

JFW Industries, Inc.



50SA-213 MANUAL

(This manual corresponds to firmware revision B)

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Additional Documents Provided with Manual:

1. Mechanical Outline Drawing
2. Specification Sheet

1. Introduction

General Description

The JFW model 50SA-213 consists of sixteen electro-mechanical 1P2T failsafe RF switches that cover the frequency range DC-18GHz. The 1P2T switches are set to their failsafe port (N.C. port) when the unit is powered on. The unit is controlled remotely via Ethernet or RS-232. In Ethernet mode, up to 4 users can simultaneously connect to the test system. The unit can be manually controlled using the keypad and display on the front panel.

In addition to this manual a CD is also provided. The CD contains the following: Manual, Specification Sheet, Outline Drawing, and JFW Test Program.

Test System Functionality

All of the failsafe 1P2T switches are individually controlled. The rear panel is screened with the address for each switch (i.e. 1-16). The switch ports are marked as NC, COM, and NO. The NC port is the port that is normally closed. If the test system loses power, the normally closed port will still be connected to the common port (COM). The NO port is the normally open port. If the test system loses power, the normally open port will go open. The switch settings can be changed manually using the keypad or remotely using one of remote commands listed in the *JFW Command Set* section of this manual.

Front Panel Display

If the slide switch on the rear panel is set to Ethernet mode when the unit is powered on, then the text *Ethernet Mode* will be displayed. When a valid Ethernet/Telnet connection to the unit has been made (using the system's assigned IP address and port number 3001), the text *1 User Connected* will be displayed. When the connection is closed, the text will be updated to read *0 Users Connected*. There can be up to four simultaneous connections made while in Ethernet mode.

If the slide switch on the rear panel is set to RS-232 mode when the unit is powered on, then the text RS-232 Mode will be displayed. The current baud rate setting is also displayed. When the unit receives the Change Baud Rate remote command, the new baud will be displayed after the remote command is processed.

Switching between Manual and Remote mode

If the unit is connected remotely to a user in Ethernet mode and you switch to manual mode using the *Manual/Remote* button, the unit will close that Ethernet connection before starting manual mode. While in manual mode, no remote Ethernet connections are allowed.

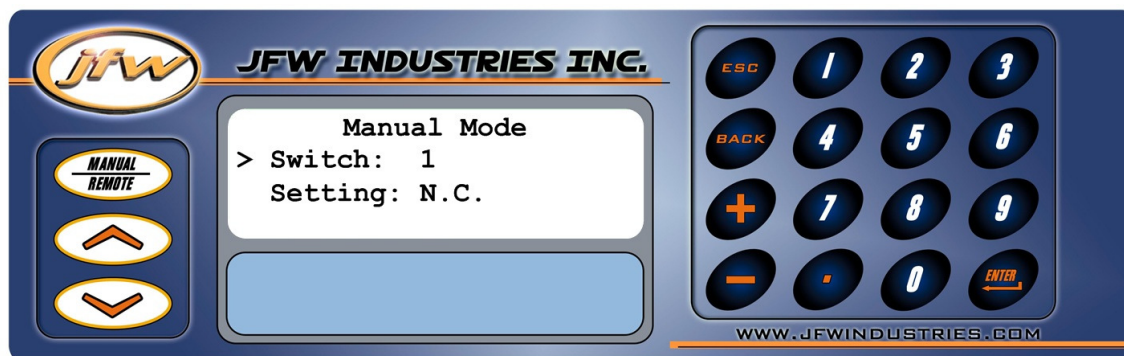
If the unit is in RS-232 mode and you switch to manual mode, the unit will stop executing RS-232 commands that it receives. When you switch back from manual mode to RS-232 mode, all RS-232 commands that were received while in manual mode are deleted from the buffer.

Using the Keypad

Manual control is based on the location of the “>” cursor on the left side of the display. The cursor indicates which line you can change settings. You may switch between the different lines with the Up and Down arrows located on the left side (below Manual/Remote button). When the “>” cursor is on the *Switch* line, the switch address may be changed. When the “>” cursor is on the *Setting* line, the port value may be changed.

Both the switch address and the port settings can be changed by using the number buttons (0-9) or the “+” and “-” buttons. Using the “+” and “-” keys while on the *Switch* line is a convenient way to quickly scroll through all of the current port settings.

The JFW logo on the keypad is also a button. If you press the logo button, the current revision level of the firmware will be display. The information will be displayed for several seconds, then return to the main menu automatically.



Mechanical Specifications

The unit is designed in a 19” rack mount style enclosure. The outline drawing details all necessary package dimensions and connector layouts. The Ethernet port (RJ-45) and RS-232 port (DE-9S) are both located on the rear panel. The slide switch between them is used to select the remote mode. The unit is AC powered via a 3-prong receptacle on the rear panel. A standard North American power cord (type B plug) is supplied with the unit. The internal power supply is a universal AC power supply that can handle AC voltages of 100-240 VAC @ 47-63 Hz. The unit is AC current protected by use of a 2 Amp fuse that is a 5x20 mm “Slo-Blo” type fuse (JFW #025-021, Littelfuse#215-002).

2. RS-232 Mode

Overview

This unit is RS-232 controlled via a standard 9-Pin D connector (DE-9S) on the rear of the unit that is labeled “RS-232”. The test system must be in RS-232 mode for the RS-232 port to be active. The remote command format and examples can be found in the *JFW Command Set* section of this manual. The command formats are the same for both RS-232 and Ethernet control. If commands are sent incorrectly to the unit, you will receive error messages.

The baud rate can be set at 9600, 19200, or 38400. The current baud rate is displayed on the front panel. To change to a different baud rate, the remote command *Change Baud Rate* must be sent. This remote command is fully described in the *JFW Command Set* section of this manual.

The slide switch on the rear panel allows the user to select between Ethernet and RS-232 modes. Set the slide switch to the desired mode and turn the unit off. When the unit is turned on, it will boot up in the selected mode.

RS-232 Cable

Included with the system should be one “Null Modem” cable (JFW part #012-174). This cable is used to interface with the RS-232 Port. This cable is DE-9P to DE-9S and is the “Null Modem” type. The female connector will plug into the serial port on most PC’s, and the male connector will connect to the “RS-232 Port” on the rear panel.

RS-232 Port Settings

When sending commands to the unit, your computer’s RS-232 port settings must be configured as follows. The baud rate must be set at 9600, 19200, or 38400. The parity must be set to “none”. The data length must be set to “8” data bits. The stop bit must be set to “1”. If your RS-232 port is not configured with these settings, the unit will not receive and execute the commands sent. It will not send back an error either, because communication was never established.

| | |
|--------------|-----------------------|
| BAUD RATE | 9600, 19200, or 38400 |
| PARITY | none |
| DATA LENGTH | 8 bits |
| STOP BITS | 1 |
| FLOW CONTROL | none |

3. Ethernet Mode

Overview

The unit is Ethernet controlled via a standard RJ-45 connector on the rear of the unit. The Ethernet port is a 10/100Base-T port that follows TCP/IP protocol. The remote command format and examples can be found in the *JFW Command Set* section of this manual. The command formats are the same for either Ethernet or RS-232 control. If commands are sent incorrectly to the unit, you will receive an error message.

The slide switch on the rear panel allows the user to select between Ethernet and RS-232 modes. Set the slide switch to the desired mode and turn the unit off. When the unit is turned on, it will boot up in the selected mode.

Telnet

This test system is Telnet compatible. When connecting to the test system using Telnet via a terminal program, you must use the IP address of the test system and Port 3001. For JFW test systems, Port 23 is the Ethernet configuration port and Port 3001 is the port you send remote commands to control the RF components. Commands sent to port 3001 must follow the JFW remote command format which is described later in this manual.

Multiple Ethernet Connections

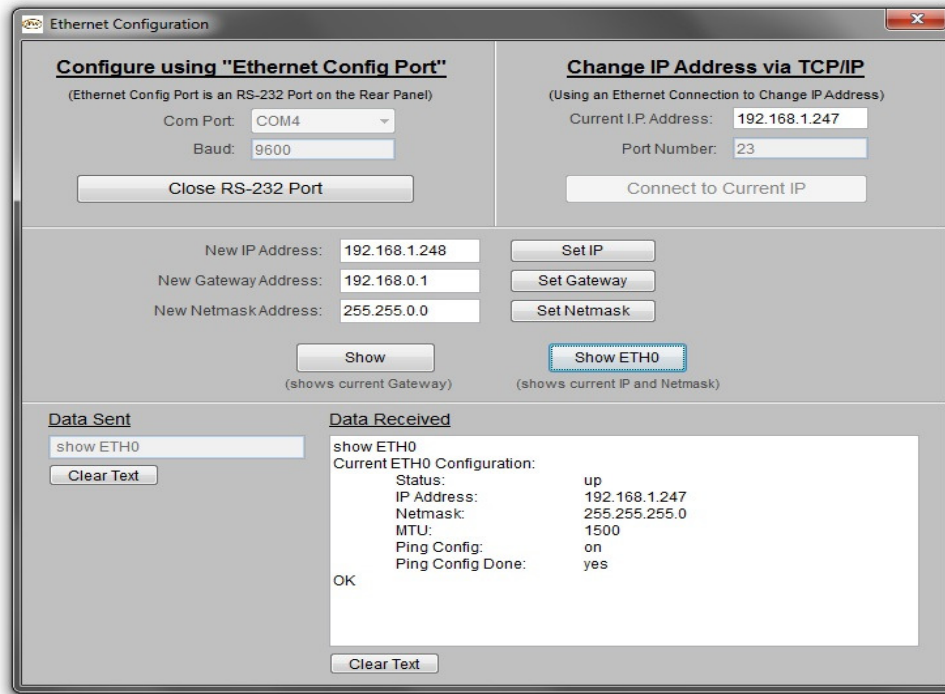
The firmware allows for multiple Ethernet connections. There can be up to 4 users connected to the test system simultaneously. All users will connect to the test system using the same IP address and port number. When you send the identification command (IDN), it will send back an ASCII message that includes the number of current Ethernet connections to the test system.

All commands sent to the test system are stored in a receive buffer. Each command is executed sequentially until there are no more remote commands in the receive buffer. It takes about 1 millisecond for the firmware to process a *Set Switch* or *Read Switch* remote command. So, user 1 might have a delay of several milliseconds depending on how many commands user 2 and user 3 are also sending to the test system.

The remote command *Pause* can take more time to process because it is designed to execute over a specified amount of time. For example, the command *PAUSE10S* is designed to pause for 10 seconds. During the 10 seconds, all other remote commands that are received will not be processed. They will be stored in the receive buffer waiting for the *PAUSE* command to finish. At the beginning and ending of a *Pause* command, the test system sends out to all connected users a message to let them know when the command has started and when it has ended.

4. Ethernet Configuration

In order to configure the TCP/IP settings, the test system must be in Ethernet mode. Use the Null Modem cable (JFW part #012-174) supplied with the test system to make the physical connection from your COM port to the “Ethernet Config. Port” on the rear panel. In order to transmit the configuration commands, you can use the supplied JFW test program or a terminal program. The JFW test program has a “Ethernet Configuration” button that brings up the below window that contains all of the configuration commands built into easy to use buttons.



The commands listed below are used to change the TCP/IP properties. When the commands have been executed, the test system will echo back an ASCII message.

| | |
|-----------------------------|-------------------------|
| SET IP xxx.xxx.xxx.xxx | Changes the I.P address |
| SET NETMASK xxx.xxx.xxx.xxx | Changes the Netmask |
| SET GATEWAY xxx.xxx.xxx.xxx | Changes the Gateway |

After you have changed the IP settings, you can verify the changes using the *Show* and *Show Eth0* commands. After these commands are sent, the test system will echo back an ASCII message that shows all of the updated settings.

| | |
|-----------|--|
| SHOW | Displays the Gateway setting |
| SHOW ETH0 | Displays IP address and Netmask settings |

This test systems comes configured with the following Ethernet settings:

| | |
|--------------|---|
| I.P. Address | 192.168.1.250 |
| Gateway | 192.168.1.1 |
| Netmask | 255.255.255.0 |
| Port | 3001 (hard-coded into the unit and can not be changed) |

5. Ethernet Configuration Example

Changing IP Address via a TCP/IP Connection

If you already know the IP address of the test system, you can connect to that IP address via Port 23 using a terminal program and configure the Ethernet settings using the same commands as shown in the following serial Ethernet configuration session.

Configure using the “Ethernet Config. Port” via an RS-232 Connection

The below sample Ethernet configuration session shows step by step how to configure the Ethernet setting via an RS-232 connection to the *Ethernet Config. Port* on the rear panel of the test system. It shows the commands that are sent and the response of the test system.

- Step 1: Verify that the test system is in Ethernet mode.
- Step 2: Connect the Null modem cable from you computer's serial port to the port on the test system labeled “Ethernet Config. Port”.
- Step 3: Open a terminal program and configure the serial settings to 9600 Baud, 8 data bits, no parity, 1 stop bit, no flow control.
- Step 4: You are now ready to send commands to configure the Ethernet port. Text that you type is shown below in bold. The <enter> is the enter key on your keyboard.

The current settings are:

| | |
|------------|--|
| IP address | 192.168.1.222 |
| Gateway | 192.168.1.2 |
| Netmask | 255.255.255.2 |
| Port | 3001 (hard-coded in system and can't be changed) |

The new settings will be:

| | |
|------------|--|
| IP address | 192.168.1.250 |
| Gateway | 192.168.1.1 |
| Netmask | 255.255.255.0 |
| Port | 3001 (hard-coded in system and can't be changed) |

help <enter>

TCP/IP User Block Console Version 1.1

Available commands: (type "help <command>" for more info)

| | |
|----------------|---|
| echo | - Turn on or off echoing of characters. |
| set | - Configure various options. |
| add nameserver | - Add a nameserver to the current 1 |
| mail | - Send an e-mail. |
| show | - Show current configuration. |
| help | - This help screen. |
| OK | |

show <enter>

Current Configuration:

I/O Parameter: 9600
Gateway: 192.168.1.2
Name Servers:
Mail Server:
Mail From: user@somewhere.com
Interfaces: ETH0

OK

show eth0 <enter>

Current ETH0 Configuration:

Status: up
IP Address: 192.168.1.222
Netmask: 255.255.255.2
MTU: 600
Ping Config: off
Ping Config Done: no

OK

set ip 192.168.1.250 <enter>

IP address set to: 192.168.1.250

OK

set netmask 255.255.255.0 <enter>

Netmask set to: 255.255.255.0

OK

show eth0 <enter>

Current ETH0 Configuration:

Status: up
IP Address: 192.168.1.250
Netmask: 255.255.255.0
MTU: 600
Ping Config: off
Ping Config Done: no

OK

set gateway 192.168.1.1 <enter>

Gateway set to: 192.168.1.1

OK

show <enter>

Current Configuration:

I/O Parameter: 9600
Gateway: 192.168.1.1
Name Servers:
Mail Server:
Mail From: user@somewhere.com
Interfaces: ETH0

OK

6. JFW Command Set

The following command set is used for both Ethernet mode and RS-232 mode. The command set consists of the following commands:

- Identification
- Change Baud Rate
- Disconnect
- Close
- Set Switch
- Set Switch w/ Response
- Set Multiple Switches
- Set All Switches
- Read Switch
- Read All Switches
- Pause
- Store
- Recall

If you send a remote command to the unit that is not properly formatted, you will receive one of the following error messages.

- Error1** **Command is formatted incorrectly.**
This error occurs if a command does not follow it's proper command syntax.

- Error2** **Switch address out of range.**
This error occurs if the switch address is not 1-16.
There are 16 total failsafe 1P2T switches in this test system.

- Error3** **Port value out of range.**
This error occurs when the port value is not NC or NO.
The switches have two settings: normally open (NO), normally closed (NC).

- Error4** **Interval time out of range.**
This error occurs when the interval time is not 1-9999.

- Error5** **Interval time not properly formatted.**
This error occurs when a "M" or "S" does not follow the interval time. The "M" formats the interval time to milliseconds. The "S" formats the interval time to seconds.

Identification Command

Syntax: **IDN<CR>**
<CR> = carriage return

Description: This command returns the identification information for the test system and is followed by a carriage return and a line feed. It includes the firmware revision level. In Ethernet mode, it will also include how many Ethernet connections are currently established with the test system.

Examples: **IDN<CR>**
In RS-232 mode, the following will be sent back to the user:
“**JFW Industries Inc., Model 50SA-213, Firmware Rev A<CR><LF>**”

IDN<CR>
In Ethernet mode when three users are connected, the following will be sent:
“**JFW Industries Inc., Model 50SA-213, Firmware Rev A<CR><LF>**”
“**Current Ethernet Connections = 3<CR><LF>**”

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Change Baud Rate Command

Syntax: **CBx<CR>**
x = new baud rate
<CR> = carriage return

Description: This command changes the baud rate of the test system. After receiving the command, the unit will reboot and start up at the new baud rate. The baud rate is stored in memory so that the test system will start up at the new baud rate if the unit loses power.

Examples: **CB9600<CR>** Changes the baud rate to 9600 baud
CB19200<CR> Changes the baud rate to 19200 baud
CB38400<CR> Changes the baud rate to 38400 baud

Notes: “x” must be either 9600, 19200, or 38400.
Command is not case sensitive, but must be terminated by a carriage return

Disconnect Command

Syntax: **DIS<CR>**
 <CR> = carriage return

Description: This command causes the test system to close the existing Ethernet connection.
 This command is only used while in Ethernet mode.

Examples: **DIS<CR>**
 The message “**50SA-213 Connection Closing**” is sent back to the user.
 Then, the Ethernet connection is be closed.

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Close Command

Syntax: **CLOSE<CR>**
 <CR> = carriage return

Description: This command causes the test system to close all other user's Ethernet connections to the
 test system, but leaves your Ethernet connection open. This command is only used
 while in Ethernet mode.

Example: Four users are connected to the test system. Send an IDN to verify.

IDN<CR>
“**JFW Industries Inc., Model 50SA-213, Firmware Rev A<CR><LF>**”
“**Current Ethernet Connections = 4<CR><LF>**”

CLOSE<CR>

Sending the close command will disconnect the other 3 users and leave you as the only
Ethernet connection. Send an IDN to verify.

IDN<CR>
“**JFW Industries Inc., Model 50SA-213, Firmware Rev A<CR><LF>**”
“**Current Ethernet Connections = 1<CR><LF>**”

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Set Switch Command

Syntax: **SSx y<CR>**
 x = switch address
 y = port value
 <CR> = carriage return

Description: This command sets switch “x” to port “y”.

Examples: **SS2 NC<CR>** Sets switch #2 to it's NC (normally closed) port.
 SS2 NO<CR> Sets switch #2 to it's NO (normally open) port.
 SS16 NC<CR> Sets switch #16 to it's NC (normally closed) port.
 SS16 NO<CR> Sets switch #16 to it's NO (normally open) port.

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Set Switch with Response Command

Syntax: **SSRx y<CR>**
 x = switch address
 y = port value
 <CR> = carriage return
 <LF> = line feed

Description: This command sets switch number “x” to port “y”. Then, it returns the switch setting for switch number “x” as a confirmation.

Examples: **SSR1 NC<CR>** Sets switch #1 to it's normally closed port and automatically returns the response “**Switch #1 = NC<CR><LF>**”.

SSR2 NO<CR> Sets switch #2 to it's normally open port and automatically returns the response “**Switch #2 = NO<CR><LF>**”.

SSR15 NC<CR> Sets switch #15 to it's normally closed port and automatically returns the response “**Switch #15 = NC<CR><LF>**”.

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Set Multiple Switches Command

Syntax: **SMS x y,x y,.....x y<CR>**
 x = switch address
 y = port value
 <CR> = carriage return

Description: This command can set multiple switches to different port settings using just a single remote command. This command is only limited by the maximum number of switches in the test system.

Examples: **SMS 1 NO,3 NO<CR>**
 Returns the response “3 Switches Set<CR><LF>”
 Switch #1 is set to it's normally open port.
 Switch #3 is set to it's normally open port.

SMS 1 NC,2 NC,3 NC,4 NO,5 NO,6 NO<CR>
 Returns the response “6 Switches Set<CR><LF>”
 Switch #1 is set to it's normally closed port.
 Switch #2 is set to it's normally closed port.
 Switch #3 is set to it's normally closed port.
 Switch #4 is set to it's normally open port.
 Switch #5 is set to it's normally open port.
 Switch #6 is set to it's normally open port.

Notes: There must be a space between “SMS” and “x” at the beginning of the command.
 There must be a space between all “x”'s and “y”'s.
 Command is not case sensitive, but must be terminated by a carriage return.

Set All Switches Command

Syntax: **SAS x<CR>**
 x = desired port settings for all switches
 <CR> = carriage return

Description: This command sets all of the switches in the test system to port “x”.

Examples: **SAS NC<CR>** Sets all switches to their normally closed ports.
 SAS NO<CR> Sets all switches to their normally open ports.

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Read Switch Command

Syntax: **RSx<CR>**
 x = switch number
 <CR> = carriage return
 <LF> = line feed

Description: This command returns the current port setting for switch “x”.

Examples: **SS1 NC<CR>** Sets switch #1 to it's normally closed port.
 RS1<CR> Sends back “**Switch #1 = NC<CR><LF>**”.

SS12 NO<CR> Sets switch #12 to it's normally open port.
 RS12<CR> Sends back “**Switch #12 = NO<CR><LF>**”.

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Read All Switches Command

Syntax: **RAS<CR>**
 <CR> = carriage return
 <LF> = line feed

Description: This command returns the current port settings of all switches. Each switch setting is listed on it's own line.

Examples: **SAS NC<CR>** Sets all switches to their normally closed ports.
 RAS<CR> Returns all current settings as seen below.

“**Switch #1 = NC<CR><LF>**”
“**Switch #2 = NC<CR><LF>**”
“**Switch #3 = NC<CR><LF>**”
“**Switch #4 = NC<CR><LF>**”
“**Switch #5 = NC<CR><LF>**”
“**Switch #6 = NC<CR><LF>**”
“**Switch #7 = NC<CR><LF>**”
“**Switch #8 = NC<CR><LF>**”
“**Switch #9 = NC<CR><LF>**”
“**Switch #10 = NC<CR><LF>**”
“**Switch #11 = NC<CR><LF>**”
“**Switch #12 = NC<CR><LF>**”
“**Switch #13 = NC<CR><LF>**”
“**Switch #14 = NC<CR><LF>**”
“**Switch #15 = NC<CR><LF>**”
“**Switch #16 = NC<CR><LF>**”

Notes: Command is not case sensitive, but must be terminated by a carriage return.

Pause Command

Milliseconds Interval Syntax: **PAUSExM<CR>**

Seconds Interval Syntax: **PAUSExS<CR>**

x = duration of time to pause

M = interval time format set to milliseconds

S = interval time format set to seconds

<CR> = carriage return

Description: This command pauses the test system for “x” duration of time. The time duration can be set from 1-9999. The time duration can be formatted to be in milliseconds or in seconds depending on if there is a “M” for milliseconds or “S” for seconds. The pause command is useful when sending scripts to the test system and you want a timed pause between other remote commands.

Examples: **PAUSE100M<CR>** Test system pauses for 100 milliseconds.

PAUSE15S<CR> Test system pauses for 15 seconds.

Notes: “x” must be between 1 and 9999.
Command is not case sensitive, but must be terminated by a carriage return.

Feedback: At the beginning and ending of each PAUSE command, the test system will send all connected users a message to provide feedback of the test system status. At the beginning, the message “Pause Started” is sent. When the command has finished executing, the message “Pause Finished” is sent.

Script Example: **SS7 NC<CR>** Sets switch #7 to it's normally closed setting.
PAUSE4000M<CR> Test system pauses for 4 seconds (4000 milliseconds).
SS7 NO<CR> Sets switch #7 to it's normally open setting.

Script Notes: Each command in a script is executed sequentially.
You can send hundreds of commands in a single script.

Store Command

Syntax: **STORE<CR>**
 <CR> = carriage return

Description: This command will write the current switch settings to the test system's onboard flash memory to be recalled at a later time using the *Recall* command. The settings that are saved using the *Store* command are retained in the onboard flash memory even after power cycling to unit.

Example: **STORE<CR>**
 The current port settings for all switches are stored in memory.
 The message “**XX Switch Settings Stored In Memory**” is sent back to the user.

Notes: The “XX” in the example will be the number of controlled components in the system. Command is not case sensitive, but must be terminated by a carriage return.

Recall Command

Syntax: **RECALL<CR>**
 <CR> = carriage return

Description: This command reads the data stored on the onboard flash memory from the last *Store* command, and resets all of the switches to those stored port settings.

Example: **RECALL<CR>**
 All switches are reset to the stored port settings from the last *Store* command.
 The message “**XX Switch Settings Loaded From Memory**” is sent back to the user.

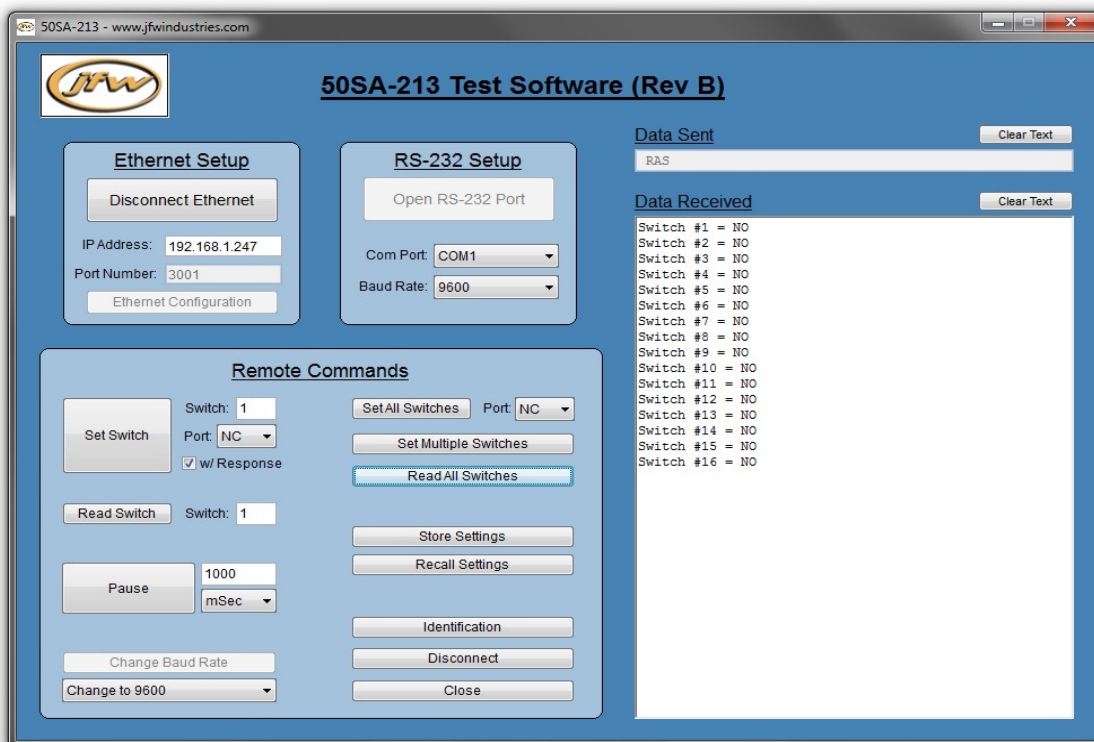
Notes: The “XX” in the example will be the number of controlled components in the system. Command is not case sensitive, but must be terminated by a carriage return.

7. JFW Test Program

No installation program needs to be run in order to use the GUI test program (graphical user interface). Just copy the executable file (50SA-213.exe) located on the CD that is provided with this manual onto any location on your computer.

The buttons listed below the “Remote Commands” header generate remote commands that follow the test system’s firmware syntax. This test program also has an Ethernet configuration button. This button brings up another window that makes configuration of Ethernet properties easier.

Ethernet Configuration Brings up a window that allows you to configure the TCP/IP settings using the serial “Ethernet Config. Port”. You can also change your IP address via a TCP/IP connection at Port 23 if you know the current IP address.



8. Test Scripts

Listed below are answers to frequently asked questions about using test scripts with JFW test systems. If you have any other questions, please email the engineering department directly with the email address jfwengr@jfwindustries.com.

What is a test script?

A test script is a text file (.txt) that lists multiple remote commands in a specific order in order to perform a specific RF test. Terminal programs such as Hyperterminal for Windows can be used to send the text file to a test system via an Ethernet or RS-232 connection.

Why would I want to use test scripts?

You have a test that will be run repeatedly and it uses the same remote commands each time. Using a test script saves you from having to type in the same set of remote commands over and over.

How does the JFW test system execute a test script?

All remote commands listed in a test script are executed sequentially. The JFW test system stores all of the commands in a receive buffer. It reads the first command and executes the command. Only when the first command is fully executed does the test system read in the second command from the receiver buffer. Each command is read in and executed sequentially until all of the commands in the receive buffer are executed.

How many remote commands can be in one test script?

JFW has used test scripts on Ethernet test systems and RS-232 test systems that contain as many as 1000 remote commands in a single test script.

What happens if I send a second test script before the first test script is finished?

The commands contained in the second test script will be processed after all of the commands in the first script have been executed.

How do I terminate each remote command in my text file with a carriage return?

When you use the "enter" key to go to the next line it will include a carriage return and line feed in the text file. This means that each line of the text file should contain only one remote command.

Why does the last remote command in my script does not execute?

The last command is not properly terminated with a carriage return. You must press the "enter" key at the end of the last remote command to add a carriage return in the text file.