Fiber Defender FD322™

User Manual

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1. Introduction

The **Fiber SenSys FD322** is an electro-optical Instrument that uses optical fiber as a distributed sensor for detecting intruders attempting to cut, climb, or crawl under a fence. The APU can be calibrated or tuned to disregard non-threatening stimulus such as wind and animals; thus, reducing nuisance alarms. When an intruder is detected, the APU sends out an alert via IP/XML Ethernet communication as well as state changes via terminal contacts that can be used to switch on lights, cameras, sirens, or to signal an alarm panel.

The optical fiber-based system has been designed to be immune to the effects of Electromagnetic Interference (EMI), lightning, and Radio Frequency Interference (RFI). The **FD322** provides maximum effective intrusion detection through its inherent system flexibility and advanced programmability.

Because the fiber optic sensors use laser light which is intrinsically inert, the **FD322** system can be installed safely at chemical plants, ammunition depots, or any location where the use of electricity is a concern.

RS-232 communication allows for simple setup and calibration, while IP/XML communication for direct network interface allows for easy integration with any security solution.

A key component of the **FD322** is its fiber optic sensor cable; this uniquely-designed cable, which is sensitive to movement, pressure, and vibration, can be routed along the fabric of a fence to detect climbing and cutting. The detection of an intruder triggers an alarm from the Alarm Processing Unit (APU).

Some of the intrusion threats the **FD322** can be used to detect include:

- Fence climbing (along both the fabric and post)

- Fabric cutting

- Crawling underneath a fence

- Ladder assisted climbing of a fence

A single run of sensor cable can protect a zone up to 500 meters (1,640 feet) in length. The APU channels can be programmed independently, which gives users the ability to protect two separate zones from the same APU.

Figure 1-1. **FD322** fiber optic intrusion detection system.

![Fiber SenSys logo]

2. Safety Information

This section contains information to help ensure personal safety and proper operation of equipment. Please read and follow all these instructions carefully and keep them accessible for future reference. Whenever using the **FD322**, use only attachments and accessories that have been specified by FSI and refer all servicing to qualified personnel.

Safety Terms

The following icons may appear throughout this manual:

CAUTION: Identifies conditions or practices that could result in damage to equipment and/or loss/contamination of data.

WARNING: Identifies conditions or practices that could result in non-fatal personal injury.

DANGER: Identifies conditions or practices that could result in serious injury or death.

Electrical Safety

If the **FD322** is damaged or malfunctions, disconnect power to the APU. Do not use the APU if any of the following conditions exist:

- The APU is visibly damaged.

- The APU does not operate as expected.

- The APU has been subjected to prolonged storage under adverse conditions.

- The APU has been damaged during shipment.

Do not put the APU into service until qualified service personnel have verified its safety.

Covers and Panels

There are no user-serviceable parts inside the APU. To avoid personal injury, do not remove any of the APU's covers or panels. The product warranty is void if the factory seal is broken. Do not operate the product unless the covers and panels are installed.

Inspection

The **FD322** APU should be inspected for shipping damage. If any damage is found, notify **Fiber SenSys** and file a claim with the carrier. Save the shipping container for possible inspection by the carrier.

Laser Radiation

The **FD322** APU is a Class I laser product, as defined by IEC 60825-1 and CFR 21 subchapter J. A Class I laser product emits insufficient laser radiation to constitute a hazard. However, avoid direct eye exposure to the output of this product or to the open end of any optical-fiber cable connected to this product.

The following stamp is found on the front panel of the **FD322** APU:

Figure 2-1. Class 1 laser stamp on front panel of the **FD322** APU

Fiber-Handling Precautions

Optical fibers are made of glass and the ends of a broken fiber can be sharp and may become lodged in the skin. Take appropriate glass-handling precautions.

FCC Rules

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If the equipment is not installed and used in accordance with the instructions it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into a different outlet than the receiver.

- Consult the dealer or an experienced radio/TV technician for help.

3. The Sensing Fiber

The **FD322** detects trespassers by sensing disturbances caused by an intruder attempting to gain access by climbing or cutting a chain-link style fence. The sensing cable must be routed along the fabric of a fence to detect climbing and cutting.

Fiber Optic Sensing

When an optical fiber is exposed to vibration, the disturbance causes small asymmetric changes in the fiber's density. In turn, these changes in density cause measurable changes in certain characteristics of laser radiation that is transmitted through the fiber. The **FD322** uses precision lasers and detectors, along with sophisticated digital signal processing, to measure changes in the laser radiation. The processor analyzes the incoming signals in order to determine whether they are caused by intruders, or harmless nuisances, such as vibrating equipment. To learn more about fiber optics and their use as sensors, refer to the application note on fiber optics titled: **AN-SM-007 Fiber Optics**.

Sensor Cable

There are two types of sensor cable for the FD322: **SC-3** and **SC-4**.

SC-3 is distinguished by its dark brown protective jacket. This jacket ensures the cable is resistant to weather, dirt, etc. although the cable is not outdoor rated and should be contained within protective conduit.

- **SC-3 (brown jacket) –** 3 mm sensor cable used for perimeter applications.

Sensor cable comes in varying lengths, with up to 2000 meters (6500 feet) per spool.

- **SC3-C (cable in conduit) –** 3 mm sensor cable within grey ½" UV rated conduit.

Cable in conduit should be purchased in premeasured zone lengths and reels can be up to 800 meters.

SC-4 comes in a thicker green jacket and is outdoor rated. This cable can be attached to the fence directly using nylon cable ties and does not need to be deployed within protective conduit.

- **SC-4 (green jacket) –** 4 mm sensor cable used for perimeter applications.

Sensor cable comes in varying lengths with up to 2000 meters (6500 feet) per spool.

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Fence Installation

As mentioned previously, the purpose of a fence line sensor cable installation is to detect threats against a fence line boundary such as climbing or fabric cutting. Under most circumstances, the sensor cable is deployed in a "loopback" configuration with strands of the loop running along the top and bottom halves of the fence height. In high security cases, the cable is also run along barbed wire outriggers and fence posts for increased perimeter protection.

Ultimately, the method by which the **FD322** system is deployed is up to the end user; **Fiber SenSys** does not recommend or mandate one particular installation setup over another; however, the general procedure for installing the **FD322** system is:

1. **Assess:** Survey the site to be protected and record all information needed for the site design phase.

2. **Design:** Create a strategy for protecting the site. This includes planning the level of security, choosing the location of the APUs, provision of electrical power, and planning cable routing.

3. **Install:** Proper deployment of the fiber optic sensor and correct installation of the Fiber SenSys system.

For ease of installation, the **FD322** can be purchased in an all-inclusive kit. The **FD322-Rapid Fiber™ Kit** can be ordered for 100 m zones or 200 m zones. The kit contains the APU and a universal input power supply pre-installed in an easily mountable weatherproof NEMA 4X IP66 rated enclosure. The kit comes with two pre-connectorized spools of SC-4 fiber, one for each zone, and UV-rated nylon cable ties for quick and easy installation. For more detailed installation instructions for the **FD322-Rapid Fiber™ Kit** refer to the application note: **AN-ENG-026 FD322-Rapid Fiber Kit Installation.**

To learn more about site assessment, site design or sensing fiber installations, refer to the application note on installation: **AN-ENG-027 Site Design and Installation for FD300 Series**.

> **Note:** Once the fiber has been installed the APU must be calibrated for the loss of the sensing fiber installation. See **Calibrating System Loss** in section 5.

Connectors

FD322 is a fiber optic intrusion detection system that can monitor up to two fully independent zones (sensing fibers) using a single APU. To maintain a high signal-to-noise ratio, it is important that all connections within a given fiber-optic sensor (zone) be made by either fusion splicing or by physical-contact fiber-optic connectors (PC). It is helpful to test the optical loss of each zone. The sensing fibers plug directly into the APU and are always connected with an ST connector (ST/PC).

Note: It is important that only clean optical connectors are inserted into the APU's optical inputs and outputs; dirty connectors can degrade the performance of the APU or even cause irreversible damage. When leaving connectors unconnected make sure they have protective caps installed on the ferrules. Caps protect the ferrule from damage that might be caused by bumping the ferrule against a foreign object. However, when caps are dirty they don't protect (effectively) against microscopic contamination. Consequently, be sure to clean all connectors prior to insertion whether or not they have been capped. For more information on the care and cleaning of fiber-optic connectors, refer to the application note on fiber optics: **AN-SM-007 Fiber Optics**.

![Fiber SenSys logo]

4. The Alarm Processing Unit (APU)

APU Description

The **FD322** APU has 7 input/output ports. There are 2 optical connectors (labeled **"Input"** and **"Output")** for each channel. In addition, the APU has a terminal connector strip for DC power and relay leads, an RS-232 connector, and an Ethernet connector. Figure 4-1 shows the layout of the ports for a Model **FD322** APU.
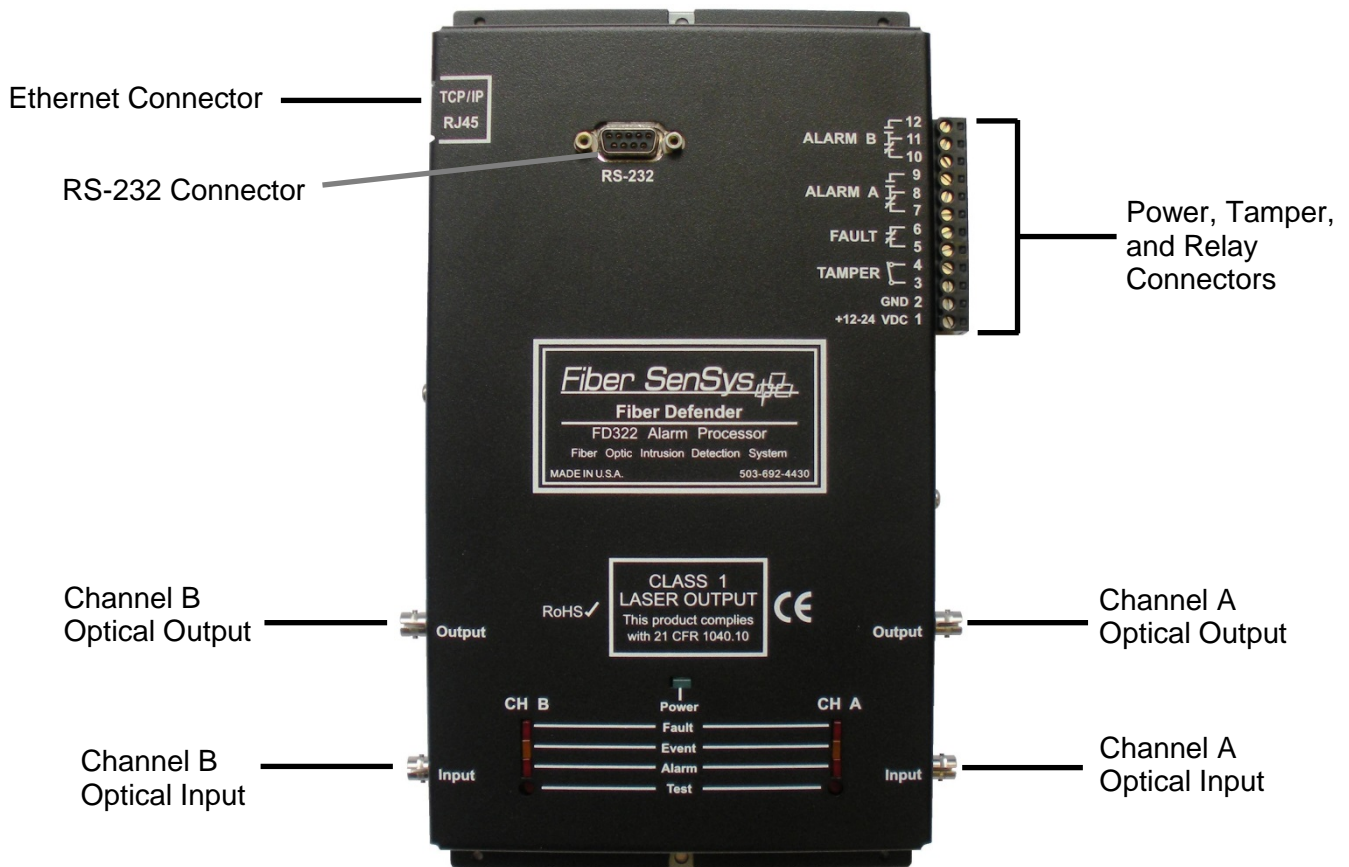

Figure 4-1. The **FD322** APU Connectors

At the right-hand side of the APU module is a 12-pin terminal strip for connecting electrical power, alarm, fault, and tamper relays. Each pin is labeled. The terminal pins, from bottom to top of the terminal strip, are listed in Table 4-1.

Pin	Description
1	+12 to +24 VDC
2	Ground
3	Tamper Input
4	Tamper Input
5	Fault
6	Fault
7	Channel A Normally Closed
8	Channel A Common
9	Channel A Normally Open
10	Channel B Normally Closed
11	Channel B Common
12	Channel B Normally Open

Table 4-1. Terminal Pin Descriptions

Power. Pins 1 and 2. 12 to 24 VDC is connected to these terminal pins. The positive lead is the bottom-most pin (Pin 1) and ground is the pin immediately above it (Pin 2).

Tamper. Pins 3 and 4. The leads of a tamper switch are normally connected here. Whenever the tamper circuit opens (because the tamper switch is not set or the enclosure door opens, etc.), the alarm relay activates and remains activated until the circuit closes again or the tamper feature is disabled (this feature is disabled by default).

Fault. Pins 5 and 6. These pins are used to connect the fault relay to a remote indicator. The normally-closed fault relay contacts open if there is a loss of optical power or if power drops below the nominal threshold on *either channel.*

While fault indication is displayed on the APU front panel for each individually affected channel, only one set of fault relay contacts is provided and is shared by both channels.

Channel A Alarm (normally-closed contact).   Pins 7 and 8.   When the APU determines an alarm condition in the channel is met, the contact opens. In an unpowered state, this contact is open.

Channel A Alarm (normally-open contact). Pins 8 and 9. When the APU determines an alarm condition in the channel is met, the contact closes. In an unpowered state, this contact is closed.

Channel B Alarm (normally-closed contact). Pins 10 and 11. When the APU determines an alarm condition in the channel is met, the contact opens. In an unpowered state, this contact is open.

Channel B Alarm (normally-open contact). Pins 11 and 12. When the APU determines an alarm condition in the channel is met, the contact closes. In an unpowered state, this contact is closed.

> *WARNING!*
> *DO NOT APPLY AC VOLTAGE TO THESE PINS. THE ALARM RELAY CONTACTS ARE RATED FOR DC VOLTAGE ONLY (100mA at 24 VDC).*

LED indicators. LED indicators for each channel are found on the front panel of the module.

- **"Fault"** indicates a loss or significant degradation of returning optical power.

- **"Event"** indicates a disturbance or event has been detected in the sensor cable.

- **"Alarm"** indicates an alarm condition has occurred.

- **"Power"** indicates the module is plugged in and receiving power.

Pressing the **Test** button (located below the LED indicators) causes the **ALARM** and **FAULT** LEDs to light up and the corresponding relay contacts to change state.

On the upper left-hand side of the APU there is an RJ45-style connector for TCP/IP Ethernet communication with a security head-end or other annunciator/monitoring equipment.

The front panel of the APU has an RS-232 connector for connecting to a PC during calibration. The pin-out for the RS-232 connector is shown in figure 4-2 and table 4-2.
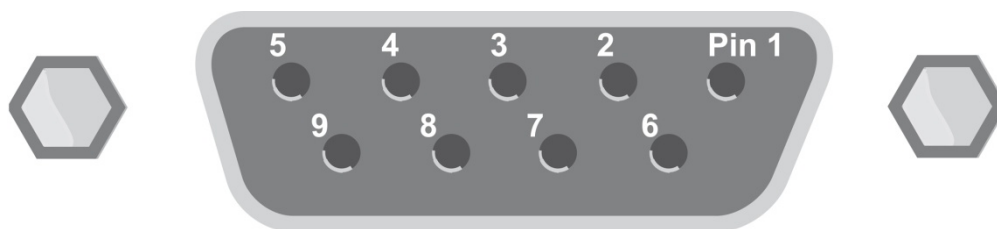
Figure 4-2. Pin-out for the RS-232 connector

Table 4-2. RS-232 Pin Assignments

Pin Number	Description
1	No connection
2	T x D transmit
3	R x D receive
4	No connection
5	Ground
6	No connection
7	RTS
8	CTS
9	No connection

Note:

Connections to the APU's RS-232 interface should use straight-pin DB-9 serial cable

5. FD322 Tuning Software

Terminal emulation software, or **FD322 Tuning Software**, is required to adjust the tuning parameters of the APU. They run on a PC that is connected to the APU via the RS-232 port on the front of the APU. Any terminal emulation software will work to change APU parameters, but **FD322 Tuning Software** is recommended for precision tuning.

FD322 Tuning Software is a Windows-based software module that allows for the tuning of the system so that it has maximum sensitivity when detecting intrusions with maximum rejection for nuisance alarms. **FD322 Tuning Software** also allows the user to monitor system performance and record and analyze sensor data.

For instructions on how to change settings using a terminal, refer to Appendix B at the end of this manual.

Using FD322 Tuning Software

With power off to the APU, connect one end of an RS-232 cable to the APU and the other end to the PC from which the **FD322 Tuning Software** will be launched, then turn on power to the APU.

Launch the **FD322 Tuning Software** by clicking on the icon pictured below or navigate to "All Programs | **Fiber SenSys** | **FD322 Tuning Software**":

Figure 5-1: FD322 Tuning Software Icon

Upon launching the program, click the tab in the top left labeled "Serial Port" and click on the appropriate port from the list of available ports. Then click "Connect to COM Port."
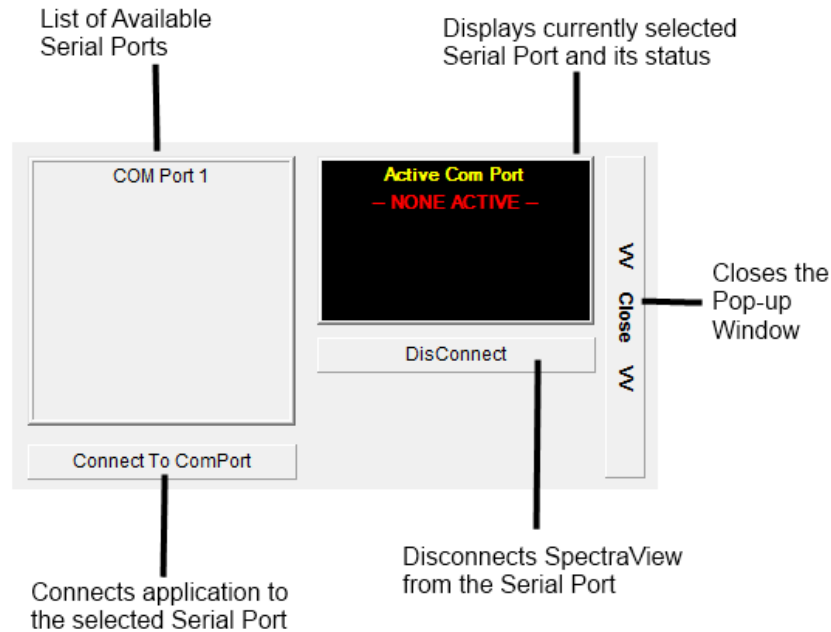
Figure 5-2. The **Serial Port** pop-up window

Calibrating System Loss

System loss is a measure of the optical loss in the fiber-optic sensor, including the loss due to bad connectors, breaks or tight bends. The system automatically adjusts its gain every time the loss is measured, up to a loss of 6 dB. If the system loss exceeds 6 dB, make any repairs necessary to reduce the loss to below that threshold.

Note: All commands in the terminal must be written in all capital letters.

To measure loss, select **Terminal** mode and then type **CALIB**. Type **ML** and when prompted, type **Y**. This places the APU in the loss calibration mode and the following prompt appears:

Cha Loss(dB)= xxx@ mm/dd/yy hh:mm

This prompt lists the optical loss along with the date and time it was measured. To measure the current loss, simply shake the channel's sensing cable vigorously for about ten seconds and then (within about two seconds after shaking the fiber) press the **test** button on the front of the APU for channel A.

After pressing the **test** button, the status line changes to read:

Cha Loss(dB)= xxx SAVED @ mm/dd/yy hh:mm

The word **SAVED** indicates that the system has been successfully calibrated and the new loss setting (**xxx**) is displayed along with the current date/time.

![Fiber SenSys logo]

Repeat this procedure two or three times ensuring that the loss measurement is less than 6 dB and does not change by more than ±1 dB. Once the system loss has been calibrated for channel A the same procedure is used to calibrate channel B.

If the loss consistently measures higher than 6 dB, a test cable that is known to be good can be used to determine if the excess loss is caused by a damaged APU or a damaged sensing cable. To do this, connect the test cable directly between the **Input** and **Output** ports on the APU and then follow the process just described (using **Terminal** mode and **CALIB**) for measuring loss. If the loss is still high then the APU may be damaged. If loss is determined to be coming from the APU, contact **Fiber SenSys Tech Support**.

APU Parameter Editor Mode

From the tab on the left labeled "Modes" select "Parameter Editor." The parameter editor mode (see figure below) is where the parameters are read, defined, and written to the APU.
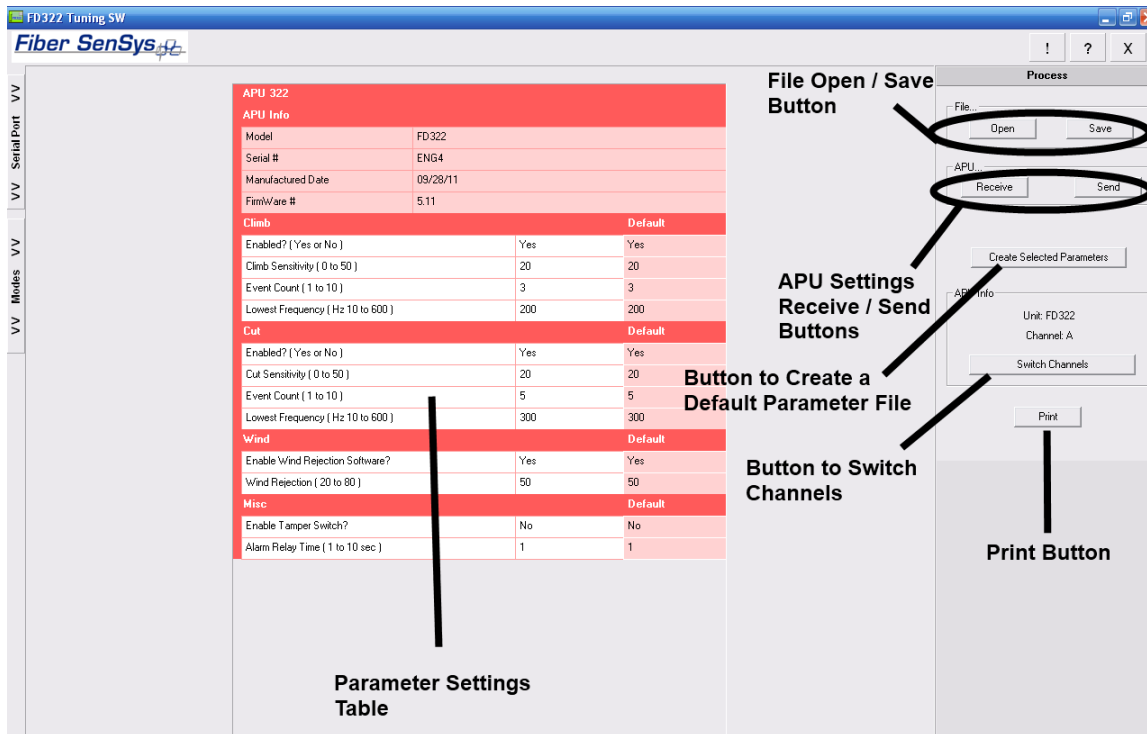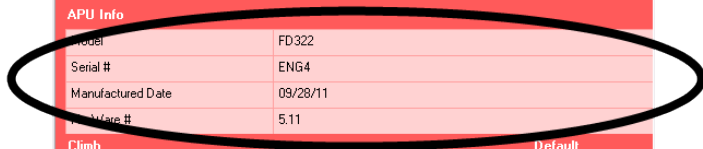

Figure 5-3. The **FD322 Tuning Software** Parameter Editor screen

Press the Receive button (upper right-hand corner of the screen) to read the current tuning parameters from the APU. **FD322 Tuning Software** queries the APU, reads in the processor information, and displays it:

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Figure 5-4. Users can change APU Parameter Settings using the Parameter Settings Table

Once received by **FD322 Tuning Software**, the APU model number, serial number, manufacturing date, and firmware version appear at the top of the Parameter Settings table. Also appearing in the table are the individual calibration parameters and their current settings. The allowable range for each parameter as well as the default value is also shown. Parameters appearing in light red cells of the table are default values and cannot be edited.

To edit or change a parameter setting:

1. Click on the desired parameter (only parameters appearing in white table cells can be edited). The parameter's row is highlighted in yellow indicating it is ready for editing.

2. Change the parameter setting to the desired value. Numerical values can be entered using the number keys or the value can be incremented/decremented from the current value using the + or – keys. Numerical values must also be kept within the allowable range or the software will reject the new value and prompt the user to enter a value within range.

3. Once the parameters have been edited, the new settings can be saved to the APU by pressing the **Send** button.

For detailed information about these tuning parameters, refer to the **Fiber SenSys** application note on tuning parameters titled: **AN-SM-008 Setting the Tuning Parameters**.

Realtime Mode

As a tuning aid, **FD322 Tuning Software** provides a powerful tool to help visualize the live frequency content of different sensor signals called **Real Time** (see figure 5-5)**.** To use this function, from the tab on the left labeled "Modes" select "Real Time."
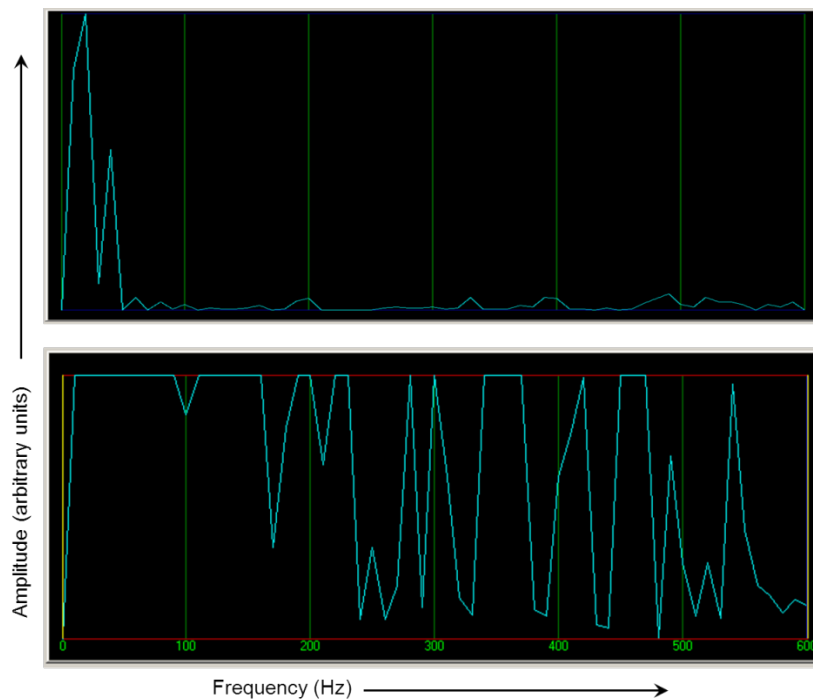
Figure 5-5. Signal with low frequency content (top) caused by wind, and a signal with high-frequency content (bottom) caused by cutting the fence fabric.

6. Integrating the APU into the Security System

The **FD322** APU is designed to be installed into a local-area network (LAN) and connected to a security head-end or other annunciator/monitoring equipment.

The **FD322** communicates via XML (extensible markup language) sending status messages to the network such as alarm, tamper, and fault conditions. It can also receive device-configuration commands in XML format.

Processes involved in integrating the APU into a security system are described in detail in the networking application note, **AN-SM-009 APU Networking**:

7. Testing and Certification

System tuning is necessary when installing new systems, replacing APUs, or after performing any system maintenance that involves changes to the cable assembly. Anytime the system is tuned, it should be re-tested to verify that it meets all requirements for probability of detection (PD) and rejection of nuisance alarms. Basic tests include:

Tamper test

If the tamper input on the **FD322** APU is used, the connection should be tested by going to the tamper-protected enclosure, opening it, and verifying that the head end records a tamper alarm.

Fault test

The fault test verifies that a loss of optical power to a zone results in a cable fault indication for that zone on the APU. To conduct this test, disconnect the optical fiber for zone 1 and verify that the fault LED for zone 1 is illuminated (this LED is located on the front of the APU). Reconnect the fiber from zone 1 and verify that the fault LED light goes off. Repeat this process for the other zone.

Probability of detection (PD)

PD performance testing involves reviewing the sorts of threats that need to be detected, simulating those threats, and measuring the probability with which the system detects the expected method of intrusion. To obtain statistically significant samples, perform each threat simulation a minimum of 20 times at various locations **in each zone**.

For example, to determine the PD for an intruder attempting to climb the fence, have a volunteer climb nearly to the top of the fence, preferably bringing his or her beltline level with the top of the fence fabric, and then dismount in a controlled and steady manner. Perform the simulated intrusion at least 20 times while keeping track of the number of times the system triggers an alarm (count only one alarm per simulated intrusion).

Verify that the system triggers an alarm, as intended, with the required probability of detection. If the PD is too low, tune the system to be more sensitive. Repeat this procedure for each installed zone on the secured perimeter.

8. Maintenance

Maintenance consists of routine inspections and periodic testing to verify the performance of the tamper and fault alarms, as well as the probability of detection for simulated intrusions.

Visually inspect the **FD322** APU at least every 90 days:

1. Ensure the Power LED is illuminated and all alarm and fault LED indicators are normal.

2. Check the optical connectors at the sides of the APU, making sure they are not pinched or otherwise compromised.

On a periodic basis (once every 180 days at a minimum), perform the tests described in section 7:

- Tamper (if used).

- Fault.

- Probability of detection.

- Relay function (if used).

There are no user-serviceable parts in the **FD322** APU. In case of an APU failure, corrective maintenance involves replacing the APU. If you replace the APU, you must perform a complete system configuration and recalibration.

To replace the APU, follow these steps:

1. Ensure all current APU calibration parameters, as well as the system configuration data, have been saved to a PC file using the **FD322 Tuning Software**.

2. Disconnect power to the APU and disconnect the optical fibers. Disconnect the Ethernet connection from the TCP/IP port.

3. Remove the APU and replace it with a new unit.

4. Clean all the optical connectors per the procedures described in the fiber optics application note: **AN-SM-007 Fiber Optics**.

5. Connect power to the new APU and repeat the processes described in the chapters in this manual, on calibration, tuning, integration, and testing.

For troubleshooting assistance, contact **Fiber SenSys** Technical Support Service: telephone, 1-503-726-4455; email, **support@fibersensys.com**; or go to the **Fiber SenSys** website, **www.fibersensys.com**.

Appendix A. Product Specifications

System Type	Alarm processor for perimeter security
Number of Zones	Two fully independent zones
Multimode Sensing Fiber	• Sensing fiber length: ≤ 500 meters (1640 feet) • Minimum bend radius: 5 cm (2 in) • Uniform sensitivity over the entire length • Passive, inert, intrinsically safe • Immune to EMI and corrosion • Maximum pull tensile Strength: 27kg (60 lb)
APU Power Requirements	• 12-24 VDC input • 3 watts @ 12 VDC, 25˚ C
Communications	• Serial port for tuning • TCP/IP port for alarm output and XML communication
Fault and Alarm Relays	• Individual dry contact alarm relays for each zone – normally open or normally closed (NO / NC) • Dry contact alarm relay for fault – Normally Closed (NC) • 28 to 14 AWG • 100 mA, 24 VDC non-inductive • Dry Contact Resistance 11 Ω typical, 17 Ω max
Front-Panel Display	LED indicators for fault, and alarm conditions for each zone
Environmental	Temperature: -40˚ C to 70˚ C (-40˚ F to 158˚ F) Humidity: 0 to 95% non-condensing
Dimensions	Height = 4.5 cm (1.77 inch) Width = 42.5 cm (16.75 inch) Depth = 40.6 cm (16 inch)
Standards and Certifications	• RoHS • CE • FCC Part 15 Class B

Appendix B. FD322 Menu Structure

This appendix provides details for all programmable **FD322** system tuning parameters. Each channel on the **FD322** is tuned independent of the other. Therefore, most parameters discussed in this appendix are duplicated in both channels.

Connect the PC to the APU via serial cable. Launch the terminal emulation software or **FD322 Tuning Software**, and establish communication between the two instruments. The following properties must be set to communicate using terminal emulation software:

> **Bits per Second:** 9600
> **Data bits:** 8
> **Parity:** None
> **Stop bits:** 1
> **Flow control:** Hardware

Upon establishing communication with the APU through **FD322 Tuning Software** in "terminal" mode or any other terminal emulation software, the system differentiates which channel is selected at the password prompt:

<div align="center">

"CHa Unit is LOCKED, Enter Password"

--or--

"CHb Unit is LOCKED, Enter Password"

</div>

At the password prompt, type either "CHA" for Channel A or "CHB" for Channel B to switch from one channel to another.

In each channel, there are 7 "passwords" that provide the user with access to related APU parameters or submenus.   For instance, the "ADMIN" password provides users with access to the admin parameters. After entering the password, "ADMIN," users can make adjustments to the settings as desired. The 7 parameter passwords are:

- STATUS
- HIST
- VERSION
- SETUP
- CALIB
- ADMIN
- CHA/CHB

Each password, and its associated parameters, is explained in detail in the following pages. Factory default settings were chosen based upon the performance of an **FD322** used in tandem with a seven foot chain link fence having a three-strand barbed wire outrigger.

> **NOTE:** Press the **Enter** key at any time to exit from any menu, submenu, or parameter in the terminal.

STATUS

This is a read-only command that provides a real-time diagnostic of conditions such as system loss, laser current, power supply voltage (to the APU) and any present fault, event or alarm conditions. When this menu is chosen, for example, the display reads:

Cha Pin(uW)= 723   Las(mA)=35.1
Loss(dB)= 1   Pwr(V)=12.4
[Evnt1][Evnt2][Alarm][Fault]

"Evnt1" and "Evnt2" refer to event conditions at Processor 1 and Processor 2, respectively.

HIST

This is a read-only menu that provides a history of alarms beginning with the most recent. Alarms are read off according to how long ago they occurred. In addition, each alarm entry is date/time stamped. For instance, if the alarm history is read after three alarms occurred, the first report in the alarm history might read:

> *#3 Alarm, Processor 2 (W=0)*
>
> *16:41 11/04/06*

One can note from this example that the alarm history is provided for each alarm that occurs for each processor. From this report, the #3 indicates the alarm report number, Processor 2 indicates the processor in which the alarm occurred, and the date and time on the bottom line of the text indicates when the alarm was received. The "W=" parameter indicates the estimated wind speed at which the alarm occurred (determined by the internal wind rejection algorithms).

Up to 128 of the most recent alarm events will be stored in volatile APU memory. Each alarm event exceeding the allowable 128 will overwrite the oldest entry. If at any point you wish to exit this menu, type "Q" and hit the [Enter] key.

VERSION

This read-only menu gives the APU model number, serial number, firmware version, date of manufacture, and the number of days the unit has been in operation.

SETUP

This menu allows access to the channel's settable tuning parameters. They are listed and described in detail in the below table.

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NOTE: Hitting **ENTER** will cycle forward to the next parameter. Typing "-" and hitting **ENTER** will cycle back to the previous parameter.

Parameter	Range	Default	Description
Climb Sensitivity	0 to 50, E or D	20 E	Enables or disables the processor and sets the overall sensitivity of the climb processor. Although raising the sensitivity level increases the likelihood of detecting an intruder, it also makes it more likely that something such as wind or animals might generate a nuisance alarm.
Cut Sensitivity	0 to 50, E or D	20 E	Enables or disables the processor and sets the overall sensitivity of the cut processor. Although raising the sensitivity level increases the likelihood of detecting an intruder, it also makes it more likely that something such as wind or animals might generate a nuisance alarm.
Climb Event Count	1 to 10	3	The number of times that an event must be registered by the climb processor for an alarm condition to occur.
Cut Event Count	1 to 10	5	The number of times that an event must be registered by the cut processor for an alarm condition to occur.
Wind Rejection	20 to 80, E or D	50 E	Sets how much the APU will dampen the signal received from the sensor cable during windy conditions. A higher wind rejection factor means more dampening, requiring a signal higher in magnitude to create an alarm condition.
Climb Lowest Frequency	10 to 600 (Hz)	200	The lowest allowable frequency used by the climb processor to evaluate the presence of an intruder. This may be set to eliminate lower order frequencies caused by nuisances such as vibrations from nearby generators.
Cut Lowest Frequency	10 to 600 (Hz)	300	The lowest allowable frequency used by the cut processor to evaluate the presence of an intruder. This may be set to eliminate lower order frequencies caused by nuisances such as vibrations from nearby generators.

CALIB

Access this menu using the "CALIB" password.   There are 2 submenus available.

- Time/Date [D]

- Measure Loss [ML]

These submenus are accessed by entering their corresponding submenu entries ("D" for the Time/Date submenu, "ML" for the Measure Loss submenu).

Time/Date [D]

From this submenu, users can change the time and date setting of the APU's real-time clock.

NOTE: There is only one real-time clock in the APU. Changing this setting affects both channels.

To change the real-time clock, enter the new time in 24 hour HH:MM format. The date is entered in MM/DD/YY format.

Measure Loss [ML]

From this submenu, users can measure the loss of their system. The system automatically adjusts its gain every time you measure the loss. For Instructions on measuring loss, see **Calibrating System Loss** in chapter 5 of this manual.

ADMIN

This menu allows access to the channel's admin settings. They are listed and described in detail in the below table.

NOTE: Hitting **ENTER** will cycle forward to the next parameter. Typing "-" and hitting **ENTER** will cycle back to the previous parameter.

Parameter	Range	Default	Description
Enable Tamper Switch	Y/N	N	Enables or disables the tamper monitoring function. When enabled, the normally-closed condition of the tamper circuit is observed by the APU. If the circuit is opened or not connected to the tamper

			switch in the enclosure, the tamper alarm will activate and remain activated until the tamper circuit is closed or the tamper switch is disabled with this command. This command affects both APU channels simultaneously.
Alarm Relay Time	1 to 10 (sec)	1	Specifies the length of time, in seconds, that the alarm will remain active once an alarm condition is set.
Device Name	31 characters maximum	APUNAME	The alias under which the device will communicate through the XML protocol.
Channel A Name	31 characters maximum	CHA	The name under which channel A will communicate through the XML protocol.
Channel B Name	31 characters maximum	CHB	The name under which channel B will communicate through the XML protocol.
XML Report Interval	1 to 600 (sec/10)	10	Adjusts the maximum frequency with which XML reports are output.

Appendix C. Warranty Information

A. **Fiber SenSys** warrants the **FD322** APU to be free from electrical and mechanical defects in materials and workmanship for a period of two years from the date of shipment. This warranty does not apply to defects in the product caused by abuse, misuse, accident, casualty, alteration, negligent use of current or voltages other than those specified by **Fiber SenSys**, application or installation not in accordance with published instruction manuals, or repair not authorized by **Fiber SenSys**. This warranty is made in lieu of any other warranty either expressed or implied.

B. All returns will be tested to verify customer claims of non-compliance with the warranty described herein. If non-compliance is verified and is not due to customer abuse or the other exceptions described previously, **Fiber SenSys** will, at its option, repair or replace the **FD322** APU returned to it, freight prepaid. Contact **Fiber SenSys** and obtain an RMA number prior to returning a product. **Fiber SenSys** will pay for ground return freight charges only. The Customer must pay for any other return shipping options.

C. **Fiber SenSys** liability is limited to the repair or replacement of the product only, and not the costs of installation, removal, or damage to user's property or other liabilities. If **Fiber SenSys** is unable to repair or replace a non-conforming product, it may offer a refund of the amount paid to **Fiber SenSys** for such product in full satisfaction of its warranty obligation. Maximum liability to **Fiber SenSys** is the cost of the product.

Appendix D. Referenced Documents

AN-ENG-027 Site Design and Installation for FD300 series
AN-SM-007 Fiber Optics
AN-SM-008 Setting the Tuning Parameters
AN-SM-009 APU Networking

Note: It is possible to download these documents online from the **Fiber Sensys** web page: www.fibersensys.com