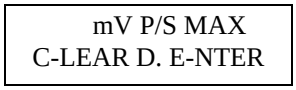
Press **C** to change the minimum structure-to-electrolyte potential to be maintained in autopotential mode, do not include a decimal point.

mV P/S MIN
C-LEAR D. E-NTER

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the maximum structure-to-electrolyte potential to be maintained in autopotential mode as a four digit number:

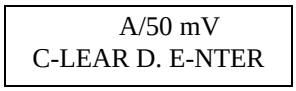
Press **C** to change the maximum structure-to-electrolyte potential to be maintained in autopotential mode, do not include a decimal point.



If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the shunt calibration value :

Press **C** to change the calibration value for the shunt, do not include a decimal point.



If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the operating **MODE** . **THERE ARE THREE OPERATION MODES AS FOLLOWS:**

- **MODE 1, THE SRC-4 SENSES AND DISPLAYS THE REFERENCE-TO-STRUCTURE POTENTIAL WITH THE CURRENT FLOWING AND DOES NOT ALLOW FOR THE IR DROP COMPONENT IN THE READING.**

- **MODE 2, THE SRC-4 READS THE IR FREE REFERENCE-TO-ELECTROLYTE POTENTIAL BETWEEN OUTPUT PULSES OF THE RECTIFIER. THIS ONLY WORKS IF THE RECTIFIER IS <u>NOT</u> EQUIPPED WITH AN OUTPUT FILTER.**

- **MODE 3, THE SRC-4 TURNS THE POWER OFF AND READS THE REFERENCE-TO-STRUCTURE POTENTIAL AFTER A PROGRAMMED DELAY. IN MODE 3 IT IS NECESSARY TO ENTER THE DELAY TIME IN UNITS OF 1/100 SECONDS, YOU MUST PROGRAM A SUFFICIENT DELAY TO ALLOW FOR CAPACITIVE DISCHARGE AND INDUCTIVE EFFECTS TO DISSIPATE. USUALLY 10/100 SECONDS IS SUFFICIENT.**

00000 MODE C-HANGE F-NEXT

Press **C** to change the MODE. Enter 1,2 or 3 do not include a decimal point.

MODE C-LEAR D. E-NTER

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

If you entered mode 3 two new screens will appear:

Press C **to change the off time in mode 3.**

00000 OFF C-HANGE F-NEXT

Enter the off time in mode 3 in 0.01 seconds, for an off time of 20/100 seconds enter 20.

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Press C **to change the on time in mode 3.**

Enter the on time in mode 3 in 0.01 seconds, for an on time of 200/100 seconds enter 200.

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

WE RECOMMEND THAT THE "ON" TIME BE AT LEAST TEN TIMES THE OFF TIME TO AVOID SERIOUS POWER LOSS IN THE CATHODIC PROTECTION SYSTEM.

The last screen sets the main type of control i.e.: CONSTANT CURRENT, CONSTANT VOLTAGE or AUTO-POTENTIAL. The unit will respond more quickly if it is programmed for the control application. Toggle the display on the last screen for MAIN CONTROL.

Press **C** to toggle from voltage (V) control to amps (A) control.

```
MAIN CONTROL A
C-HANGE F-NEXT
```

Press **C** to toggle from amps (A) control to structure-to-electrolyte (mV) control

```
MAIN CONTROL mV
C-HANGE F-NEXT
```

When **F** is pressed on this last screen the SRC-4 goes into operation and the operation screen is displayed.

OTHER FUNCTIONS:

By pressing 3 & C simultaneously the SRC-4 is rebooted and access to the menu screens can be obtained by pressing **C** for menu. The other functions that can be performed are:

- SET PARAMETERS **PRESS A**
- SET TIME AND DATE **PRESS C**
- PERFORM TEST FUNCTIONS **PRESS B**
- ERASE THE MEMORY **PRESS E**

TO SET TIME AND DATE

PRESS C

Enter the day of the month 1 to 31:

00000 DAY C-HANGE F-NEXT

Press **C** to change the day of the month, Enter the day of the month 1 to 31, do not include a decimal point.

DAY C-LEAR D. E-NTER

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the month 1 to 12: (1 = January)

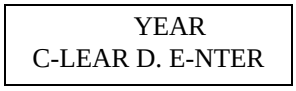
00000 MONTH C-HANGE F-NEXT

Press **C** to change the month, enter the month 1 for January, 12 for December, do not include a decimal point.

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the year as a two digit number.

Press **C** to change the year, enter the year as a two digit number i.e.: 1993 is entered as 93, do not include a decimal point.



If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the week day a one digit number.

Press **C** to change the week day, enter the week day i.e.: 1 = Monday 5 = Friday, do not include a decimal point.

WEEKDAY C-LEAR D. E-NTER

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the hour as a two digit number.

00000 HOURS C-HANGE F-NEXT

Press **C** to change the hour, enter the hour using the 24 hour clock i.e.: 2 PM = 14 hours, do not include a decimal point.

HOUR C-LEAR D. E-NTER

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

Enter the minute as a two digit number.

00000 MINUTE C-HANGE F-NEXT

Press **C** to change the minuet, enter the minute as a number between 0 and 59, do not include a decimal point.

MINUTE C-LEAR D. E-NTER

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

To start the clock press **F** when the following screen is displayed.

F -0 sec.

PRESS 3 & C TO RETURN TO OPERATION

TEST FUNCTIONS:

WHEN B FOR TEST IS PRESSED THE FOLLOWING SCREEN IS DISPLAYED.

```
A-MEM B-SEE E-AD
 C-SCR       F-DISK
```

MEMORY TEST

When **A** is pressed the SRC-4 checks its memory and displays the memory available:

```
8K, 32K, 32K
```

MEMORY CONTENTS

When **B** is pressed the SRC-4 allows the contents of the specified memory address to be displayed.

```
   00000 ADR
C-HANGE F-NEXT
```

Press **C** to change the memory address, do not include a decimal point. Enter the memory address in hexadecimal format.

```
      ADR
C-LEAR D. E-NTER
```

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

ANALOG TO DIGITAL CONVERTER

This function can be used to observe the conversion of analog signals to digital values.

When **E** is pressed the SRC-4 allows the hexadecimal equivalent of the analog value to be displayed

Press **C** to change the A/D address, do not include a decimal point. The address codes are shown in the table #1 below

If you make a mistake press **C** to clear the entry and re-enter the number, When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

TABLE No. 1

ADDRESS CODES FOR A/D CONVERTERS

FUNCTION	ADDRESS	VALUE & MULTIPLIER
RECTIFIER VOLTS	245	VOLTS = XXXX/8-256
RECTIFIER AMPS	243	Mv = XXXX*100/2048-100
REFERENCE 1	119	XXXX*10000/4096-5000
REFERENCE 2	183	XXXX*10000/4096-5000
REFERENCE 3	231	XXXX*10000/4096-5000
REFERENCE 4	215	XXXX*10000/4096-5000

SILICON CONTROLLED RECTIFIER:

When **C** is pressed the firing angle of the SCR'S can be set, this is a handy test feature for rectifiers.

Press **C** to change the firing angle of the SCR's in electrical degrees. 174 is minimum power and 45 is maximum power. Enter a number between 45 and 174. Include a decimal point by pressing **D**.

If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

DISK:

This function is disabled unless the SRC-4 is equipped with a floppy disk storage media.

ERASE:

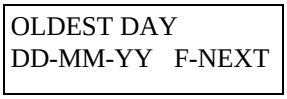
This function which is activated by pressing 3 & E simultaneously from the menu screen. Pressing 3 & E simultaneously will erase the memory and all stored parameters.

PRINTING DATA:

Data and events stored in the memory of the SRC-255 can be down loaded to a dot matrix printer by selecting the print screen from the operation window. Press **C** from the operation window until the following screen appears.

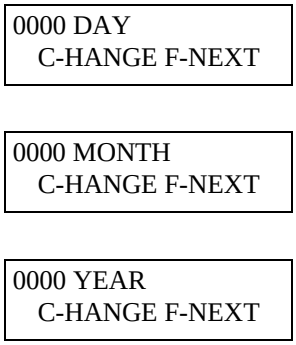
If **E** or **F** are pressed on the keyboard with this screen displayed, the printer program is entered **F** will send a graphical representation of the data to a dot matrix printer. **E** will send the data in ASKII format to the dot matrix printer, and the following screens will appear.

The SRC-4 is searching its memory for the oldest date. When the oldest date is located the following screen appears.



The oldest available date in memory is displayed, after pressing **F** a new screen appears and the current date is shown as the default value. At this stage you can program the SRC-4 to print information covering the period from the present date to any date up to the oldest date in memory. The following screens step you through the process of exporting data to a printer.

TIP **Make sure the printer is connected to the RS232C port on the front of the SRC-4 and that the printer is set for 9600 baud, 8 data bits, no parity and 2 stop bits and that the printer is turned on line, prior to pressing F on the last screen.**



If you make a mistake press **C** to clear the entry and re-enter the number. When the number is correct press **E** to enter the value in memory. The unit will now revert to the previous screen, if the entry is OK press **F** for the next entry screen, if you made a mistake press **C** to change the entry then go through the previous steps.

MODEM OPERATION:

The SRC-4 sends a setup string to the modem each time **C & 3** are pressed or following each power failure. A Hayes compatible modem should be used for communication capable of accepting the following setup string:

SETUP STRING:

AT&FS0=1S23=23&W

The SRC-4 transmits data in the following format

2400 Baud

8 Data Bits

1 Stop Bits

No Parity

To initiate communication with the SRC-4 use a terminal and a modem of a PC and a modem. Dial the telephone number of the rectifier containing the SRC-4 and modem. When communication is achieved (Modem answers ring) enter the following password.

PASSWORD:

"C" the answer is "yes?"

within 5 seconds you must send the remainder of the password after receiving "yes?"

"ATHPAC" the answer is "OK"

TIP the SRC-4 only responds to upper case letters, therefore set capital lock ON, on your keyboard.

When you receive an **OK** from the SRC-4 you have entered the correct password and established communication. The SRC-4 will respond to the following characters.

SEND	**RECEIVE**
?	?SPEGTI^H$B
S	OPERATION STATUS AND PARAMETERS
P	CHANGE PARAMETERS
E	TO RECEIVE EVENTS
G	TO RECEIVE DATA
T	TO RESET CLOCK
I	TO TURN RECTIFIER OFF (SEND $ TO TURN RECTIFIER ON)
^	Y/N (TO ERASE MEMORY AND PARAMETERS) *
H	TO DUMP DATA IN HEXADECIMAL FORMAT
$	TO RE-BOOT SRC-4
B	BYE (TO END COMMUNICATION WITH SRC-4)

*** If you erase the memory and re-program the SRC-4 remotely you must send a "$" to re-start the unit. Failure to send a "$" after remotely re-programming the SRC-4 could result in a locked unit.**

NOTE: Always send a "**B**" before ending remote communication with the SRC-4.

SRC-4 MENU:

Send **?** to receive the menu string **?SPEGTI^H$B**

To down load data to your PC send a **G** and follow through the steps for exporting data to a printer, shown in the previous section.

TIP make sure you have opened a capture file in your PC to receive the information from the SRC-4.

NOTE: always end your session with the SRC-4 by sending a **B** to end communication.

The following is an example of an actual communication with the SRC-4 via a modem and PC.

REMOTE COMMUNICATION:

AT&FS0=1S23=23&W	*(setup string)*
yes?	*(answer after sending C)*
ok	*(answer after sending ATHPAC)*
?SPEGTI^H$B	*(answer after sending ?)*

0000min LOG TIME CF *(answer after sending P)*

To change the logging interval
0001min LOG TIME CF *(send "C" to toggle logging interval)*
0002min LOG TIME CF
0003min LOG TIME CF
0004min LOG TIME CF
0005min LOG TIME CF
0006min LOG TIME CF
0010min LOG TIME CF
0015min LOG TIME CF
0020min LOG TIME CF
0030min LOG TIME CF
0060min LOG TIME CF
0120min LOG TIME CF
0180min LOG TIME CF
0240min LOG TIME CF
0360min LOG TIME CF
0720min LOG TIME CF
1440min LOG TIME CF

store events N CF
store events Y CF

REC# 00000 CF *(send "C" to change then send number)*
(send "F" for next item)

00001 **NOTE:** In remote communication five digits are required, send 00001 to enter 1.

00001 CF

Vmin 000.0 CF
Vmax 000.0 CF

Amin 000.0 CF
Amax 000.0 CF

mV-REF1 00000 CF
+ CF

mV-REF2 00000 CF
+ CF

mV-REF3 00000 CF
09999
09999 CF
+ CF

mV-REF4 00000 CF
09999
09999 CF
+ CF

mV P/Smin 00000 CF
00000 CF
01100
01100 CF

mV P/Smax 00000 CF
01150
01150 CF

A/50mV 00000 CF
00000 CF
00020
00020 CF

MODE 00001 CF
00003
00003 CF

OFF 00000 CF
00020
00020 CF

ON 00000 CF
00200
00200 CF
main control mV CF

THE STATUS SCREEN *(shows operation and programming)*

SRC4 50Hz 31 VII 93
#0001 00ODE000 00:03
000.0V 000.0A 174.0d
0000mV-REF1 0000mV-REF2 9999mV-REF3 9999mV-REF4
000.0Vmin 000.0Vmax 000.0Amin 000.0Amax
0000mV-REF1 0000mV-REF2 9999mV-REF3 9999mV-REF4
1100mV P/Smin 1150mV P/S max 0020A/50mV MODE 003 OFF 0020 ON 0200
0001min LOG TIME
00ODE000

To retrieve data from the SRC-4 send a "G". The answer is as follows:

G
WAIT

OLDEST DAY 12OCT93
DAY00012 CF
MONTH00010 CF
YEAR00093 CF *(when F is pressed the SRC-4 will transmit the data)*

To retrieve stored events send an "E"

E
WAIT

OLDEST DAY 12OCT93
DAY00012 CF
MONTH00010 CF
YEAR00093 CF *(when F is pressed the SRC-4 will transmit the data)*

bye *(to end communication)*

RECTIFIER INTERFACE:

The SRC-4 is equipped with a 25 pin male D connector which interfaces the SRC-4 with the rectifier to be controlled.

The pin configuration for the 25 pin male D connector is as follows:

PIN #	DESCRIPTION
1.	AC2 .5 TO 6.3 VOLTS AC
2.	AC1 12 TO 20 VOLTS AC
3.	RECTIFIER + OUTPUT (MAXIMUM 200 V DC TO PIN 16
4.	SHUNT +
5.	SCR 1 CATHODE
6.	SCR 2 CATHODE
7.	RECTIFIER - OUTPUT
8.	REFERENCE 1 - (NEGATIVE)
9.	REFERENCE 2 - (NEGATIVE)
10.	REFERENCE 3 - (NEGATIVE)
11.	REFERENCE 4 - (NEGATIVE)
12.	DO NOT USE

13. DO NOT USE
14. AC1 12 TO 20 VOLTS AC
15. AC2 .5 TO 6.3 VOLTS AC
16. STRUCTURE OR PIPELINE (CIRCUIT GROUND, UNIT WILL NOT OPERATE WITHOUT THIS CONNECTION)
17. SHUNT -
18. SCR 1 GATE
19. SCR 2 GATE
20. REFERENCE 1 (POSITIVE)
21. REFERENCE 2 (POSITIVE)
22. REFERENCE 3 (POSITIVE)
23. REFERENCE 4 (POSITIVE)
24. DO NOT USE
25. DO NOT USE

NOTES:

- PROVIDE 12 TO 20 VOLTS AC BETWEEN PINS 2 AND 14
- PROVIDE .5 TO 6.3 VOLTS AC BETWEEN PINS 1 AND 15
- PIN 16 IS CIRCUIT GROUND AND ALL VOLTAGE LIMITS ARE WITH RESPECT TO PIN 16.
- PIN 3 MUST NOT EXCEED +200 VOLTS WITH RESPECT TO PIN 16
- PINS 8 TO 11 AND 20 TO 23 MUST NOT EXCEED <-12 OR >+12 WITH RESPECT TO PIN 16
- PINS 8 TO 11 MUST NOT EXCEED +/- 5 VOLTS WITH RESPECT TO PINS 20 TO 23
- SHUNT MAY BE CONNECTED IN POSITIVE OR NEGATIVE OUTPUT OF RECTIFIER, HOWEVER IT MUST NOT EXCEED +/- 200 V WITH RESPECT TO PIN 16