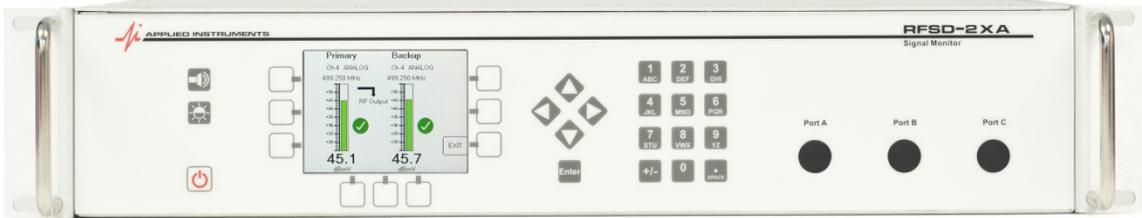


**RFSD-2XA**  
**RF Signal Monitor**  
*Operation Manual*



This manual covers basic operations and functions of the RFSD-2XA RF Signal Monitor. For more detailed instructions on how to use the instrument for different applications, see the Application Notes available on our website, <http://www.appliedin.com>

Revision	3.3
Date	24 August 2018

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# **1 Introduction**

The RFSD-2XA is an innovative test instrument platform. The base unit is a rack-mount chassis, display, and power supply that accepts various modules for testing a variety of signals used in the telecommunications industry. The RFSD-2XA is an RF signal monitor, signal level meter and analyzer configurable for testing cable, satellite, and terrestrial over-the-air broadcast TV signals.

Several tuner modules available now for the RFSD-2XA are:

- XA-CA-01 Cable TV (analog and QAM), Off-Air broadcast (8VSB and analog)
- XA-TS2-01 North American DBS and Turbo coded applications
- XA-S2ACM-01 VSAT, commercial TVRO, and non-North American DTH applications

The RFSD-2XA platform is ideal for service providers, private cable operators, CATV headends and hubsites that demand fast, easy, and accurate RF signal monitoring and measurements today and in the future.

## **1.1 Definition**

The RFSD-2XA monitors one or more RF inputs, comparing values to set limits and initiating actions when limits are exceeded. It is primarily an RF system monitor and switch.

## **1.2 Possible Uses**

1. Monitoring a primary and secondary feed and switching an output signal to the secondary when the primary fails
2. Monitoring a cable system channel and inserting a CW carrier for AGC purposes when the channel fails
3. Monitoring satellite feeds and raising alarms when signals fade or are lost
4. Allowing remote monitoring of the system status
5. Others to be determined...

## **1.3 Terms**

The following terms have specific meanings in this context:

1. RF INPUT - An RF signal that is connected to the RFSD-2XA via a single coax cable
2. INPUT PORT - the RF connector on the back panel where the RF input is connected to
3. INPUT FEED - a group of RF signals present on one cable at the same time. In a cable system this is the same as an RF input. A satellite system that employs a multi-head LNBF may have different feeds on a cable at different times.
4. CHANNEL - An RF input may contain one or more channels. A channel is a distinct carrier that appears within a defined frequency range. It is not the same as a TV channel, since QAM channels or satellite transponder channels may contain multiple MPEG-2 / MPEG-4 data streams, each of which comprises a TV channel.
5. RF SWITCH - switches one of two or more RF inputs onto a single output cable
6. OUTPUT SWITCH - an RF switch that selects the instrument output from two or more RF inputs
7. MULTIPLEXOR - an RF switch that selects one of two or more RF inputs to be presented to the measuring instrument
8. TUNER MODULE - A module within the RFSD-2XA that can measure one or more channels from just one RF input. However, the RF input may be the output from a multiplexor, which can select from multiple external inputs.
9. CHANNEL PLAN - A file that defines the channels to be measured on one port

## 1.4 Symbols Used

The following symbols may be used in this manual and/or marked on the instrument:



Hazardous areas on the instrument are marked with this symbol. Consult this manual to learn the nature of the hazard and proper actions for safe operation.



Indicates an earth ground terminal



Indicates possibility of electric shock



Indicates a protective conductor terminal



Indicates direct current (DC)

## 1.5 Safety Instructions

- Read and follow all instructions in this manual.
- Cleaning: Unplug and turn unit off before cleaning. Clean with a dry cloth only.
- Use only the cord supplied with the unit.
- Servicing should be done by qualified service technicians only.
- The beeper is quite loud. To avoid hearing damage during prolonged use, protective earpieces are recommended.
- Use of the instrument in a manner not consistent with the instructions in this manual may impair the safety features and lead to damage or injury.

## 1.6 References

The RFSD-2XA is based on the Applied Instruments XR-3 field portable modular test instrument. Most of the documentation for that instrument applies to the RFSD-2XA. This manual does not attempt to duplicate that information, which can be found in the following documents:

Links to operation manuals for the XR-3 base instrument and associated tuner modules can be found at

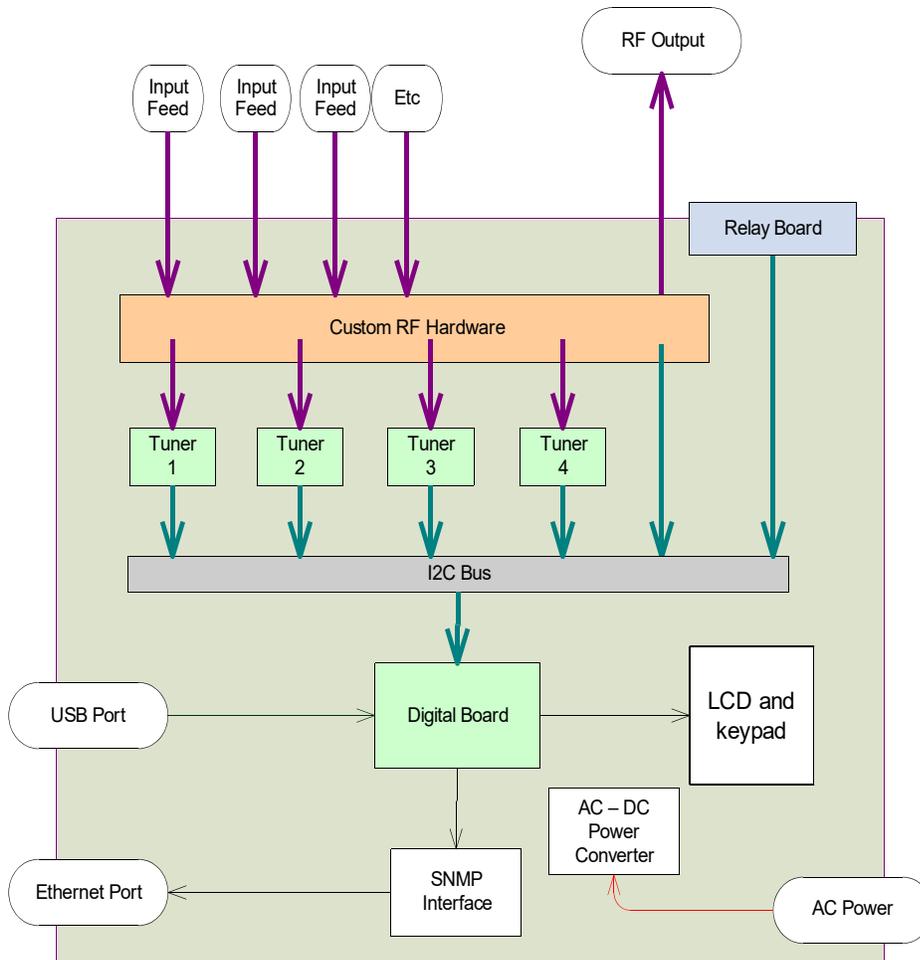
[http://www.appliedin.com/www/products/XR-3\\_operation\\_manuals.html](http://www.appliedin.com/www/products/XR-3_operation_manuals.html)

Links to download MIB files for SNMP operation with the RFSD-2XA can be found at

[http://www.appliedin.com/www/products/RFSD-2XA\\_MIB\\_Browser\\_files.html](http://www.appliedin.com/www/products/RFSD-2XA_MIB_Browser_files.html)

## 2 System Overview

### 2.1 Block Diagram



### 2.2 General Features

- Monitors digital and analog channel signals' level and quality
- Real-time measurement display
- User-defined level and quality thresholds
- Alarm notification via SNMP, dry contacts, and front panel
- Friendly user interface
- USB interface for firmware updates & data transfer
- Store measurements for Proof-of-Performance reporting
- Easily create new custom channel plans or use standard base plans
- Supplies LNB / LNA / off-air antenna preamp power
- High signal sensitivity
- SNMP for remote monitoring
- Web page display of status and monitored information

## 2.3 Physical Features

- Easy to replace type F-female barrel connectors (BNC available)
- 2RU Rack-mount aluminum enclosure
- Color graphic LCD screen
- Numeric keypad with arrow key controls

## 2.4 Monitoring & Signal Meter Mode Measurements

- Digital and Analog Signal Level (dBm, dBmV, or dB $\mu$ V) with present and peak bar graph
- Analog Delta Audio Carrier
- Analog Signal Quality (C/N)
- Demodulated Digital Signal Quality (MER, SNR, Eb/No, Es/No, or IRD#)
- Tilt
- Current draw of LNB / LNA / off-air antenna pre-amp

## 2.5 Signal Meter Mode Measurements

- Spectrum Screen (frequency on x-axis, amplitude on y-axis)
- Constellation Screen (I and Q demodulator values)
- BER (Bit Error Rate), pre-FEC and post-FEC

## 2.6 Standard Accessories

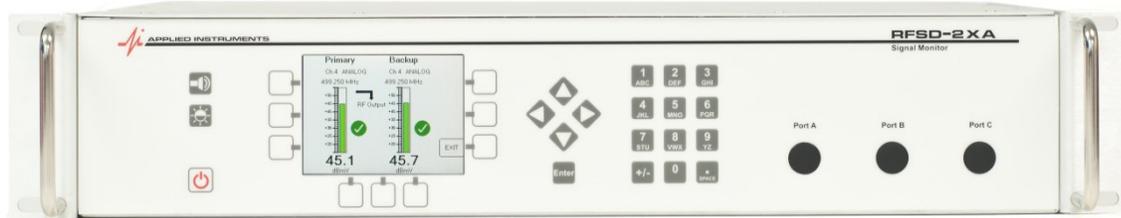
- AC Line Cord
- USB data transfer cable

## 2.7 Options

- Various built-in tuner modules for test signal applications
  - Cable / Off-Air Module (for digital QAM Annex B & 8VSB signals and analog signals)
  - Satellite Module for North American DBS and Commercial Broadcast Satellite TVRO
  - Satellite Module for VSAT and non-North American DBS / DTH and Commercial Broadcast Satellite TVRO
- Primary / Backup output switching
- Multiplexed inputs
- Multiple tuners for different input feeds
- Front panel test ports, -20 dB
- Built-in switches for redundant feeds or optional CW pilots insertion
- Built-in CW pilot carrier generator to maintain stable network AGC (User must specify pilot carrier frequency at time of order, 5 to 1218 MHz)

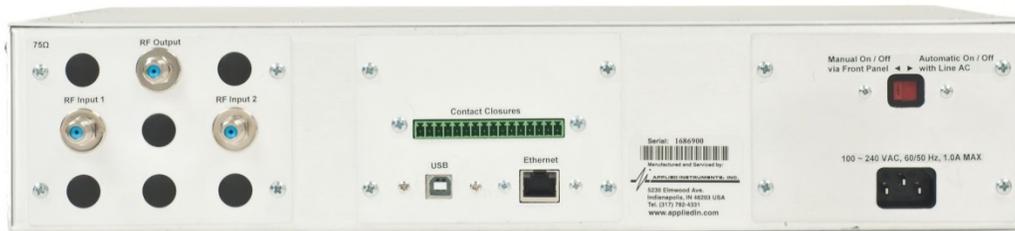
## 2.8 Connections

### FRONT



1. Port A – reserved for use in some configurations
2. Port B – reserved for use in some configurations
3. Port C – reserved for use in some configurations

### BACK



1. RF Output Port
2. RF Input 1 Port (Primary)
3. RF Input 2 Port (Backup)
4. Contact Closures
5. USB Port
6. Ethernet Port
7. AC Line Cord Port
8. Power On Option Switch

#### RF Output Port

The selected incoming RF signal exits the RFSD-2XA's RF output port after passing through the instrument.

#### RF Input Port 1 (Primary)

The RFSD-2XA can be equipped with multiple input ports. If the RFSD-2XA is configured for a Primary / Backup configuration, the RF input port 1 is considered the Primary.

#### RF Input Port 2 (Backup)

The RFSD-2XA can be equipped with multiple input ports. If the RFSD-2XA is configured for a Primary / Backup configuration, the RF input port 2 is considered the Backup.

### Contact Closures

The RFSD-2XA is equipped with dry contact closures for communicating warnings, alarms, etc.

### USB Port

The RFSD-2XA connects to a USB port of a PC via the supplied cable. PC software is available for download from our website ([www.appliedin.com](http://www.appliedin.com)). The FlashUpdate program is used for updating the instrument with the latest firmware and the MeterMaid program is used for transferring custom channel plans, limits files, and monitoring scripts.

### Ethernet Port

The RFSD-2XA can be monitored remotely via SNMP. MIB Browser files are available for download from our website at [http://www.appliedin.com/www/products/RFSD-2XA\\_MIB\\_Browser\\_files.html](http://www.appliedin.com/www/products/RFSD-2XA_MIB_Browser_files.html)

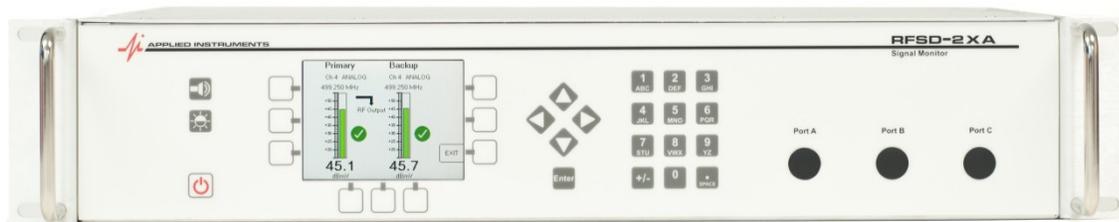
### AC Line Cord Port

The mains power connects to the RFSD-2XA's internal AC to DC switching power supply (100-240VAC, 50-60 Hz Input and 15VDC output) via the AC line cord port on the rear of the unit.

### Power On Option Switch

You can use the power on option switch to control whether you would like the RFSD-2XA to power up automatically when AC mains power is connected or whether you would like to power the instrument on or off using the ON / OFF power button located on the front panel.

## 2.9 Front Panel Buttons



1. Audible Tone
2. Screen Brightness
3. ON / OFF Power
4. Alphanumeric Keypad
5. Enter button
6. Arrow keys
7. Soft-keys (nine)

## 2.10 Tuner Module Availability

RFSD-2XA tuner modules available now include DBS Satellite, VSAT Satellite, and Cable TV / Off-Air broadcast. Other modules will follow.

Module Part Number	Description	Application
<b>XA-TS2-01</b>	Satellite Tuner Module North American DBS / Broadcast TVRO 250-2150 MHz	DISH, DIRECTV, Bell TV, Shaw Direct, and more
<b>XA-S2ACM-01</b>	Satellite Tuner Module VSAT, Broadcast TVRO, International DTH 900-2150 MHz	iDirect, Hughes, and more
<b>XA-CA-01</b>	Cable & Off-Air Tuner Module QAM (J.83B) / VHF / UHF 5-1000 MHz	UHF Off-Air, CATV, SMATV

## 2.11 AC Power

When 110VAC or 220VAC mains power is applied with the AC line cord to the RFSD-2XA's internal AC to DC switching power supply, it supplies 15VDC power to run the instrument (and power the LNA, pre-amp, or LNB if applicable). In this case, the power available to the LNA or LNB is limited to 750 mAmps to avoid overdriving the power circuit.

### 3 General Operation

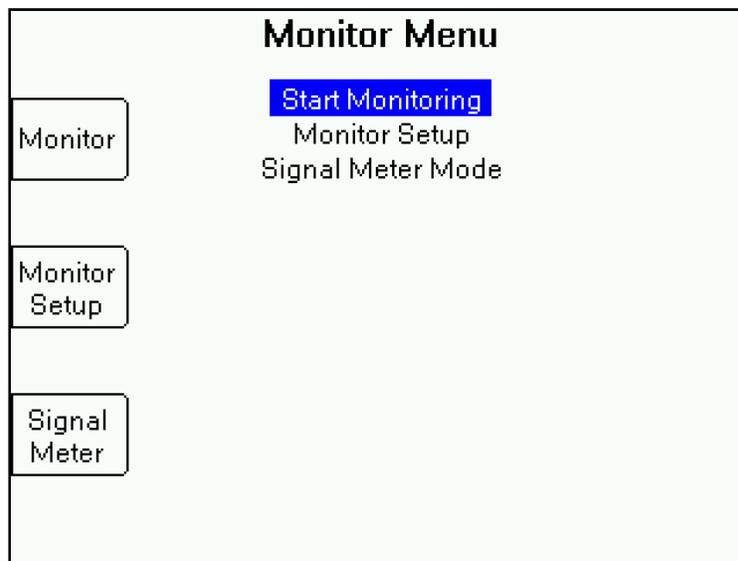
The instrument is expected to operate as follows:

1. The RFSD-2XA has two operating modes, monitor mode and signal meter mode.
2. When the instrument powers up, it returns to the previously active mode, either signal meter mode or monitor mode.
3. Monitor mode is the normal operating mode for the instrument. The behavior in this mode is determined by a monitoring script configuration (.cfg) file. Front panel and remote operations are limited.
4. In signal meter mode, the instrument may be used as a signal level meter with extra options available for controlling the custom RF hardware.

#### 3.1 Monitor Menu

At power up, if the instrument was previously in the monitor mode, it resumes monitoring. Otherwise, it enters the Monitor Menu screen.

You can navigate the Monitor Menu using the up/down and Enter keys. Some functions are also available via soft-keys as a shortcut.



The monitor menu offers a choice of functions:

- a. Start Monitoring
- b. Monitor Setup
- c. Signal Meter Mode
- d. Output Switch (if an output switch is present)

“Start Monitoring” will take you to the monitoring screen for the personality defined in the selected Monitoring Script. See the setup screens for how to define and select a monitoring script.

“Monitor Setup” will take you to the monitor setup menu, which contains links to Options and fields for defining the personality in the Monitoring Script.

“Signal Meter Mode” will let you select an input feed, if there is more than one, and then take you to the signal meter functions that apply to that feed. See the XR-3 user operation manuals for information about signal meter functions.

“Output Switch” lets you manually override and select which input port signal is directed to the output port.

### **3.2 Monitor Mode**

In Monitor Mode, the instrument will:

1. Measure and display the configured RF inputs
2. Compare the measurements to configured limit values
3. Post alarms when limits are exceeded
4. Process the alarms according to the configured alarm logic
5. Accept alarm acknowledgments and reset commands from the keypad when appropriate
6. Set alarm relay contacts per selected logic
7. Set RF output switches per selected logic
8. Make results available to the SNMP and web browser remote access system

### **3.3 Monitor Mode Keypad Operations**

In Monitor Mode, the instrument is constantly performing its monitoring functions as defined in the monitoring script. This includes output switching and alarming. Front panel operations are limited to:

1. Acknowledging alarms
2. Resetting the instrument
3. Changing the output switch position (if manual over-ride is enabled)
4. Changing the displayed view (table or graph)
5. Exiting from Monitoring Mode to Signal Meter mode

### 3.4 Relay Outputs

The back panel contact closures directly follow the system alarm state. The contacts are in their normal state except as noted in the table below. Active positions are noted with a color that could be used if connected to LEDs.

State	Alarm Relay	Warn Relay	Ack Relay	Monitoring
Normal				Green
Alarm	Red			Green
Warning		Yellow		Green
Ack	Red		White	Green
Warning Ack		Yellow	White	Green
Clear			White	Green

The relay contacts on the back panel are assigned as follows:

Pos	Terminal	Use	LED	Cmd bit
1	A-NO	No alarm - held when no alarm state		xxx1 xxxx
2	A-NC	Alarm - NC active to show system alarm	Red	xxx0 xxxx
3	A-COM	A - common	+5V	
4	B-NO	No warning - held when no warning present		xxxx 1xxx
5	B-NC	Warning - NC active shows warning	Yellow	xxxx 0xxx
6	B-COM	B - common	+5V	
7	C-NO	Ack - Ack received	White	xxxx x1xx
8	C-NC	Ack - not in ack state		xxxx x0xx
9	C-COM	C - common	+5V	
10	D-NO	Monitoring - held when system is monitoring	Green	xxxx xx1x
11	D-NC	Not monitoring		xxxx xx0x
12	D-COM	D - common	+5V	
13		unused		
14	E-V+	External override switch positive voltage		
15	E-GND	External override switch ground		

## **4 Primary / Backup Personality**

In this configuration, two inputs are used. One input (RF Input 1) is labeled as the primary, and the other (RF Input 2) is labeled as the secondary. The purpose is to monitor the inputs and switch a known good input to the RF output port.

1. Both the primary and secondary input are continuously monitored on one channel and compared to alarm and warning limit values.
2. Normally the primary input is switched to the RF output primary input.
3. If the primary input drops below the alarm level:
  - a) the output is switched to the secondary (if the secondary is found to be good)
  - b) the alarm relay is activated
2. If operating on the secondary input and the secondary input drops and the primary is now OK, the primary is switched back to the output.
3. Otherwise, the primary is restored only after an Acknowledgment and Reset is processed.

### **4.1 Input Processing**

With each new measurement from the tuner, the following occurs:

1. The input level is compared to the warning and alarm limit values.
2. Depending on the result of that comparison, one of three events will be posted for the active input:
  - a) Alarm
  - b) Warning
  - c) Clear
3. The event is passed to the switch handling state machine for rapid switch processing.
4. The event is queued for later handling by the display processing state machine.

### **4.2 Display Processing State Machine**

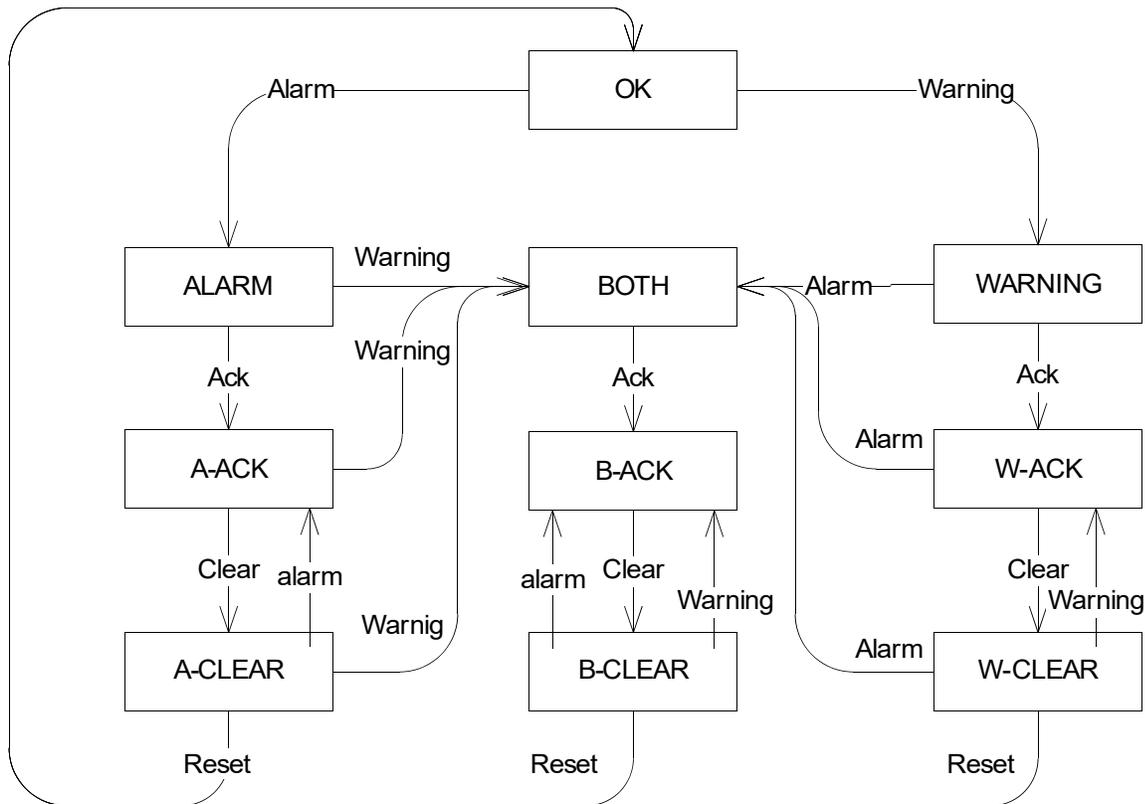
This section runs as a background task and handles the front panel display and the rear panel contact closures.

#### **Events**

Events may come from the input processing section (for each input) or from the front panel.

1. Alarm - alarm limit exceeded
2. Warning - warning limit exceeded
3. Clear - value returns to within normal limits
4. Ack - acknowledge button has been pressed
5. Reset - the instrument reset button has been pressed

**State Diagram**



**Outputs**

The state is indicated on the front panel by an icon for each input. The rear panel contact closures and system state follow the higher priority state of the two input states.

<i>State</i>	<i>Priority</i>	<i>Icon</i>	<i>Contacts</i>	<i>System State</i>
OK	10	Green check	none	Normal
Alarm	2	Red X	alarm	Alarm
Both	1	Red X !	alarm	Alarm
Warning	3	Orange !	warning	Warning
A-Ack	5	Red X	Ack	Alarm Acked
B-Ack	4	Red X !	Ack	Alarm Acked
W-Ack	6	Orange !	Ack	Warning Acked
A-Clear	8	Yellow X	Ack	Clear
B-Clear	7	Yellow X !	Ack	Clear
W-Clear	9	Yellow !	Ack	Clear

Note: The monitoring contact closure is always active when the system is monitoring and not shown in the above table.

The system state reflects the combined status and is what is reported via SNMP.

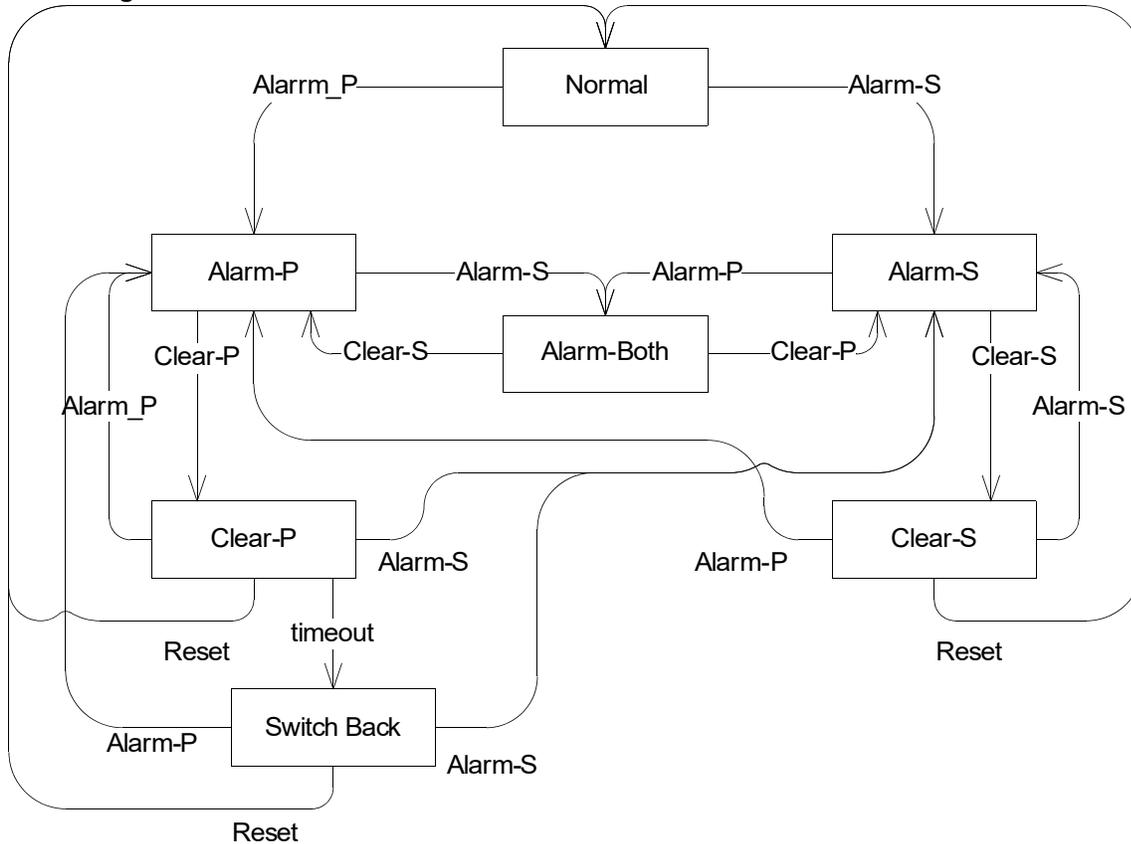
### 4.3 RF Switch Control

The RF output switch control is intended to provide a known good signal on the output if one is available. It uses a separate state machine driven with the same events.

#### Events

The source of the event, primary (P) or secondary (S) is relevant and reflected in the event labels. Warnings and acknowledgments are not used. A timeout is added to handle the auto-switch back option.

#### State Diagram



#### Outputs

<i>State</i>	<i>Switch</i>
Normal	primary
Alarm-P	secondary
Alarm-S	primary
Alarm-Both	primary
Clear-P	secondary
Clear-S	primary
Switch Back	primary

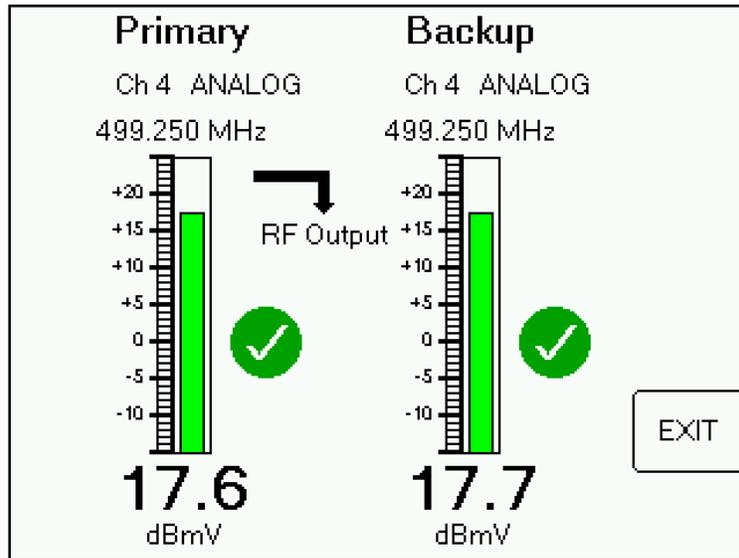
### 4.4 Monitoring Screen

This screen includes the following functions:

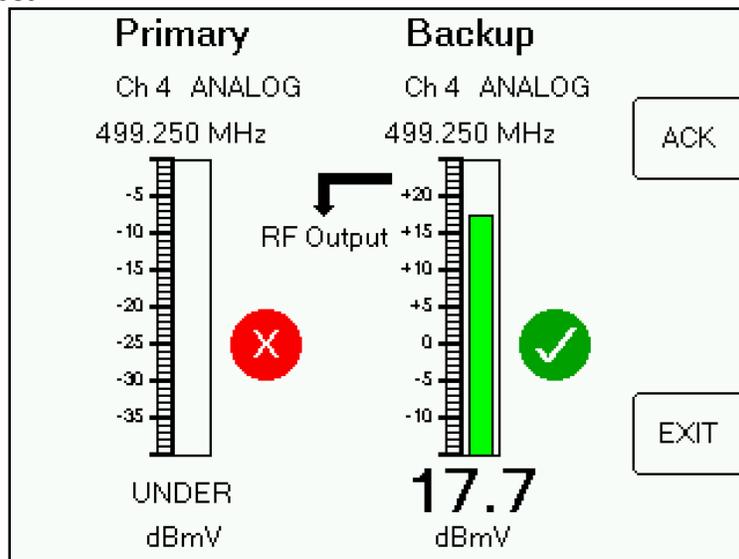
1. Alarm status display
2. Acknowledgment button when acknowledgment needed
3. Reset button when reset needed
4. Exit to the Monitor Menu screen, requires confirmation

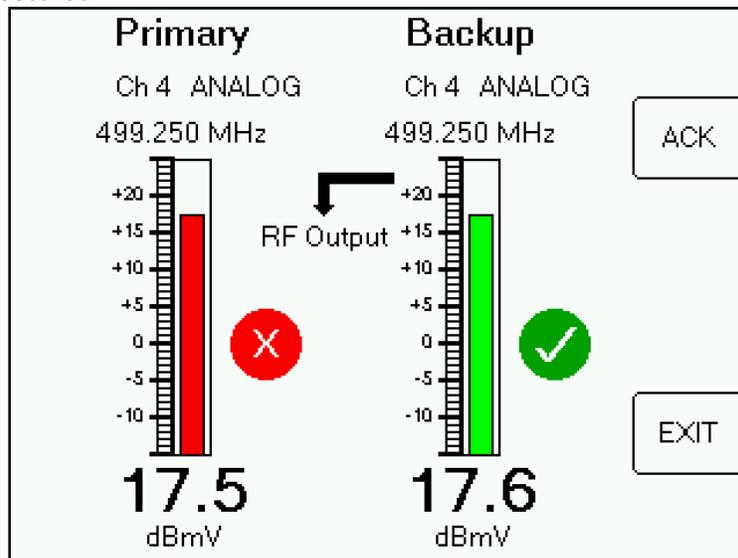
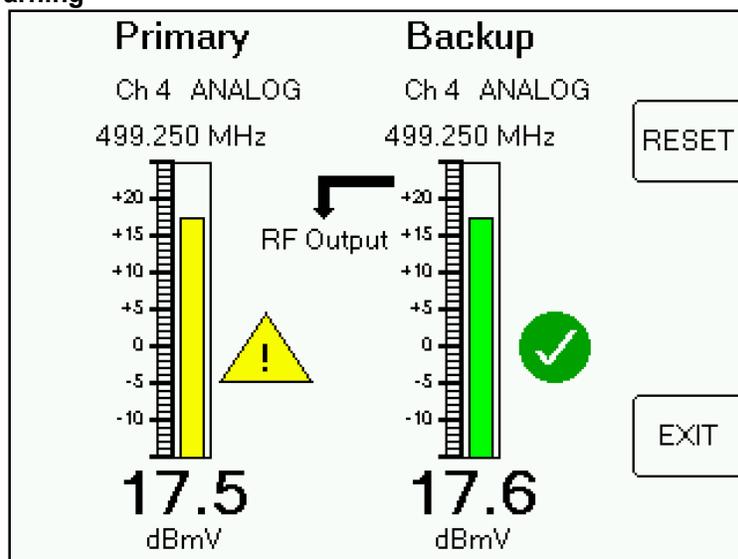
It shows the input level of both the primary and backup signals and the output switch position.

#### Normal Display



#### Primary Channel Lost



**Primary Channel Restored****Primary Channel Warning**

1. The screen shows:
  - a. signal level of both inputs
  - b. alarm status of inputs (via colored icons)
  - c. the switch position (which of the RF inputs is being routed to the RF output port)
  - d. an alarm Acknowledge button (soft-key appears when needed)
  - e. an alarm Reset button (soft-key appears when needed)
2. The measuring mode is altered to provide rapid response to a primary input alarm
  - a. Fastest analog measuring mode used
  - b. Abbreviated I2C messages used
  - c. Interrupt priority given to tuner linked to selected switch position
  - d. Alarm threshold comparison and switch command done in high priority task

This method provides about a 100 millisecond switch response time to a drop in the primary input.

### 4.5 External Override Switch

**Note:** This only applies to RFSD-2XA units built after 20 August 2018.

If desired, an external switch can be connected between the E-V+ and E-GND contacts on the rear panel. When this switch is closed, and the instrument is in the primary/backup monitoring screen, the output switch will be put into the backup position regardless of the alarm status of the instrument. When the instrument detects an alarm and switches to the backup position, these contacts are internally grounded.

The contacts may be daisy-chained to other RFSD-2XA instruments. When one unit detects an alarm, and switches to the backup, it grounds the E-V+ line. This causes all other connected RFSD-2XA units to also switch to the backup position.

## 5 Monitor Only Personality

With this operating mode selected, the instrument repeatedly scans one or more inputs and one or more channels per input. Output switching is not performed.

Two display formats are available: table view and graph view.

### 5.1 Table View

In this view, the measurements are displayed in a table format. New measurements are added to the bottom and older measurements may scroll off the top. A normal display looks like this:

Feed 2 Scan <span style="float: right;">More ↑</span>					
Feed Num	Transponder	Level (dBm)	Quality (IRD#)	Lock	Pass / Fail
2	Tr 23	-42.5	34		✓
2	Tr 25	-43.5	29		✓
2	Tr 26	-42.0	15		✓
2	Tr 28	-46.3	16		✓
2	Tr 30	-49.4	15		✓

Graph View

Exit

The level and quality measurements are shown. The lock column indicates if a signal lock was obtained on the channel. At the right, the alarm status of each channel is shown.

When an alarm is encountered, the screen may look something like this:

Feed 2 Scan <span style="float: right;">More ↑</span>					
Feed Num	Transponder	Level (dBm)	Quality (IRD#)	Lock	Pass / Fail
2	Tr 26	-42.1	13	🔒	✓
2	Tr 28	-46.2	17	🔒	✓
2	Tr 30	-49.5	14	🔒	✓
2	Tr 31	-53.6	UNDER	🔒	✗
2	Tr 32	-50.5	20	🔒	✓

Graph View

✗

Exit

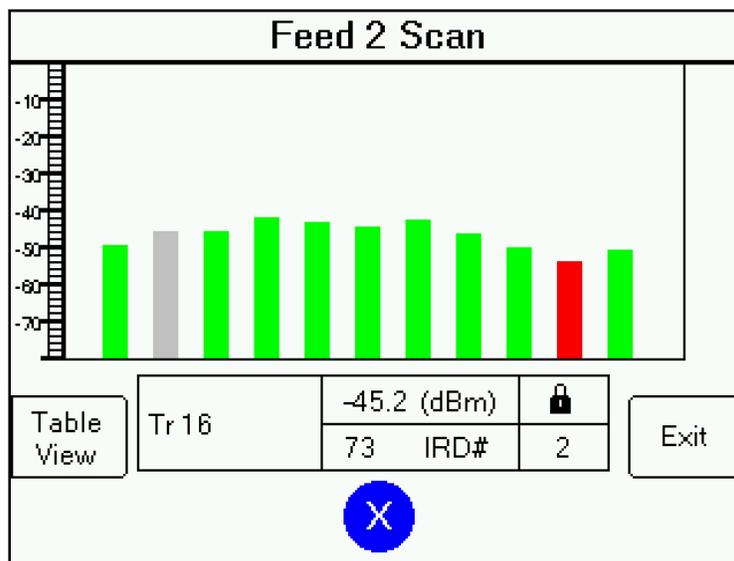
ACK

Press ACK button to acknowledge the alarm. If the alarm situation clears, the ACK button will be replaced by a RESET button. Press RESET to return to normal display and status.

It takes one complete cycle through all channels with no alarms or warnings found for the system to clear.

### 5.2 Graph View

In graph view, the signal levels are displayed in a bar graph form with all channels displayed at once:



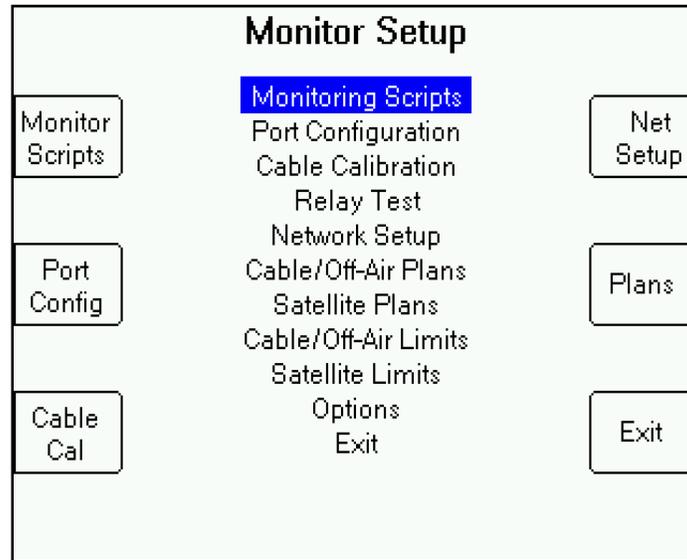
The blue X in this example indicates that an alarm has occurred and has been acknowledged. It cannot be reset since the alarm is still present, as indicated by the channel with the red bar on the graph.

The gray bar indicates the channel presently being scanned.

The area at the bottom displays the measurements from the last channel scanned.

## 6 Setup Screens

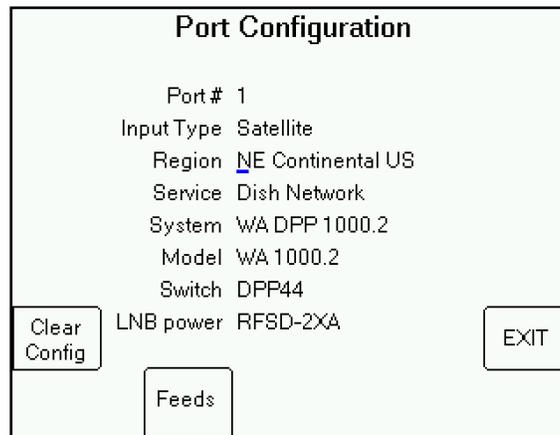
RFSD-2XA specific setup functions are available from the Monitor Setup screen:



Monitoring Scripts, Channel Plans, and Limits are covered in separate sections. Descriptions of the other options follow.

### 6.1 Port Configuration

Use this section to describe the system that you are connecting to the input port.



Each input port on the rear panel will come factory configured for the type of tuner it is connected to. In this example, a satellite tuner is used. In a cable system, the configuration is much simpler.

The "Clear Config" button will clear the configuration for all ports. You must then re-enter a new configuration.

### Satellite Input Ports

You must configure the type of LNB that is connected to each port so the Field Guide will operate with the satellites and transponders visible to that LNB. If you are familiar with the XR-3 field portable satellite meter System Setup, this part is the same. You must have the appropriate Field Guide pre-loaded via the FlashUpdate program.

1. Select the geographic Region where the antenna is located.
2. Select the Service or general LNB type
3. Select the System
4. Select the specific LNB Model
5. Select a Switch type if used and different than the default
6. If the LNB is to be powered by the RFSD-2XA, select "Internal LNB power". Otherwise select "External LNB power".

### Input Feeds

Some satellite antenna systems have multiple LNBF heads feeding the one cable. The RFSD-2XA can provide DiSEqC switching commands to select the different heads when internal RFSD-2XA power is used to power the LNB. Since each head picks up a different satellite, the different positions are called "input feeds".

Even if there is only one feed for a port, you need to configure the feed to provide the orbit to use, a label for the feed and possibly the polarity to use.

**LNB Feeds**

Port # 1	Next
LNB position LNB1	
Polarity Vert	Prev
Orbit 116.8W	
Feed label 119W	
Create Plan	EXIT

A satellite channel plan will need to be associated with the feed when you set up the monitoring script. You may use the "Create Plan" button here to create a plan from the Field Guide. This will create a plan file for the specified orbit and polarity that contains all transponders visible to the LNB in the selected region. You may then edit the channel plan to delete unwanted transponders, or add transponders that were not included in the Field Guide.

Press NEXT or PREV to rotate among the LNB positions available to this LNB type. These buttons will not appear if there is only one feed possible for the port.

Press EXIT to return to the port configuration screen.

### 6.2 Cable Calibration

**Note:** This section presently applies only to units configured with the cable/air tuner module. Satellite configured units will have some minor signal loss between the rear panel and the internal tuner module. An equivalent feature for the satellite systems will be available in the future.

When shipped, the unit is calibrated to a known signal level at the RF input ports. You may use the cable calibration screen to adjust the calibration to allow for losses in your cables connected to the box to establish a measurement point other than the input port. You may also use the cable calibration screen to compensate for any drift in the factory calibration that may occur over time.

Cable Calibration					
Row	Freq (MHz)	Level (dBmV)	Input 1 Offset	Input 2 Offset	
1	5.000	10.0	-4.8	-6.5	Auto Input 1
2	50.000	10.0	-3.9	-4.1	
3	150.000	10.0	-3.4	-2.9	Auto Input 2
4	450.000	10.0	-5.1	-6.1	
5	750.000	10.0	-5.3	-5.5	
6	1000.000	10.0	-5.9	-6.5	Manual
			Default	Cancel	Save

If you have a multiple carrier signal generator that can output 6 CW (continuous wave) frequencies, the Auto buttons allow very easy calibration. The Applied Instruments models 5112-6, 1685 and CSS-1200 can all be used for this purpose. The generator should have six frequencies spread across the frequency band used by the RFSD-2XA.

#### Frequency List

If the frequencies displayed do NOT match the frequencies of your signal generator, the MANUAL mode must be used first to define the frequencies. After the initial manual calibration, the frequencies entered will be stored and used in subsequent calibrations.

### Manual Calibration

Press the Manual soft key. Some entry fields will appear at the bottom of the screen.

Cable Calibration					
Row	Freq (MHz)	Level (dBmV)	Input 1 Offset	Input 2 Offset	
1	5.000	10.0	-4.8	-6.5	Done
2	50.000	10.0	-3.9	-4.1	
3	150.000	10.0	-3.4	-2.9	Next Row
4	450.000	10.0	-5.1	-6.1	
5	750.000	10.0	-5.3	-5.5	
6	1000.000	10.0	-5.9	-6.5	MEAS
1	5.000	10.0	none	none	

You must step through each row in the table for both inputs, supplying a known signal. The instrument will then measure the signal and calculate the difference which is stored in an offset table.

1. Connect your signal generator to Input Port 1.
2. Set the frequency and level of the signal generator.
3. Enter the first frequency.
4. Enter the known level.
5. Press MEAS and wait while the instrument takes the measurement and computes the offset.
6. Press Next Row and repeat steps 2 thru 5 for the other frequencies.
7. After processing all frequencies on input port 1, connect you signal generator to input port 2 and continue the process going through the same frequencies for the second port.
8. Press DONE to return to main calibration screen.
9. Press SAVE to store the calibrations.

You will not actually need to reenter the frequencies and levels for the second port. If you have a multi-carrier signal generator, you could press DONE after entering all frequencies and levels for input 1 and then use the Auto calibration for input 2.

### Automatic Calibration

Use this procedure when you have a six carrier signal generator available. The manual procedure above may be needed first to store the correct frequency list.

1. Connect your signal generator to input port 1 and set all frequencies and levels to the ones shown on the screen.
2. Press "Auto input 1".
3. Wait for the instrument to measure all frequencies and store new offsets. It will beep when done.
4. Connect your signal generator to input port 2 and repeat the process.
5. Press SAVE when done.

### 6.3 Relay Test

This function is used for testing the alarm relay output on the back panel.



The relays and their values are labelled as follows:

- Alarm relay (alarm, normal)
- Warning relay (warning, normal)
- Ack relay (normal, acknowledged)
- Monitoring relay (not monitoring, monitoring)
- Spare relay (NC closed, NO closed)

Use the left/right keys to change relay values.

## 6.4 Network Setup

To enable SNMP and remote web access, several parameters must be defined for the instrument. In addition, some SNMP parameters are defined in the individual configuration file described in a section below.

Network Setup	
IP Address <b>192.168. 1 .208</b>	Clear History
System ID TEST	Save Settings
Login ID TEST	
Password 123_	EXIT

The IP address is the network address for the instrument when attached to your network. It must be a static IP address or an address reserved by your DHCP server so that it will not be assigned to another device. Enter the 4 parts as 4 numbers, pressing ENTER after each number, the periods denote the standard address format and are not entered.

The System ID field provides a label that identifies the instrument when accessed remotely via HTTP by a web browser. Enter something that will let you know which instrument you are on when accessing remotely.

Also, when accessing remotely, you must log in to the instrument using the Login ID and Password stored on this screen. Also see the section on “Web Page Access”.

The “Clear History” button clears out the history table that is displayed in the web page or SNMP interface. This table holds up to 200 entries and older ones are automatically dropped when the table becomes full.

## 6.5 Cable Plans

This menu option provides access to the same cable and off-air channel plan selection and editing screens that are available in the XR-3 field portable meter when your RFSD-2XA is configured with a cable/air tuner module. Refer to the XR-3 user operation manuals as needed.

## 6.6 Satellite Plans

The XR-3 meter operates using a database of satellites and transponders known as a “field guide”. The RFSD-2XA also uses a field guide in the Signal Meter mode, but in the Monitoring Mode it uses channel plans consisting of transponder definitions. These channel plans can be built from the field guide as explained in the section on input feeds.

The Satellite Plans menu option lets you edit these channel plans.

**Plan List**

**Satellite Plans**

Delete

**119W.SPLN**  
110W.SPLN  
129W.SPLN

Create

Edit

EXIT

(Enter to select)

The first screen allows you to pick a plan for editing or deleting, or lets you create a new one if none exist. It is much easier to create a plan under the feed setup than to create one from scratch.

Select a plan and press “Edit” to edit the plan.

**Plan Editor**

**Satellite Plan Editor**

Filename 119W  
Feed 119W

Save

Next

EXIT

The feed label is to help identify the feed that the plan was created for. If the plan was created in the Feed Configuration screen, it will already be filled in.

Press “Next” to view the transponder list.

Press “Save” to save the modified file.

Press “Exit” to exit without saving any changes.

**Transponder List**

Transponder List	
↑	
Tr 1	1222.40
Tr 3	1225.31
Tr 14	1241.35
Tr 15	1242.81
Tr 19	1248.64
Tr 22	1253.01
Tr 23	1254.47
Tr 26	1258.85
Tr 27	1260.30
Tr 28	1261.76
↓	
(Enter to edit)	

Insert

Delete

Back

To insert a new transponder, put the highlight where you want the new transponder and press “Insert”. To delete, select the transponder to delete by positioning the highlight, and press “Delete”. Press “Back” to return to the first plan editing screen.

To edit a transponder, select it with the highlight, and press “Enter”.

**Transponder Parameters**

Edit Transponder	
Label	Tr 14
Downlink	1241.354
Polarity	Left
Modulation	DVB-S
Code rate	Auto
Symbol rate	20000
Options	None
Pilot	AUTO
Limit set	Default

Prev

Next

EXIT

Enter the parameters to match your transponder’s configuration. Press “Prev” or “Next” to edit adjacent transponders in the list. Press “Exit” to return to the transponder list.

The “Limit set” field is a label that associates a set of limits to each transponder. For example, you may want to have one set of limits for your standard high-power transponders and another set of limits to apply to spot beam transponders.

Although it is not labelled, the bottom soft key on the left side will clear a text field to the right of the cursor. You need to start editing the field before this key is active. This is helpful when changing a label to a new, shorter label.

**Saving the Plan**

After returning to the satellite Plan Editor screen, press SAVE to save the modified plan and the standard file saving screen will appear:

<b>Save Plan</b>		
03/10/2016		
<b>File Name</b>		
TEST3		
DATE TIME	<b>Location</b> PARK VIEW	SAVE
<b>Technician</b>		
JH		
Clear	<b>Notes</b> TESTING	EXIT

You may enter whatever you want in the Location, Technician and Notes fields.

## 6.7 Satellite Limits

Satellite systems use a different set of limits than cable systems so there is a separate editing function.

Limits		
	TEST1.SLIM	
Delete	MIDWEST.SLIM	Create
		Edit
		EXIT

Press "Create" to create a new limits file.  
 Select a file and press "Delete" to delete it.  
 Select a file and press "Edit" to edit the file.  
 Press "Exit" to return to main menu.

### Editing a Limits File

Limit Groups List		
	Default	
	BEAM	
	LOW	
Insert		
Delete		Save
		Exit
(Enter to edit)		

Each limits file can contain one or more sets of limits, and each set is named. This screen lets you insert a new set, delete a set, or select a set to edit.

It also lets you save the set after making changes or exit without saving changes.

To edit a set, select it with the highlight and press "Enter".

## Editing a Limits Set

Edit Limits		
Label	Level	Quality
<u>BEAM</u>	dBm	IRD#
	Minimum: -68.8	10
	Min Warning: -58.8	12
	Max Warning: -38.8	100
	Maximum: -28.8	100
		Back

When monitoring a satellite system, you can set alarm and warning limits, both high and low, on the signal level and signal quality measurements.

It is important to set the signal quality units you want before creating limits files. The instrument cannot convert an IRD number to a C/N number. If you change the measurement display units later, you will need to create new limits files. The display units are selected in the Options screen of the Monitor Setup menu.

The limit set label, "BEAM" in this example, is important because it associates the limits with the transponders in the channel plan.

High alarm and warning limits are probably not needed, particularly the quality limits, and can be set to very high values to keep them from triggering.

## 7 Monitoring Scripts

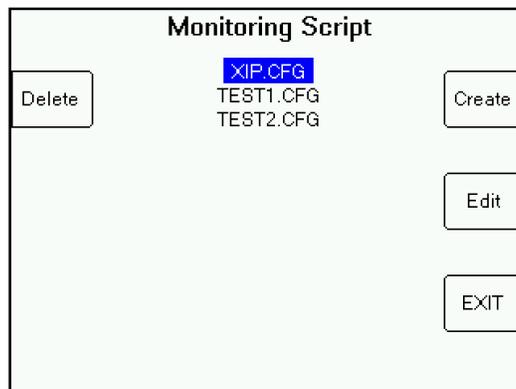
A monitoring script file is where you define the channels you want to monitor and other parameters that control the monitoring operation. You may store more than one script so you can easily change between different monitoring functions. You may also transfer the script files to and from a PC via the MeterMaid software.

### 7.1 Script Selection

The first configuration screen lets you:

1. Pick an existing script configuration file to use
2. Create a new configuration
3. Edit an existing configuration

If the selected file has been edited, you will also have the option to save it. If you try to exit without first saving an edited file, you will be given a warning and a chance to save it first.



To select a script file, highlight it with the up and down arrows and press ENTER. The Create and Edit options will take you to the following sequence of screens.

### 7.2 General Configuration

The name of the file being edited or "New Configuration" is shown at the top.



### Personality

Two choices are available: Primary/Backup or Monitor Only. Your instrument must be configured with an output switch to utilize the Primary/Backup personality.

Primary/Backup is intended for monitoring two input feeds, a primary and a backup. Normally, the primary feed is routed through the switch to an output port. When the primary fails, the backup is routed to the output instead. See the Primary / Backup Personality section for details.

The Monitor Only personality does not use an output switch, but just monitors one or more input feeds and reports alarms when measurements are outside the programmed limits.

### Modules

This field just indicates the number of tuner modules installed in the instrument.

### Feeds

This field shows the number of feeds that have been configured. See Port Configuration for more details.

### Auto Switchback and Switch Delay

These fields are only active in the Primary/Backup mode.

If “Auto Switchback” is turned on, you may enter a switch delay in seconds. This delay is used to automatically switch the output back to the primary input after an alarm has triggered a switch to the backup and then the primary comes back into normal limits. The delay starts when the primary returns to normal.

### Hysteresis Band

The “Hysteresis Band” is used to avoid the system repeatedly going into and out of alarm when the measured level is right at the alarm limit. For a low level alarm, the system will go into alarm when the level falls below the limit, but it will not be considered as having returned to normal until the level rises above the alarm limit PLUS the hysteresis band value.

For example, if the alarm limit is set for 0 dBmV and the hysteresis band is 2 dB, an alarm is triggered when the level falls to -0.1 dB or below but the alarm is not cleared until it rises to 2.0 dB or above. There is a 2 dB band just above the alarm limit which will not clear the alarm.

## 7.3 SNMP Configuration

This screen defines several parameters used for remote SNMP monitoring via a network.

TEST1.CFG	
Trap IP 1:	192.168.1.106
Trap IP 2:	0 . 0 . 0 . 0
Trap IP 3:	0 . 0 . 0 . 0
Write Community:	AIWRITE
Read Community:	AIREAD
	Back
	Next
	EXIT

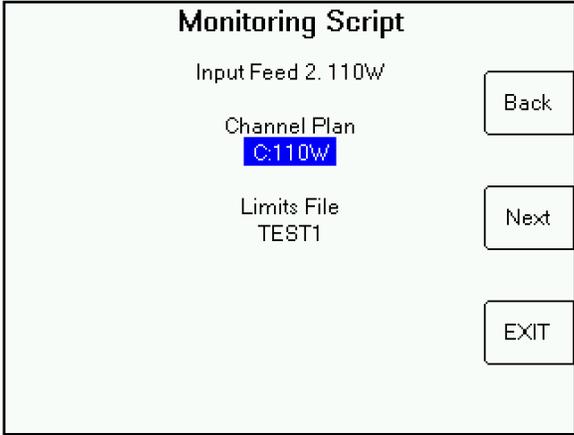
When an alarm or significant event occurs, the instrument will send an SNMP trap message to the IP addresses entered on this screen.

The Write and Read Community names are SNMP parameters that act like passwords and must be entered into any SNMP browser that tries to remotely access the instrument.

At present, there are no write functions supported so only the Read Community name is needed.

## 7.4 Feed Configuration

This screen is repeated for each input feed. See Port Configuration for definition of input feed. Each feed may use its own channel plan and limits file, or the same may be used for multiple feeds.



The image shows a terminal-style screen titled "Monitoring Script". The screen displays the following configuration for "Input Feed 2. 110W":

- Channel Plan: C:110W (highlighted in blue)
- Limits File: TEST1

On the right side of the screen, there are three buttons: "Back", "Next", and "EXIT".

To select a channel plan, highlight the field and press ENTER. A selection screen will come up that will let you pick from available plans. If you want to create a new plan, you will have to use the channel plan functions available from the Monitoring Setup menu. You may also select "Skip Feed" if you do not want to monitor a feed in this script file.

Similarly, to select a limits file, highlight the field and press ENTER. Again, if you need to define a new limits file, you will need to use the screens available in the Monitoring Setup menu.

In the Primary/Backup mode, a channel number field will also appear. From the channels available in the channel plan, you must select one channel to monitor.

Press Next to go to the next feed.

The last feed will have a Save button. Use that to save the file when you are done editing.

## 8 Event Logging

Events are logged to the SNMP system, the web page, and an internal log file.

**Note:** The internal log file function is presently disabled.

The following events are logged for each input:

1. Alarms
2. Warnings
3. Alarm cleared
4. Warning cleared
5. Acknowledgment received
6. Reset

In addition, the following events are logged for the system:

1. Power up
2. Power down
3. Monitoring mode started
4. Monitoring mode stopped
5. Any switch operation
6. System alarm (any input alarm)
7. System warning (any input warning)
8. System alarm cleared (ALL input alarms cleared)
9. System warning cleared (ALL input warnings cleared)
10. Acknowledgment received (any acknowledgment)
11. Reset (all inputs OK and reset)

The log file is written to a separate partition so that it can be kept open and added to as needed. When the allocated space is filled, the last 10% of entries are kept and the remainder are discarded (pruned).

## 9 Ethernet Port Configuration

The Ethernet interface uses a Lantronix XPort module that handles all of the Ethernet and SNMP tasks. This module comes configured but may need to be reconfigured depending on the network in which it operates.

See the “RFSD-2XA Ethernet Module Upgrade” document for instructions on how to update the firmware in the Ethernet module.

### 9.1 Device IP Parameters

1. IP address. This is preset to 192.162.2xx where xx will vary among units shipped in the same order. This address is a static address that must be unique within your network. Your network DHCP controller should be set to not assign addresses in the range used by the RFSD-2XA units.
2. Subnet mask - typically 255.255.255.0 but may be network dependent
3. Default gateway - the IP address of your network gateway device. Needed to gain access to the internet to post alarm traps outside of the local network.

The device's IP address may be changed from the front panel using the “Set Device IP Address” option on the monitoring menu.

To change the subnet mask or default gateway:

1. Run the Lantronix Device Installer program
2. The search routine should find the XPort device
3. Select the IP address that matches the XPort module to configure
4. There should be an “assign IP” button on the tool bar near the top of the display. Click this button and follow the wizard to set the IP addresses.

### 9.2 SNMP Parameters

To utilize the SNMP features, a few more parameters are needed. These are stored in the monitoring script configuration file.

1. SNMP community read name
2. SNMP community write name
3. Trap IP address 1
4. Trap IP address 2
5. Trap IP address 3

The community names are like passwords and a remote system wanting to access the SNMP data must use matching names.

Up to three IP addresses may be entered for sending traps. A notice will be sent to these addresses on every significant event (alarms, power up, etc.).

### 9.3 MIB Browser

Any MIB browser application may be used to remotely access the data on the device. There are several free ones available on the internet. An example of a free MIB browser is the iReasoning MIB Browser Personal Edition. Visit <http://www.ireasoning.com> for more information.

The MIB browser must be configured with:

1. The IP address of the RFSD-2XA – to be specified in the RFSD-2XA by selecting ‘Set Device IP Address’ from Monitoring Menu.
2. The SNMP community read name – Note: must match what is entered in monitoring script
3. The SNMP community write name – Note: must match what is entered in monitoring script

Also, the MIB description files must be loaded. The MIB description files may be downloaded from: [http://www.appliedin.com/www/products/RFSD-2XA\\_MIB\\_Browser\\_files.html](http://www.appliedin.com/www/products/RFSD-2XA_MIB_Browser_files.html)

The MIB browser must be run from one of the trap IP addresses configured in the last section for any write access to occur.

Note: There are no supported write operations at this time.

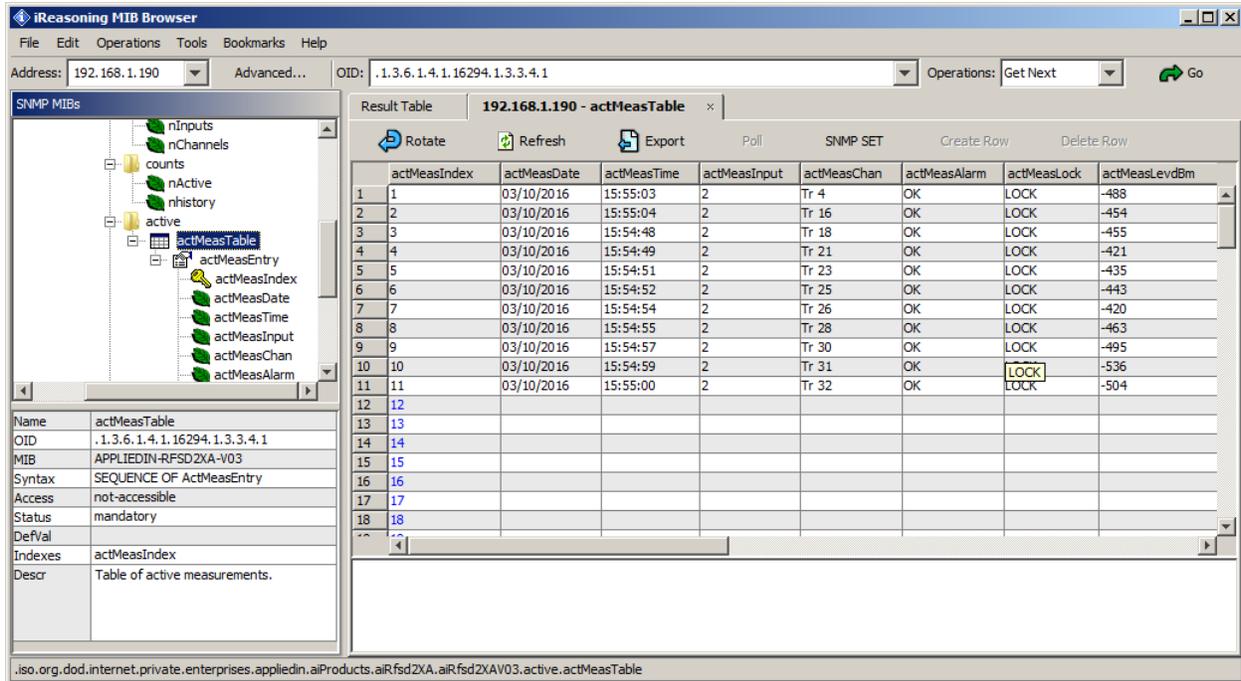
## **10 SNMP Operation**

The SNMP interface makes available the following information:

1. System status
  - a. Run state (monitoring, manual, or error)
  - b. Alarm state (OK, alarm, alarm acked, warning, warning acked, cleared)
  - c. Switch state (primary, backup)
2. Configuration
  - a. # of RF inputs
  - b. total # of channels measured
3. Counts
  - a. # of active measurement table entries
  - b. # of historical table entries
4. Active measurement table (one row per measured channel)
  - a. time stamp
  - b. RF input #
  - c. Channel #
  - d. signal level
  - e. signal quality
  - f. delta video-audio
  - g. alarm status of measurement
5. Historical measurement table
6. Event Log

### 10.1 Active Measurement Data

A MIB browser can be used to display the latest readings. The date and time of the readings is included so you can be sure the data is up to date.



### 10.2 Historical Measurement Table

The historical measurement table contains copies of the active measurement table entries saved when alarm events occur. The events that trigger saving a copy to the historical table are:

1. Monitoring begins. This includes:
  - a. Powering up into monitoring mode
  - b. Front panel starting of monitor mode
2. An alarm occurs
3. A warning occurs
4. A manual reset restores normal monitoring

These same events trigger a trap message to be sent. The history table data is the same as the active data table above.

### 10.3 Event Log

The log file table can also be accessed from the MIB browser:

The screenshot shows the iReasoning MIB Browser interface. The left pane displays a tree view of SNMP MIBs, with 'actMeasTable' selected under the 'active' folder. The main pane shows a 'Result Table' for '192.168.1.190 - actMeasTable'. The table contains 11 rows of data, each representing a measurement entry. The columns are: actMeasIndex, actMeasDate, actMeasTime, actMeasInput, actMeasChan, actMeasAlarm, actMeasLock, and actMeasLevDbm. The 'actMeasLock' column shows 'LOCK' for rows 10 and 11.

actMeasIndex	actMeasDate	actMeasTime	actMeasInput	actMeasChan	actMeasAlarm	actMeasLock	actMeasLevDbm
1	03/10/2016	15:55:03	2	Tr 4	OK	LOCK	-488
2	03/10/2016	15:55:04	2	Tr 16	OK	LOCK	-454
3	03/10/2016	15:54:48	2	Tr 18	OK	LOCK	-455
4	03/10/2016	15:54:49	2	Tr 21	OK	LOCK	-421
5	03/10/2016	15:54:51	2	Tr 23	OK	LOCK	-435
6	03/10/2016	15:54:52	2	Tr 25	OK	LOCK	-443
7	03/10/2016	15:54:54	2	Tr 26	OK	LOCK	-420
8	03/10/2016	15:54:55	2	Tr 28	OK	LOCK	-463
9	03/10/2016	15:54:57	2	Tr 30	OK	LOCK	-495
10	03/10/2016	15:54:59	2	Tr 31	OK	LOCK	-536
11	03/10/2016	15:55:00	2	Tr 32	OK	LOCK	-504

Below the table, a metadata section provides details for the 'actMeasTable' MIB:

- Name: actMeasTable
- OID: .1.3.6.1.4.1.16294.1.3.3.4.1
- MIB: APPLIEDIN-RFSD2XA-V03
- Syntax: SEQUENCE OF ActMeasEntry
- Access: not-accessible
- Status: mandatory
- DefVal:
- Indexes: actMeasIndex
- Descr: Table of active measurements.

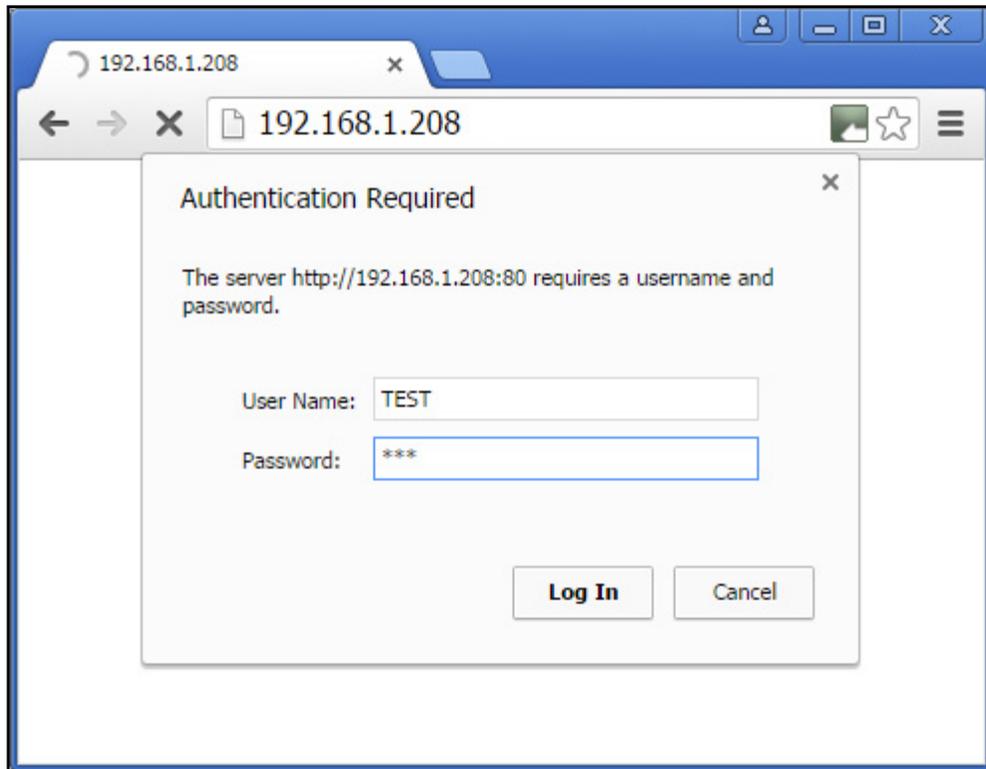
The status bar at the bottom of the window shows the full path: .iso.org.dod.internet.private.enterprises.appliedin.aiProducts.aiRfsd2XA.aiRfsd2XAV03.active.actMeasTable

## 11 Web Page Access

The same information available via SNMP is available via a web page except for the SNMP trap messages.

### 11.1 Accessing the Web Page

From any web browser on your network, enter the device's IP address into the URL field. This should bring up the login screen for the web page:



Enter the login ID and password from the Network Setup screen. If these match, the main web page should appear:

## 11.2 Main Web Page

AI Web x  
192.168.1.208/status.cgi

**APPLIED INSTRUMENTS, INC.**  
TELECOMMUNICATIONS INSTRUMENTATION

**RFSD-2XA**

Status Data Active Data History Data Log Data

Refresh

Unit ID: **ALEX**  
Date: 12/01/2015  
Time: 11:11:27

Run State	Manual
Alarm State	Normal
Switch State	Primary

This page shows:

1. The Unit ID or System ID from the Network Setup screen to identify the unit
2. The date and time of the last data update to the web page
3. The run state of the device
4. The alarm state of the device
5. The state of the switch (if the instrument is configured with a switch)

This information should be sufficient to tell at a glance what the state of the device is.

This page will be automatically updated about every 10 seconds, but if the system is in manual mode, the date and time will not change since no new measurement data is posted in manual mode.

Several buttons are available to obtain more detailed data:

1. Active Data
2. History Data
3. Log Data

### 11.3 Active Data

This page shows the latest reported measurements:

Date	Time	Input	Channel	Level (dBmV)	Quality(dB)	DVA(dB)	Alarm
12/01/2015	11:22:33	1	1	9.9			✓ Normal
12/01/2015	11:22:33	2	1	8.0			✓ Normal

The input column identifies which port the measurement comes from.  
 The channel indicates which channel is being measured within the channel plan.  
 In a primary/backup system, only the level is measured so the Quality and DVA columns are empty.

### 11.4 History Data

The History Page shows the same table format as the active data page, but multiple measurements are shown. New history values are stored whenever a system alarm is triggered or other significant event occurs. The events that trigger history storage are:

1. Alarm
2. Warning
3. System Reset
4. Starting monitoring (either power up or from manual mode)

The history table stores about 200 entries. Older entries are dropped as new ones are added.

The screenshot shows a web browser window with the URL 192.168.1.208/active.cgi. The page header features the Applied Instruments, Inc. logo and the text 'TELECOMMUNICATIONS INSTRUMENTATION' and 'RFSD-2XA'. Below the header is a navigation bar with buttons for 'Status Data', 'Active Data', 'History Data', and 'Log Data', and a 'Refresh' button. The main content area contains a table with the following data:

Date	Time	Input	Channel	Level (dBmV)	Quality (dB)	DVA (dB)	Alarm
12/01/2015	11:22:33	1	1	9.9			✓ Normal
12/01/2015	11:22:33	2	1	8.0			✓ Normal

### 11.5 Log Data

The Log Data page shows the event log entries with the latest entries at the top.

Date	Time	Log Message
12/01/2015	11:31:34	Reset Backup Ch 2
12/01/2015	11:31:27	Clear Backup Ch 2
12/01/2015	11:31:25	Ack Backup Ch 2
12/01/2015	11:31:19	ALARM Backup Ch 2
12/01/2015	11:31:14	Ack Backup Ch 2
12/01/2015	11:31:02	WARNING Backup Ch 2
12/01/2015	11:17:49	Monitor ON
12/01/2015	11:11:28	Monitor OFF
12/01/2015	11:09:55	Monitor ON
12/01/2015	11:09:39	Monitor OFF

The table stores about 200 entries. Older entries are dropped as new ones are added.

## 12 Software Updates

Updates to the instrument's software, the standard cable/off-air channel plans, and satellite Field Guides are available from the Applied Instruments website. The upgrades are made using a Windows PC application called FlashUpdate, which is available for download from our website at:

[www.appliedin.com/downloads/flashupdatezip.exe](http://www.appliedin.com/downloads/flashupdatezip.exe)

See [http://www.appliedin.com/www/products/RFSD-2XA\\_Software\\_Updates.html](http://www.appliedin.com/www/products/RFSD-2XA_Software_Updates.html) for more details and links to instructions about the RFSD-2XA software update process.

If you have any problems or questions about FlashUpdate, call Applied Instruments' Tech Support team at +1 (317) 782-4331 from Monday through Friday, 8AM to 6PM USA Eastern Time Zone (UTC-5).

### 12.1 Requirements

1. A PC running Microsoft Windows XP, Vista, Windows 7, Windows 8, or Windows 10
2. An open USB connection port on your PC
3. An internet connection
4. USB data transfer cable (USB 2.0 Type A Male to Type B Male)

### 12.2 Standard Channel Plans

(applies to CATV / Off-Air module only)

Standard Channel Plans for the CATV / Off-Air module are available. These may be revised or added to in the future. The standard channel plans include:

Standard Cable Plans	Plan Descriptions
EIASTD	N.Am EIA analog & digital
EIASTD QAM	N.Am EIA digital
EIASTD ANLG	N.Am EIA analog
HRC	HRC analog
IRC	IRC analog
PAL BG	PAL B-G analog
PAL I	PAL I analog
SECAM	SECAM analog

Standard Off-Air Plans	Plan Descriptions
NTSC ATSC	VHF/UHF analog & 8VSB
OTA DIGITAL	VHF/UHF 8VSB
OTA ANALOG	VHF/UHF analog
FM N. Am	FM N.America

### 12.3 Satellite Field Guides

(applies to satellite modules only)

There are several Field Guides of satellite transponders now and more may be added in the future. You select the Field Guide you need using the pull down list in FlashUpdate.

- North American Field Guide (for the continental United States and Canada)
- Alaska-Hawaii Field Guide
- Carib-CentralAm Field Guide (for Caribbean, Central America, and Mexico)
- South American Field Guide
- European Field Guide
- African Field Guide

- Middle East Field Guide
- Asian Field Guide
- South Pacific Field Guide

If you simply want to change Field Guides even though no new versions are available, you may need to also put a check in the box before clicking "UPDATE".

## 12.4 Limit Values

(applies to satellite modules only)

For Dish Network related work, there are Limit Value databases available, Select the one for the geographic region you are in. If you won't be using the RFSD-2XA for Dish Network applications, select 'No Limits'. You can select the Limit Values you need using the pull down list.

## 12.5 Postal Codes

(applies to satellite modules only)

Postal Code files provide look-up of latitude and longitude based on the postal code. Postal code files for the United States and Canada are available now and more may be added in the future.

If you are outside the United States and Canada, choose "No Postal Codes." You may then type in and save the latitude and longitude for your location. Based on the lat/long coordinates, the instrument can calculate the azimuth, elevation, and skew settings of the dish antenna as it relates to each satellite.

# 13 MeterMaid Operations

MeterMaid is a Windows PC application that provides some additional capabilities when used on a PC connected via USB cable to the instrument.

MeterMaid allows you to transfer several file types to and from the instrument and to print reports of the data in those files or use the files in other PC applications.

The MeterMaid application is included in the FlashUpdate installation. See Software Updates section that describes how to download FlashUpdate.

## 13.1 Transfer to PC

The files that can be transferred to a PC are:

1. Monitoring Files:
  - a. Monitoring scripts
  - b. Channel plans (cable and satellite)
  - c. Limit definitions (cable and satellite)
  - d. Log file (available soon)
2. Cable/Air Files
  - a. Channel scans
  - b. Favorites scans
  - c. Spectrum graphs
  - d. Constellation graphs
3. Satellite Files:
  - a. PoP Scans
  - b. Limit Scans
  - c. Spectrum graphs

## **13.2 Transfer to Instrument**

The files that can be transferred from the PC to the instrument are:

1. Channel plans (satellite and cable)
2. Limit definitions (cable and satellite)
3. Monitoring scripts

## 14 Troubleshooting / FAQs

1. Does my RFSD-2XA instrument have a hard reset feature?
  - a) Yes. If the screen freezes and the RFSD-2XA won't respond to any buttons, press and hold the ON / OFF power button for 10 seconds to initiate a hard reset.

Note: This method of hard reset will only work if the red Power On Option toggle switch on the rear of the unit above the AC line cord port is set to 'Manual On / Off via Front Panel'. If the switch is set to 'Automatic On / Off with Line AC', then the only method to perform a hard reset is to disconnect the AC mains power from the RFSD-2XA and then plug it back in.
2. My RFSD-2XA is displaying a message that says "ERROR Module not found". Why?
  - a) It means the RFSD-2XA base isn't detecting a tuner module.
3. While I have the cable connected to the RF IN port of the instrument, I don't even see any signal level shown on left bar graph. It just says "UNDER".
  - a) Try toggling to a different channel. Perhaps the frequency you were tuned to doesn't have an active channel present.
  - b) Replace F-connector barrel connectors (Type F 75 Ohm) for the related RF Input port. Use a 7/16" wrench to loosen existing barrel. Install new F-connector barrel and only tighten to 20 inch pounds of torque with wrench after finger-tightening. Warning: Do NOT over-tighten!
  - c) If issue still remains, contact Applied Instruments' Tech Support department and request a RMA# to send the instrument to the factory for inspection and repair.
4. Can the RFSD-2XA's Cable Air module be used to measure CATV and Off-Air signals outside the United States?
  - a) Yes, the XA-CA-01 Cable Air module can be used outside the United States, but it depends on the signal types used in each country. Be sure to select the appropriate channel plan in the instrument for your signal type.
  - b) For digital off-air signals, the XA-CA-01 is compatible with the 8VSB signal type, which is used in the USA (and U.S. territories such as Puerto Rico), Canada, Mexico, Dominican Republic, Guatemala, Honduras, and South Korea.
  - c) For digital cable signals, the XA-CA-01 is compatible with the QAM64 and QAM256 (ITU-T, J.83 Annex B) signal types, which are used primarily in North America (USA, Canada, Mexico), but also some parts of Central and South America.
  - d) For analog cable and off-air signals, the XA-CA-01 is compatible with NTSC, PAL, and SECAM, so it can be used worldwide for legacy analog cable TV and off-air testing purposes.
5. My serial number is missing off the back of my RFSD-2XA instrument. How can I obtain my serial number to check with the factory if it's still under warranty?
  - a) Connect your RFSD-2XA instrument to the PC, power it on, and open the FlashUpdate or MeterMaid program. The serial number of the connected unit will be displayed in FlashUpdate and MeterMaid if proper connection is established.
  - b) Turn the RFSD-2XA on. Enter the Signal Meter Mode. Then go to MENU, Versions, to see the base unit's serial number and the module's serial number, along with the loaded software versions.
6. While attempting to download or install the FlashUpdate application, the download just seems to stall out and not make any progress. What could be the cause of this?
  - a) This issue is most likely caused by your anti-virus software or firewall blocking our program. Please temporarily disable your computer's anti-virus software and firewall so it doesn't interfere with the installation of the FlashUpdate and MeterMaid programs and the related USB drivers. If you have a hardware firewall, either stand-alone, or in a router, you must either modify the settings of the device to permit access to our program or you will have to entirely by-pass the router or other inhibiting hardware device. Also ensure that you are signed on as Administrator or have Administrator rights for Microsoft Windows.
  - b) If your company has a strict policy and the firewall blocks any executable files, then please contact your IT department and ask for assistance. Applied Instruments is more than happy to speak to the IT department about a work-around solution.

## **15 Replacement Parts & Accessories**

### **Standard Accessories**

Item Description	Part Number
120-240VAC/15VDC AC Adapter and Metal Bracket for RFSD-2XA (to be installed in instrument)	990-10320
USB Data Transfer Cable for models RFSD-2XA, NPRT 2200, NS-3	983-00004
Replacement Double Female F-Connector Barrel (Type F connector)	715-01026

## **16 Warranty and Repairs**

### **Warranty**

The instrument is warranted for one year from the date of purchase. This warranty covers defects in material and workmanship only. This warranty does not apply if the instrument has been opened, abused, or exposed to moisture.

### **Repair Services**

If a unit is damaged or not performing as specified, repair and maintenance service is available. Each repair is done on a case by case basis. Charges include time, materials and a handling charge. Shipping charges to our factory are the responsibility of the customer. Return shipping charges are also the responsibility of the customer (except for "in warranty" repairs for customers located within the USA).

If you need to return equipment for service, please call our factory at +1 (317) 782-4331 and ask for Tech Support or email us at [info@appliedin.com](mailto:info@appliedin.com) and indicate REPAIR REQUEST in the subject line. To obtain a RMA number, you will first need to provide the following information:

- Your first and last name, company name, email address, telephone number, ship-to address, and bill-to address
- Model of instrument you have
- Version of software that you have loaded (if applicable)
- Serial number of the instrument
- Detailed description of the issue

The RMA number must be written on the outside of the shipping box and on all correspondence relating to that particular shipment. Please include details of the service requested. Ensure that the equipment is securely packed with proper cushioning material on all sides. The unit should be insured for its full value in case of damage or loss in transit. After the repair is completed, we will contact you for payment. If payment is not received within 60 days after contact is made, then the repaired equipment will become the property of Applied Instruments.

### **Version Updating**

As our product lines are refined and features and performance are enhanced, we will upgrade older units at a nominal cost when possible. Shipping charges are additional. Contact us at +1 (317) 782-4331 for price and schedule if you are interested in having a unit updated.

### **Calibration**

Periodic calibration of modules may be necessary to ensure that the unit is operating within the original factory specifications. A standard calibration charge will be incurred.

## 17 Specifications

### RFSD-2XA Base Instrument Specifications

Power Supply.....	100 to 240VAC, 50/60 Hz standard, 12VDC optional
Computer Interface.....	USB and Ethernet
Size/Weight.....	3.5"H (2RU) x 19"W / 12 lbs. (8.9cm x 48 cm / 4.5 kg)
RF Connectors .....	Type F-female standard, BNC
optionalWarranty.....	12 month limited

### XA-CA-01 Cable-Air Tuner Module Specifications

Frequency Range.....	5-1000 MHz
Tuning Resolution.....	Standard channel spacing or 125 kHz increments
Signal Level Range.....	-40 to +60 dBmV (-89 to +11 dBm) (+20 to +120 dB $\mu$ V)
RF Level Accuracy.....	+/- 1.5 dB typical
Compatible Analog Signal Formats.....	NTSC, PAL, SECAM
Compatible Digital Signal Lock Formats.....	8VSB (ATSC A/53) 64QAM, 256QAM (ITU-T J.83, Annex B)
Nominal Impedance.....	75 Ohm
LNA/Pre-Amp Power.....	13, 18 VDC

### XA-S2ACM-01 Satellite Tuner Module Specifications

Frequency Range.....	900-2150 MHz
Tuning Resolution.....	4 kHz
Signal Level Range... ..	-75 to -15 dBm (-26 to +34 dBmV) (+34 to +94 dB $\mu$ V)
RF Level Accuracy.....	+/- 2 dB typical, 3 dB max
Signal Lock Formats.....	DVB-S (QPSK) DVB-S2 (QPSK, 8PSK, 16APSK, 32APSK, CCM, VCM, ACM), DSS / DIRECTV Legacy (QPSK)
Impedance.....	75 Ohm
LNB Power.....	13VDC for V/R, 18VDC for H/L (current limited at 780mA), 21VDC for DIRECTV SWM LNBs (current limited at 520 mA), 29VDC (current limited at 360 mA)
Switch Control.....	22 kHz, DiSEqC

### XA-TS2-01 Satellite Tuner Module Specifications

Frequency Range.....	250-2150 MHz
Tuning Resolution.....	4 kHz
Signal Level Range... ..	-75 to -15 dBm (-26 to +34 dBmV) (+34 to +94 dB $\mu$ V)
RF Level Accuracy.....	+/- 2 dB typical, 3 dB max
Signal Lock Formats.....	DVB-S (QPSK), Digicipher 2 (QPSK & OQPSK), DVB-S2 (QPSK & 8PSK CCM), DSS / DIRECTV Legacy (QPSK), Turbo (QPSK & 8PSK)
Impedance.....	75 Ohm
LNB Power.....	13VDC for V/R, 18VDC for H/L, 21VDC for DIRECTV SWiM LNBs, 29VDC
Switch Control.....	22 kHz, DiSEqC

*Specifications are subject to change without notice.*

## WARRANTY

The Applied Instruments RFSD-2XA is warranted against defects in materials and workmanship for a period of twelve months. Applied Instruments agrees to repair or replace any assembly or component found to be defective under normal use during this period. Our obligation under this warranty is limited solely to repairing the instrument proven to be defective within the scope of the warranty when returned to the factory. Transportation to the factory is to be prepaid by the customer. Authorization (RMA#) by Applied Instruments is required prior to shipment.

Applied Instruments assumes no liability for secondary charges or consequential damages and, in any event, Applied Instruments' liability for breach of warranty under any contract shall not exceed the purchase price of the instrument shipped, and against which a claim is made.

Any application recommendation made by Applied Instruments for the use of its products is based upon tests believed to be reliable, but Applied Instruments makes no guarantee of the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for Applied Instruments any liability in connection with the sale of our products other than that set forth herein.

### Manufactured, Serviced, and Supported by:

Applied Instruments, Inc.  
5230 Elmwood Avenue  
Indianapolis, IN 46203 USA  
<http://www.appliedin.com>

Tel: +1 (317) 782-4331  
Toll-free USA Tel: (800) 244-2976  
Fax: +1 (317) 786-9665  
Email: [info@appliedin.com](mailto:info@appliedin.com)

