

The FE Series RS232 Communication Port

This Technical Information Publication explains how to use the FERRUPS communication port; it expands on information in the FERRUPS User Manual. This TIP applies to all FE, FES, FER, QFE, QFES, and QFER models with 8.01-8.07 software versions.

The communication port lets you set up full duplex RS232 communication with FERRUPS so you can send commands and receive messages from the UPS. You can also display the information that your FERRUPS gathers and stores about power conditions and its own operation. The communication port also includes relay contacts, a +12 VDC level, a Remote Emergency Power Off connection, and pins for special options.

[Section 100](#) describes the many ways you can use the RS232 port. Sections [200](#) and [300](#) describe RS232 communication. [Section 400](#) describes the Remote Emergency Power Off feature and how you can adjust FERRUPS settings to work with your EPO system. [Section 500](#) describes how to control the operation of the alarm contacts. Section 600 describes how to connect an external relay to monitor the FERRUPS' contacts.

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100 How You Can Use the Communication Port

This section describes the ways that you can use the FERRUPS DB25S communication port. You can use more than one feature at a time as long as you connect each device to the correct pins on the FERRUPS communication port. To use a combination of features, you must have a cable that is made specifically for your applications. Figure 1 below shows the many ways you can use the port. Figure 2 explains the functions of each pin.

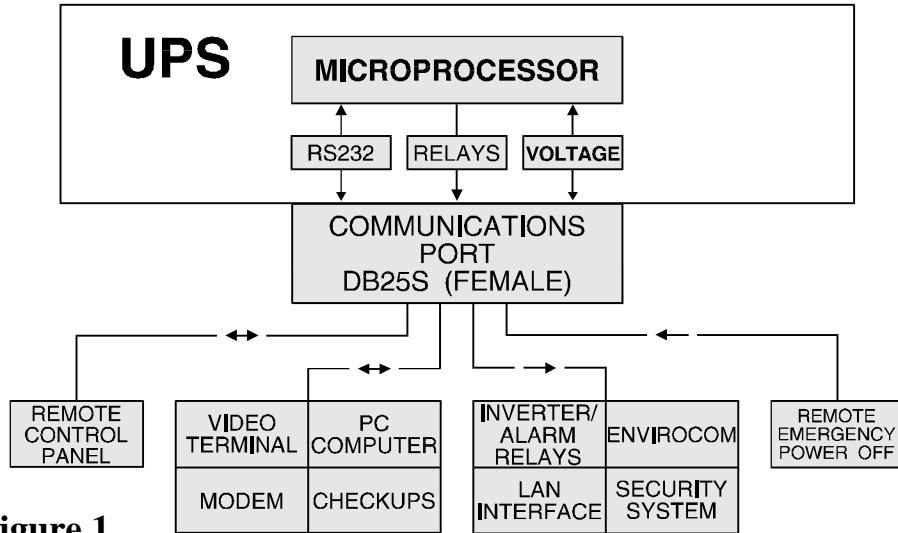
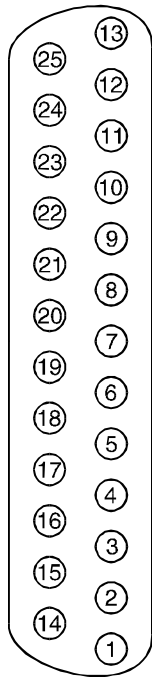


Figure 1



Pin	Description	
2	Transmit Data.	
3	Receive Data.	
4	Request to Send.	To enable hardware handshaking on these pins, see page 5.
5	Clear to Send.	
6	+12V Level (0.01 amp) when UPS is operating.	
7	Signal Ground.	
11	Contact opens when on inverter.	These relay contacts are rated at 25V AC/DC and 250 mA. See the User Manual and Section 600 of this TIP
12	Contact closes when on inverter.	
13	Common Inverter Signal Contact.	
14	+12V, 0.3 amp (500VA to 3.1KVA) or 0.5 amp (4.3 to 18KVA). See Section 600 to use this pin with an external relay.	
18	+12V Level (0.01 amp) when UPS is operating.	
20	AS/400 Option.	
21	Remote Emergency Power Off. See Section 400.	
23	Contact closes on alarm.	These relay contacts are rated at 25 V AC/ DC, 250 mA. Pins 23 and 25 change status when UPS is turned off. See the User Manual and Sections 500 and 600 of this TIP.
24	Common Alarm Signal Contact.	
25	Contact opens on alarm.	

Figure 2

RS232 Communication: Pins 2, 3, 4, 5, and 7

You can connect your FERRUPS to a terminal, computer, or modem for full duplex communication. This lets you send FERRUPS commands, change the FERRUPS operating mode, view and change parameters, receive messages from the FERRUPS, and read the alarm and inverter logs. To communicate with the FERRUPS, see the User Manual and Sections [200](#) and [300](#) of this TIP.

Relay Contacts: Pins 11-13 and 23-25

You can use FERRUPS' alarm and inverter contacts for remote monitoring or for your own alarm system or indicator. With the right interface cable, you can also use the relay contacts to control the shutdown of computer networks. (See the description of CheckUPS software under "Options.") For more information on the relay contacts, see the FERRUPS User Manual. To control the operation of the alarm contacts; see [Section 500](#) of this TIP. To connect an external relay to monitor the contacts, see [Section 600](#) of this TIP.

Remote Emergency Power Off: Pin 21 (with 6 or 18)

The Remote Emergency Power Off feature lets you connect your computer room's emergency shutdown switch to the FERRUPS. By doing this, you can make sure your emergency shutdown system will shut off the power that goes from FERRUPS to your protected equipment. You can determine what type of shutdown signal the FERRUPS responds to and how long it waits before shutting down. See [Section 400](#) for more information.

+12 Level: Pins 6, 14, and 18

You can use the +12 VDC Level on pins 6 and 18 for setting an external logic level 1. You can use this to set a fixed input logic level in an external device. The voltage is present any time the FERRUPS is operating.

Pin 14 has +12 Volts DC at 0.5 amperes (or 0.3 amperes for FE500VA to FE3.1KVA models). You can use this pin to connect an external relay to monitor the contacts at the port; see [Section 600](#).

Options

Remote Control Panels: You can connect an optional control panel to the RS232 port to communicate with FERRUPS. Optional control panels work like the control panel that is standard on 4.3 KVA-18 KVA models; if you have one of these models, you can use a standard and optional control panel to communicate with the FERRUPS at the same time. The control panel provides quick, easy communication with the FERRUPS. See the User Manual or TIP 407 for more information.

CheckUPS®

Software: BEST's CheckUPS runs on your computer. During a long power outage, this optional software automatically shuts down the computer and the FERRUPS before the FERRUPS batteries run down. It also lets you communicate with FERRUPS. CheckUPS is available for most kinds of computers and operating systems. Call BEST for more information.

Interface Kits: If your computer or Local Area Network has its own UPS monitoring or shutdown software, you can use a BEST interface kit. These kits include cables, cards, adapters and instructions for interfacing between the FERRUPS and your computer system. Call BEST for details.

EnviroCom: BEST's EnviroCom I and II monitor the FERRUPS' alarm and inverter contacts. These devices use a telephone line to let you know when there is an alarm or when FERRUPS is running on inverter (battery power). EnviroCom II includes a modem so you can communicate with FERRUPS from a remote location. See TIP 577 for more information.

200 Setting Up RS232 Communication

201 Connecting a Terminal or Computer

The Communication section in your FERRUPS User Manual provides basic instructions for connecting a terminal or computer to the FERRUPS RS232 port. This section provides a few additional guidelines.

1. **Important:** When you connect your computer or terminal to the FERRUPS' RS232 port, signal ground and chassis ground **must not** be connected within the terminal or computer. These two signals may or may not be common in your computer or terminal. If they are common, you **must** remove any jumper connection between signal ground and chassis ground.

When you connect the computer or terminal to FERRUPS, signal ground from your computer or terminal is connected to pin 7 (signal ground) on the FERRUPS. See the User Manual. This signal ground is a reference ground for the other RS232 signals.

2. Before you connect a computer or terminal to the UPS, make sure it receives its power from the UPS.
3. The battery bank **must not be positive ground**.



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 help, call BEST's Technical Support Center at 1-800-356-5737 or call your nearest BEST office.

202 Terminal Emulation

The computer or terminal that you connect to FERRUPS must be able to 1) send commands that you type on a keyboard to FERRUPS and 2) send responses to the computer's or terminal's screen. A standard terminal does this; however, if you are using a computer, you must run a terminal emulation program.

Computers, serial interface cards, and modems often include terminal emulation programs. If you do not have an emulation program, you can use the BASIC program on the next page. Before you use an emulation program, you must often set the baud rate and data format. On some computers, you can do this with switches, and on others, you can make the changes with software. (For example, MS-DOS users would use MODE COM1:1200 N, 8, 1.)

The BASIC program below lets a computer emulate a dumb terminal. It should work on any IBM PC or compatible. To use the program, simply connect the proper cable from your computer's COM1: serial port to the FERRUPS communication port. (See the User Manual.) After you have made the connection, run the program. There are four comments after the program. You can find more help in the IBM BASIC manual's communication appendix.

Emulation Program

```
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$(29):GOSUB 200: REM Replace backspaces by cursor lefts
160 PRINT A$;
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
```

Comments:

1. If you are using hardware handshake, omit the "CS" option in the OPEN statement of line 70.
2. If you are using MS-DOS® QBASIC (which comes with DOS 6.0) or MICROSOFT® QUICKBASIC™, change the OPEN statement in line 70 to this:

```
OPEN "COM1:1200,N,8,1,DS,RB1024,TB64" AS #1
```

3. Note the use of the "DS" option in the OPEN statement of line 70. This inhibits testing of the DSR line from FERRUPS. This is necessary because FERRUPS does not use this line.
4. Because of the way the BASIC PRINT statement works, the program must strip out or make substitutions for the line-feeds and backspaces sent from FERRUPS to preserve the screen display. Hence lines 140 and 150, and the subroutine at line 200.

203 Enabling Hardware Handshaking

To enable hardware handshaking with your computer or terminal, change the setting for parameter 97 (console handshake) to 15. You can do this either through a control panel or through a computer or terminal that you have connected to the communication port.

Control Panel: Display parameter 97; then press [PROGRAM], [1], [5], and [ENTER].
Computer or Terminal: Enter the command **program 97**, and enter 15 as the new value.

204 Using a Modem

To use a modem with the FERRUPS, you must configure both the modem and the FERRUPS properly.

To configure the UPS, set parameter 97 (consolehandshake) to "15"; see [Section 203](#) if you need instructions for changing parameter values.

Set up the modem to ignore the DTR signal and to support the RTS and CTS signals. You should also disable the modem's ability to send result codes. In most modern modems, you can make these changes using modem "AT" commands. In these modems, you can use a computer or terminal to send the following string to your modem; this string will set your modem to work optimally with the FERRUPS.

```
AT &F &DO &K3 QO &W <CR>
```

AT is a required command prefix.

&F reset the modem to factory defaults.

&DO sets the modem to ignore the state of DTR.

&K3 enables RTS/CTS handshaking.

QO puts the modem in the quiet mode, suppressing result codes.

&W makes the changes permanent.

<CR> is a required terminating carriage return.

Since modem commands vary for different brands of modems, the above string may not work as shown. In many older modems, you must set dipswitches to make the required changes in your modem. See the documentation that came with your modem to configure its response to RS232 control signals.

The FERRUPS communication port is wired as a DCE (Data Communications Equipment) device. Since most modems are also wired DCE, you must use a "null modem" cable to connect the modem to the FERRUPS. See the drawing in the User Manual to build a cable to connect the FERRUPS to a modem. If you want to use handshaking, see Figure 3.

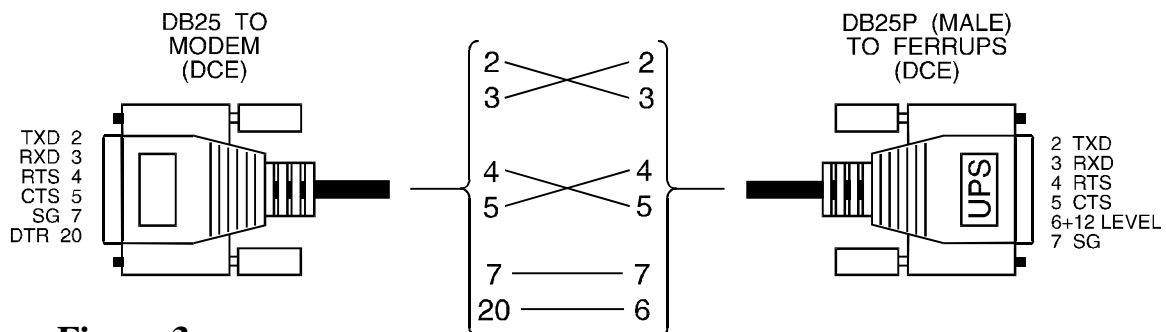


Figure 3

300 Communicating with FERRUPS

The FERRUPS User Manual includes a command table and basic information about entering commands. The sections below provide more detailed information about some commands.

301 Entering Commands

See the User Manual for a complete table of FERRUPS commands. The FERRUPS microprocessor can recognize commands in a variety of formats. Commands can be in uppercase, lowercase, or a combination of uppercase and lowercase.

Example:

alarmlog would be a valid command, but so would **ALARMLOG**, **Alarmlog** or **alarmLog**. The terminal or computer would display the alarm log.

You can enter the complete command or the short form shown in the User Manual. You can also enter an abbreviation of the command. The command you enter must 1) include the letters in the short form, 2) have the letters in the correct order, and 3) use the same spacing as the original command.

Example 1:

alarmlog, **al**, or **alog** are all valid commands. The terminal or computer displays the alarm log. If you put a space between any of the letters in the command, the FERRUPS does not recognize it.

Example 2:

systemmode auto, **sm a** and **sysmode a** are all valid commands; the FERRUPS switches to auto mode. However, if you do not include the space before “a” or “auto,” the UPS will not recognize the command.

If you make an error when you enter the command, your terminal will display “Error” with a pointer that shows what part of the command may be incorrect.

Example:

If you misspell a command, the Error arrow will point to the command and give you an error message:

```
=>displey time
displey time
^ Error
Command not recognized.
```

If you are using commands to display and change FERRUPS parameters, see [Section 305](#).

302 Passwords

Some FERRUPS commands require a password; in other words, the FERRUPS won't recognize certain commands unless you have entered the correct password first. You must also enter a password before you change most FERRUPS parameters.

Note: If you change parameter 39 to “Yes,” some parameters and commands that do not normally require a password will require a User password. [CONTROL] functions at a control panel will also require a User password.

To enter a password, use the **password** command shown in the FERRUPS User Manual. For example, to enter the User Password, you would type the command below and press <ENTER> on your keyboard.

```
password 377
```

You don't need to use the complete password command; instead, you could just enter this:

```
pw 377
```

You can use one of two passwords: the User password (377), or the Service password (2639). The password level determines whether a user or a trained service person should make the changes. To find out which commands require a password, see the command table in your FERRUPS User Manual. That table also shows which password you need for each command. To find out which password you need to display and change each parameter, see the Parameter Table in [Section 306](#) of this TIP.

303 Help Commands

You can use some commands to help you learn more about how FERRUPS communication works. These commands are **help** (or **?**), **alarmshelp**, and **commands**.

Help Command

When you enter the **help** or **?** command, your terminal will display each FERRUPS command and a brief explanation.

Example: For example, the display begins with the **AlarmTest** command:

```
AlarmTest [Cancel]
-- Set [or Cancel] user test alarm (J).
```

Notice that some letters in the command are capitalized; these letters make up the short form of the command. You could enter **alarmtest**, **at**, or any abbreviation that includes the short form letters in the correct order. “[Cancel]” means **alarmtest cancel** (or **at c**) cancels the User Test Alarm.

AlarmsHelp Command

The **alarmshelp** command displays a list of alarms with their letters and codes, the current status of the alarm (active or off), and the relay setting. See the sample list below:

Active	Alarm Name	Ltr	Code	Relay
No	Low Battery	A	● –	Yes
No	Near Low Battery	B	– ● ● ●	Yes
No	High Battery	C	– ● – ●	Yes
No	Low Runtime Left	D	– ● ●	Yes
No	Low AC Output	E	●	Yes
No	High AC Output	F	● ● – ●	Yes
No	Output Overload	G	– – ●	Yes
No	Hi Ambient Temp	H	● ● ● ●	Yes
No	Hi Heatsink Temp	I	● ●	Yes
No	User Test Alarm	J	● – – –	Yes
No	Hi Transfmr Temp	K	– ● –	Yes
No	Check Charger	L	● – ● ●	Yes
No	Check Battery	M	– –	Yes
No	Check Inverter	N	– ●	Yes
No	Check Memory	O	– – –	Yes
No	Emergency PwrOff	P	● – – ●	Yes
No	Hi PFM Res Temp	Q	– – ● –	Yes
No	Probe Missing	R	● – ●	Yes
No	High AC Input	S	● ● ●	Yes
No	Call Service	T	–	Yes

Commands

When you enter **commands**, the terminal will display all valid FERRUPS commands. The capitalized letters in each command are the short form for that command.

304 Status Commands

The **status** and **contstatus** commands display several FERRUPS parameter values, active alarms, and other status information. This is one example of a **status** display:

```
Status report for FE500VA [Unit ID Number from parameter 15] [Serial Number]
Tuesday, November 16, 1993 - 14:51:31
```

Parameters				System	
V In	120.4	Freq	60.20	Mode:	Auto
-----		Watts	347	Ready:	Yes
V Out	118.8	VA Out	345	Inverter:	Off
I Out	2.9	PF 1.00	---	Charger:	On
-----		Load	99%	Beeper:	Enabled
V Batt	12.45	Runtime	6m	Level:	(None)
I Batt	0.9	AmbTemp	20c		
		BrnLvl	95.8		

Active Alarms

```
-----
No active alarms
```

The **contstatus** command shows the same display, but it continuously updates the information until you press a key.

305 Parameter Commands

This section describes the commands you can use to display and program parameters.

When you use the commands described below, you must often specify a parameter. To do this, you can enter the parameter number or its name. The Parameter Table in [Section 306](#) shows the name you can use for each parameter; you can also use the short form shown in the table, or you can enter an abbreviation of the name as long as you include the letters in the short form. (You can also abbreviate commands; see [Section 301](#).)

The **display**, **contdisplay**, **parameters** and **paramkeywords** commands let you display parameters. The **program** command changes parameter values.

Display

The **display** (or **d**) command lets you display specific parameters on your computer or terminal. For example, if you enter **display 0**, **display time** or **d t**, your computer or terminal will display parameter 0 (below). Notice that you must leave a space between the command and the parameter number or name.

```
00 Time 14:42:21
```

If you enter more than one parameter name or number after this command, your computer or terminal will display those parameters. For example, if you enter **d time 45 10**, the display will show parameters 0, 45 and 10:

```
00 Time 14:42:21
45 RatedVA 500
10 Date 06/01/93
```

Notice that you can mix names and numbers, and you can list the parameters in any order.

If you have already displayed a parameter, you can display the next parameter by entering **display** alone.

Contdisplay

The **contdisplay** (or **cd**) command works like the **display** command, but it constantly updates the parameter values displayed until you press a key.

Parameters

Like the **display** command, the **parameters** (or **p**) command will display a parameter if you enter a parameter number or name after the command. For example, if you enter **parameter 0**, **parameter time**, or **p t**, your terminal or computer will display something like this:

```
00 Time 14:42:21
```

However, the **parameters** command works differently when you enter it alone or when you enter more than one parameter after the command. When you enter **parameters** (or **p**) alone, your computer or terminal displays all of the user-level and service-level parameters shown in Section 306.

To display a range of parameters, enter the starting and ending parameters after the command. Instead of showing just the parameters you list (as the **display** command does), the **parameters** command will display all of the parameters in between. For example, if you enter **parameter 0 5**, **parameter time vaout**, or **p t va**, your computer or terminal will display parameters 0 through 5:

```
00 Time 14:42:21
01 V In  118.2
02 V Out 118.2
03 --Reserved--
04 I Out  2.9
05 VA Out 345
```

Paramkeywords

The **paramkeywords** (or **pk**) command works like the **parameters** command, but it also displays the keyword or name of each parameter you display. (The keyword is the name shown in Section 306.) For example, if you enter **paramkeywords time vaout** (or **pk t va**), your computer or terminal display will be similar to this:

```
00 Time 14:43:59      Time
01 V In  118.2        acVoltsIn
02 V Out 118.8        acVOltsout
03 --Reserved--      *
04 I Out  2.9         acampsiOut
05 VA Out 345         VAout
```

Notice that some letters are capitalized in the keywords on the right. These letters are the short form of the parameter name (or keyword). Reserved parameters (like 03 above) do not have keywords.

To display all of the user and service parameters and their keywords, enter **paramkeywords** (or **pk**) alone.

Program

Before you can program or change some parameters, you must enter the User or Service password. (See [Section 302](#).) Some parameters cannot be changed.

The **program** (or **pr**) command lets you program parameters. If you have already displayed a parameter, you can enter **program** alone to program the parameter. The computer or terminal displays the parameter's old value and ask you to enter a new value.

Example 1: If you have displayed parameter 0, "00 Time 14:59:43," and you want to change the time, you can enter **program** to change the parameter. You may need to enter a User password before you can make this change; see [Section 306](#).

```
User =>display 0
00 Time 14:59:43
User =>program
Old value: 00 Time 14:59:50
>>> New value for parameter 00 ->
```

You can enter the new value in response to the new prompt; the display will then show the new parameter value. For example, if you enter 09:30:00, you will see this display:

```
>>> New value for parameter 00-> 09:30:00
New value: 00 Time 09:30:00
User =>
```

If you have not displayed the parameter already, you can specify which parameter you want to change by entering its number or name after the **program** (or **pr**) command.

Example 2: If you enter **program time**, the computer or terminal will display the old value and ask you for the new value:

```
User =>program time
Old value: 00 Time 14:59:50
>>> New value for parameter 00 ->
```

You can enter the new value at the prompt. (See Example 1.)

If you want to enter a new parameter value without seeing the old value first, you can enter **program**, the parameter number or name, and the new value at the same time.

Example 3: If you enter **program time 09:30:00**, the time will be changed, and the computer or terminal will show a display similar to the one below:

```
User =>program time 09:30:00
Old value: 00 Time 14:59:50
New value: 00 Time 09:30:00
User=>
```

306 Parameter Table

The table on the next few pages shows the parameters that you can view or reset from a terminal or computer. Some of these parameters keep track of information (like Time, Date, or the Alarm and Inverter Logs) or display operating and power conditions (like voltage, current, or temperature). Other parameters (like User ID) let you program FERRUPS for special situations.

When you use the FERRUPS commands to display and program parameters, you can identify the parameter with either its number or name. If you use the name, you can enter the whole parameter name or just the letters in the short form. (See the Name column in the Parameter Table.)

Passwords restrict access to some parameters. See [Section 302](#).

The table sometimes shows different parameters for different revisions of FERRUPS software. If you are not sure which software version is in your FERRUPS, display parameter 120. If parameter 120 is SW Ver, it will show your software version; if not, display parameter 137 to see the software version.

All changeable parameters except 0 (Time), 10 (Date) and 15 (Unit ID) are set at the factory. Only qualified technicians using the proper metering equipment should change other parameters. Incorrect settings may make FERRUPS malfunction. Call BEST's Technical Support Center at 1-800-356-5737 before you try to change any parameters except 0, 10, and 15. (Outside of the U.S.A. and Canada, call your nearest BEST office.)

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
0	time (t)	00 Time 07:04:00	None (User if parameter 39 has been changed to "Yes.")	00:00:00-23:59:59	Time. The FERRUPS uses the time to record alarms and inverter runs. Reset the time when you restart the FERRUPS after DC power has been off.
1	acvoltsin (vi)	01 V In 120.7	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The input voltage the FERRUPS is receiving. When this value drops below the brownout voltage, the FERRUPS switches to inverter.
2	acvoltsout (vo)	02 V Out 120.7	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The voltage the UPS is providing to your equipment.
3	Reserved	03 --Reserved--	—	—	—
4	acampsout (o)	04 I Out 5.3	Service	0.0-220.0	The current your equipment is drawing from the FERRUPS.
5	vaout (va)	05 VA Out 637	Change Not Allowed	0-27000	The total "apparent power" (volt-amperes) your equipment is drawing from the UPS. This value is based on parameters 2 and 4, and should be less than or equal to VALimit, parameter 19 .
6	ibatt (ib)	06 I Batt 0.5	Service	0.0-200.0	In 8.06 and higher software, when the UPS runs on AC line, this is the charging current. In all software versions, when the UPS runs on battery power, this is the amount of current (in amps) the batteries are supplying to the UPS.

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
7	vbatt (vb)	07 V Batt 13.48	Service	0.00-175.00	Battery voltage. The FERRUPS will alarm if this value is too low.
8	frequency (f)	08 Freq 60.43 Hz	Change Not Allowed	47.00-63.00	During normal operation, this is the frequency of the AC input power the FERRUPS is receiving. If this value falls outside the limits set by parameters 51 and 52, the UPS switches to battery power. When the UPS is using battery power, this is the frequency it is supplying to your equipment.
9	runtime (rt)	09 RunTime 12m	Change Not Allowed	0-9999	The estimated amount of time the FERRUPS will continue to support your equipment when the FERRUPS is running on battery power. The FERRUPS will alarm when this value falls below parameter 68 .
10	date (d)	10 Date 06/01/93	None (User if parameter 39 has been changed to "Yes.")	01/01/1988-12/31/2166	Date. The FERRUPS uses the date to record alarms and inverter runs. Reset the date when you restart the unit after DC power has been turned off.
. or 11 ¹	ambtemp (at)	11 Amb Temp 23c	Change Not Allowed	-63 to 193	The temperature (in Celsius) inside the unit. The UPS will alarm if this value is too high.
12	heatsinktemp (st)	12 SinkTemp 26c	Change Not Allowed	-63 to 193	The temperature of the heatsink. The FERRUPS will alarm if this value is too high.
13	Reserved	13 --Reserved--	—	—	—
14	xfmrtemp (xt)	14 XfmrTemp 28c	Change Not Allowed	-63 to 193	Transformer temperature. The FERRUPS will alarm if this value is too high. This parameter is only for models that monitor transformer temperature; for other models, this parameter will always show -63° C.
15	unitident (id)	15 Unit ID Network #1 UPS	Service	Up to 20 characters.	Unit ID. You can enter any string of 20 characters or less into this parameter. This string can help you identify individual FERRUPS units in network environments that use more than one UPS.
16	fullload (l)	16 FullLoad% 075	Change Not Allowed	0-150	Percent of Full Load. The percentage of the FERRUPS' total capacity that your equipment is actually using.
17	watts (w)	17 Watts 465	Change Not Allowed	0-15000	The total "real power" your equipment is drawing from the FERRUPS.
18	powerfact (pf)	18 PF 0.73 Lead	Change Not Allowed	0.00-1.00	The power factor of your equipment; the difference in the way it draws voltage and current. Power factor = Watts Out (parameter 17) divided by VA Out (parameter 5). This parameter also tells whether the power factor is leading (Lead), lagging (Lag), or distortion (Dist).

¹ To display parameter 11 at a control panel, press [DISPLAY] [.] [ENTER] or [DISPLAY] [1] [1] [ENTER].

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
19	valimit (val)	19 VALimit 850	Change Not Allowed	350-18000	The maximum volt-amp the FERRUPS can supply to your equipment at the present power factor. The FERRUPS will alarm when VA Out (parameter 5) is higher than this value.
20	powerout (po) (In 8.06 and higher software, the short form is pwro).	20 #PwrOut 1	Change Not Allowed	0-65535	The number of times there has been a loss of input power since you started the FERRUPS.
21	overloads (ol)	21 #OvrLds 0	Change Not Allowed	0-65535	The number of times the FERRUPS has been overloaded; that is, the number of times VA Out has been greater than VA Limit (parameter 19).
22	syshours (sh)	22 Sys Hrs 00000	Change Not Allowed	0-65535	The total number of hours the FERRUPS has been operating, regardless of mode. This number does not increase while the Off/On switch is turned Off.
23	invmin (im)	23 InvMin 0000.0	Change Not Allowed	0000.0-6553.5	The total number of minutes the inverter has run since startup.
24	inverterlog (il)	24 Inverter Log L 0319 2127 1215	Change Not Allowed	Not Applicable	A record of the date, time, duration, and reason for the last 20 inverter (battery power) runs. (See the User Manual.)
25	alarmlog (al)	25 Alarm Log A 0319 2127 1215	Change Not Allowed	Not Applicable	A record of the date, time, duration, and reason for the last 20 alarms. (See the User Manual.)
26	testresults (tr)	26 Test Results (See the Explanation column.)	Change Not Allowed	Not Applicable	This parameter records the results of the last system test. The parameter displays the time and date of the test and the results of each part of the system test. (See the User Manual.)
27	crestfact (cf)	27 Crest 1.41	Change Not Allowed	0.00-5.00	Crest factor (peak AC amps out divided by RMS AC amps out).
28	brownlevel (bl)	28 BrnLvl 79.8	Change Not Allowed	74.4-192.0	The AC input voltage at which the FERRUPS will switch to inverter (battery power). If extended brownout (parameter 63) is set to "Yes," this varies from 62% of nominal AC Volts In at no load to 80% at full load. If parameter 63 is set to "No," this is fixed at 80% of nominal AC volts in. See parameter 64.
29	beepfreq (bf)	29 BeepFreq 1320	Service	0-9999	This parameter sets the pitch of the beeper. Smaller numbers set the pitch higher; larger numbers set the pitch lower.
30	mindcv (mind)	30 MinDCV 11.36	Service	0.00-200.00	The minimum battery voltage measured since you started the FERRUPS or since the last time you used the extendedhistory command.
31	maxdcv (maxd)	31 MaxDCV 13.59	Service	0.00-200.00	The maximum battery voltage measured since you started the FERRUPS or since the last time you used the extendedhistory command.

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
32	minacvi (minvi)	32 MinACVI 0.0	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The minimum AC input voltage measured since you started the FERRUPS or since the last time you used the extendedhistory command.
33	maxacvi (maxvi)	33 MaxACVI 124.2	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The maximum AC input voltage measured since you started the FERRUPS or since the last time you used the extendedhistory command.
34	minacvo (minvo)	34 MinACVO 119.1	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The minimum AC output voltage measured since you started the FERRUPS or since the last time you used the extendedhistory command.
35	maxacvo (maxvo)	35 MaxACVO 122.5	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The maximum AC output voltage measured since you started the FERRUPS or since the last time you used the extendedhistory command.
36	minva (minva)	36 Min VA 115	Service	0-20000	The minimum volt-ampere output measured since you started the UPS or since the last time you used the extendedhistory command.
37	maxva (maxva)	37 Max VA 705	Service	0-30000	The maximum volt-ampere output measured since you started the UPS or since the last time you used the extendedhistory command.
38	badpassword (bp)	38 #Bad PW 0	Service	0-65535	The number of times an invalid password was entered.
39	ctrlpw (cp)	39 Ctrl PW 0)No	None (User if the setting has been changed to "Yes.")	0)No-1)Yes	If this is set to 1)Yes, you need a User password (or higher) to change some parameters and to use the red Control key functions on a control panel. If this is set to 0)No, you do not need a password to use these functions.
40	serialnumber (sn)	40 Serial Number FE850VA12345	Change Not Allowed	Not Applicable	This is the FERRUPS factory serial number; it is used to identify your FERRUPS.
41	modelindex (mi)	41 ModelIndex 303: FE850VA	Change Not Allowed	1:FE500VA-14:FE18KVA	Your FERRUPS' size and model number.
42	nomfreq (nf)	42 NomFrq 1)60Hz	Change Not Allowed	0)50Hz-1)60Hz	The nominal frequency of the AC input and output voltages.
43	nomvin (nvi)	43 NomVIn 120.0	Change Not Allowed	60.0-500.0 (In 8.01 software, 100.0-300.0)	The nominal AC input voltage to the FERRUPS.
44	nomvout (nvo)	44 NomVOut 120.0	Change Not Allowed	60.0-500.0 (In 8.01 software, 75.0-500.0)	The nominal AC output voltage from the FERRUPS.
45	ratedva (rva)	45 RatedVA 850	Change Not Allowed	100-30000	The maximum rated volt-amperes that the UPS can deliver to your protected equipment without sounding an Overload alarm.

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
46	ratedwatts (rw)	46 RatedW 600	Change Not Allowed	100-30000	The maximum rated watts that the FERRUPS can provide to your protected equipment without sounding an Overload alarm.
47	ilimitlevel (ill)	47 ILimitLvl 123	Change Not Allowed	10-253	The level at which the FERRUPS' inverter limits current drawn from the batteries.
48	ilimitamps (ila)	48 ILimitAmp 229	Change Not Allowed	0-600	The approximate level of DC current (in amps) at which the FERRUPS' inverter will limit current drawn from the batteries.
49	rackmount (rm)	49 Rackmnt 0)No	Change Not Allowed	0)No-1)Yes	This parameter shows whether your FERRUPS is a rackmount model or a standard model.
50	startup (sta)	50 Startup 1)On	Service	0)Off-1)On	This parameter determines whether the UPS will be in the Auto mode when you turn the On/Off switch on. If this is set to 0)Off, the UPS will stay in the Off mode when you turn the switch on until you put it into Auto mode. If this is set to 1)On, the UPS goes into the Auto mode when you switch on the On/Off switch.
51	lowfreq (lf)	51 LowFreq 57.00	Service	45.00-65.00	The low AC input frequency at which the FERRUPS switches to inverter (battery power). The UPS will continue to use battery power until the frequency rises above this point again.
52	highfreq (hf)	52 HiFreq 63.00	Service	45.00-65.00	The high AC input frequency at which the UPS switches to inverter (battery power). The UPS will continue to use battery power until the frequency drops below this point again.
53	slewrates (sr)	53 SlewRate 100	Service	5-500	The rate at which the FERRUPS' inverter tracks a varying AC input.
54	phaselock (pl)	54 PhaseLk 500	Service	50-5000	The point at which the FERRUPS has locked onto the AC input phase before it transfers from inverter (battery power) to AC input power.
55	freqglitchcnt (fgc)	55 FreqGlCnt 3	Service	1-60	The number of cycles that AC input frequency must be outside of the range set by parameters 51 and 52 before the FERRUPS switches to inverter (battery power).
56	lineglitchcnt (lgc)	56 LineGlCnt 3	Service	1-20	The number of AC input glitches in a row that must happen before the FERRUPS switches to inverter (battery power).
57	linedelta (lid)	57 LineDelta 80	Service	1-512	This parameter helps the FERRUPS determine what qualifies as an AC input glitch. Higher values make the FERRUPS less sensitive to input line transients.
58	xferdelay (xd)	58 XferDly 1.0s	Service	0.0-999.9	The minimum number of seconds the FERRUPS will run on inverter (battery power) before it switches back to AC input power.
59	lowvoutalarm (lvoa)	59 LVOAlrm 108.0	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The output voltage at which the FERRUPS sounds a Low AC Output alarm. See the User Manual.

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
60	lowvoutshutdn (lvos)	60 LVOShdn 102.0	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The point at which the FERRUPS shuts down because of low output voltage.
61	hivoutalarm (hvoa)	61 HVOAlrm 129.6	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The output voltage at which the FERRUPS sounds a High AC Output alarm. (See the User Manual.)
62	hivinalarm (hvia)	62 HVIAAlrm 138.0	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The input voltage at which the FERRUPS sounds a High AC Input alarm. (See the User Manual.)
63	extbrnout (ebo)	63 ExBrOut 1)Yes	None (User if parameter 39 has been changed to "Yes.")	0)No-1)Yes	This parameter enables or disables extended brownout. If this is set to "Yes," then the Brownout setpoint (parameter 28) varies from 62% of nominal AC Volts In at no load to 80% of nominal AC Volts In at full load. If this is set to "No," the Brownout setpoint (parameter 28) stays at 80%. (See parameter 64.)
64	brownoutv (bv)	64 BrnOutV 96.0	Service	50.0-500.0	When parameter 63 is set to 0)No, this parameter determines when there is a brownout condition. When AC input voltage falls below this setpoint, the FERRUPS switches to battery power.
65	lowbattv (lb)	65 LoBatV 10.50	Service	6.00-175.00	The DC voltage at which the UPS shuts down because of a low battery. The UPS will remain off until you switch it off and on again.
66	nearlowbattv (nlb)	66 NLBatV 11.00	Service	6.00-175.00	The battery voltage at which the UPS sounds a Near Low Battery alarm. (See the User Manual.)
67	highbattv (hb)	67 HiBatV 15.00	Service	6.00-200.00	The battery voltage at which the UPS sounds a High Battery alarm. (See the User Manual.)
68	lowruntime (lr)	68 LowRunTm 6m	None (User if parameter 39 has been changed to "Yes.")	0-999	When runtime (parameter 9) drops to this point, the FERRUPS sounds a Low Runtime alarm. (See the User Manual.)
69	battamphours (bah)	69 Batt AH 31	Service	5-20000	The amp-hour capacity of the FERRUPS' batteries.
70	runtimek (k)	70 RuntimeK 20	Service	1-200	A constant that the FERRUPS uses to calculate runtime.
71	testlevel (tl)	71 Test Level 3	None (User if parameter 39 has been changed to "Yes.")	0-3	This determines which parts of the Automatic System Test the FERRUPS will do. See the User Manual for more information. 0=None; 1=Logic Test; 2=Logic and Inverter Tests; 3=Logic, Inverter, and Battery Tests.

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
72	testint (tei)	72 TestInt 7dy	None (User if parameter 39 has been changed to "Yes.")	0 (Off)-366	The number of days between Automatic System Tests. See the User Manual for more information on the test.
73	testtime (tt)	73 Test@ 1:00:00	None (User if parameter 39 has been changed to "Yes.")	00:00:00-23:59:59	The time of day (in 24-hour time) when the FERRUPS will do the Automatic System Test.
74	nomilimit (nil)	74 NomILimit 360	Service	10-999	The maximum current the FERRUPS can draw from its batteries when it runs on battery power.
75	batttesttime (btt)	75 BT Time 60s	Service	0-9999 (In 8.01-8.05 software, 0-999)	The number of seconds the FERRUPS must run on battery power during the battery test before it compares calculated runtime to the Low Runtime alarm setpoint.
76	pfmtemp (pt)	76 PFM Temp 28c	Change Not Allowed	-63 to 193	The temperature of the Power Factor Module.
77	autorestart (ar)	77 AutoRst 60s	Service	0-9999	When you have shut down the FERRUPS using an off or shutdown command (see the User Manual), or when an alarm shuts down the FERRUPS, this is the minimum number of seconds the FERRUPS will remain off before it can restart automatically. To disable the automatic restart, set this to "0."
78	alarmsenable (ae)	78 AlmEnbl 1)Yes	Service	0)No-1)Yes	This parameter enables or disables the FERRUPS' ability to sense an alarm.
79	consolemode (cm)	79 Console Mode	None (User if parameter 39 has been changed to "Yes.")	1-4	This parameter helps make the UPS compatible with CheckUPS. Setting affects parameter 97 . 1 = UPS sends inverter/alarm messages. 2 = UPS suppresses inverter/alarm messages. 3 = UPS does not echo back commands. 4 = UPS sends the "F" string every 15 seconds. (See Section 307 .)
80	ambtempalarm (ata)	80 AT Alarm 60c	Service	0-200	The point at which the FERRUPS sounds a High Ambient Temperature alarm. See the User Manual.
81	ambtempshutdn (ats)	81 AT Shdn 70c	Service	0-200	The point at which the FERRUPS shuts down because of a High Ambient Temperature.
82	hstempalarm (hta)	82 HT Alarm 105c	Service	0-200	The point at which the FERRUPS sounds a High Heatsink Temperature alarm. See the User Manual.
83	hstempshutdn (hts)	83 HT Shdn 110c	Service	0-200	The point at which the FERRUPS shuts down because of a High Heatsink Temperature.
84	xtempalarm (xta)	84 XT Alarm 75c	Service	0-200	The point at which the UPS sounds a High Transformer Temperature alarm. See the User Manual. In models that do not monitor transformer temperature, this is set to "0."

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
85	xtempshutdn (xts)	85 XT Shdn 85c	Service	0-200	The point at which the FERRUPS shuts down because of a High Transformer Temperature. In models that do not monitor transformer temperature, this is set to "0."
86	pfmtempalarm (pta)	86 PF Alarm 85c	Service	0-200	The point at which the FERRUPS sounds a High Power Factor Module Temperature alarm. See the User Manual.
87	pfmtempshtdn (pts)	87 PF Shdn 95c	Service	0-200	The point at which the FERRUPS shuts down because of a high Power Factor Module temperature.
88	acvofault (vof)	88 VOutFlt 24.0	Service	0.0-500.0 (In 8.01 software, 0.0-300.0)	The point at which the FERRUPS shuts down because of output power problems.
89	invrelaydelay (ird)	89 IRlyDly 0s (Reserved in 8.01 software)	Service	0-9999	When the UPS starts running on inverter (battery), this is the number of seconds the UPS will delay before it activates the inverter relay.
90	remotebaudrate (rb)	90 Rem Baud 7 [07]: 1200 baud	Service	[0]: 50- [15]: 38400	The baud rate of the control panel's RJ-45 (phone jack) connector. If you have a device connected to the port, changing the baud rate could cause communication problems. Settings: [0]:50, [1]:75, [2]:110, [3]:135, [4]:150, [5]:300, [6]:600, [7]:1200, [8]:1800, [9]:2400, [10]:3600, [11]:4800, [12]:7200, [13]:9600, [14]:19200, [15]:38400.
91	remotewordfmt (rwf)	91 RemWordFmt 0 [00]: 8N1	Service	0-7	This parameter sets the data word format of the control panel's RJ-45 (phone jack) connector on 4.3-18KVA models. Call BEST for more information.
92	remotehandshake (rh)	92 Rem HndShk 15 SRx*STx*CTS*RTS	Service	0-15	This parameter enables or disables hardware and software handshaking of the control panel's RJ-45 (phone jack) connector on 4.3-18KVA models. Call BEST for more information.
93	remotercp (rrcp)	93 Rem RCP 1)Yes	Service	0)No-1)Yes	When this is 1)Yes, the control panel's RJ-45 (phone jack) connector (4.3-18KVA models) is set up to communicate with the control panel. When it is set to 0)No, the connector acts as an RS232 communication port.
94	remotectl (rc)	94 Rem Ctrl 15 Eco*Err*Msg*P=>	Service	0-31	This parameter enables or disables messaging and echoback on the control panel's RJ-45 connector. Call BEST for more information.
95	consolebaudrate (cb)	95 Con Baud 7 [07]: 1200 baud	Service	[0]: 50- [15]: 38400 (See Explanation column.)	The baud rate of the UPS' communication port. If you have a device connected to the RS232 port, changing the baud rate could cause communication problems. Settings: [0]:50, [1]:75, [2]:110, [3]:135, [4]:150, [5]:300, [6]:600, [7]:1200, [8]:1800, [9]:2400, [10]:3600, [11]:4800, [12]:7200, [13]:9600, [14]:19200, [15]:38400.

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
96	consolewrdfmt (cw)	96 ConWordFmt 0 [00]: 8N1	Service	0-7	The data word format of the RS232 communication port. Settings: 8N1, 8N2, 7N1, 7N2, 7E1, 7E2, 7O1, and 7O2. Changing the setting could cause communication problems.
97	consolehandshake (ch)	97 Con HndShk 12 SRx*STx* *	Service	0-15	This parameter enables and disables hardware and software handshaking at the RS232 communication port.
98	consolercp (crcp)	98 Con RCP 0)No	Service	0)No-1)Yes	When this is set to 1)Yes, the FERRUPS' communication port is set up to communicate with a control panel. When this is set to 0)No, the communication port acts as an RS232 port.
99	consolectrl (cc)	99 Con Ctrl 15 Eco*Err*Msg*P=>	Service	0-31	This parameter enables and disables UPS messaging and echo back of the UPS' RS232 communication port (on the back panel).
100	search1 (s1)	100 Search #1 Network UPS 1	Service	Up to 20 characters.	To enable the UPS to automatically log onto the host system that it is connected to, you can use this parameter to enter the string the host system uses to search for a UPS. When the UPS receives this search string, it will respond with the string you enter in parameter 102. See parameters 101-103.
101	search2 (s2)	101 Search #2 Network UPS 1	Service	Up to 20 characters.	When the UPS receives this search string, it will execute the command you enter in parameter 103.
102	response1 (r1)	102 Response #1 UPS #1 active	Service	Up to 40 characters.	See parameter 100. When the UPS receives the search string you enter in parameter 100, it will respond to your host system with the string you enter for this parameter (102).
103	response2 (r2)	103 Response #2	Service	Up to 40 characters.	See parameter 101. When the UPS receives the search string you enter in parameter 101, it will execute the command you enter in this parameter (103).
104	relaymask1 (rm1)	104 RMask1 65535 PONMLKJIHGFEDCEA	Service	0-65535	This parameter determines which of the alarms A-P will activate the alarm relay contact at the FERRUPS' RS232 port (on the back panel). (See Section 500 to program this parameter.)
105	relaymask2 (rm2)	105 RMask2 65535 543210ZYXWVUTSRQ	Service	0-65535	This parameter determines which of alarms Q-T will activate the alarm relay contact at the FERRUPS' RS232 port (on the back panel). (See Section 500 to program this parameter.)
106	epomode (em)	106 EPO Mode 0 * * *	Service	0-16	This parameter selects the Remote Emergency Power Off Mode. (See Section 400 .)
107	epodebounce (edb)	107 EPODbc 0.3s	Service	0.0-999.9	The length of Emergency Power Off signal that the FERRUPS requires. (See Section 400 .)
108	epodelay (edl)	108 EPODly 0.1s	Service	0.0-999.9	The amount of time the FERRUPS delays a Remote Emergency Power Off shutdown after it receives the signal. (See Section 400 .)

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
109	pabase (pab)	109 PABase 3560	Change Not Allowed	0-20000	This parameter affects FERRUPS transfers.
110	cfacvin (cfvin)	110 CFACVIN 1180	Change Not Allowed	0-32767 (In 8.01 software, 0-3000)	The calibration factor numerator for AC input voltage.
111	cfacvid (cvid)	111 CFACVID 554	Change Not Allowed	1-1023	The calibration factor denominator for AC input voltage.
112	cfacvon (cvon)	112 CFACVON 1180	Change Not Allowed	0-32767 (In 8.01 software, 0-3000)	The calibration factor numerator for AC output voltage.
113	cfacvod (cvod)	113 CFACVOD 554	Change Not Allowed	1-1023	The calibration factor denominator for AC output voltage.
114	cfacaon (caon)	114 CFACAON 68	Change Not Allowed	0-32767 (In 8.01 software, 0-2200)	The calibration factor numerator for AC output current.
115	cfacaod (caod)	115 CFACAOD 44	Change Not Allowed	1-1023	The calibration factor denominator for AC output current.
116	cfdcvn (cdvn)	116 CFDCVN 1100	Change Not Allowed	0-32767 (In 8.01 software, 0-17500)	The calibration factor numerator for DC voltage.
117	cfdcvd (cdvd)	117 CFDCVD 629	Change Not Allowed	1-1023	The calibration factor denominator for DC voltage.
118	cfdcn (cdan)	118 CFDCAN 2732	Change Not Allowed	0-32767 (In 8.01 software, 0-2000)	The calibration factor numerator for DC current.
119	cfdcad (cdad)	119 CFDCAD 512	Change Not Allowed	1-1023	The calibration factor denominator for DC current.
120 (8.01-8.05 software)	softwver (sv)	120 SW Ver 8.02	Change Not Allowed	00.00-99.99	The FERRUPS software version for units with 8.01-8.05 software versions. See parameter 137 for higher software versions.
(8.06 and higher software)	cfchgcn (ccn)	120 CFCHGN 1000	Change Not Allowed	0-32767	The calibration factor numerator for charger current.
121 (8.01-8.05 software)	nvchecksum (c)	121 Chksum 1CF8h	Change Not Allowed	0000h-FFFFh	Nonvolatile RAM Checksum for units with 8.01-8.05 software versions. See parameter 138 for higher software versions.)
(8.06 and higher software)	cfchgd (ccd)	121 CFCHGD 1023	Change Not Allowed	1-1023	The calibration factor denominator for DC amps (charging current).

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
122 (8.01-8.05 software)	romchecksum (rcs)	122 ROMChk 41B7h	Change Not Allowed	0000h-FFFFh	EPROM Checksum for units with 8.01-8.05 software versions. See parameter 139 for higher software versions.
(8.06 and higher software)	chargertype (ct)	122 Chgr Type 0	Service	0-3	The type of charger installed: 0 = Hardware float charger. 1 = Software-controlled float charger. 2 = Software-controlled hysteresis charger. 3 = Disabled; independent external charger.
123 (8.06 and higher software)	maxchargeamp (mc)	123 MaxChgA 20.0	Change Note Allowed	1.0-99.9	If parameter 122 is set to "1" or "2," parameter 123 is the continuous rated charger current. The average charger current cannot exceed this value. If parameter 122 is set to "0," parameter 123 is not effective.
124 (8.06 and higher software)	lowchargerv (lcv)	124 LoCV 13.00	Service	0.0-200.0	When parameter 122 is set to "2," this parameter is the low charging voltage setpoint. The charger is started when DC volts fall below this value.
125 (8.06 and higher software)	floatchargerv (fcv)	125 FltCV 13.60	Service	0.0-200.0	When parameter 122 is set to "1," this parameter is the float charger voltage level. The FERRUPS maintains the battery voltage at this level if possible.
126 (8.06 and higher software)	highchargerv (hcv)	126 HiCV 14.40	Service	0.0-200.0	When parameter 122 is set to "2," this parameter is the high charging voltage setpoint. The charger is turned off when DC volts rise above this value.
127 (8.06 and higher software)	equalizechargerv (ecv)	127 EqCV 12.60	Service	0.0-200.0	When parameter 122 is set to "2" or "3," this parameter is the equalize charging voltage setpoint. When battery voltage is below this point, the charger equalizes the batteries.
128 (8.06 and higher software)	chargerondelay (cod)	128 ChOnDly 240s	Change Not Allowed	2-9999	The amount of time (in seconds) that the FERRUPS will delay before starting the charger after startup or after an inverter run.
129 (8.06 and higher software)	lowacdelay (lacd)	129 LoACDly 5s	Change Not Allowed	1-255	Once the FERRUPS senses a low AC output, this parameter determines the number of seconds the unit waits before causing a Low AC Output alarm shutdown.
130 (8.06 and higher software)	Reserved	130 --Reserved--	—	—	—
131 (8.06 and higher software)	Reserved	131 --Reserved--	—	—	—
132 (8.06 and higher software)	Reserved	132 --Reserved--	—	—	—

Number	Name (Short Form)	Sample Display	Password to Change	Range	Explanation
133 (8.06 and higher software)	Reserved	133 --Reserved--	—	—	—
134 (8.06 and higher software)	Reserved	134 --Reserved--	—	—	—
135 (8.06 and higher software)	Reserved	135 --Reserved--	—	—	—
136 (8.06 and higher software)	Reserved	136 --Reserved--	—	—	—
137 (8.06 and higher software)	softwver (sv)	137 SW Ver 8.06	Change Not Allowed	00.00-99.99	The FERRUPS software version for units with 8.06 and higher versions. See parameter 120 for earlier software versions.
138 (8.06 and higher software)	nvchecksum (c)	138 Chksum 1CF8h	Change Not Allowed	0000h-FFFFh	Nonvolatile RAM Checksum for units with 8.06 and higher software versions. See parameter 121 for earlier software versions.
139 (8.06 and higher software)	romchecksum (rcs)	139 ROMChk 41B7h	Change Not Allowed	0000h-FFFFh	EPROM Checksum for units with 8.06 and higher software versions. See parameter 122 for earlier software versions.

307 The Format Command

The **format** command tells the FERRUPS to send system status and metering information in a fixed format. This information can be incorporated into your host system software without any text or punctuation. The data string is made up of

1. For 8.01-8.04 software, <cr><lf><cr>, or a carriage return, a line feed, and another carriage return. For 8.05 and higher software, <cr><cr><lf>, or two carriage returns and a line feed.
2. 80 ASCII characters that represent 40 hexadecimal bytes of information.
3. <cr><cr><lf>, or two carriage returns and a line feed.

The data is in the format shown in the table below and on the next two pages.

Characters	# Bytes	Description
header	Not Applicable	For 8.01-8.04 software, a <cr><lf><cr> or <ODH><OAH><ODH> sequence. For 8.05 and higher software, a <cr><cr><lf> or <ODH><ODH><OAH> sequence.
0-1	1	Month (BCD) Range: 01-12
2-3	1	Day (BCD) Range: 01-31
4-5	1	Hours (BCD) Range: 00-23
6-7	1	Minutes (BCD) Range: 00-59

Characters	# Bytes	Description																		
8-9	1	Seconds (BCD) Range: 00-59																		
10-11	1	System Mode (BCD) Range: 00-03 00 = Off; 01 = Auto; 02 = Line Conditioning; 03 = Inverter (Battery Power).																		
12-13	1	Reserved.																		
14-15	1	Alarm Status (BCD) Range: 00-01 00 = Alarms disabled; 01 = Alarms enabled.																		
16-17	1	Inverter Status (BCD) Range: 00-01 00 = Inverter is off; 01 = Inverter is on.																		
18-19	1	Charger Status (BCD) Range: 00-01 00 = Charger is off; 01 = Charger is on.																		
20-21	1	Alarm Status Register #1, alarms A-H (bit-mapped, 1=true). See the information below. <div style="text-align: center;">Bit Position</div> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>Alarm</td> <td>High Ambient Temp</td> <td>Output Overload</td> <td>High AC Out</td> <td>Low AC Out</td> <td>Low Runtime Left</td> <td>High Battery</td> <td>Near Low Battery</td> <td>Low Battery</td> </tr> </table>		7	6	5	4	3	2	1	0	Alarm	High Ambient Temp	Output Overload	High AC Out	Low AC Out	Low Runtime Left	High Battery	Near Low Battery	Low Battery
	7	6	5	4	3	2	1	0												
Alarm	High Ambient Temp	Output Overload	High AC Out	Low AC Out	Low Runtime Left	High Battery	Near Low Battery	Low Battery												
22-23	1	Alarm Status Register #2, alarms I-P (bit-mapped, 1=true). See the information below. <div style="text-align: center;">Bit Position</div> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>Alarm</td> <td>Emergency Power Off</td> <td>Check Memory</td> <td>Check Inverter</td> <td>Check Battery</td> <td>Check Charger</td> <td>High Transformer Temp</td> <td>User Test Alarm</td> <td>High Heatsink Temp</td> </tr> </table>		7	6	5	4	3	2	1	0	Alarm	Emergency Power Off	Check Memory	Check Inverter	Check Battery	Check Charger	High Transformer Temp	User Test Alarm	High Heatsink Temp
	7	6	5	4	3	2	1	0												
Alarm	Emergency Power Off	Check Memory	Check Inverter	Check Battery	Check Charger	High Transformer Temp	User Test Alarm	High Heatsink Temp												
24-27	2	AC Volts In (BCD) Range: 0000-9999																		
28-31	2	AC Volts Out (BCD) Range: 0000-9999																		
32-35	2	Reserved.																		
36-39	2	AC Current Out in Amps (BCD) Range: 0000-9999. A decimal point is implied after the third digit (xxx.x)																		
40-45	3	Volt-Amperes (VA) Out (BCD) Range: 000000-999999																		
46-49	2	DC Current in Amps (BCD) Range: 0000-9999. A decimal point is implied after the third digit (xxx.x).																		
50-53	2	DC Volts (BCD) Range: 0000-9999. A decimal point is implied after the third digit (xxx.x).																		
54-57	2	Frequency in Hz (BCD) Range: 0000-9999. A decimal point is implied after the second digit (xx.xx).																		
58-61	2	Runtime Minutes Remaining (BCD) Range: 0000-9999																		
62-65	2	Ambient Temperature in Degrees Celsius (BCD) Range: 0000-9999																		
66-67	2	Alarm Status Register #3, alarms Q-X (bit-mapped, 1=true). See the information below. <div style="text-align: center;">Bit Position</div> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>Alarm</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Call Service</td> <td>High AC Input</td> <td>Probe Missing</td> <td>Check PFM Temp</td> </tr> </table>		7	6	5	4	3	2	1	0	Alarm	Reserved	Reserved	Reserved	Reserved	Call Service	High AC Input	Probe Missing	Check PFM Temp
	7	6	5	4	3	2	1	0												
Alarm	Reserved	Reserved	Reserved	Reserved	Call Service	High AC Input	Probe Missing	Check PFM Temp												

Characters	# Bytes	Description																		
68-69	2	Alarm Status Register #4, alarms Y-Z and 0-5 (bit-mapped, 1=true). See the information below. <div style="text-align: center;">Bit Position</div> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>Alarm</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> </tr> </table>		7	6	5	4	3	2	1	0	Alarm	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
	7	6	5	4	3	2	1	0												
Alarm	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved												
70-71	1	Console Error Codes: 00 = No error 01 = Unrecognized comman 02 = Not implemented 03 = Number expected 04 = Bad/missing keyword 05 = String expected 06 = Keyword or number expected 07 = Additional parameters expected 08 = Too many parameters 09 = Value out of range 0A= Bad password 0B = Password required 0C = Parameter not programmable 0D = Cannot change system mode 0E = Unrecognized error code																		
72-73	1	ADR5. Range: 00-FF. A/D conversion value of aux board input.																		
74-77	2	Software Version number.																		
78-79	1	Checksum Byte (Hexadecimal, 00-FF is valid). Equal to the 2's complement hex sum, without carry, of the preceding 39 two-digit hexadecimal numbers.																		
trailer	Not Applicable	<cr><lf> or <ODH><ODH><OAH> sequence.																		

400 Remote Emergency Power Off

The **Remote Emergency Power Off** feature on pin 21 lets you shut down the FERRUPS' output power through your computer room's emergency shutdown switch. Usually, the computer room's emergency shutdown switch shuts down AC input power to all of the equipment that is connected to the switch. This kind of switch can shut down the FERRUPS' input power if FERRUPS receives its input power through the emergency shutdown switch. However, this setup will not shut down the output power that the FERRUPS provides to the protected equipment; instead, the FERRUPS will continue to provide output power until its batteries run down. To set up the emergency shutdown switch to shut off the FERRUPS' **output** power, you need to use the Remote Emergency Power Off feature.

To shut down the FERRUPS' output power, your computer room's emergency shutdown switch must have a set of contacts that apply the +12 VDC level on pin 6 (or on pin 18) to pin 21. Use a shielded, single twisted pair cable to connect your switch to these pins. **Do not use pin 14.**

A brief connection between pins 6 and 21 (or pins 18 and 21) will shut down the FERRUPS' output and start the Emergency Power Off alarm. As long as pin 6 or pin 18 is connected to pin 21, you cannot restart the FERRUPS to provide output power. To restart the UPS, break the connection between pins 6 and 21 (or between pins 18 and 21). Then, turn the FERRUPS On/Off switch off and on again. (You can put the UPS in the Auto Mode instead of turning the On/Off switch off and on again.)

Note: The +12 VDC level on pin 6 or pin 18 is only available when the FERRUPS is operating.

You can change the way the Remote Emergency Power Off feature operates by using parameters 106, 107, and 108. See the instructions in Sections [401](#), [402](#), and [403](#).

401 Changing the Remote Emergency Power Off Mode (Parameter 106)

Parameter 106, EPO Mode, lets you decide which of four available features you want to use. The tables below describe these features. All four are off when the FERRUPS is shipped to you. To choose one or more of the features, simply add the values of the features you want to use and use the total as the new parameter setting. If you don't want to use any of these features, leave the setting at 0. You can completely disable the EPO feature by setting parameter 106 to 16. (See [Section 305](#) for information on programming parameters.)

Name	Value	What the FERRUPS Does When You Select This Option	What the FERRUPS Does When You Leave this Off
Rst (Restart)	8	The FERRUPS automatically restarts when the emergency power off signal from your emergency shutdown switch stops.	The FERRUPS does not restart until you break the connection between pins 6 and 21 (or 18 and 21) and turn the UPS on manually.
Inv (Inverter)	4	The FERRUPS will only shut down if it receives the emergency power off signal when it is running on battery power.	The UPS will shut down when it receives the emergency power off signal regardless of whether it is running on AC input or battery power.
Lvl (Level)	2	Level-sensitive. The UPS responds to a level emergency power off signal (not a rising or falling signal). (See the table below.)	Edge-Sensitive. The UPS responds to an emergency power off signal made up of rising or falling voltage. (See the table below.)
Neg (Negate)	1	FERRUPS responds to 0 volts on pin 21 as an emergency power off signal.	FERRUPS responds to 12 volts on pin 21 as an emergency power off signal.

Examples: If you chose the Restart and Level features, you would add the values (8 and 2) to get your new parameter setting (10).

Using the Level and Negative Features		
Level	Negative	What FERRUPS Does
On	Off	Pin 6 or 18 is usually not applied to pin 21, so the UPS usually receives no signal (0 volts). When pin 6 or 18 is applied to pin 21 and the UPS receives a steady or level 12-volt signal, the UPS will shut down its output power and start the Emergency Power Off alarm.
On	On	Pin 6 or pin 18 is usually applied to pin 21, so the UPS usually receives a 12-volt signal. After pin 6 or 18 is removed from pin 21 and the UPS is not receiving a signal (0 volts), the UPS will shut down its output power and start the Emergency Power Off alarm.
Off	Off	Pin 6 or 18 is usually not applied to pin 21, so the UPS usually receives no signal (0 volts). When pin 6 or 18 is applied to pin 21 and the voltage is rising to 12 volts, the UPS will shut down its output power and start the Emergency Power Off alarm.
Off	On	Pin 6 or 18 usually is applied to pin 21, so the UPS usually receives a 12-volt signal. When pin 6 or 18 is removed from pin 21 and the voltage is falling to 0 volts, the UPS will shut down its output power and start the Emergency Power Off alarm.

402 Changing the Length of Emergency Power Off Signal FERRUPS Requires (Parameter 107)

Using parameter 107, you can also tell the FERRUPS how long an emergency power off signal should be.

Note: This delay only works if "level" is set (on) in parameter 106. (See Section 401.)

In some environments with a lot of electrical noise, the noise could act like an emergency power off signal. To make sure that the FERRUPS recognizes a true emergency power off signal, you can change the value of parameter 107.

As shipped, the FERRUPS' parameter 107 is set to 0.3s (.3 seconds). This means that the FERRUPS will wait for an emergency power off signal on pin 21 that is at least .3 seconds long. If you want the FERRUPS to wait for a longer signal, you can change the setting of parameter 107. (See the Parameter Table in [Section 306](#) for more information.)

403 Changing FERRUPS' Delay Before Shutdown (Parameter 108)

As shipped, the UPS waits 0.1 seconds after it recognizes an emergency shutdown signal before it shuts down. You can adjust this delay by changing the value of parameter 108. (See the Parameter Table in [Section 306](#).)

500 Using the RelayMask Parameters to Control the Alarm Contacts

The RelayMask parameters (104 and 105) let you choose which alarms will operate the alarm signal contacts at the UPS communication port. For more information on the alarm contacts, see the FERRUPS User Manual (Section 403).

As shipped, the alarm signal contacts change status whenever the UPS alarms. By programming the RelayMask parameters, you can set up the alarm contacts so they will only change status during certain alarms. RelayMask1 (parameter 104) is for alarms A-P, and RelayMask2 (parameter 105) is for alarms Q-T. **No matter how you program these parameters, when the On/Off switch is off, the alarm contacts will act as if an alarm is present.**

To program parameters 104 and 105, follow these steps:

1. Enter the Service password (2639). If you are using a FERRUPS control panel, use the [PROGRAM] key to enter the password. If you are using a terminal or computer, use the **password** (or **pw**) command.
2. Display parameter 104 (RelayMask1). If you have a control panel, press [DISPLAY] [1] [0] [4] [ENTER]. If not, enter **display 104** on your computer or terminal.
3. Parameter 104 determines whether alarms A-P will activate the contacts. At the factory, it is set to 65535; this setting means all of the alarms (A-P) will activate the alarm relay contacts.

If you do not want any of the alarms to activate the contacts, write 0 for the "Total" on the next page. If you want some of the alarms to activate the contacts, find the Alarm Value for each of those alarms and write it in the third column on the next page. Write 0 for each alarm that you do not want to activate the contacts. Then, add the numbers in the third column.

For example, to enable alarms A (Low Battery), B (Near Low Battery), and C (High Battery), write 1 for alarm A, 2 for alarm B, 4 for alarm C, and 0 for the rest of the alarms. The total is 7.

Note: For the AS/400, you should **only** enable the alarm signal contacts for the Low Battery and Near Low Battery alarms. In the blanks on the next page, A=1, B=2, C through P=0, and Total=3.

<u>Alarm</u>	<u>Alarm Value</u>	<u>Enter 0 to disable contacts or the Alarm Value to enable them</u>
Low Battery (A)	1	_____
Near Low Battery (B)	2	_____
High Battery (C)	4	_____
Low Runtime (D)	8	_____
Low AC Output (E)	16	_____
High AC Output (F)	32	_____
Output Overload (G)	64	_____
High Ambient Temperature (H)	128	_____
High Heatsink Temperature (I)	256	_____
User Test Alarm (J)	512	_____
High Transformer Temperature (K)	1024	_____
Check Charger (L)	2048	_____
Check Battery (M)	4096	_____
Check Inverter (N)	8192	_____
Memory Check (O)	16384	_____
Emergency Power Off (P)	32768	_____
	Total:	_____

4. Now, change the parameter 104 setting to the total you found in step 3. If you have a control panel, use the [PROGRAM] key to change the setting; if not, use the **program** (or **pr**) command at your terminal or computer.
5. Next, display parameter 105 (RelayMask2); this parameter is for alarms Q-T. If you have never changed the setting, it should be 65535 now, which means alarms Q-T will all activate the alarm signal contacts.
6. If you do not want any of these alarms (Q-T) to operate the alarm contacts, write 0 for the "Total" below.

Note: For AS/400, the contacts should be disabled for all of these alarms. Write 0 for the "Total."

If you want some of the alarms to operate the contacts, write the Alarm Value for each of those alarms in the blanks below; write "0" for any alarm that you do not want to operate the contacts. (Notice that several alarms are "Reserved"; this means no alarm has been assigned to these letters, and the alarms will not appear on your UPS.) Now, add the numbers in the third column.

<u>Alarm</u>	<u>Alarm Value</u>	<u>Enter 0 to disable contacts or the Alarm Value to enable them</u>
High PFM Temperature (Q)	1	_____
Probe Missing (R)	2	_____
High AC Input (S)	4	_____
Call Service (T)	8	_____
Reserved (U)	16	_____
Reserved (V)	32	_____
Reserved (W)	64	_____
Reserved (X)	128	_____
Reserved (Y)	256	_____
Reserved (Z)	512	_____
Reserved (0)	1024	_____
Reserved (1)	2048	_____
Reserved (2)	4096	_____
Reserved (3)	8192	_____
Reserved (4)	16384	_____
Reserved (5)	32768	_____
	Total:	_____

7. Change the parameter 105 setting to the total you found in step 6. (Use the [PROGRAM] key on the control panel or the **program** or **pr** command on a terminal or computer.)
8. Display parameter 104 and 105 to verify the settings.

600: Connecting an External Relay to Monitor the Dry Contacts

The FERRUPS provides a 12 VDC, 0.5-amp source on pin 14 that you can use to power an external relay. See Figure 5. When you connect the relay, you must place a 1N4148 or equivalent diode in parallel with the relay coil to clamp spikes. Spikes are induced when the relay coil is de-energized.

The FERRUPS' dry contacts are rated at 25 volts AC or DC and 250 mA.

⚠ CAUTION: If you do not connect the diode in parallel with the relay coil, the spikes could damage the logic board or make it reset. If the logic board resets, it loses any parameter changes you have made and some programming important to your model .

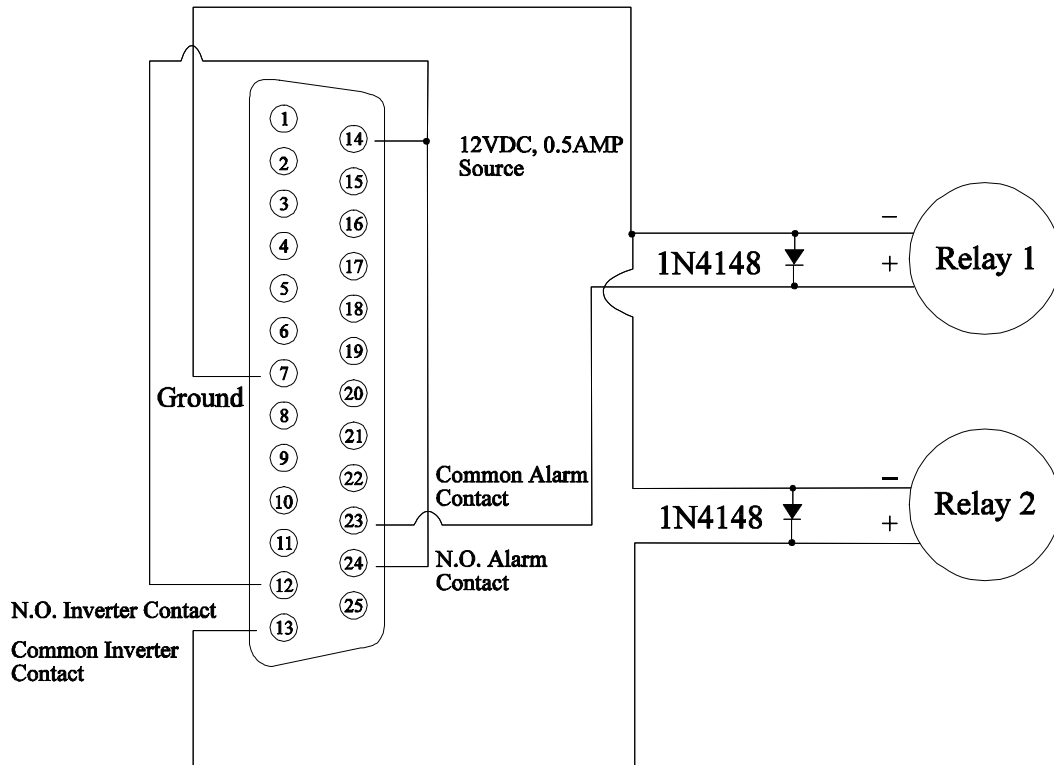


Figure 5

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