FBT-6-PA

Fieldbus Monitor

User Manual



Relcom

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II. Introduction

The FBT-6-PA Fieldbus Monitor is a Profibus PA physical segment and signal testing tool. It allows both engineering and service technicians to determine the health of fieldbus segments. The Monitor supports segment troubleshooting without interfering with segment operation.

This manual was current at the time of printing. Go to www.relcominc.com for an electronic copy of the latest version of this manual. Further information on fieldbus is available in the Fieldbus Wiring Guide, also available on the website.

Summary of Features

The FBT-6-PA includes the following features:

- Tests the segment automatically and gives a OK/BAD indication without operator intervention.
- Measures segment DC voltage.
- Detects short circuits between the segment cable's wires and shield.
- Indicates number of detected retransmissions to devices.
- Measures noise in three bands: Below, at and above fieldbus frequencies.
- Shows when a device is added to or dropped from the segment.
- Supports the transfer of data collected to a PC via a USB port.
- Supports firmware updates via a USB port.
- Displays the number of devices on the segment.
- Indicates the address of the device with the lowest detected signal level.
- Displays device addresses (in decimal and hexadecimal) signal levels and whether each device is a master or slave.
- Creates printable reports indicating segment condition.
- Usable in hazardous areas.

III. Certifications

CE

The FBT-6-PA meets the European Union requirements for electromagnetic radiation by complying with the EMC Directive 89/336/EEC.

FCC

The FBT-6-PA is a Class A digital device and complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Hazardous Area/Location Approvals

FM US and Canada:

- Class I Division 2 Groups A,B,C, and D T4
- Class I Zone 2 Group IIC T4
- Class I Division 1 Groups A,B,C, and D T4
- Class I Zone 0 and 1 Ex/AEx ia IIC T4

ATEX Ex ia IIC T4
ATEX Ex nL IIC T4
ATEX Ex ic IIC T4

IV. FBT-6 Assistant Software Installation Instructions

Before Starting

FBT-6 Assistant software included with the Monitor supports the USB features of the Monitor.

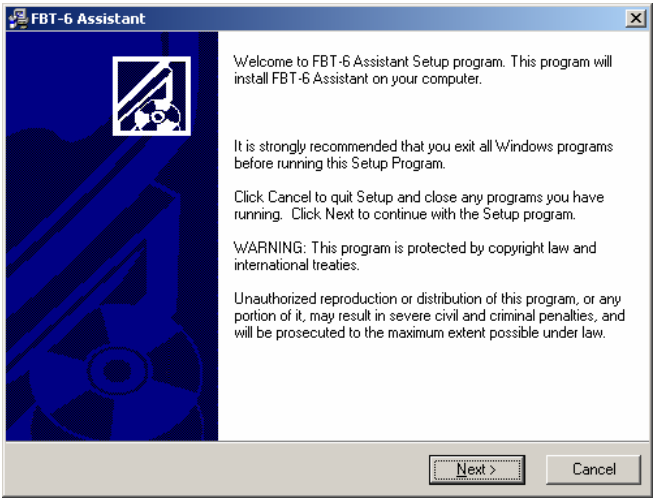
The FBT-6 Assistant software is on the **FBT-6 Software and Documents** CD included with the Monitor shipment. The **FBT-6-PA User Manual** is also included on the CD and will be installed along with the FBT-6 Assistant software.

You must be logged in as an administrator to install the software and driver. **Install the FBT-6 Assistant Software before attaching the Monitor to the computer.** The FBT-6 Assistant application should be installed first, followed by the USB driver for either Windows XP (on page 11) or Windows 2000 (on page 15).

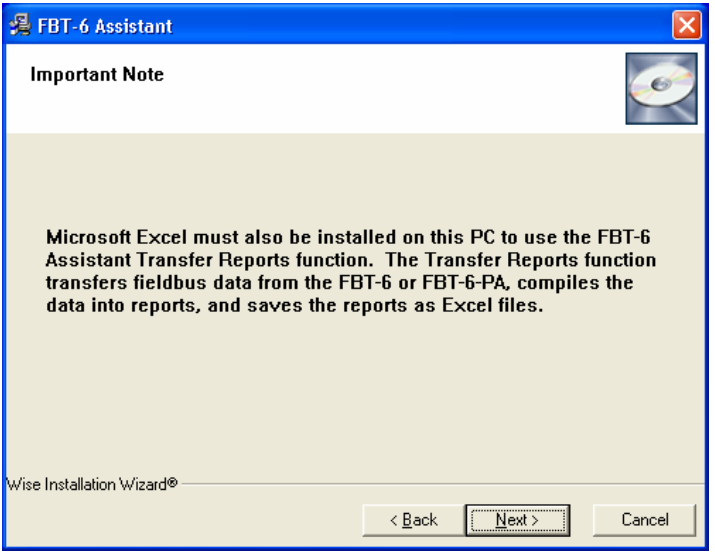
FBT-6 Assistant Installation

The Monitor should not be attached yet. Close all Windows programs. You must be logged in as an administrator to install the software and driver.

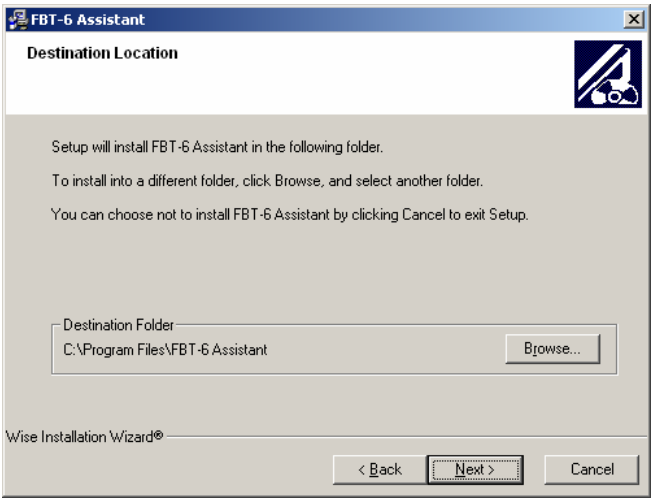
Insert the **FBT-6 Software and Documents** CD and the setup program will run automatically. The following screen will be displayed:



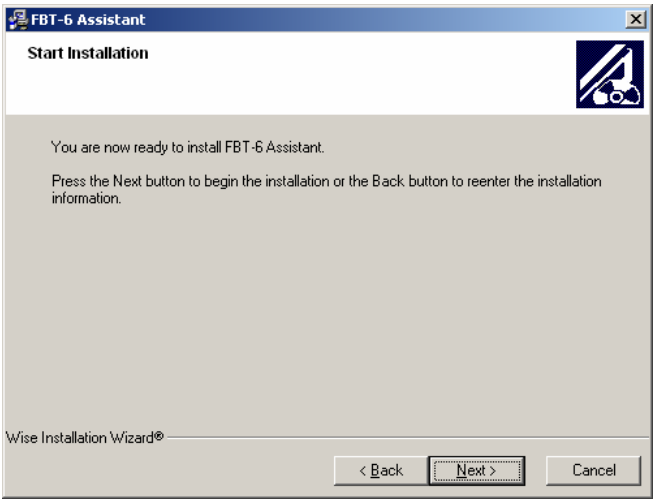
Press the **Next** button to continue.



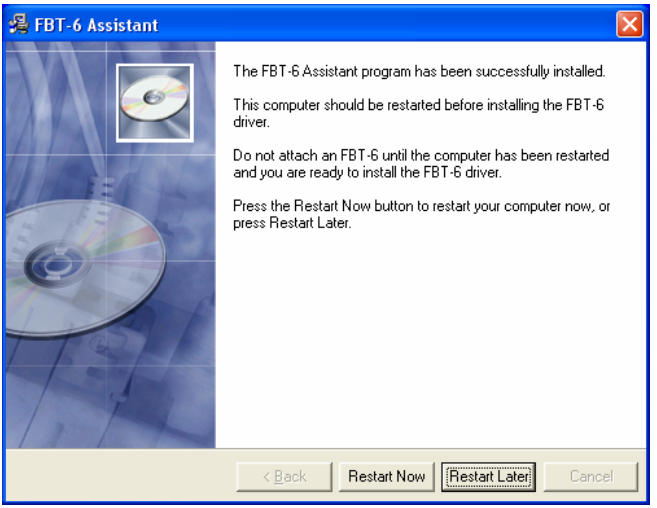
Microsoft Excel is required to use the Transfer Reports function. Press the **Next** button to continue.



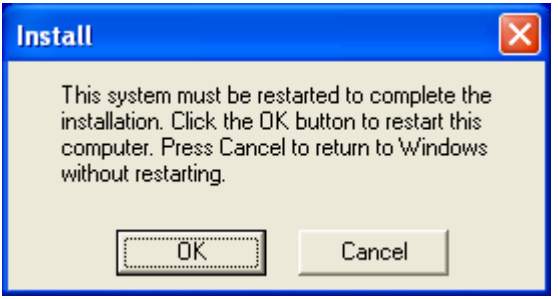
Choose an installation location or use the default location displayed and press the **Next** button to continue.



Press the **Next** button to continue.



Press **Restart Now**. The FBT-6 Assistant application is now installed and the driver files are ready to install.



Press **OK**. Your computer will restart. The FBT-6 Assistant application is now installed and the driver files are ready to install.

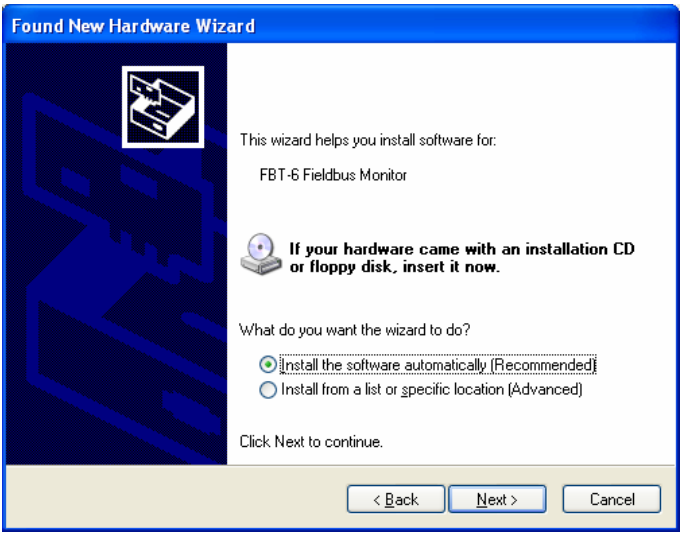
Turn to the Windows XP driver installation instructions on page 11, or turn to the Windows 2000 driver installation instructions on page 15.

Windows XP Driver Installation

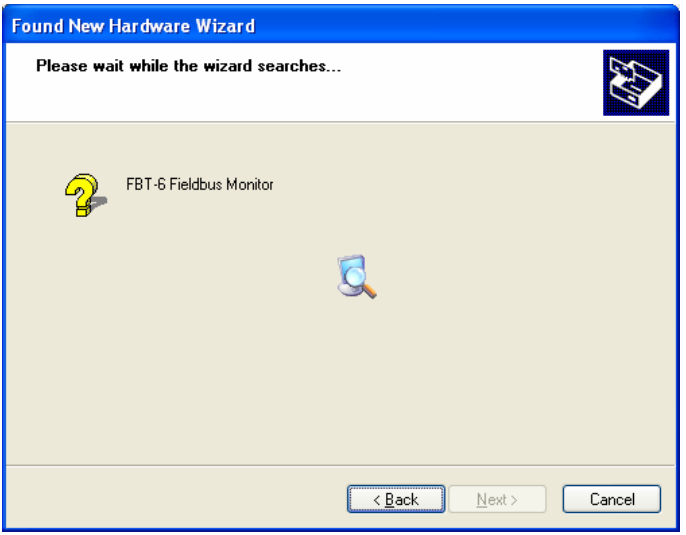
After installing the FBT-6 Assistant application, the USB driver needs to be installed. Attach the Monitor to a USB port on the PC with the provided cable, and then this driver wizard dialog box will appear:



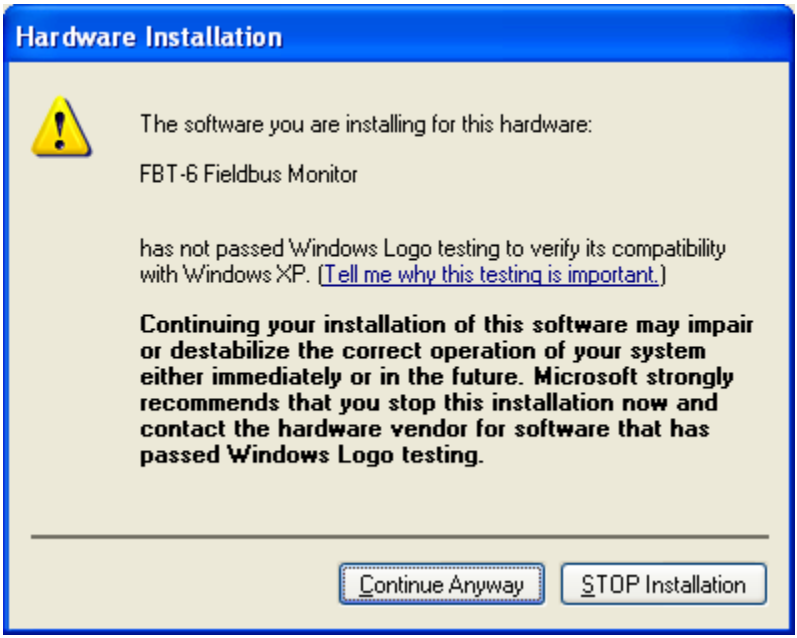
Select **No, not this time** and press the **Next** button to continue.



Select the first option, **Install the software automatically (Recommended)**, and press the **Next** button to continue.



The computer searches for the driver.



Press **Continue Anyway**.



This dialog shows that the driver has been installed. Press the **Finish** button to exit.

The Windows XP driver installation is now complete and the FBT-6 Assistant program is ready for use.

Important note: The driver must be installed on each USB port that the Monitor will be connected to on the PC. The "Found New Hardware Wizard" will run for each new port that the Monitor is plugged into. Follow these driver installation instructions again for each additional USB port.

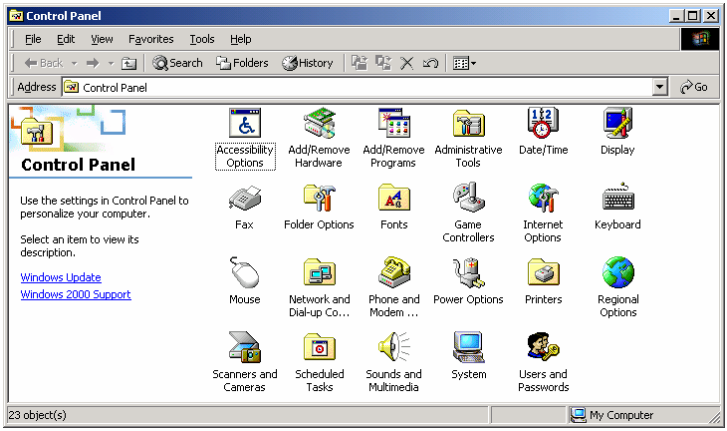
Windows 2000 Driver Installation

After installing the FBT-6 Assistant application, the USB driver needs to be installed. Attach the Monitor to a USB port on the PC with the provided cable. The following dialog box will appear:

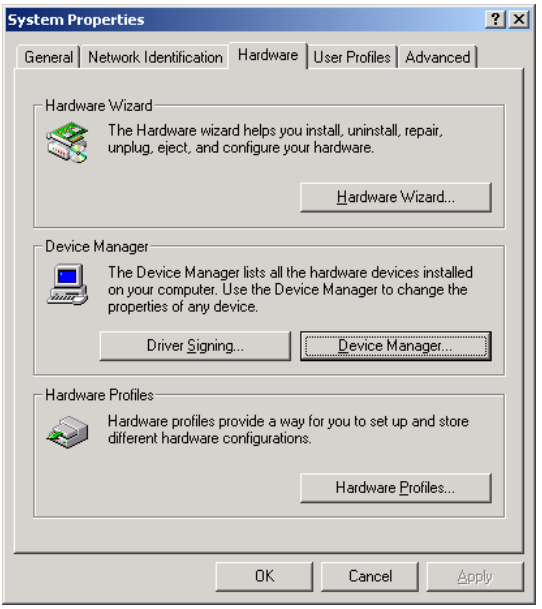


The driver installs automatically after about 30 seconds.

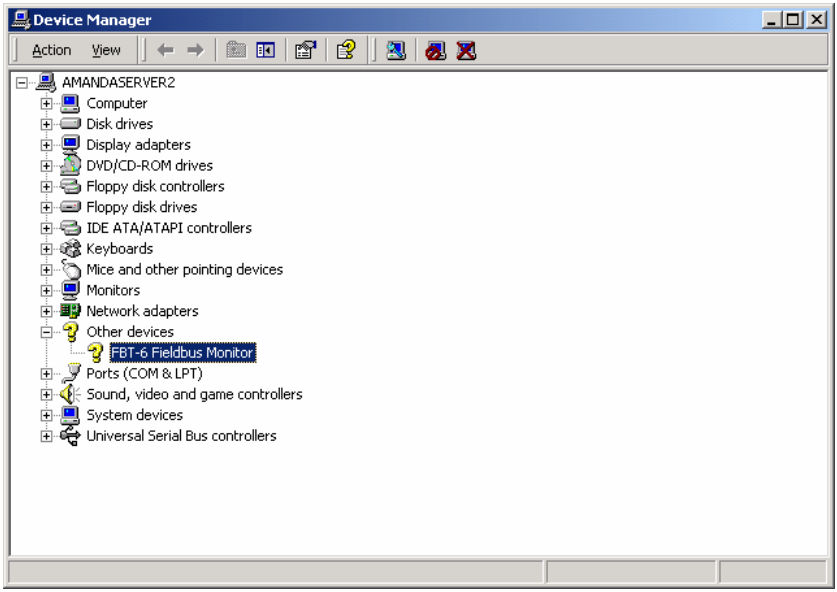
From the Start menu, open the Control Panel by selecting **Start>Settings>Control Panel**.



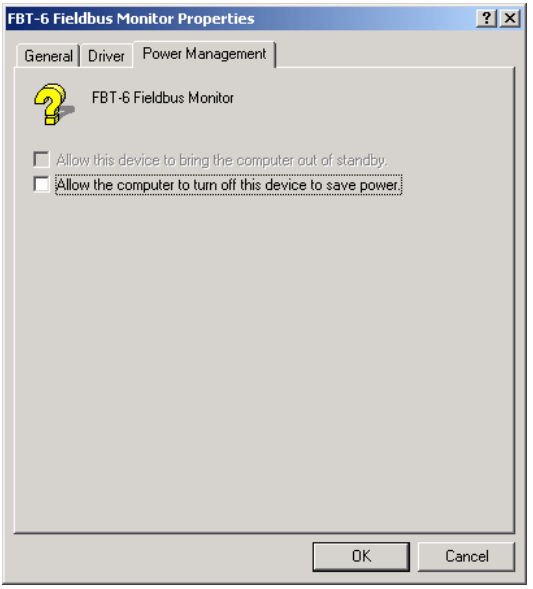
Open **System**.



Select the **Hardware** tab. Click the **Device Manager** button.



Look for **Other Devices** and expand this by selecting **+**. Right-click on **FBT-6 Fieldbus Monitor** and click **Properties**.



Select the **Power Management** tab. Uncheck **Allow the computer to turn off this device to save power**. Select **OK**.

Select **OK** on the **System Properties** screen.

Restart the computer.

The Windows 2000 driver installation is now complete and the FBT-6 Assistant program is ready for use.

Uninstalling the FBT-6 Assistant

To uninstall the FBT-6 Assistant double-click on the UNWISE.EXE file in the FBT-6 Assistant folder and follow the on-screen instructions. After the uninstall is complete, restart the computer.

The default location for the UNWISE.EXE file is C:\Program Files\FBT-6 Assistant\UNWISE.EXE.

V. Operation



WARNING: Do not connect the Monitor to a fieldbus and a PC at the same time. This could damage the fieldbus segment and the Monitor.



Use the USB port only in safe (non-hazardous) areas.



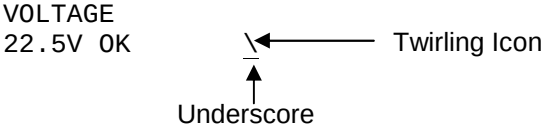
The Monitor draws 10mA of current from the fieldbus it is connected to. Verify adequate current is available before connecting the Monitor or bus communications may be impacted.

Install the FBT-6 Assistant software by following the section FBT-6 Assistant Software Installation Instructions on page 6 before attempting to connect the Monitor to the USB port.

The Monitor is powered by the segment it is connected to and turns on automatically. The firmware version in the Monitor is displayed for 4 seconds upon powering up:

```
RELCOM FBT-6-PA
FW VER XX.XX
```

The Monitor begins measuring segment parameters. A bar (icon) twirls on the right side of the display's second line while segment signals are present. If a bad frame is detected since the last display update then an underscore is displayed beneath the twirling icon.



Two buttons on the front of the Monitor control its operation. The buttons are labeled FUNC (for FUNCTION) and SEL (for SELECT). Press the FUNCTION button to cycle through the available Monitor functions.

Some functions have multiple sub-screens of data available for display. Sub-screens available for each function are cycled through by pressing the SELECT button. Most functions are reset by holding down the SELECT button for 2 seconds. After holding down the SELECT button for 2 seconds, the data collected for that function is erased giving that function a "fresh start".

Holding down the SELECT and FUNCTION buttons at the same time for 2 seconds causes the Monitor to reset. The data collected by all Monitor functions is erased (unless saved using the SAVE REPORT feature). The reset is the same as if the Monitor was disconnected then re-connected to the segment.

Short button presses (less than 2 seconds) are acted upon when the button is released, not when depressed.

Figure 1 shows a block diagram of how to navigate through the Monitor functions.

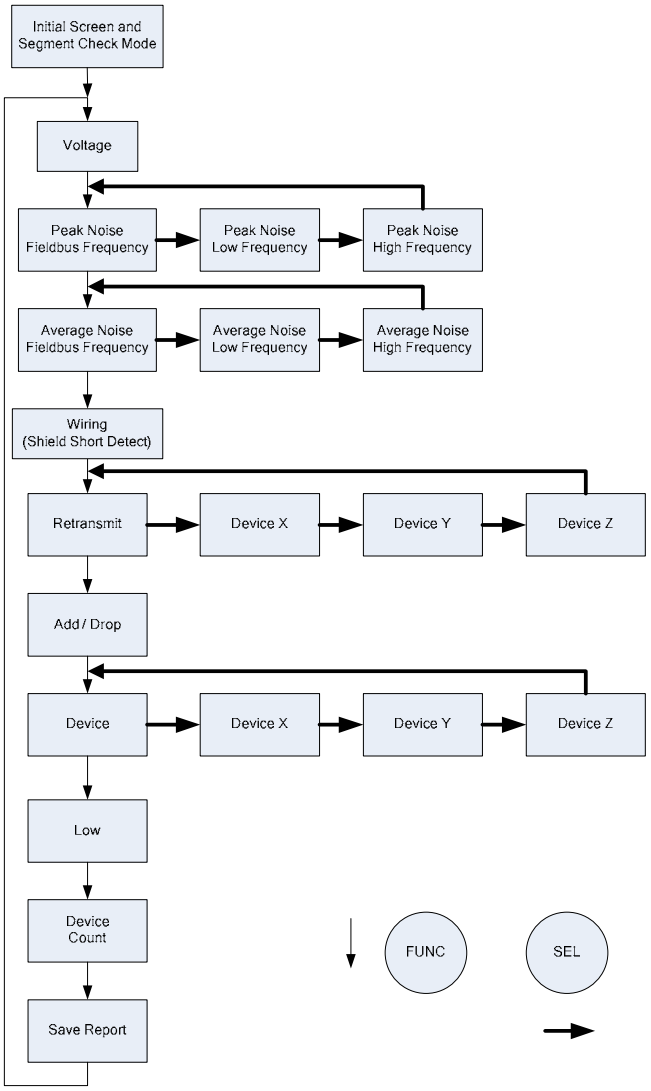


Figure 1: Navigating through the Monitor's Functions

Segment Check Mode

When first attached to a segment, the Monitor enters the automatic Segment Check Mode and shows:

```
SEGMENT CHECK
IN PROGRESS
```

The Monitor proceeds to automatically collect data and evaluates it to determine the health of the segment. Press either button to exit this mode and enter the Manual Mode at any time.

In Segment Check Mode, the Monitor collects the same data that it collects in Manual Mode. As the data is collected, the Monitor evaluates the data to determine if it is out of specification. When the Monitor has collected enough data to determine that all of the measured parameters are in specification, the display shows:

```
ALL MEASUREMENTS
OK
```

In this state the Monitor continues taking measurements and displays the OK message.

If at any point in time the Monitor finds a parameter out of specification, it will jump into the Manual Mode and display the screen for the function associated with the first detected out of specification parameter. For example, if a (+) to Shield Short condition is detected, the Monitor enters the Shield Short function in Manual Mode and displays:

```
 (+) TO SHIELD
SHORT
```

The Monitor then operates in Manual Mode as described below from that point on.

Parameters are evaluated against limits as OK or BAD. The limits can be set using the Set OK/BAD Limits feature of the FBT-6 Assistant software. See the section **Set OK/BAD Limits function on page 47** for details.

Table 1 lists the parameters checked in Segment Check Mode and the default limit values.

Table 1: Parameters Checked in Segment Check Mode (Default Limit Values Shown)

Voltage is >= 9VDC
Peak noise is <= 75mV in the fieldbus band
Peak noise is <= 150mV in the low and high frequency bands
Average noise is <= 75mV in the fieldbus band
Average noise is <= 150mV in the low and high frequency bands
No shield short exists
No retransmits
No device drops or adds
At least one device is detected on the segment
The lowest device signal level is >= 150mV

Manual Mode Functions

Manual Mode is entered when the Monitor detects the first out of specification parameter or either button is pushed. The functions available are described below in the order in which they appear.

1. Voltage

The DC voltage of the segment is displayed.

```
VOLTAGE
22.5V OK
```

If the DC voltage is less than the allowed limit (9V by default), BAD is displayed instead of OK.

```
VOLTAGE
 8.5V  BAD
```

The DC voltage limit is configurable using the Set OK/BAD Limits function in the FBT-6 Assistant software. See **Set OK/BAD Limits function on page 47** for details.

2. Peak Noise

Peak noise is measured in three bands: frequencies in the fieldbus signaling band (Fieldbus Frequency, FF), frequencies below fieldbus signaling band (Low Frequency, LF), and frequencies above fieldbus signaling band (High Frequency, HF). The value displayed is the highest noise level measured since the last reset. The particular frequency band displayed is selected by pushing the SELECT button. The FF band is shown first followed by the LF then HF bands.

```
PK FF NOISE
  64 mV OK
```

If the FF band noise level is above the allowed limit (75mV by default), the display will say BAD where it normally says OK.

```
PK FF NOISE
  99 mV BAD
```

If the LF or HF band noise level is above the allowed limit (150mV by default), the display will say BAD where it normally says OK.

```
PK LF NOISE
 199 mV BAD
```

The FF, LF, and HF noise level limits are configurable using the Set OK/BAD Limits function in the FBT-6 Assistant software. See **Set OK/BAD Limits function on page 47** for details.

Holding down the SELECT button for 2 seconds resets the selected peak noise value.

The approximate frequency bands monitored are listed below.

Low Frequency Band	50Hz to 4KHz
Fieldbus Frequency Band	9KHz to 40KHz
High Frequency Band	90KHz to 350KHz

3. Average Noise

Average noise is measured in three bands: frequencies in the fieldbus signaling band (Fieldbus Frequency, FF), frequencies below fieldbus signaling band (Low Frequency, LF), and frequencies above fieldbus signaling band (High Frequency, HF). The value displayed is the average of the last 100 noise measurements. The particular frequency band displayed is selected by pushing the SELECT button. The FF band is shown first followed by the LF then HF bands.

```
AVG FF NOISE
  68mV OK
```

If the FF band noise level is above the allowed limit (75mV by default), the display will say BAD where it normally says OK.

```
AVG FF NOISE
1000mV BAD
```

If the LF or HF band noise level is above the allowed limit (150mV by default), the display will say BAD where it normally says OK.

```
AVG HF NOISE
 200mV BAD
```

The FF, LF, and HF noise level limits are configurable using the Set OK/BAD Limits function in the FBT-6 Assistant software. See **Set OK/BAD Limits function on page 47** for details.

Holding down the SELECT button for 2 seconds resets the selected average noise value.

The approximate frequency bands monitored are listed below.

Low Frequency Band	50Hz to 4KHz
Fieldbus Frequency Band	9KHz to 40KHz
High Frequency Band	90KHz to 350KHz

4. Shield Short

If the segment wiring is good, the Monitor shows

```
WIRING OK
```

If one of the wires is shorted to the cable shield, the Monitor indicates a (+) or (-) to shield short as applicable.

```
 (+) TO SHIELD
SHORT   BAD
```

The Monitor will always detect shorts of 4 Kohms or less. The amount of resistance the Monitor reports as a short varies with temperature and DC bus voltage and could be as high as 36 Kohms.

Shorts come and go in some cases, such as with the presence of moisture or vibration. If the Monitor detected a short in the past then the short went away it indicates the short is intermittent.

```
 (+) TO SHIELD
INTERMITTENT
```

Holding the SELECT button down for 2 seconds resets the Shield Short function. Resetting the Shield Short function clears intermittent short indications.

5. Retransmit

If a device does not respond to a request or token frame, or if the Master does not hear the device's response, the Master will query the device again. The Monitor displays the address of the device most recently requiring such a retransmission.

```
RETRANSMIT
NONE OK
```

Or

```
RETRANSMITS=3
DEVICE  19(13H)
```

Press the SELECT button to cycle through a display for each device. The number of retransmissions (up to 250) detected since the Monitor was connected is displayed. If more than 250 retransmissions are detected for a device, 250+ is displayed.

```
RETRANSMITS=250+
DEVICE  19(13H)
```

Holding down the SELECT button for 2 seconds resets the number of retransmits for all devices to 0.

6. Add-Drop

If a new device is added to the segment, the Monitor detects it transmitting frames and will display its address and signal level. A device is considered dropped if a frame is retransmitted to the device. A Master device that is sent an FDL Status Request frame is also considered dropped. When a device is dropped by the Monitor and it will display the address and last known signal level of the dropped device.

```
ADD or DROP
NONE
```

If a device drops from the segment the Monitor shows

```
DROP  17 (11H)
 690mV
```

If a device is added to the segment, the Monitor shows

```
ADD  19 (13H)
 700mV
```

The Monitor is more sensitive to device add and drop activity than control systems. The Monitor may momentarily indicate a device dropped from the fieldbus then quickly added back on while the device status provided by the control system is unchanged.

Holding down the SELECT button for 2 seconds resets the Add-Drop function. Resetting the Add-Drop function also resets the Device and Device Count functions.

7. Device

For each device, the address (decimal and hexadecimal), signal level, and whether or not it is a Master or Slave is displayed in turn by pushing the SELECT button. If the signal level is at or above the minimum limit OK is displayed. The first device shown is a Master. “M” is displayed after the signal level to indicate that the device shown is a Master. “S” is shown for slaves.

```
DEVICE  16 (10H)
1000mV   M  OK
```

If the device was added after connecting the Monitor , a + symbol displays after the signal level. If the device was removed after connecting the Monitor, a - symbol is displayed after the last known signal level.

```
DEVICE  41 (29H)
 854mV + S  OK
```

The Monitor is more sensitive to device add and drop activity than control systems. The Monitor may momentarily indicate a device dropped from the fieldbus then quickly added back on while the control system shows no change.

If any device has a signal level less than the allowed limit (150mV by default), the display will say BAD where it normally says OK.

```
DEVICE  41 (29H)
 140mV   S   BAD
```

The minimum allowed signal level limit is configurable using the Set OK/BAD Limits function in the FBT-6 Assistant software. See **Set OK/BAD Limits function on page 47** for details.

Holding down the SELECT button for 2 seconds will clear the “added” status of any devices added after connecting the Monitor (or since the last reset). Holding down the SELECT button for 2 seconds also deletes dropped devices from the Monitor’s internal device list. Resetting the Device function also resets the Add-Drop and Device Count functions.

8. Low

The Monitor displays the lowest (weakest) detected device signal level since the Monitor was connected and the address (decimal and hex) of the associated device. If the lowest signal level is at or above the minimum limit OK is displayed.

```
LOW= 580mV OK
ADDR= 41 (29H)
```

If the lowest signal level is less than the allowed limit (150mV by default), the display will say BAD where OK is normally displayed.

```
LOW= 149mV BAD
ADDR= 41 (29H)
```

The minimum allowed signal level limit is configurable using the Set OK/BAD Limits function in the FBT-6 Assistant software. See **Set OK/BAD Limits function on page 47** for details.

Holding down the SELECT button for 2 seconds resets the low signal level value.

9. Device Count

The Monitor displays the number of active devices on the segment. If the count has remained the same since the Monitor was connected and the count is greater than 0, OK is displayed.

```
DEVICE COUNT
12 OK
```

If a device does not respond to a frame the Monitor considers the device to be dropped (no longer active). The count is reduced, and the display shows a – instead of OK. If a new device is added, the display shows a +.

```
DEVICE COUNT
11 -
```

If the number of active devices is the same as the number of devices detected when the Monitor was first connected to the segment then the device count displays OK.

The Monitor is more sensitive to device add and drop activity than control systems. The Monitor may momentarily indicate a device dropped from the fieldbus then quickly added back on while the control system showed no change.

To make it easier to detect the adding or dropping of a device, the starting device count can be reset by holding down the SELECT button for 2 seconds. Resetting the Device Count function also resets the Add-Drop and Device functions.

10. Save Report

The Monitor can save the data it collected as a report in one of eight numbered report locations (internal memory blocks).

The display repeatedly cycles through three screens with each screen displayed for about three seconds.

The first screen indicates the currently selected report name, report location number and the status of the report location: used or empty. The second and third screens describe how the SELECT button is used to save a report.

```
Report 1
LOCATION 1 EMPTY

HOLD DOWN SEL TO
SAVE REPORT

PUSH SEL TO PICK
NEXT LOCATION
```

The first screen displays LOCATION # EMPTY (# is the location number, 1 to 8) if no report is saved in the selected report location. The screen displays LOCATION # USED if a report is already saved in the selected report location.

To save a report, first choose one of the eight report locations to store the report in. The Monitor starts at the first empty location. Momentarily pressing the SELECT button advances to the next report location. In the example below, Report 8 is the name of the report stored in location 8.

```
Report 8
LOCATION 8 USED
```

When the last report location, location 8, is displayed and the SELECT button is pressed, the display rolls back to the first report location, location 1.

To save a report in the selected report location, hold down the SELECT button for 2 seconds. The display shows, SAVING REPORT, while the report is saving .

```
Report 5
SAVING REPORT
```

When the report is saved, the display shows REPORT SAVED.

```
Report 5
REPORT SAVED
```

The next time this report location screen is displayed, the report status will indicate USED.

```
Report 5
LOCATION 5 USED
```

When a USED report location is chosen and the SELECT button is held down for 2 seconds the report is overwritten with a new report.

Use the Set Report Names feature in the FBT-6 Assistant to change the report names. See the section **Set Report Names function on page 45** for details.

USB Port and Associated Features

The USB port on the Monitor can be connected to a PC. Using the FBT-6 Assistant program installed on a PC, reports collected on the Monitor can be transferred to an Excel file on the PC and the firmware in the Monitor can be updated.

Install the FBT-6 Assistant software by following the instructions FBT-6 Assistant Software Installation Instructions on page 6 before attempting to connect the Monitor to the USB port.

WARNING: Do not connect the Monitor to a fieldbus and a PC at the same time. This could damage the fieldbus segment and the Monitor. Only use the USB port in safe (non-hazardous) locations.

1. Connecting the Monitor to the PC USB Port and Starting the FBT-6 Assistant

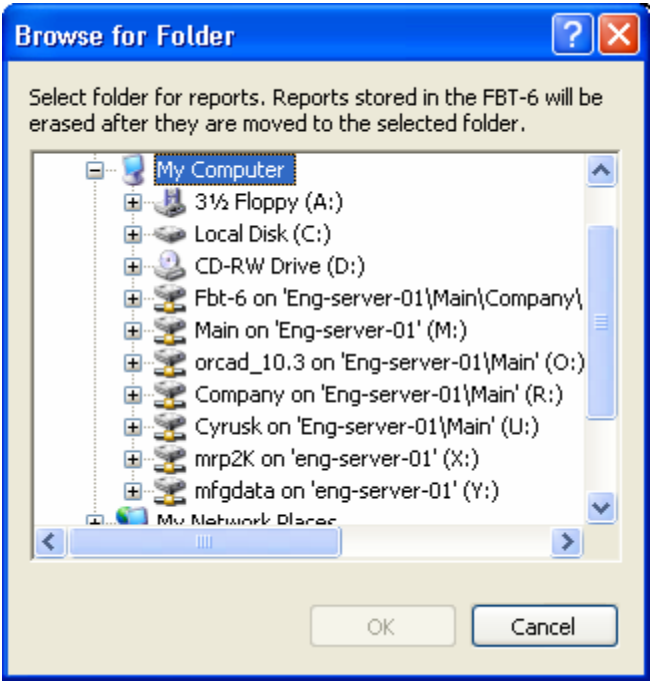
Connect the Monitor to the USB port using the supplied USB cable. Connect only one Monitor at a time. Open the FBT-6 Assistant program by double clicking on the FBT-6 Assistant desktop icon or selecting Start – All Programs – FBT-6 Assistant – FBT-6 Assistant. Pushbuttons to perform USB related functions are displayed on the screen below.



2. Transfer Reports function

Click the **Transfer Reports from FBT-6** button to transfer the reports saved in all eight Monitor report locations to a PC via the USB port.

The FBT-6 Assistant displays a screen like the one below allowing selection of the folder to save the reports in.



Browse to the folder to save the reports in and click the **OK** button. File names for each report are automatically generated in the following format:

<Report name> <Date report file saved on the PC (MM-DD-YYYY)> <Time report saved on the PC (HH-MM-SS AM or PM)>.xls

For example
Report 1 02-14-2007 3-59-37 PM.xls

When all files have been saved, the main menu is displayed.



The reports are saved in a formatted Excel spreadsheet file. The contents of the file and how it will look when opened in Excel are shown in Table 2.

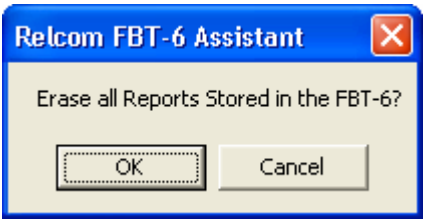
Table 2: Example Report File

Report 1			
Segment Measurements	**Data**	**Acceptable Values**	**OK/BAD**
Voltage	21.8V	9.0V Minimum	OK
Lowest Device Signal	725mV	150mV Minimum	OK
Lowest Device Signal Address	16 (10H)		
Avg Fieldbus Frequency Noise	0mV	75mV Maximum	OK
Peak Fieldbus Frequency Noise	4mV	75mV Maximum	OK
Avg Low Frequency Noise	5mV	150mV Maximum	OK
Peak Low Frequency Noise	5mV	150mV Maximum	OK
Avg High Frequency Noise	1mV	150mV Maximum	OK
Peak High Frequency Noise	32mV	150mV Maximum	OK
Shield Short	No Shorts	No Shorts	OK
LAS Address	16 (10H)		
Most Recent Add/Drop Address	No Devices Added/Dropped		
Device Add or Drop	None Added/Dropped	None Added/Dropped	OK
Date/Time of Device Add/Drop	Not Available		
Number of Active Devices	1		
Device Measurements	**Data**	**Acceptable Values**	**OK/BAD**
Device Address	16 (10H)		
Signal Level	729mV	150mV Minimum	OK
Added/Dropped	Not Added/Dropped	Not Added/Dropped	OK
Retransmits	0	0	OK
	Measurement Summary: All Measurements are OK		
	Data collected by _____		
	Report approved by _____		

3. Erase Reports function

After all reports are successfully transferred to a PC, the Monitor will erase the reports in its memory the next time it is connected to a fieldbus. This allows transfer of reports to multiple PCs or to more than one location on a single PC and conveniently prepares the Monitor for a “fresh” start the next time it is taken into the field.

The reports in a Monitor may also be erased without first downloading them. From the **File** pull-down menu in the upper left corner of the main screen click **Erase Reports in FBT-6**. A window appears asking for confirmation to erase all of the reports stored in the Monitor.



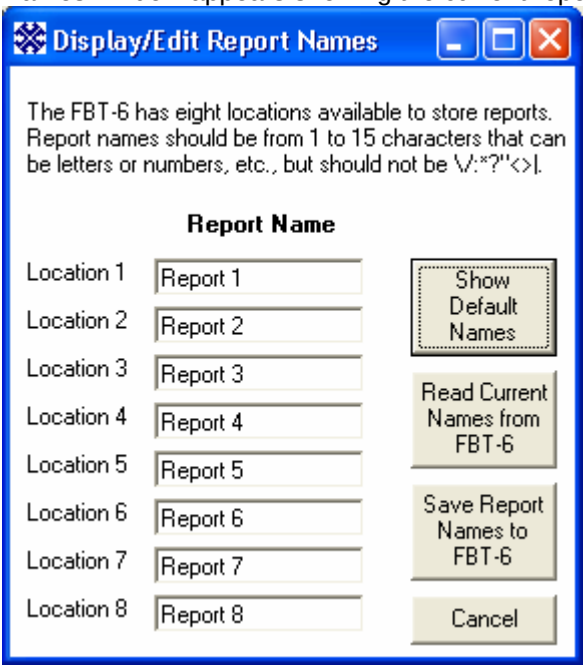
Click **OK** to erase all of the reports in the Monitor. The reports will be erased the next time the Monitor is connected to a fieldbus.

4. Set Report Names function

The Monitor can save the data it collects as a report in one of eight report locations (memory blocks) using the SAVE REPORT function (see page 37). Each report has a name that can be changed. The report names are changed using the Set Report Names function in the FBT-6 Assistant.

Report names automatically generate file names and titles for reports transferred to a PC using the Transfer Reports From FBT-6 feature (see page 41). Report names help to keep track of where the reports were collected (which segment, location on a segment, etc.).

To display and edit report names in the Monitor click the **Set** pull-down menu and select **Report Names**. The Display/Edit Report Names window appears showing the current report names.



Type in the desired report names and click **Save Report Names to FBT-6**. This writes the report names to the Monitor. The

report names must be 1-15 characters long and cannot contain the following characters: \ / : * ? < > |

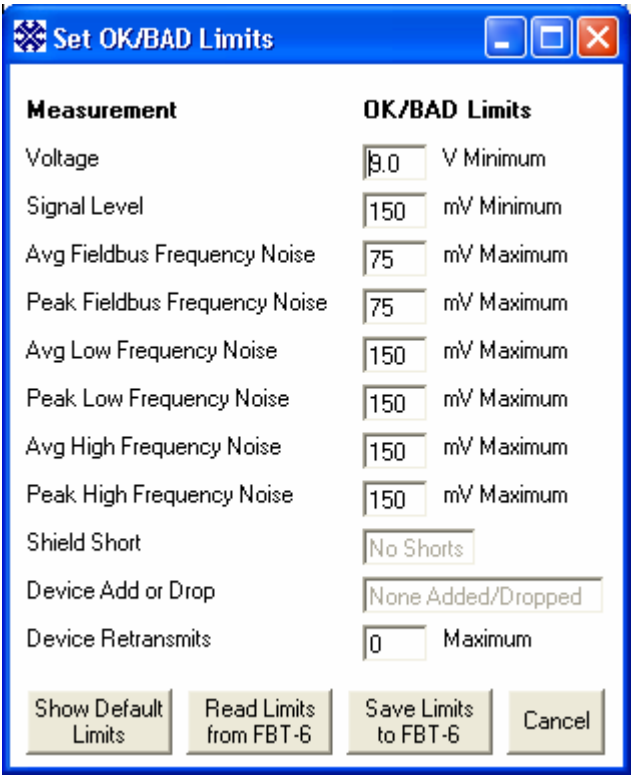
Click **Show Default Names** to show the default report names. To save the default names in the Monitor, Click **Save Report Names to FBT-6**.

Click **Read Current Report Names from FBT-6** to display the report names stored in the Monitor.

Click **Cancel** to leave the Display/Edit Report Names window without changing the report names stored in the Monitor.

5. Set OK/BAD Limits function

The Monitor evaluates some of the parameters it monitors as OK or BAD based upon user configurable limits. To display and edit these limits click the **Set** pull-down menu and select **OK/BAD Limits**.



Type in the desired limits for each parameter and click **Save Limits to FBT-6** to write the limits to the Monitor.

Click **Show Default Limits** to show the factory default limit values. To save the default limits in the Monitor, Click **Save Limits to FBT-6**. The default limits are based upon the Foundation Fieldbus physical layer standard (IEC 61158) where possible.

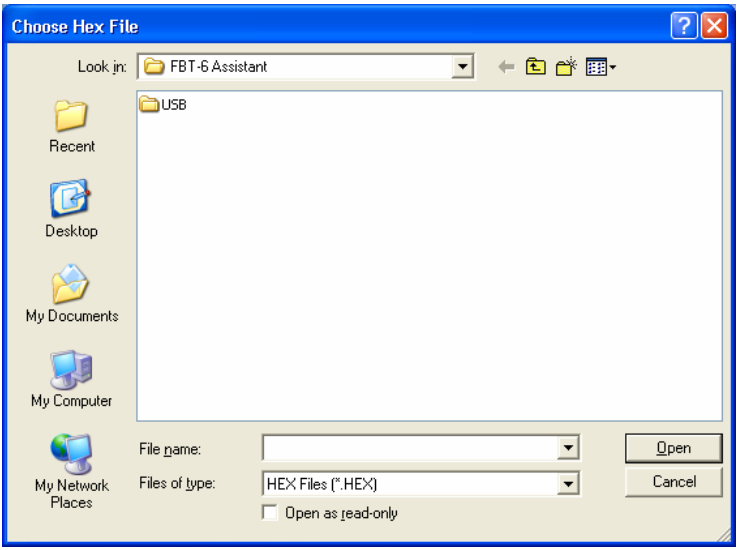
Click **Read Limits from FBT-6** to display the limit values stored in the Monitor.

Click **Cancel** to leave the Set OK/BAD Limits window without changing the limits stored in the Monitor.

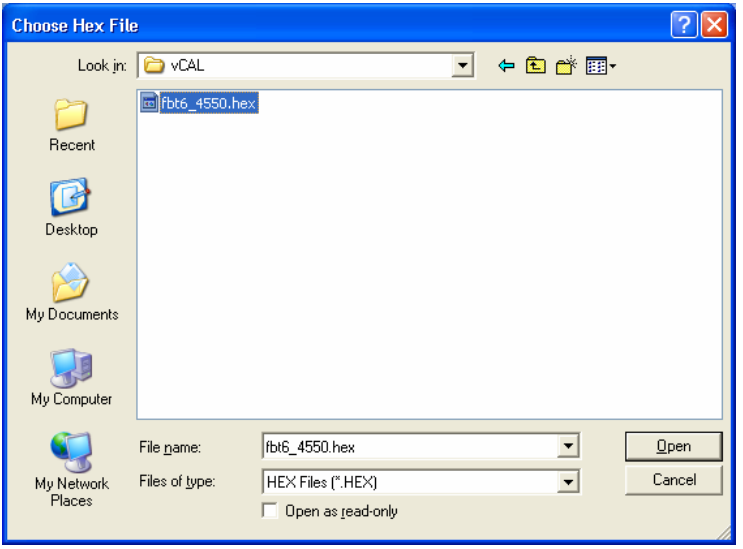
6. Update Firmware function

New features for the Monitor may be released occasionally. These features may be added to Monitor units already in the field by updating the Monitor firmware. The Update Firmware function allows the existing firmware in the Monitor to be replaced with new firmware.

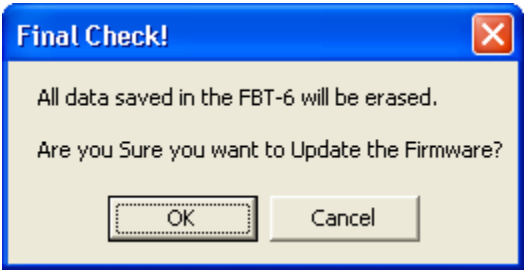
Download the Monitor firmware file from www.relcominc.com and save it on the PC. Start the FBT-6 Assistant and click the **Update Firmware** button to begin the update process. The Choose Hex File window opens.



Specify the new firmware file by browsing to the folder containing the firmware file, selecting the file, then clicking the **Open** button.



The Final Check! window opens as shown below.



Updating the firmware erases any reports saved in the Monitor. Click **OK** to proceed with the update. Click **Cancel** to stop the update and return to the main FBT-6 Assistant screen.

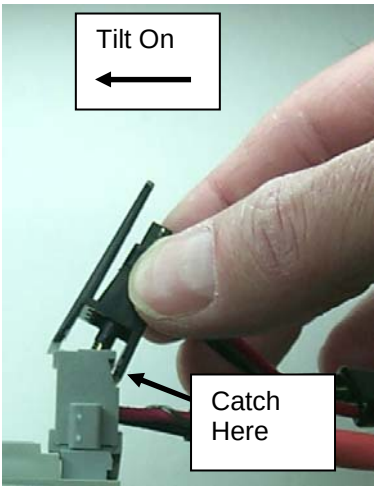
After clicking **OK**, the following screen appears.

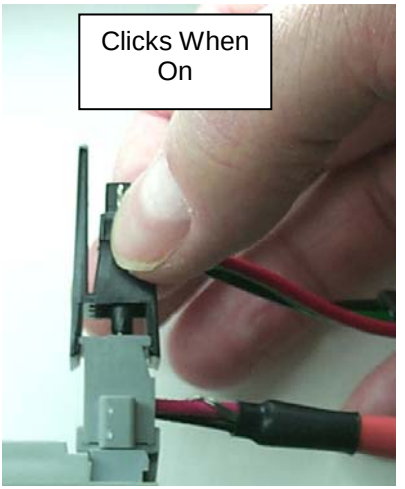


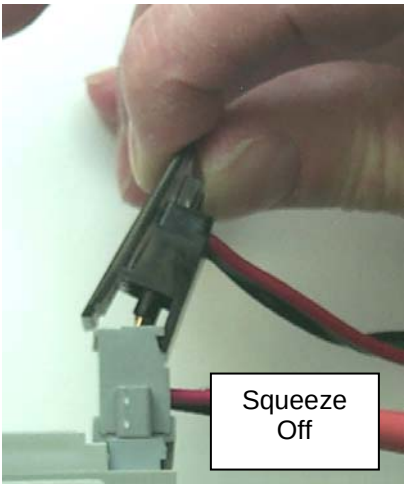
Once the firmware update is complete, the FBT-6 Assistant status line in the middle of the FBT-6 Assistant main menu will change from, “Firmware update will take a few moments. Please wait…” to “FBT-6 firmware loaded. Ready...”. Close the FBT-6 Assistant program by clicking the **Exit** button and begin using the Monitor.

Using the Clip-on Probe Cable

Each Monitor ships with two cables to attach the Monitor to a fieldbus. One cable has standard mini-hook connectors for attaching to the fieldbus. The second cable has a clip-on probe for easy attachment to Phoenix Contact style screw terminal connectors such as those on the Relcom Megablock wiring blocks. The pictures below show the best methods for attaching and removing the clip-on probe.







VI. Operation in Special Cases

The Monitor operates differently under certain special circumstances. This section describes the behavior of the Monitor in these special cases.

Limitations

The Monitor will transfer report data to the PC on a total of up to 32 devices per segment including the Master (each device has a separate address). The Not Added/Dropped devices are transferred first, followed by Added devices, and finally Dropped devices. The data for devices beyond the 32nd device is not transferred to the PC.

Silent Segment Behavior

The fieldbus segment that the Monitor is connected to may contain no frame traffic for long periods of time. This Silent Segment condition may be present when the Monitor is initially connected to the segment or may occur after the segment has been transmitting frames for some period of time. The Monitor will continue to record and display data, even when the segment is silent.

When the segment is in a silent condition the Monitor will collect a set of non-device related data (DC Volts, Noise, etc.). In addition, if the segment remains silent for about 2 seconds, the Monitor will mark all devices as dropped and set the (active) device count to 0.

Excess Noise Mode

High levels of noise on the fieldbus can make fieldbus signals undetectable. In addition, the noise may be interpreted as constantly transmitted corrupted fieldbus data. In this case, the Monitor becomes unresponsive because it is spending so much time trying to identify good fieldbus frames. When this situation occurs, the Monitor recognizes that it is spending too much time trying to identify good fieldbus frames and will enter Excess Noise Mode. Upon entering Excess Noise Mode, the Monitor quits looking for fieldbus transmissions and the following display appears:

```
EXCESS NOISE, NO
FIELDBUS MEAS. *
```

Pressing either the FUNCTION or SELECT button returns to the Voltage screen and the screens can be navigated normally. However, only fieldbus physical layer information (voltage, noise, and shield shorts) is displayed. Information contained in fieldbus data (device addresses, signal level, number of devices, etc.) is not available and the data portion of the screens normally displaying fieldbus data is blank. The twirling icon is also replaced by “*”.

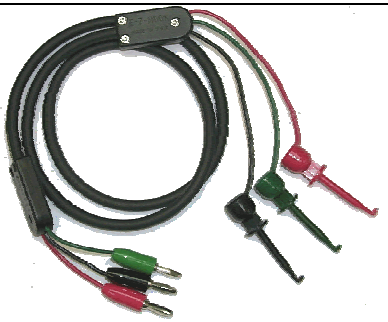
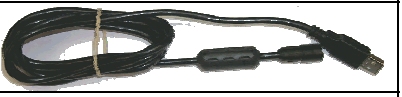
To exit the Excess Noise Mode, remove the source of the noise from the bus then reset the Monitor by holding down both buttons for 2 seconds or disconnecting and reconnecting the Monitor. If the high noise level is still present, the Monitor will again enter Excess Noise Mode.

Note that in Excess Noise Mode, the Monitor cannot differentiate between fieldbus signals and noise. As a result, the Monitor measures noise plus signal when it displays noise values. The noise level measurements displayed will be very high.

Unavailable Data

The data for some or all displays will be unavailable during Initial Discovery, Excess Noise Mode, after a function is reset, or because the segment is silent. When the Monitor is collecting and processing segment data, information may not be ready for display. In this case, only the selected Monitor function name is displayed. The FUNCTION and SELECT buttons still navigate through the menus as they normally would.

VII. Accessories

Part Number	Description	Picture
FBT-A61	FBT-6 Fieldbus Cable with Mini-Hook Probes	
FBT-A62	FBT-6 USB Cable	
FBT-A63	FBT-6 Fieldbus Cable with Clip-on Probe	
FBT-A64	Clip-on Probe	

Contact your local MTL representative for pricing and availability.

www.mtl-fieldbus.com
(or in the U.S. call 1-888-746-4685)

VIII. Specifications

Input Voltage:	Fieldbus Mode: 8 to 32 VDC USB Mode: 4.1 to 5.5 VDC
Max. Input Current:	Fieldbus Mode: 10 mA USB Mode: 30mA
Power Dissipation:	Fieldbus Mode: 320 mW max (@ 32 VDC) USB Mode: 165 mW max (@ 5.5 VDC)
Operating Temperature:	–20 to +50°C *
Dimensions:	146 x 88 x 28 mm (5.7 x 3.5 x 1.1in.)
Weight:	378g (0.83lb.)
Case material:	ABS
DC Voltage Measurement Range:	8 to 32 VDC +/- 0.5 VDC
LF Noise Measurement Range:	50Hz to 4KHz 0 to 1000 mVpp ±15% ±25mVpp
FF Noise Measurement Range:	9KHz to 40KHz 0 to 1000 mVpp ±10% ±25mVpp
HF Noise Measurement Range:	90KHz to 350KHz 0 to 250 mVpp ±20% ±25mVpp
Signal Level Measurement Range:	0.12 to 2 Vpp ±10% ±0.025Vpp

* Display updates very slowly below –10°C.

The Monitor is powered by the Fieldbus and draws approximately 9.4 mA of current from the segment (depending on bus voltage and ambient temperature).

Specifications subject to change without notice.

IX. Service

The Monitor does not contain any user serviceable parts. All adjustments and/or repairs have to be performed at the factory. If the Monitor needs to be serviced, return it to Relcom, Inc. If the Monitor is covered by the limited warranty, the repairs or replacement will be made free of charge. For service outside the warranty, please call or write to determine the charges for the service before sending the Monitor.

X. Warranty

Relcom, Inc. warrants the Monitor to perform as described in this manual under normal use for a period of one year after delivery to the original purchaser. This warranty does not apply if the Monitor has been disassembled, modified or used for purposes other than those described in this manual.

Upon verification of any defect, Relcom, Inc. shall, at its option, repair or replace the defective unit.

In no event does Relcom, Inc. assume liability for incidental or consequential damages. This warranty is the extent of the obligation or liability assumed by Relcom, Inc., and no other warranty or guarantee is either expressed or implied.

Relcom, Inc. reserves the right to make design changes to the Monitor without notice and with no obligation to make the same or similar changes to units previously manufactured.

Relcom, Inc. has made every effort to assure the accuracy of the information contained in this manual. Relcom is not, however, responsible for any errors or omissions. Please contact us with any questions or suggestions.

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USA

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www.relcominc.com

XI. EMC Summary Information

European Union EMC Tests in accordance with:

- EN61326 EMC requirements for measurement, control and laboratory equipment
- CISPR22:2005 (EN55022) INFORMATION TECHNOLOGY EQUIPMENT - RADIO DISTURBANCE CHARACTERISTICS - LIMITS AND METHODS OF MEASUREMENT
- CISPR24:2002 (EN55024) INFORMATION TECHNOLOGY EQUIPMENT - IMMUNITY CHARACTERISTICS - LIMITS AND METHODS OF MEASUREMENT

Tested Products: **FBT-6**

Other products that conform based on these tests: **FBT-6-PA**

European Union Electromagnetic Compatibility (EMC) Tests in accordance with EC Council Directive 89/336/EEC

Emissions Tests per EN61326 Class A

Result	Standard	Description	Port	Comments
Pass	EN61326	Radiated Emissions	Enclosure	N/A
N/A	EN61326	Conducted Emissions	AC Power	N/A

Immunity Tests per EN61326 Annex A

Result	Standard	Description	Port	Criteria
Pass	EN61000-4-2	Electrostatic Discharge Immunity	Enclosure	C
Pass	EN61000-4-3	RF Electromagnetic Field Immunity	Enclosure	A
Pass	EN61000-4-4	Electrical Fast Transient/Burst Immunity	I/O signal/control	B
Pass	EN61000-4-5	Surge Immunity	I/O signal/control	B
Pass	EN61000-4-6	RF Conducted Immunity	I/O signal/control	A
N/A	EN61000-4-8	Magnetic Field Immunity	N/A	N/A
N/A	EN61000-4-11	Voltage Dips/Short Interruptions Immunity	N/A	N/A

EMC Summary Information

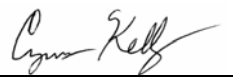
Emissions Tests per EN55022 Class B

Result	Standard	Description	Port	Comments
Pass	EN55022	Radiated Emissions	Enclosure	N/A
Pass	EN55022	Conducted Emissions	AC Power	N/A

Immunity Tests per EN55024

Result	Standard	Description	Port	Criteria
Pass	EN61000-4-2	Electrostatic Discharge Immunity	Enclosure	B
Pass	EN61000-4-3	RF Electromagnetic Field Immunity	Enclosure	A
Pass	EN61000-4-4	Electrical Fast Transient/Burst Immunity	AC Mains	B
Pass	EN61000-4-5	Surge Immunity	AC Mains	B
Pass	EN61000-4-6	RF Conducted Immunity	AC Mains	A
N/A	EN61000-4-8	Magnetic Field Immunity	N/A	N/A
N/A	EN61000-4-11	Voltage Dips/Short Interruptions Immunity	N/A	N/A

I, Cyrus Kelly, representative for Relcom, Inc., verify that the product tested is representative of production products to be sold. Based on the results presented in this report the FBT-6 product family can be marked with the FCC mark (as a Class A digital device) and the CE mark.

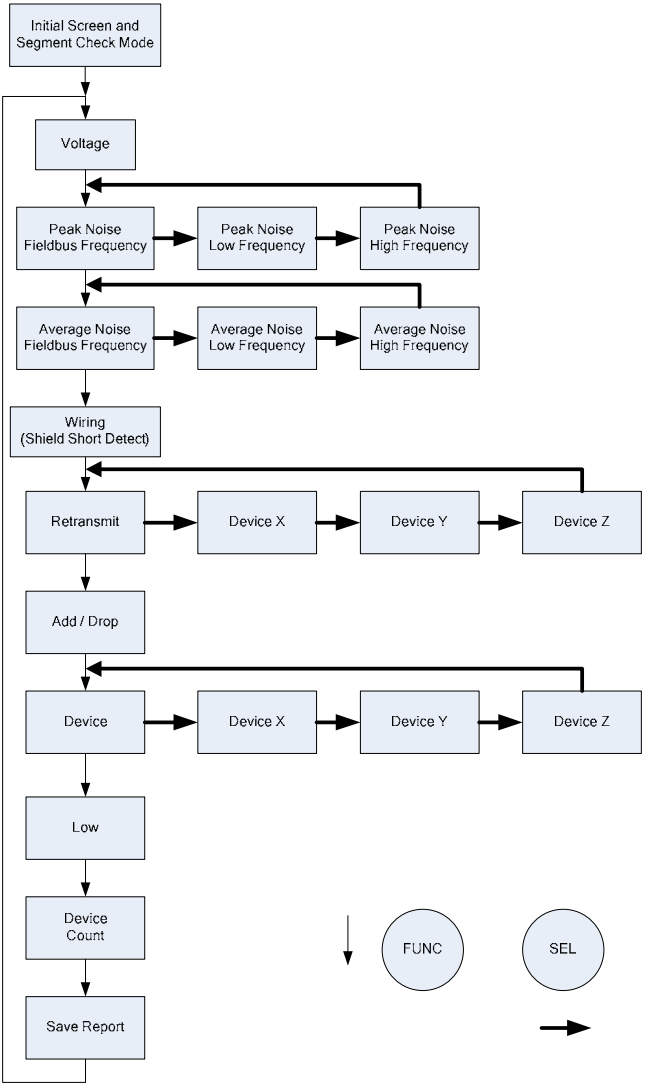


(signature)

XII. Revision History

Revision	Date	Description
A	11/27/2006	Original Release
B	04/17/2007	Updated with release 2 features
C	01/07/2008	Added ATEX Cat. 3 certifications, updated software and driver installation.

Navigating through the Monitor's Functions



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