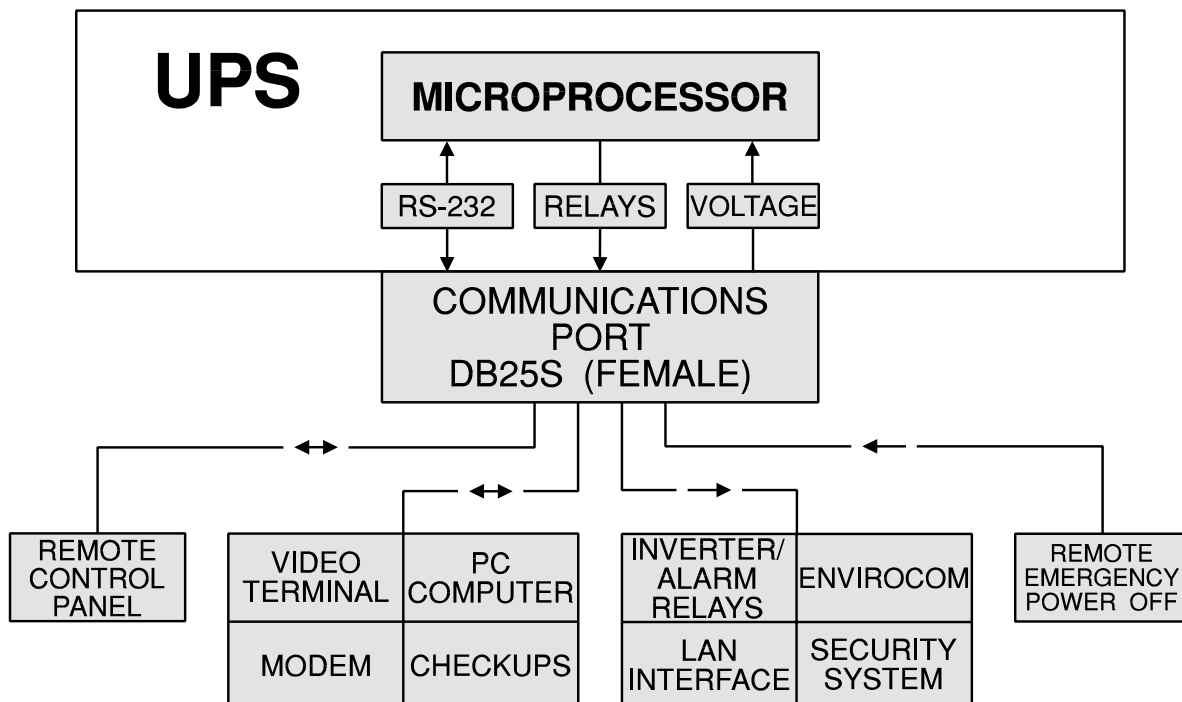# The RS232 Communication Port

This Technical Information Publication describes the UPS communications port capabilities and the port pin connections. It provides information for software versions through 6.10 for FD and RD models and through 7.11 for ME and RE models.

Introduction

The FERRUPS' sophisticated microprocessor monitors input and output power conditions, controls the unit's response to those conditions, and records significant responses. The microprocessor communicates with the user through the LED Status display lights and an audible alarm indicator. In addition, the user may communicate with FERRUPS directly and more completely by using the RS232 communications port. This port, standard on all units, is the gateway to the intelligent and interactive communication capabilities of the FERRUPS. These capabilities include the RS232 communications functions, the relay contacts and the Remote Emergency Power Off (REPO) feature. The figure below shows the FERRUPS unit and the external communications options or features, including CheckUPS software.

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The RS232 Communication Port

Contents Index

100 Communications Functions

The features described below are all available at the DB25S communications port located on the back of the UPS. All are available for use simultaneously as long as each feature is connected to the appropriate pins on the communications port. To use a combination of communications features, you must have a cable made to connect to the applicable pins. Read Section 200 for more information on the communications port.

RS232 Full Duplex Communications

A video terminal, a specially programmed personal computer (see Appendix E for program), or an optional remote control panel (RCP) is required for the RS232 communication feature. Your computer/terminal must have serial communication capability; computers must be capable of terminal emulation. An appropriate interface cable is required if you are using a video terminal or personal computer to communicate. See Sections 200 and 300 for more information.

The remote control panel comes complete with the cable and connector. Refer to the Technical Information Publication (TIP) that describes RCP operation.

The RS232 communication port permits changes in the UPS operating modes, metering calibration, alarm set points, battery charger settings and other functions. Regardless of the type of RS232 communication used, levels of communication access are secured by a password.

You can also use optional CheckUPS® software with your RS232 communication port to do an orderly shutdown of your equipment during a power outage, communicate with the UPS, monitor the UPS' operating status, do remote tests, or change UPS parameters.

Relay Contacts

The communications port is also the access point for the alarm relay and inverter relay contacts. These contacts can be used to activate an external alarm or indicator, and with an appropriate interface cable, control the shutdown of various computer networks. Refer to Section 201 for more information.

The optional environmental monitoring and communication devices (EnviroCom I and II) use the alarm and inverter contacts as an input source. The environmental monitoring option can communicate the status of alarm or inverter operation to a remote location via a telephone line. Refer to the TIP describing EnviroCom I and II operation for more information.

REPO Feature

The Remote Emergency Power Off (REPO) feature can be activated at the communications port. The REPO feature provides a way of quickly shutting off the UPS output when an external emergency power shutdown switch is turned off. See Section 202 for more information.

200 Communications Port Description

This section describes all the wiring connections which can be made at the UPS communications port and explains the function of each pin. Read this section if you are connecting any external terminal, computer or other optional device to the UPS.

Do not attempt to use RS232 communications features before reviewing Section 300. Figure 200 shows the pin functions on the UPS communications port.

Communications Port Pin Descriptions

Contact Opens On Alarm* — 25
Common Alarm Signal Contact — 24
Contact Closes On Alarm* — 23
22

Remote Emergency Power Off — 21
AS/400 Option — 20
19
+12V Level — 18
17
16
15
+12V, .5 Amp — 14

13 — Common Inverter On Signal Contact
12 — Contact Closes When On Inverter
11 — Contact Opens When On Inverter
10
9
8
7 — **Signal Ground** (RS232)
6 — +12V Level
5
4
3 — **Receive Data** (RS232)
2 — **Transmit Data** (RS232)
1
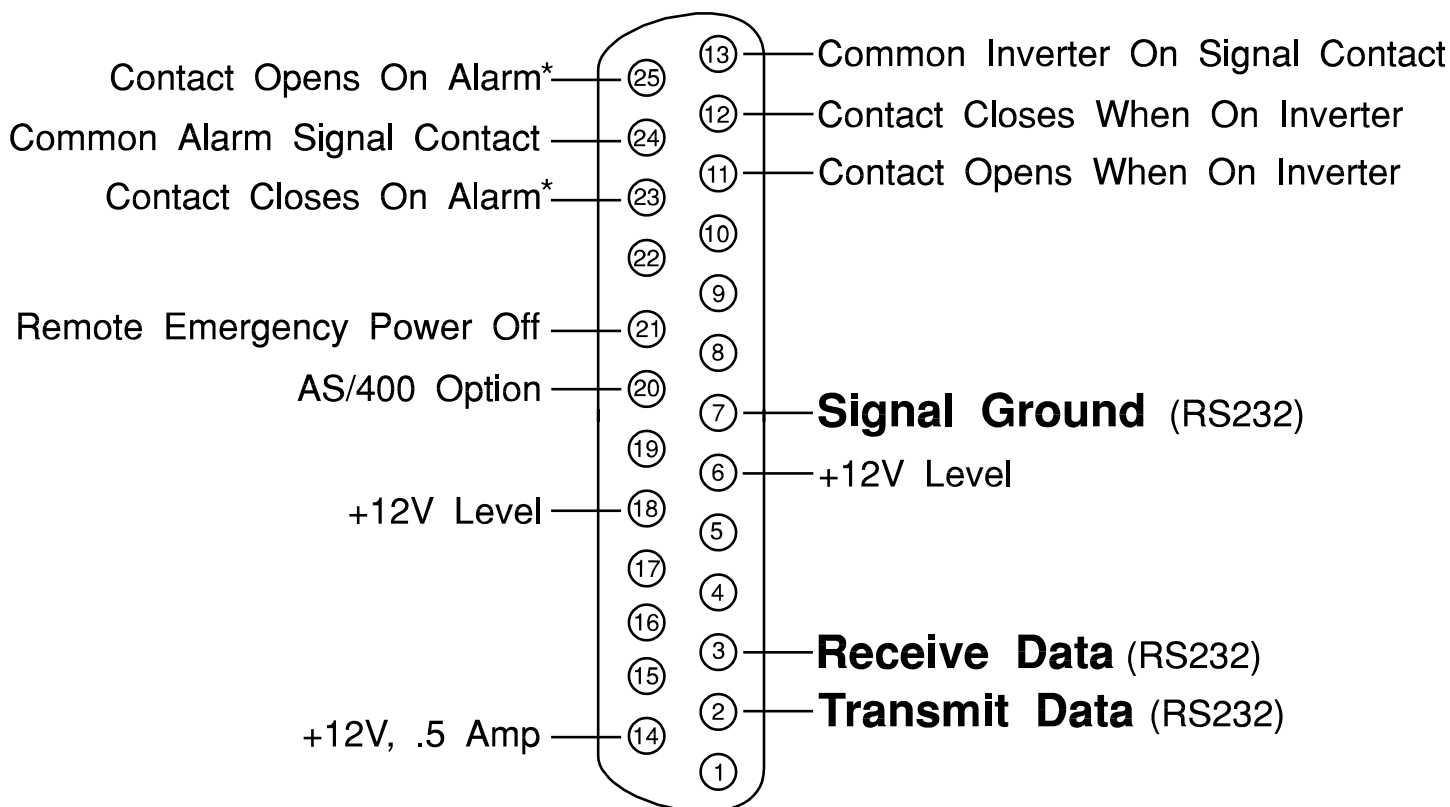
Figure 200

*Contact changes status when the UPS is turned off.

201 Relay Contact Information

The **Alarm Signal Contacts** are relay contacts (rated at 25 V AC/DC and 250 mA) that change state upon any alarm condition. Contacts that close on an alarm or when the UPS is turned off are available between pins 23 and 24. Contacts that open on an alarm or when the UPS is turned off are available between pins 24 and 25.

The **Inverter On Signal Contacts** are relay contacts (rated at 25 V AC/DC and 250 mA) that change state when the inverter turns on. Contacts that close on inverter operation are available between pins 12 and 13. Contacts that open on inverter operation are available between pins 11 and 13.

202 Remote Emergency Power Off

The **Remote Emergency Power Off** on pin 21 permits remote shutdown of the UPS. Computer rooms often include an external emergency shutdown switch that shuts down AC input power to all connected equipment. The emergency shutdown switch will stop AC input to the UPS (if the UPS input power is supplied through the emergency shutdown switch). However, without the REPO feature, the UPS will continue to provide AC output power to protected equipment until its batteries are depleted.

The UPS Remote Emergency Power Off feature shuts off AC output from the UPS to the protected equipment when the computer room emergency shutdown switch is activated. To shut down AC output, the external emergency shutdown switch must have a set of contacts which apply the +12 VDC level on pin 6 (or on pin 18) to pin 21. A momentary connection will shut down the UPS output and start the Shutdown Activated alarm. If this 12 VDC level remains connected to pin 21, the UPS cannot be restarted to provide AC output power. To start the UPS, break the connection between pins 6 and 21 (or between pins 18 and 21). Then, change the system mode at the keypad to restart.

The Remote Emergency Power Off operates differently in units with higher software versions. (To find your unit's software version, display parameter 40.)

Units with 6.07 or 7.05-7.06 Software
When the Remote Emergency Power Off feature has been activated, parameter 48 determines whether the UPS will shut down immediately or after a delay. If parameter 48 is set to 2>No (its default value), the UPS will shut down immediately. If parameter 48 is set to 1>Yes, parameter 39, EPO Delay, determines the number of seconds from the time the REPO switch is activated until the UPS shuts down. After the shutdown, units with a keypad and units communicating with a terminal will display "Shutdn Activated."

To start the UPS, break the connection between pins 6 and 21 (or between pins 18 and 21) at the RS232 port. Then, change the system mode at the keypad to restart.

Automatic Restart: To permit the UPS to restart automatically following a REPO shutdown, set parameter 48, EPO Rst, to 1>Yes. Then, when the connection between pins 6 and 21 (or 18 and 21) is broken, the UPS will restart if AC input line is present and the DC battery voltage is above the low battery figure. The default value for parameter 48 is 2>No; the UPS will not restart automatically if parameter 48 is set to 2>No.

Units with 6.08 or 7.07 and higher Software
Parameter 48, EPO Mode, determines how the Remote Emergency Power Off will operate. This parameter has three settings:

0   The UPS will shut down as soon as the Remote Emergency Power Off signal has been applied. (The UPS will not delay shutdown.)

1   The UPS will shut down after the number of seconds shown in parameter 39. (Normally parameter 39 is set to 20 seconds.) After 60 seconds, the UPS will automatically restart if the input line voltage is acceptable and the connection between pins 6 and 21 (or 18 and 21) has been broken at the RS232 port.

2   The UPS will only shut down if it is running on inverter. When the UPS runs on inverter, it delays shutdown 20 seconds (or the number of seconds shown in parameter 39). After 60 seconds, the UPS will automatically restart if the input line voltage is acceptable and the connection between pins 6 and 21 (or 18 and 21) has been broken at the RS232 port.

203 +12 Level

The **+12 Level** is on pins 6 and 18 and is a voltage suitable for setting an external logic level 1. This may be used to set a fixed input logic level on an external device. This voltage is present any time the UPS is operating.

Pin 14 has +12 Volts DC at .5 ampere available. This 12-volt DC source is for BEST option use only. Do not use it for setting a logic level, and do not connect it to any external terminal or other device.

204 RS232 Connections

Standard RS232 connection points are found on Pin 7 (signal ground), Pin 3 (receive data), and Pin 2 (transmit data). See Section 300 for detailed information on RS232 communications capabilities.

300 RS232 Communications From a Terminal or Computer Console

Pins 6, 10, 11, 12, 13, 14, 18, 21, 22, 23, 24 and 25 on the UPS communications port are for diagnostic or BEST option use only. Do not connect these pins to the EXTERNAL DEVICE (terminal, computer, etc.) via the RS232 (communications) port. See Section 200 for more pin information on the other communications functions.

DO NOT USE 25 CONDUCTOR STRAIGHT THROUGH CABLE. The communications port has some pin connections which are for use with options other than the standard RS232 connections.

Connect the UPS RS232 interface to the external terminal or computer according to one of the connection diagrams in Section 301. Construct your own high-quality shielded cable using the applicable wiring diagram.

IMPORTANT INFORMATION

The signal ground, which is connected to Pin 7 on the computer or terminal through the cable, acts as the reference ground for the other RS232 signals. Within the UPS there is no connection between protective (chassis) ground and the signal ground. Although the computer or terminal may or may not have these two signals common, they must not be connected together when the terminal or computer is connected to the UPS. Any jumper connection between Pin 7 (signal ground) and Pin 1 (chassis ground) should be removed prior to connecting the unit to the UPS. See the RS232 cable connection diagrams in Figures 301-1 and 301-2.

⚠ WARNING

Do not make connections to the RS232 communications port if the UPS is connected to a positive ground battery system. The RS232 ground must be isolated or equipment damage will result. For assistance, call BEST's Technical Support Center at 800-356-5737 or call your local BEST office.

---

301 RS232 Cable Connections to a Computer or Terminal

Computer DB9 to UPS

DB9
TO COMPUTER
(DCE)

DB25P (MALE)
TO FERRUPS
(DCE)

TD 2
RD 3
DCD 4
SG 5
DTR 6
RTS 7
CTS 8

3 ———— 2
2 ———— 3
5 ———— 7
1
4
6
7
8

2 TD
3 RD

7 SG

Figure 301-1

Computer DB25 to UPS

DB25
TO COMPUTER
(DTE)

DB25P (MALE)
TO FERRUPS
(DCE)

TD 2
RD 3
RTS 4
CTS 5
DSR 6
SG 7
DCD 8
DTR 20

2 ———— 2
3 ———— 3
7 ———— 7
4
5
6
8
20

2 TD
3 RD

7 SG

Figure 301-2

MODEM DB25 to UPS

DB25
TO MODEM
(DCE)

DB25P (MALE)
TO FERRUPS
(DCE)

TD 2
RD 3
RTS 4
CTS 5
SG 7

2   2
3   3
4
5
7 ———— 7

2 TD
3 RD

7 SG

Figure 301-3
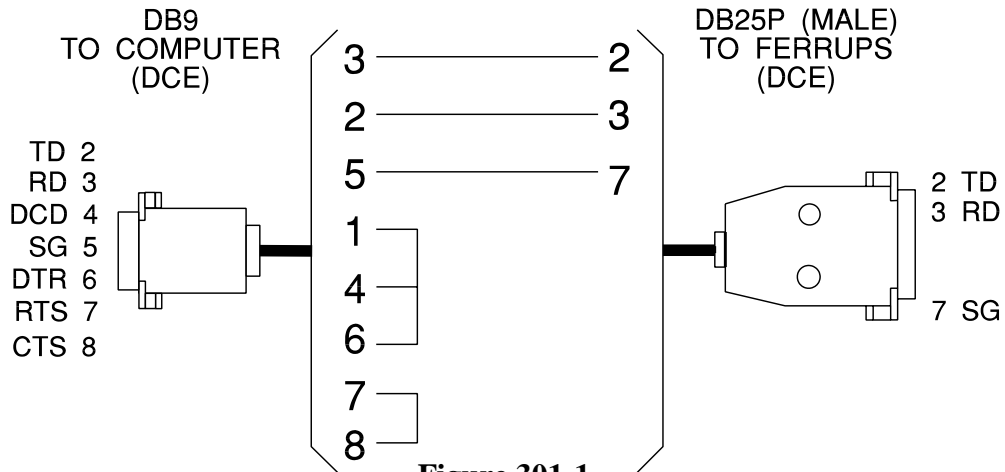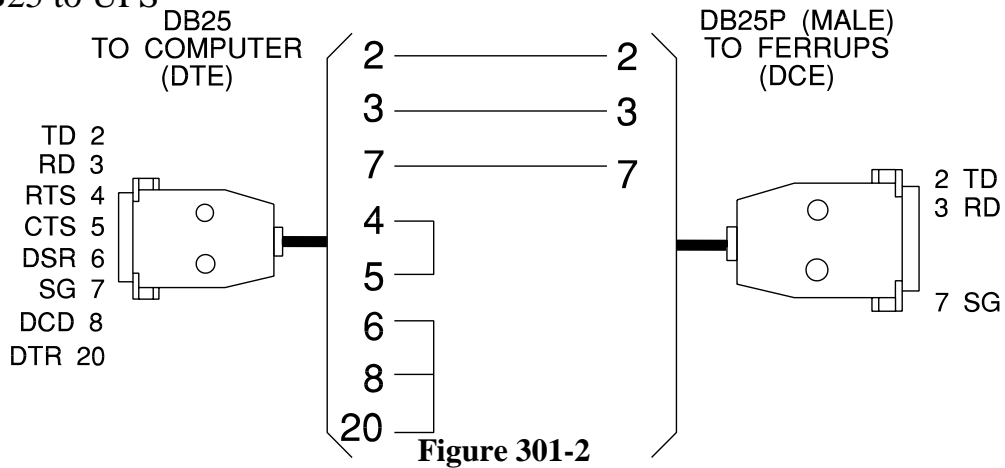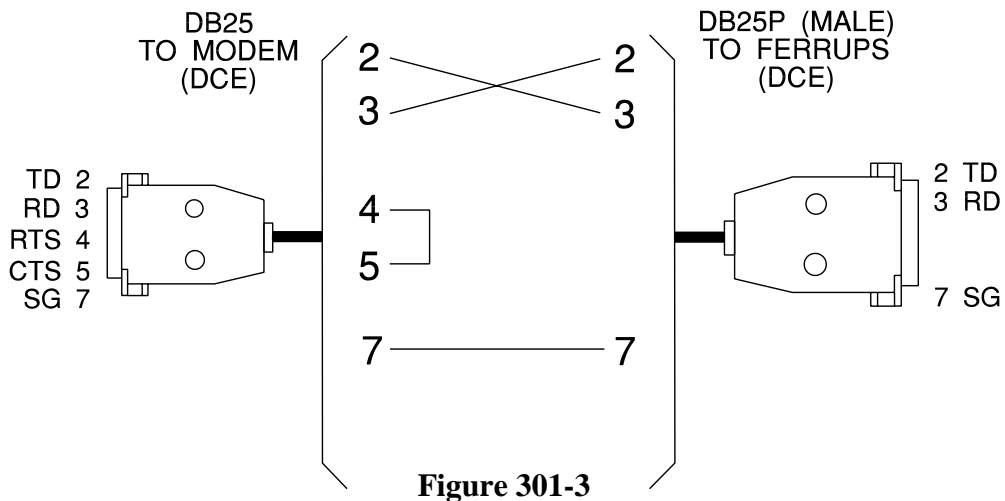
302 UPS RS232 Technical Specification Summary

CONNECTOR: 25 pin D (female) wired as DCE.
FORMAT: ASCII 8 Data bits. 1 stop bit.
Most Significant Bit set to 0.
BAUD RATE: 300, 1200, 4800, or 9600 selectable. (Contact BEST's Technical Support to change BAUD if you cannot communicate with the UPS at the factory setting of 1200 BAUD.)
PARITY: None.
DUPLEX: Full.

303 Preparing to Communicate from a Computer, Terminal or MODEM

The computer or terminal must provide a mechanism that sends commands typed on a keyboard to the UPS and sends responses to the user's CRT screen. This is easy with a standard terminal because a terminal is dedicated to this function. However, if you are connecting a computer to communicate with the UPS, the computer must be capable of terminal emulation. Programs are often included with the computer or the purchase of a serial interface card. Before using an emulation program, you must often set such things as BAUD rate and data format. Some computers do this with hardware (switches), and others with software (such as MODE COM1:1200 N, 8, 1 for MS-DOS users).

To proceed, you must install the UPS according to instructions in the User's Manual and the Installation Manual. The computer or terminal should receive its AC line input from the UPS. Connect the RS232 cable (with pin connections wired as shown in Figure 301-1 or 301-2) between the UPS and the terminal or computer. You can then switch on the terminal/computer and (if necessary) start the terminal emulation program. When you first switch the computer/terminal on, the UPS will send a sign-on message followed by a prompt after a few seconds. Press RETURN a few times to make sure that the UPS responds to keyboard input.

MODEM Use: The MODEM should be configured (via dipswitch or other means) to ignore the state of all RS232 lines except RxD and TxD. Many modems use Pin 20 as a reset (DTR). See Figure 301-3.

NOTE: The sending of result codes must be disabled on the modem attached to the UPS. If you do not disable result codes, communication will be inconsistent.

As shipped, the UPS is set up for serial communication at 1200 BAUD using 8 data bits per character, one stop bit and no parity. The UPS echoes all characters sent to it; therefore, the computer or terminal should be operated full duplex. All alphanumeric data transmitted by the UPS is sent in uppercase, seven bit ASCII with the eighth most significant bit (MSB) set to 0. The UPS strips the MSB of data received. (When the UPS echoes characters, lowercase characters are converted to uppercase).

304 Console Prompts

The Command Processor prompt (=>) indicates that the UPS is ready to accept a command input from the console device. The prompt varies according to the password level present in the system. All prompts are preceded by a carriage return (ODh)*, linefeed (OAh) sequence. Refer to Section 308 for more information on passwords and access codes. To enter a password, see the information on the "PW'n'" command in Section 307.

=>	Normal Command Processor prompt
User =>	Indicates presence of User Password
Serv =>	Indicates presence of Service Password

305 Entering a Command from the Console

The Command Processor echoes each character typed at the input line, meaning that the console should be set for FULL DUPLEX operation. Some simple editing of the input line is supported. A backspace (O8h)* or CTRL-H may be typed to delete the last character entered. A CTRL-X (18h) may be typed to cancel the entire input line. All commands must be followed by a carriage return (ODh). Commands may be entered in upper- or lowercase. See Section 307 for a summary of prompts and commands.

*Entries in ( ) are hexadecimal code.

306 Suspending Console Output

To stop and start the display scroll, use the XON/XOFF software handshake feature to suspend the output to the console. This is particularly useful with commands such as PARAM that output more than one "screen" of information. Simply type CTRL-S to stop the console output for about one minute, and CTRL-Q to resume. One minute after you send a CTRL-S, communications will resume. **Remember to resume communications with a CTRL-Q before exiting the communications program or turning off the terminal.**

307 Alphabetical Summary of Available Console Prompts And Commands

FERRUPS Help Menu	NO	indicates no password required to enter command.
	U	indicates user password required. See PW in the table that starts on the next page.
	S	indicates service password required. See PW in the table that starts on the next page.

[   ] indicates an optional command; <   > indicates replace with an appropriate value. See Format information or the examples that accompany commands.

Entering one of the following commands at the console or terminal will display the information listed.

Passwords restrict access to the UPS Control and Program modes. See Section 308 for PW information.

PW Level	Command	Description
NO	A or ALARM	Lists the currently active alarm(s).
NO	AHELP	Lists all alarm messages, along with status and letter code and Morse code for each. Format: *Alarm Ltr Morse Code *Low Battery A ● – (Alarm codes A-P are listed.) The "*" in the first column is present only if the alarm is currently active.
NO	ALOG	Displays alarm log. See Section 309 for more information.
NO	AMASK	FD units with 6.08 or higher software only. Enables and disables alarms. To display whether alarm is enabled, type AMASK, a space, and the alarm letter. To enable or disable the alarm, type AMASK, the alarm letter and + to enable the alarm or – to disable it. Example: To display whether Alarm A is enabled, type AMASK A. To enable Alarm A, type AMASK A +.
S	ATEST	Invokes user test alarm (alarm code J). ATEST C cancels user test alarm. If optional CheckUPS® software is in use, UPS may shut down after two minutes on this alarm when running on inverter. Check CheckUPS software documentation.
	ATEST C	Cancels user test alarm.
NO	AUTOLOG	7.11 and higher software only. Typing AUTOLOG alone shows the current values for Search 1 (S 1). Response 1 (R 1), Search 2 (S 2), and Response 2 (R 2).
	AUTOLOG S 1 <"String"> and AUTOLOG R 1 <"String">	Using both commands allows the UPS to automatically log on to the host system that it is connected to. To instruct the UPS to recognize the host system's search string, enter AUTOLOG S 1 <"String">, where "String" is the exact string that the host system uses to search for a UPS. To instruct the UPS to respond to the search string, enter AUTOLOG R 1 <"String">, where "String" is the response that the host system uses to identify a UPS. To add a carriage return to the end of the string, end the string with ^M. Example: If the host system sends the string "PLEASE LOG IN" to search for a UPS and requires the response string "UPS SYS 1^M" to recognize the UPS, enter AUTOLOG S 1 "PLEASE LOG IN" and AUTOLOG R 1 "UPS SYS 1^M".
	AUTOLOG S 2 ["String"] and AUTOLOG R 2 ["String"]	These commands have the same function as AUTOLOG S1 and AUTOLOG R 1, which are described above.

PW Level	Command	Description
U	BTEST	Performs battery test over a period of several minutes. This test automatically runs the inverter test and runs the inverter for one minute. The test will end automatically, then the "Batt Test Done" message will appear. An alarm will sound if the unit does not pass the test.
NO	CLRPW	See PW to set passwords. CLRPW removes the password level; it resets password level to 0 or none.
NO	DATA	
	DATA X	Outputs AC line and reference table at time of last Inverter start.
	DATA R	Output of present reference table.
	DATA L	Output of present AC line samples. **DATA is a generic 64 point ASCII output for use with external plot programs.**
	DATA 1	AC output voltage.
	DATA 2	AC input voltage.
	DATA 3	AC output current.
	DATA 4	DC input current. **Generic 32 point ASCII output for use with external plot programs. Three data numbers can be entered at the same time; however, Data 2 can only be entered alone.** *Example: DATA 1 3 4*
NO	D or DISPLAY	Display function. Format: D [<start#> <end#>]. *Example: D 1 12*
NO	DATE or TIME	Displays system time and date.
NO	F	Returns 80 characters of fixed-field status information for use with programs that monitor the UPS state. See Appendix D for details.
NO	H or HELP	Displays list of available console commands (this list).
NO	I or IDENTIFY	Displays copyright message, software version and model number.
U	ID	Displays unit ID.
S	ID [<ID>]	Changes unit ID. Up to 16 characters can be entered. *Example: ID MICRO*
NO	ILOG	Displays inverter log. See Section 309 for more log information.
U	ITEST	Performs inverter test. Test will end automatically.
NO	L or LOG	Prints both alarm and inverter logs.
U	OFF [<time>]	Timed shutdown facility (time is in seconds). Allows operator to conduct shutdown of computer and then the UPS from the computer console. *Example: OFF 60*

PW Level	Command	Description
U	OFF [<time>] A	Timed shutdown facility with auto restart when power returns.
U	OFF C	Cancels timed shutdown.
NO	P or PARAM	Displays list of system parameters. See Appendix B for detailed listing.

NO	PLOT
	
	    PLOT X
	
	    PLOT R
	
	    PLOT L
		
		Outputs AC line voltage and AC reference table voltages at time of last inverter startup point.
		
		Reference table.
		
		Present AC line samples.
		
		64-point ASCII plot for use with terminals. See Appendix A for sample PLOTs.

	PLOT 1
	
	    PLOT 2
	
	    PLOT 3
	
	    PLOT 4
		AC output voltage.
		
		AC input voltage.
		
		AC output current.
		
		DC input current.
		
		32-point ASCII plot for use with terminals. Two plots (1, 3, or 4) can be entered at the same time; however, Plot 2 can only be entered and shown alone.
		Example: PLOT 1 3
		See Appendix A for sample PLOTs.

NO	PR or PROGRAM	Enters "program" mode, where parameters can be set if password permits. Format: PR <par.#> <value>.
		
		    To change the time, parameter 0, to 8:15 a. m.: *Example: PR 0 815*
		
		    To change to 1:30 p.m.: *Example: PR 0 1330*

NO	PW[<n>]	To enter a password, enter PW and a 1-4 digit number (with no spaces). If the number matches one of the internally stored passwords, that password level will be activated. It can be removed with the CLRPW command or simply by entering "PW" without a #. The USER password is 377. The SERVICE password is 2639. *Example: PW377*
U	SHUTUP	Disables audible alarm.
NO	SMODE [<mode>]	Displays and optionally changes system mode. Typing SMODE with no parameter displays the current system mode (Off, Auto, LnCond or InvRun). Typing a single character will then specify a new system mode: F=Off, A=Auto, L=LnCond, I=InvRun. *Example: SMODE A (changes mode to AUTO).*
NO	S or STATUS	Displays date, time and system status. System mode, Alarm enable on/off, and inverter status are shown. Alarms, if any, appear next. Parameters 0 through 9 and 11 (.) are then displayed.
U	UNSHUTUP	Enables audible alarm.

308 Password Information

You can set up the Control mode so that a user password is required to turn the system off or on (or perform some other control functions) from the remote computer or terminal. You can also set the Control mode so that no password is needed to perform some control functions. This restriction can be applied or removed by someone who knows the service password. For more information refer to Parameter 80 in the Parameter Table, Appendix B.

Refer to the PW command in Section 307 for instructions on entering the user or service password.

The User Password is 377.

The Service Password provides access to control and program Parameters. It is 2639.

Parameters and their Password levels are in the Parameter Table in Appendix B. The password levels determine whether the parameters may be altered by the user or are limited to service use only.

309 Logs

The inverter and alarm logs record events so they can be checked later. Both logs contain such information as time, date and type. See Section 307, Summary of Available Console Prompts and Commands, for more information on how to display the logs.

309-1 Inverter Log

When you type ILOG, you will see:

=>ILOG

02/05	14:32	00:11:10	L *
Month Day Inv. Start	Time Inverter has run.	Hours; minutes; seconds	Inverter code (See list below)

*Indicates condition still exists when displayed from terminal only.
(Seconds displayed from terminal only.)

Inverter Log

C	Battery Test	(indicates battery test has activated inverter)
B	Brownout	(indicates AC input voltage low)
L	Line Loss	(indicates inverter started due to line loss)
M	Manual	(indicates inverter was started manually)
F	Frequency	(indicates AC input line frequency high or low)
R	Reset	(indicates DC reset)

309-2 Alarm Log

The other log is the Alarm log It is recorded parameter 25.

When you type ALOG, you will see:

=>ALOG

02/05	10:17	00:01:26	B *
Month Day	Time	Hours; minutes; seconds alarm has sounded.	Alarm Code (See codes below.)

*Indicates condition still exists when displayed from terminal only.
(Seconds displayed from terminal only).

Alarm Audio Code

A ● –   Low Battery
B – ● ● ●   Near Low Battery
C – ● – ● High Battery
D – ● ●   Low Run Time Left
E ●   Low AC Out
F ● ● – ● High AC Out
G – – ●   Output Overload
H ● ● ● ●   High Ambient Temp

I ● ●   Heatsink Overtemp
J ● – – –   User Test
K – ● –   Reserved
L ● – ● ● Check Cooling
M – –   Check Battery
N – ●   Check Inverter
O – – –   Memory Check
P ● – – ● Shutdown Activated

400 Control Panel

The control panel is standard on FD and RD units and optional on ME and RE units; additional panels may be ordered for FD units as options. The control panel adds great flexibility of application to MICRO-FERRUPS units. The control panel is about the size of a pocket calculator; it has a 16-character keypad, vacuum fluorescent display, three status lights and audible alarm. It operates at a baud rate of 1200.

The control panel is especially helpful where the UPS is some distance from the operator. It provides the operator with nearly the same communications capability that a computer terminal would provide. This is a real asset when space is at a premium.

Working with a MICRO-FERRUPS UPS, the control panel can display AC input and output voltages, load VA, battery voltage, AC current out, line frequency and other vital power parameters. In addition, when the AC line power fails, it's reassuring to know the projected run time available on the battery. The control panel also provides an audible alarm when there is an alarm on the UPS.

Refer to the TIP that describes Remote Control Panel operation for additional information. The control panel that is standard on FERRUPS units is described in the FERRUPS' User's manual.

Of course the control panel permits operating mode changes and even allows the adjustment of alarm and other set points. This is especially helpful with unusual line voltage problems.

500 EnviroCom™ I and II Options

This section describes the **EnviroCom I** and **EnviroCom II** options for FERRUPS uninterruptible power systems. Both EnviroCom units will work with any FERRUPS unit with alarm contacts (alarm contacts are standard on all FERRUPS models.)

EnviroCom I and EnviroCom II give the FERRUPS the ability to send messages in case of an alarm condition, and both permit calling in to check on the FERRUPS' alarm conditions and operation. In addition, EnviroCom I and EnviroCom II can provide the following information on your office environment via your telephone line:

1. Monitors whether your electricity is on.
2. Monitors whether the temperature at the EnviroCom's location is within the limits that you have preset.
3. Monitors FERRUPS alarm condition. The UPS' "Alarm" relay contacts can activate the EnviroCom when there is an alarm condition.
4. Monitors two other conditions of your choice, such as basement water level, a door opening, or the temperature at a remote location.

EnviroCom I and II can make you aware of problems in the following ways:

5. Will automatically call you or any one you designate and state what the problem is in **ENGLISH**. Up to four parties will be called in sequence until the warning message is received and acknowledged.
6. Allows you to call your unattended home or office from any telephone anywhere; EnviroCom will state the status of every monitored condition.
7. Allows you to "listen" to your home or office through its built-in microphone. You may be able to identify which UPS alarm is on by listening for the alarm code letter. This will only work if the EnviroCom is near the UPS.
8. Battery Backup — EnviroCom uses a battery backup so that the unit will operate fully for up to 15 hours if the power fails.

EnviroCom I
EnviroCom I also offers these features:

1. Monitors unusual audible sounds such as smoke alarm or burglar alarm.
2. Automatic Dialer — Up to four frequently called telephone numbers can be automatically dialed.
3. Time — States the correct time in **ENGLISH** at your command.
4. Temperature —States the temperature in **ENGLISH** at your command.

EnviroCom II
EnviroCom II includes a **built-in 1200 baud modem** that lets you

1. Control the FERRUPS from a remote computer or terminal.
2. Set the EnviroCom II to automatically transmit a data message to a remote computer.

600 Changing Baud Rate

If you are going to use a terminal or computer that uses a baud rate other than 1200, you must change the UPS baud rate from 1200 to the desired value. Optional values for baud rate are 300, 1200, 4800, and 9600. **Important Note: If you are using the optional Remote Control Panel, it will not operate if the baud rate is changed from 1200.**

If you have connected a terminal or computer console to the RS232 port and are communicating with the UPS, changing the baud rate is simple.

For example, to change to a baud of 300:

Refer to Section 307 (Summary of Available Console Prompts And Commands) to enter the PROGRAM mode; then, change Parameter 78 from "2>1200" to "1>300."

If you cannot communicate with the FERRUPS via the RS232 port, contact BEST's Technical Support for instructions on how to change the baud rate.
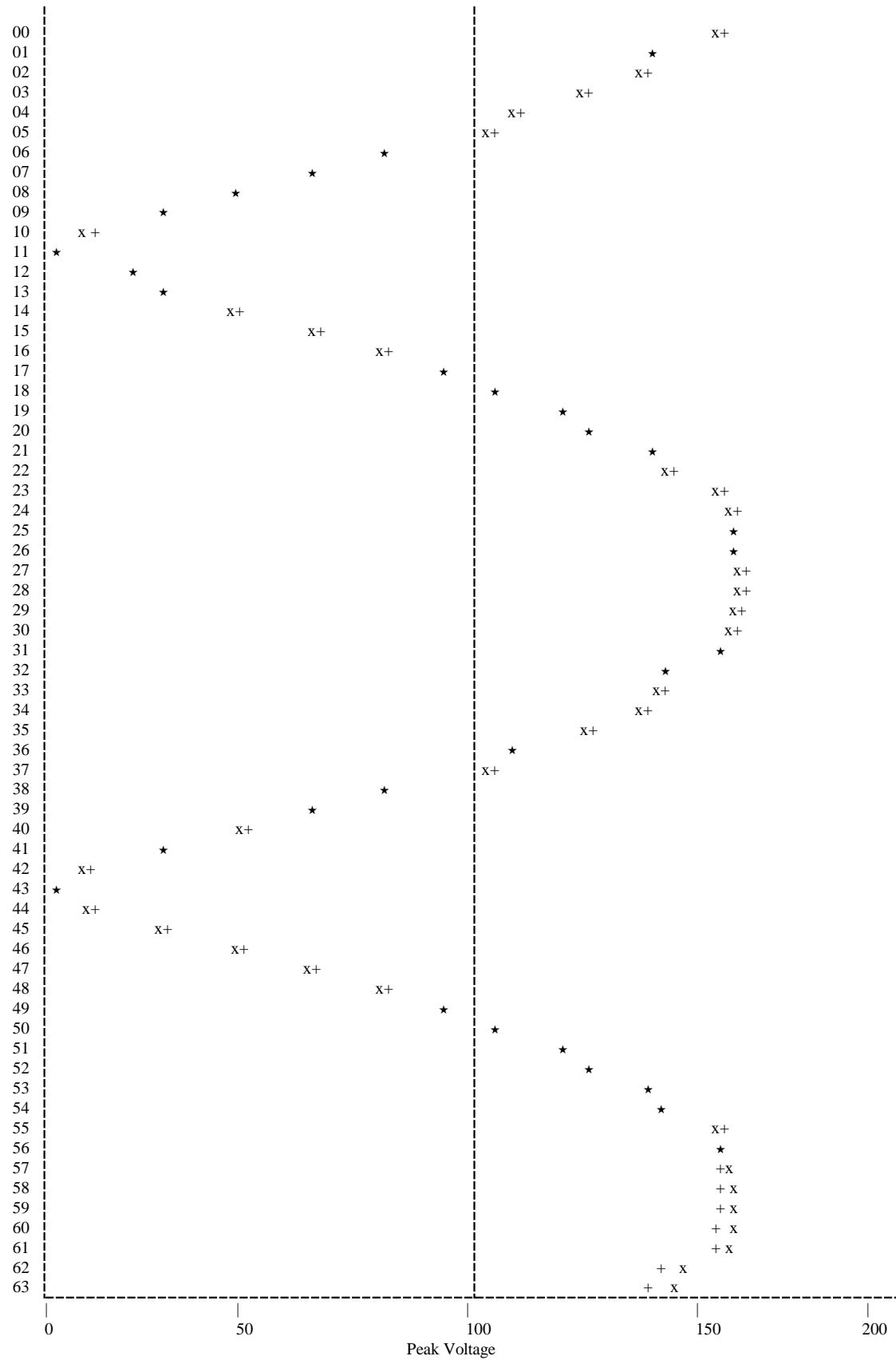
Appendix A: Sample PLOT Commands

PLOT x

```
diag=>plot x
Inverter Transfer Plot - Jun 14, 08:09 Type L
+ - Line sample, x - Reference sample, ★ - Both
```
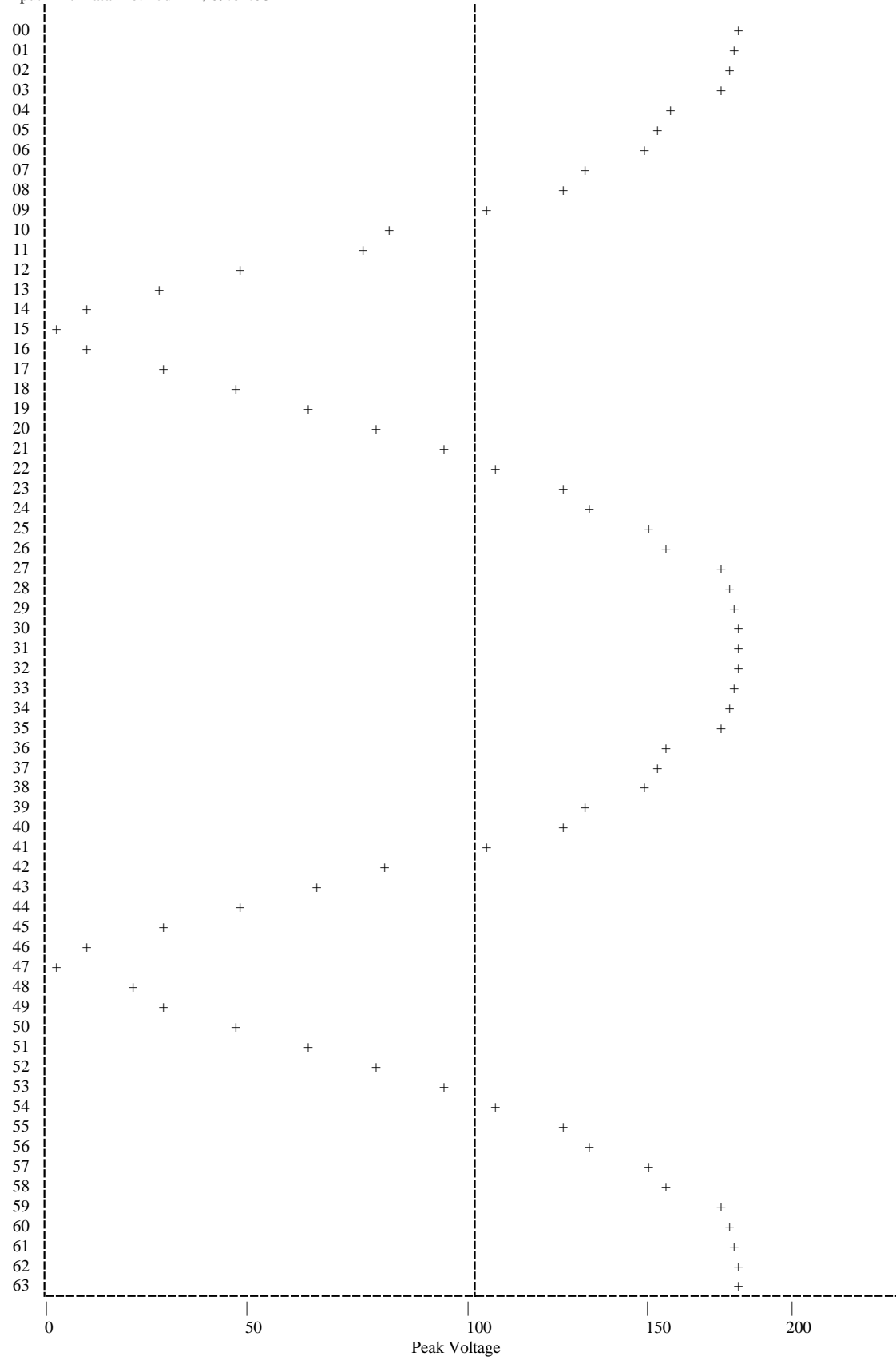

Peak Voltage

TIP 501   August 3, 1993

PLOT r

Peak Voltage
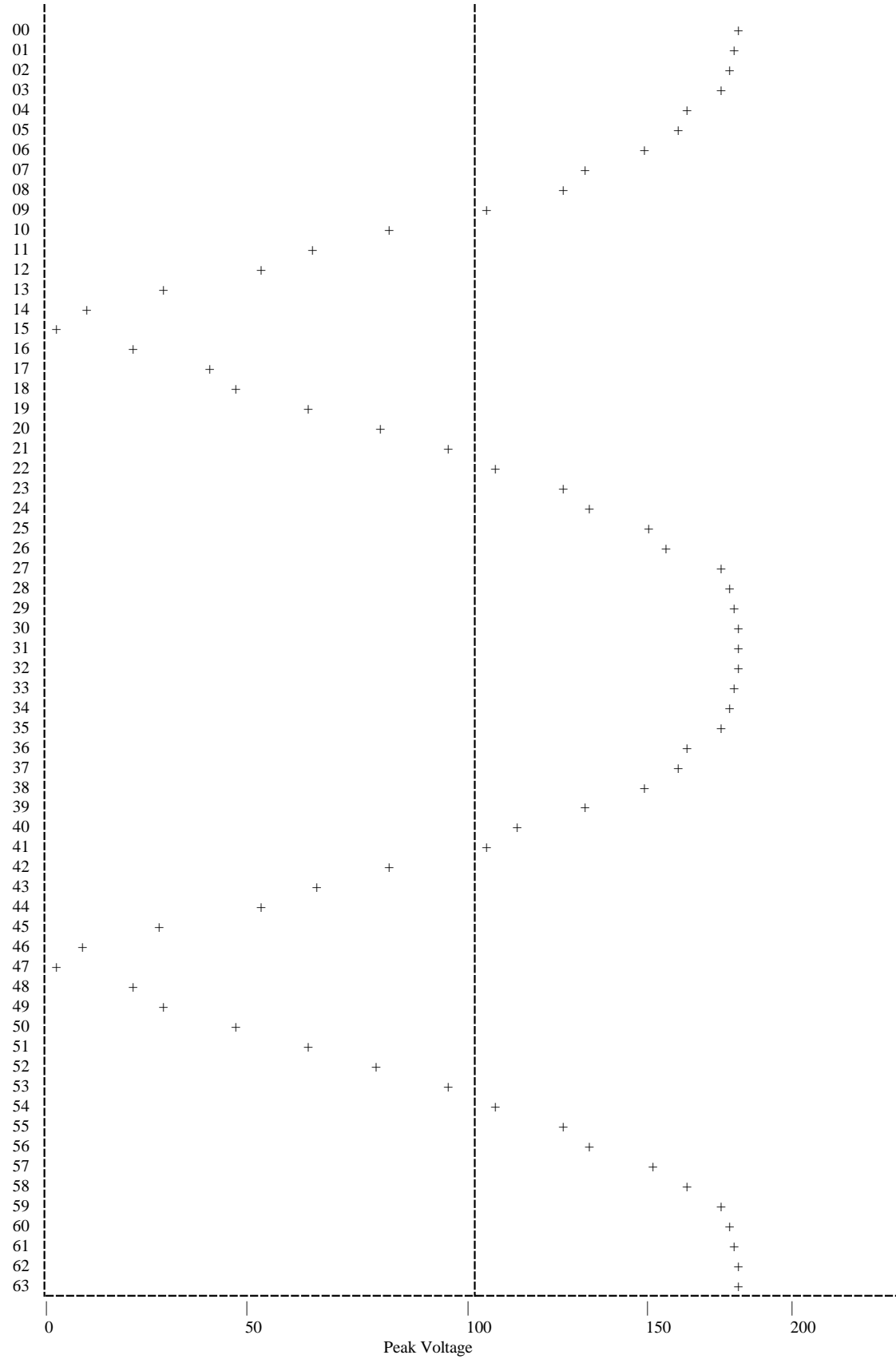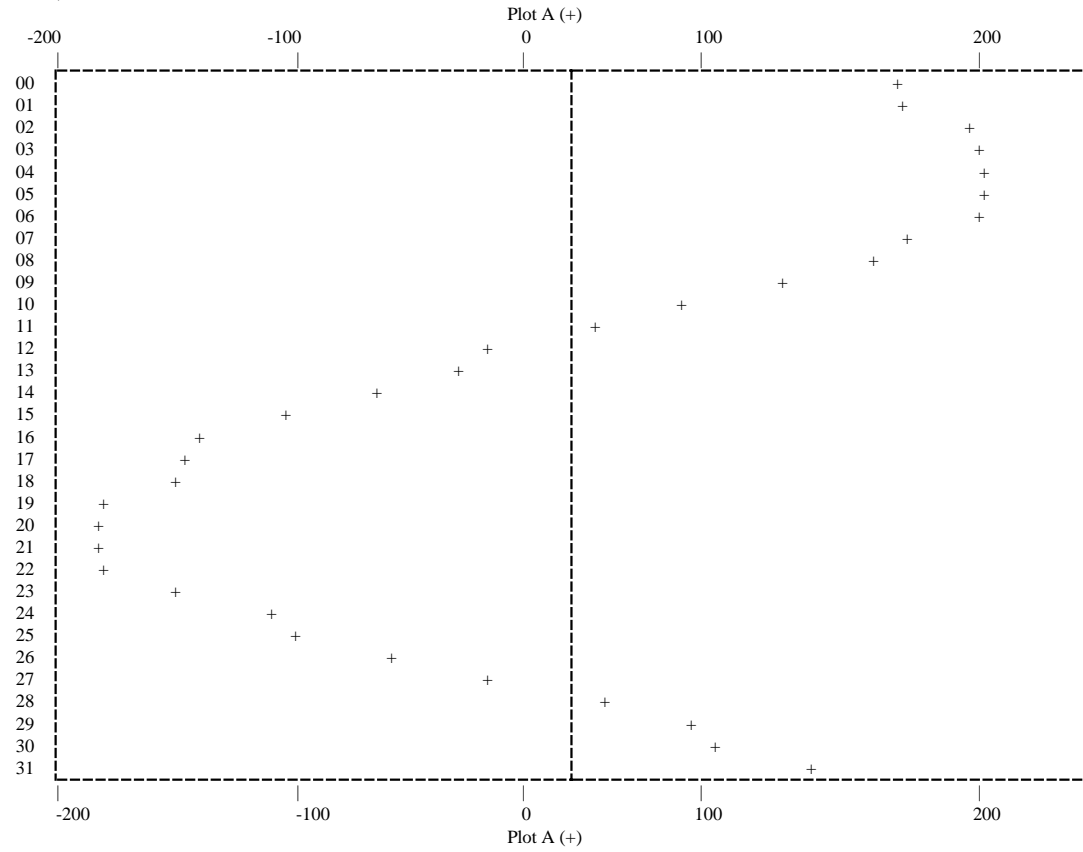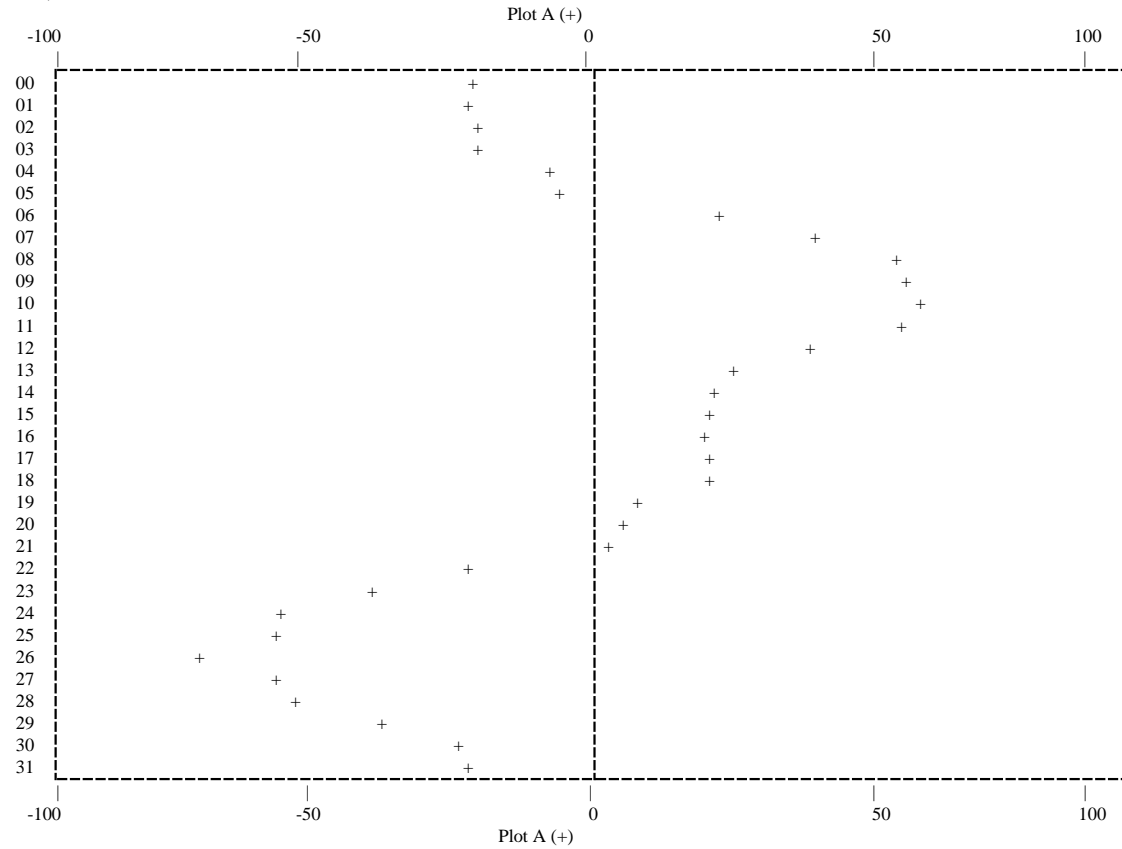
PLOT 1

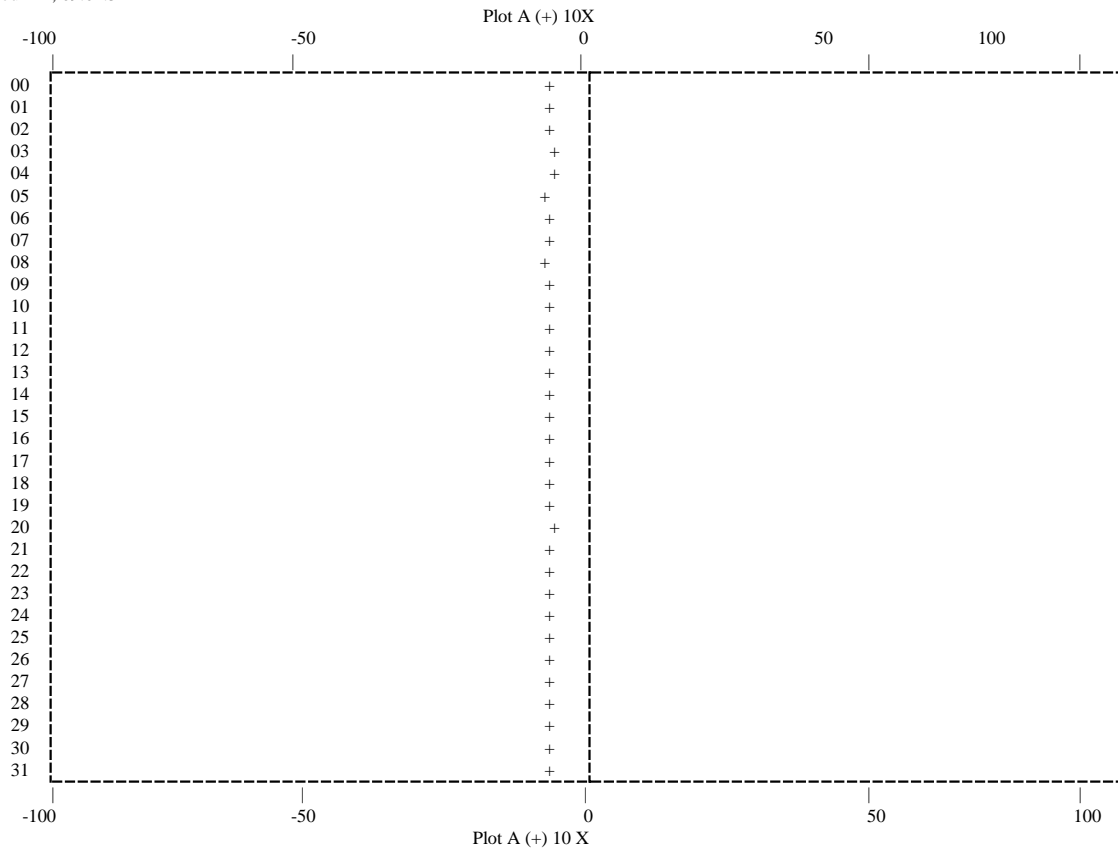# PLOT 2 & 3   Diag =>plot 2

PLOT A (+) - AC Input Voltage
Jun 14, 09:01:22
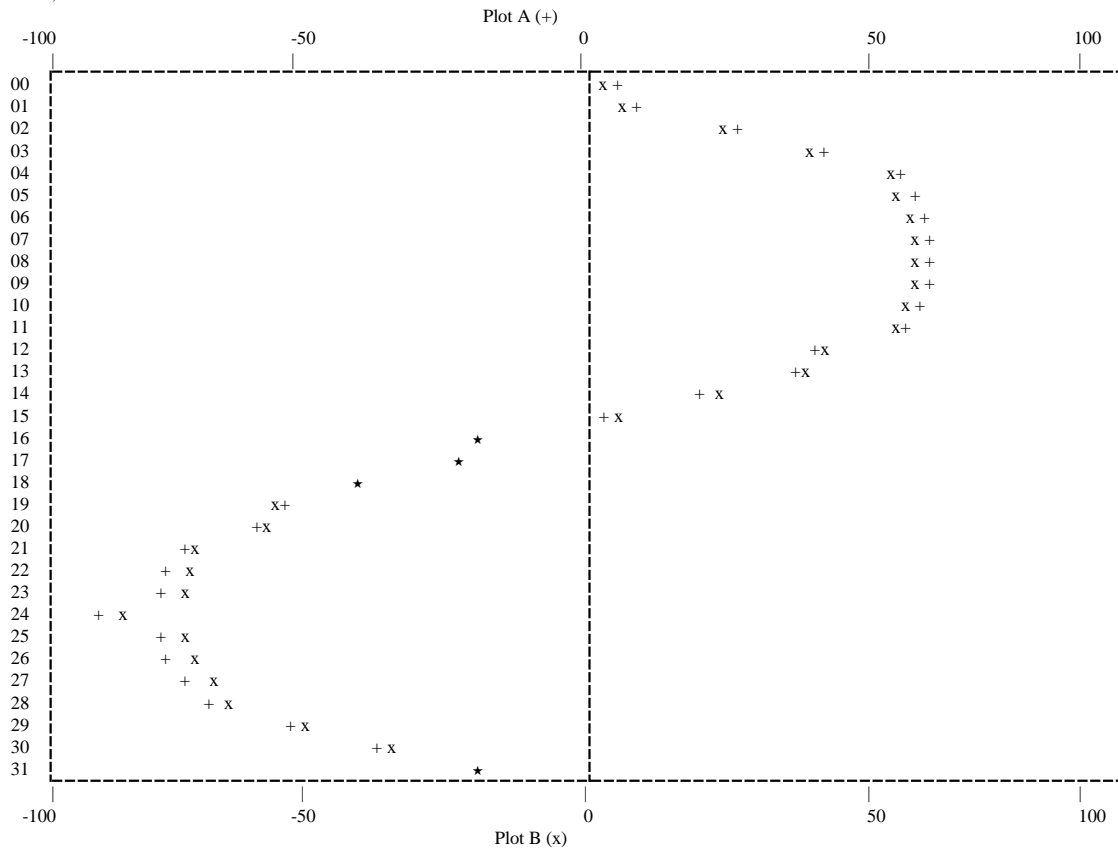

plot 3
PLOT A (+) - AC Output Current
Jan 1, 06:57:41

PLOT 4

Diag =>plot 4
PLOT A (+) - Battery Current
Jun 14, 09:01:34

Plot A (+) 10X

-100	-50	0	50	100

```
     -100            -50             0              50            100
00  |------------------------------------+-------------------------------------|
01  |                                    +                                      |
02  |                                    +                                      |
03  |                                     +                                     |
04  |                                     +                                     |
05  |                                    +                                      |
06  |                                    +                                      |
07  |                                    +                                      |
08  |                                    +                                      |
09  |                                    +                                      |
10  |                                    +                                      |
11  |                                    +                                      |
12  |                                    +                                      |
13  |                                    +                                      |
14  |                                    +                                      |
15  |                                    +                                      |
16  |                                    +                                      |
17  |                                    +                                      |
18  |                                    +                                      |
19  |                                    +                                      |
20  |                                     +                                     |
21  |                                    +                                      |
22  |                                    +                                      |
23  |                                    +                                      |
24  |                                    +                                      |
25  |                                    +                                      |
26  |                                    +                                      |
27  |                                    +                                      |
28  |                                    +                                      |
29  |                                    +                                      |
30  |                                    +                                      |
31  |------------------------------------+-------------------------------------|
     -100            -50             0              50            100
```

Plot A (+) 10 X

PLOT 1 3

Diag =>plot 1 3
PLOT A (+) - AC Output Voltage
PLOT B (x) - AC Output Current
Jun 14, 09:03:59

Plot A (+)

```
     -100            -50             0              50            100
00  |----------------------------------------x +--------------------------------|
01  |                                         x +                                |
02  |                                              x +                           |
03  |                                                 x +                        |
04  |                                                     x+                     |
05  |                                                    x  +                    |
06  |                                                      x +                   |
07  |                                                       x +                  |
08  |                                                       x +                  |
09  |                                                       x +                  |
10  |                                                      x +                   |
11  |                                                     x+                     |
12  |                                               +x                           |
13  |                                               +x                           |
14  |                                          + x                               |
15  |                                       + x                                  |
16  |                               ★                                            |
17  |                            ★                                               |
18  |                      ★                                                     |
19  |                 x+                                                         |
20  |               +x                                                          |
21  |           +x                                                              |
22  |         +  x                                                              |
23  |         +  x                                                              |
24  |     +  x                                                                  |
25  |        +  x                                                               |
26  |        +  x                                                               |
27  |         +   x                                                             |
28  |          +  x                                                             |
29  |               + x                                                         |
30  |                   + x                                                     |
31  |------------------★----------------------------------------------------------|
     -100            -50             0              50            100
```

Plot B (x)

Appendix B: Parameter Table

MICRO-FERRUPS/FERRUPS Help Menu   U   Indicates user password required.

                                        S   Indicates service password required.

                                        NC   Indicates no change permitted.

Passwords restrict access to the UPS Control and Program modes. See for PW information.

Sample display readings are for a FD4.3KVA with 240 VAC input and may vary with operating voltages, line frequency, and load.

PARAMETER NUMBER	SAMPLE DISPLAY	DESCRIPTION	RANGE	PASSWORD REQUIRED TO CHANGE
0	Time 07:04 am	System Time.	0000-2359	U
1	V In 239	AC Volts in.	ME: 000-300 FD: 000-500	S
2	V Out 120	AC Volts out.	000-300	S
3 (ME Units)	Reserved.			
3 (FD Units)	I In 009.1	AC Line Amps In.	000-300	S
4	I Out 006.3	AC amps out.	000-300	S
5	VA Out 01517	Volt-amperes out.	00000-99999	NC
6	I Batt 005	Battery current.	000-300	S
7	V Batt 051.9	Battery volts.	000-175	S
8	Freq 59.95 Hz	Incoming line frequency.	00.00-99.99	NC
9	RnTm 0005 Min	Estimated battery runtime remaining.	0000-9999	NC
10	Date May 07	System date.	0101-1231	U
.(11)	Amb Temp 023C	Ambient temperature.	000-999 ($^\circ$C)	NC
12	HS Temp 036C	Heatsink temperature.	000-999 ($^\circ$C)	NC
13	Reserved.			
14	ID Number: FD4.3KVA00001	Serial number.	Up to 16 alphanumeric characters (no display if value not entered).	S
15	Model Number FD4.3KVA	Model Identifier.	ME500VA, ME700VA, ME850VA, ME1.15KVA, ME1.4KVA, ME1.8KVA, ME2.1KVA, ME3.1KVA, FD4.3KVA, FD5.3KVA, FD7KVA, FD10KVA, FD12.5KVA, FD18KVA, RE850VA, RE1.15KVA, RE1.4KVA, RE1.8KVA, RE2.1KVA, RE3.1KVA, RD4.3KVA, RD7KVA	NC

PARAMETER NUMBER	SAMPLE DISPLAY	DESCRIPTION	RANGE	PASSWORD REQUIRED TO CHANGE
16	FullLoad% 050	Percentage of system load capacity used.	000-999	NC
17	Watts 01554	Watts.	00000-99999	NC
18	PF 1.00 ---- (Less than .98: "----" will be replaced by Lead, Lag, or Dist)	Power Factor.	1.00-0.00	NC
19	VALimit 03000	VA Limit. (This varies up to the full VA rating of the unit depending on the type and size of load.)	00000-99999	NC
20	#Pwr Out 0005	Number of power outages.	0000-9999	NC
21	#Ovr Lds 0001	Number of output overloads.	0000-9999	NC
22	Sys Hrs 00027	Total system ON hours (accumulates whenever power switch is ON).	00000-99999	NC
23	InvMin 0015.7	Number of minutes inverter has run.	0000.0-9999.9	NC
24	Inverter Log	Record of reason for inverter run. (See Log section — Section 309.)	No range.	NC
25	Alarm Log	Record of reason for alarm. (See Log section — Section 309.)	No range.	NC
26	Reserved.			
27	Low Vout 108	Low volts-out alarm setpoint. (AC voltage out and Low Vout setpoint for that voltage: 100 V=90, 110 V=99, 115 V=104, 120 V=108, 200 V=180, 220 V=199, 230 V=207, 240 V=216.)	090-300	S
28	High Vout 130	High volts-out alarm setpoint. (AC voltage out and High Vout setpoint for that voltage: 100 V=108, 110 V=119, 115 V=125, 120 V=130, 200 V=217, 220 V=238, 230 V=249, 240 V=260.)	100-300	S
29	LowBatt 041.0	Low Battery voltage alarm (shutdown) setpoint.	000-175	NC
30	NLBatt 044.0	Near Low Battery volts setpoint.	000-175	S
31	Hi Batt 059.6	High battery DC setpoint.	000-200	NC
32	L RnTm 05 Min	Low runtime alarm setpoint.	00-99	S
33	A Otemp 060C	Ambient over-temperature (alarm) setpoint.	25-60 (°C)	S
34	AT Shdn 070C	Ambient Temperature shutdown.	25-80 (°C)	S
35	S Otemp 095C	Heatsink over-temperature (alarm) setpoint.	050-110	NC
36	Reserved.			
37	Reserved.			
38	Off Cnt 0000	Time to off. Entering number starts countdown (in seconds).	0000-9999	U

PARAMETER NUMBER	SAMPLE DISPLAY	DESCRIPTION	RANGE	PASSWORD REQUIRED TO CHANGE
39	EPO Dly 0020	Delay (in seconds) before Remote Emergency Power off shuts down protected equipment. If parameter 48 is EPO Rst, this will only function if EPO Rst is set to 1>Yes. If parameter 48 is EPO Mode, parameter 39 will work if parameter 48 is set to 1 or 2.	0001-9999	S
40	NVVers 06.10	Software version.	00.00-99.99	NC
41	Model Indx 09	Model index code. 1=500VA, 2=700VA, 3=850VA, 4=1.15KVA, 5=1.4KVA, 6=1.8KVA, 7=2.1KVA, 8=3.1KVA, 9=4.3KVA, 10=5.3KVA, 11=7KVA, 12=10KVA, 13=12.5KVA, 14=18KVA	01-14	NC
42	ARst Time 001	Auto restart time after lowbat (in minutes).	000-255	NC
43	XferDly 05Sec	Transfer delay; time to delay before transferring to line when line returns.	03-99	S
44	AutoRst 1>Yes	Automatic Restart after a shutdown due to a low battery condition. 1>Yes, Restart, 2>No, do not Restart.	1>Yes or 2>No	S
45	AC ShDn 1>Yes	AC Shutdown. Shuts down on low AC output when set to 1>Yes.	1>Yes or 2>No	NC
46	ExBnOut 1>Yes	Extended Brownout. If 1>Yes, brownout voltage level will be reduced as UPS load variations permit. This maintains output voltage regulation and reduces battery runtime and prolongs battery life.	1>Yes or 2>No	S
47	AltSetup 0	Alternate Setup. This permits selection of alternate setups for some parameters. **Contact BEST's Technical Support before attempting to change.**	0-7	S
48 (with 6.07 and 7.05-7.06 software)	EPO Rst 2>No	Remote Emergency Power Off Restart.	1>Yes or 2>No	S
48 (with 6.08 or 7.07 and higher software)	EPO Mode 0	Remote Emergency Power Off shutdown and restart. Three settings: 0>No delay before shutdown when REPO is activated. 1>Shutdown after number of seconds in parameter 39. If AC line is present and REPO signal is removed, unit restarts in 60 seconds (see page 4). 2>When UPS runs on inverter, shutdown after number of seconds in parameter 39. If AC line is present and REPO signal is removed, unit restarts in 60 seconds (see page 4).	0-2	S
49	VinNom 240	AC input voltage (nominal).	ME: 100-380 FD: 0100-0500	NC

PARAMETER NUMBER	SAMPLE DISPLAY	DESCRIPTION	RANGE	PASSWORD REQUIRED TO CHANGE
50	VoutNom 240	AC output voltage (nominal).	100-240	NC
51	BrownoutV 190	Full load AC input voltage setpoint at which inverter starts. (100=79, 110=87, 115=91, 120=95, 200=158, 208=165, 220=175, 230=182, 240=190.)	075-240	S
52	Lo Freq 59.50 (49.50)	Low frequency inverter start point.	57-60	S
53	Hi Freq 60.50 (50.50)	High frequency inverter start point.	60-63	S
54-55 (with 6.01-6.08 and 7.01-7.08 software)	Reserved.			
54 (with 6.10 or 7.09 and higher software)	Max ACVI	Maximum AC Volts in.	000-500	NC
55 (with 6.10 or 7.09 and higher software)	Min ACVI	Minimum AC Volts in.	000-500	NC
56	Freq Delay 2	Time that frequency must be bad (in 1/6 second intervals) before frequency detect switchover occurs.	1-9	S
57	Glitch Cnt1 2	Glitch count; number of bad line samples before inverter is activated. Line samples occur 32 times per half-cycle.	1-5	S
58 (with 6.01-6.07 and 7.01-7.06 software)	Reserved.			
58 (with 6.08 and 7.07 and higher software)	RTL Mode 0	Return to Line. **Call BEST's Technical Support at 800-356-5737 before attempting to change this parameter.**	0-1	S
59	Line Delt1 25	Sensitivity of line monitoring system.	05-99	S
60	Line Delt2 40	Sensitivity of line monitoring system.	05-99	S
61	V Reftbl 234	Programmed RMS voltage of filtered line input. Calibrated with input at brownout voltage.	ME: 000-300 FD: 000-500	S
62	EBrownotV 167	Extended Brownout Voltage. Point unit will brownout at, depending on percent of load.	ME: 075-240 FD: 075-400	NC
63	Reserved.			
66	Reserved (FD Units).			

PARAMETER NUMBER	SAMPLE DISPLAY	DESCRIPTION	RANGE	PASSWORD REQUIRED TO CHANGE
67 (ME Units)	Parity 0	RS232 communication port parity. 0=None, 1=Odd, 2=Even.	0-2	S
67 (FD Units)	Reserved.			
68	InvTest 1>Yes	Determines if unit runs automatic inverter test.	1>Yes or 2>No	S
69	TestRate 1440	Number of minutes between automatic inverter tests.	0001-9999	S
71	TestPhas 0100	Current inverter test phase.	ME: 1280-3200 FD: 005-100	NC
72	I Batt Pk 000	Instantaneous peak battery current.	000-999	NC
73	Peak 1 0154	Inverter test peak current.	0000-9999	NC
74	Peak 2 0145	Inverter test peak current.	0000-9999	NC
75 (ME units with 7.05 or higher software; FD units with 6.06 or 6.07 software)	AlmMask1 255	Alarm Mask #1. This disables or enables alarms A-H. All alarms are enabled if 255 is entered. Contact BEST's Technical Support before changing.	000-255	S
75 (FD units with 6.08 and higher software)	Alarm Enables	Alarm Enable. This enables or disables all alarms. For programming instructions, see TIP 502.	1-2	S
76 (ME units with 7.05 or higher software; FD units with 6.06 or 6.07 software)	AlmMask2 255	Alarm Mask #2. This disables or enables alarms I-P. All alarms enabled if 255 entered. Contact BEST's Technical Support before changing.	000-255	S
76 (FD units with 6.08 and higher software)	Relay Control	Relay Control. This parameter controls the function of the relay board option. See TIP 415 for more information.	00-35	S
77 (ME Units)	Wordsize 8	RS232 communication port word size.	7-8	S
77 (FD Units)	Reserved.			
78	Baud 2>1200	Communication rate used by RS232 port.	1-4	S
79	ConMde 1>Norm	Console mode. 1>Norm, normal operation. 2>No AM, no auto message. 3>No EB, No Echo Back. See F command characters 70 and 71. 4>SndF: sends F command string every 15 seconds (also acts like 3>).	1-4	S

PARAMETER NUMBER	SAMPLE DISPLAY	DESCRIPTION	RANGE	PASSWORD REQUIRED TO CHANGE
80	CtlPswd 2>No	Determine if USER password needed to execute SMODE (mode-changing) commands.	1>Yes or 2>No	S
81	# Bad PW 0000	Number of bad passwords.	0000-9999	NC
82 (ME Units)	Stopbits 1	RS232 communication port stopbits.	1-2	S
82 (FD Units)	Reserved.			
84	BattCap 0031	Battery capacity in AH (Ampere Hours).	00005-99999	S
85	BTT 060	Amount of time unit operates on battery during battery test.	010-600	NC
86	BattTst 1>Yes	Determines whether battery test operates.	1>Yes or 2>No	S
87	IntrvlDays 30	Number of days between battery tests.	01-30	S
88	RnTm Alm 0005	Full load battery test alarm setpoint. Number changes with model and battery.	0005-9999	S
89	FctrAlm 00027	Runtime required at current load to meet full load runtime alarm setpoint.	00000-99999	NC
90	BTRT 2052 Min	Runtime at the end of last battery test.	0000-9999	NC
91	Reserved.			
92	CFACVI 07535	Calibration factor, AC volts in.	00000-59999	NC
93	CFACVO 06106	Calibration factor, AC volts out.	00000-59999	NC
94 (ME Units)	Reserved.			
94 (FD Units)	CFACAI 17712	Calibration factor, AC current input.	00000-59999	NC
95	CFACAO 08602	Calibration factor, AC amps out.	00000-59999	NC
96	CFDCV 11237	Calibration factor, DC (battery) volts.	00000-59999	NC
97	CFDCA 10240	Calibration factor, DC (battery) amps.	00000-59999	NC
98	CFREF 08552	Calibration factor, RMS voltage of filtered line input.	00000-59999	NC
99	Reserved.			

Appendix C: Sample Printouts in Response to Terminal or Computer (Console) Commands

=>S
Status - Model # FD4.3KVA - Unit ID "FD4.3KVA00001" - May 07, 08:53:37

SysMode: Auto
STATUS: Ready
Aud Alm: Enabled
Inverter: Off

Alarms(s)-None

1 V In	239	31 Hi Batt	059.6	67 Reserved	
2 V Out	120	32 L RnTm	05 Min	68 InvTest	1>Yes
3 I In	009.1	33 A Otemp	060C	69 TestRate	1440
4 I Out	006.3	34 AT Shdn	070C	71 TestPhas	0100
5 VA Out	01517	35 S Otemp	095C	72 I Batt Pk	000
6 I Batt	005	36 Reserved		73 Peak 1	0154
7 V Batt	051.9	37 Reserved		74 Peak 2	0145
8 Freq	59.95 Hz	38 Off Cnt	0000	75 Alarm Enables	
9 RnTm	0005 Min	39 EPO Dly	0020	76 Relay Control	
(11). Amb Temp	023C	40 NVVers	06.10	77 Reserved	
		41 Model Indx	09	78 Baud	2>1200
Parameters-May 07, 8:53:41		42 ARst Time	001	79 ConMde	1>Norm
		43 XferDly	05Sec	80 CtlPswd	2>No
12 HS Temp	036C	44 AutoRst	1>Yes	81 # Bad PW	0000
13 Reserved		45 AC ShDn	1>Yes	82 Reserved	
14 ID Number:		46 ExBnOut	1>Yes	84 BattCap	0031
FD4.3KVA00001		47 AltSetup	0	85 BTT	060
15 Model Number		48 EPO Mode	0	86 BattTst	1>Yes
FD4.3KVA		49 VinNom	240	87 IntrvlDays	30
16 FullLoad%	050	50 VoutNom	120	88 RnTm Alm	0005
17 Watts	01554	51 BrownoutV	190	89 FctrAlm	00027
18 PF	1.00 ----	52 Lo Freq	59.50	90 BTRT	2052 Min
19 VA Limit	03000	53 Hi Freq	60.50	91 Reserved	
20 #Pwr Out	0005	54 Max ACVI		92 CFACVI	07535
21 #Ovr Lds	0001	55 Min ACVI		93 CFACVO	06106
22 Sys Hrs	00027	56 Freq Delay	2	94 CFACAI	17712
23 InvMin	0015.7	57 Glitch Cnt1	2	95 CFACAO	08602
24 Inverter Log		58 RTL Mode	0	96 CFDCV	11237
25 Alarm Log		59 Line Delt1	25	97 CFDCA	10240
26 Reserved		60 Line Delt2	40	98 CFREF	08552
27 Low Vout	108	61 V Reftbl	234	99 Reserved	
28 Hi Vout	130	62 EBrownotV	167		
29 LowBat	041.0	63 Reserved			
30 NLBatt	044.0	66 Reserved			

Appendix D: Format of Data Output in Response to "F" Command

The "F" command directs the UPS unit to output system status and metering information in a fixed format. This information is suitable for incorporation into host system software, without any text or punctuation. The data string consists of a <cr><lf> sequence, followed by 80 ASCII characters representing 40 hexadecimal bytes of information. The format of the data is as listed:

Characters	#Bytes	Description
header	n/a	<cr><lf> or <ODH><OAH> sequence
0-1	1	Month (BCD, 01-12 valid)
2-3	1	Day (BCD, 01-31 valid)
4-5	1	Hours (BCD, 00-23 valid)
6-7	1	Minutes (BCD, 00-59 valid)
8-9	1	Seconds (BCD, 00-59 valid)
10-11	1	System Mode (BCD, 00-03 valid) 00=Off 01=Auto 02=Line Conditioning 03=Inverter Run
12-13	1	Reserved for future use.
14-15	1	Audible Alarm Mode (BCD, 00-01 valid) 00=Off 01=On
16-17	1	Inverter Status (BCD, 00-01 valid) 00=Off 01=On
18-19	1	Charger on or off (BCD, 00-01 valid) 00=Off 01=On
20-21	1	Alarm Status Register 1 (bit-mapped, 1=true)

Bit Position 7 6 5 4 3 2 1 0   Alarm Condition

- Low Battery
- Near Low Battery
- High Battery
- Low Runtime Left
- Low AC Out
- High AC Out
- Output Overload
- High Ambient Temp
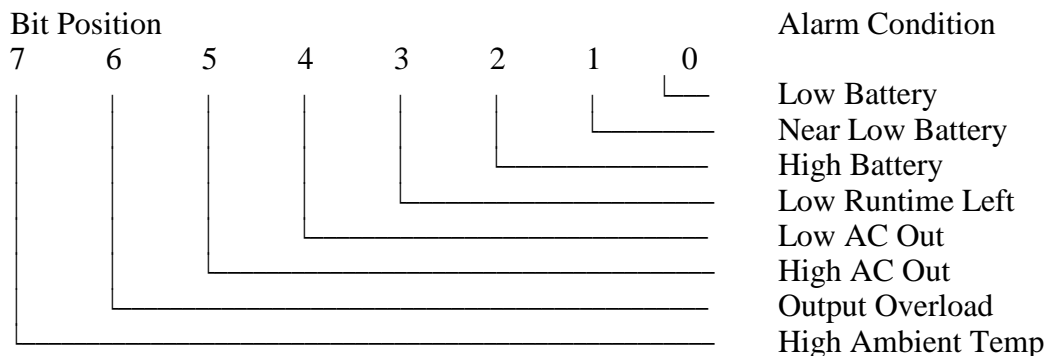
22-23	1	Alarm Status Register 2 (bit-mapped, 1=true)

Bit Position   Alarm Condition

```
7   6   5   4   3   2   1   0
                        └──────  Heatsink Overtemp
                    └──────────  User Test Alarm
                └──────────────  Reserved
            └──────────────────  Check Cooling
        └──────────────────────  Check Battery
    └──────────────────────────  Check Inverter
└──────────────────────────────  Memory Check
────────────────────────────────  Shutdown Activated
```
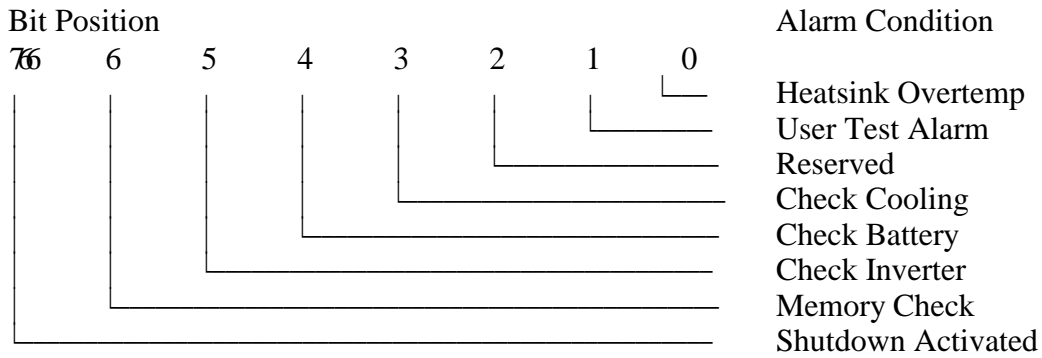
24-27	2	AC Volts In (BCD, 0000-9999 valid)
28-31	2	AC Volts Out (BCD, 0000-9999 valid)
32-35	2	Reserved [FD: AC Line Current In (BCD, 0000-9999 valid)]
36-39	2	AC Amps Out (BCD, 0000-9999 valid) Decimal point implied at xxx.x
40-45	3	Output Load VA (BCD, 000000-999999 valid)
46-49	2	DC (Battery) Amps (BCD, 0000-9999 valid)
50-53	2	DC (Battery) Volts (BCD, 0000-9999 valid) Decimal point implied at xxx.x
54-57	2	Frequency (Hz) (BCD, 0000-9999 valid) Decimal point implied at xx.xx
58-61	2	Runtime Min. Remaining (BCD, 0000-9999 valid)
62-65	2	Ambient Temp. (C) (BCD, 0000-9999 valid)
66-69	2	Reserved for future use.
70-71	1	Command Error Flag for ConMde (Console Mode). 3>No EB or no echo back; suppresses prompts, character echo, auto messages, error messages, and carriage returns. Characters 70 and 71 will help indicate mistakes in absence of other indicators. The following numbers may appear:

01=Invalid command   05=Invalid parameters (out of range)
02=Parameters required   06=Password required
03=No parameters allowed   00=No error made
04=Invalid # of parameters   10=Invalid password

72-73	1	Reserved for future use.

74-77	2	Software Version #.
78-79	1	Checksum Byte (Hexadecimal, 00-FF valid). Equal to the 2's complement hex sum, without carry, of the preceding 39 two-digit hexadecimal numbers. Note: If you sum the values of all 40 two-digit hexadecimal numbers without carry you should obtain 00.

Appendix E: Sample BASIC Terminal Emulation Program for Communicating with the UPS

The BASIC program listed below allows an IBM PC to emulate a dumb terminal so that the computer may communicate with the UPS. It was written for the IBM PC and should work on any IBM PC or compatible. To use it, simply connect a cable from the COM1: port of your computer to the UPS as described in Section 300 of this Technical Information Publication. Turn the UPS and the computer on, enter the program into the computer and run it.

Some comments follow the program in case you wish to make any modifications to it. Additional help can be found in the communications appendix to the IBM BASIC manual.

```
10 REM Program to communicate with the FERRUPS
20 REM
30 SCREEN 0,0: WIDTH 80: CLS
40 KEY OFF:LOCATE 25,1
50 PRINT "FERRUPS COMMUNICATIONS PROGRAM-hit ESC to exit"
60 LOCATE 1,1,1: PRINT "Enter the command HELP for a menu"
70 OPEN "COM1:1200,N,8,1,CS,DS" AS #1
80 PRINT #1,""
100 A$=INKEY$: IF A$="" THEN 120
110 IF A$=CHR$(27) THEN 990 ELSE PRINT #1,A$;
120 IF EOF(1) THEN 100
130 A$=INPUT$(LOC(1),#1)
140 B$=CHR$(10): C$=" ":GOSUB 200 REM Replace line feeds by spaces
150 B$=CHR$(8): C$=CHR$(29):GOSUB 200 REM Replace back spaces by cursor lefts
160 PRINT A$;
180 GOTO 100
200 P%=0
210 P%=INSTR(P%+1,A$,B$)
220 IF P%>0 THEN MID$(A$,P%,1)=C$:GOTO 210
230 RETURN
990 CLOSE: KEY ON
```

Some comments:

1. Note the use of the "DS" and "CS" options in the OPEN statement of line 70. This inhibits testing of the DSR and CTS lines from the FERRUPS unit. This is necessary since the UPS does not make use of these lines.

2. Because of the way the BASIC PRINT statement works, to preserve the screen display it was necessary to strip out or make substitutions for the line-feeds and back-spaces in the strings being received from the UPS. Hence lines 140 and 150, and the subroutine at line 200.

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