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ROCLINK™ 800 Configuration Software User Manual (for FloBoss™ 107)

Remote Automation Solutions

EMERSON.
Process Management

Revision Tracking Sheet

January 2008

This manual may be revised periodically to incorporate new or updated information. The revision date of each page appears at the bottom of the page opposite the page number. A change in revision date to any page also changes the date of the manual that appears on the front cover. Listed below is the revision date of each page (if applicable):

Page	Revision
Initial issue	January-08

Contents

Chapter 1 – Introduction

This chapter describes both the ROCLINK™ 800 Configuration software ("ROCLINK 800") you use to configure and monitor the FloBoss™ 107 Flow Manager ("FB107") and the FB107's dynamic user interface.

In This Chapter

1.1 ROCLINK 800 Software Description

ROCLINK 800 Configuration software enables you to monitor, configure, and calibrate FloBoss 107 Flow Managers. Emerson Process Management provides the software and user documentation on a CD-ROM.

ROCLINK 800 is designed for ease of use. Drop-down menus simplify accessing the functions provided by the software. Dialog boxes and drop-down list boxes help to direct selections and data entry. You can perform actions with the keyboard or a pointing device, such as a mouse. Refer to *Section 1.6, User Interface Basics* for a description of the user interface.

You access help screens either from the Help menu or in a context-sensitive fashion using the **F1** key. This feature makes it easy to access on-line information for any ROCLINK 800 topic.

You can build custom displays for the FB107 that combine both graphic and dynamic data elements, and then use these displays to monitor the FB107's operation either locally or remotely.

The software also provides multiple levels of security to control access to ROCLINK 800 functions as well as the FB107 database.

1.2 Computer Requirements

ROCLINK 800 runs on most IBM-compatible personal computers (PCs). The PC can be a desktop or a portable computer, but must meet the following minimum requirements:

- Pentium-class processor (233 MHz or greater recommended).
- CD-ROM drive.
- Windows NT 4.0 (Service Pack 6), 2000 (Service Pack 2), or XP.
- 64 MB of RAM (random access memory).
- SVGA color monitor, 800 by 600 pixels, small fonts.
- 15 to 50 MB of available hard disk space depending on operating system and revision level.
- EIA-232 (RS-232) serial connection or a dial-up modem connection.

1.3 Contacting Technical Support

For technical support, please contact your local sales representative. You may also contact Remote Automation Solutions directly.

Emerson Process Management
Remote Automation Solutions
Marshalltown, IA 50158 USA
Houston, TX 77065 USA
Pickering, North Yorkshire UK Y018 7JA

E-mail: supportnet@emersonprocess.com

Website: http://www.emersonprocess.com/Remote/

Technical Support Website:
http://www.emersonprocess.com/flow/Emerson/support/support_index.html

Telephone: 641.754.3449
Toll Free: (US and Canada) 800.807.0730
Hours: Monday through Friday 7:30 AM to 4:30 PM Central Standard Time USA.

1.4 Software Installation

To install ROCLINK 800:

1. Start the installation using either of the following methods.
   - **Method 1 –** If you have a **CD-ROM** that contains the ROCLINK 800 installation files:
     A. Place the ROCLINK 800 installation CD-ROM into your drive.
     B. If the CD-ROM runs automatically, click **Install a ROCLINK Product** on the Main Menu.

C. Click the **Install ROCLINK 800** button in the Installation Screen.

Note: If the CD-ROM does not run automatically, click Windows **Start** > **Run**. When the Run dialog box opens, click **Browse** and navigate to the CD-ROM drive and select **setup.exe**. Click **Open**. If the CD-ROM is drive D, the location will be D:\Installs\ROCLINK800_W68130\Setup.exe. Click **OK** in the Run dialog box.

- **Method 2 –** If you have a **.zip** file that contains the ROCLINK 800 installation files:

  A. Extract the .zip file to the local hard drive (for example, in the C:\TEMP\directory).

  B. Run **setup.exe** from the extraction directory (for example, run C:\TEMP\SETUP.EXE).

The Installation Wizard screen appears.

2. The Installation Wizard determines whether you have previously installed ROCLINK 800.
   - If this is an **upgrade**, a dialog box appears asking whether to continue with the upgrade. Click **Yes** to begin the installation. Click **Next** when prompted.
   - If this is a **new** installation, click **Next** on the ROCLINK 800 Welcome screen. Read the License Agreement and click **Yes** to accept it. Enter your **Name** and **Company** name, and click **Next**.
3. The program installs the software in the default recommended directory C:\Program Files\ROCLINK800. Select an alternative destination folder if you want to install the software in a folder other than the default.
4. Click **Next**. A confirmation screen appears when you are ready to start copying files.
5. Click **Next** in the Setup Status screen.
6. Click **Finish** in the Wizard Complete screen.
7. If you installed the software from a CD-ROM, select **View Manual** or **Exit** on the Main Menu screen. Once you have exited the Main Menu, remove the installation CD-ROM.

Note: You may need to restart your PC to complete the installation.

1.4.1 Manually Creating a Desktop Shortcut

The ROCLINK 800 installation should automatically create a desktop shortcut on your computer. To manually create a desktop shortcut:

1. Double-click the **My Computer** icon.

2. Navigate to the C:\Program Files\ROCLINK800 folder or the folder where you installed ROCLINK 800.
3. Right-click the ROCLINK.exe file.
4. Select **Send To** and **Desktop** from the drop-down menu.
5. The icon appears on your desktop.

1.4.2 Un-installing ROCLINK 800

To remove ROCLINK 800 from your PC:

1. Click the Windows **Start** button.
2. Select **Settings** > **Control Panel**.
3. Double-click the **Add/Remove Programs** icon.
4. Select **ROCLINK 800**.
5. Click **Add/Remove**.
6. Follow the displayed instructions.

1.5 Starting ROCLINK 800 Software

To use ROCLINK 800 to configure a hardware device, you must first properly connect the device to power. Refer to the appropriate hardware instruction manual. You must also connect the PC to the device's Local Operator Interface (LOI), serial, or modem port.

To run ROCLINK 800, perform one of the following steps:

- Double-click the **Desktop Shortcut**.
- Select **Start** > **Programs** > **ROCLINK 800** > **ROCLINK 800**.

The software loads and initializes.

Note: You can only run **one** version of ROCLINK 800 at a time.

1.5.1 Logging On

To log on to ROCLINK 800 software:

1. **Connect** the FB107 to the Local Operator Interface (LOI – Local Port) and launch **ROCLINK 800**.

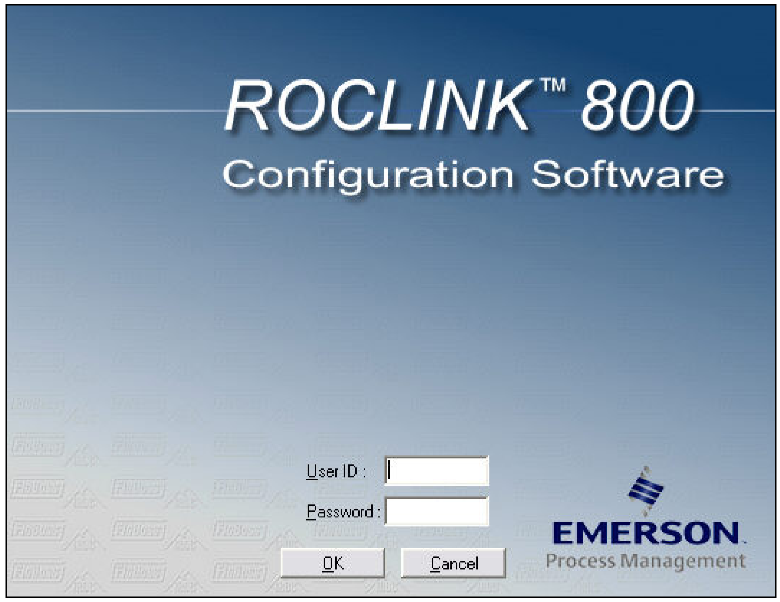


Figure 1-1. Logon

2. Type your assigned 3-character identifier in the **User ID** field and press **Enter** or **Tab**.

   Note: The User ID is case sensitive.

   Typically, your initials are your user ID. If user IDs have not yet been assigned, try using the default user ID of **LOI**. You assign user IDs by using the **ROC** > **Security** features of ROCLINK 800.

3. Type your assigned 4-digit password and click **OK**. For added security, the software displays an asterisk for each number that you type. If passwords have not yet been assigned, use the default password of **1000** (valid **only** with the default user ID of LOI).

   ROCLINK 800 validates the user ID and password you enter against a predefined list.

   If the log on **is not** valid, a dialog box appears. Click **OK** and re-enter the user ID and password. You can repeat the procedure as many times as needed until you successfully enter a valid User ID and password. If the log on is valid, ROCLINK 800 displays the Device Directory screen (see *Figure 2-1*).

To exit the log on screen, click **Cancel** or press **Esc**. This closes ROCLINK 800 and returns you to the point where you started ROCLINK 800.

1.6 User Interface Basics

You interact with ROCLINK 800 using various displays on the computer monitor, keyboard, and pointing device.

The major components of ROCLINK 800 user interface are:

- Graphical Interface (Splash Screen)
- Menu bar and menus.
- Toolbar.
- Function screens.
- Dialog boxes.
- Help system, including the Status bar and message boxes.
- Device Directory or Configuration Tree menu.

ROCLINK 800 employs a dynamic graphical user interface (GUI) with a standard Windows menu structure. After you log on to ROCLINK 800, available functions display in a menu bar with drop-down menus. A **Status Line** at the bottom left of the display contains pertinent information about the highlighted item, such as a menu option or a parameter.

Buttons display dialog boxes for further configuration details or perform a desired action, such as the **Update** button. To activate the button:

- Click the button with a left click of the mouse.
- When a button is active, press **Enter** or a function key.

Dialog boxes are areas that "pop up" inside the current screen allowing you to make further selections or enter values. Dialog boxes can also provide messages or more detailed information.

The menu structure lists choices from which you can select the desired function. Once you select a function, the screen or dialog box for that function displays. This screen or dialog box provides the requested information and lets you enter the applicable configuration data.

Table 1-1. Menu Listing for ROCLINK 800

Menu	Menu Options
File	New, Open, Download, Close, Save Configuration, Print Configuration, Print, Print Setup, [List of recent files], Exit
Edit	Undo, Cut, Copy, Paste. **Note**: This option is not available in the current release.
View	Directory, EFM Report, Calibration Report, History, Alarms, Events, Display, I/O Monitor, Toolbar
ROC	Direct Connect, Disconnect, Collect Data, Clock, Security, Comm Ports, Memory, Information, Flags
Configure	I/O, Control, History Points, Opcode Table, MODBUS, LCD User List, User Data
Meter	Setup, Calibration, Values, Plate Change

Menu	Menu Options
Utilities	Update Firmware, License Key Administrator, Convert EFM File, User Program Administrator, ROCLINK 800 Security, AI Calibration Values, MVS Calibration Values, FST Editor, Communications Monitor
Tools	Options
Window	Cascade, Tile, Device Directory, [List of open windows]
Help	Help Topics, About ROCLINK 800

1.6.1 The FloBoss 107 Dynamic Interface

You can navigate the FB107 options either by using the ROCLINK menu structure or by clicking on the FB107 graphical dynamic interface and selecting a tab or button. The dynamic interface display shows the current settings of the point including alarms and integrity.

The system displays a white line around objects that are links when you hover your cursor over them. A link descriptor displays indicating what the link is for. The system displays a yellow line around currently selected components. The configuration for the selected hardware displays at the bottom of the screen.

Note: For more information on using the dynamic interface, refer to SupportNet course *RAS-0044 FB107 Dynamic Interface*.

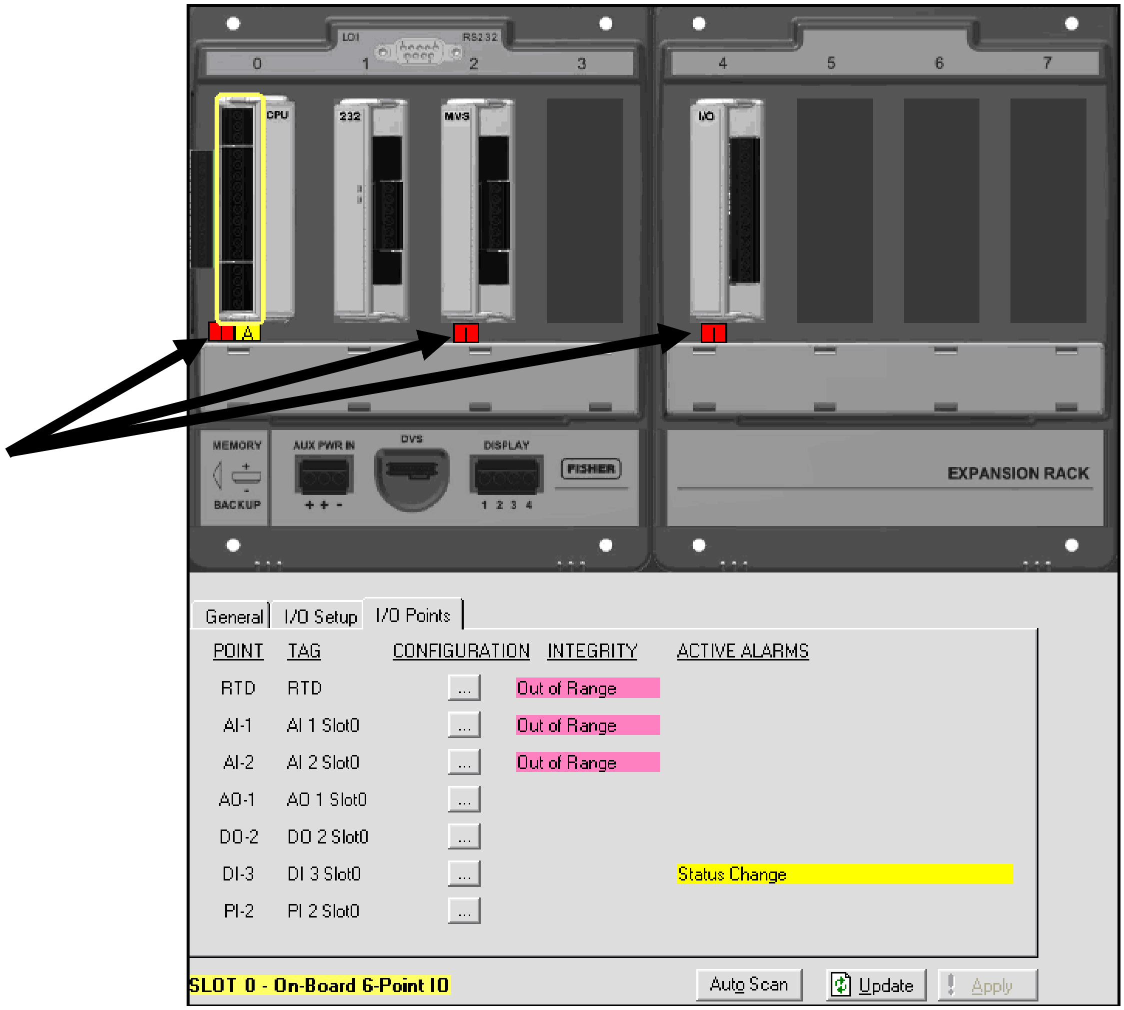


Figure 1-2. FloBoss 107 Dynamic Interface

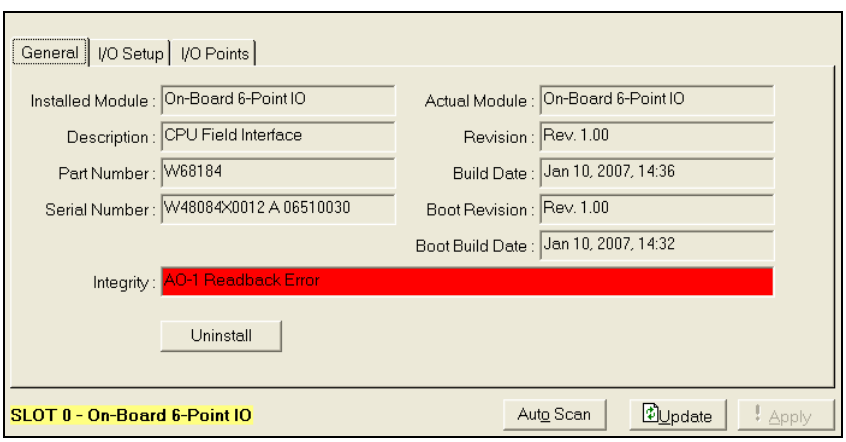


Figure 1-3. Integrity Alarm

Alarms The FB107 supports two kinds of alarms: **integrity** (which indicate hardware problems) and **alarms** (which indicate software or field device problems).

Alarm notifications display on both the graphical representation of the FB107 and on the tabbed screen below the graphical FB107. ROCLINK 800 color-codes the notifications to help you quickly identify and resolve the alarms. Integrity notifications display as an **I** in a red box and alarm notifications display as an **A** in a yellow box (see Figure 1-2). Moving the mouse over these alarm icons displays a definition. ROCLINK 800 also displays definitions in the Integrity field.

Integrity Integrity notifications indicate hardware problems related to the CPU module, I/O modules (Auxiliary 6-Point IO), the CPU module's optional I/O assembly (On-Board 6-Point IO), MVS modules, communication modules, and smart application modules.

Other integrity notifications can include:

Red "I" – Integrity. The point is out of the user-defined or default range. For example, when an AI is open, the actual AD count is 0 but the default range is 643 to 3220 or loss of communications occurred.

- **Communication Failure**: The FB107 sets a diagnostic error indicating **Communication Failure** if the Actual Module field is empty and the Installed Module field displays a value or if communications is lost between the FloBoss and the module. Refer to *Section 1.6.2, Actual versus Installed Module.*
- **Module Mismatch**: Displays if you install a different module type than the one currently displayed in the Installed Module field, which draws from information residing in the CPU configuration.
- **Out of Range**: Indicates that the point is not within the user-defined configured parameters.
- **Integrity Failure**: Displays when the FB107 cannot read or communicate with the associated hardware. The hardware reports a malfunction.

Alarm Alarm notifications indicate problems related to field or other user-defined values.

The FB107 dynamic interface displays an A in a yellow box to indicate an alarm condition (see *Figure 1-2*). The alarm condition indicates the type of point and location associated with the installed hardware point.

ROCLINK 800 displays alarms when you enable the

- **Yellow "A" – Alarm**. The point is in alarm condition. The **Active Alarms** fields indicate any alarms that are active for this point. When Alarming is set to Enabled, the active alarms appear. If Alarming is set to Enabled, an alarm is generated when Scanning is Disabled. Even if Alarming is Disabled, the Integrity Failure (hardware malfunction) alarm indicator can still appear.

1.6.2 Actual versus Installed Module

As a diagnostic tool, the General tab in the window underneath the FB107 dynamic interface includes two fields, **Installed Module** and **Actual Module**. The **Actual Module** field indicates what module is physically installed in the backplane. The system updates this field whenever you restart the FB107. The **Installed Module** field indicates the module identified in the configuration file currently residing in firmware.

If the contents of the Actual Module and Installed Module fields are not identical, the system displays integrity alarms. You then correct the integrity errors. The FloBoss 107 remembers the "Installed Module" type until you "Uninstall" it.

The FB107 uses a plug and play system to install newly inserted modules to the backplane. For example, in a new FB107 with no installed modules, the Actual Module field displays "Empty" for all slots. The Installed Module field also displays "Empty" for all slots.

When you insert an I/O module in slot 2 and power up the FB107, the FB107 displays **Aux IO** in the Actual Module field. The FB107 also displays **Aux IO** in the Installed Module field (since there was not a module previously installed in slot 2) and creates the I/O points associated with the I/O module.

If you remove the I/O module from slot 2 and power up the FB107, the Actual Module field now displays **Empty**, but the Installed Module field still displays **Aux IO**. The FB107 "remembers" what was previously installed. Additionally, the FB107 sets an integrity error (specifically, "Communication Failure"**)** on slot 2 because the slot is now physically empty and the Installed Module field indicates **Aux IO**. You can still define and manage the I/O points associated with the Installed Module (Aux I/O), but because of the unresolved integrity error any I/O points are marked in point fail.

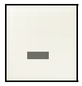
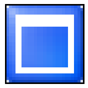
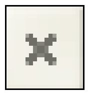
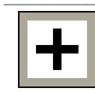
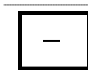
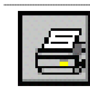
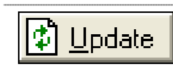
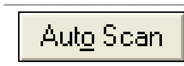
A **Module Mismatch** error occurs if you install a different type of module than currently displays in the Installed Module field.

To completely remove a module from the FB107 click **Uninstall**. This resets the value in the Installed Module field to **Empty and** deletes any I/O points associated with the previously installed module.

Note: The FB107 completely re-scans for actual and installed modules if you select **ROC** > **Flags,** click **Flash Memory Clear** on the Flags screen, and click **Cold Start & Clear All**.

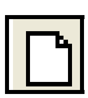
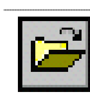
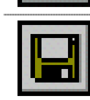
1.6.3 Standard Buttons

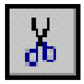
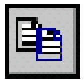
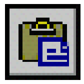
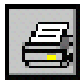
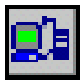
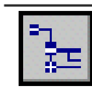
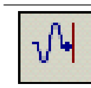
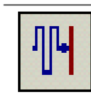
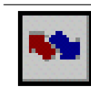
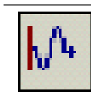
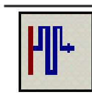
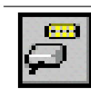
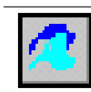
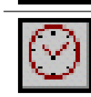
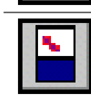
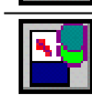
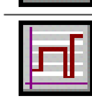
Several buttons appear on most ROCLINK 800 screens.

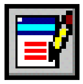
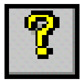
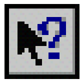
Button	Description
	Minimizes and hides windows.
	Maximizes the size of the windows to fit in the screen area.
	Restores window to original size.
	Closes a window.
	Expands options listed in the Device Directory or Configuration Tree Menu.
	Hides options listed in the Device Directory of Configuration Tree Menu.
	Prints the active display.
	Updates contents of the active window from the device.
	Applies changes on the active window to the device and closes the active window. A Confirm Save dialog box displays if there are unsaved changes.
	Cancels without saving changes and close the active window.
	Applies changes on the active window to the device. Clicking **Apply** does not close the active window.
	Starts automatic device polling.
	Stops automatic device polling.

1.6.4 Toolbar Buttons

The following buttons appear in the ROCLINK 800 toolbar. ROCLINK 800 grays out a button if it is not applicable to the current screen.

Button	Description
	Creates a new configuration file. You specify available configuration parameters using menu selections. Configure the file as if you were connected to the device. Functions requiring a live connection are unavailable in this mode.
	Opens an existing configuration file. You create configuration files using the New Device or Save Configuration functions.
	Saves the current configuration of the connected device to a disk file.

Button	Description
	Deletes currently selected text and place it in the Clipboard. **Note**: Currently not available.
	Copies currently selected text and places it in the Clipboard. **Note**: Currently not available.
	Pastes text currently in the Clipboard at the cursor's current location. **Note**: Currently not available.
	Prints the configuration file. **Note**: Currently not available.
	Connects to a device locally using the (LOI) Local Operator Interface port.
	Disconnects from a device.
	Displays the first of two .DSP files loaded on the device. **Note**: Not available on the FB107.
	Displays the second of two .DSP files loaded on the device. **Note**: Not available on the FB107.
	Displays the Analog Input (AI) screen.
	Displays the Discrete Input (DI) screen.
	Displays the Pulse Input (PI) screen.
	Displays the Analog Output (AO) screen.
	Displays the Discrete Output (DO) screen.
	Displays the Comm Port screen.
	Displays the Flags screen.
	Displays the Clock screen.
	Displays the Meter Setup screen.
	Displays the Plate Change screen.
	Displays the PID Loop screen.

Button	Description
	Opens the Function Sequence Table (FST) Editor.
	Displays an About ROCLINK 800 screen providing program information, version, creation date, and copyright for ROCLINK 800.
	Launches the ROCLINK 800 on-line help system.

1.6.5 Configuration Tree Menu

When you open a configuration file or go on-line with an FB107, the Configuration Tree appears on the left-hand side of the screen. The tree hierarchically displays the parts of a configuration (such as I/O, Meter Runs, and History) that you can change.

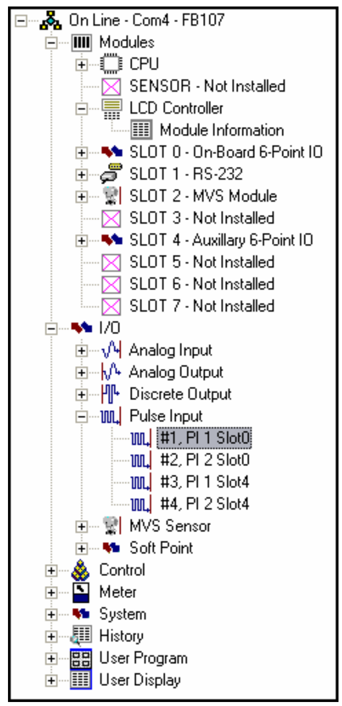


Figure 1-4. Configuration Tree

Option	Description
Modules	Lists all installed modules.
I/O	Lists all available inputs and outputs by type.
Control	Displays the FST and PID options enabled on the **ROC** > **Information** screen.
Meter	Lists all available meters.
System	Displays **ROC** > **Information** system folders, Comm Port, Device Flags, and the Opcode Table.
History	Displays all available History Points.
User Programs	Displays all installed user programs.

User Display	Accesses custom displays stored in the FB107. The FB107 can store a maximum of 40 displays (including both custom user displays and user program displays).

From the Configuration Tree, you may change the configuration or monitor current operations. Once you are in the Configuration Tree menu, you can use the **+** and **–** symbols to display or hide various options.

Double-click the desired function in the Configuration Tree to display the associated screen. Double-clicking an icon is the same as selecting the menu bar or Toolbar button option.

If this is the first time that you have connected to the FloBoss, refer to *Section 6.4, Setting the Clock*.

1.6.6 Keystrokes

If you are using the keyboard, you may use the **Alt** key plus one or more letters to access menus. Windows underlines the appropriate letter in the menus. For example, to access the Open File dialog box, press **Alt** + **F** and press **O**. You may also use the Left Arrow (←) and Right Arrow (→) keys to highlight a menu bar item (the help Status Line at the bottom of the screen provides a description of the menu) and press the letter.

With a menu displayed, you can highlight the desired item by using the Down Arrow (↓) and Up Arrow (↑) keys or the mouse. Once you have highlighted an item, press **Enter** to activate the function.

To leave a menu or submenu, press **Esc**. You can then select another menu. You can also access another menu using ← and →.

The text scrolling keys are **Page Up** and **Page Down**.

To use the keyboard in configuration screens and dialog boxes, press **Tab** to move in a predetermined sequence from one parameter field or button to the next. The selected field or button becomes highlighted. Fields unavailable for changes are automatically skipped.

When you **Tab** to the last field or button in the screen or dialog box, pressing **Tab** again jumps back to the first field or button. To go back to a previous field or button, press **Shift** + **Tab**.

In an option field, the currently selected option is highlighted. To select one of the other options, use ↓ or ↑ to highlight the desired option and then press **Enter**.

In a field that requires a text or numerical entry, type in the required characters or numbers from the keyboard. Use **Backspace** or **Delete** to erase unwanted characters. Use ← and → to move the cursor one character at a time and **Home** and **End** to place the cursor at the beginning and end of the field, respectively.

Other keys or key combinations include:

- **F1** – Launches ROCLINK 800 on-line help.

- **Esc –** Cancels the current activity, closes the screen, and returns you to the last-used place in the menu structure, screen, or other place from which the dialog box originated. If a menu is active, **Esc** closes the last-opened menu, taking you up one level in the menu structure. If the menu bar is active, **Esc** de-selects all menu options. Press **Alt** or click with the mouse to reactivate the menu bar.
- **Ctrl + N –** Creates a new configuration file.
- **Ctrl + O –** Opens a configuration file.
- **Ctrl + S –** Saves the current configuration file.

1.6.7 Help System

The Help menu provides detailed on-screen information about getting started with ROCLINK 800 and performing keyboard operations, a list of the Help topics, and the ROCLINK 800 version.

To display context sensitive help on a menu item, a parameter, or a button, press **F1** while the item, parameter, or button is highlighted. A help window appears on the screen.

To view detailed help, select **Help** > **Help Topics** from the menu bar.

Option	Description
Contents	Presents a list of Help Topics that display based on task-oriented situations. Each screen, tab, and field has a help topic associated with it. For example: the Modbus Scale Values tab is located under **Modbus** > **Modbus Configuration** > **Scale Values** tab.
Index	Locates specific Help Topics. The Index lists each field by the tab or screen in which the field appears.
Search	Activates a search function on a specific word.
Back	Returns to the last topic that you viewed.
Print	Sends the currently displayed topic to the PC's default printer.
See Also	Displays topics related to the currently selected topic.
<< / >>	Navigates forward (**>>**) or backwards (**<<**) through the help system on a per topic basis. The Browse Sequence follows the order of the topics as displayed in the Contents tab.

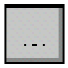
1.6.8 Basic Navigation

When you start ROCLINK 800, the Device Directory displays. After you connect to an FB107, the Configuration Tree displays (see *Figure 1-4*).

Use the + and – symbols to display or hide various options. Double-click a point to display the associated parameter configuration screen. You can also use the menu options and buttons to display the associated parameter configuration screen.

The Status Line at the bottom of the Device Directory and Configuration Tree provides critical information. The left side displays brief information about the device being connected. The right side displays the device status (on-line or off-line) and system time.

TLP Selections



In many locations in ROCLINK 800, you can click **Browse** (a button with three dots) to view the Select TLP dialog. The Select TLP dialog allows you to assign specific inputs and outputs to parameters. ROCLINK 800 uses Point Type (T), Logical Number (L), and Parameter (P) to define point locations.

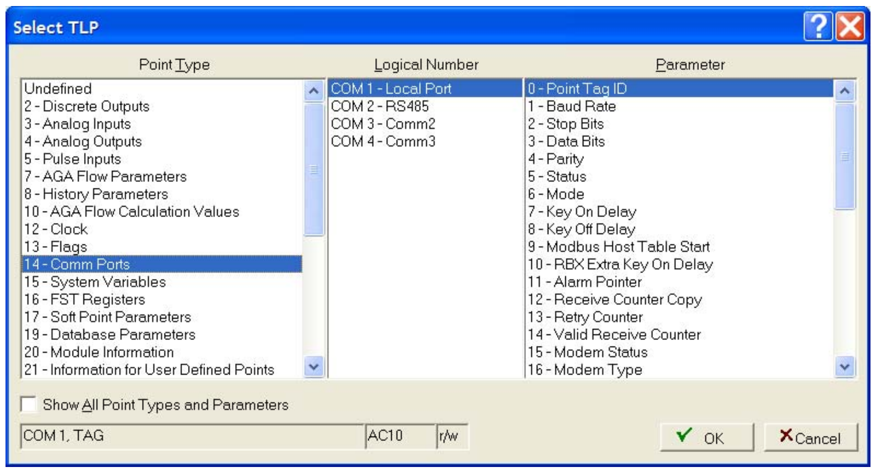


Figure 1-5. Select TLP

To use the Select TLP dialog box:

1. Select the **Point Type** from the list. This opens a list of logical numbers and parameters that belong to that Point Type.
2. Select the **Logical Number**. In the configuration screens, the Logical Number is generally referred to as Point Number or Number.
3. Select the specific **Parameter**. These are usually called by the same term as the Tag on the configuration screen. Click **OK**.

   The field at the bottom of the Select TLP dialog displays the numeric point location of the TLP point or a text abbreviation, depending on the setting in the **Tools** > **Options** window.

AutoScan Update Interval Option

Select **Tools** > **Options** to set the time interval, in seconds, at which the AutoScan feature on various screens in ROCLINK 800 polls the FB107. Clicking **AutoScan** causes ROCLINK 800 to poll the device automatically, until you click **StopScan**.

Chapter 2 – Device Directory and Device Root

This chapter describes the Device Directory screen and the Device Root, the graphical representation of all devices, which appears on that screen.

In This Chapter

2.1 Device Directory

The Device Directory is the first screen that displays after you successfully log onto ROCLINK 800 but **before** you connect to a device.

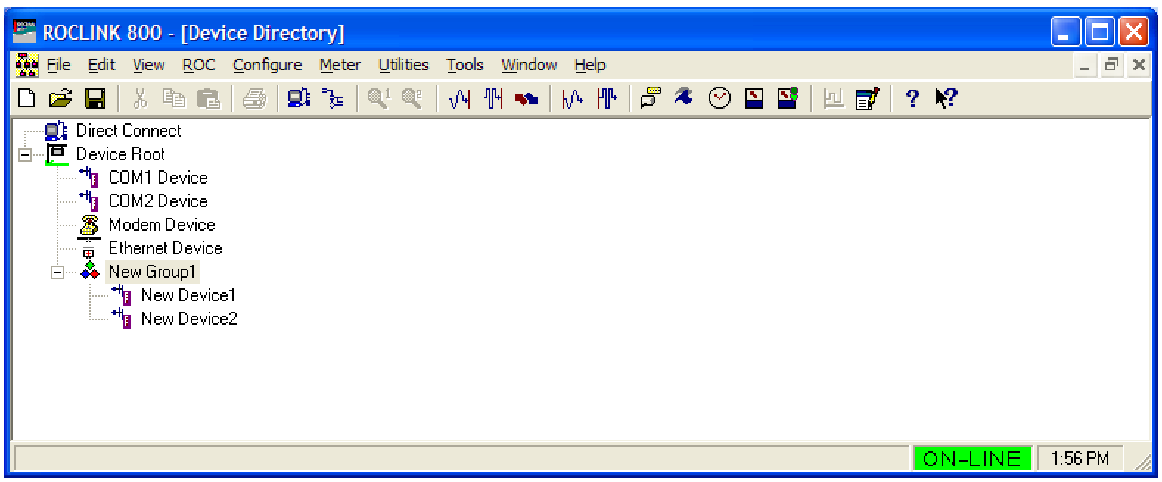


Figure 2-1. Device Directory and Device Root

Note: Once you connect to a device, ROCLINK 800 replaces the Device Directory screen with a device-specific configuration tree screen (see *Figure 2-2*).

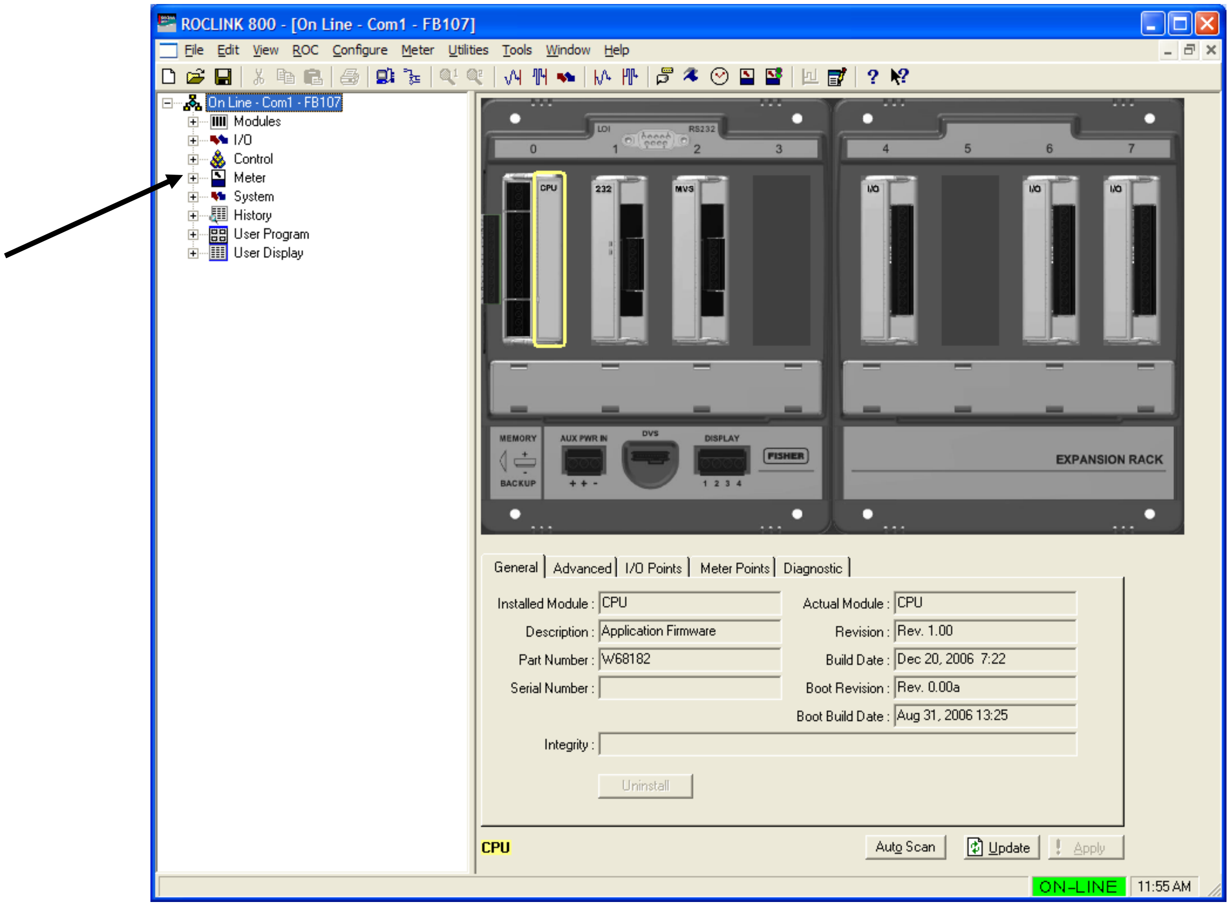


Figure 2-2. Configuration Tree

You use the Device Directory screen (*Figure 2-1*) to create and maintain communications setup configurations for a PC running ROCLINK 800. You can uniquely configure the communication ports on the PC to send data to a specified FB107. You may add, delete, or modify these communications setups and establish a tree of groups and devices.

Use the **+** and **–** symbols to display or hide various options.

Note: You can only configure a PC's communications ports from the Device Directory screen. To redisplay the Device Directory screen at any time, select **Window** > **Device Directory** or **View** > **Directory**.

2.1.1 Communication Parameter Setup Screen

The ROCLINK 800 Communication Parameter Setup screen allows you to change your PC communications port, time-out settings, and other variables ROCLINK 800 uses when establishing a connection to a device.

In order for ROCLINK 800 to communicate with a device, ROCLINK 800 must know to which device it is communicating. Each device within a group is given a unique device address.

To set the PC communication parameters:

1. Right-click the label in the Device Directory that corresponds to the PC port you want to use.

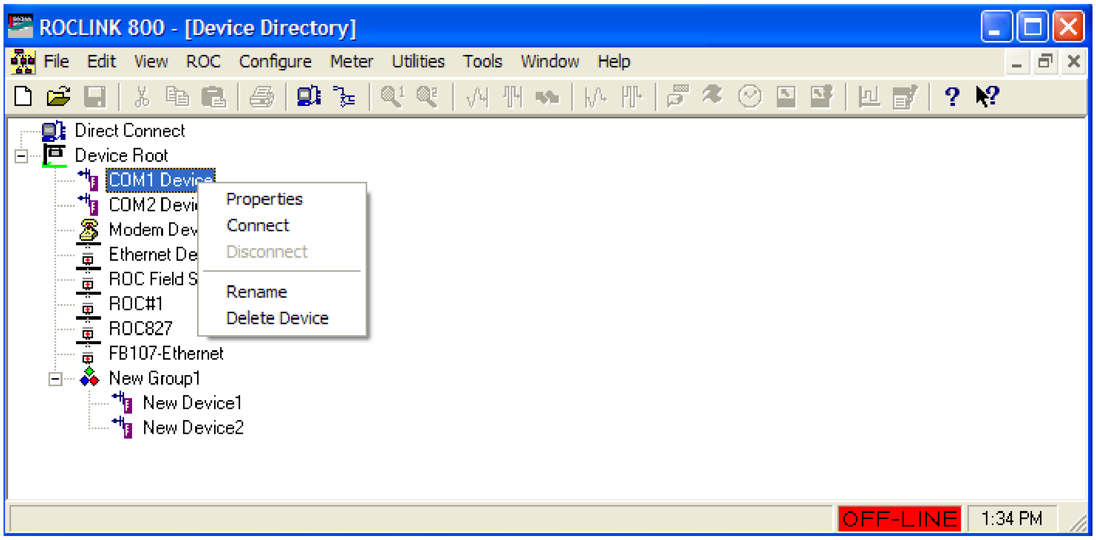


Figure 2-3. Device Pop-up Menu

2. Select **Properties**. The ROCLINK 800 Communication Parameters screen displays.

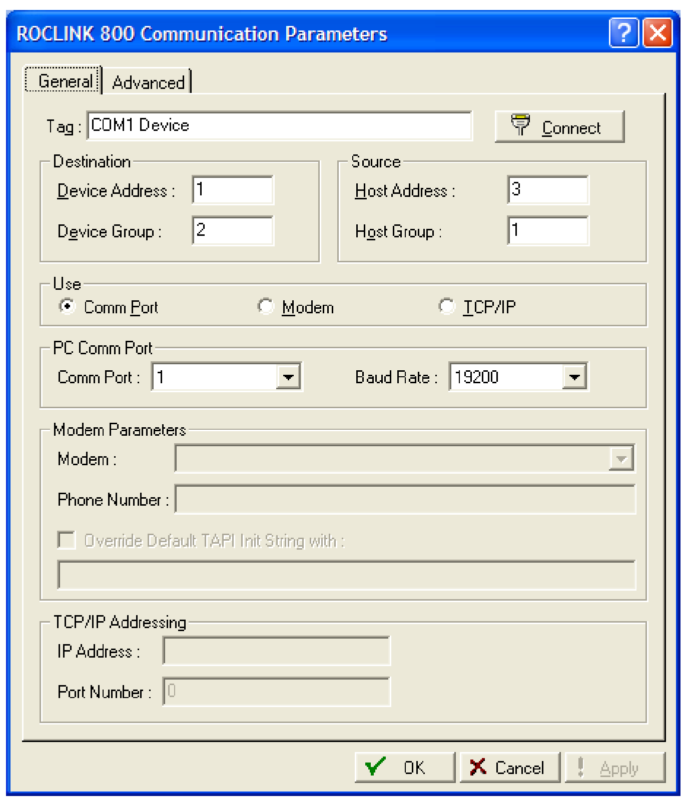


Figure 2-4. Communication Parameters

3. Configure the ROCLINK 800 communications parameters (refer to *Chapter 3, Communications and Security* for a complete discussion of this screen).
4. Click **Apply**. You are ready to connect to the FB107.

2.2 Device Root

The device root graphically represents the devices and their organizational structure on the Device Directory screen. When you open ROCLINK 800, the device root displays the default device labels. Using the Communication Parameters screen, you can modify the communications setup configurations for these devices or add new devices with new configurations. Each icon on the device root represents a different type of communications connection.

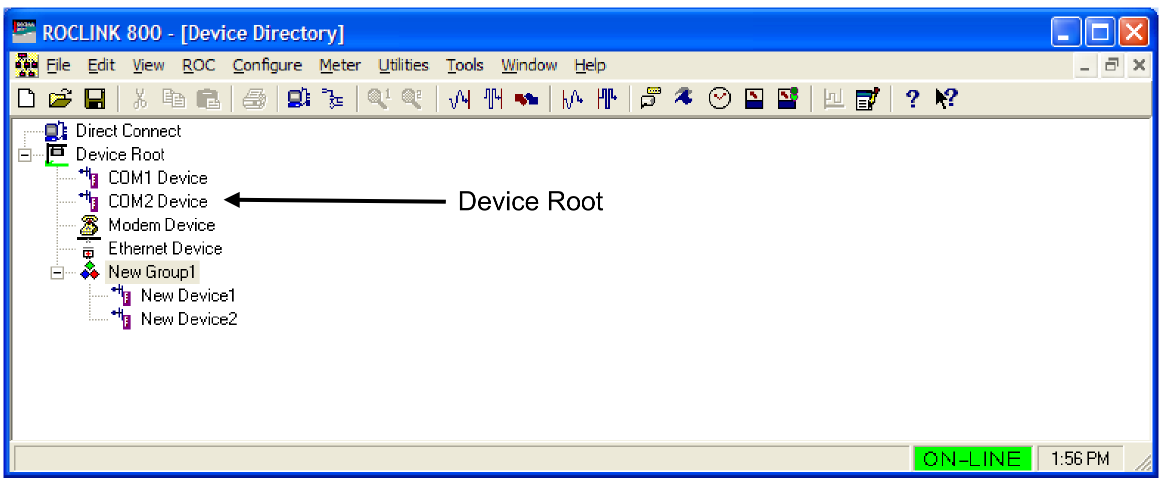


Figure 2-5. Device Root

The default device labels, which correspond to available communication ports, include:

- COM1 Device.
- COM2 Device.
- Modem Device.
- Ethernet Device.
- New Group1.

You may add, delete, or modify the communication configurations for each of these devices. You can also define device groups.

2.2.1 Backing Up Configurations

After you configure your device settings, we strongly recommend that you create a back-up file of those settings. ROCLINK 800 stores these values in the file **ROC_USER.mdb**. Use Windows Explorer to find the **ROC_USER.mdb** file, then copy the file and store it in a safe place. This backup file enables you to restore your settings in case they ever become corrupted.

You can configure devices on-line communications using the Local Operator Interface (LOI) Port (also known as the "local port") or a communication port, such as a modem.

For differentiation, each FB107 has a **tag** and a unique **device address** which you define on the ROCLINK 800 Communications Parameters screen (see *Figure 2-4*). The Device Address must be different from any other host system that may access the network.

2.2.2 Adding a Group

You can organize devices into groups. Typically, groups contain devices in the same geographical area or with another common feature. When you double-click a group icon, ROCLINK 800 displays all devices or subgroups associated with that group.

To add a new group to the device root directory:

1. Right-click the Device Root icon. A pop-up menu displays.
2. Select **Add a Group**. ROCLINK 800 adds the new group icon to the device root graphic.

To add a subgroup to an existing group:

1. Right-click the group icon. A pop-up menu displays.
2. Select **Add a Group**. ROCLINK 800 adds the new group icon to the selected group.

2.2.3 Deleting a Group

To delete a group:

1. Right-click a group icon. A pop-up menu displays.
2. Select **Delete Group**. A Confirm Delete dialog box displays.

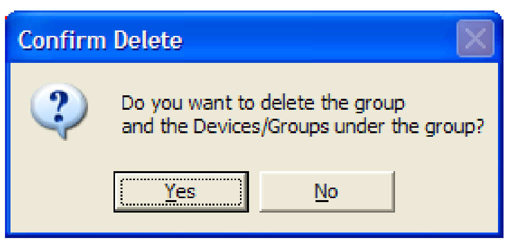


Figure 2-6. Delete Group

3. Click **Yes** to delete the group and all subordinate groups and devices in that group.

2.2.4 Deleting a Device

To delete a device:

1. Right-click a device icon. A pop-up menu displays.

2. Select **Delete Device**. A Confirm Delete dialog box displays.

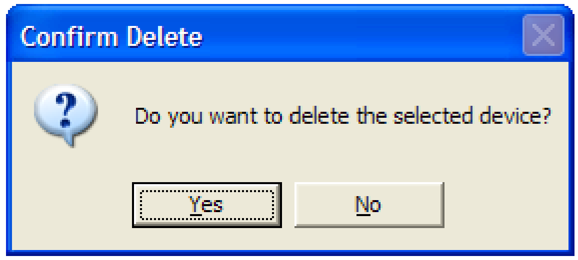


Figure 2-7. Delete Device

3. Click **Yes** to delete the device.

2.2.5 Adding a Device

To add a new device to the device root:

1. Right-click the device root icon. A pop-up menu displays.
2. Select **Add a Device**. ROCLINK 800 adds a device icon to the device root.
3. Configure the new device's communication parameters (see *Chapter 3, Communications and Security*).

To add a device to an existing group:

1. Right-click the group icon. A pop-up menu displays.
2. Select **Add a Device**. ROCLINK 800 adds a device icon in the selected group.
3. Configure the new device's communication parameters (see *Chapter 3, Communications and Security*).

2.2.6 Deleting All Devices

To delete all device communication parameter configurations in the device root directory:

Note: This deletes **all** devices you currently have configured.

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1. Right-click the device root icon. A pop-up menu displays.
2. Select **Delete All Devices**. A Confirm Delete dialog box displays.

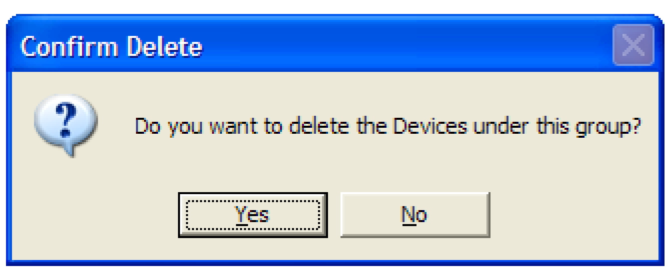


Figure 2-8. Delete All Devices

3. Click **Yes**. ROCLINK 800 deletes **all** devices in the device root.

2.2.7 Renaming a Group or Device

You can easily replace the ROCLINK 800-provided default group or device names with names you choose. To rename a group or device in the Device directory:

1. Right-click the device or group icon. A pop-up menu displays.
2. Select **Rename**. Enter a name.

Note: Although your label can be up to 72 characters in length, keep the label short for easy recognition.

3. Press **Enter** when finished. ROCLINK 800 adds the new label to the device or group.

Chapter 3 – Communications and Security

This chapter describes how to configure the communication ports on a PC and on an FB107. It also describes how to use the Connect and Direct Connect features in ROCLINK 800 and how to define security to control access to the FB107 and ROCLINK 800.

In This Chapter

3.1 Communications

Before you attempt to connect to an FB107, you must configure communication parameters in two places:

- **ROCLINK 800 Communications**
  Configure device communications on the Device Directory screen (see *Chapter 2, Device Directory and Device Root*). This sets the PC's comm ports to communication with a specific device.
- **Communication Ports on the FB107**
  Select **ROC** > **Comm Ports** to access the Comm Port screen and configure the FB107's communication ports for incoming or outgoing communications. Refer to *Section 3.3, Communication Ports on the FB107.*

3.2 ROCLINK 800 Communications

The Device Directory communication configurations allow ROCLINK 800 to communicate to an individual FB107.

3.2.1 ROCLINK 800 Communications Parameters General Tab

The Device Directory screen is the first screen that displays after you successfully log onto ROCLINK 800 but before you connect to a device.

To display the ROCLINK 800 Communication Parameters screen, right-click on a device icon in the device root and select **Properties**. The ROCLINK 800 Communication Parameters screen displays, showing the General tab.

Use the General tab to configure basic communications for the PC running ROCLINK 800.

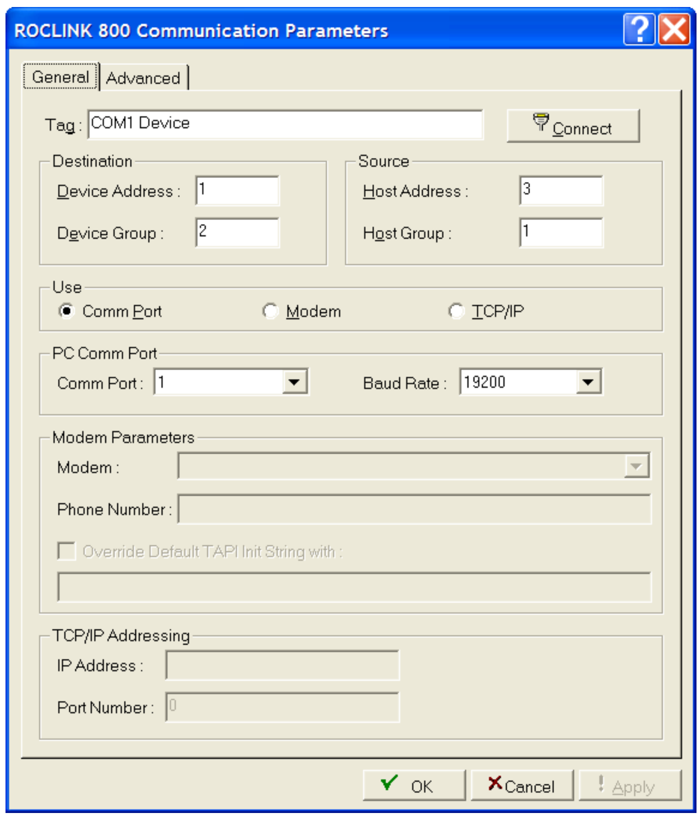


Figure 3-1. ROCLINK 800 Communications, General tab

Field	Description
Tag	Sets a unique name for the FB107. Enter up to 50 alphanumeric characters to identify the FB107.
Connect	Click to communicate with the PC using the parameters configured for this PC's communications port.

Field	Description
Device Address	Sets the address of the specific FB107 with which you desire to communicate. If you are connected to a multi-drop series of devices, enter the device address and device group of a specific device. **Note**: The default device address is **240**.
Device Group	Associates the FB107 with a specific group. The default device group is **240**. **Note:** If you connect a PC running ROCLINK 800 directly to the device's LOI (Local Port), ROCLINK 800 makes a request to Device Group of 240 and Device Address of 240. The Local Port of a device always responds to a request for Address 240 and Group 240, no matter what Device Address and Device Group is configured in the device if the LOI Security is valid.
Host Address	Identifies the PC's host address, which by default is Address **3**. If more than one computer running ROCLINK 800 communicates with a group of devices (either by radio or by other multi-drop communications), you must define unique host address for each device to avoid multiple responses. The host address must also be different from any other host system that may access the communications link. Use the following host group and host address conventions: 0 and 240 are reserved.
Host Group	Identifies the PC's host group, which by default is **1**. When using ROC Protocol, the group address must match the address defined at the destination device in order for communications to properly transmit. Use the following host group and host address convention: 0 and 240 are reserved.
Use	Sets the type of connection. Valid values are **Comm Port**, **Modem**, or **TCP/IP**. **Note**: If you select **TCP/IP**, ROCLINK 800 applies **only** the Time Out parameter you define on the **Advanced** tab. No other parameters defined on that tab apply.
PC Comm Port	Sets the comm port on the PC ROCLINK 800 uses for this setup. The FB107 can communicate through any of the PC's configured comm ports. The default comm port is **1**. **Note**: This field is available **only** if you select the **Comm Port** option. Before you select this parameter, check to see which communications ports are assigned in the PC.

Field	Description
PC Baud Rate	Sets the baud rate ROCLINK 800 uses to communicate with the device through a serial port (COM port). For successful communications, the baud rate you set here must match the baud rate on the PC. The default value is **19200**. **Note**: This field is available **only** if you select the **Comm Port** option.
Modem	Indicates the modem ROCLINK 800 uses. Click ▼ to list all available modems. Only the modems defined in the Windows' Control Panel display here. Ensure that the modem you select is properly set up. **Note**: This field is available **only** if you selected the **Modem** option.
Phone Number	Sets the telephone number for the modem ROCLINK 800 uses. If you select **Modem** in the Use field, enter the phone number of the device ROCLINK 800 dials. **Note**: This field is available **only** if you selected the **Modem** option.
Override Default TAPI Init String	Indicates that ROCLINK 800 should use an override initialization string configuration. When you select this optoin, you must provide an override initialization string. **Note**: This field is available **only** if you selected the **Modem** option.
IP Address	Indicates the IP address for the TCP/IP connection. **Note**: This field is available **only** if you selected the **TCP/IP** option.
Port Number	Indicates the port for the TCP/IP connection. **Note**: This field is available **only** if you selected the **TCP/IP** option.

3.2.2 ROCLINK 800 Communications Parameters Advanced Tab

Use the Advanced tab on the ROCLINK 800 Communication Parameters screen to configure advanced communications features.

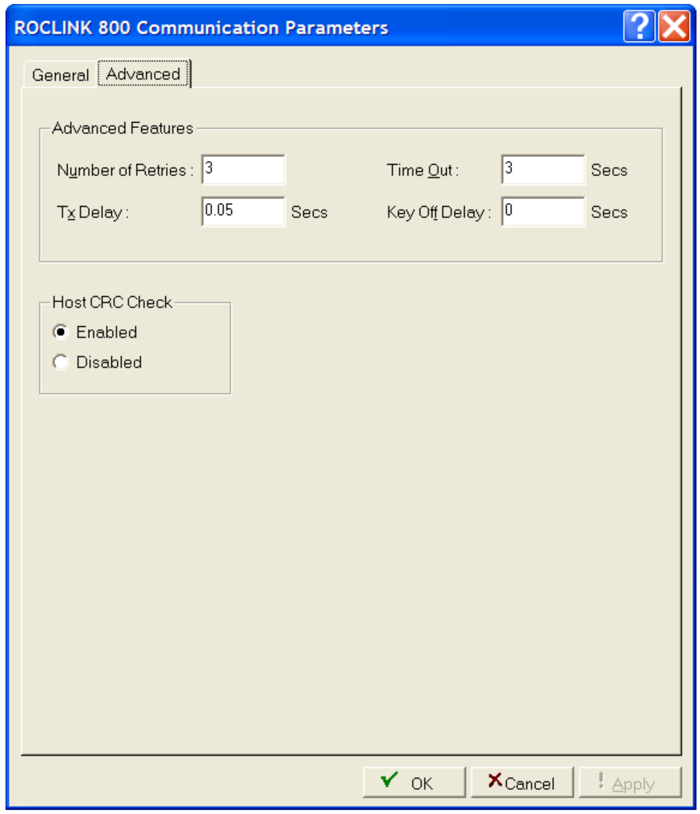


Figure 3-2. ROCLINK 800 Communications, Advanced tab

Field	Description
Number of Retries	Sets the number of times (after the initial attempt) ROCLINK 800 tries to request data from the specified device before reporting a timeout error. Valid values are between **0** and **25**. The default is **3**. Use the Time Out parameter to adjust the amount of time between retries. **Note**: This parameter does not apply to the dial-up modem, which only tries to establish a connection once.

Field	Description
Tx Delay	Sets, in seconds, the amount of time ROCLINK 800 waits before transmitting data. This delay enables the request-to-send (RTS) line for the amount of delay specified before transmitting data. The default is **0.05**. Typically, this value allows a radio to fully stabilize before the system applies data for transmission. ▪ For EIA-232 (RS-232) and dial-up modem communications, set this value (and the value in the Key Off Delay field) to 0 (zero) or the default of 0.05 seconds. ▪ For EIA-485 (RS-485) and radio communications, set this value to **0.1.** **Note:** These variables may change, based on your situation. These are general values which you need to assess for each circumstance.
Time Out	Sets, in seconds, the actual amount of time that ROCLINK 800 waits to receive a valid message after it sends a request to a device. The default is **3**. Modem users typically accept the default value. **Do not** set this field to **0** (zero). This prevents ROCLINK 800 from timing out, and quickly exhausts the Retries. **Note**: If you select **TCP/IP** as the communications method on the General tab, ROCLINK 800 applies **only** the Time Out parameter. No other parameters defined on that tab apply.
Key Off Delay	Sets, in seconds, the amount of time ROCLINK 800 waits after transmitting a message before turning off the ready to send (RTS) signal. The default is 0. You can change this value to optimize communications. The default value should be sufficient for dial-up modems and EIA-232 (RS-232) connections. For radios, a value of 0.01 may be appropriate.
Host CRC Check	Indicates whether ROCLINK 800 uses cyclical redundancy checking. The default value is **Enabled**.

3.3 Communication Ports on the FB107

In addition to configuring the communications ports on the PC, you also configure the device-specific communication parameters.

While in a configuration and on-line with an FB107, select **ROC** > **Comm Ports** to display the Comm Port screen. Each communications port has a unique set of parameters on the screen.

Use the Comm Ports screen to set up the communications ports that are available for incoming and outgoing communications with the FloBoss.

Note: Use the Device Directory to define PC communication ports.

The communication ports located on the FB107 provide a data link to ROCLINK 800, other devices, and host systems. The type of module enables the following communications:

- EIA-232 (RS-232) serial communications.
- EIA-485 (RS-485) multi-point serial communications.

Table 3-1. Communication Ports for the FloBoss 107

Comm Port	Port Location	Type	Protocols
LOI	CPU	Local Port / RS-232C	ROC or Modbus slave
COM1	CPU	EIA-485 (RS-485)	ROC or Modbus host/slave
COM2	CPU	EIA-232 (RS-232) – Default	ROC or Modbus host/slave
COM3	Module Slot 1	EIA-232 (RS-232) or EIA-485 (RS-485)	ROC or Modbus host/slave
COM2	Module Slot 2	EIA-232 (RS-232) or EIA-485 (RS-485) **Note:** When installed in Slot 2, the module replaces COM2 on the CPU.	ROC or Modbus host/slave
DISPLAY	DISPLAY	EIA-232 (RS-232) [Limited Function]	ROC or Modbus slave

3.3.1 Communication Modules

You can navigate FB107 options using the ROCLINK menu structure or by clicking on components of the FB107 graphic (such as modules, tabs, or buttons). The graphical interface display shows the current settings of the point including alarms and integrity.

To display the communication port for the FloBoss 107, click the communications module on the graphical interface.

The currently selected hardware displays at the bottom of the screen.

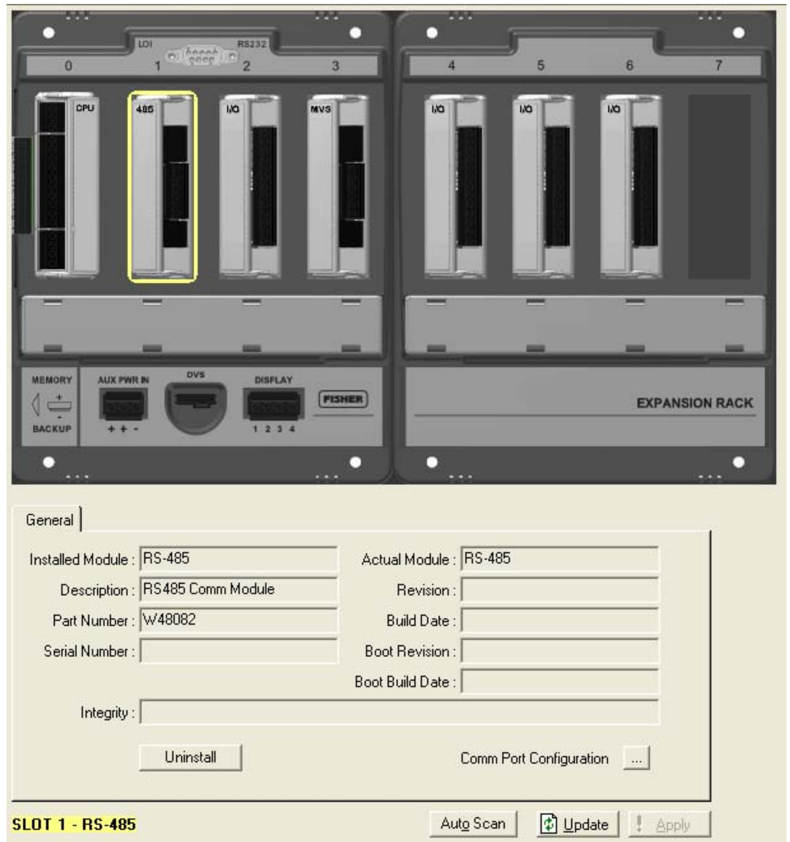


Figure 3-3. Communications Port

Field	Description
Installed Module	This **read-only** field shows the module currently defined in the active FB107 configuration. ROCLINK 800 does not require that a module be physically installed to display. Refer to *Section 1.6.2, Actual versus Installed Module*.
Description	This **read-only** field shows a description of the hardware currently installed in the FB107.
Part Number	This **read-only** field shows the part number of the hardware currently installed in the FB107.
Serial Number	This **read-only** field shows the serial number of the hardware currently installed in the FB107. **Note**: Not associated with communications modules.
Actual Module	This **read-only** field shows the module physically installed in the backplane. ROCLINK 800 updates this field whenever you restart the FB107. Refer to *Section 1.6.2, Actual versus Installed Module*.
Revision	This **read-only** field shows the firmware revision for the hardware currently installed in the FB107. **Note**: Not associated with communications modules.

Field	Description
Build Date	This **read-only** field shows the date the firmware was built for the hardware currently installed in the FloBoss 107. **Note**: Not associated with communications modules
Boot Revision	This **read-only** field shows the version for the main startup ("boot") firmware currently installed in the module. **Note**: Not associated with communications modules
Boot Build Date	This **read-only** field shows the build date for the main startup ("boot") firmware currently installed in the module. **Note**: Not associated with communications modules
Integrity	This **read-only** field shows a message regarding the status of the hardware currently installed in the FB107. The user interface displays alarms that indicate the state of the hardware (CPU, I/O modules, CPU I/O assembly, MVS modules, and communication modules). Mousing over an alarm displays a short explanation of the alarm. Refer to *Section 1.6.1, FloBoss 107 User Interface*.
Uninstall	Click to remove the hardware definition currently installed in the active FB107 configuration. The Installed Module field displays the type of module the FB107 is using for point configuration. It does not require that the module is physically installed in the FB107 to display. The FloBoss 107 "remembers" the type of installed module until you use this button to uninstall it. Refer to *Section 1.6.2, Actual versus Installed Module*.
Comm Port Configuration	Click **…** to display the Comm Port screen. Refer to *Section 3.4, Configuring FB107 Communication Ports*.

3.4 Configuring FB107 Communications Ports

The FB107 communication ("comm") ports link the device to computers, such as the one running ROCLINK 800 or a host computer.

You use the Comm Port screen to configure comm ports. After you select a communications module on the FB107 graphic, click **…** in the lower right portion of the screen. ROCLINK 800 displays the Comm Port screen for that module or comm port.

Note: You also access the Comm Port screen by selecting **ROC** > **Comm Ports** from the ROCLINK 800 menu bar and then selecting the appropriate comm port from the drop-down menu or by selecting the (Comm) icon from the configuration tree.

After you completely configure all comm ports, save that configuration to Flash memoryusing the **Save Configuration** button on the Flags screen (**ROC** > **Flags**)

3.4.1 Comm Ports General Tab

Select a comm module from the FB107 graphic, and then click **…** in the lower right corner of the screen. ROCLINK 800 displays the Comm Port screen for the selected module, which shows the **General** tab.

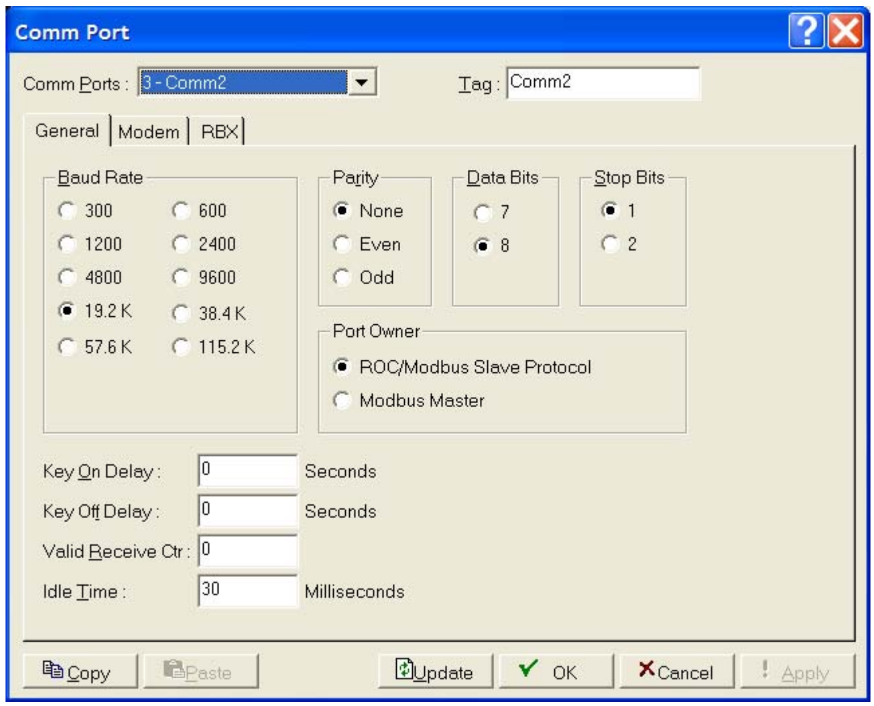


Figure 3-4. Comm Port, General tab

Field	Description
Comm Ports	Indicates the specific comm port to be configured. Click ▼ to display all valid selections.
Tag	Sets a 10-character name ("tag") to help identify the comm port.
Baud Rate	Sets, in bits per second, the transmit and receive data baud rate for the comm port.
Parity	Indicates whether the communications controller performs parity checks and, if selected, the parity value (odd or even).
Data Bits	Sets the number of data bits contained in an asynchronous byte, or character. The default is **8**.
Stop Bits	Sets the number of stop bits contained in an asynchronous byte, or character. The default is **1**.

Field	Description
Port Owner	Sets the communications protocol this port uses. Valid values are **ROC/Modbus Slave Protocol** (which configures the port to automatically switch between Modbus and ROC Protocol messages) and **Modbus Master** (which configures the port to allow the FB107 to poll Modbus devices).
Key On Delay	Sets, in seconds, the amount of time ROCLINK 800 waits after turning on the ready to send (RTS) signal before beginning transmission. The default is 0. You can change this value to optimize communications. The default value should be sufficient for dial-up modems and EIA-232 (RS-232) connections. For older radios, you may need to set this value to 0.2 seconds. For newer radios, 0.02 seconds should be sufficient.
Key Off Delay	Sets, in seconds, the amount of time ROCLINK 800 waits after transmitting a message before turning off the ready to send (RTS) signal. The default is **0**. You can change this value to optimize communications. The default value should be sufficient for dial-up modems and EIA-232 (RS-232) connections. For radios, a value of 0.01 may be appropriate. **Note:** These variables may change, based on your situation. These are general values which you need to assess for each circumstance.
Valid Receive Ctr	Sets the number of valid messages received by the FloBoss on this communication port. This counter can be preset to a value or cleared.
Idle Time	Sets, in milliseconds, the amount of time the FloBoss waits between communication events.

3.4.2 Comm Ports Modem Tab

Use the **Modem** tab on the Comm Ports screen to configure the device's modem communication ports.

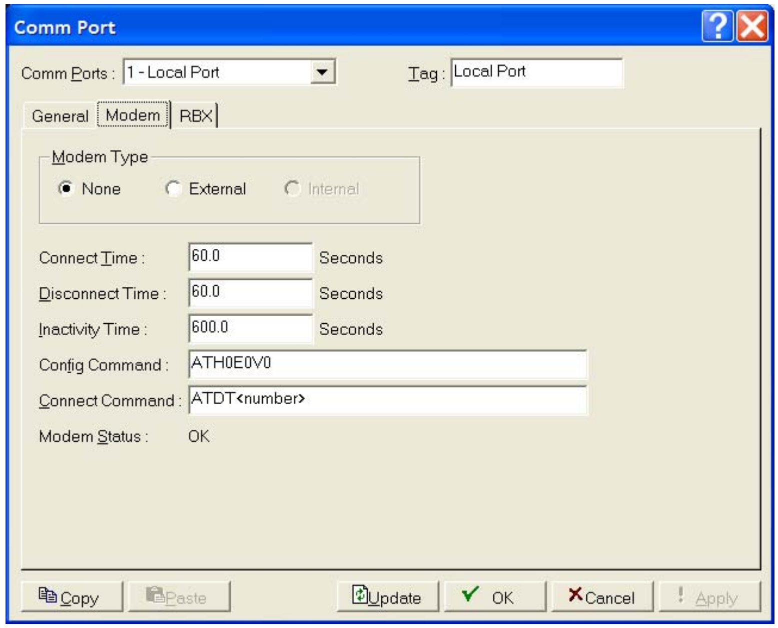


Figure 3-5. Comm Ports, Modem tab

Field	Description
Modem Type	Sets the modem type. Valid values are **None** (using a serial link to the host), **External** (using an external modem), and **Internal** (not available in the release). The default is **None**.
Connect Time	Sets, in seconds, the amount of time that ROCLINK 800 waits after initiating a call to receive a connect message from a device (typically the modem) before it terminates the call. The default is **60** seconds. The **Connect Time** varies from system to system and can take up to 60 seconds to make and complete a dial up connection. If a successful connection is made, the Disconnect Time begins.
Disconnect Time	Sets, in seconds, the amount of time that ROCLINK 800 waits for further activity on the line before it hangs up. ROCLINK 800 resets this timer after each valid receive signal.
Inactivity Time	Sets, in seconds, how long ROCLINK 800 waits without receiving a signal before resetting the modem. The inactivity timer looks at the valid receive counter to determine if the signal has been received.
Config Command	Sets the string of characters required to initialize the modem. For external modems, refer to the manufacturer's literature. For an internal modem, use the default value or the modem card may not operate correctly. Refer to your modem's documentation for default Config Command characters.

Field	Description	
Connect Command	Sets the Hayes-style Connect Command required to contact the host. Typically, this is the command **ATDT** followed by the telephone number (for example, **ATDT5155551212**). This parameter is required only for dial-out operations, such as for SRBX Alarming.	
Modem Status	This **read-only** field shows the modem's current status result code. Valid values are:	
	OK	Successfully executed command line
	CONNECT	Connection established
	RING	Ring signal detected
	NO CARRIER	Carrier not detected/lost
	ERROR	Error in command line
	NO DIAL TONE	No dial tone detected
	BUSY	Busy signal detected
	NO ANSWER	Line not picked up on the called end

3.4.3 Comm Ports RBX Tab

Use the **RBX** tab to configure the Spontaneous-Report-by-Exception alarming features.

The RBX or SRBX (Spontaneous Report-by-Exception) alarming feature is available for serial communication ports. This feature allows the device to call in to a host computer when a configured alarm occurs. If you wish to configure dial-up RBX, then a modem must be present and appropriately configured.

When you use RBX alarming, ensure that you enable and configure alarms for each point you wish to monitor. Configure the alarm parameters so that an alarm occurs only when desired. This prevents "nuisance" alarms. You configure RBX alarm parameters on the Alarms tab on the I/O, MVS, and Meter Setup configuration screens.

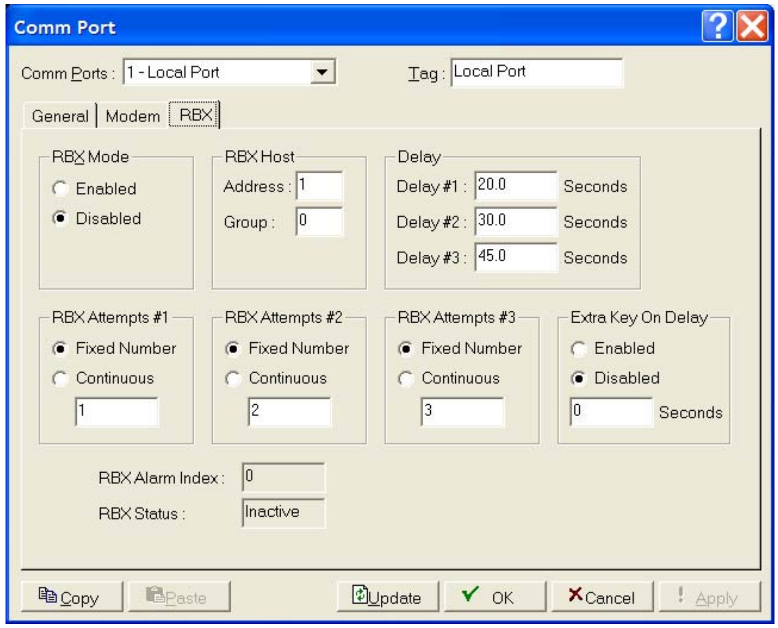


Figure 3-6. Comm Ports, RBX tab

Field	Description
RBX Mode	Sets the RBX Mode for Spontaneous-Report-by-Exception alarming on this comm port. The default is **Disabled**.
Address	Sets the address of the host to which the RBX feature communicates.
Group	Sets the group of the host to which the RBX feature communicates.
Delay	Sets, in seconds, the time the device waits between attempts to transmit an RBX message. Each RBX Attempts parameter has an associated delay parameter. The default for Delay #1 is **20** seconds, the default for Delay #2 is **30** seconds, and the default for Delay #3 is **45** seconds.
RBX Attempts	Sets the number of times the device attempts to resend a message if it does not obtain a valid response on the first try. “Attempt” refers to the initial message **plus** any retries. ROCLINK 800 provides three parameters. The default for all parameters is **Fixed Number**. The default value for RBX Attempt #1 is **1**, for RBX Attempt #2 is **2**, and for RBX Attempt #3 is **3**. Select **Fixed Number** to set how many times ROCLINK 800 retries sending a message after the first unsuccessful attempt. If you enter **0**, no retries occur. Select **Continuous** (255) to start continuous retries that stop only when the host acknowledges the SRBX alarm.

Field	Description
Extra Key On Delay	Indicates whether ROCLINK 800 adds additional delay time to the amount of time it waits after turning on the ready to send (RTS) signal before sending an RBX message. Valid values are **Disabled** (the default) or **Enabled**. If you select **Enabled**, you must also indicate the number of seconds for the extra delay. **Note**: This parameter may be required for radio communications.
RBX Alarm Index	This **read-only** field shows the alarm currently being reported through RBX.
RBX Status	This **read-only** field shows the status of RBX messaging. Valid values are **Active** (an RBX alarm is being processed) or **Inactive**.

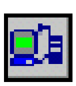
3.5 Connecting to an FB107

Once you have configured ROCLINK 800 communication parameters, you can connect to the FB107 using any one of the following methods:

- **Direct Connect**
  Click the Direct Connect icon on the ROCLINK 800 tool bar to connect to the FB107.
- **Device Directory**
  Double-click the device icon on the Device Directory to connect using the parameters currently set for that port.
- **ROC > Connect**
  Select a comm port icon on the Device Directory and select menu options from the ROCLINK 800 menu bar.

Note: Once you are connected (on-line), ROCLINK 800 displays the Configuration Tree screen.

3.5.1 Direct Connect



Click the Direct Connect icon to establish a connection with a FloBoss. ROCLINK 800 attempts to establish communications through all PC comm ports PC at various baud rates. If unsuccessful, the program then attempts to establish communications through the remaining comm ports on the PC, successively, until it receives a valid reply.

By default, ROCLINK 800 tags the LOI Port as the local port (comm 1), as shown on the Comm Port screen (**ROC** > **Comm Ports**).

For the Direct Connect option to work, security conditions must be met, and the PC must be connected to the Local Operator (LOI) port of the device with communication settings of:

- 8 Data Bits.
- 1 Stop Bit.
- No Parity.

When you click **Direct Connect**, ROCLINK tries to initiate communications with the device by performing a search of the PC communication ports at various baud rates. ROCLINK then “locks on” to the first comm port and baud rate that are successful in communicating with a device.

To use Direct Connect:

1. Physically connect cable to the FloBoss.
2. Launch and log into ROCLINK 800.
3. Do one of the following:
   - Click on the **Direct Connect** icon in the Device Directory.
   - Click the **Direct Connect** button on the toolbar.
   - Select **ROC** > **Direct Connect**.
4. If this is the first time that you have connected to the FloBoss, refer to *Section 6.4, Setting the Clock*.

3.5.2 Local Port (LOI)

The PC running ROCLINK 800 physically connects to the device through a cable. For a local connection, this cable is typically a prefabricated local operator interface (LOI) cable (available from Remote Automation Solutions). One end of the cable (a 9-pin, D-shell, female connector) plugs into a serial communications port on the PC running ROCLINK 800. The other end of the cable plugs into the FloBoss operator interface connector called the Local Port.

Note: If your PC does not have a serial port, you may use a USB-to-serial connector for the LOI connection.

3.5.3 Connect to a FloBoss

To connect the computer to a remotely located FloBoss, a serial, dial-up modem, radio, satellite, or other communications line should be installed. This connection may be made through the LOI (Local Port) or other Communications Port on the FloBoss.

Use the **Connect** command to connect to a serial or dial-up modem. To use Connect:

1. Physically **connect** the FloBoss.
2. Launch and **log in** to ROCLINK 800.

3. Perform one of the following:
   - Select a device from the Device Directory and press **Enter**.
   - Double-click a device in the Device Directory.
   - Select a device from the Device Directory and click **Connect** on the toolbar.
   - Select **ROC** > **Connect** to connect to the device currently selected in the Device Directory.

3.5.4 Successful Logon

A successful logon produces an on-line connection and displays both a tree representing the configuration in the FB107 and the FB107 graphic. Refer to Configuration Tree Menu.

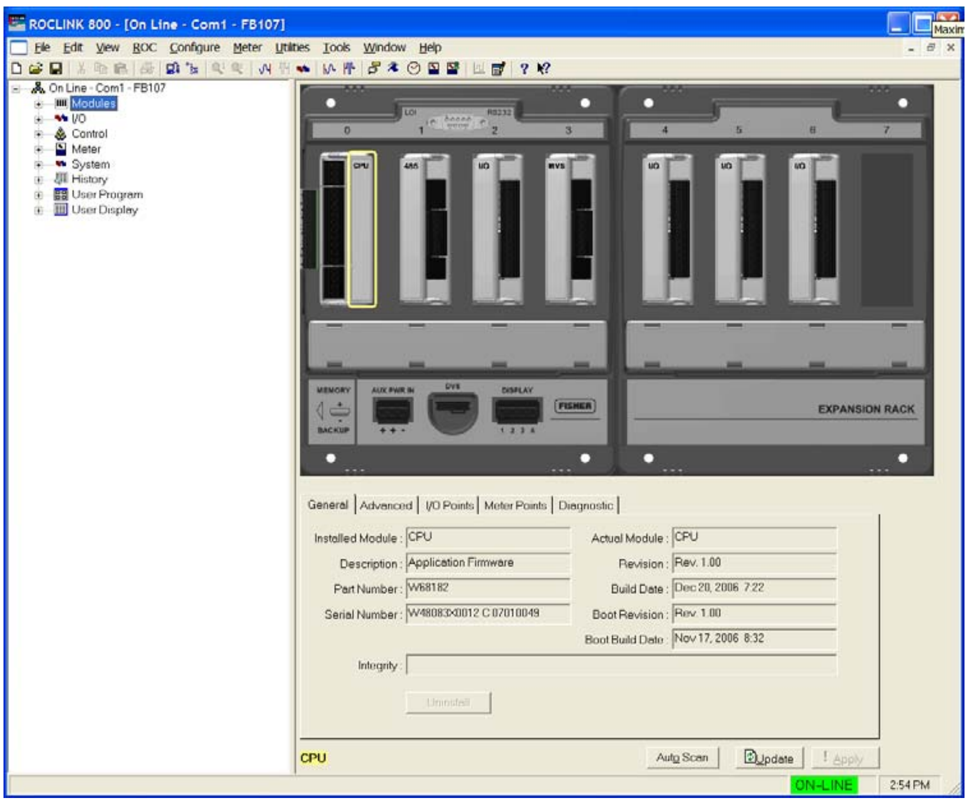


Figure 3-7. Successful Login

3.5.5 Disconnecting from a FloBoss

To disconnect an on-line connection, close the screen by clicking the lower of the two Close buttons () located in the upper-right corner of the device screen, select the Disconnect button () located on the Toolbar, or select **File** > **Close**. This automatically closes the connection.

3.6 Troubleshooting Connection Errors

Several events can cause a connection problem:

- If the parameters used by ROCLINK 800 when establishing a communications link to your PC are incorrect, a Direct Connect connection cannot be made.
- If ROCLINK 800 stands idle for too long and exceeds the timeout value for a device, a communications failure can also occur. In this case, simply log back into ROCLINK 800 and use the Direct Connect or Connect features.
- If you do not have security access to the FloBoss, you cannot make a connection. You must configure a valid User ID and Password (using the **ROC** > **Security** option) for each user who can connect to a FloBoss.

3.6.1 Troubleshooting ROCLINK 800 Communications

Occasionally, you may need to alter your PC communications options when you are having problems communicating with your FloBoss.

1. Select the desired device in the Device Directory. Right-mouse click and select **Properties**.
2. Make sure you have specified the correct Device Address and Device Group of the FloBoss with which you are trying to communicate. If you are communicating through the LOI port of the device, the Device Address is 240 and Group Address is 240, which is the universal address.
3. Click the **Advanced** tab. Try increasing the Time Out and/or Tx Delay.
4. Click **Apply**. Return to the General tab, and click **Connect**.
5. If you are still having trouble communicating, try increasing the Number of Retries field in the Advanced tab screen. Click **Apply**. Return to the General tab, and click **Connect**.
6. If you are still having trouble communicating, try increasing or decreasing the Key Off Delay field in the Advanced tab screen. Click **Apply**. Return to the General tab, and click **Connect**.
7. Check the security settings of ROCLINK 800.

3.7 Security

You control security in two ways:

- **ROCLINK 800 Security –** Enables who can access (log on) ROCLINK 800 and the Access Level assigned to a user.
- **Device Security –** Enables who has access to the FB107 comm ports.

Note: Security Access Levels enable you to control which users have access to specific ROCLINK 800 functions.

3.7.1 ROCLINK 800 Security

Use the ROCLINK 800 Security screen to set access to ROCLINK 800.

Note: Refer to *Section 3.7.2, Device Security* for instructions on securing the FB107.

To access this screen, select **Utilities** > **ROCLINK 800 Security**. The ROCLINK 800 Security screen displays. Its table format enables you to define, by operator ID, password, and security level, who can log on to ROCLINK 800 and the screens which those IDs can access. You may define up to 32 different users.

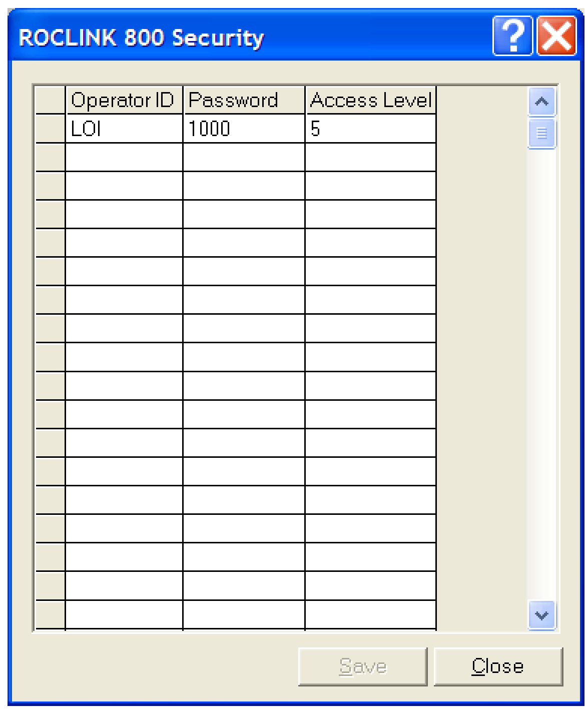


Figure 3-8. ROCLINK 800 Security

Note: The default Operator ID is **LOI**. The default Password is **1000**.

1. Enter three alphanumeric characters for the Operator ID, which is typically the initials of the person who operates the device. Each Operator ID must be unique and is case-sensitive.
2. Enter four numeric characters (between 0000 and 9999) to define the operator password. More than one user can have the same password.
3. Enter the desired access level for the user. **0** is the lowest (least inclusive) access level and allows access to the fewest number of screens. **5** is the highest (most inclusive) access level and allows

access to all screens. Each access level permits access to screens at that level and any inherited from lower access levels. For example, an operator ID with Access Level 3 can access screens with levels 0, 1, 2, and 3. Refer to *Security Access Levels*.

Security Access Levels

Table 3-2 lists the system screens and their system-assigned security access levels. The **Menu Options** focus on the activity while you use the **Access Levels** to increase or decrease responsibility levels within the Menu Options.

Notes:

- If you enable security on any port, at least one operator ID must have the highest level of security (level 5).
- ROCLINK 800 rejects login requests if access levels are greater than device security.

Table 3-2. Security Access Levels

Menu	Menu Option	Access Level
ROC	Security	5
Utilities	License Key Administrator	5
Utilities	ROCLINK 800 Security	5
Utilities	Update Firmware	4
Utilities	User Program Administrator	4
Configure	Control > FST Registers	3
Configure	Control > PID Loop	3
Configure	History Points	3
Configure	I/O > AI Points	3
Configure	I/O > AO Points	3
Configure	I/O > DI Points	3
Configure	I/O > DO Points	3
Configure	I/O > MVS Sensor	3
Configure	I/O > PI Points	3
Configure	I/O > Soft Points	3
Configure	LCD User List	3
Configure	Modbus > Configuration	3
Configure	Modbus > History	3
Configure	Modbus > Master Modem	3
Configure	Modbus > Master Table	3
Configure	Modbus > Registers	3
Configure	Opcode table	3
Configure	User Data	3
File	Download	3
File	New	3
File	Save Configuration	3
ROC	Clock	3
ROC	Comm Ports	3

Menu	Menu Option	Access Level
ROC	ROC Flags	3
ROC	ROC Information	3
Tools	Options	3
Utilities	AI Calibration Values	3
Utilities	Convert EFM File	3
Utilities	FST Editor	3
View	Display > New	3
Meter	Calibration	2
Meter	Plate Change	2
Meter	Setup	2
Meter	Values	2
ROC	Collect Data	2
View	Calibration Report	2
View	EFM Report	2
File	Close	1
File	Open	1
File	Print Configuration	1
File	Recent Files	1
ROC	Memory	1
View	Alarms > From File	1
View	Alarms > From Device	1
View	Events > From File	1
View	Events > From Device	1
View	History > From File	1
View	History > From Device	1
View	I/O Monitor	1
File	Exit	0
File	Print	0
File	Print Setup	0
Help	About ROCLINK	0
Help	Help Topics	0
ROC	Connect	0
ROC	Direct Connect	0
Tools	Customize	0
Utilities	Communications Monitor	0
View	Directory	0
View	Display > From File	0
View	Toolbar	0
Window	Cascade	0
Window	Currently Open Files	0
Window	Tile	0

3.7.2 Device Security

Use the Device Security screen to control who has access to the Comm Ports on a specific device. When you enable this feature, you must log onto ROCLINK 800 to use the communications port. You can enable this feature on each communications port separately.

To access the Device Security screen, select **ROC** > **Security**. The Device Security screen displays.

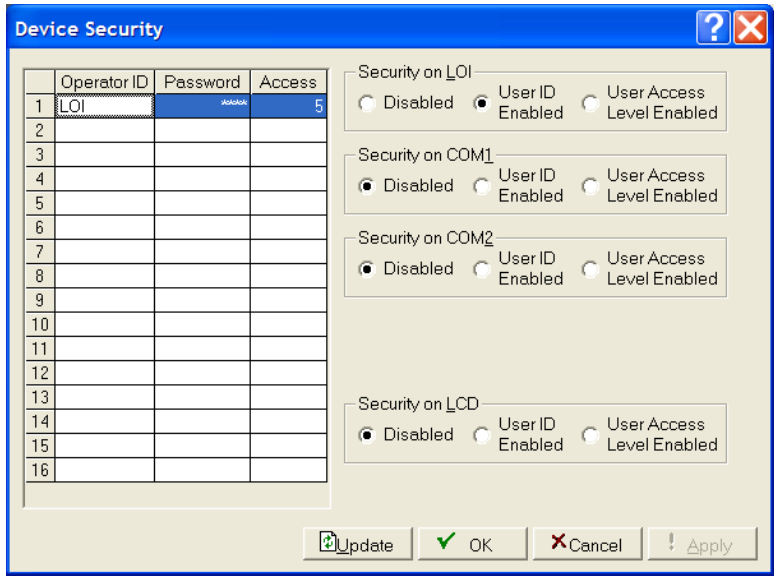


Figure 3-9. Device Security

Field	Description
User Table	Click an operator ID in the table. The Device Security dialog box displays.

Figure 3-10. Device Security

Use this dialog box to edit the security on an existing operator ID. To **add** an operator ID, click on an empty cell in the table. The Device Security dialog box displays. Complete the dialog box as described below. To **delete** an operator ID, click a cell in that line. When the Device Security dialog box appears, click **Remove**. Answer **Yes** to the confirmation dialog box that displays. ROCLINK 800 removes the operator ID from the table.

Field	Description
Operator ID	Sets the three alphanumeric characters for the operator ID, which is typically the initials of the person who operates the device through that communications port. The operator ID is case-sensitive. Each operator ID must be unique.
Password	Sets the four numeric characters between 0000 and 9999 for the password. More than one operator ID can have the same password.
Confirm Password	Validates the password you entered in the previous field.
Access Levels	Sets the access permitted to this operator ID. Click ▼ to display all options. **0** is the lowest access level and allows access to the fewest number of screens. **5** is the highest access level and permits access to all screens. Each access level permits access to screens at that level and any inherited from lower access levels. For example, the IDs with access level 3 can access screens with levels 0, 1, 2, and 3. Refer to *Security Access Levels*.
Security One	Enables security for each comm port. Valid values are: ▪ **Disabled**: Accepts all login requests. This is the default. ▪ **User ID Enabled**: Accepts login requests if the user (operator) ID and password are valid. On successful login, full access is allowed (access level 5). ▪ **User Access Level Enabled**: Accepts login requests if the user (operator) ID and password are valid. Upon successful login, the user is restricted by access level. Refer to *Security Access Levels.*

When you are finished, click **Apply** and then click **OK** to exit the screen.

Chapter 4 – The File Menu

Use the File menu options to print, open, close, and save configuration files.

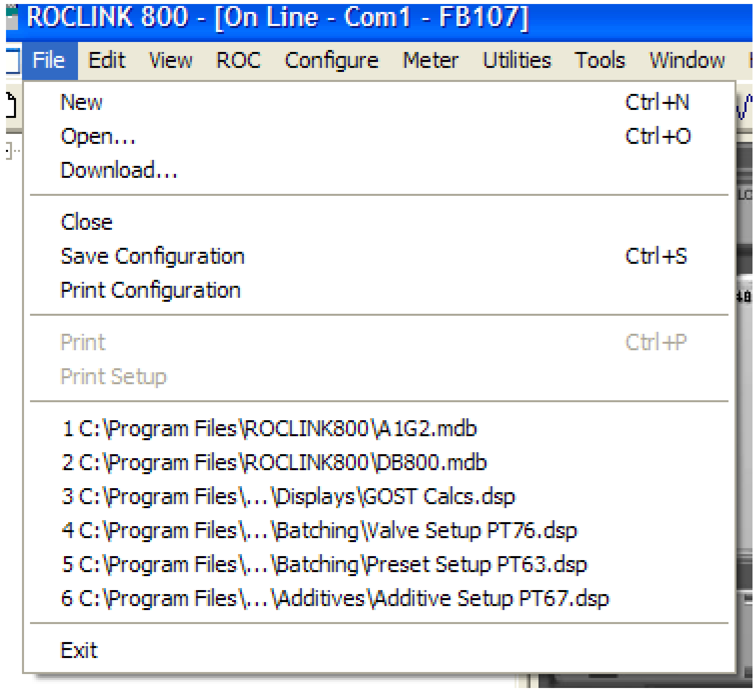


Figure 4-1. File Menu

In This Chapter

4.1 New Configuration

You configure a FloBoss either by modifying an existing configuration file or by starting a new configuration file.

The full configuration procedure involves using the menu functions or Configuration Tree Menu to access the configuration screens. Some of the configuration screens may not be required for your application or may not be available for your type of FloBoss.

The following checklists present the order of configuration in a typical application. Omit configuration screens for modules and accessories that do not appear in your hardware configuration and for control elements (PID, FST, and such) that do not apply to your application.

4.1.1 Configuration Checklist

For a FloBoss 107:

- ROC menu > ROCLINK 800 Security (logon)
- Device Directory > Comm Port > Properties (PC communication configurations)
- ROC menu > Security (User List and Comm Port Security)
- ROC menu > Clock
- ROC menu > Information (system variables)
- ROC menu > Comm Ports (FloBoss communication configurations)
- Configure menu > I/O menu > AI, AO, DI, DO, MVS, DVS, PIM, and PI
- Meter menu > Setup
- Configure menu > Control menu > PID Loop
- Configure menu > Control menu > FST Registers
- Configure menu > History Points
- Utilities menu > FST Editor
- View menu > Display > New or from File (for custom PC displays)
- ROC menu > Flags (for saving and system variables to Flash memory)

4.1.2 Duplicating a Configuration

You can duplicate the configuration for another FloBoss by using these menu functions in the following order:

1. **File** > **Save Configuration** to save a device’s configuration to a specified file.
2. **ROC** > **Direct Connect** (Local Port) or **Connect** (modem) to connect physically to the second unit, and then communicate.
3. **File** > **Download** loads the configuration into the unit.

After you have loaded configuration data into the second FloBoss (Step 3) and changed it as needed, you can save the configuration to its own disk file by using Step 1.

4.1.3 Creating a New Configuration File

The New Configuration File screen allows you to create a configuration file off-line with the basic information about the meters and modules that will be installed on the FloBoss for which the new configuration was created.

1. Select **File** > **New**. The New Configuration File screen displays.

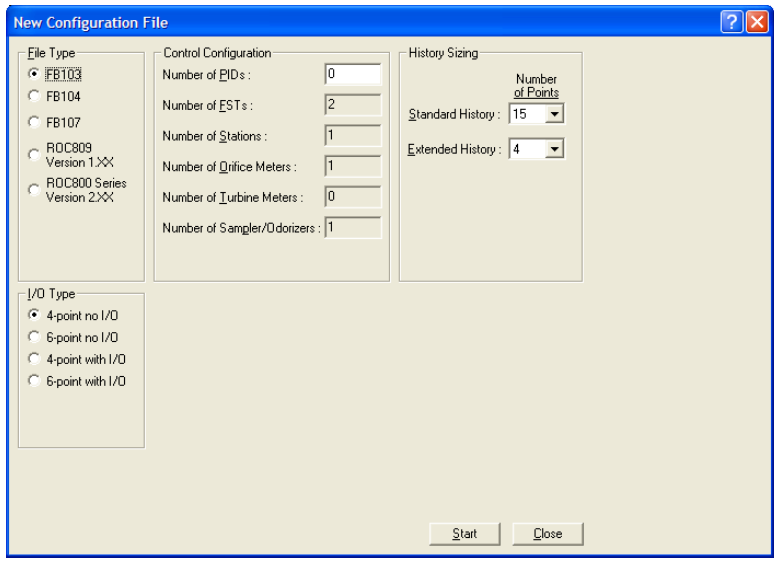


Figure 4-2. New File Configuration

2. Select **FB107** from the File Type frame. The lower portion of the New File Configuration screen changes to reflect the FB107.

Note: As you define the modules and place them in slots on the FB107, additional fields appear on the New Configuration File. *Figure 4-3* shows a sample completed configuration.

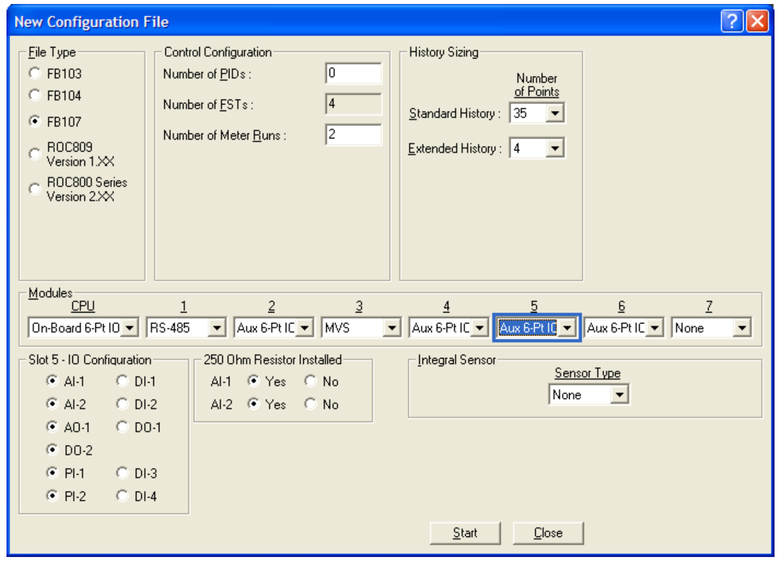


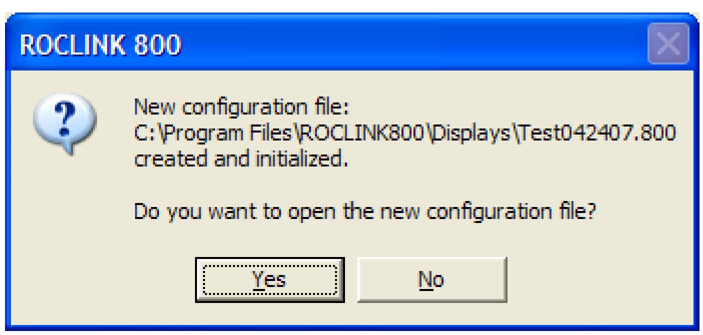
Figure 4-3. New File Configuration (completed)

3. Review and complete the following fields:

Field	Description
File Type	Associates the file type with a specific device. Select **FB107** to build an off-line configuration file for the FB107.
Control Configuration	Indicates the number of PID loops, FSTs, and Meter Runs (AGAs) for the configuration. **Note**: Activate only the necessary number of devices for your device.
History Sizing	Selects the maximum number of history points in Standard and Extended History (**History Sizing**). **Caution**: Select this value carefully: you cannot later add History Points without first clearing current history present in the unit. ▪ **Standard History** archives up to 100 points of minimum/maximum (min/max), minute, hourly, and daily values. The min/max values are from today and yesterday; the minute values are from the last 60 minutes; hourly values are from the last 35 days; and daily values are from the last 35 or 60 days. ▪ **Extended History** can be configured to archive up to 25 points of user-selectable values, from 1 second to 60 minute periods. Extended History archiving provides a monitoring resolution for the FloBoss that is similar to a chart recorder or data logger.
Modules	Indicates the type and number of modules you can install in the FB107.: Click ▼ to display valid choices. ▪ **On-Board No I/O** – CPU does not have an I/O assembly installed. Available only for slot 0. ▪ **On-Board 6-Pt I/O** – CPU has an I/O assembly installed. Available only for slot 0.

Field	Description
	▪ **None** – No module is installed in the slot. ▪ **RS-232** – Slot has an RS-232 communications module installed. Available only for slot 1 or 2. ▪ **RS-485** – Slot has an RS-485 communications module installed. Available only for slot 1 or 2. ▪ **MVS** – Slot has an MVS module installed. ▪ **Aux 6-Pt I/O** – Slot has an I/O module installed. **Note**: FB107 modules are slot-specific. As you define the type and location of modules, ROCLINK 800 displays only those modules available for installation in any slot. .
I/O Configuration	Sets the configuration of I/O points for either a 6 point CPU I/O assembly (On-Board 6 Point IO) or I/O module (Auxiliary 6 Point IO). **Note**: This option displays only if you select the I/O module.
250 Ohm Resistor Installed	Sets, for analog inputs, whether the module supports 4–20 mA or 0–5 V dc. Valid values are **Yes** (250 ohm resistor is installed and input uses 4–20 mA current) or **No** (250 ohn resistor is not installed and input uses 0–5 V dc current). The default is **Yes**.
Integral Sensor	Displays the type of Integral Sensor installed in the new configuration. Valid values are **None**, a Dual-Variable Sensor (**DVS**), or Pulse Input Module (**PIM**).

4. Once you have completed the configuration, click **Start**. The Save As dialog box displays.
5. Enter a file name for the configuration file. Configuration files for ROCLINK 800 use the extension **.800**.
6. Click **Save**. ROCLINK 800 saves the new configuration file, and displays the following dialog.



7. Click **No** to save the new configuration file and return to the New Configuration File screen.

4.2 Opening a Configuration File

Use the Open option to open an existing configuration file either on-line (from a FloBoss) or off-line (from the PC's hard drive or disk). You use the Save Configuration function to create configuration files (see *Section 4.1.3, Creating a New Configuration File*). To open a configuration file:

1. Establish an on-line connection to the FloBoss, if opening a file on-line.
2. Select **File** > **Open**. The Open dialog box displays.
3. Select the configuration file name. ROCLINK 800 files have the extension .800.
4. Alter the parameters and point assignments as necessary.

Once you open the configuration file, it automatically becomes the active configuration file and you may edit the file off-line. You can also load the configuration file into the FB107 using the Download function.

4.3 Downloading a Configuration

Use the Download option to download a saved configuration to a FloBoss device. You create configuration files using **File** > **New Configuration**. To download a saved configuration file:

1. **Connect** to the FloBoss.
2. Select **File** > **Download**. The Select File to Download dialog box displays.
3. Select the configuration file name. ROCLINK 800 files have the extension .800.
4. Click **Open**. The Download Configuration screen displays.

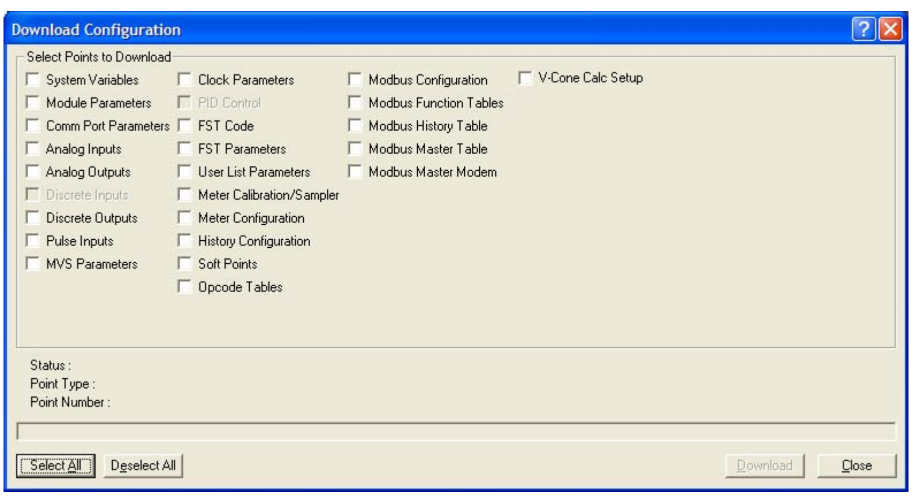


Figure 4-4. Download Configuration

5. Select only the Configuration Points you desire to download. ROCLINK 800 grays out any items not configured in your configuration.

Note: Once you select a point, ROCLINK 800 activates the Download button.

6. Click **Download**. ROCLINK 800 begins to download the configuration points you have chosen, and displays the status, point type, and point number information as the download progresses.
7. Click **OK** when the download completes.
8. Select **ROC** > **Flags** and click the Save Configuration for Flash Memory button.

4.4 Saving a ROC User File

In addition to keeping backup copies of the configuration file, it is also good practice to keep a backup copy of the **ROC_USER.mdb** file. This file contains the communications, security, and password settings for the FloBoss.

To create a backup copy of the file:

1. Open Windows Explorer and navigate to the folder where ROCLINK 800 software is located. Typically, this folder is C:\Program Files\ROCLINK800.
2. Create a copy of the **ROC_USER.mdb** file.
3. Paste the copy into another folder on the PC or a disk.

4.5 Saving a Configuration

The Save option saves the current configuration of a connected device to a disk file. This feature is useful when creating a backup, when configuring similar FloBoss units for the first time, or when making configuration changes off-line. Once a backup configuration file is created, it can be loaded into a device using **File** > **Download**.

1. Select **File** > **Save Configuration**. The Save As dialog box appears.
2. Type the desired **File name** of the backup file.
3. Click **Save**.

ROCLINK 800 configuration files have the extension .800.

4.5.1 Print Configuration

Use the Print Configuration option to specify the point types that you desire to print.

1. Select **File** > **Print Configuration**. The Print Configuration Setup screen displays.

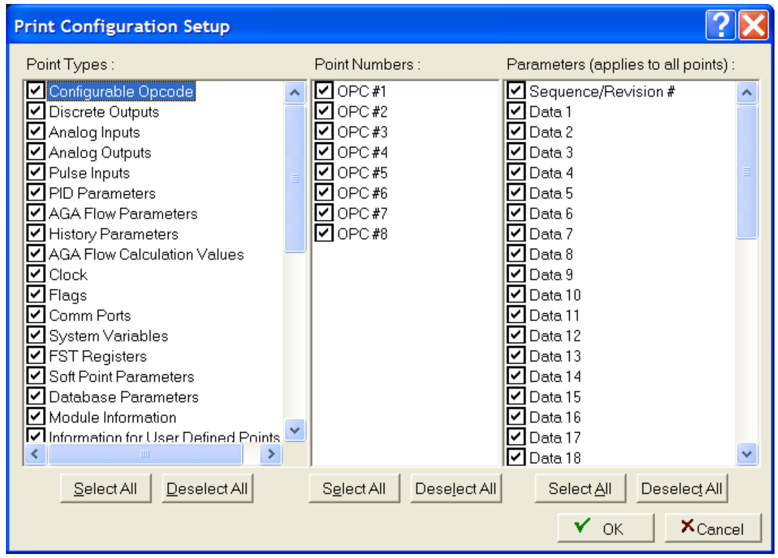


Figure 4-5. Print Configuration

Note: This screen initially displays with all point types selected (as shown in *Figure 4-5*).

2. Select the specific point types you desire to print. Use the **Select All** or **Deselect All** buttons to select multiple point types, point numbers, or parameters. Use your mouse to select/deselect individual point types, point numbers, or parameters.
3. Click **OK**. ROCLINK 800 reads the configuration from the device and displays the Print Preview screen:

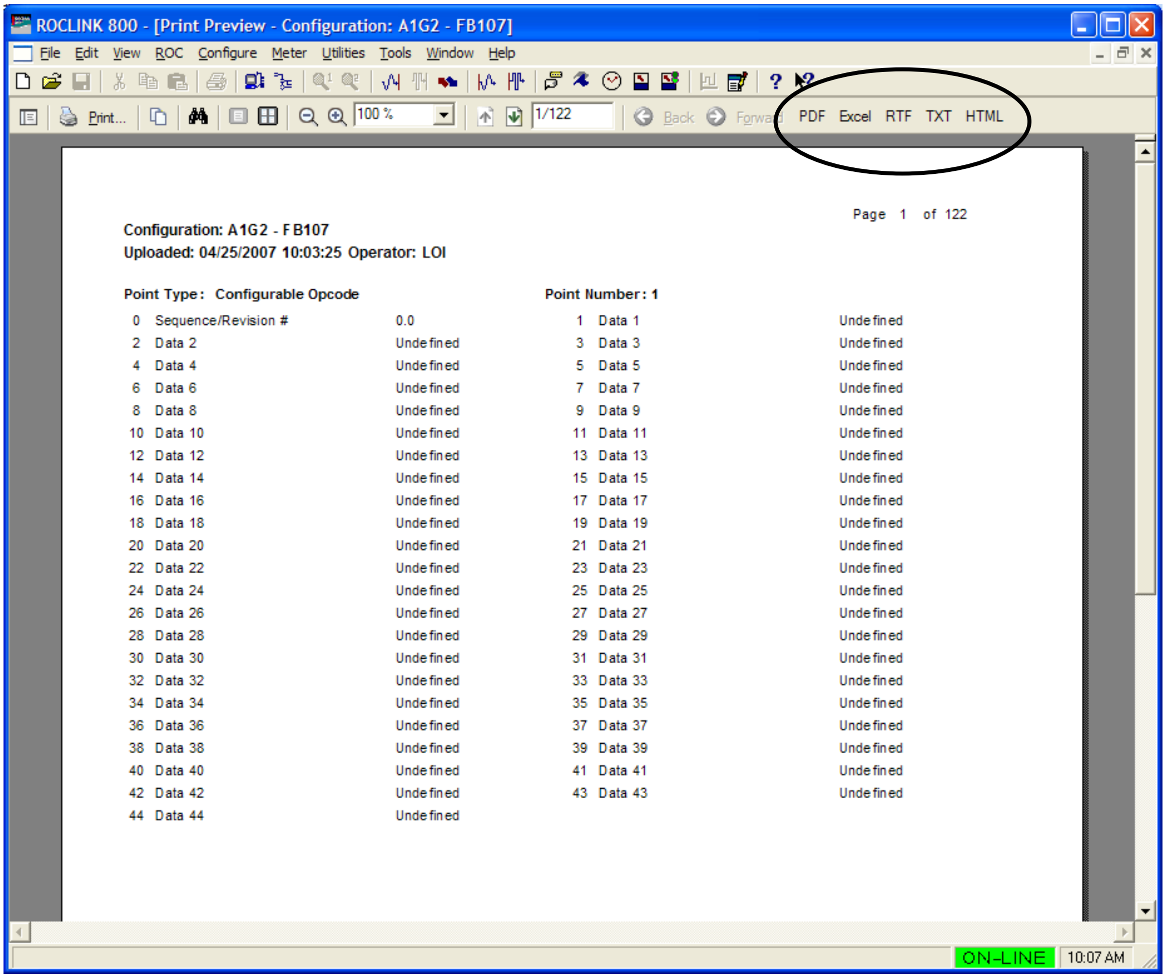


Figure 4-6. Print Preview

4. Use screen option buttons (located on the toolbar) to either directly print the preview or export it (with a file name you specify) to your PC's hard drive in one of the following formats:
   - **PDF** to create a **.pdf** (Portable Document File).
   - **Excel** to create an **.xls** spreadsheet file.
   - **RTF** to create an **.rtf** (Rich Text Format) file.
   - **TXT** to create a **.txt** text file.
   - **HTML** to create an **.htm** Internet browser file.

4.6 Print

Click Print or select Print from the File menu to print ROCLINK 800-generated historical, event, and alarm log reports.

4.7 Print Setup

Use Print Setup to change the default printer for ROCLINK 800 information.

To change printers:

1. Select **File** > **Print Setup**.
2. Select the printer you desire to print to from the **Name** drop-down list.

4.8 Recent Files

The File menu also displays the configuration files that you have recently opened or saved:

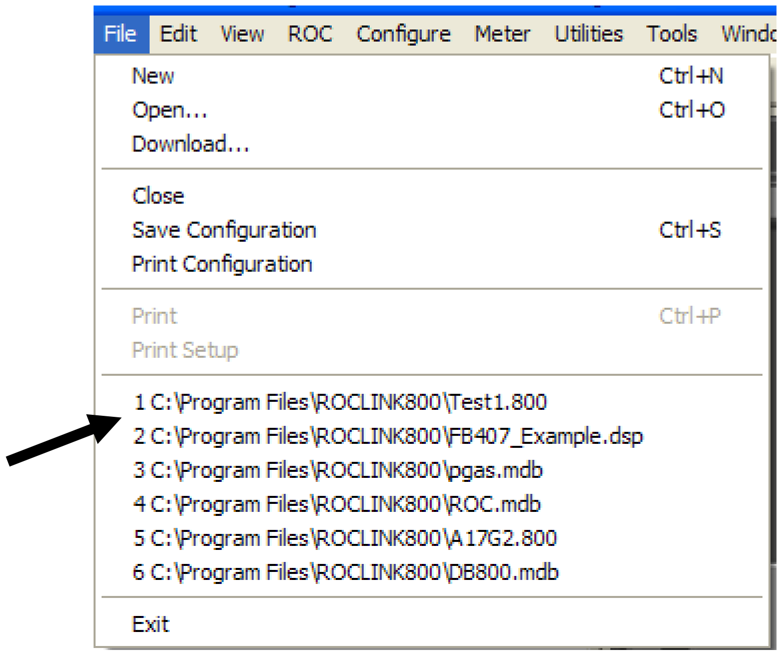


Figure 4-7. Recent Files

4.9 Close

Select **Close** from the File menu to close the active screen.

Note: Because the FB107's graphic display is an active screen, selecting **Close** can terminate the online connection.

4.10 Exit

Select **Exit** under the File menu to exit the ROCLINK 800 program. Depending on your situation, the following occurs:

- If you are currently editing a configuration file, ROCLINK 800 closes the file.
- If you are currently connected to a dial-up FloBoss, ROCLINK 800 issues a hang-up command to the modem.
- If you are currently online with a FloBoss, ROCLINK 800 automatically terminates the connection.

Chapter 5 – The View Menu

Use the View menu options to view the Device Directory; electronic flow management (EFM) reports; calibration logs; history, alarms, and events logs; create and manage custom displays, and view the I/O monitor.

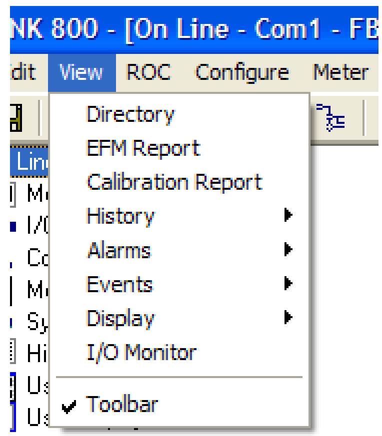


Figure 5-1. View Menu Options

In This Chapter

5.1 Directory

Select **View** > **Directory** to replace the FB107 graphic image with the Device Directory. The Device Directory displays the root level of all devices and groups configured in ROCLINK 800.

Note: You can also switch displays between the Device Directory and the online device using the **Windows** option on the ROCLINK 800 menu bar.

5.2 EFM Report

Select **View** > **EFM Report** to generate printed and on-screen reports of the configuration, alarms, events, and historical flow data for a meter point. ROCLINK 800 uses EFM (Electronic Flow Measurement) reports in conjunction with the FB107's AGA flow calculation capabilities to display or print previously collected flow data. An EFM report file contains all flow data, which includes the operational characteristics (configuration parameters, history, events, and alarms) of each measured meter run configured in the FloBoss.

5.2.1 Creating the EFM File

Before you can view the EFM report data, you must first create the report file. To create this file:

1. Select **ROC** > **Collect Data** while the FloBoss is connected and communicating. A Collect Device Data dialog box displays.

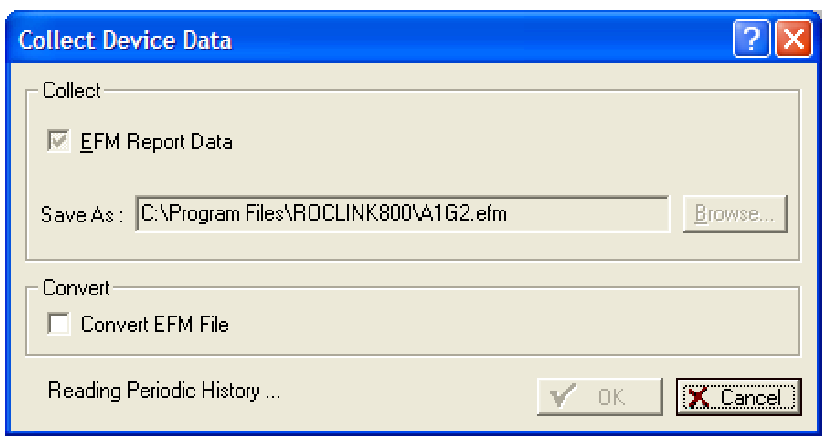


Figure 5-2. Collect Device Data (initial)

2. Click **OK**. ROCLINK 800 collects information about the device to the designated .efm file. When the collection completes, the system displays a message at the bottom of the screen.

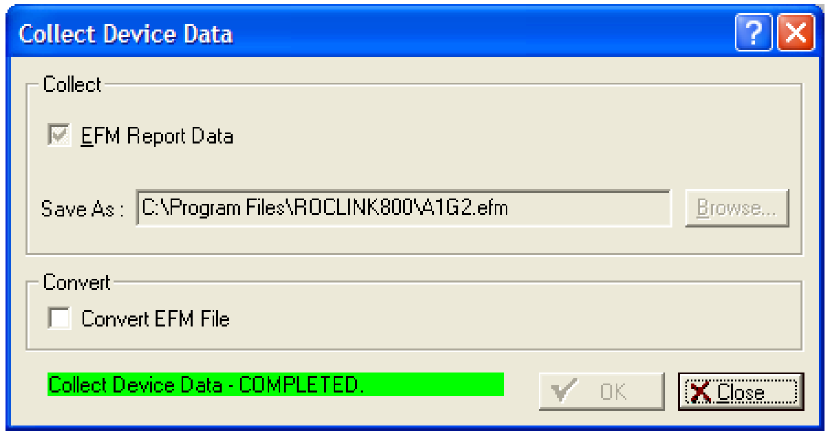


Figure 5-3. Collect Device Data (complete)

Note: Select **Convert EFM File** to convert the data to AGA/DET data format.

3. Click **Close**. This creates the .efm file.

Once you create this file, you can generate a report at any time (such as in the office) and a connection with the device is no longer necessary. The EFM Reports utility retrieves the data associated with the requested meter run and time period from the *.efm file and formats this report for each meter run covering a specified period of time.

Note: For the EFM Reports utility to function correctly, you must configure the historical database in the FloBoss so that the system can retrieve flow values from memory. Refer to *Configuring History Points* in *Chapter 7*.

5.2.2 Viewing EFM Reports

To view the EFM report:

1. Select **View** > **EFM Report**. An Open dialog box displays, showing all files with an .EFM file extension.
2. Select an .EFM file and click **Open**. The View EFM Report screen displays.

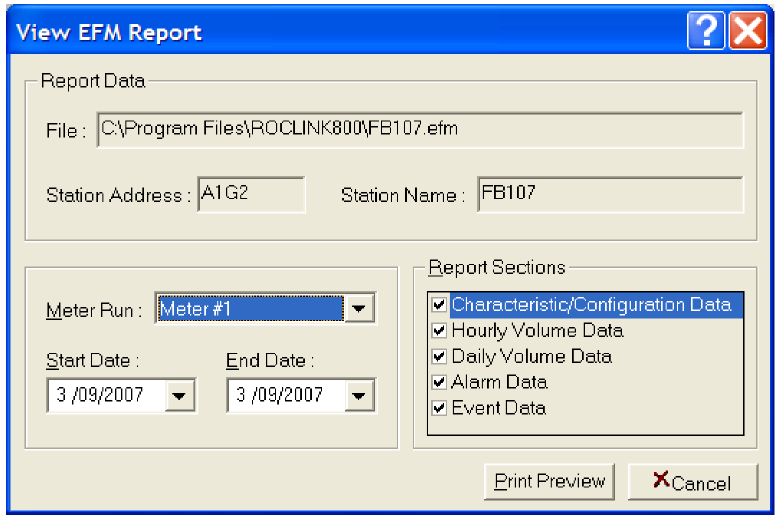


Figure 5-4. View EFM Report

Field	Description
File	Displays the name of the EFM Report you have open. Information about the FloBoss displays in the Station Address and Station Name fields.
Meter Run	Select the **Meter Run** from drop-down list box to select the Meter Run on which you desire to report.
Start Date/End Date	Enter the **Start Date**. Enter the **End Date**. These are the dates for the period of the report you desire to cover. **Note**: Click ▼ to view a calendar and select report dates.
Report Sections	Select the **Report Sections** for the data to include in the EFM Report.

3. Complete the fields (identifying the meter run, start and end report dates, and any report sections) and click **Print Preview**. A Print Preview screen displays.

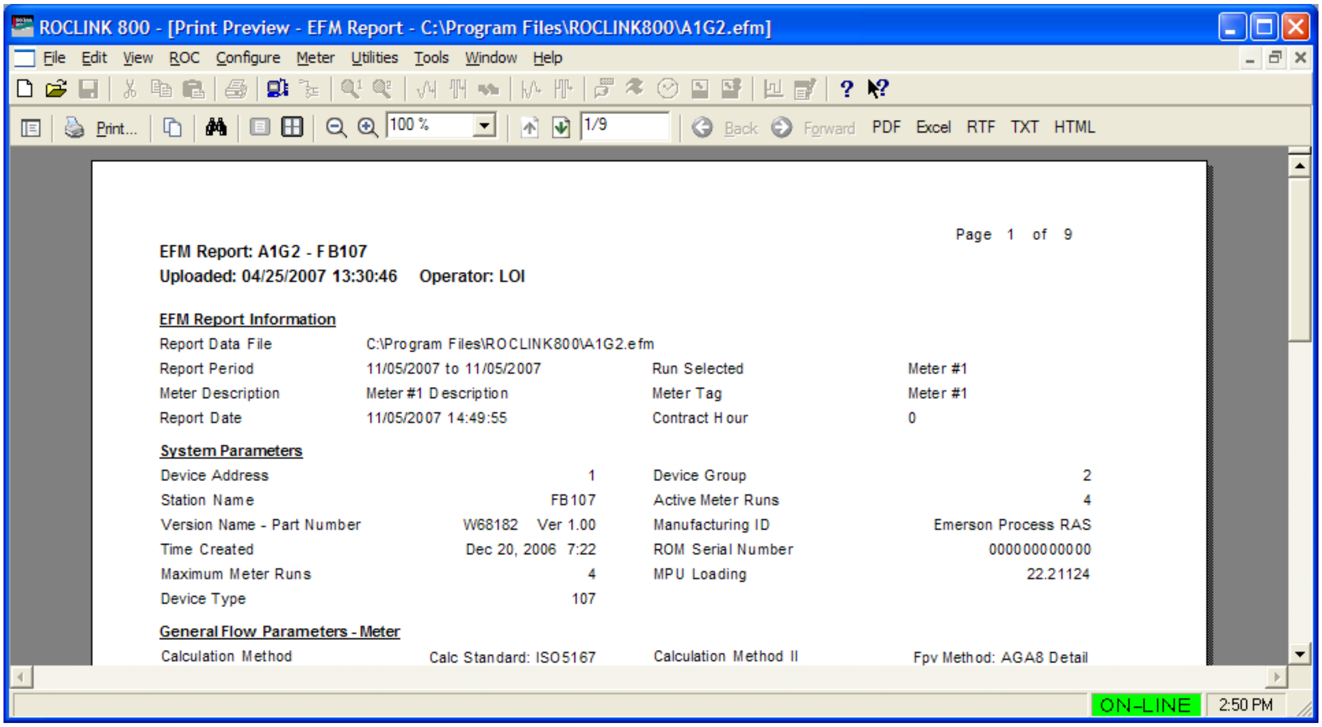


Figure 5-5. Previewed EFM Report

4. Use this screen to print the report at a printer or convert the report file to another format. *Figure 5-6* shows the first page of a printed sample report.

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EFM Report: A1G2 - FB107
Uploaded: 04/25/2007 13:30:46 Operator: LOI

EFM Report Information

Report Data File	C:\Program Files\ROCLINK800\A1G2.efm		
Report Period	11/05/2007 to 11/05/2007	Run Selected	Meter #1
Meter Description	Meter #1 Description	Meter Tag	Meter #1
Report Date	11/05/2007 14:32:10	Contract Hour	0

System Parameters

Device Address	1	Device Group	2
Station Name	FB107	Active Meter Runs	4
Version Name - Part Number	W68182 Ver 1.00	Manufacturing ID	Emerson Process RAS
Time Created	Dec 20, 2006 7:22	ROM Serial Number	000000000000
Maximum Meter Runs	4	MPU Loading	22.21124
Device Type	107		

General Flow Parameters - Meter

Calculation Method	Calc Standard: ISO5167 Units: English Alarming: Enabled	Calculation Method II	Fpv Method: AGA8 Detail Heating Value Basis: Dry Atmospheric Pressure: Entered Gas Quality: Constant
Options	Pressure: Flange Tap, Upstream, Gauge Specific Gravity: Calculated Heating Value Basis: Volume Heating Value: Calculated Gravitational Acceleration: Calculated Log Methane Adjust: Enabled	IMP	1.0
Pipe Diameter	8.071	Pipe Reference Temperature	68.0
Pipe Material	Carbon Steel	Orifice Diameter	4.0
Orifice Reference Temperature	68.0	Orifice Material	Stainless Steel
Base or Contract Pressure	14.73	Base or Contract Temperature	60.0
Atmospheric Pressure	14.45	Specific Gravity	0.573542
Heating Value	1027.152	Viscosity	0.0000069
Specific Heat Ratio	1.3	Elevation	500.0
Latitude	35.0	Local Gravitational Acceleration	32.14398
Low hw Cutoff	1.0	Alarm Code	193
Low Alarm Flow	250.0	High Alarm Flow	10000.0
User Correction Factor	1.0		

Gas Composition (Mole %)

N2 - Nitrogen	1.00	CO2 - Carbon Dioxide	0.00
H2S - Hydrogen Sulfide	0.00	H2O - Water	0.00
He - Helium	0.00	CH4 - Methane	96.00
C2H6 - Ethane	3.00	C3H8 - Propane	0.00
C4H10 - n-Butane	0.00	C4H10 - i-Butane	0.00
C5H12 - n-Pentane	0.00	C5H12 - i-Pentane	0.00
C6Hb - n-Hexane	0.00	C7H16 - n-Heptane	0.00
C8H18 - n-Octane	0.00	C9H20 - n-Nonane	0.00
C10H22 - n-Decane	0.00	O2 - Oxygen	0.00
CO - Carbon Monoxide	0.00	H2 - Hydrogen	0.00

Calculated Factors

Flow Rate per Day	0.0	Energy Rate per Day	0.0
Flow Rate per Hour	0.0	Energy Rate per Hour	0.0
Pressure Extension	0.0	Expansion Factor	1.0
CdFT	0.6	Fn	1.130528
Fpb	1.0	Ftb	0.9999999

Figure 5-6. Sample EFM Report

5.3 Calibration Reports

Create a calibration report to record the calibration procedure.

5.3.1 Creating a Calibration Report

To create a calibration report:

1. Select **Meter** > **Calibration**. The Meter Calibration screen displays.

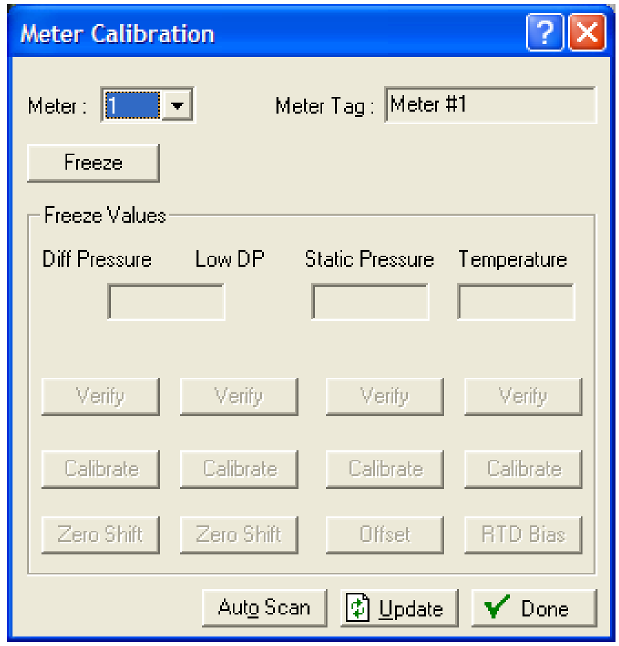


Figure 5-7. Meter Calibration

2. Click **Freeze** to stop the system from updating the values of the analog, MVS, and temperature (RTD) inputs during verification or calibration.
3. Click **Yes** in the confirmation dialog to create a calibration report.
4. Enter the file name of the calibration report and use the default extension of .800 or .cal to represent calibration.
5. Click **Save**.

The system creates the calibration report file in the default directory C:/Program Files/ROCLINK 800, unless you specify another drive/ directory.

Once the calibration is complete, you can view the report using **View** > **Calibration Report** or a text editor.

5.3.2 Viewing an Existing Calibration Report

To view a calibration report:

1. Select **View** > **Calibration Report**. An Open dialog box displays.
2. Select the Calibration Report you desire to view.
3. Click **Open**. The View Calibration Report screen displays.

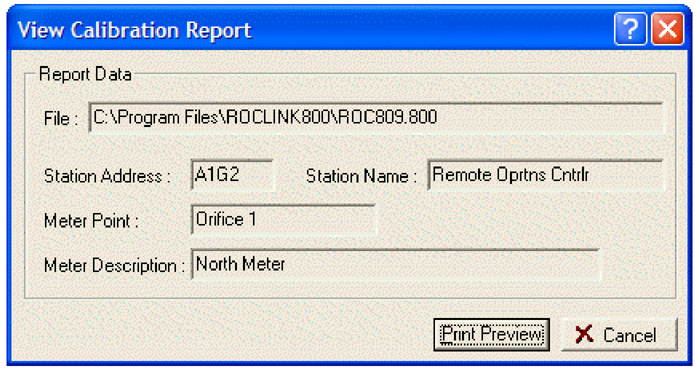


Figure 5-8. View Calibration Report

4. Click **Print Preview**. The Print Preview screen displays.

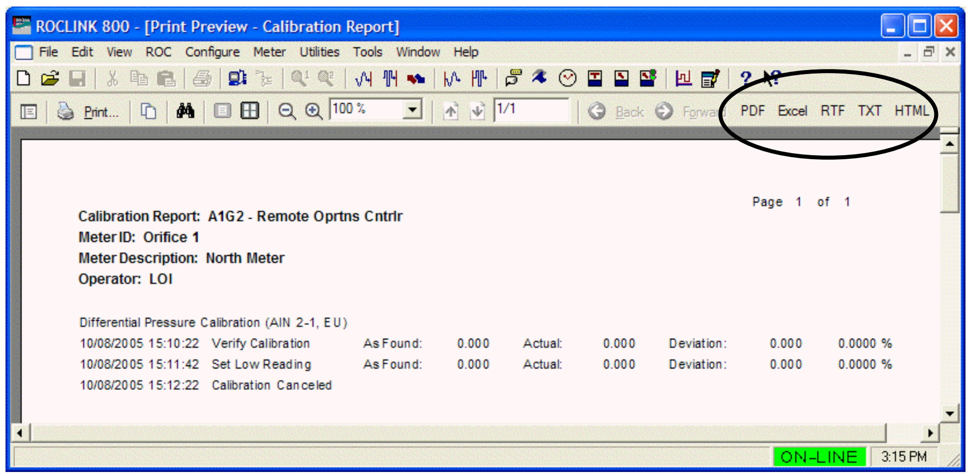


Figure 5-9. Calibration Report Print Preview

5. Click **Print…** to print the report. ROCLINK 800 displays a Print window that allows you select the printer, number of copies, and other options.

   You can also export the report to different formats using the PDF, RTF, TXT, and HTML buttons on the tool bar.

5.4 History, Alarm, and Event Log Reports

The View menu option enables you to access and display the Minute, Hourly (Periodic), and Daily History Log reports (**View** > **History**); the Alarm Logs (**View** > **Alarms**); or the Event Logs (**View** > **Events)**.

You can retrieve these logs either from the device itself (if ROCLINK 800 is currently connected) or from a previously saved file on your PC.

Once you select the view, the system displays the log. ROCLINK 800 provides several option buttons you can use to manage report data:

Option	Description
Plot	Graphically displays history data based on criteria you select. **Note** This option is available **only** for history values obtained either from a connected device or from a file. Refer to *Section 5.4.3, Plotting History*.
Select New	Redisplays the Select History Points screen, which you can use to select new history values. **Note**: This option is available **only** if you are viewing history data from the device.
Save	Saves the log as a file on your PC, using one following file name extensions you select: **.ALM** Alarm log file **.EVT** Event log file **.MDB** Minute-based history log file. **.PDB** Hourly (period) based history log file. **.DAY** Daily based history log file. **.EDB** Extended history log file.
Print Preview	Displays a preview of the report data. Refer to *Section 4.5.1, Print Configuration* for information on managing the print preview.
Close	Closes the display.

5.4.1 Viewing History Logs from a Device

When you choose to view history logs from a connected device, ROCLINK 800 displays a dialog box. You use this dialog to specify the report contents.

1. Select **View**> **History** > **From Device**. The Select History to View screen displays.

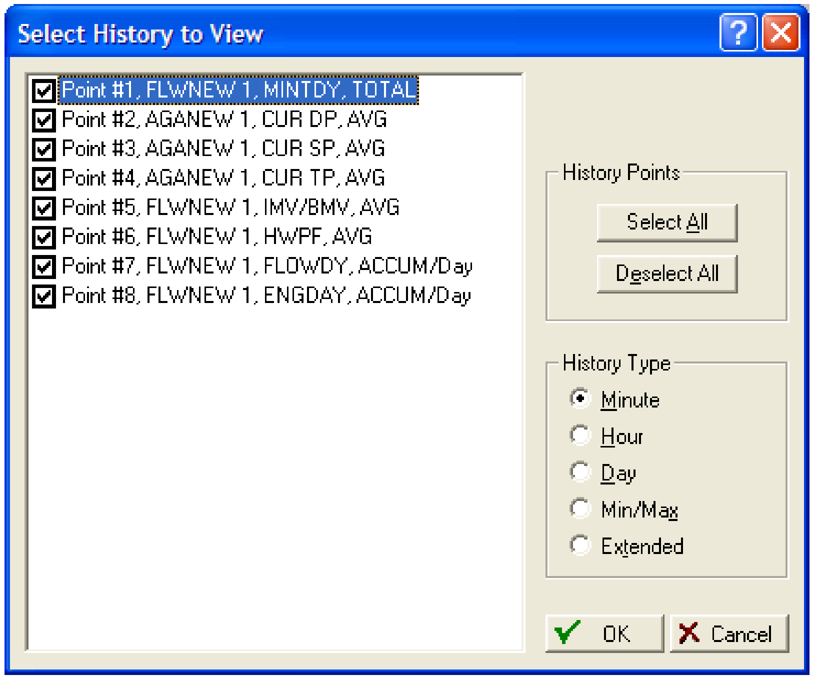


Figure 5-10. Select History to View

Note: This screen initially displays with all points selected.

2. Select or de-select the history points and history types to include on the view.

3. Click **OK**. ROCLINK 800 retrieves the data you have selected and displays it on a preview screen.

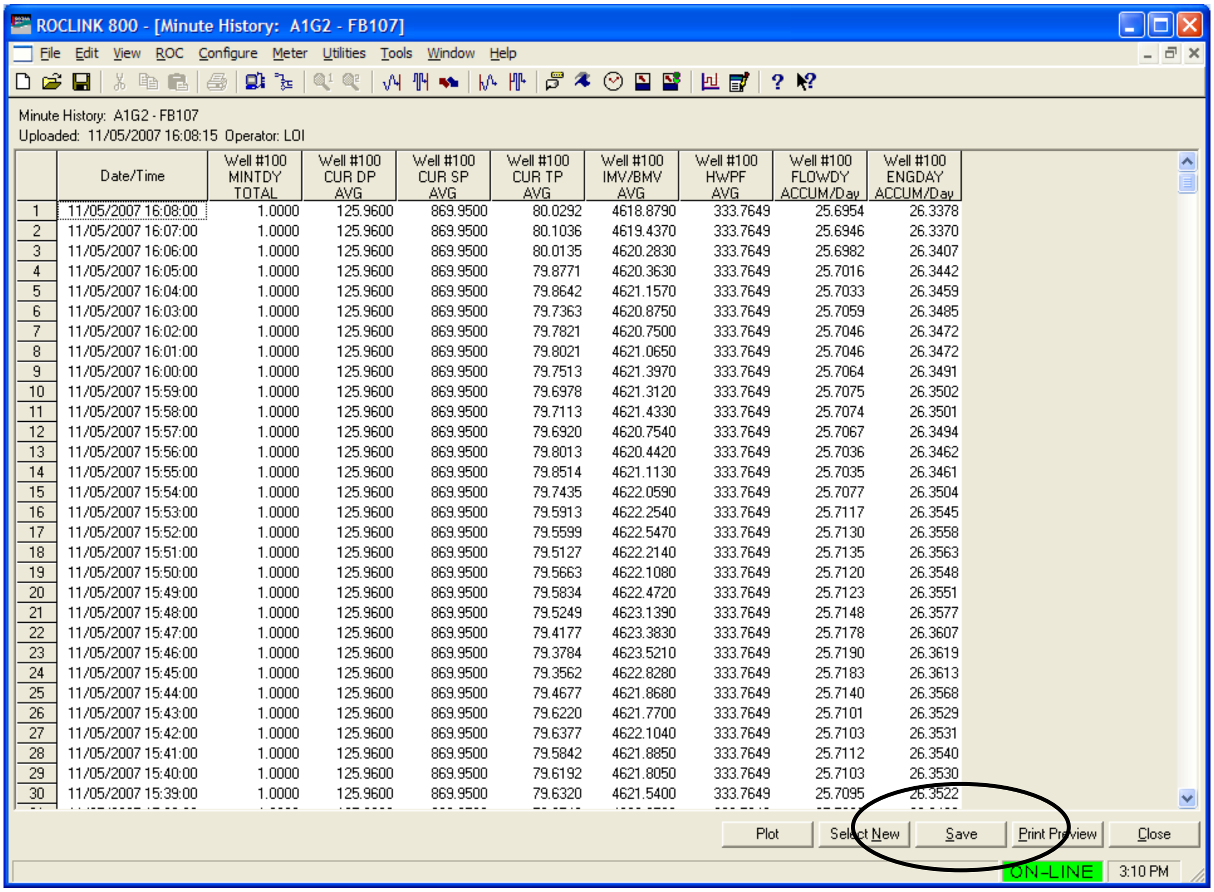


Figure 5-11. History (from device)

Note: Click the **Save** button at the bottom of the screen to save the displayed contacts in a file. You can then view history logs without being connected to the FB107.

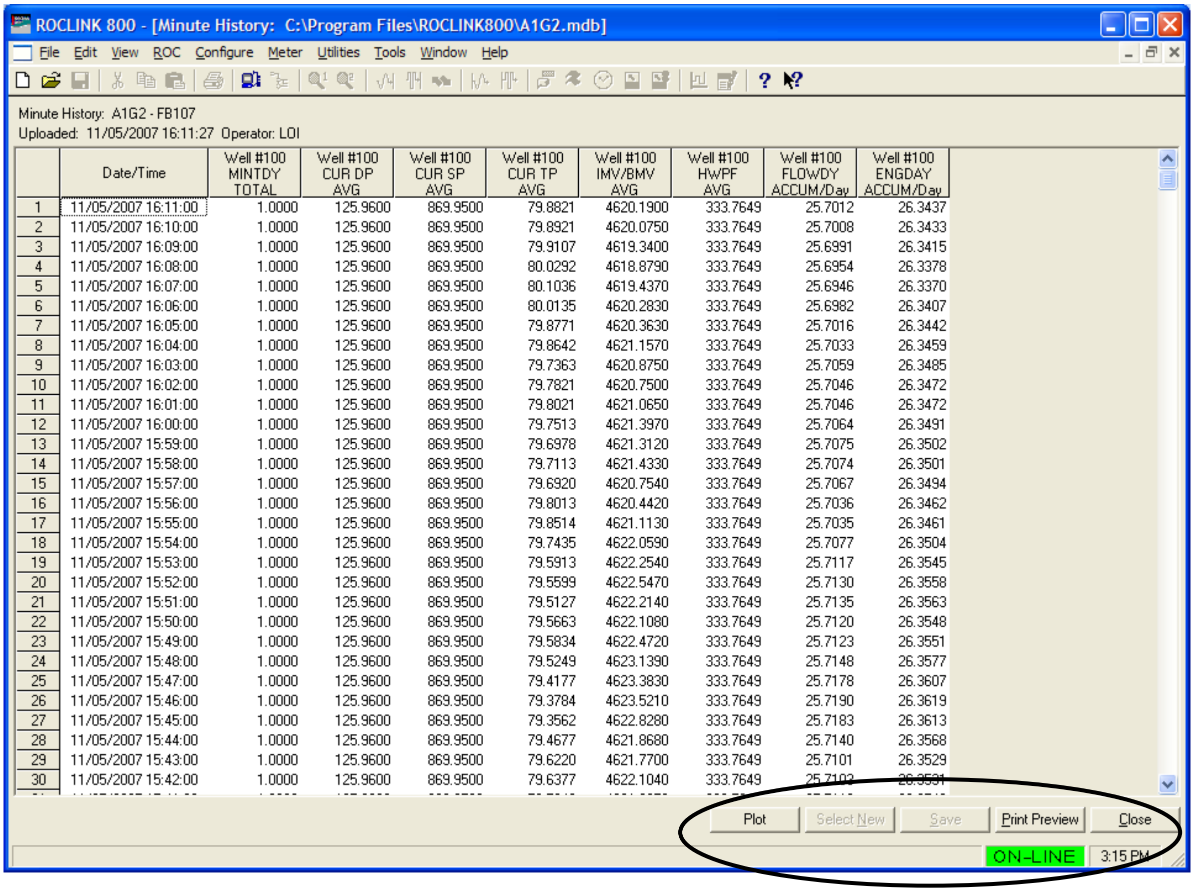
4. Review the report and click **Close** to return to the FB107 graphic screen.

5.4.2 Viewing History Logs from a File

When you generate a history report, you can save it to a file (with a filetype of *.mdb*) for off-line viewing and analysis. However, you **must** save the report file to view it. ROCLINK 800 provides additional tools you can use to manipulate the data.

1. Select **View** > **History** > **From File**. An Open dialog box displays.
2. Select a file and click **Open**. A preview screen displays

Note: Refer to *Section 5.4, History, Alarm, and Event Log Reports* for valid file name extensions for history files.



	Date/Time	Well #100 MINTDY TOTAL	Well #100 CUR DP AVG	Well #100 CUR SP AVG	Well #100 CUR TP AVG	Well #100 IMV/BMV AVG	Well #100 HWPF AVG	Well #100 FLOWDY ACCUM/Day	Well #100 ENGDAY ACCUM/Day
1	11/05/2007 16:11:00	1.0000	125.9600	869.9500	79.8821	4620.1900	333.7649	25.7012	26.3437
2	11/05/2007 16:10:00	1.0000	125.9600	869.9500	79.8921	4620.0750	333.7649	25.7008	26.3433
3	11/05/2007 16:09:00	1.0000	125.9600	869.9500	79.9107	4619.3400	333.7649	25.6991	26.3415
4	11/05/2007 16:08:00	1.0000	125.9600	869.9500	80.0292	4618.8790	333.7649	25.6954	26.3378
5	11/05/2007 16:07:00	1.0000	125.9600	869.9500	80.1036	4619.4370	333.7649	25.6946	26.3370
6	11/05/2007 16:06:00	1.0000	125.9600	869.9500	80.0135	4620.2830	333.7649	25.6982	26.3407
7	11/05/2007 16:05:00	1.0000	125.9600	869.9500	79.8771	4620.3630	333.7649	25.7016	26.3442
8	11/05/2007 16:04:00	1.0000	125.9600	869.9500	79.8642	4621.1570	333.7649	25.7033	26.3459
9	11/05/2007 16:03:00	1.0000	125.9600	869.9500	79.7363	4620.8750	333.7649	25.7059	26.3485
10	11/05/2007 16:02:00	1.0000	125.9600	869.9500	79.7821	4620.7500	333.7649	25.7046	26.3472
11	11/05/2007 16:01:00	1.0000	125.9600	869.9500	79.8021	4621.0650	333.7649	25.7046	26.3472
12	11/05/2007 16:00:00	1.0000	125.9600	869.9500	79.7513	4621.3970	333.7649	25.7064	26.3491
13	11/05/2007 15:59:00	1.0000	125.9600	869.9500	79.6978	4621.3120	333.7649	25.7075	26.3502
14	11/05/2007 15:58:00	1.0000	125.9600	869.9500	79.7113	4621.4330	333.7649	25.7074	26.3501
15	11/05/2007 15:57:00	1.0000	125.9600	869.9500	79.6920	4620.7540	333.7649	25.7067	26.3494
16	11/05/2007 15:56:00	1.0000	125.9600	869.9500	79.8013	4620.4420	333.7649	25.7036	26.3462
17	11/05/2007 15:55:00	1.0000	125.9600	869.9500	79.8514	4621.1130	333.7649	25.7035	26.3461
18	11/05/2007 15:54:00	1.0000	125.9600	869.9500	79.7435	4622.0590	333.7649	25.7077	26.3504
19	11/05/2007 15:53:00	1.0000	125.9600	869.9500	79.5913	4622.2540	333.7649	25.7117	26.3545
20	11/05/2007 15:52:00	1.0000	125.9600	869.9500	79.5599	4622.5470	333.7649	25.7130	26.3558
21	11/05/2007 15:51:00	1.0000	125.9600	869.9500	79.5127	4622.2140	333.7649	25.7135	26.3563
22	11/05/2007 15:50:00	1.0000	125.9600	869.9500	79.5663	4622.1080	333.7649	25.7120	26.3548
23	11/05/2007 15:49:00	1.0000	125.9600	869.9500	79.5834	4622.4720	333.7649	25.7123	26.3551
24	11/05/2007 15:48:00	1.0000	125.9600	869.9500	79.5249	4623.1390	333.7649	25.7148	26.3577
25	11/05/2007 15:47:00	1.0000	125.9600	869.9500	79.4177	4623.3830	333.7649	25.7178	26.3607
26	11/05/2007 15:46:00	1.0000	125.9600	869.9500	79.3784	4623.5210	333.7649	25.7190	26.3619
27	11/05/2007 15:45:00	1.0000	125.9600	869.9500	79.3562	4622.8280	333.7649	25.7183	26.3613
28	11/05/2007 15:44:00	1.0000	125.9600	869.9500	79.4677	4621.8680	333.7649	25.7140	26.3568
29	11/05/2007 15:43:00	1.0000	125.9600	869.9500	79.6220	4621.7700	333.7649	25.7101	26.3529
30	11/05/2007 15:42:00	1.0000	125.9600	869.9500	79.6377	4622.1040	333.7649	25.7103	26.3531

Figure 5-12. History (from file)

3. Review the file. Click **Close** to return to the FB107 graphic display.

Note: Click **Print Preview** to print the report contents (see *Section 4.5.1, Print Configuration*) or **Plot** to create a graphic display of the report contents.

5.4.3 Plotting History

For history data from either a connected device or a file, ROCLINK 800 provides an option on print preview screens that enables you to graphically present the report results.

After you select the report data and display the preview screen, click **Plot**. ROCLINK 800 displays a graphical version of the selected data.

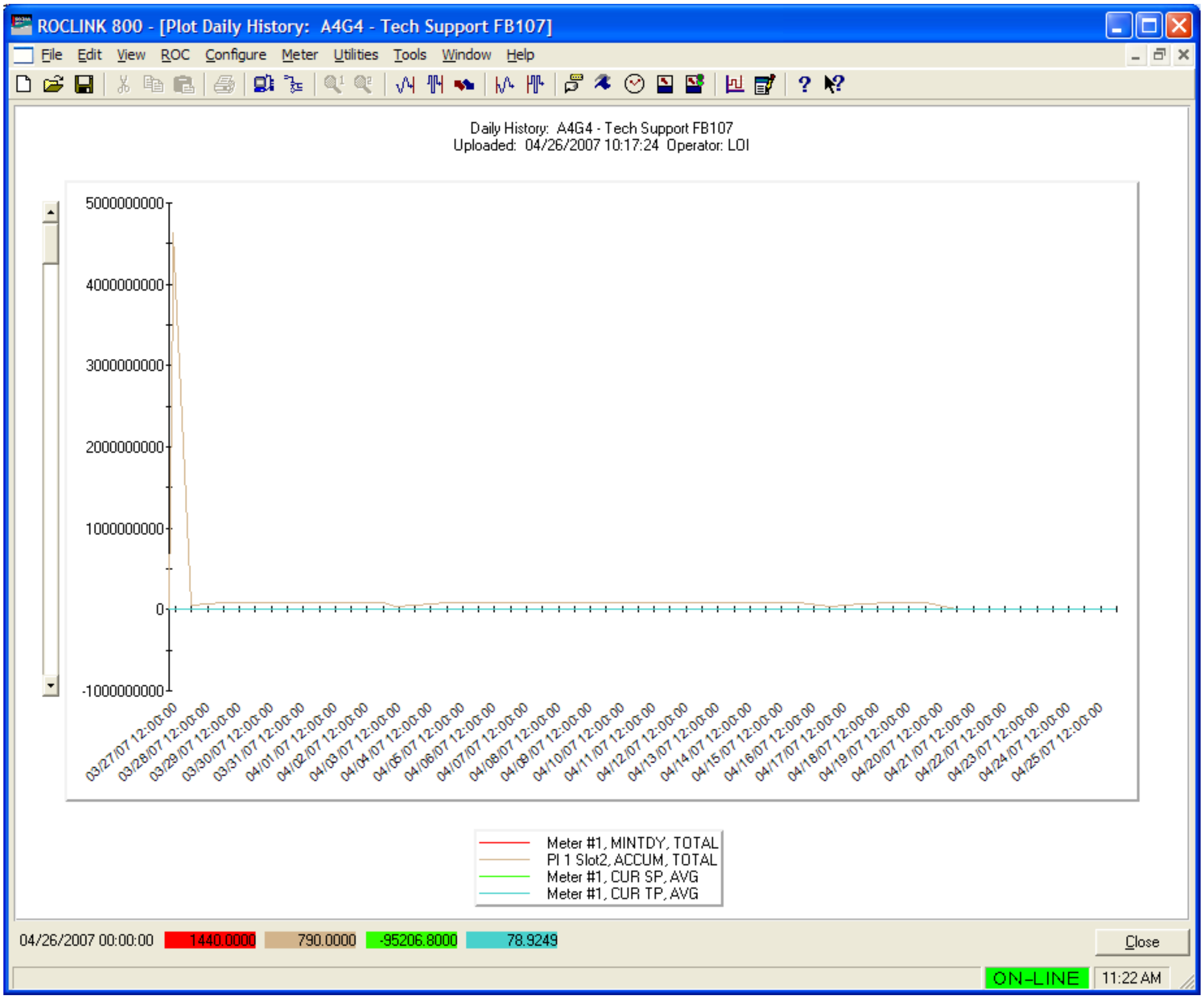


Figure 5-13. Plotted History

The plot displays each series of lines as connected points of data, based on the time the data was archived and the current value at that time. The plot chart displays the type of history, device type, date, time, and the Operator ID in the header. The left (**Y**) axis displays the value and the bottom (**X**) axis displays the date and time the value was read. A legend at the bottom of the graph corresponds with the lines within the graph.

Use the scroll bar to the left of the graph to change the Y-axis.

Graphics zoom enlarges the selected area of a chart, while not necessarily showing the axes.

Axis zoom changes the minimum and maximum data values to those selected and redraws only that data with the axes.

Graphics Zoom an Area

To zoom into an area of the plot:

1. Press **Ctrl** and hold down the left mouse button.
2. Drag the mouse to select zoom area and release the mouse button.

3. Press **r** to remove the effect and restore the original plot.

Axis Zoom the Chart

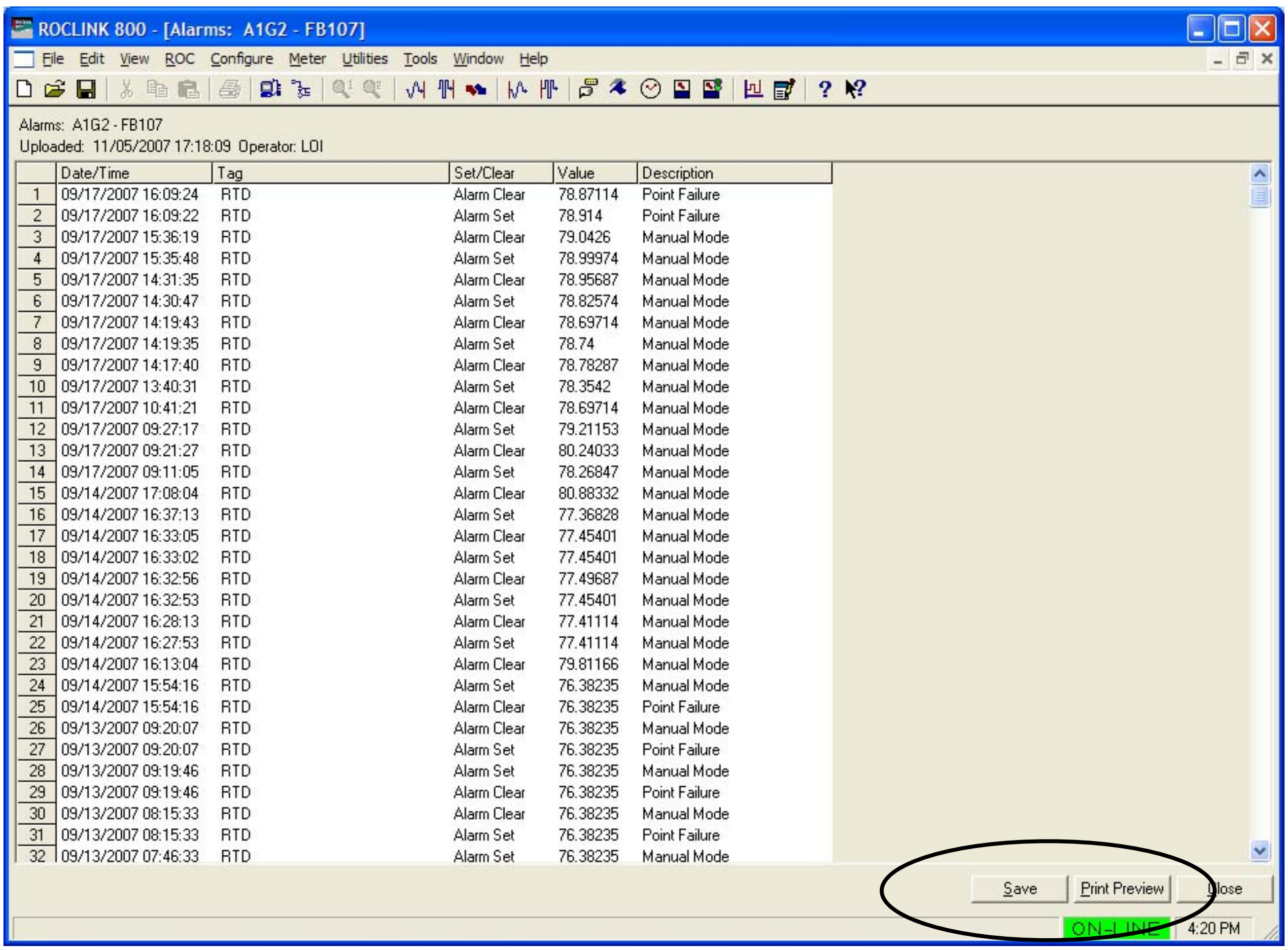
To zoom into a particular axis of the plot:

1. Press **Shift** and hold down the left mouse button.
2. Drag the mouse to select the zoom area and release the mouse button.
3. Press **r** to remove the effect and restore the original plot.

5.4.4 Viewing Alarm Logs

You can view a log of all alarms on your connected FloBoss.

1. Select **View** > **Alarms** > **From Device**. An alarm preview screen displays.



	Date/Time	Tag	Set/Clear	Value	Description
1	09/17/2007 16:09:24	RTD	Alarm Clear	78.87114	Point Failure
2	09/17/2007 16:09:22	RTD	Alarm Set	78.914	Point Failure
3	09/17/2007 15:36:19	RTD	Alarm Clear	79.0426	Manual Mode
4	09/17/2007 15:35:48	RTD	Alarm Set	78.99974	Manual Mode
5	09/17/2007 14:31:35	RTD	Alarm Clear	78.95687	Manual Mode
6	09/17/2007 14:30:47	RTD	Alarm Set	78.82574	Manual Mode
7	09/17/2007 14:19:43	RTD	Alarm Clear	78.69714	Manual Mode
8	09/17/2007 14:19:35	RTD	Alarm Set	78.74	Manual Mode
9	09/17/2007 14:17:40	RTD	Alarm Clear	78.78287	Manual Mode
10	09/17/2007 13:40:31	RTD	Alarm Set	78.3542	Manual Mode
11	09/17/2007 10:41:21	RTD	Alarm Clear	78.69714	Manual Mode
12	09/17/2007 09:27:17	RTD	Alarm Set	79.21153	Manual Mode
13	09/17/2007 09:21:27	RTD	Alarm Clear	80.24033	Manual Mode
14	09/17/2007 09:11:05	RTD	Alarm Set	78.26847	Manual Mode
15	09/14/2007 17:08:04	RTD	Alarm Clear	80.88332	Manual Mode
16	09/14/2007 16:37:13	RTD	Alarm Set	77.36828	Manual Mode
17	09/14/2007 16:33:05	RTD	Alarm Clear	77.45401	Manual Mode
18	09/14/2007 16:33:02	RTD	Alarm Set	77.45401	Manual Mode
19	09/14/2007 16:32:56	RTD	Alarm Clear	77.49687	Manual Mode
20	09/14/2007 16:32:53	RTD	Alarm Set	77.45401	Manual Mode
21	09/14/2007 16:28:13	RTD	Alarm Clear	77.41114	Manual Mode
22	09/14/2007 16:27:53	RTD	Alarm Set	77.41114	Manual Mode
23	09/14/2007 16:13:04	RTD	Alarm Clear	79.81166	Manual Mode
24	09/14/2007 15:54:16	RTD	Alarm Set	76.38235	Manual Mode
25	09/14/2007 15:54:16	RTD	Alarm Clear	76.38235	Point Failure
26	09/13/2007 09:20:07	RTD	Alarm Clear	76.38235	Manual Mode
27	09/13/2007 09:20:07	RTD	Alarm Set	76.38235	Point Failure
28	09/13/2007 09:19:46	RTD	Alarm Set	76.38235	Manual Mode
29	09/13/2007 09:19:46	RTD	Alarm Clear	76.38235	Point Failure
30	09/13/2007 08:15:33	RTD	Alarm Clear	76.38235	Manual Mode
31	09/13/2007 08:15:33	RTD	Alarm Set	76.38235	Point Failure
32	09/13/2007 07:46:33	RTD	Alarm Set	76.38235	Manual Mode

Figure 5-14. Alarm Preview

2. Review the alarms preview, and click **Close** to return to the FB107 graphic display.

Note: Click **Print Preview** to print the report contents (see *Section 4.5.1, Print Configuration*) or **Save** to save the preview to a file for off-line viewing (select **View** > **Alarms** > **From File**).

5.4.5 Viewing Event Logs

You can view a log of all events on your connected FloBoss.

1. Select **View** > **Events** > **From Device**. An events preview screen displays.

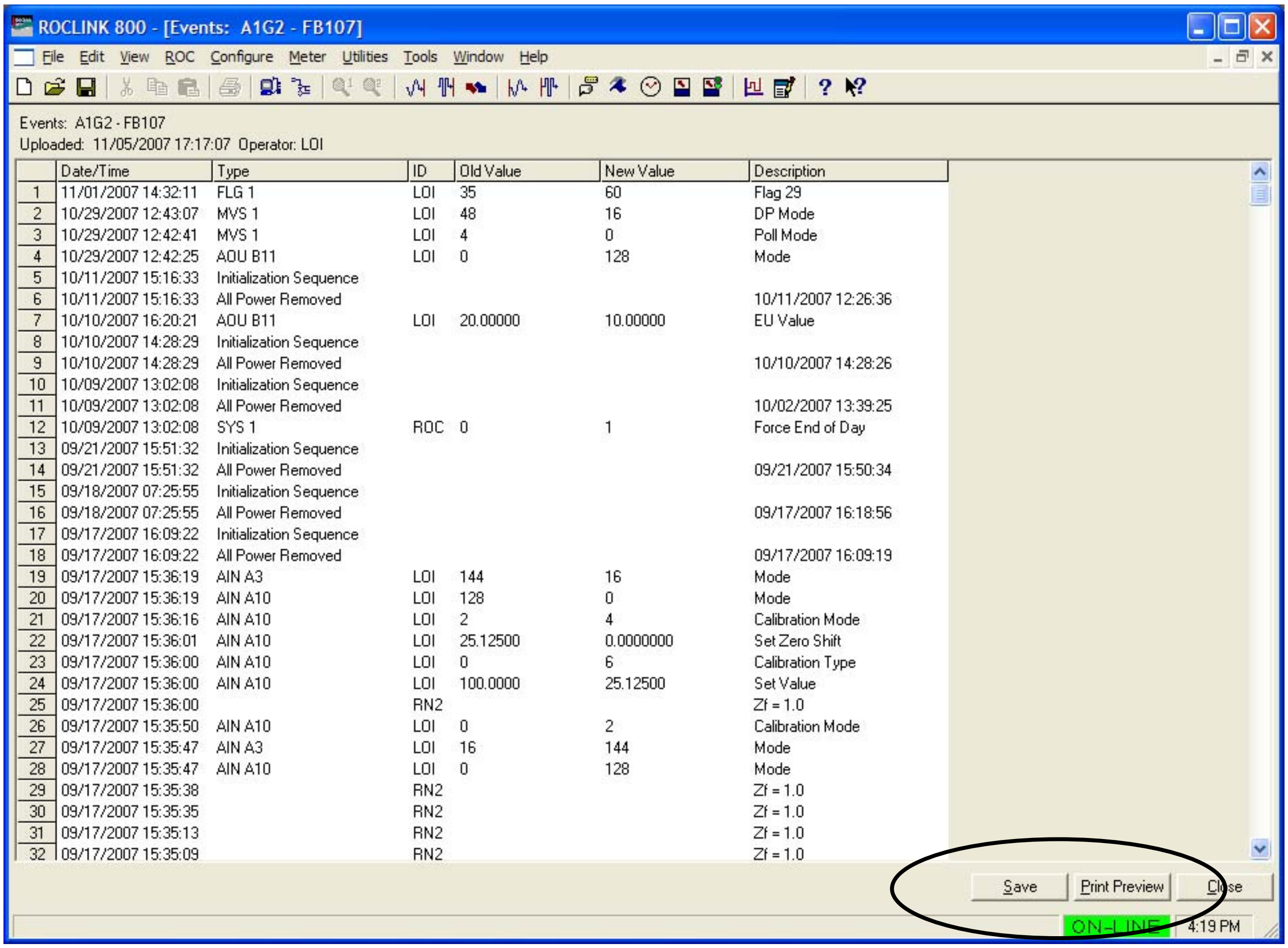


Figure 5-15. Events Preview

2. Review the events preview, and click **Close** to return to the FB107 graphic display.

Note: Click **Print Preview** to print the report contents (see *Section 4.5.1, Print Configuration*) or **Save** to save the preview to a file for off-line viewing (select **View** > **Events** > **From File**).

5.5 Display Administrator

Use the Display Administrator screen to manage custom displays stored in the FB107. The FB107 can store a maximum of 40 displays, which includes both custom user displays (that your organization may create) and user program displays (that accompany User C programs).

To view the display files stores in the FB107:

1. Select **View** > **Display** > **From Device** > **Administrator**. The Display Administrator screen displays, showing all displays currently loaded in the FB107.

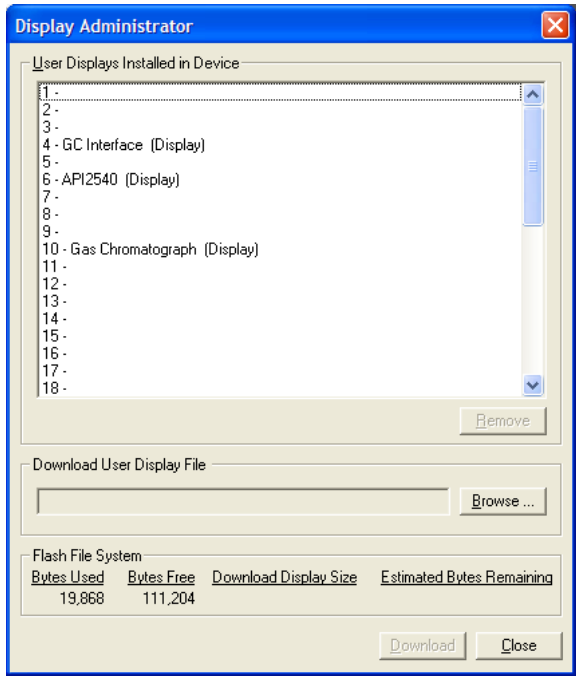


Figure 5-16. Display Administrator

2. Select an empty slot.

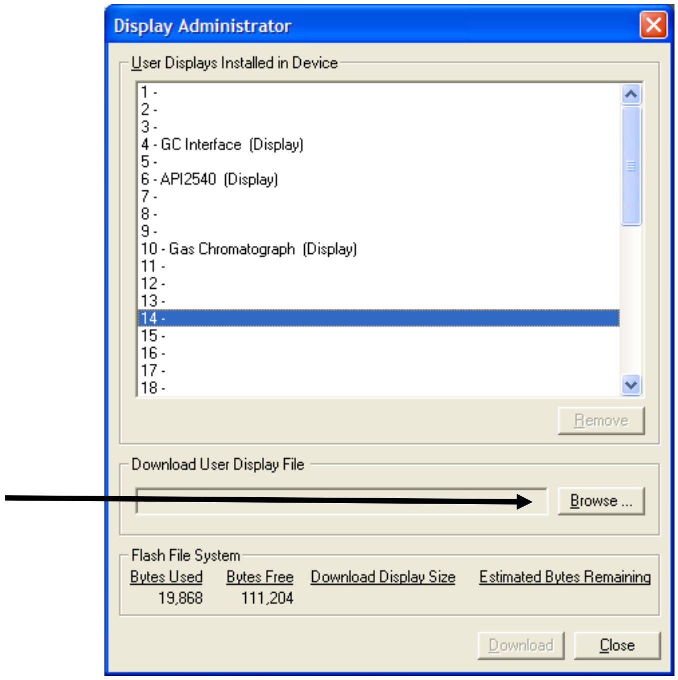


Figure 5-17. Display Administrator

3. Click **Browse** to open the Select User Display File. Double-click a display file to load. The Display Administrator screen redisplays with **Download** now active.
4. Click **Download** to add the user display to the FB107.

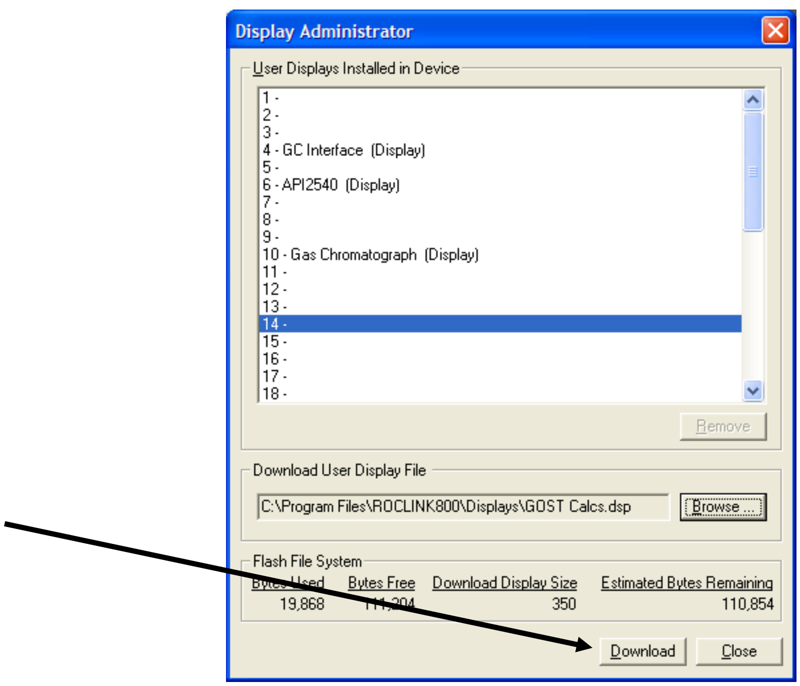


Figure 5-18. Display Administrator

ROCLINK 800 prompts you to verify the installation, loads the file, displays a verification message, and updates the display.

Note: Use the Flash File System frame on this screen to monitor the number of available bytes used and remaining. Use **Remove** to delete a display file from the FB107.

5. Click **Close** to return to the FB107 graphic display.

5.6 Custom Displays

The custom display option in ROCLINK 800 software allows you to create customized FB107 displays or load a display from a file. The FB107 can store up to 40 displays (including both custom user displays you create and user program displays that accompany user programs).

Caution **You should be familiar with Visual Basic before attempting to create custom displays.**

You can add fields to monitor flow, I/O points, and other TLPs. Select **View** > **Display** > **New**. A blank Display Editor screen displays.

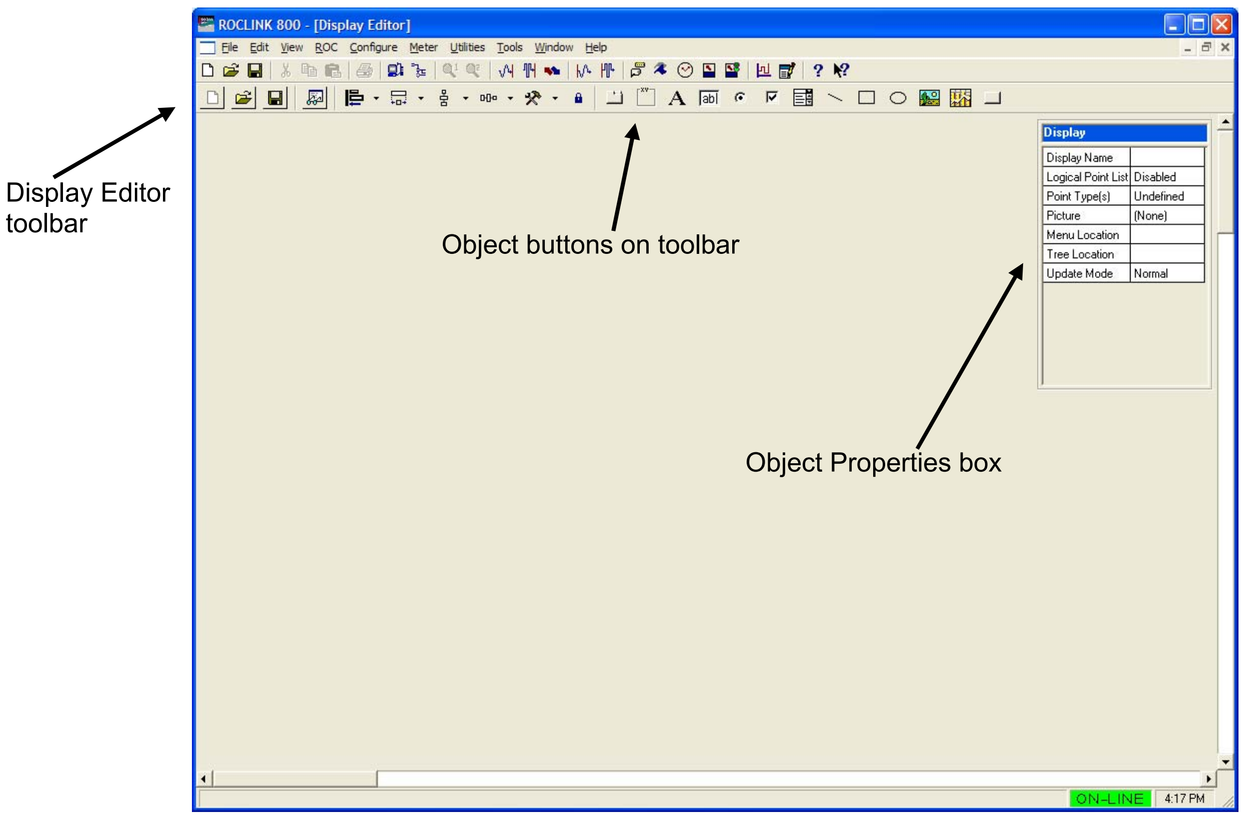


Figure 5-19. Display Editor

By adding objects (tabs, fields, labels, text, etc.) to the display, you can incorporate “live” data as well as images and other information you wish to convey. One use of custom displays is to graphically represent the application that an FB107 monitors and controls. Another use is to monitor the FB107, giving you to opportunity to change commonly used parameters from a single screen.

Each custom display has parameters specific to the entire display that you are creating. By default, the system places the Display object properties box at the upper right of the screen in a pop-up window. A similar object properties box displays for each object you add to the display.

Drag and drop the object buttons from the toolbar to the Display Editor screen and set the associated parameters. Each option has parameters associated with it depending on the type of option you have selected and you can customize the parameters in the object properties box.

Note: Custom displays are not compatible between ROCLINK for Windows and ROCLINK 800 Configuration software.

Sections 5.6.1 and *5.6.2* discuss the process of creating a new custom display and adding and arranging objects on that display.

5.6.1 Creating a New Custom Display

To create a new display:

1. Select **View** > **Display** > **New**. A blank Display Editor screen displays.

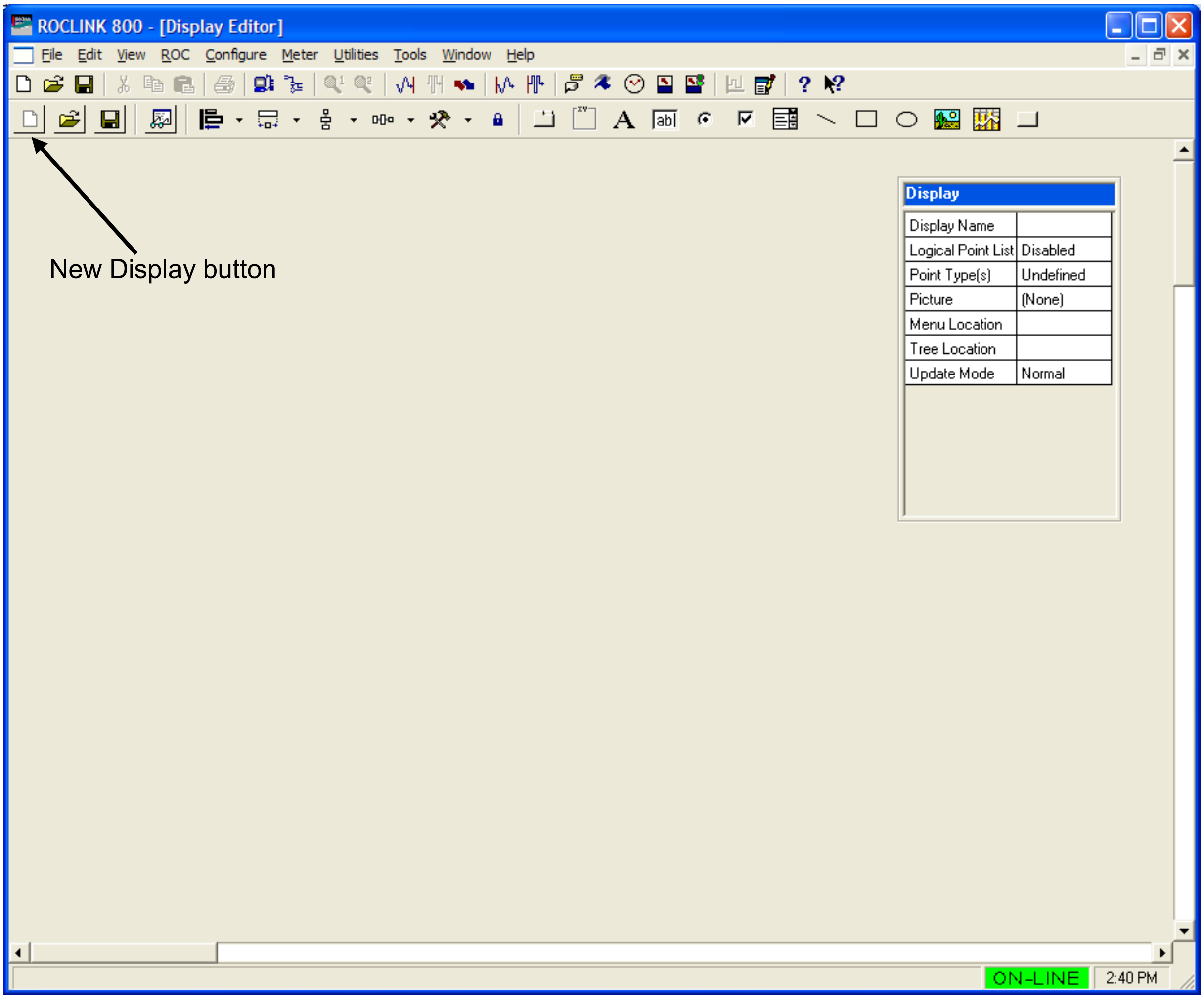


Figure 5-20. Display Editor (blank)

Note: You can also click the **New Display** button (at the extreme left of the Display Editor toolbar) to create a new display.

2. Specify the properties for the new custom display:

Field	Description
Display Name	Names the display. Although you can enter up to 120 characters for a screen name, a maximum of 10-20 characters should be sufficient to uniquely name the screen.
Logical Point List	Indicates whether the display is unique or one of several iterations. Click ▼ (which appears when you click the field) to display the values. Valid values are **Disabled** (screen is unique) or **Enabled** (number of screens equals the number of logicals). The default is **Disabled**. **Note**: The number of screens is based of the number of logicals for the first point type selected in the Point Type field.

Field	Description
Point Type(s)	Sets, if you **enable** the Logical Point List option, the point type(s) whose logicals track the iteration of the display. Click **…** (which appears when you click the field) to display the Select Point Type(s) screen. Use that screen to associate one or more point types with this Logical Point List.
Picture	Identifies a graphic used for the background of the display. Click **…** (which appears when you click the field) to display a Select Picture File screen. Use that screen to associate an image with the display.
Menu Location	Allows you to hide, replace, or rename a menu selection in the ROCLINK 800 menu. This option applies **only** to displays physically residing in the FB107. **Hide** — Hides a menu selection in the Meter, View, or ROC menu. Requires the syntax H:menuname.submenuname (as in **H:Meter.Plate Change**). **Replace** — Replaces a screen in the Meter menu with the current custom display. Requires the syntax R:menuname.submenuname (as in **R:Meter.Setup**). **Rename** — Replaces a menu in the Meter, View, or ROC menu with the current display using the indicated name. Requires the syntax N:menuname.submenuname: newsubmenuname (as in **N:Meter.Calibration:Coriolis Cal**). **Note**: Use a comma to hide, replace, or rename multiple features, as in **N:Meter.Calibration:Coriolis Cal,N:Meter,Calibration:Central Cal**.
Tree Location	Currently unavailable.
Update Mode	Sets when the system updates data on this screen. Valid values are **Normal** (system does not update the screen content) or **AutoScan** (system updates the screen content based on the interval you specify in the Auto Scan Update Interval field on the Options screen (**Tools** > **Options**). The default value is **Normal**. **Note**: If you include dynamic content on your custom display, you may want the system to refresh that content for the most current values.

3. Add display content to the custom display. You can **either** drag an object from the toolbar and place it on the custom display **or** place the cursor on the display where you want the object, right-click, and select from the pop-up menu. Refer to *Section 5.6.2, Adding Custom Display Objects*, for a description of each object and its properties.

- Add as many objects to the screen as you need. You can place objects anywhere on the Display Editor screen. Use a frame with a label to logically group certain options (such as option buttons or check boxes) to ensure that others know the use context for the options.
- For each object you enter, complete that object's Properties box. Each object's Properties box has different items, and you can edit those properties at any time.
- Move and re-shape objects within the display as necessary. To modify an object's placement or shape:
  - Click and drag on the control squares to change the size of the object.
  - Press **Shift + arrow keys** to change an object's size. Press **Shift +Alt + arrow keys** for smaller changes.
  - Press **Ctrl + arrow keys** to move an object to the desired position. Press **Ctrl + Alt + arrow keys** for smaller moves.
  - Select the **Align Lefts** icon to align all selected objects to the furthest left point in the group.
  - Select the **Size to Widest** icon to change the width of all selected objects to the width of the widest element.
  - Select the **Make Vertical Spacing Equal** icon to evenly adjust the vertical spacing between all the selected objects.
  - Select the **Make Horizontal Spacing Equal** icon to evenly adjust the horizontal spacing between all the selected objects.
  - Remove objects by selecting the object and pressing **Delete**.

4. Click the **Test** icon to verify that the completed custom display works correctly.

5. Click the **Save Display to File** icon to save the completed and tested custom display. ROCLINK 800 displays use the suffix .DSP (as in *TestScreen.dsp*).

5.6.2 Adding Custom Display Objects

The right-hand side of the Display Editor toolbar includes a number of buttons for custom objects (see *Figure 5-21*).

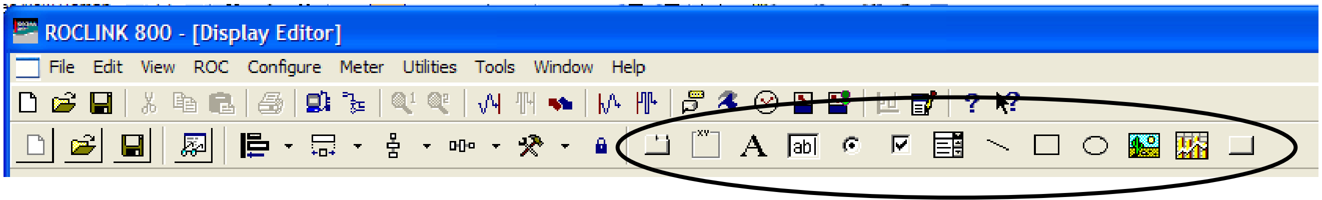
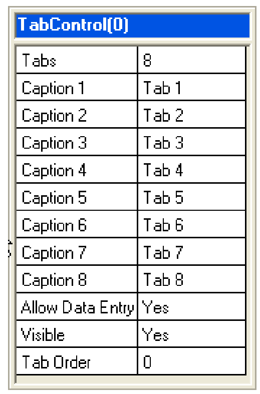


Figure 5-21. Custom Display Objects

Tab Control

Adds an eight-tab image, which you can size appropriately and edit to fewer tabs. You can then drag and drop objects onto each tab.

This object has the following properties:



TabControl(0)

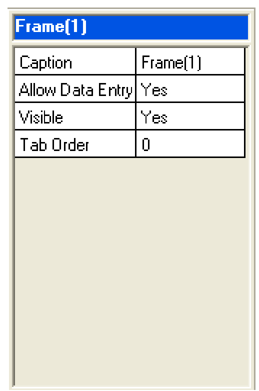
Tabs	8
Caption 1	Tab 1
Caption 2	Tab 2
Caption 3	Tab 3
Caption 4	Tab 4
Caption 5	Tab 5
Caption 6	Tab 6
Caption 7	Tab 7
Caption 8	Tab 8
Allow Data Entry	Yes
Visible	Yes
Tab Order	0

Property	Description	
Tabs	Sets the number of tabs (up to 8) on the screen. Click ▼ (which displays when you click in the field) to specify the number of tabs.	
Caption 1 through **8**	Sets a label or caption for each tab. The size of the tab increases to accommodate the text.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Editing is permitted based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.

	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Frame Adds an organizing frame, which you use to group similar user selections. Once a frame is in place, drag and drop objects onto the frame.

This object has the following properties:

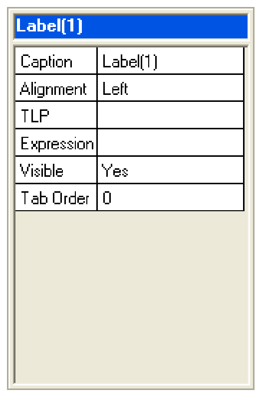


Property	Description	
Caption	Sets a label or caption for the object. The default is **Frame(1)**; the system uniquely names each object until you rename it.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Editing is allowed based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	

	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Label

Adds labels to identify objects. This object has the following properties:

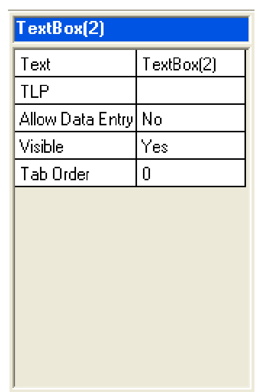


Property	Description
Caption	Sets a label or caption for the object. The default is **Label(1)**; the system uniquely names each object until you rename it.
Alignment	Indicates where the label text displays. Click ▼ (which displays when you click in the field) to display the valid values: **Left** (text is flush left), **Right** (text is flush right), or **Center** (text is centered).
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.
Expression	Associates the object with a Visual Basic expression. Click **…** (which displays when you click in the field) to display an Expression Builder window which you use to define the expression. Refer to *Section 5.6.4, Adding an Expression to an Object.*

Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values: **Yes** — Object is always visible. This is the **default**. **No** — Object is not visible. **Expression** — Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.

Text Box

Adds a data entry field. This object has the following properties:

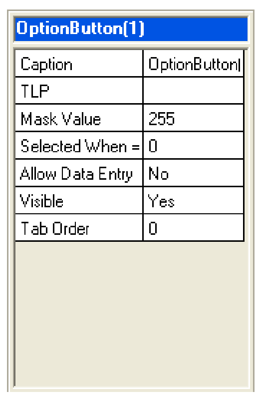


Property	Description
Text	Sets text that appears in the object. You can enter as many characters as necessary. Use the control squares to change the size of the text box. The default is **TextBox(1)**; the system uniquely names each object until you rename it.
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values: **Yes** — Allows editing. This is the **default**. **No** — Does not allow editing.

	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Option Button

Adds a radio button to limit input to a single selection. This object has the following properties:

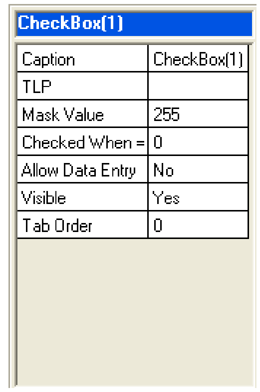


Property	Description
Caption	Sets a label or caption for each object. The default is **OptionButton(1)**; the system uniquely names each object until you rename it.
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.

Mask Value	Identifies individual bits of an 8-bit integer ROCLINK uses when calculating the value to be compared to the value specified in the **Selected When** or **Checked When** fields. ROCLINK performs a mathematical AND comparing this masked value and the value in the Selected When or Checked When field and activates the button or box if the values are equal. The default value is **255**.
Selected When =	Specifies the value at which the option button activates. Works in conjunction with the value in the **Mask Value** field.
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values: **Yes** – Allows editing. This is the **default**. **No** – Does not allow editing. **Expression** – Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values: **Yes** – Object is always visible. This is the **default**. **No** – Object is not visible. **Expression** – Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.

Check Box

Adds a check box for multiple selections. This object has the following properties:

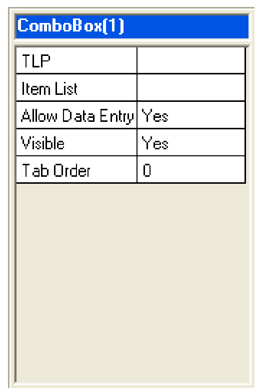


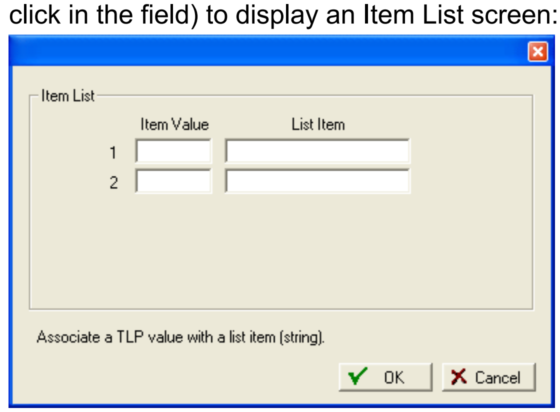
Property	Description	
Caption	Sets a label or caption for the object. The default is **CheckBox(1)**; the system uniquely names each object until you rename it.	
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.	
Mask Value	Identifies individual bits of an 8-bit integer ROCLINK uses when calculating the value to be compared to the value specified in the **Selected When** or **Checked When** fields. ROCLINK performs a mathematical AND comparing this masked value and the value in the Selected When or Checked When field and activates the button or box if the values are equal. The default value is **255**.	
Checked When =	Specifies the value at which the checkbox activates. Works in conjunction with the value in the **Mask Value** field.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.

	Expression Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.

Combo Box

Adds a list of options that opens when you click ▼. This object has the following properties:

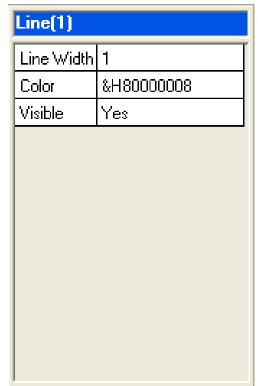


Property	**Description**
TLP	Associates the object with a TLP. Click **...** (which displays when you click in the field) to display a Select TLP screen you use to select the associated TLP.
Item List	Enables you to build a drop-down list of up to 30 selectable items. Click **...** (which displays when you click in the field) to display an Item List screen:  Use this screen to add items to the drop-down menu. ROCLINK 800 expands the list as you add items.

	Item Value	Associates the label in the drop-down menu with a value in the designated TLP.
	List Item	Sets the label that appears in the drop-down menu.
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing
	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Line 

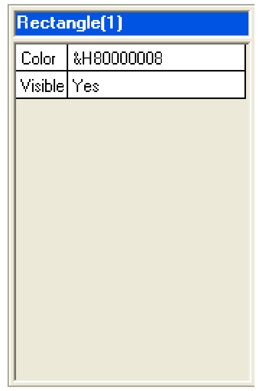
Adds a line to mark borders between objects. This object has the following properties:



Property	Description	
Line Width	Sets the thickness of the line. The default is **1**.	
Color	Sets the color of the object. Enter a hexadecimal color value or click in the field to display a Color screen, which you use to assign a color to the object.	
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*

Rectangle

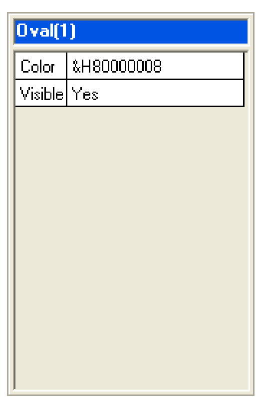
Adds a rectangle to mark borders between objects. This option has the following properties:



Property	Description
Color	Sets the color of the object. Enter a hexadecimal color value or click in the field to display a Color screen, which you use to assign a color to the object.
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values: **Yes** – Object is always visible. This is the **default**. **No** – Object is not visible. **Expression** – Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object*.

Oval

Adds an oval to mark borders between objects. This object has the following properties:

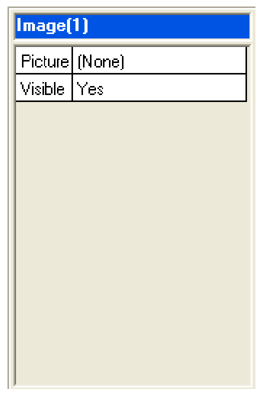


Property	Description
Color	Sets the color of the object. Enter a hexadecimal color value or click in the field to display a Color screen, which you use to assign a color to the object.

Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*

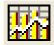
Image

Adds an image (.JPG, .BMP, .PNG, .GIF, or other graphic formats) from a file. This object has the following properties:



Property	Description	
Picture	Sets an image (.JPG, .BMP, .GIF, or other graphic formats) to display with the object. Click in the field to display a Select Picture File screen which you use to indicate the appropriate image. The default is **None**.	
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*

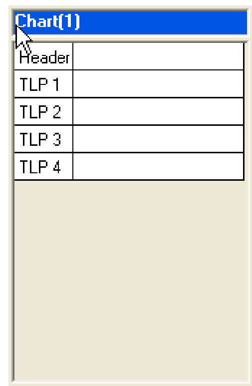
Chart



Adds a chart to represent data graphically.

Note: You can view real-time data by configuring what figures display on the chart. After you configure the chart, view the display and select **Auto-Scan**. The chart displays the collected data in real-time. You cannot save the chart data to system memory.

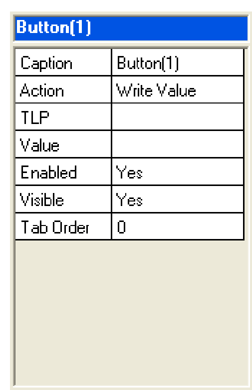
This option has the following properties:



Property	Description
Header	Sets a title for the object.
TLP 1 through **4**	Associates up to four TLPs with the chart. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the TLPs.

Button

Adds a button to the screen. This object has the following properties:



Property	Description
Caption	Sets a label or caption for the object. The default is **Button(1)**; the system uniquely names each object until you rename it.
Action	Associates an activity with the button. **Write Value** is the only action currently associated with this control. The system writes the value identified in the Value property
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the TLP.

Value	Opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*	
Enabled	Indicates whether the button is active. Valid values are:	
	Yes	Object is always active. This is the **default**.
	No	Object is not active.
	Expression	Selection is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

5.6.3 Managing Custom Display Objects

The left-hand side of the Custom Display toolbar provides utilities you use to manage the objects placed on the custom display (see *Figure 5-22*).

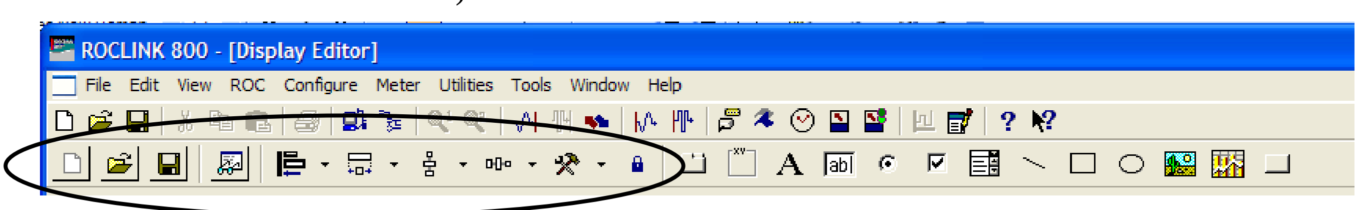


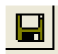
Figure 5-22. Object Management Tools

New Display


Creates a new custom display file.

Open Display File


Opens an existing custom display file. Click this button to display an Open screen that shows all available .DSP files in the default ROCKLINK 800 directory. If you store .DSP files elsewhere, use this screen to navigate to that location and select a file.

Save Display to File


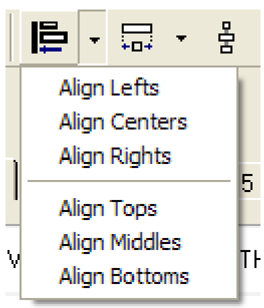
Saves the current display. Click this button to display a Save As screen that shows the .DSP files in the default ROCKLINK 800 directory. If you store .DSP files elsewhere, use this screen to navigate to that location and save the display file.

Test


Closes edit mode for the custom display and shows the custom display as defined. If any errors exist, the system displays appropriate error messages.

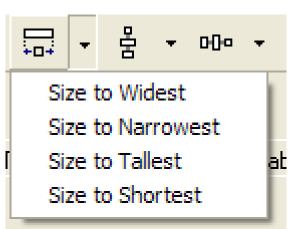
Align Lefts


Aligns selected objects to the left. Click ▼ to display a drop-down menu that provides more specific alignment options:



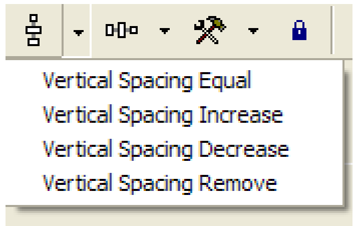
Size to Widest


Adjusts the size of the selected objects to the width of the widest object. Click ▼ to display a drop-down menu that provides more specific sizing options:



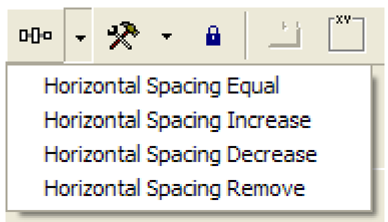
Make Vertical Spacing Equal

Equalizes the vertical spacing between the selected objects. Click ▼ to display a drop-down menu that provides more specific spacing options:



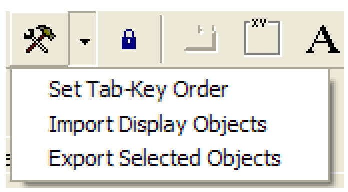
Make Horizontal Spacing Equal

Equalizes the horizontal spacing between the selected objects. Click ▼ to display a drop-down menu that provides more specific spacing options:

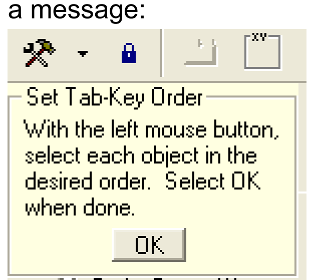


Other Tools

Provides additional object-management tools. Click ▼ to display a drop-down menu that provides more specific spacing options:



Option	Description
Set Tab-Key Order	Allows you to specify the object-to-object sequence for the cursor on the custom display when you press Tab. When you click this option, the system displays a message:



Import Display Objects	Allows you to import another custom display into the current custom display. Use this to quickly duplicate custom displays or build similar custom displays. When you click this option, the system displays an Import screen that you use to select the .DSP file to import.
Export Display Objects	Allows you to save the current custom display. When you click this option, the system displays a Save As screen. Use it to save the .DSP file to the default (or other) ROCLINK 800 directory.

Lock Controls

Restricts the movement of objects on the custom display. This control is helpful when you want to make minor changes to the custom display without accidentally modifying the location of objects.

5.6.4 Adding an Expression to an Object

Some custom display objects—tab, label, button, text box, option, check box, combo box, line, circle, square, and image—allow you to add Visual Basic expressions that cause the display to change under specific conditions.

The Expression Builder screen enables you to quickly build and test a Visual Basic expression to provide customized functioning. For example, you could set a frame's Visible property to Expression and then specify the conditions (such as a particular TLP value) under which the frame displays. Until that value occurs, the frame does not appear on the custom display.

Caution — **We strongly suggest prior experience in Visual Basic programming if you want to create display element expressions.**

To add an expression:

1. Click an object's property that includes **Expression** as an option.
2. Click ▼ and select **Expression**.
3. Click **…** (which displays as part of the Expression option). The Expression Builder screen displays:

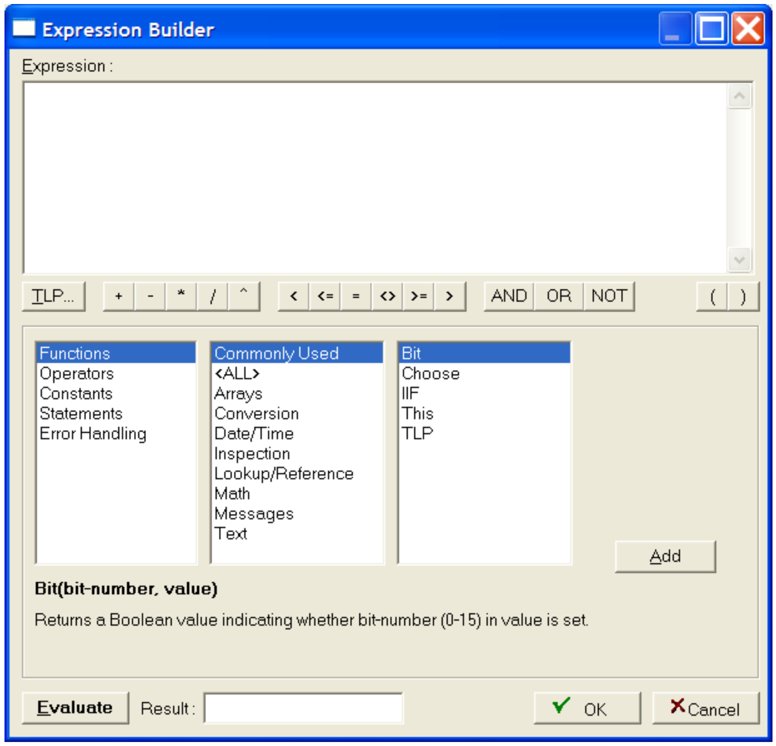


Figure 5-23. Expression Builder

Note: If you are skilled in Visual Basic or already know the specific expression you want to add, you can enter the desired expression directly in the upper (Expression) box on this screen.

4. Build an expression using the buttons immediately under the Expression box and/or the three boxes in the center of the screen. Click **Add** to include each expression component to the screen.

Note: Based on your selected expression category, ROCLINK 800 changes the options displayed in the other two boxes to help you in the building process. Additionally, ROCLINK 800 displays definitions and explanations at the bottom of the screen.

5. When your expression is complete, click Evaluate. ROCLINK 800 checks your expression for errors. Correct any errors.

6. Click OK when your expression is complete. The Display Editor screen displays.

Note: At this point it is **strongly** recommended that you save the custom display to save the expression.

5.6.5 Editing a Custom Display from a File

Once you have created a custom display, you save the display as a **.DSP** file you can later edit. Click **Save Display to File** on the Display Editor toolbar and indicate the name and location for the saved display.

To edit a saved display, select **View** > **Display** > **From File**. An Open screen displays. Select the .DSP file and click **Open**. ROCLINK 800 opens that display.

If **Edit** is **not** included in the buttons displayed at the bottom of the ROCLINK 800 screen, you need to change the attributes of the .DSP file. Using Window's Explorer, access the directory that houses your .DSP files (typically C:\Program Files\ROCLINK800\Displays, if you accepted defaults during system installation). If you store your .DSP files in another location, access that directory. Locate the .DSP file and left-click the file to display a pop-up menu. Select **Properties**. A window similar to this one should appear:

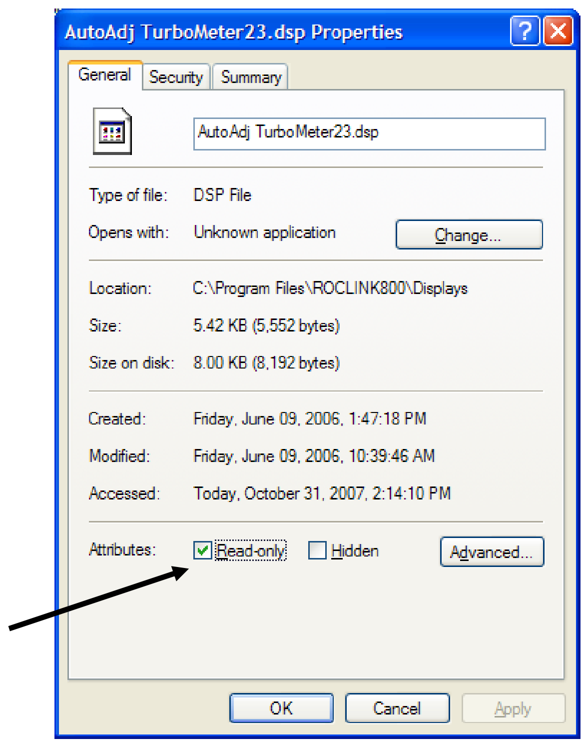


Figure 5-24. Properties

Uncheck the **Read-only** Attributes box and click **Apply**. You can now edit the .DSP file.

5.7 I/O Monitor

Use I/O Monitor to view all installed and active I/O points, MVS values, and flow calculations that provide information configured in the FloBoss and its operating environment.

1. Select **View** > **I/O Monitor**. The Select Points to Monitor dialog box displays.

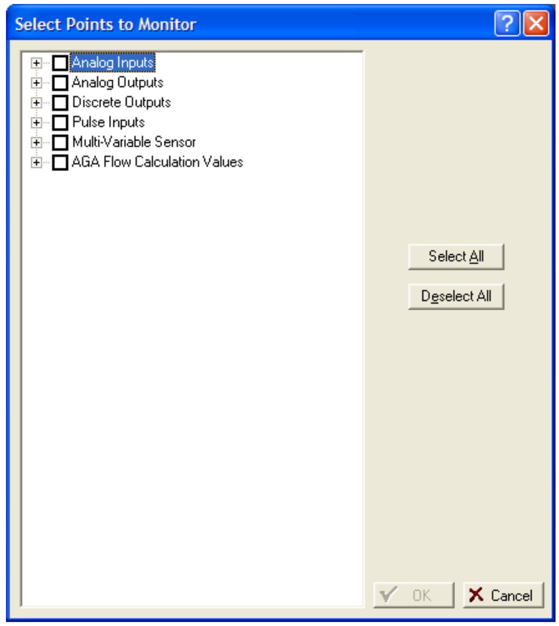
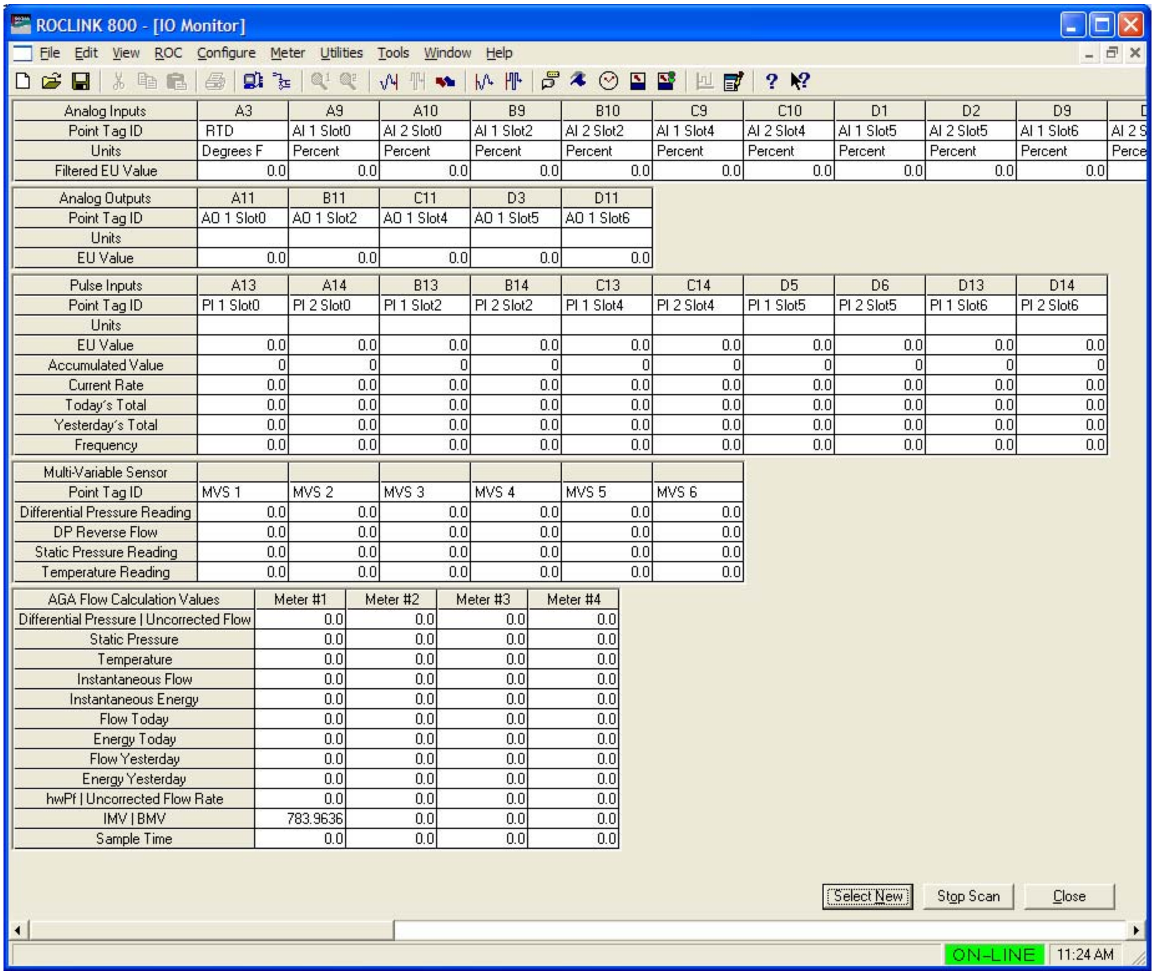


Figure 5-25. Select Points to Monitor

2. Select the points you want to monitor. Click the plus sign next to each item to expand the selection. Click **Select All** or **Deselect All** to select or deselect all points.
3. Click **OK**. ROCLINK 800 displays a screen showing the point information you have requested and automatically updates the on-screen values.



Analog Inputs	A3	A9	A10	B9	B10	C9	C10	D1	D2	D9	D
Point Tag ID	RTD	AI 1 Slot0	AI 2 Slot0	AI 1 Slot2	AI 2 Slot2	AI 1 Slot4	AI 2 Slot4	AI 1 Slot5	AI 2 Slot5	AI 1 Slot6	AI 2 S
Units	Degrees F	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Perce
Filtered EU Value	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Analog Outputs	A11	B11	C11	D3	D11
Point Tag ID	AO 1 Slot0	AO 1 Slot2	AO 1 Slot4	AO 1 Slot5	AO 1 Slot6
Units					
EU Value	0.0	0.0	0.0	0.0	0.0

Pulse Inputs	A13	A14	B13	B14	C13	C14	D5	D6	D13	D14
Point Tag ID	PI 1 Slot0	PI 2 Slot0	PI 1 Slot2	PI 2 Slot2	PI 1 Slot4	PI 2 Slot4	PI 1 Slot5	PI 2 Slot5	PI 1 Slot6	PI 2 Slot6
Units										
EU Value	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Accumulated Value	0	0	0	0	0	0	0	0	0	0
Current Rate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Today's Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yesterday's Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Frequency	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Multi-Variable Sensor						
Point Tag ID	MVS 1	MVS 2	MVS 3	MVS 4	MVS 5	MVS 6
Differential Pressure Reading	0.0	0.0	0.0	0.0	0.0	0.0
DP Reverse Flow	0.0	0.0	0.0	0.0	0.0	0.0
Static Pressure Reading	0.0	0.0	0.0	0.0	0.0	0.0
Temperature Reading	0.0	0.0	0.0	0.0	0.0	0.0

AGA Flow Calculation Values	Meter #1	Meter #2	Meter #3	Meter #4
Differential Pressure | Uncorrected Flow	0.0	0.0	0.0	0.0
Static Pressure	0.0	0.0	0.0	0.0
Temperature	0.0	0.0	0.0	0.0
Instantaneous Flow	0.0	0.0	0.0	0.0
Instantaneous Energy	0.0	0.0	0.0	0.0
Flow Today	0.0	0.0	0.0	0.0
Energy Today	0.0	0.0	0.0	0.0
Flow Yesterday	0.0	0.0	0.0	0.0
Energy Yesterday	0.0	0.0	0.0	0.0
hwPf | Uncorrected Flow Rate	0.0	0.0	0.0	0.0
IMV | BMV	783.9636	0.0	0.0	0.0
Sample Time	0.0	0.0	0.0	0.0

Figure 5-26. I/O Monitor

5.8 Toolbar

Select **View** > **Toolbar** to display or hide the ROCLINK 800 toolbar. A checkmark appears next to the menu option when the toolbar is available.

For information on buttons in the toolbar refer to *Section 1.6.4, Toolbar Buttons*.

Chapter 6 – The ROC Menu

Use the ROC menu options to set system information for the FloBoss.

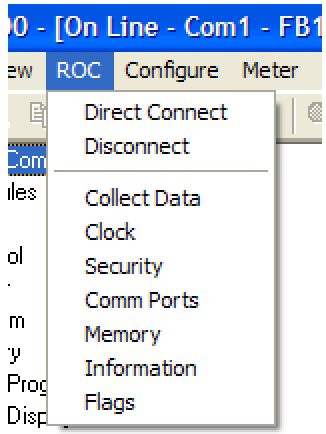


Figure 6-1. Collect Device Data

In This Chapter

6.1 Direct Connect

Use this option to connect to the FB107 via the LOI port. You can also directly connect to the FB107 by clicking the Direct Connect icon () on the ROCLINK 800 menu bar.

6.2 Disconnect

Use this option to disconnect from the FB107. You can also disconnect by clicking the Disconnect icon ( ) on the ROCLINK 800 menu bar.

6.3 Collecting ROC Data

Use this option to save FloBoss electronic flow management (EFM) data to disk files. Data includes:

- Configuration data.
- Hourly volume data.
- Daily volume data.
- Alarm Log data.
- Event Log data.

Once you select **ROC** > **Collect Data**, the Collect Device Data screen displays.

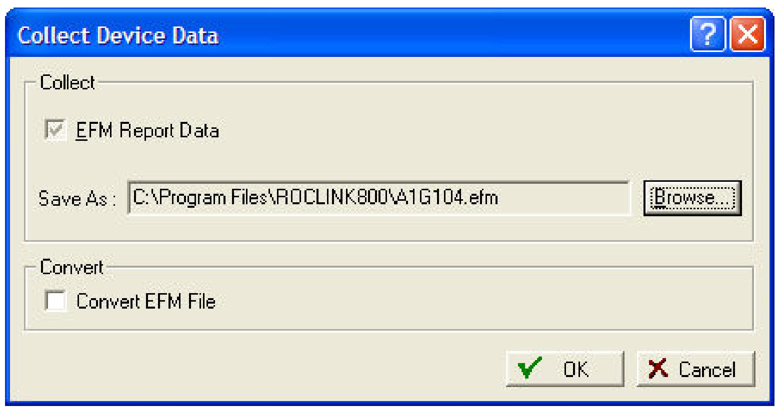


Figure 6-2. Collect Device Data

Field	Description
Collect	This **read-only** check box allows the Collect Data function to save all values for EFM parameters in a .EFM file.
Save As	Sets a file name (other than the default shown) to which the FB107 saves .EFM information.
Convert EFM File	Launches the EFM file conversion utility. After the system collects EFM data, you can convert the data to an .AGA, .CFX, or .DET file for subsequent import into the PGAS or Flow-Cal metering report applications. **Note**: You can also select this utility by selecting **Utilities** > **Convert EFM File**.

6.4 Setting the Clock

Immediately after connecting to a FloBoss for the first time, you should set the clock to ensure that the FB107 properly logs history.

The internal real-time clock provides time-stamping and control of the historical databases, Event Log, and Alarm Log.

Note: The user-selectable time stamp in the FloBoss reflects the time either at the beginning or at the end of the period. Select **Configure** > **History Points** > **Setup** tab to adjust this preference in the History Time Stamp field.

1. Select **ROC** > **Clock** or click the **Clock** icon in the toolbar. The Clock screen displays.

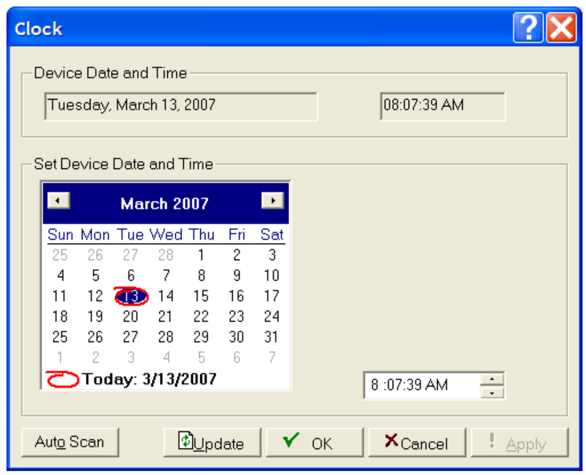


Figure 6-3. Clock

2. If the clock in your PC is set correctly, you can use it to set the FloBoss clock. Click **Today** at the bottom of the calendar.
3. If the PC clock is not correct:
   - Use the arrow buttons to select the correct Month and Year. You can also click the Month to select the exact month or the Year and use the arrows to select the desired Year.
   - Click on the desired **day** of the month.
   - Click on the time field and type in the desired value (type **P** or **A** for the AM/PM field) or use the arrows.
4. Click **Apply** if you changed any fields on this screen.
5. Click **OK**.

6.5 ROC Security

For a complete discussion of device security, refer to *Section 3.7.2, Device Security*.

6.6 ROC Comm Ports

For a compete discussion on configuring communication ports, refer to *Section 3.4, Configuring FB107 Communications Ports*.

6.7 ROC Device Memory

Use this option in troubleshooting and advanced diagnostics to display a screen that shows the memory address as a single hex address for the FloBoss.

1. Select **ROC** > **Memory**. The Device Memory screen displays.

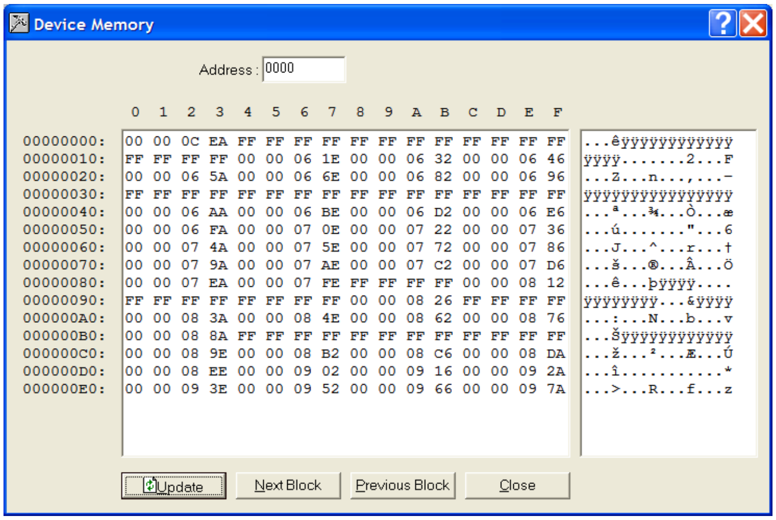


Figure 6-4. Device Memory

2. Complete the **Address** field with a vallid range of memory location and click **Update**.

   ROCLINK 800 updates the display to show the contents of 240 bytes of memory. The hexadecimal values appear on the left side of the screen; ASCII character equivalents appear on the right.

   Click **Next Block** and **Previous Block** to view the previous or next block (240 bytes) of memory. If you are viewing data that may be changing, click the **Update** button to refresh the screen with the most recent values from the FloBoss.

3. Click **Close** to exit the Device Memory screen.

6.8 Configuring Device Information

Use this option to set a number of variables—including station name, address, group, active PIDs and associated history points, and other global variables—as well as review device information that differentiates each individual FB107.

The Device Information screen has four tabs:

- **General** tab, which provides basic information about the FB107.
- **Points** tab, which allows you to change point-related information.
- **Other Information**, which displays customer information.
- **Revision Info**, which displays firmware and boot information.

6.8.1 Device Information General Tab

The General tab has basic information about the FloBoss.

1. Select **ROC** > **Information**. The Device Information screen displays, showing the General tab.

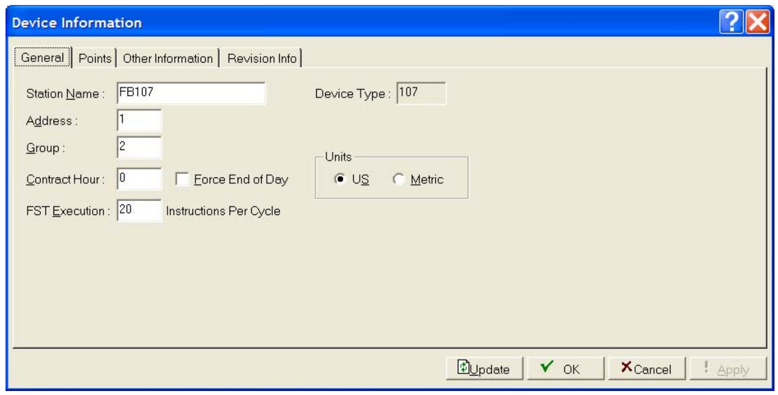


Figure 6-5. Device Information, General tab

2. Review the following fields for your organization's values:

Field	Description
Station Name	Sets the station name logged into EFM reports.
Device Type	This **read-only** field shows the currently attached device.
Address	Sets a unique address for this FB107 that differentiates it from all other FB107s in a communication group. Valid values are **1** to **255**. **Note**: To avoid communications problems, do not use **240**.
Group	Sets a number that identifies a group of FB107s for communication purposes. All FB107s defined as an area in the host must have the same group. Valid values are **1** to **255**. **Note**: To avoid communications problems, do not use **240**. With ROC Protocol, the values in the Address and Group fields must match the address defined in the destination device for communications to work.
Contract Hour	Sets the hour at which the system totals values for a single day of production, clears accumulators, and logs data to the Daily History database. The contract hour is based on a 24-hour clock using **0** as the midnight hour.

Field	Description
Force End of Day	Logs, when you select this check box and click **Apply**, the current day and its hourly values into memory for all historical data, with the exception of station totals. This field also resets the daily and hourly accumulator. **Note**: This option uses of the 35 possible slots for storing daily data.
Units	Sets the engineering units of measure. If you select **Metric**, the AGA calculations expect all input in the terms of the indicated units (such as kPa for static pressure input). The system expresses calculation results in the selected units.
FST Execution	Specifies how many FST instructions can be executed per FST execution cycle. Execution period is based on system scan speed. The default number of instructions is **20**. Under the default value, an FST with 30 sequential instructions runs in two execution periods, with 20 instructions in the first cycle and 10 in the second. **Note**: Any changes to this value take effect in the **next** execution cycle. Re-start is not required. To reduce the potential risk of loading on the FB107, monitor the MPU loading when making changes to this parameter. See *Section 6.8.3, Device Information Other Information Tab.*

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 6.8.2, Device Information Points Tab.*

6.8.2 Device Information Points Tab

The Points tab displays history point information.

1. Select the **Points** tab on the Device Information screen. The Points tab displays.

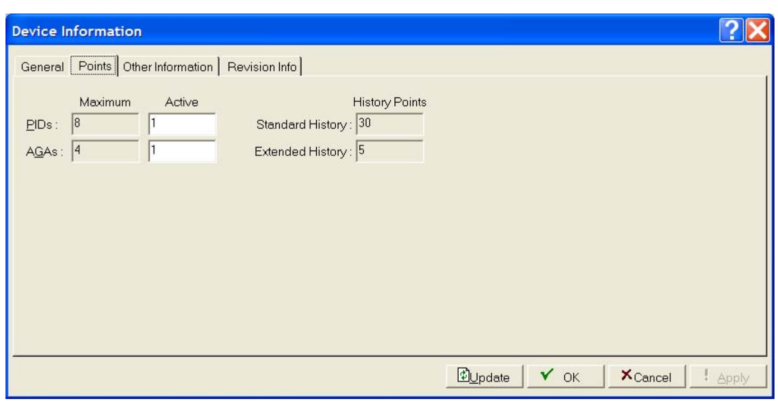


Figure 6-6. Device Information, Points tab

2. Review the following fields for your organization's values:

Field	Description
Maximum	This **read-only** field shows the maximum number of PID loops or AGA points (meter runs) allowed in the FB107.
Active	Sets the number of active PIDs loops or AGA points on the currently attached device. **Note**: This value cannot exceed the value shown in the Maximum number field. To conserve processor executions, set this value to the minimum value your application requires.
History Points	This **read-only** field shows, for both Standard History and Extended History, the number of points allocated for each. **Note**: You can configure these values on the Setup tab of the History Setup screen (**Configure** > **History Points**).

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 6.8.3, Device Information Other Information Tab.*

6.8.3 Device Information Other Information Tab

The Other Information tab displays customer information.

1. Select the **Other Information** tab on the Device Information screen. The Other Information screen displays.

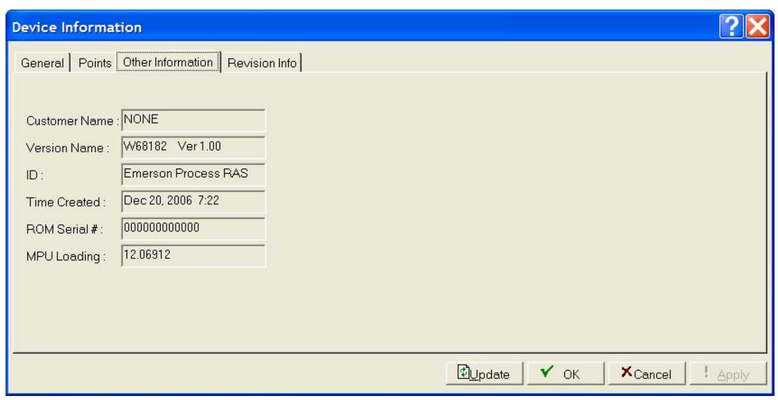


Figure 6-7. Device Information, Other Information tab

2. Review the information on this screen.

Field	Description
Customer Name	This **read-only** field shows the information about the customer or owner associated with this device.
Version Name	This **read-only** field shows the version number for this device.
ID	This **read-only** field shows the vendor associated with this device.
Time Created	This **read-only** field shows the date the firmware was created.

Field	Description
ROM Serial#	This **read-only** field shows The serial number assigned by the factory to the read only memory (ROM) installed in the device.
MPU Loading	This **read-only** field shows the processes in the processor (MPU Loading) .

3. Proceed to *Section 6.8.4, Device Information Revision Info Tab*

6.8.4 Device Information Revision Info Tab

The Revision Info tab displays information about the applicaton firmware or accessory software installed in the FB107.

1. Select the **Revision Info** tab on the Device Information screen. The Revision Info screen displays.

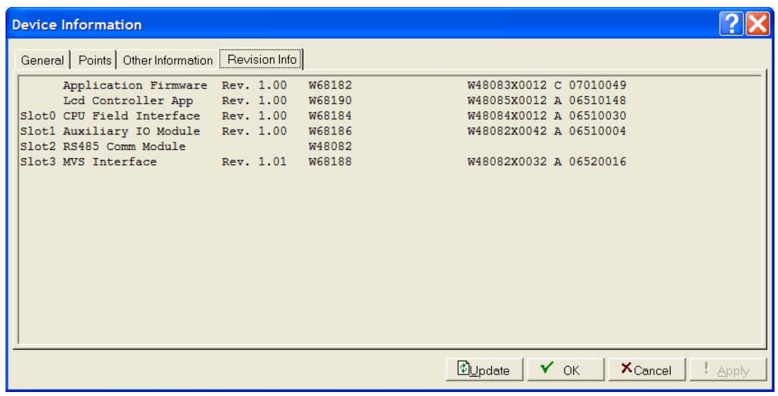


Figure 6-8. Device Information, Revision Info tab

2. Review the information on this screen.
3. Click **OK** to close the Device Information screen.

6.9 CPU Information

You can navigate FloBoss 107 options using the ROCLINK menu structure or by clicking on the FloBoss 107 graphic and selecting a tab or button. The graphical interface display shows the current settings of the point, including alarms and integrity.

To display the CPU information for the FloBoss 107, click the CPU module on the graphical interface.

The currently selected hardware displays at the bottom of the screen.

6.9.1 CPU Information General Tab

The CPU Information screen's General tab displays hardware and firmware information about the CPU.

1. Click the CPU module on the FB107's dynamic interface. The CPU Information displays the General tab.

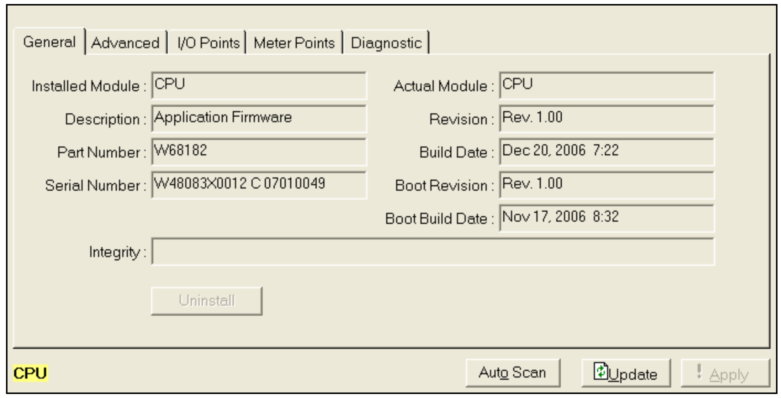


Figure 6-9. CPU Information, General tab

2. Review the following fields:

Field	Description
Installed Module	This **read-only** field shows the type of module the FloBoss 107 is using for point configuration and does not require that a module be physically installed to display. The FloBoss 107 remembers the “Installed Module” type until you “Uninstall” it. Refer to *Section 1.6.2*, *Actual versus Installed Module*.
Description	This **read-only** field shows a description of the hardware currently installed in the FloBoss.
Part Number	This **read-only** field show the **Part Number** of the firmware currently installed in the FloBoss 107.
Serial Number	This **read-only** field shows the **Serial Number** of the hardware currently installed in the FloBoss.
Actual Module	This **read-only** field shows the module physically installed in the backplane. ROCLINK 800 updates this field whenever you restart the FloBoss 107. Refer to *Section 1.6.2*, *Actual versus Installed Module*.
Revision	This **read-only** field shows the firmware revision for the hardware currently installed in the FloBoss 107.
Build Date	This **read-only** field shows the date the firmware was built for the hardware currently installed in the FloBoss 107.
Boot Revision	This **read-only** field shows the revision of the main startup firmware currently installed in the FloBoss or the smart application module.
Boot Build Date	This **read-only** field shows the date the main startup firmware was installed in the FloBoss or smart application module.

Field	Description
Integrity	This **read-only** field shows the status of the hardware currently installed in the FloBoss. Alarms display on the dynamic user interface to indicate the state of the hardware, including the CPU, I/O modules, CPU I/O assembly, MVS modules, communication modules, and smart application modules. You can mouse over an alarm icon to display the definition and they also display at the bottom of the screen under the I/O Points tab. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*. Integrity indicates the point is out of the user defined or default range. For example, when an AI is open the actual AD count is 0 but, the default range is 643 to 3220 or when a module was installed and improperly removed or loss of communications occurred.
Uninstall	Click to remove the hardware firmware currently installed in the FloBoss 107. The Installed Module field displays the type of module the FloBoss 107 uses for point configuration and does not require that a module be physically installed to display. The FloBoss 107 remembers the “installed module” type until you “uninstall” it. Refer to *Section 1.6.2*, *Actual versus Installed Module*. **Note**: Uninstall is valid for all modules except the CPU.

3. Proceed to *Section 6.9.2, CPU Information Advanced Tab*.

6.9.2 CPU Information Advanced Tab

Use the Advanced tab to configure CPU clock speed, scan period, sleep modes, and the loop output voltage.

1. Select the **Advanced** tab. The CPU Information Advanced screen displays.

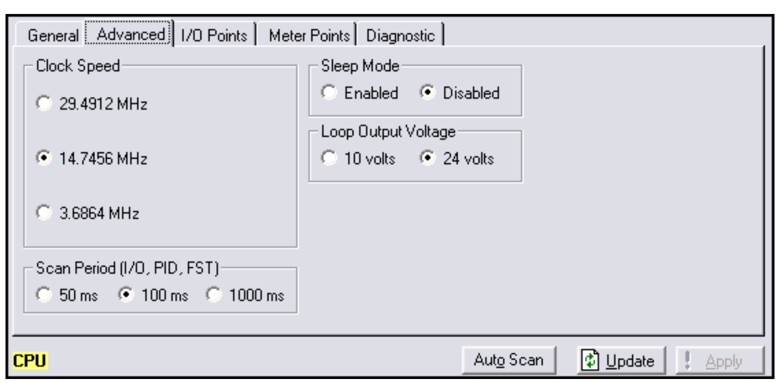


Figure 6-10. CPU Information, Advanced tab

2. Review the following fields.

Field	Description
Clock Speed	Sets the desired clock speed for the FloBoss 107 CPU. This value determines the speed at which the CPU executes code.
Scan Period	Sets the amount of time between updates of each scan. The system updates all inputs, such as FSTs, PIDs, and I/O, based on their individual scan periods. The FloBoss 107 has three configurable scan rate resolutions: 50 milliseconds, 100 milliseconds, and 1000 milliseconds (1 second). The minimum scan period allowed is 50 milliseconds.
Sleep Mode	Indicates whether the CPU uses a conserve power mode. Valid values are **Enabled** or **Disabled**; default is **Disabled**.
Loop Output Voltage	Sets the loop output power for I/O to 10 volts dc or 24 volts dc. The I/O module only supports 24 volts dc loop output power. **Note:** The CPU I/O assembly uses the CPU's loop power output and ground connections. The loop output powers field devices or transmitters that require 24 volts dc to ground, allowing the external device to send the FB107 a 4 to 20 mA signal based on pressure, temperature, level, and such. The 10-volt loop output power is intended for low power transmitters. The loop current is designed to deliver 80 mA to power two field devices that connect back to the two analog inputs. **Note:** If the input voltage is greater than the 10-volt loop, then the loop voltage equals the input voltage. For example, if the PWR IN is 14 volts dc and you select a 10-volt loop, the loop output equals 14 volts dc. You can use current analog inputs of 4 to 20 mA when the 250-ohm resistor is selected in the AI configuration using ROCLINK 800.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 6.9.3, CPU Information I/O Points Tab*.

6.9.3 CPU Information I/O Points Tab

Use the I/O Points to configure the CPU's system analog inputs.

1. Select the **I/O Points** tab. The CPU Module I/O Points screen displays.

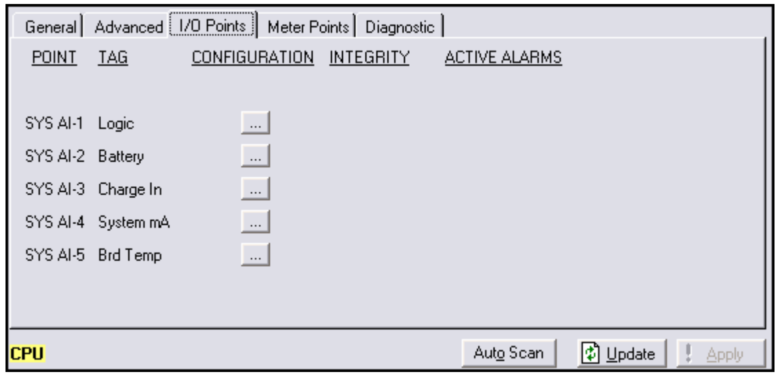


Figure 6-11. CPU Information, I/O tab

2. Review the following fields.

Field	Description
Point Type	This **read-only** field shows the database points associated with the installed hardware and CPU. The built-in inputs and outputs (I/O) on the CPU consist of a resistance thermal detector (RTD) input interface and five diagnostic analog inputs (AI) that monitor the: ▪ Logical voltage ▪ Battery voltage from the backplane voltage input connector ▪ Charge in voltage originating from the CPU power input. ▪ System milliamps originating from the power input from the CPU. (Use to determine current draw for battery sizing.) ▪ Battery temperature originating at the CPU.
Tag	Displays the tag associated with each point type.
Configuration	Click **…** to display an analog input screen you use to configure the point associated with the hardware.

3. For information on integrity or active alarms, refer to *Section 1.6.1, FloBoss 107 Dynamic Interface*.
4. Proceed to *Section 6.9.4, CPU Information Meter Points Tab*.

6.9.4 CPU Information Meter Points Tab

Uset the Meter Points tab to configure the meter run for the FloBoss.

1. Select the **Meter Points** tab. The CPU Information Meter Points screen displays.

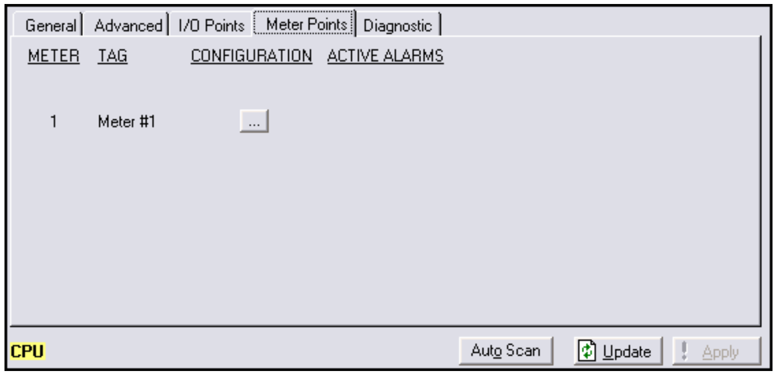


Figure 6-12. CPU Information, Meter Points tab

2. Review the following fields.

Field	Description
Meter	This **read-only** field shows the number associated with this meter.
Tag	Displays the tag associated with each point type.
Configuration	Click **…** to display a Meter Setup screen you use to configure the meter.

3. For information on active alarms, refer to *Section 1.6.1, FloBoss 107 Dynamic Interface*.

4. Proceed to *Section 6.9.5, CPU Information Diagnostic Tab*.

6.9.5 CPU Information Diagnostic Tab

Use the Diagnostic tab to display hardware statistics about the CPU.

1. Select the **Diagnostic** tab. The CPU Information Diagnostic screen displays.

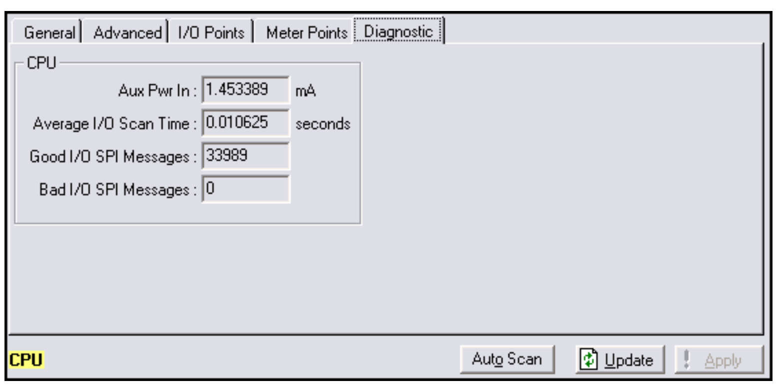


Figure 6-13. CPU Information, Diagnostic tab

2. Review the following fields.

Field	Description
Aux Pwr In	This **read-only** field shows the current input power the FB107 is acquiring at the battery.

Field	Description
Average I/O Scan Time	This **read-only** field shows the average time, in seconds, the PIDs, FSTs, and backplane scans have taken.
Good I/O SPI Messages	This **read-only** field shows the number of good Synchronous Peripheral Interface (SPI) messages that occurred at the backplane. SPI is the communications protocol used between the modules in the backplane and the CPU.
Bad I/O SPI Messages	This **read-only** field shows the number bad SPI messages that occurred at the backplane.

3. This completes the process for configuring I/O points on the CPU module.

6.10 Flags

Use the Flags screen to perform actions that affect the overall operation of the FloBoss. From this screen, you can save a configuration to Flash memory and, if necessary, re-initialize the FloBoss.

When you select **ROC** > **Flags**, ROCLINK 800 displays the Flags screen.

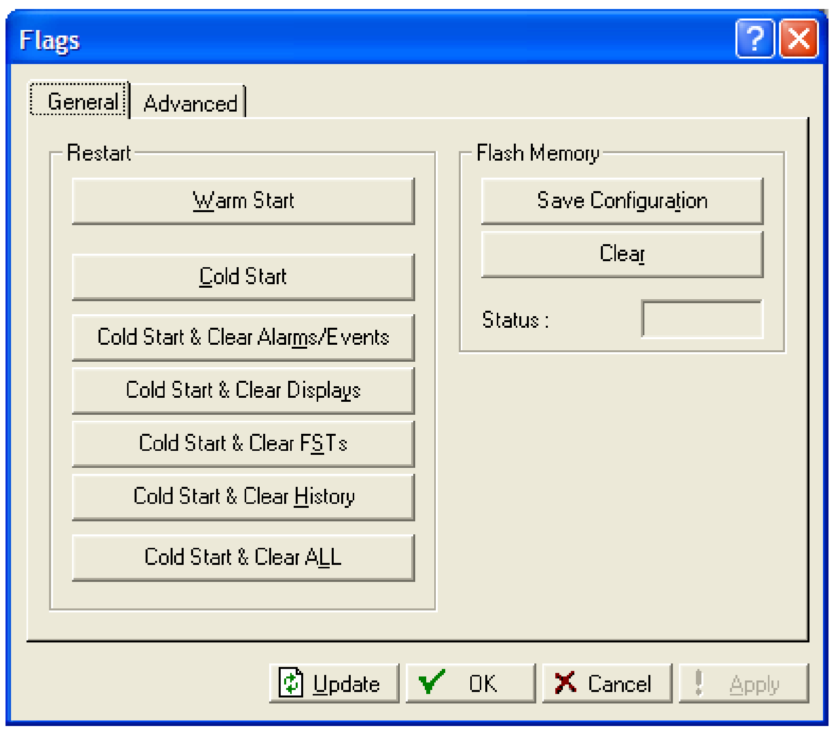


Figure 6-14. Flags

6.10.1 Flags General Tab

Use the General tab on the Flags screen to restart the FB107 or save your configuration to flash memory.

Notes:
- Be **very** careful when using the system flags. Certain flags lose data, change parameter values, and clear configuration memory. Be sure you understand the function of the Flags before changing them.
- If you select **Cold Start & Clear Displays**, the FB107 performs the cold start but **does not** clear any displays.

1. Select **ROC** > **Flags**. The Flags screen opens, displaying the General tab.

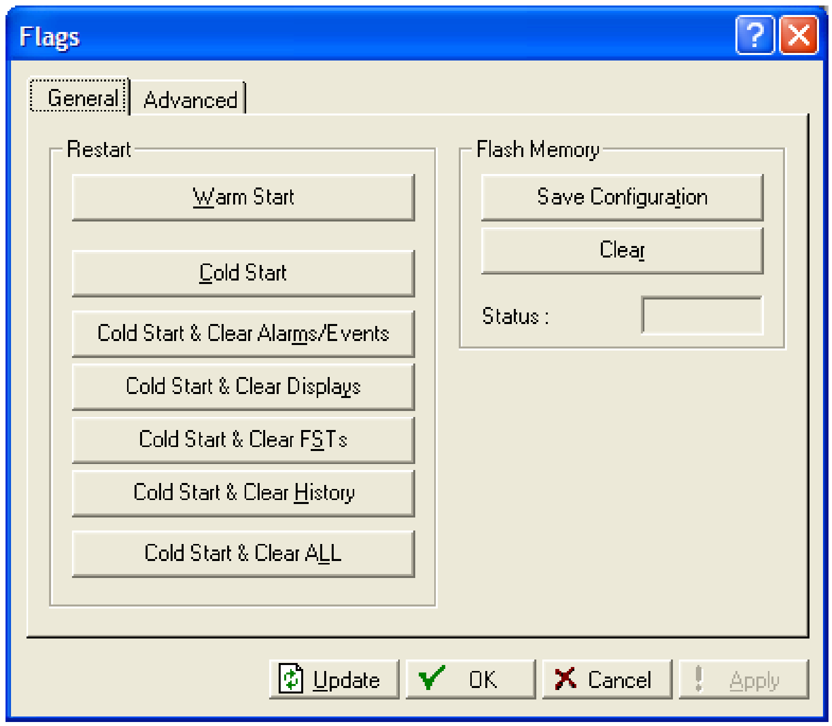


Figure 6-15. Flags, General tab

2. Click one of following buttons:

Button	Action
Warm Start	Following a warm start, ROCLINK 800 initializes SRAM memory. If the configuration is valid, databases and FSTs remain intact. If the configuration is not valid, ROCLINK 800 uses the last configuration saved to flash memory. To save a valid configuration, click **Save Configuration**. A user program remains on after a warm start. **Note**: Refer to *Appendix B, The FST Editor*, for details concerning an FST's state on a restart.

Button	Action
Cold Start	Initializes the FB107 from the last valid restart configuration saved in flash memory. If the configuration memory does not have a valid configuration written to it, the process uses the factory defaults. Use a cold start if a FloBoss is performing erratically, when the memory appears to be corrupted, or when resetting the unit to the last saved configuration. **Note**: **Cold Start** reloads all restart configuration data and may also clear logs, displays, and FSTs. Additionally, it may change outputs, load new accumulator values, and disable user program tasks and user data types. **Generally, do not use Cold Start on a FloBoss that is actively gathering data or performing control**. Save or document all required data and parameter values that could be affected **before** you perform a cold start. During a cold start, logs and FSTs may clear. If you performed a Save Configuration (which includes the FST and FST point in flash memory) before the cold start, the system reloads the saved FST reloads in place of the cleared one.
Cold Start & Clear Alarms/Events	Restores a configuration from default values stored in flash memory and clears the Alarm Log and Event Log.
Cold Start & Clear Displays	Restores a configuration from default values stored in flash memory but **does not** clear displays.
Cold Start & Clear FSTs	Restores a configuration from default values stored in flash memory and clears all FSTs.
Cold Start & Clear History	Restores a configuration from default values stored in flash memory and clears all History database files.
Cold Start & Clear All	Restores a configuration from default values stored in flash memory and clears all History database files, alarm logs, event logs, and FSTs.
Save Configuration	Saves the current configuration to flash memory.
Clear	Clears flash memory.
Status	This **read-only** field shows the status of the selected activity.

3. Proceed to *Section 6.10.3, Flags Advanced Tab*.

Reset Switch

The CPU module provides a reset (RST) switch which you can use to restart the FB107 from the boot block of flash memory (essentially a cold start) rather than from RAM (a warm start).

However, a CPU-based reset reconfigures all comm ports back to their factory defaults, shuts off all user programs and FSTs. All other data remains intact.

Note: Performing a reset using the CPU module's RST switch reloads the factory default settings for the communication ports and disables all FSTs and user programs.

6.10.2 Returning a Device to Factory Default Settings

Sometimes you may find it necessary to return a device to its original factory default settings. Use the following procedure to clear all saved restart configuration data contained in flash memory, retaining **only** the factory defaults.

1. Select **ROC** > **Flags**.
2. Click **Clear** in the Flash Memory frame. ROCLINK 800 displays a verification dialog box.
3. Click **Yes.** ROCLINK 800 displays a completed dialog box when the process completes.
4. Click **OK**.
5. Click **Cold Start & Clear All** to perform a cold start. ROCLINK 800 displays a verification dialog box.
6. Click **Yes**. ROCLINK 800 displays a dialog box when the process completes.
7. Click **OK**.

Note: You may need to re-connect as the factory default settings may be altered from the stored data.

6.10.3 Flags Advanced Tab

Use the Advanced tab to perform actions that affect the CRC checking and the I/O scanning.

1. Select the **Advanced** tab. The Flags Advanced screen displays.

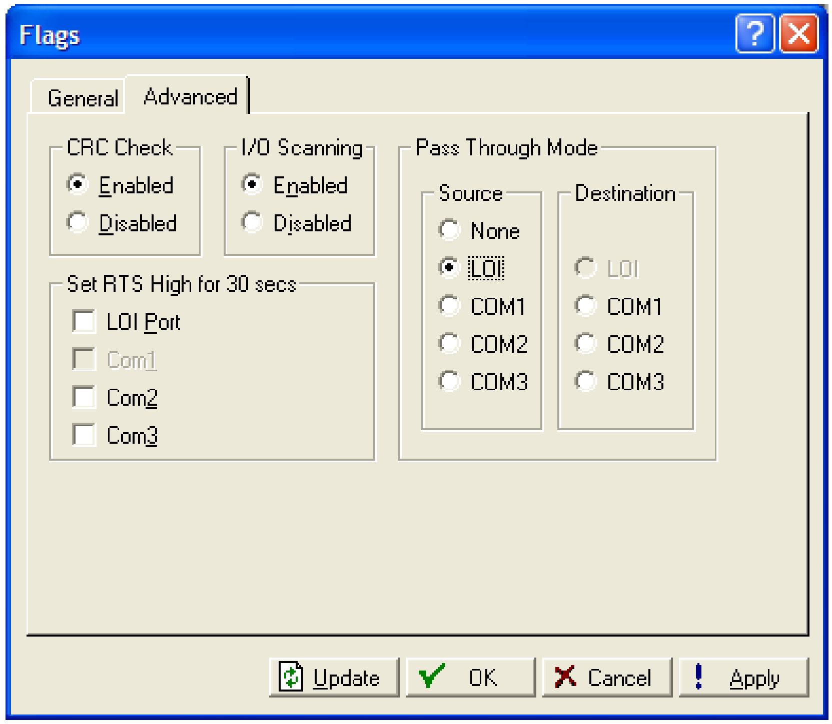


Figure 6-16. Flags, Advanced tab

2. Review the following fields.

Field	Description
CRC Check	Activates Cyclical Redundancy Checking (CRC) on ROC protocol communications. Valid values are **Enabled** or **Disabled**. The default is **Enabled**.
I/O Scanning	Activates I/O scanning for **read-only** field shows the average time, in seconds, the PIDs, FSTs, and backplane scans have taken. **Note**: You can also enable or disable I/O scanning on the I/O point displays.
Set RTS High for 30 Seconds	Sets the respective port (Local Port, COM2, or COM3) for the **Set RTS to High** for 30 Sec option and click Apply to activate the RTS (Request-to-Send) signal. The RTS signal turns on for 30 seconds.

Field	Description
Pass Through Mode	Sets a communications option to send Pass Through messages. By using any of the FloBoss communications ports, Pass Through Mode allows data to be received by one unit (source) and then passed through to other devices (destinations) connected on any other communications port. Select the Source and the Destination. For example, the host communicates via a radio on the FloBoss COM2 port. Other FloBoss units can then be connected via EIA-485 (RS-485) on the COM1 port of the first FloBoss, and then all the FloBoss can use the one radio to communicate to the host using the COM1 or COM2 option. **Note:** The group number of the FloBoss receiving the data must match the group number of the FloBoss units to which the data will be passed. If the Group number does not match, the data will be forwarded, but not received. Refer to **ROC** > **Information** to view or change the Group number.

3. Click **Apply** if you change any parameters on this screen.
4. Click **OK** to close this screen.

Chapter 7 – The Configure Menu

Use the Configure menu options to define points for inputs/outputs, control functions, user programs, Modbus, the optional FB107 Touchpad, and User C program data.

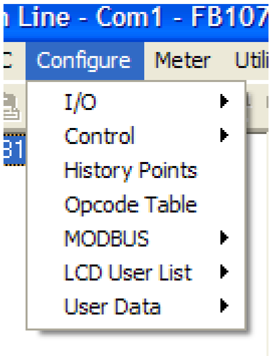


Figure 7-1. Configure Menu

In This Chapter

7.1 Configuring Input/Output (I/O)

The I/O module rack provides slots for up to seven I/O modules. The available expansion rack plugs directly into the FB107 module rack connector on the bottom edge of the MCU. *Figure 7-2* shows the positions of point numbers on the racks:

Slot	Point Number	Supported Module Types
0	A1-A14	CPU
1	B1-B8	Com, I/O, or Smart Module
2	B9-B16	Com, I/O, or Smart Module
3	C1-C8	I/O or Smart Module
4	C9-16	I/O or Smart Module
5	D1-D8	I/O or Smart Module
6	D9-D16	I/O or Smart Module
7	NA	Smart Module
7	B1-B8	I/O (if no I/O in slot 1)

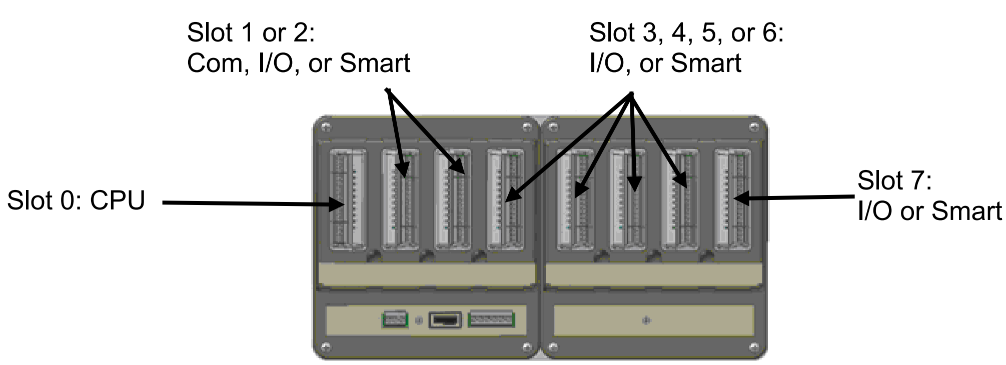


Figure 7-2. FloBoss 107 I/O Module Racks

Note: Slot 1 and Slot 7 share the I/O file/rack address. The address of slot 1 (B1-B8) is valid as long as no I/O module is installed in slot 7. The address of slot 7 (B1-B8) is valid as long as no I/O module is installed in slot 1.

You can configure many items for the I/O points in the FloBoss 107. For more information on the types of I/O available and their functions, refer to the *FloBoss 107 Flow Manager Instruction Manual* (Form A6206).

Note: You may also refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface* and *Section 1.6.2*, *Actual versus Installed Module* in this manual.

The graphical interface display shows the current settings of the point including alarms and integrity.

7.1.1 I/O Interface General Tab

You can navigate FloBoss 107 options using the I/O menu options or by clicking on the FloBoss 107 graphic and selecting a tab or button. The graphical interface display shows the current settings of the point including alarms and integrity.

The currently selected hardware displays at the bottom of the screen. This applies to the software-selectable AI/DI, DO, PI/DI channels, communications modules, and smart modules.

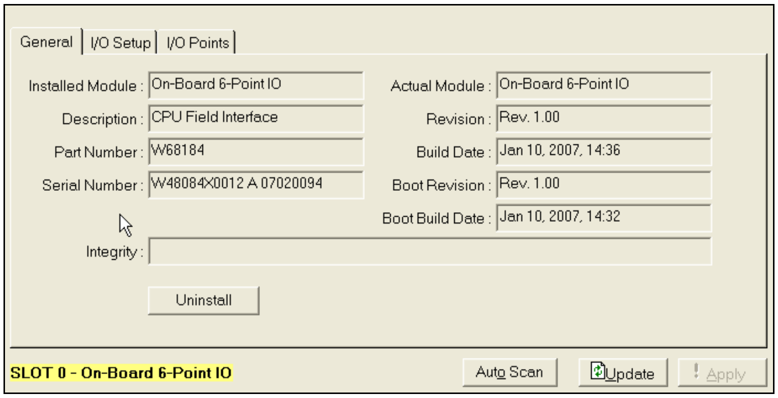


Figure 7-3. I/O Interface, General tab

Field	Description
Installed Module	This **read-only** field shows the type of module the FloBoss 107 uses for point configuration and does not require that a module be physically installed to display. The FloBoss 107 remembers the “Installed Module” type until you “Uninstall” it. Refer to *Section 1.6.2*, *Actual versus Installed Module*.
Description	This **read-only** field shows a description of the hardware currently installed in the FloBoss.
Part Number	This **read-only** field shows the part number of the hardware currently installed in the FloBoss 107.

Field	Description
Serial Number	This **read-only** field shows the serial number of the hardware currently installed in the FloBoss.
Actual Module	This **read-only** field shows the module is physically installed in the backplane. This field is updated whenever the FloBoss 107 is restarted. Refer to *Section 1.6.2*, *Actual versus Installed Module*.
Revision	This **read-only** field shows the firmware revision for the hardware currently installed in the FloBoss 107.
Build Date	This **read-only** field shows date the firmware was built for the hardware currently installed in the FloBoss 107.
Boot Revision	This **read-only** field shows Displays the revision of the main startup firmware currently installed in the FloBoss or hardware.
Boot Build Date	This **read-only** field shows the date the main startup firmware currently installed in the FloBoss or hardware.
Integrity	This **read-only** field shows the status of the hardware currently installed in the FloBoss 107. Alarms display on the user interface indicating the state of the hardware including the CPU, I/O modules, CPU I/O assembly, MVS modules, communication modules, and smart application modules. You can mouse over an alarm icon to display the definition.
Uninstall	Click to remove the hardware currently installed in the FloBoss 107. This field displays the type of module the FloBoss 107 uses for point configuration and does not require that a module be physically installed to display. The FloBoss 107 remembers the "Installed Module" type until you "Uninstall" it. Refer to *Section 1.6.2*, *Actual versus Installed Module*.

7.1.2 I/O Interface I/O Setup Tab

Use this tab to assign types of I/O to each channel **before** you configure the I/O points. This applies to the software-selectable AI/DI, DO, and PI/DI channels only.

Note: You can also use the configuration tree (at the left of the ROCLINK 800 screen) to navigate to this screen.

1. Select the **I/O Setup** tab. The I/O Setup screen displays.

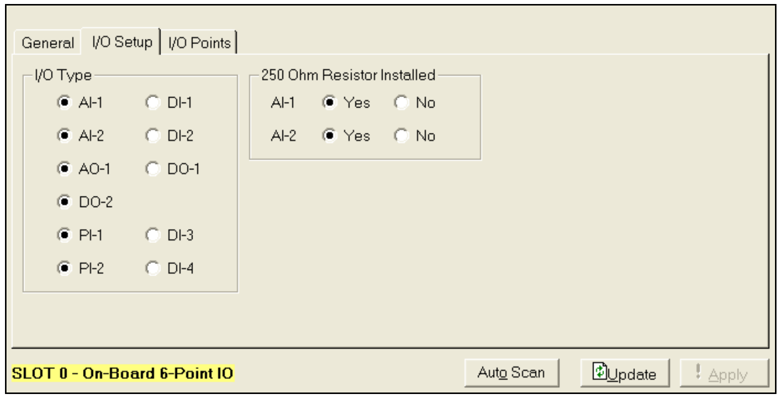


Figure 7-4. I/O Interface, I/O Setup tab

2. Review the following fields for your organization's values:

Field	Description
I/O Type	Sets the types of I/O assigned to each channel be before you configure the I/O points. This applies to the software-selectable AI/DI, DO, and PI/DI channels only.
250 Ohm Resistor Installed	Indicates whether a 250-ohm resistor is used for the analog inputs. Valid values are **Yes** (configures inputs to 4 to 20 mA) or **No** (configures inputs to 0 to 5 V dc input). The default is **Yes**. A 250-ohm resistor is required for use between the + and – analog inputs when you implement 4 to 20 mA inputs. **Note**: This field displays **only** if you select AI-1 or AI-2 as an I/O Type.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.1.3, I/O Interface I/O Points Tab*.

7.1.3 I/O Interface I/O Points Tab

Use the I/O Points tab to configure assigned points on the FB107.

1. Select the **I/O Points** tab. The I/O Points screen displays.

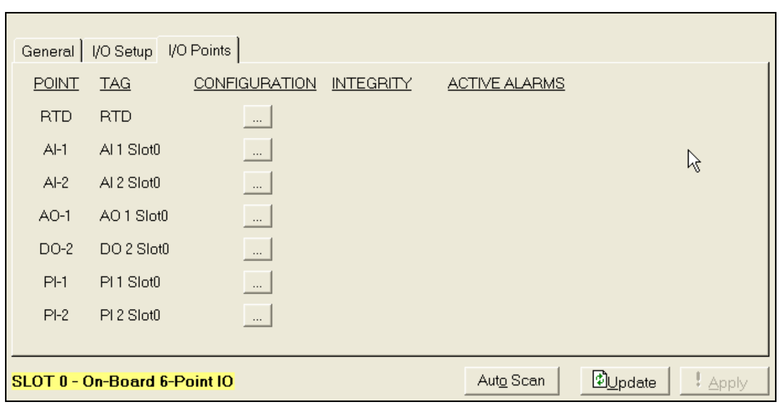


Figure 7-5. I/O Interface, I/O Points tab

2. Review the following fields for your organization's values:

Field	Description
Point	Defines the database point to be one of the possible types of points available to the system. The point type determines the basic functions of a point. Point type displays the database points associated with the installed hardware and CPU. The point type indicates the location of the point at the slot number of the I/O module and channel number. For example, **DO-2** indicates the point number for a discrete output at module slot zero, channel two.
Tag	Sets a short (10 alphanumeric characters) identifier for the point.
Configuration	Click **…**(the TLP button) to display a configuration screen you use to configure the point associated with the hardware.
Integrity	This **read-only** field shows Displays the status of the hardware currently installed in the FloBoss 107. Alarms display on the user interface indicating the state of the hardware including the CPU, I/O modules, CPU I/O assembly, MVS modules, communication modules, and smart application modules. You can mouse over an alarm icon to display the definition. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*. Integrity indicates the point is out of the user defined or default range. For example, when an AI is open the actual AD count is 0, but the default range is 643 to 3220 or when a module was installed and improperly removed or loss of communications occurred.
Active Alarms	This **read-only** field shows any alarms that are active for this point. When Alarming is set to Enabled, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. If Alarming is Disabled, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.

3. Click **Apply** if you change any parameters on this screen.

7.2 Analog Input (AI) Configuration

Analog inputs are analog signals that measurement devices (such as pressure and temperature transmitters, including RTD probes and pressure sensors) generate.

Note: Use the AI configuration screens to configure a DVS and RTD inputs for the FloBoss 107. DVS points, Differential Pressure, and Static Pressure are visible once you connect a DVS sensor.

Select **Configure** > **I/O** > **AI Points**. The Analog Input screen displays.

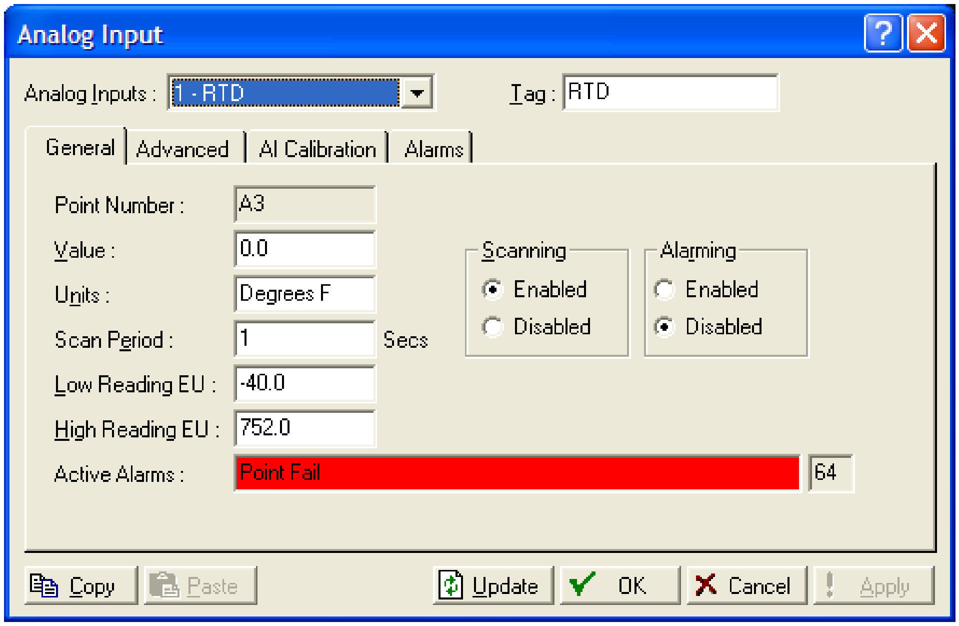


Figure 7-6. Analog Input

The Analog Input screen has four tabs. Use each tab to configure a component of the input.

- Use the **General** tab to set the basic parameters for the analog input point.
- Use the **Advanced** tab to configure features, such as filtering, A/D conversions, and clipping for the selected analog input.
- Use the **AI Calibration** tab to calibrate the AI point while on-line.
- Use the **Alarms** tab to set the alarm parameters for this AI point.

Note: If you enable Alarming (**Configure** > **I/O** > **AI Points** > **General** tab), configure the limit alarms (four levels, rate, and deadband) on the Alarms tab. To conserve alarm log space, enable alarms only when necessary. If you do not plan to use all the alarms, check and adjust the value of each one to prevent the generation of false alarms.

Refer to *Sections 7.2.1* through *7.2.4* for a complete description of the fields on each tab.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.2.1 AI General Tab

The Analog Input screen initially displays the General tab. Use this tab to set the basic parameters for the analog input point.

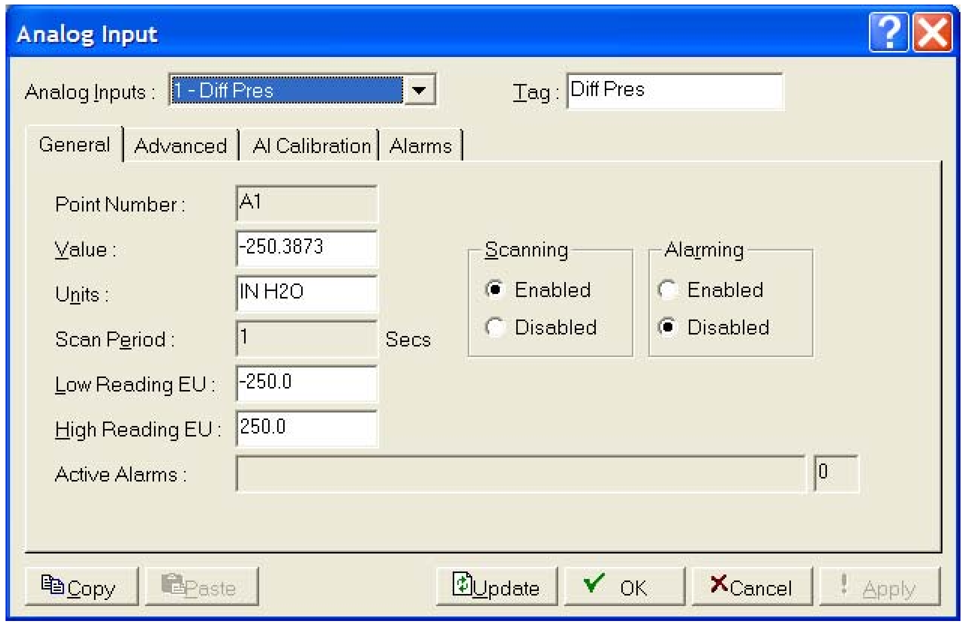


Figure 7-7. AI, General tab

1. Review the following fields for your organization's values:

Field	Description
Analog Inputs	Selects the analog input to be configured. The inputs are listed by both Point Number and Tag. **Note**: This selection in this field applies to each tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note**: This selection in this field applies to each tab on this screen.
Point Number	This **read-only** field identifies the rack location for this point.
Value	Reads value from a field device. **Note**: When scanning is **disabled**, enter a value to override the input. If scanning is **enabled**, this field displays the last analog scan in engineering units.
Units	Sets the engineering units for the I/O (such IN H20, PSIG, MCF, degrees F, milliamps, volts, etc.).
Scan Period	Sets the amount of time between updates of the Filter value. All analog inputs are updated based on their individual Scan Periods. The default value is 100 milliseconds. The minimum **Scan Period** allowed is 50 milliseconds.

Field	Description
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent input. For example, if a temperature transmitter is connected to the analog input with a range of –40 to 160 degrees F, the Low Reading EU would be set to –40.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent input. For example, if a temperature transmitter is connected to the analog input with a range of –40 to 160 degrees F, the High Reading EU would be set to 160.
Scanning	Sets the scanning option for this point. Valid values are **Enabled** (automatically process the field input and display the last analog input scan in the Value field) or **Disabled** (permit only manual updates of the Value field). **Note**: If you enable alarming, the FB107 generates a Manual Mode alarm when scanning is disabled. If Scanning is set to Disabled, you must manually enter a value in the Value field to override the input.
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband - on the Alarms tab) or **Disabled** (does not generate limit alarms). **Note**: The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you Enable alarming, the system generates an alarm if you disable scanning.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.2.2, AI Advanced Tab.*

7.2.2 AI Advanced Tab

Use the Advanced tab to configure features, such as filtering, A/D conversions, and clipping for the selected analog input.

1. Select the **Advanced** tab. The Advanced screen displays.

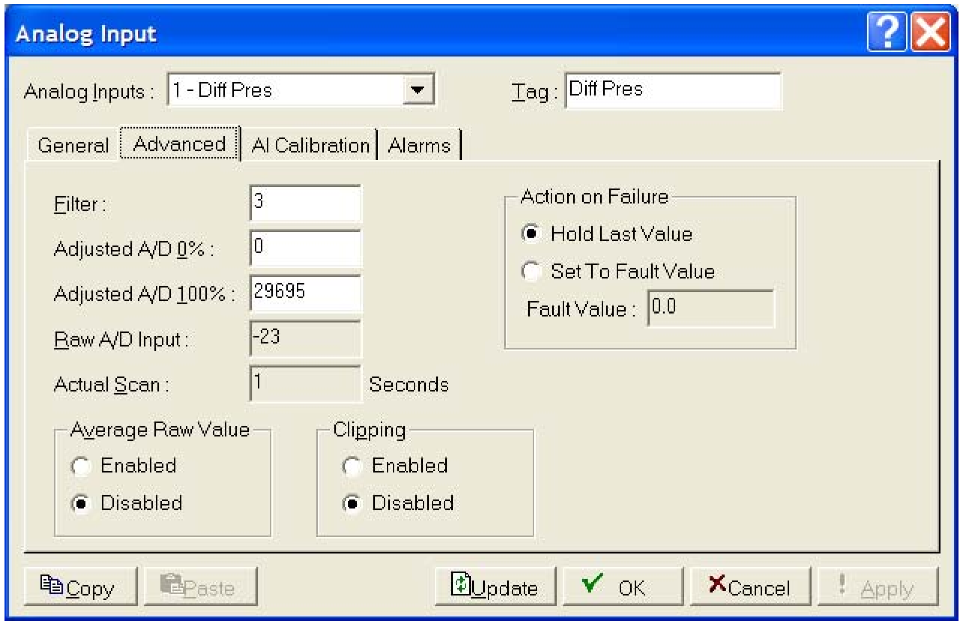


Figure 7-8. AI, Advanced tab

2. Review the following fields for your organization's values:

Field	Description
Filter	Sets the value for a weighted sample using a percentage of the last value plus a percentage of the new value. The entered value is the percentage of the last value used. The filter is calculated every scan period by the formula: (Last Value x Entered %) + [New Value x (100 – Entered %)] = Filtered Value
Adjusted A/D 0%	Sets the calibrated Analog-to-Digital count corresponding to zero percent input. In the Calibrate function, this value is altered to set the zero percent input exactly at the Low Reading EU value.
Adjusted A/D 100%	Sets the calibrated Analog-to-Digital count corresponding to 100 percent input. Use this value to convert the input to engineering units. In the Calibrate function, this value is altered to set the 100 percent input exactly at the High Reading EU value.
Raw A/D Input	This **read-only** field shows the current digital count directly from the Analog-to-Digital converter.
Actual Scan	This **read-only** field shows the actual amount of time, in seconds, taken to complete the entire list of tasks. This value should be the same as the value in the Scan Period field on the General tab if the system is not overloaded.
Average Raw Value	Sets whether the system averages raw values during the scan period. Valid values are **Enabled** (average and calculate the raw readings during the scan period and use the results as the Raw A/D Input during calculations) or **Disabled** (acquire instantaneous values).

Field	Description
Clipping	Forces the filtered EUs within a defined limit set on the Alarms tab. Valid values are **Enabled** (forces the filtered EUs to stay within a range defined by the cut off limits, set by using the LoLo Alarm and HiHi Alarm parameters defined on the Alarms tab) or **Disabled** (do not force clipping).
Action on Failure	Sets how the system acts on point failure. Valid values are **Hold Last Value** (retain the last input value on point fail) and **Set to Fault Value** (write the value in the Fault Value field to the Filtered Value on point fail).

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.2.3, AI AI Calibration Tab.*

7.2.3 AI AI Calibration Tab

Use this tab to select an RTD input or analog input to calibrate.

The calibration routine provides Verify, Calibrate, and Zero Shift functions for AI, DVS, and RTD inputs. You can calibrate differential pressure (orifice metering may be High or Low Differential Pressure, depending on the device), static pressure, or temperature readings for each meter run.

1. Select the **AI Calibration** tab. The AI Calibration screen displays.

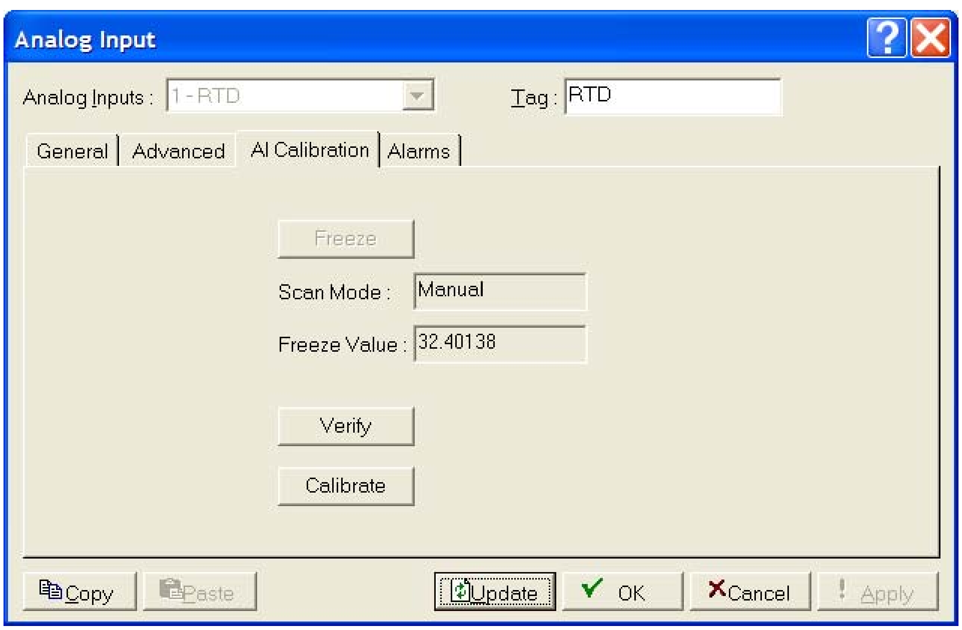


Figure 7-9. AI, AI Calibration tab

2. Select either an **RTD input** or **analog input**.
3. Click **Update** to request one value update from the input.
4. Click **Freeze** to stop the system from updating input values during verification or calibration.

5. Click **Update** and then **Freeze** to create the freeze value the system uses in ongoing processing (such as flow calculations and history logging) while performing calibration.

Note: The Freeze Value field displays the value received from the AI or RTD input when you last clicked **Update**.

6. Review the value in the **Scan Mode** field. Valid values are **Normal** (point scanning is enabled and is updated each scan period) or **Manual** (the point is not in scanning mode).

7. If you are calibrating a temperature input, disconnect the RTD sensor and connect a decade box (or comparable equipment) to the RTD terminals of the FloBoss.

Note: You can also use a pocket current source or another deadweight test input source to test this value.

8. Press **Calibrate**. A Set Zero dialog box displays.

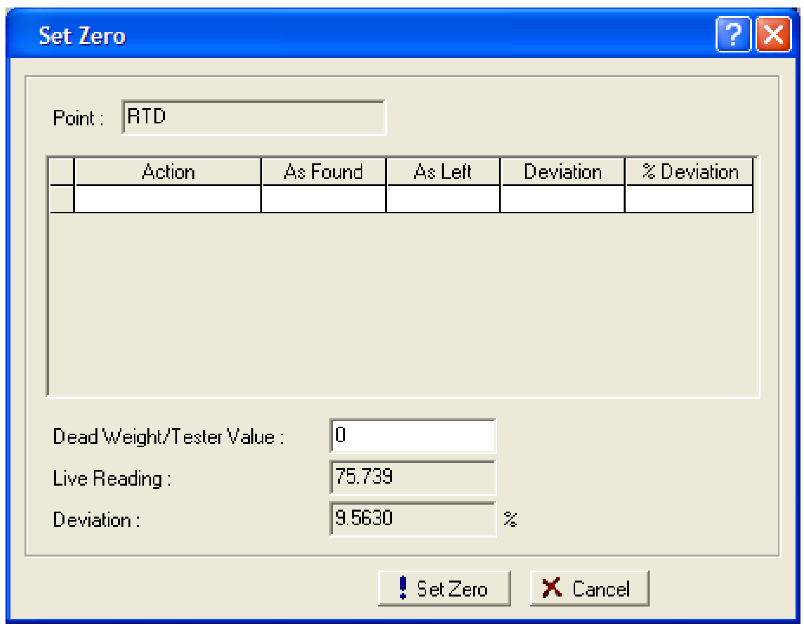


Figure 7-10. Set Zero

9. Enter a value in the Dead Weight/Tester Value field and click **Set Zero** to set a zero value. Note that ROCLINK 800 changes the screen name and button name to **Set Span**.

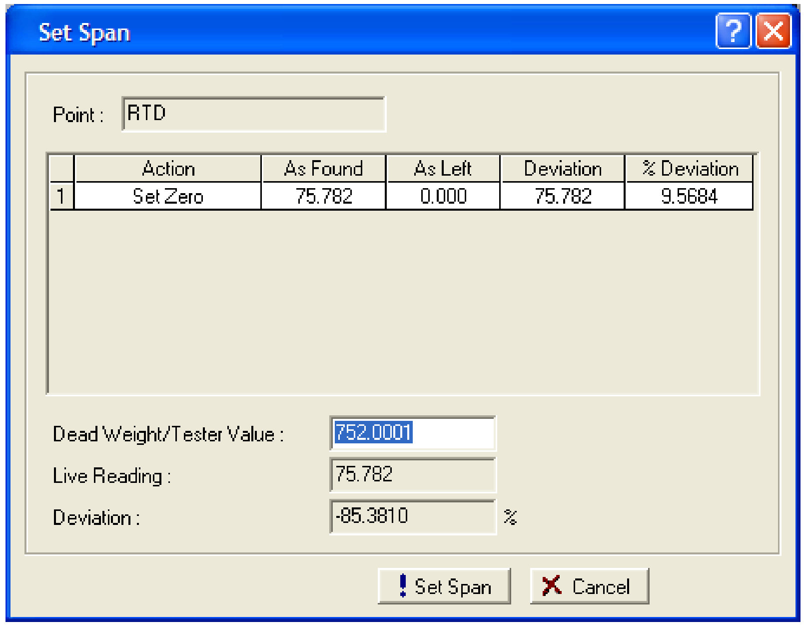


Figure 7-11. Set Span

For the Set Zero entry in the calibration log, ROCLINK 800 records the **As Found** and **As Left** values and calculates the **Deviation** and **% Deviation** values (between the Dead Weight/Tester Value and the Live Reading values).

10. Enter a value in the Dead Weight/Tester Value for the span and click **Set Span** to set a span value and record the values in the calibration log. Note that ROCLINK 800 changes the screen name and button name to **Set Mid 1**.

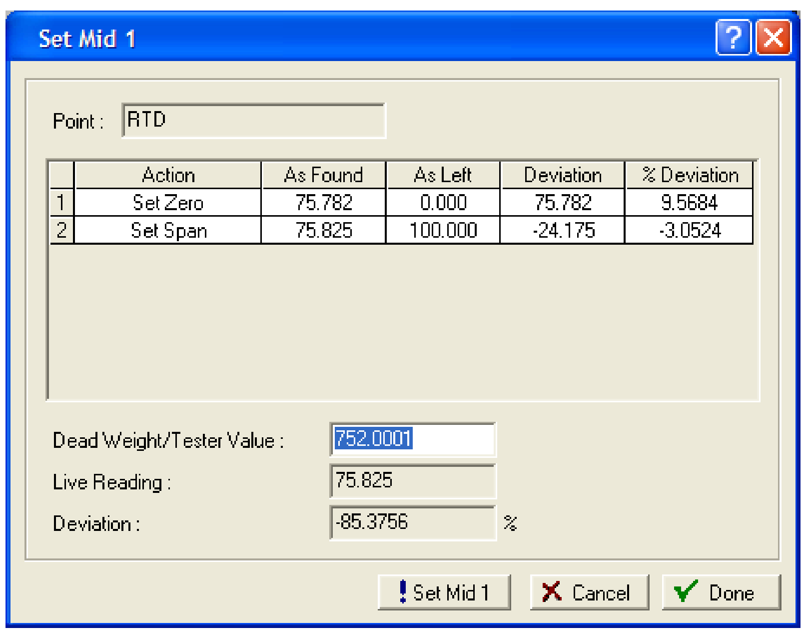


Figure 7-12. Set Midpoint 1

11. If you do not wish to configure midpoints, click **Done**. The AI Calibration screen displays. If you wish to configure midpoints, click **Set Mid 1** to define the first midpoint value. You can define up to three midpoints (typically at 25%, 50%, and 75%). Click **Done** when you finish configuring midpoints.

When the AI Calibration screen displays, you can calibrate inputs for another AI or RTD by starting again at step 1. Otherwise, proceed to *Section 7.2.4, AI Alarms Tab*.

7.2.4 AI Alarms Tab

Use this tab to set the alarm parameters for this AI point.

Note: You must enable alarming on the General tab to configure the limit alarms (Low, High, LoLo, HiHi, Rate, and Deadband) on this tab.

To conserve alarm log space, enable alarms only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one alarm to prevent the generation of false alarms.

1. Select the **Alarms** tab. The Alarms screen displays.

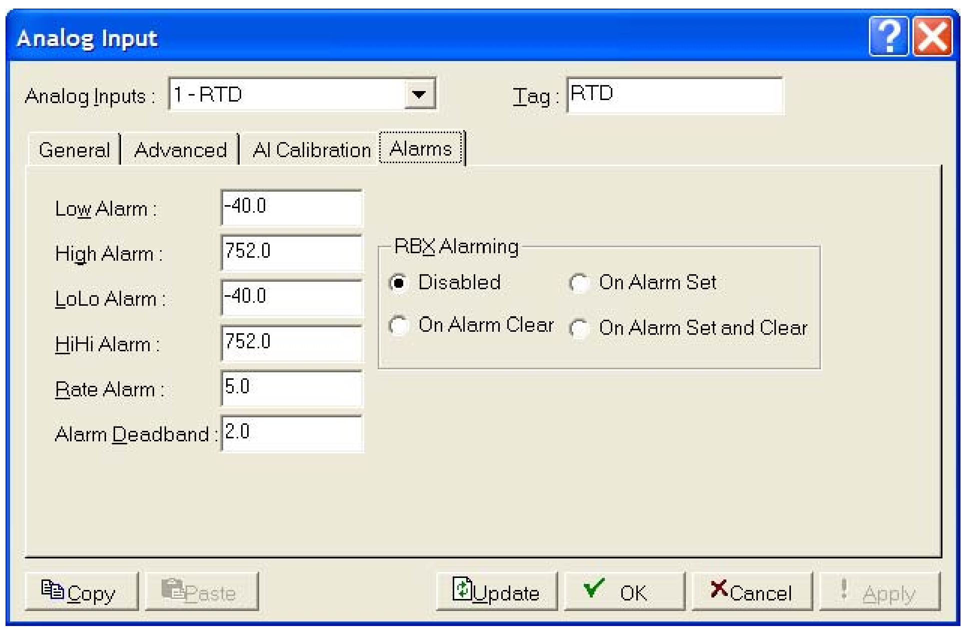


Figure 7-13. AI, Alarms tab

2. Review the following fields for your organization's values.

Field	Description
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a Low alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a High alarm.

Field	Description
LoLo Alarm	Sets, in engineering units, a value to which the input value must fall to generate a LoLo alarm. **Note**: Typically you set the value for the LoLo Alarm lower than the value for the Low alarm.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a HiHi Alarm. **Note**: Typically you set the value for the HiHi Alarm higher than the value for the High alarm.
Rate Alarm	Sets, in engineering units, a value that represents the maximum amount of change allowed in the calculated rate between updates before an alarm generates. If the change is equal to or greater than this value, an alarm occurs, **Note**: To disable the rate alarm without disabling the other alarms, you can set the rate alarm value greater than the scan of the analog input.
Alarm Deadband	Sets, in engineering units, an inactive zone above the Low Alarm limits and below the High Alarm limits. The Alarm Deadband prevents the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This prevents the Alarm Log from being over-filled with data.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: **Disabled** – Turns off RBX alarming. This is the **default**. **On Alarm Set** – Generates an RBX message to the host when the point **enters** an alarm condition. **On Alarm Clear** – Generates an RBX message to the host when the point **leaves** an alarm condition. **On Alarm Set and Clear** – Generates an RBX message to the host when the point **enters** or **leaves** an alarm condition. **Note**: RBX Alarming requires you to configure the communications port. Refer to *Section 3.4.3, Comm Ports RBX Tab.*

3. Click **Apply** if you change any parameters on this screen.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.3 Analog Output (AO) Configuration

Analog outputs are analog signals the FB107 generates to regulate equipment such as control valves or any device requiring proportional control.

Select **Configure** > **I/O** > **AO Points**. The Analog Output screen displays.

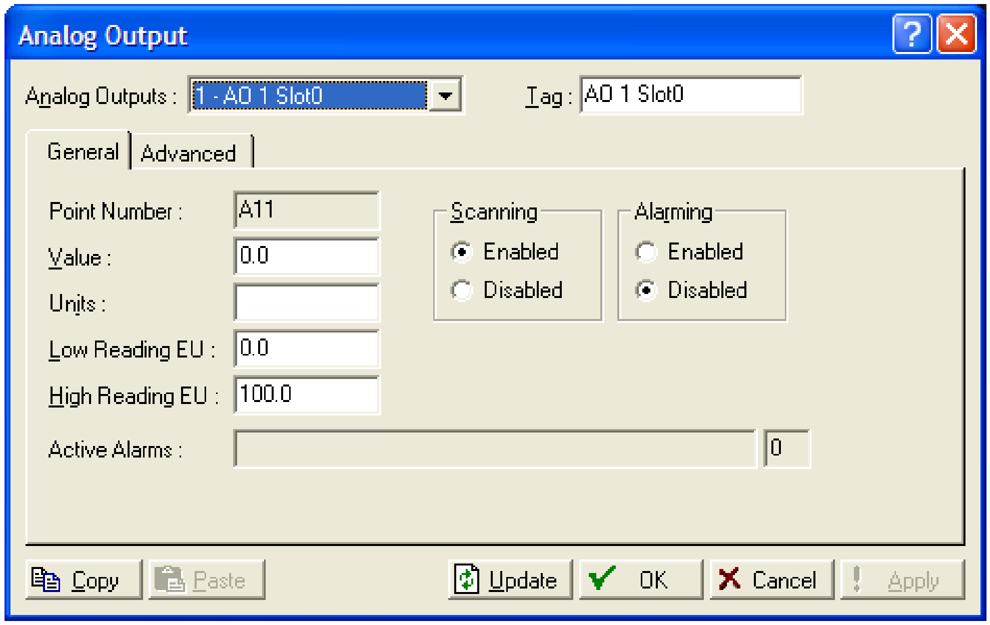


Figure 7-14. Analog Output

The Analog Output screen has two tabs. Use each tab to configure a component of the output.

- Use the **General** tab to set the basic parameters for the analog output point.
- Use the **Advanced** tab to configure features, such as on-restart power settings and RBX alarming.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.3.1 AO General Tab

The Analog Output screen initially displays the General tab. Use this tab to set the basic parameters for the analog output point.

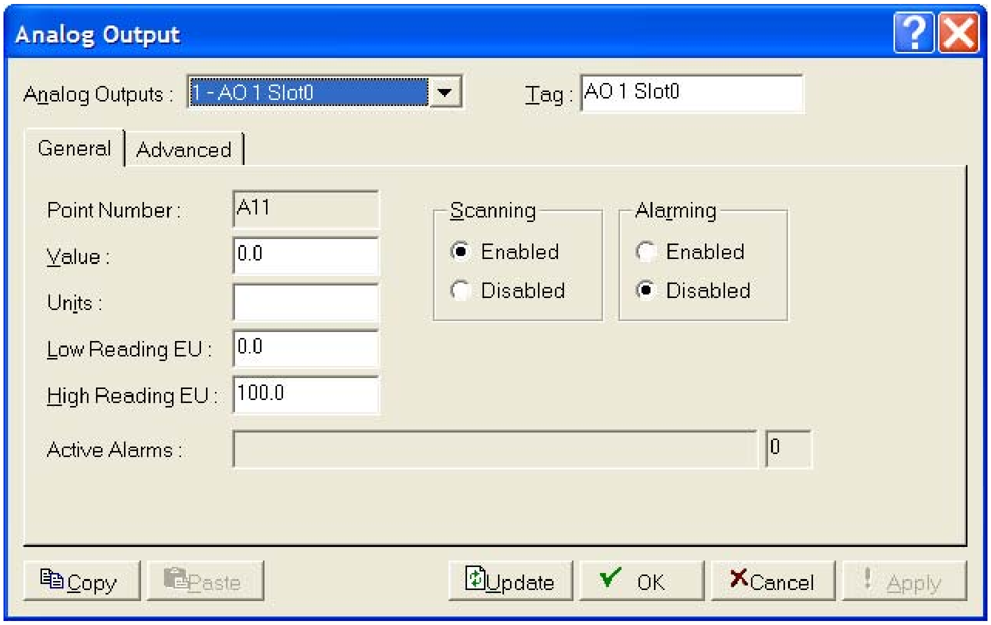


Figure 7-15. AO, General tab

1. Review the following fields for your organization's values.

Field	Description
Analog Outputs	Selects the analog output to be configured. The outputs are listed by both Point Number and Tag. **Note**: This selection in this field applies to each tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note**: This selection in this field applies to each tab on this screen.
Point Number	This **read-only** field identifies the rack location for this point.
Value	Sets a value to override the output. **Note**: When scanning is **disabled**, enter a value to override the output. If scanning is **enabled**, this field displays the last analog scan in engineering units.
Units	Sets the engineering units for the I/O (such IN H20, PSIG, MCF, degrees F, milliamps, volts, etc.).
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding analog signal.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding analog signal

Field	Description
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*. **Note**: A read-back error indicates the AO is driving the output to a set level, but the loop is not responding. Example: An I/P converter is connected to the A/O and set to 25%. If the I/P is not connected or an open wire occurs, a read-back error would display.
Scanning	Sets the scanning option for this point. Valid values are **Enabled** (automatically process the field input and display the last analog output scan in the Value field) or **Disabled** (permit only manual updates of the Value field). **Note**: If you enable alarming, the FB107 generates a Manual Mode alarm when scanning is disabled. If Scanning is set to Disabled, you must manually enter a value in the Value field to override the input.
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband - on the Alarms tab) or **Disabled** (does not generate limit alarms). **Note**: The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.3.2 AO Advanced Tab*.

7.3.2 AO Advanced Tab

Use the Advanced tab to configure features, such as resetting and RBX Alarming for the analog output.

1. Select the **Advanced** tab. The Advanced screen displays.

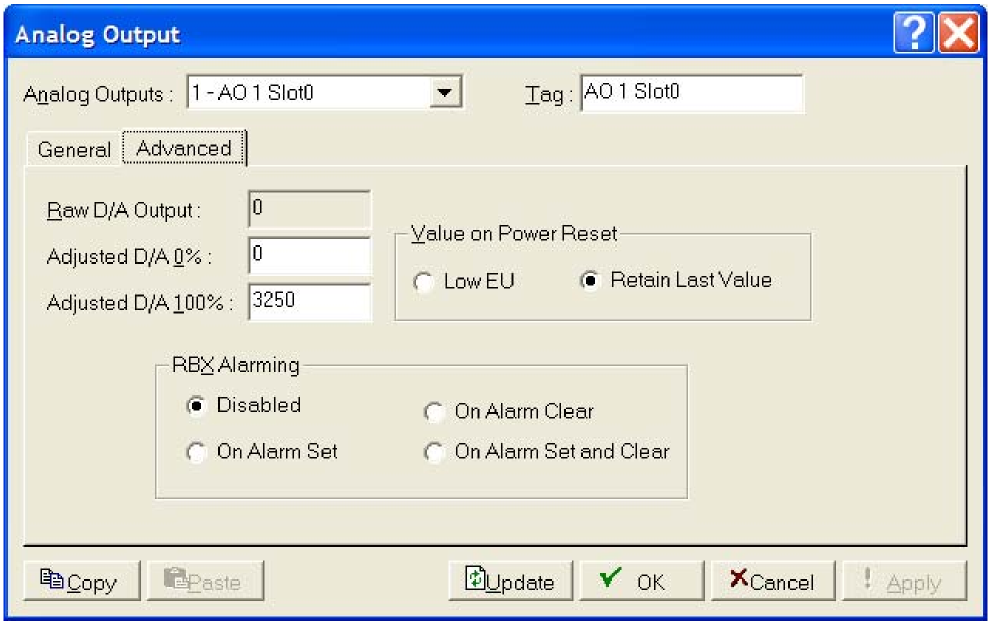


Figure 7-16. AO, Advanced tab

2. Review the following fields for your organization's values.

Field	Description
Raw D/A Input	This **read-only** field shows the current counts written to the digital-to-analog converter. The D/A value set to the AO is the raw D/A output. The default value is **0**.
Adjusted D/A 0%	Sets the count the digital-to-analog converter uses for zero percent output. This value is also used to scale the output to engineering units. The default is **0.**
Adjusted D/A 100%	Sets the count decoded by the digital-to-analog converter for 100 percent output. This value is also used to scale the output to engineering units. The default is **3250**.
Value on Power Reset	Sets what value the system uses on a power restart or a warm start. Valid values are **Low EU** (sets Value parameter on General tab to value in Low Reading EU field value) or **Retain Last Value** (maintain last output value). **Retain Last Value** is the default.

Field	Description	
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are:	
	Disabled	Turns off RBX alarming. This is the **default**.
	On Alarm Set	Generates an RBX message to the host when the point **enters** an alarm condition.
	On Alarm Clear	Generates an RBX message to the host when the point **leaves** an alarm condition.
	On Alarm Set and Clear	Generates an RBX message to the host when the point **enters** or **leaves** an alarm condition.
	Note: RBX Alarming requires you to configure the communications port. Refer to *Section 3.4.3, Comm Ports RBX Tab.*	

3. Click **Apply** if you change any parameters on this screen.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.4 Discrete Input (DI) Configuration

Discrete Input (DI) modules monitor the status of relays, open collector/open drain type solid-state switches, and other two-state devices. Each DI channel can also be software configured to function as a "latched" DI, which remains in the active state until reset. Other parameters can invert the field signal and gather statistical information on the number of transitions and the time accumulated in the on or off state.

Select **Configure** > **I/O** > **DI Points**. The Discrete Input screen displays.

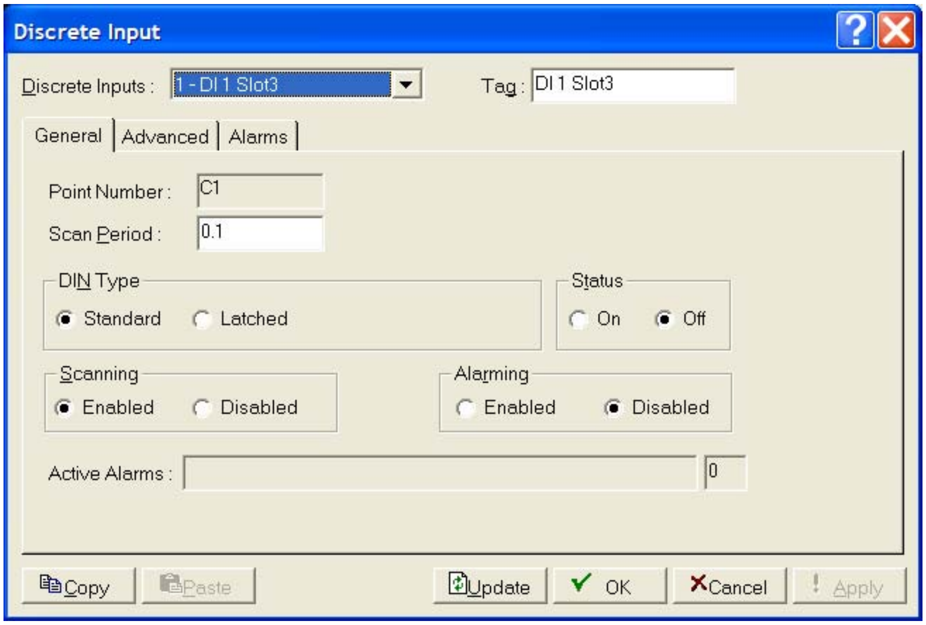


Figure 7-17. Discrete Input

The Discrete Input screen has three tabs. Use each tab to configure a component of the input.

Examine the default settings and adjust the parameters to suit your application on each of the tabs in the order given below.

- Use the **General** tab to set the basic parameters for the DI point.
- Use the **Advanced** tab to configure features, such as filtering, input inversion, and counter values for the discrete output.
- Use the **Alarms** tab to set alarm parameters for this DI point.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.4.1 DI General Tab

The Discrete Input screen initially displays the General tab. Use this tab to set the basic parameters for the discrete input point.

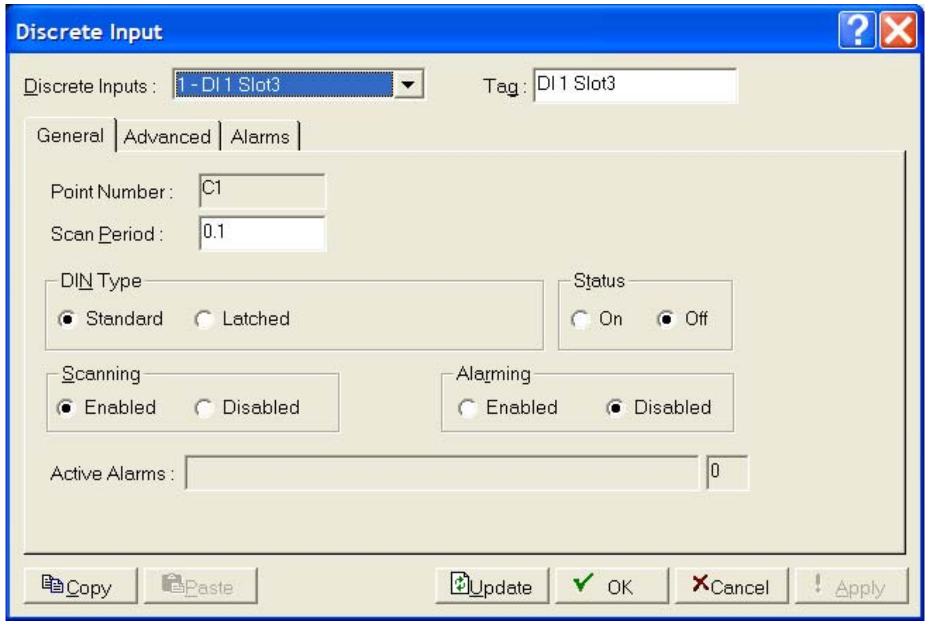


Figure 7-18. DI, General tab

1. Review the following fields for your organization's values:

Field	Description
Discrete Inputs	Selects the discrete input to be configured. The inputs are listed by both Point Number and Tag. **Note**: This selection in this field applies to each tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note**: This selection in this field applies to each tab on this screen.
Point Number	This **read-only** field identifies the rack location for this point.
Scan Period	Sets, in seconds, how frequently the system scans the input.
DIN Type	Sets how the DI works. Valid values are: **Standard** Follow the actual field input. **Latched** Maintains the input status. For example, in an active transition from off to on, the DI remains in the on state until you clear the Status parameter either manually or through the software.
Status	Sets the state of the discrete input. Valid values are **On** (indicates that a contact is closed or input is on) or **Off** (indicates that a contact is open or input is off).

Field	Description
Scanning	Sets the scanning option for this point. Valid values are **Enabled** (automatically process the field input and display the last analog input scan in the Value field) or **Disabled** (permit only manual updates of the Value field). **Note**: If you enable alarming, the FB107 generates a Manual Mode alarm when scanning is disabled. If Scanning is set to Disabled, you must manually enter a value in the Value field to override the input.
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband - on the Alarms tab) or **Disabled** (does not generate limit alarms). **Note**: The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you Enable alarming, the system generates an alarm if you disable scanning.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.4.2, DI Advanced Tab*.

7.4.2 DI Advanced Tab

Use the Advanced tab to configure features (such as filtering, input inversion, and counter values) for the discrete input.

1. Select the **Advanced** tab. The Advanced screen displays.

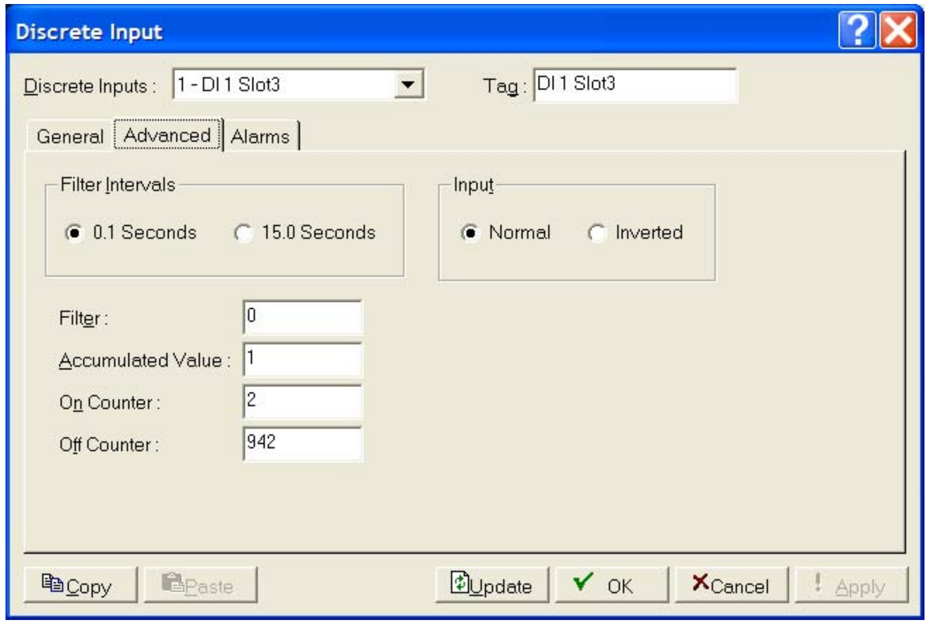


Figure 7-19. DI, Advanced tab

2. Review the following field for your organization's values.

Field	Description
Filter Intervals	Sets, with the Filter parameter, the amount of time that the discrete input must remain in the On (high) state before it is recognized as such. Valid values are **0.1 Seconds** and **15.0 Seconds**. Enter the Filter value as a number from 0 to 255; the Filter Intervals selection determines the time basis. The discrete input returns to the Off state immediately upon detection of the On to Off transition; there is no filtering for this transition.
Input	Sets the state of the input. Valid values are **Normal** (field input operates normally, so that On is On) or **Inverted** (inverts the field input in the Status field so that On becomes Off and vice-versa). In the Inverted state, an open circuit in the field would then be indicated as On in the Status field, and closed contacts would be indicated as Off.
Filter	Sets, in conjunction with the Filter Intervals field, the amount of time that the discrete input must remain in the On (high) state before it is recognized as such. Enter the **Filter** value as a valid between **0** to **255**. The discrete input returns to the Off state immediately upon detection of the On to Off transition; there is no filtering for this transition.
Accumulated Value	Counts the number of times the discrete input goes from Off to On. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator by entering the desired value or clear the accumulator by entering **0**.

Field	Description
On Counter	Counts the number of 50-millisecond periods when the Status parameter is in the On state. The On Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the On Counter by entering the desired value or clear the counter by entering **0**. **Note**: The On Counter does not function if you **disable** scanning.
Off Counter	Conts the number of 50-millisecond periods when the Status parameter is in the Off state. The Off Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the Off Counter by entering the desired value or clear the counter by entering **0**. **Note**: The Off Counter does not function if you **disable** scanning.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.4.3, DI Alarms Tab*.

7.4.3 DI Alarms Tab

Use the Alarms tab to configure the alarm parameters for this discrete input.

1. Select the **Alarms** tab. The Alarms screen displays.

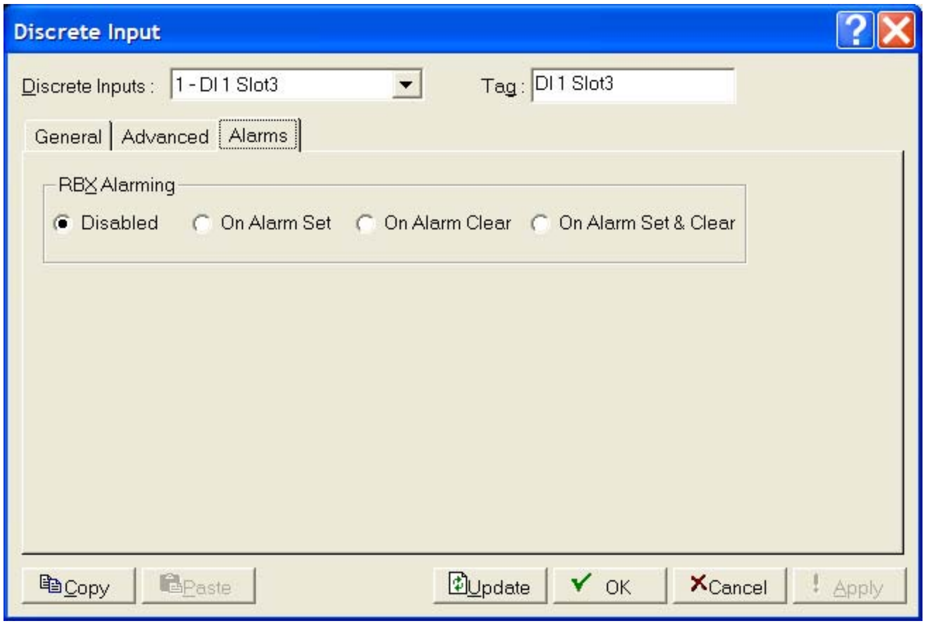


Figure 7-20. DI, Alarms tab

2. Review the following field for your organization's values.

Field	Description
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: **Disabled** – Turns off RBX alarming. This is the **default**. **On Alarm Set** – Generates an RBX message to the host when the point **enters** an alarm condition. **On Alarm Clear** – Generates an RBX message to the host when the point **leaves** an alarm condition. **On Alarm Set and Clear** – Generates an RBX message to the host when the point **enters** or **leaves** an alarm condition. **Note**: RBX Alarming requires you to configure the communications port. Refer to *Section 3.4.3, Comm Ports RBX Tab.*

3. Click **Apply** if you change any parameters on this screen.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.5 Discrete Output (DO) Configuration

DOs are high/low outputs used to turn equipment on and off. You can set a discrete output to send a pulse to a specified device. You can also configure a discrete output as latched, momentary, toggle, Timed Duration Output (TDO), and TDO toggle.

Select **Configure** > **I/O** > **DO Points**. The Discrete Output screen displays.

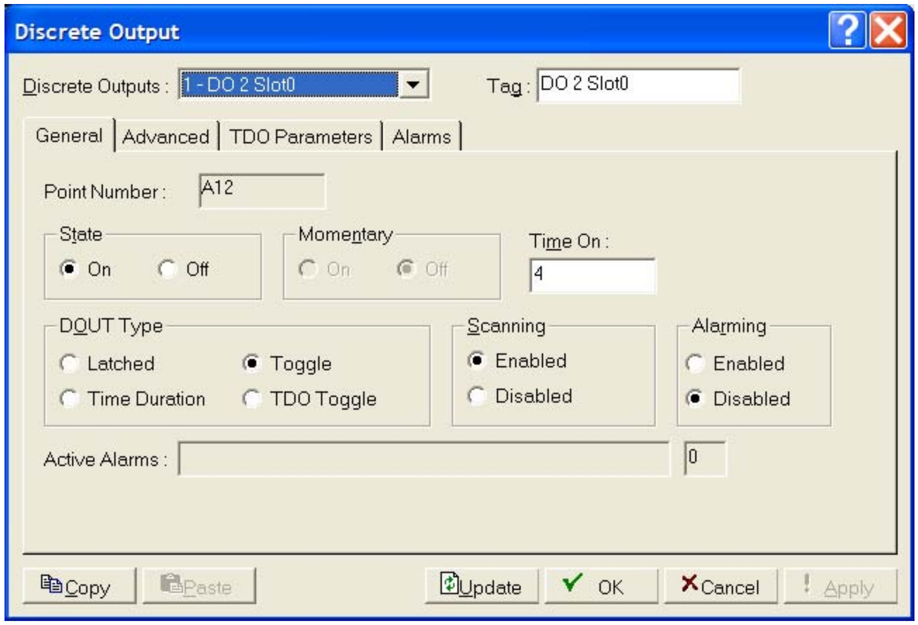


Figure 7-21. Discrete Output

The Discrete Output screen has four tabs. Use each tab to configure a component of the output.

- Use the **General** tab to set the basic parameters for the DO point.
- Use the **Advanced** tab to configure accumulated value and state for reset for the selected DO.
- Use the **TDO Parameters** tab to configure time duration parameters.

  Note: This tab **does not** display if you choose **Latched** in the DOUT Type field on the General tab.

- Use the **Alarms** tab to set the alarm parameters for the DO point.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.5.1 DO General Tab

The Discrete Output screen initially displays the General tab. Use this tab to configure the basic parameters for the DO point.

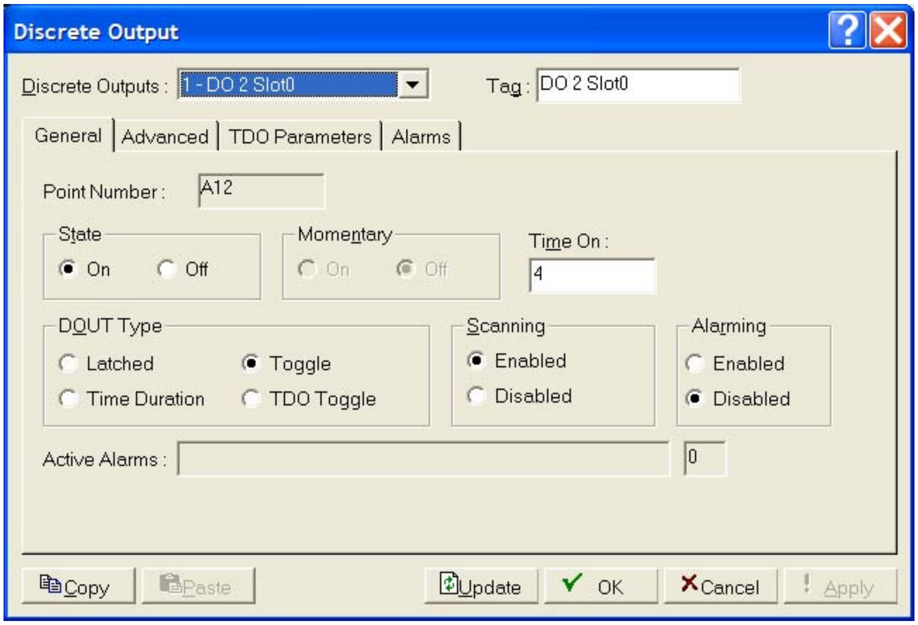


Figure 7-22. DO, General tab

1. Review the following fields for your organization's values.

Field	Description
Discrete Outputs	Selects the discrete output to be configured. The outputs are listed by both point number and tag. **Note**: This selection in this field applies to each tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note**: This selection in this field applies to each tab on this screen.
Point Number	This **read-only** field identifies the rack location for this point.
State	Indicates the **State** of the discrete output. Valid values are **Off** (indicating that the output is off or that a contact is open) or **On** (indicating that the output is on or that a contact is closed).
Momentary	Activates the one-shot Momentary mode. If you select **On**, set the value in the DOUT Type to **Latched**, set a value in the Time On field, and then click **Apply**, ROCLINK 800 activates the discrete output for the amount of time defined in the Time On field. At the end of that time, ROCLINK 800 resets this value to **Off**.
Time On	Sets, in seconds, the amount of time for momentary operation. The default value is **1** second. **Note**: In Momentary mode, this is the amount of time (in seconds) that the momentary contact is energized. In the Toggle mode, this is the time (in seconds) between switching On or Off. In the TDO and TDO Toggle modes, the TDO configuration calculates this value.

Field	Description
DOUT Type	Selects the function of this discrete output. Valid values are: **Latched** – Changes – on an active transition of the output (from off to on) – the discrete output status to On and leaves the output in that state until cleared (by selecting the Off in the Status field). **Time Duration** – Enables the discrete output to have a time duration. **Note**: Selecting this option displays the TDO Parameters tab on the Discrete Output screen. Use that tab to define time-related parameters (see *Section 7.5.3, DO TDO Parameters Tab*). **Toggle** – Enables the discrete output to enter the Toggle mode. Toggle mode enables a square-wave output for which both the Time On and Time Off are defined by the value in the Time On field. Time On and Time Off are equal. **Note**: Selecting this option displays the TDO Parameters tab on the Discrete Output screen. Use that tab to define time-related parameters (see *Section 7.5.3, DO TDO Parameters Tab*). **TDO Toggle** – Enables the discrete output to use the TDO Toggle mode. The DO continuously repeats in a cycle defined by the value in the Cycle Time field (on the TDO Parameter tab) where the EU Value controls the on-time duration. **Note**: Selecting this option displays the TDO Parameters tab on the Discrete Output screen. Use that tab to define time-related parameters (see *Section 7.5.3, DO TDO Parameters Tab*).
Scanning	Sets the scanning option for this point. Valid values are **Enabled** (automatically process the field input and display the last analog output scan in the Value field) or **Disabled** (permit only manual updates of the Value field). **Note**: If you enable alarming, the FB107 generates a Manual Mode alarm when scanning is disabled. If Scanning is set to Disabled, you must manually enter a value in the Value field to override the input.

Field	Description
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband - on the Alarms tab) or **Disabled** (does not generate limit alarms). **Note**: The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.5.2, DO Advanced Tab.*

7.5.2 DO Advanced Tab

Use this tab to configure accumulated value and state for reset for the selected DO.

1. Select the **Advanced** tab. The Advanced screen displays.

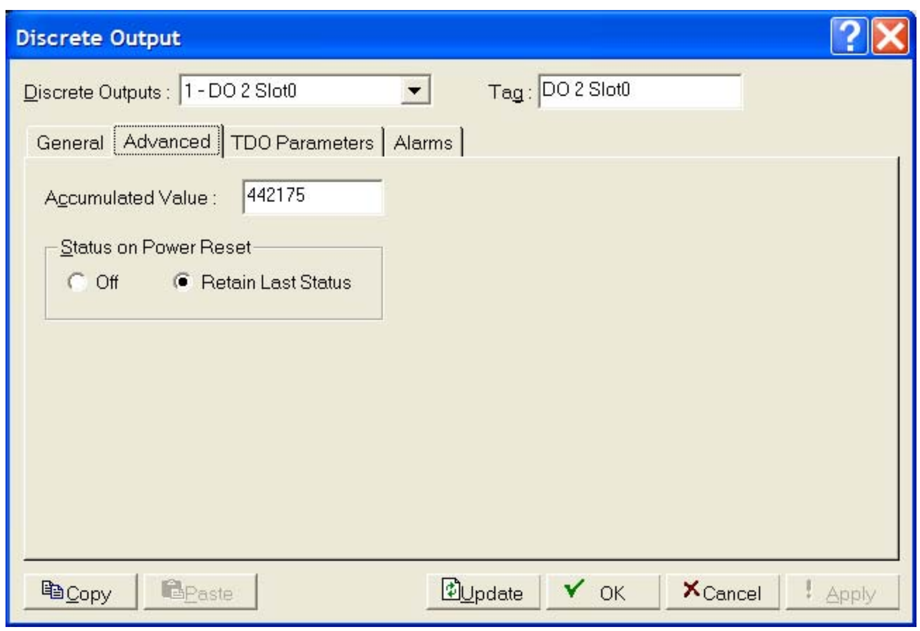


Figure 7-23. DO, Advanced tab

2. Review the following fields for your organization's values.

Field	Description
Accumulated Value	Sets a value for the accumulated number of off-to-on transitions for the discrete output. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator to a desire value or clear it by enter zero (**0**).
Status on Power Reset	Indicates how the FloBoss handles the discrete output state on power resets. Valid values are **Off** (discrete output is off on power reset) or **Retain Last Status** (FB107 retains the DO status, whether off or on).

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.5.3, DO TDO Parameters Tab.*

7.5.3 DO TDO Parameters Tab

Use this tab to configure time duration parameters for this DO point.

Note: This tab **does not** display if you choose **Latched** in the DOUT Type field on the General tab.

1. Select the TDO Parameters tab. The TDO Parameters screen displays.

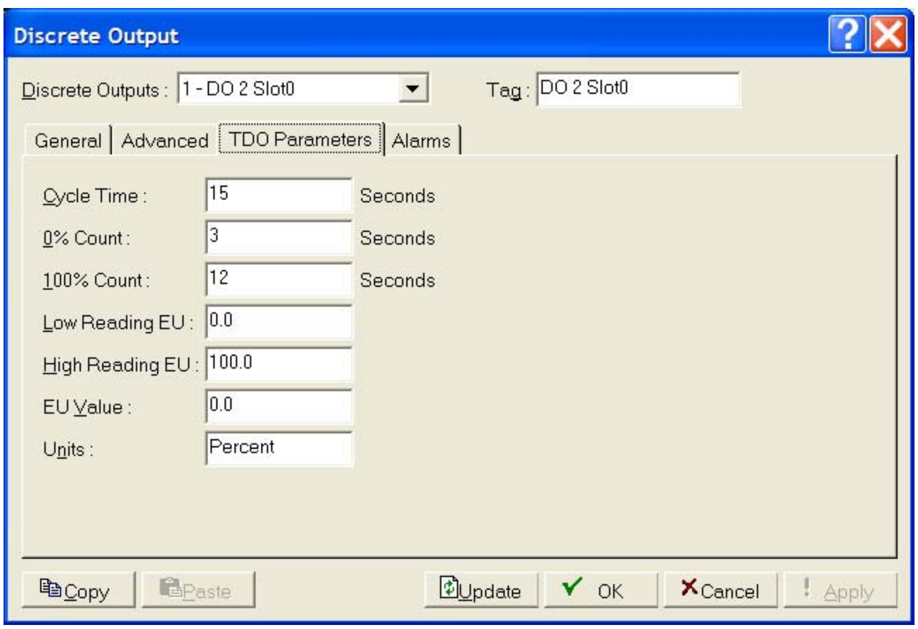


Figure 7-24. DO, TDO Parameters tab

2. Review the following fields for your organization's values.

Field	Description
Cycle Time	Sets, in seconds, the total amount of time the cycle spends in the on and off positions.

Field	Description
0% Count	Sets, in seconds, the amount of time the cycle is in the on position when the EU is at zero percent. **Note**: 0% and 100% should equal the cycle time.
100% Count	Sets, in seconds, the amount of time the cycle is in the on position when the EU is at 100 percent. **Note**: 0% and 100% should equal the cycle time.
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding analog signal.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding analog signal
EU Value	Current value, displayed in Engineering Units.
Units	Sets the engineering units for the discrete output (such as percentage, IN H20, PSIG, MCF, degrees F, milliamps, volts, etc.).

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.5.4, DO Alarms Tab.*

7.5.4 DO Alarms Tab

Select **Configure** > **I/O** > **DO Points** > **Alarms** tab to configure the alarm parameters for this DO point.

1. Select the **Alarms** tab. The Alarms screen displays.

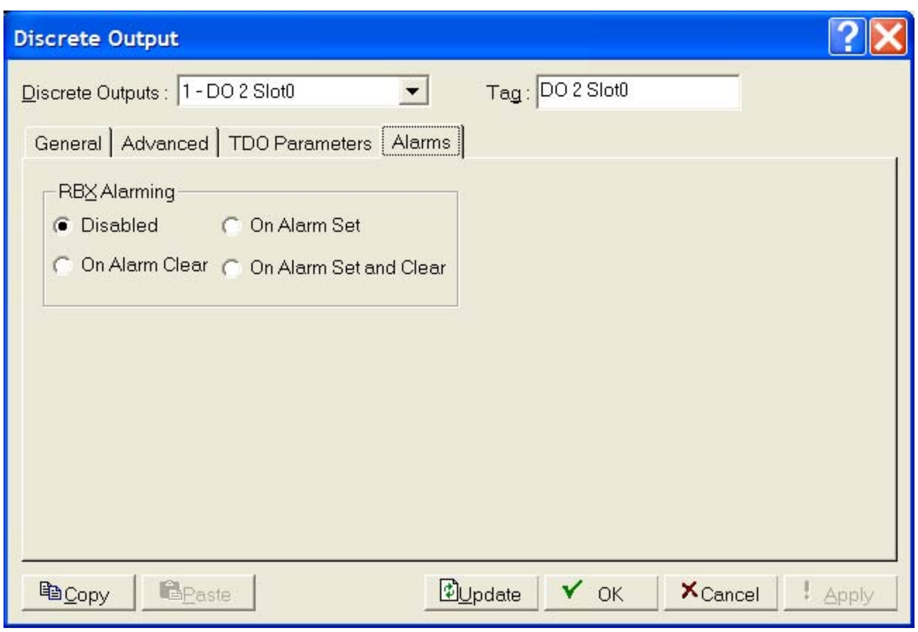


Figure 7-25. DO, Alarms tab

2. Review the following fields for your organization's values.

Field	Description	
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are:	
	Disabled	Turns off RBX alarming. This is the **default**.
	On Alarm Set	Generates an RBX message to the host when the point **enters** an alarm condition.
	On Alarm Clear	Generates an RBX message to the host when the point **leaves** an alarm condition.
	On Alarm Set and Clear	Generates an RBX message to the host when the point **enters** or **leaves** an alarm condition.
	Note: RBX Alarming requires you to configure the communications port. Refer to *Section 3.4.3, Comm Ports RBX Tab.*	

3. Click **Apply** if you change any parameters on this screen.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.6 Pulse Input (PI) Configuration

Pulse Input (PI) modules accept pulse trains (square wave signals) that measurement devices (such as turbine meters) generate. The pulse input accepts digital level on/off signals from an external device and accumulates the changes over a configured period of time. The PI can also determine a rate from the accumulated pulses over a configured period of time.

Select **Configure** > **I/O** > **PI Points**. The Pulse Input screen displays.

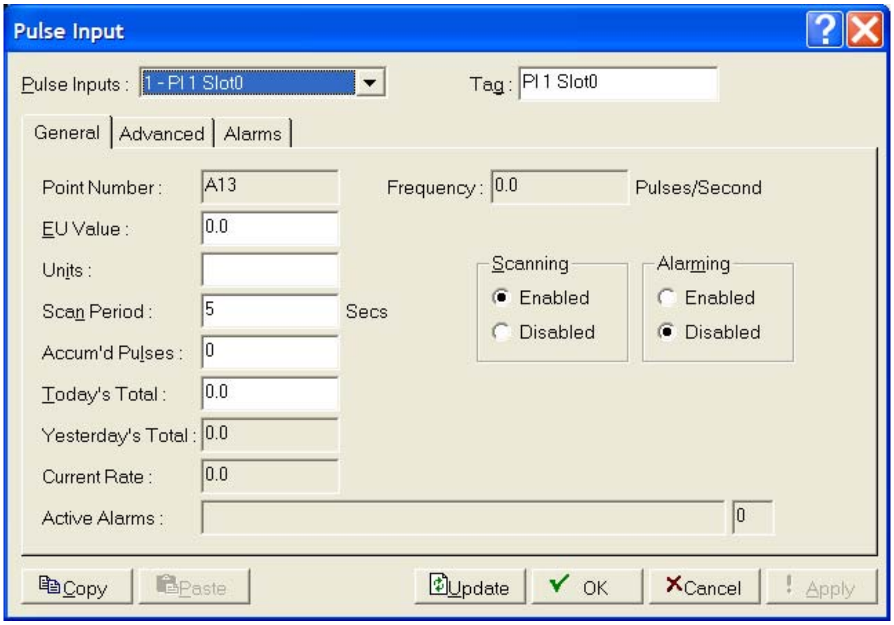


Figure 7-26. Pulse Input

The Pulse Input screen has three tabs. Use each tab to configure a component of the input.

- Use the **General** tab to set the basic parameters for the PI point.
- Use the **Advanced** tab to configure features, such as EU Options, Rate Period, Rollover value, and Conversion for the pulse input.
- Use the **Alarms** tab to sets the alarm parameters for this PI point.

Note: If you enable Alarming (**Configure** > **I/O** > **PI Points** > **General** tab), configure the limit alarms (four levels, rate, and deadband) on the Alarms tab. By disabling alarms, you can prevent alarms from generating for this point. To conserve alarm log space, enable alarms only when necessary. If you do not plan to use all the alarms, check and adjust the value of each one to prevent the generation of false alarms.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.6.1 PI General Tab

The Pulse Input screen initially displays the General tab. Use this tab to set the basic parameters for the pulse input point.

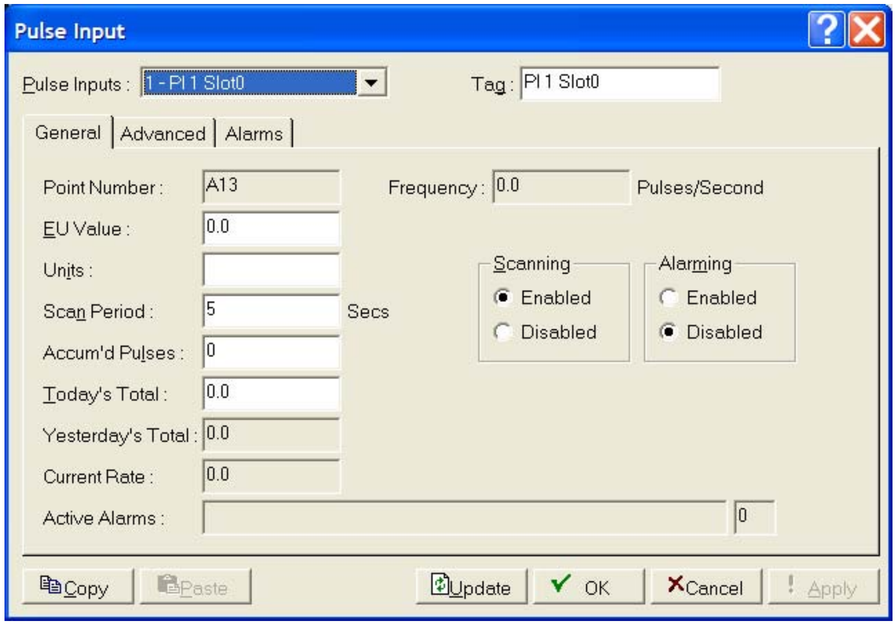


Figure 7-27. PI, General tab

1. Review the following fields for your organization's values:

Field	Description
Pulse Inputs	Selects the pulse input to be configured. The inputs are listed by both Point Number and Tag. **Note**: The selection in this field applies to each tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note**: This selection in this field applies to each tab on this screen.
Point Number	This **read-only** field identifies the rack location for this point.
EU Value	Sets the value for engineering units (EUs). The **EU Value** is dependent on how you set the EU Options on the Advanced tab. If you set up the PI as a Rate (Max Rollover), then the system assigns the Current Rate to the EU Value. If you set up the PI as an accumulator using Today's Total (Max Rollover), then the system assigns Today's Total to the EU Value. If you set up the PI as an accumulator using Running Total (Entered Rollover), then the EU Value corresponds to the accumulated pulses times the Conversion. The system compares the EU Value to the value entered for the Rollover Value. If the EU Value is greater than or equal to the entered Rollover Value, the system sets the EU Value here to zero.
Units	Sets the engineering units for the I/O (such IN H20, PSIG, MCF, degrees F, milliamps, volts, etc.).

Field	Description
Scan Period	Sets, in seconds, the amount of time between scans of the EU Value. The system calculates this rate by counting the number of pulses during the scan interval and dividing by the time interval. To avoid highly fluctuating calculation results, typically at least 10 pulses should occur between scans at low flow conditions. For example, if a flow meter produces one pulse per second at low flow, then set the Scan Period value to a minimum of **10** (10 seconds). **Note**: Once the system reaches the scan period, it updates the values in the Accum'd Pulses, Pulses Today, Today's Total, Yesterday's Total, and Current Rate fields.
Accum'd Pulses	Sets the number of raw counts stored in the accumulated value counter in firmware. For each scan period, the FloBoss determines the number of raw counts that have occurred since the last scan period and adds them to the accumulated value counter. The accumulated value rolls over to zero after reaching 16,777,216.
Today's Total	Displays the total EU Values accumulated for the current contract day, calculated by multiplying the conversion value by the accumulated pulses. The system resets this value to zero at the contract hour.
Yesterday's Total	This **read-only** field shows the total EU Value accumulated the previous contract day, calculated as the previous day's Today's Total value at the contract hour before being cleared.
Current Rate	This **read-only** field shows the calculated rate as of the most recent scan expressed in EUs per unit of time. You select time units using the Rate Period field on the Advanced tab. The system calculates the rate at the end of each scan period by multiplying the number of pulses received by the conversion value divided by the rate period.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.
Frequency	This **read-only** field shows, in pulses/second, the frequence of incoming pulses.

Field	Description
Scanning	Sets the scanning option for this point. Valid values are **Enabled** (automatically process the field input and display the last pulse input scan in the Value field) or **Disabled** (permit only manual updates of the Value field). **Note**: If you enable alarming, the FB107 generates a Manual Mode alarm when scanning is disabled. If Scanning is **disabled**, you must manually enter a value in the Value field to override the input.
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband - on the Alarms tab) or **Disabled** (does not generate limit alarms). **Note**: The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you Enable alarming, the system generates an alarm if you disable scanning.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.6.2, PI Advanced Tab.*

7.6.2 PI Advanced Tab

Use this tab to configure features, such as EU Options, Rate Period, Rollover value, and Conversion for the pulse input.

1. Select the **Advanced** tab. The Advanced screen displays.

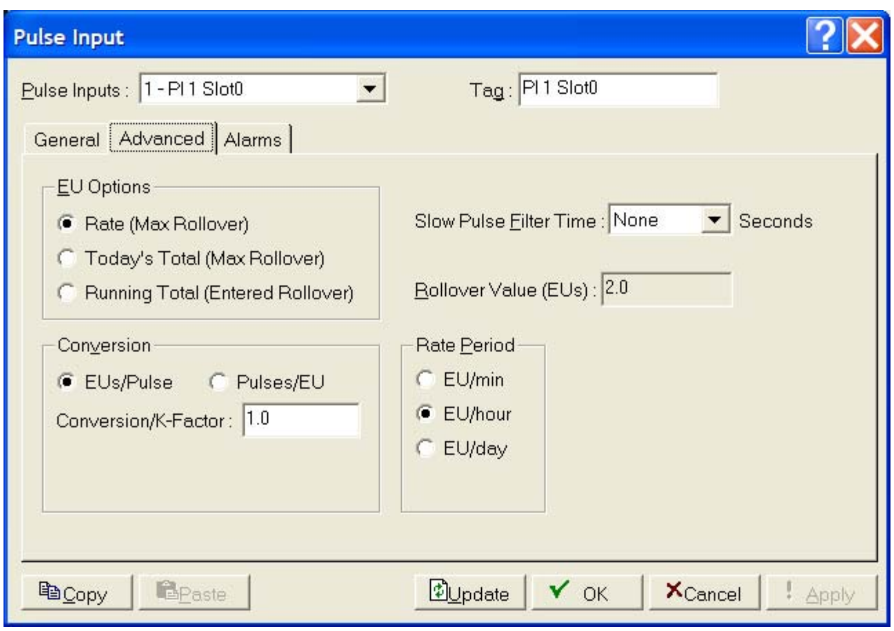


Figure 7-28. PI, Advanced tab

2. Review the following fields for your organization's values:

Field	Description	
EU Options	Sets how the system assigns the value of the engineering units (EU). Valid values are:	
	Rate	Uses the value of the Current Rate parameter (as shown on the General tab).
	Today's Total	Uses the value of Today's Total parameter (as shown on the General tab).
	Running Total	Uses a value calculated by multiplying the accumulated pulses (shown on the General tab) by the Conversion factor. If the EU Value exceeds the Rollover value, it is cleared and starts to accumulate again from **0**. **Note**: This option **does not** clear EU values at the contract hour.
Conversion	Sets the conversion value if you selected **Rate** as an EU option. Valid values are **EUs/Pulse** (associates a specific number of engineering units, typically fractional parts such as 0.01, with a single pulse) or **Pulses/EU** (associates a specific number of pulses, such as 100, with one engineering unit). **Note**: If you use the PI as input to the AGA7 calculations, complete the **Conversion Factor** field to produce the EU value as MCF or kM^3.	
Slow Pulse Filter Time	Sets the amount of time, in seconds, between the start of a pulse and the recognition of that pulse.. Click ▼ to display all valid values. Estimate the amount of signal "bounce" time so that the FloBoss does not count noise as actual pulses. If you select **None** (the default value, the FloBoss recognizes **all** pulse signal movement as actual pulses.	
Rollover Value	Sets a value in EUs (not pulses) to indicate when rollover should occur. **Note**: This field is available **only** if you select **Running Total** as an EU Option value.	
Rate Period	Sets how the system calculates rates, if you selected **Rate** as an EU Option. Valid values are:	
	EU/min	Calculates based on EU minute totals.
	EU/hour	Calculates based on EU hour totals.
	EU/day	Calculates based on EU day totals.

Field	Description
Rate Period (cont.)	**Note**: If you select **EUs/Pulse** as a conversion rate and **EU/min** as a rate period, the system calculates Current Rate as (accumulated pulses x Conversion) ÷ (Scan Period x conversion from seconds to minutes). If you select **Pulses/EU** as a conversion rate and **EU/hour** as a rate period, the system calculates Current Rate as (accumulated pulses ÷ Conversion) ÷ (Scan Period x conversion from seconds to minutes).

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.6.3, PI Alarms Tab.*

7.6.3 PI Alarms Tab

Use this tab to configure the alarm parameters for this PI point.

Note: You must enable alarming on the General tab to configure the limit alarms (Low, High, LoLo, HiHi, Rate, and Deadband) on this tab. If you disable alarming, no limit alarms generate for this point. The Point Fail alarm appears in the Active Alarms field on the General tab, but the system does not log it in the Alarms Log.

To conserve alarm log space, enable alarms only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one alarm to prevent the generation of false alarms.

1. Select the **Alarms** tab. The Alarms screen displays.

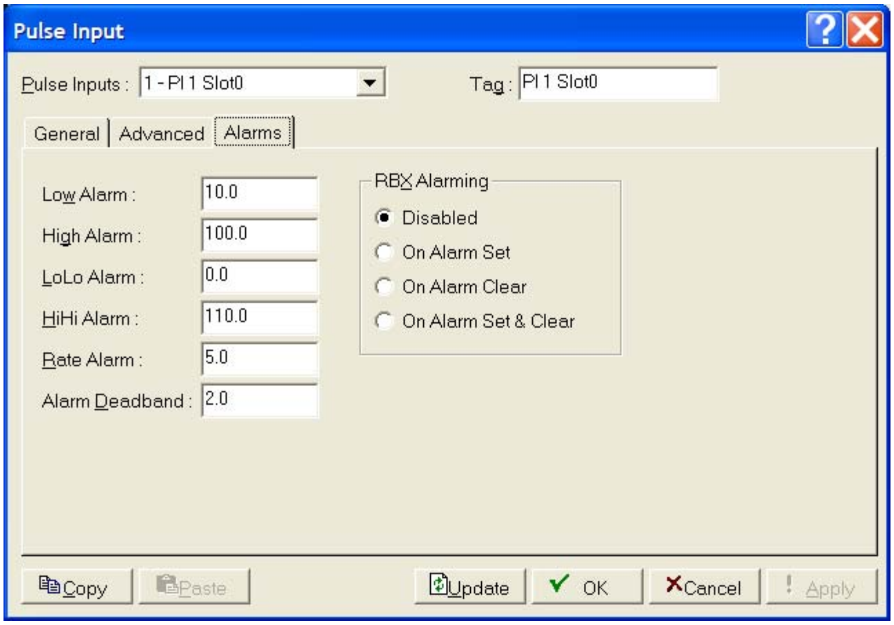


Figure 7-29. PI, Alarms tab

2. Review the following fields for your organization's values.

Field	Description
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a Low alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a High alarm..
LoLo Alarm	Sets, in engineering units, a value to which the input value must fall to generate a LoLo alarm. **Note**: Typically you set the value for the LoLo Alarm lower than the value for the Low alarm.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a HiHi Alarm. **Note**: Typically you set the value for the HiHi Alarm higher than the value for the High alarm.
Rate Alarm	Sets, in engineering units, a value that represents the maximum amount of change allowed in the calculated rate between updates before an alarm generates. If the change is equal to or greater than this value, an alarm occurs, **Note**: To disable the rate alarm without disabling the other alarms, you can set the rate alarm value greater than the scan of the analog input.
Alarm Deadband	Sets, in engineering units, an inactive zone above the Low Alarm limit and below the High Alarm limit. The Alarm Deadband prevents the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This prevents the Alarm Log from being over-filled with data.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: **Disabled** – Turns off RBX alarming. This is the **default**. **On Alarm Set** – Generates an RBX message to the host when the point **enters** an alarm condition. **On Alarm Clear** – Generates an RBX message to the host when the point **leaves** an alarm condition. **On Alarm Set and Clear** – Generates an RBXmessage to the host when the point **enters** or **leaves** an alarm condition. **Note**: RBX Alarming requires you to configure the communications port. Refer to *Section 3.4.3, Comm Ports RBX Tab.*

3. Click **Apply** if you change any parameters on this screen.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.7 Soft Points

Softpoints are global data storage areas that any FloBoss application can use. A softpoint may store the results of a specified calculation from an FST or an intermediate result of a specified value an FST acquires. Softpoints consist of a ten-character identifier ("tag"), one integer value (16-bits from 0 to 65,535), and up to 20 floating point values. The FB107 supports up to 32 softpoints.

1. Select **Configure** > **I/O** > **Soft Points**. The Soft Point screen displays.

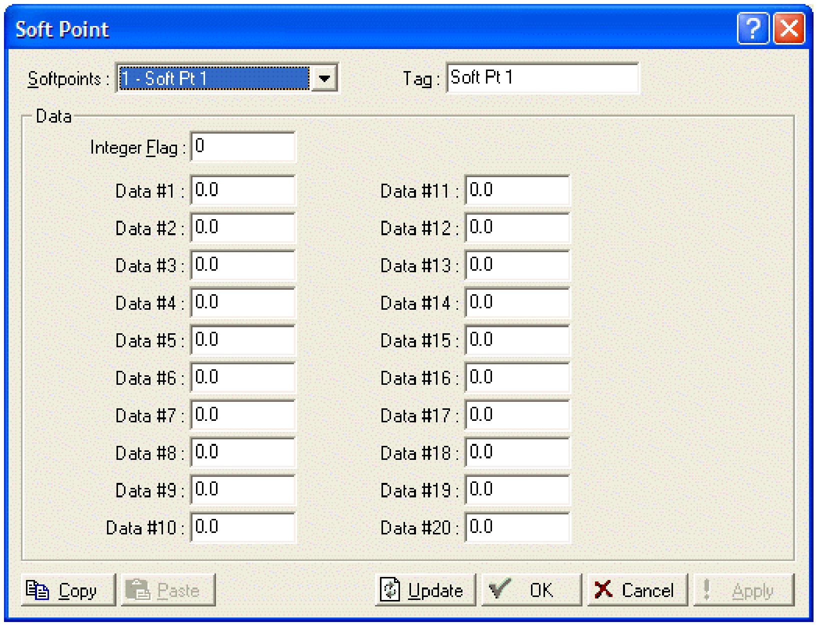


Figure 7-30. Soft Point

2. Review the following fields for your organization's values.

Field	Description
Softpoints	Sets the softpoint to configure. Click ▼ to display all available softpoints.
Tag	Sets a 10-character identifier for the softpoint.
Integer Flag	Sets a 16-bit unsigned integer value the system uses to indicate a status. The value may be under the control of an FST or a user program.
Data #1 through Data #20	Sets up to 20 parameters (**Data #1** to **Data #20**) to provide storage for IEEE floating point values for the softpoint.

3. Click **Apply** if you change any parameters on this screen.

Note: After you successfully configure a softpoint, access the Flags screen (**ROC** > **Flags**) and click **Save Configuration**. This saves a configuration (and associated softpoints) to permanent memory in case you must perform a cold start.

4. Click **OK** to display the FB107 graphic.

7.8 Multi-Variable Sensor (MVS) Configuration

The MVS Sensor setup screens provide you with an interface to configure a multi-variable sensor, a smart device that can measure temperature, static pressure, and differential pressure.

Because of the FB107's graphical interface, you can either use the Configure option on the ROCLINK 800 menu (**Configure** > **I/O** > **MVS Sensor**) **or** click on the FloBoss 107 MVS module graphic. (You can also use the configuration tree.) The FB107's graphical interface display shows the current settings of the point (including alarms and integrity) and provides access to the I/O configuration screens.

Note: If you change a parameter on the MVS screens, you must update the sensor configuration using the **Write** button on the Multi-Variable Sensor screen's General tab.

When you click the MVS module on FloBoss 107 graphical display, the two-tab MVS screen displays.

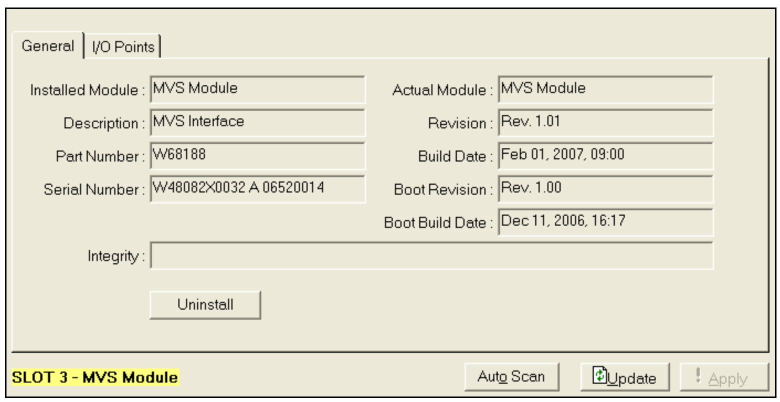


Figure 7-31. MVS Interface

7.8.1 MVS Module General Tab

The MVS display shows the General tab, which shows the current settings including any alarms and integrity alerts.

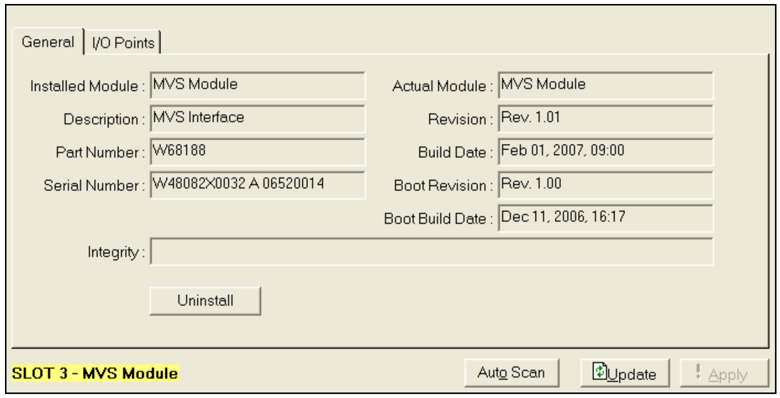


Figure 7-32. MVS Interface, General tab

Field	Description
Installed Module	This **read-only** field shows the type of module the FB107 uses for point configuration. It **does not** require that a module be physically installed to display. The FloBoss 107 remembers the "installed module" type until you "uninstall" it. Refer to *Section 1.6.2*, *Actual versus Installed Module*.
Description	This **read-only** field shows a description of the hardware currently installed in the FB107.
Part Number	This **read-only** field shows the part number of the hardware currently installed in the FB107.
Serial Number	This **read-only** field shows the serial number of the hardware currently installed in the FB107.
Actual Module	This **read-only** field shows the module is physically installed in the backplane. This field is updated whenever you restart the FB107. Refer to *Section 1.6.2*, *Actual versus Installed Module*.
Revision	This **read-only** field shows the firmware revision for the hardware currently installed in the FB107.
Build Date	This **read-only** field shows the date the firmware was built for the hardware currently installed in the FB107.
Boot Revision	This **read-only** field shows the revision number for the main startup firmware currently installed in the FB107 or hardware.
Boot Build Date	This **read-only** field shows the date the main startup firmware currently installed in the FloBoss or hardware.
Integrity	This **read-only** field shows the status of the hardware currently installed in the FloBoss 107. Alarms display on the user interface indicating the state of the hardware including the CPU, I/O modules, CPU I/O assembly, MVS modules, communication modules, and smart application modules. You can mouse over an alarm icon to display the definition.

Field	Description
Uninstall	Click to remove the hardware currently installed in the FB107. This field displays the type of module the FB107 uses for point configuration and **does not** require that a module be physically installed to display. The FB107 remembers the “installed module” until you “uninstall” it. Refer to *Section 1.6.2, Actual versus Installed Module*.

7.8.2 MVS Module I/O Points Tab

Use this tab to assign types of I/O to each channel **before** you configure the I/O points. You can navigate FloBoss 107 options using the I/O menu options, by clicking on the FloBoss 107 graphic and selecting a tab or button, or by clicking on MVS in the configuration tree.

1. Select the **I/O Points** tab. The I/O Points screen displays.

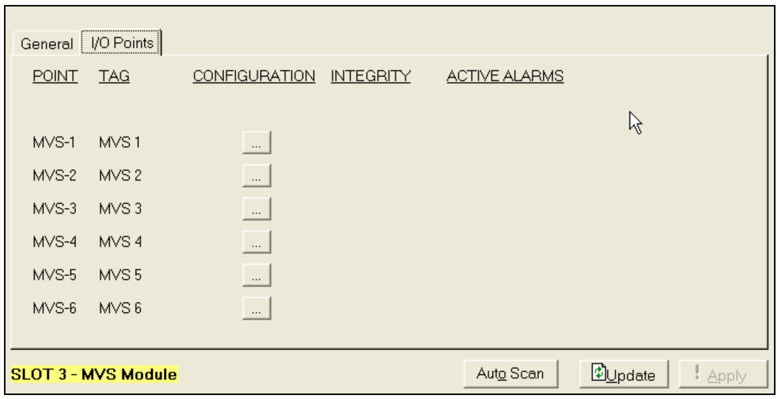


Figure 7-33. MVS, I/O Points tab

2. Review the following fields for your organization’s values:

Field	Description
Point Type	Defines the database point to be one of the possible types of points available to the system. The point type determines the basic functions of a point. Point type displays the database points associated with the installed hardware and CPU. The Point type indicates the location of the point at the slot number of the I/O module and channel number. For example, DI 2-1 indicates the Point Number for a discrete input at module slot number two, first channel.
Tag	Sets a short (10 alphanumeric characters) identifier for the point.
Configuration	Click **…** (the TLP button) to display a configuration screen you use to configure the point associated with the hardware. See *Sections 7.8.3 through 7.8.6*.

Field	Description
Integrity	This **read-only** field shows the status of the hardware currently installed in the FloBoss 107. Alarms display on the user interface indicating the state of the hardware including the CPU, I/O modules, CPU I/O assembly, MVS modules, communication modules, and smart application modules. You can mouse over an alarm icon to display the definition. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.
Active Alarms	This **read-only** field shows any alarms that are active for this point. When you **enable** alarming, any active limit alarms (such as Low Alarm and Rate Alarm) appear. If you **disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to *Section 1.6.1*, *FloBoss 107 Dynamic Interface*.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.8.3, MVS General Tab* to configure the point.

7.8.3 Multi-Variable Sensor General Tab

The Multi-Variable Sensor (MVS) screens provide you with an interface to configure a multi-variable sensor.

Note: If you have a dual-variable sensor (DVS) attached to the MVS module, you configure it as part of the MVS module. If you attach the DVS to the DVS connector on the FB107 base unit, you configure the DVS as an analog input. Refer to the *ROC Protocol Configuration Manual* (Form A4199).

1. Select **Configure** > **I/O** > **MVS Sensor**. The Multi-Variable Sensor screen displays, showing the General tab.

   Note: You can also access this screen by clicking the TLP button on the graphic interface's I/O Points screen (see *Section 7.8.2*).

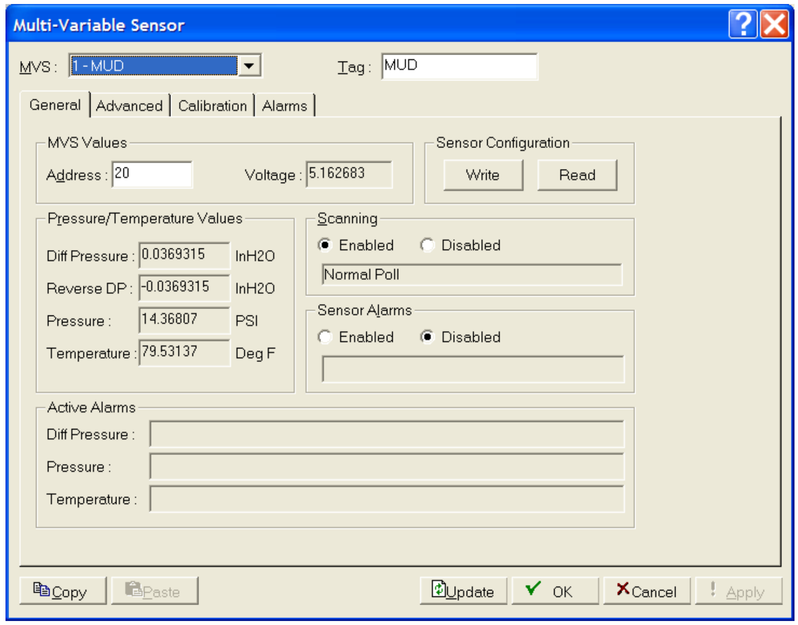


Figure 7-34. Multi-Variable Sensor, General tab

2. Review the following fields for your organization's values.

Note: If you change any values on this tab – or on the Advanced, Calibration, or Alarms tabs – **other** than the MVS or Tag fields, you must click **Write** in the Sensor Configuration field to apply those changes to the sensor configuration.

Field	Description
MVS	Selects the **MVS** sensor to configure. Each MVS has a unique address number to differentiate it from other MVS units, because MVS sensors can be multi-dropped.
Tag	Sets the ten-character identifier that resides in the MVS.
Address	Sets the unique address for this device used in the device communications protocol. The default address is **1**. If the MVS is used in the multi-drop mode, each MVS must have a unique address. Address 240 can be used to poll the sensor to determine the address of the connected sensor. This is similar to polling a FloBoss using Address and Group 240. When Address 240 is used, the sensor will respond with its address by updating the Address field.

Field	Description
Voltage	This **read-only** field shows the voltage input to the sensor. If the MVS interface version (as shown on the Advanced tab's Sensor Interface Version field) is 6 or greater, this field should read approximately **5**, which is the voltage to the microcontroller in the sensor. If the MVS interface version is less than 6, this field shows the input voltage to the sensor. **Note**: For proper operation, the input voltage to the sensors with versions less than 6 **must** be at least 10.5 volts dc.
Sensor Configuration	Click **Write** to update the sensor with the current values on the screen or click **Read** to read the sensor's current configuration data and process variables.
Pressure/ Temperature Values	These **read-only** fields show scaled differential pressure readings from the sensor. The units display as either InH2O or kPa. The scaled Differential Pressure (Reverse DP) reading is from the sensor times a negative "1" for flow in the reverse direction. The scaled absolute Pressure (Static Pressure) reading from the sensor displays in either PSI or kPa. The scaled process Temperature reading from the sensor displays in either degrees Fahrenheit or degrees Celsius, based on global settings (**ROC** > **Information**).
Scanning	Sets whether the input communicates with the MVS sensor. Valid values are **Enabled** (allow communications to the MVS sensor) or **Disabled** (the system does not update information from the sensor). **Note**: The field in this frame displays scanning status messages. Additionally, the system generates an alarm when you **Disable** scanning.
Sensor Alarms	Sets the alarm conditions of the sensor or any alarms that are active for this point. Valid values are **Enabled** (display any active failed alarms, such as point fail or sensor fail) or **Disabled** (do not display alarms). **Note**: When you enable sensor alarms, the system displays any loss of communications to the sensors by displaying an RS-485 Communications Failure. If you disable scanning, an Off Scan Mode alarm displays.
Active Alarms	These **read-only** fields indicate any alarms that are active for this point. If you enable alarming, any active limit alarms (such as Low Alarm and Rate Alarm) appear. Even if you disable alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear.

3. Click **Write** if you change any parameters (other than the MVS identifier or Tag) on this screen.
4. Proceed to *Section 7.8.4, MVS Advanced Tab.*

7.8.4 Multi-Variable Sensor Advanced Tab

Use the MVS Advanced screen to configure how the FB107 retains information on failure, what it uses as a reference temperature, and reports pressure.

1. Select the **Advanced** tab. The Advanced screen displays.

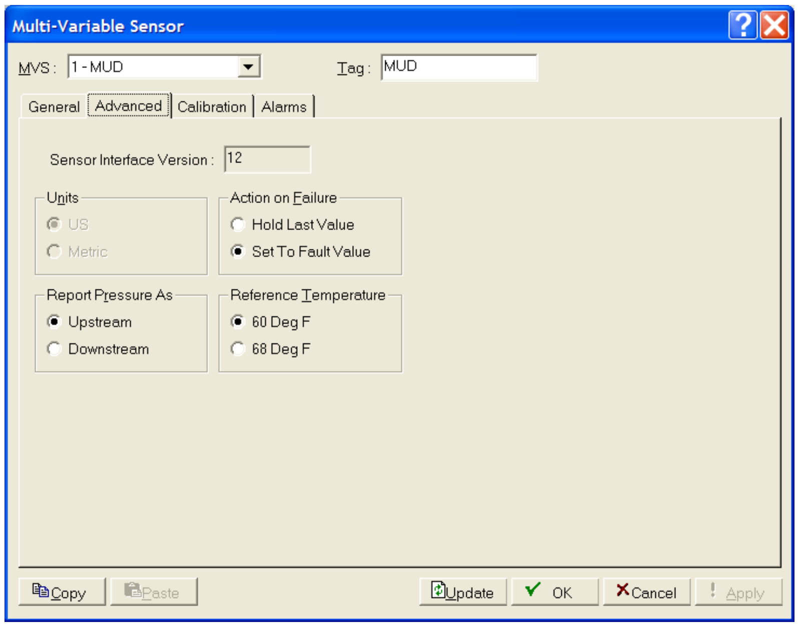


Figure 7-35. Multi-Variable Sensor, Advanced tab

2. Review the following fields for your organization's values.

Field	Description
Sensor Interface Version	This **read-only** field shows the version of the sensor interface firmware for the sensor.
Units	This **read-only** field shows the engineering units selected for the process variable. You define this value on the Device Information screen (**ROC** > **Information**); the MVS reads this value from the system. **Note**: If you change this value, click **Write** on the General tab to save the new configuration.

Field	Description
Report Pressure As	Sets the location of the static pressure tap in relation to the orifice and normal flow. Valid values are **Upstream** or **Downstream. Upstream** is the default. If you select **Downstream**, the system subtracts the Diff Pressure (DP) (in PSI) from the Static Pressure (SP) reading to obtain a Downstream Pressure measurement for archiving. For Downstream operation, adjustments to the calibration procedure may be required when setting the Span value. **Note**: If you change this value, click **Write** on the General tab to save the new configuration.
Action on Failure	Sets how the sensor retains values on failure of the sensor, an input point, or communications. Valid values are **Hold Last Value** (retains the last values before the failure) or **Set to Fault Value** (returns to the configured fault values). **Note**: See the Alarms tab for the Fault Value.
Reference Temperature	Sets a reference temperature the sensor uses when reporting differential pressure. The default value is **60** °F (15.6 °C). The system uses this value only when you change the Units selection is changed or when you select the Downstream option is selected in Metric units. **Note**: If you change this value, click **Write** on the General tab to save the new configuration.

3. Click **Write** if you change any parameters on this screen.
4. Proceed to *Section 7.8.5, MVS Calibration Tab.*

7.8.5 Multi-Variable Sensor Calibration Tab

Use this tab to calibrate the MVS points.

Note: You can calibrate sensors at up to five points: zero, span, and up to three mid-points. You **must** define at least **zero** and **span** points for calibration.

1. Select the **Calibrate** tab. The Calibrate screen displays.

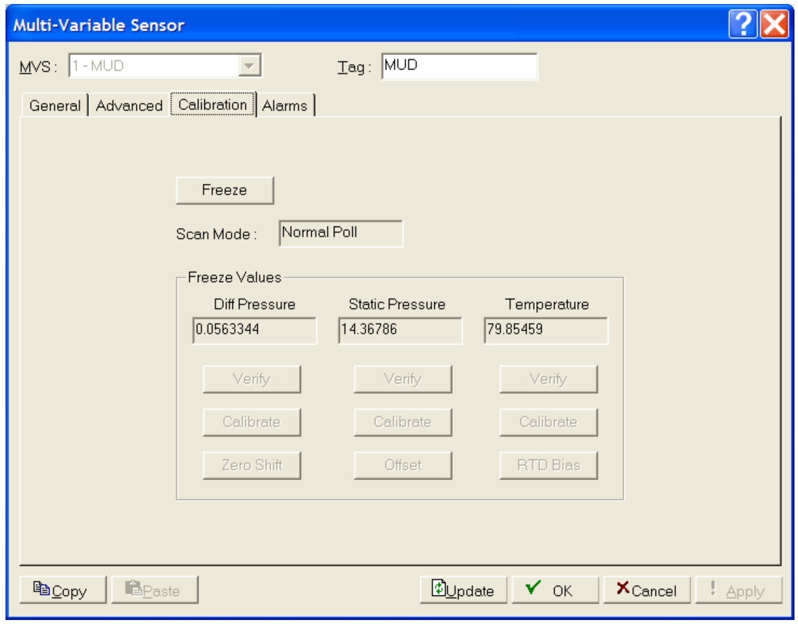


Figure 7-36. Multi-Variable Sensor, Calibration tab

2. Review the following fields for your organization's values.

Field	Description
Freeze	Click to stop the system from updating analog, MVS, or temperature (RTD) inputs during verification or calibration. Once you click this button, the system grays it out as a reminder.
Scan Mode	This **read-only** field shows the input status. **Normal Poll** indicates the system is functioning normally. After you click **Freeze**, the software changes the displayed message to **Input Freeze** for the verification or calibration process and activates all buttons in the Freeze Values frame.
Differential Pressures, Static Pressure, Temperature	These **read-only** fields show the values for the differential pressure, static pressure, and temperature received from the analog, MVS, or temperature (RTD) input.

At this point, you can verify or calibrate the values for differential pressure, static pressure, or temperature. ROCLINK 800 displays similar screens for each activity. Typically the process is to first perform a verification. If the results are within contractual limits, the process ends. However, if the results are not within contractual parameters, perform a calibration followed by a repeat verification.

3. Click **Freeze**. ROCLINK 800 freezes the input for the sensor.

4. Click **Verify**. ROCLINK 800 displays a verification screen:

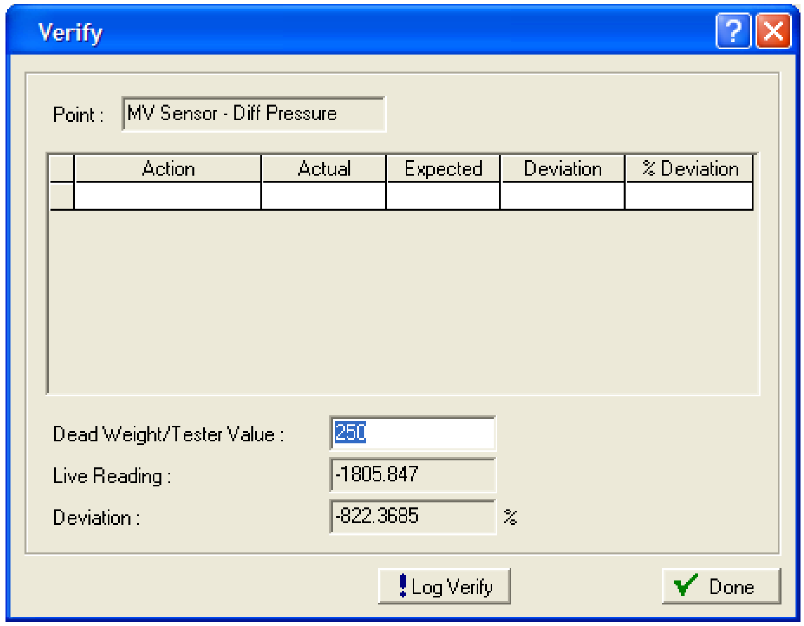


Figure 7-37. Verify Calibration

5. Complete the **Dead Weight/Tester Value** field using a pre-determined calibration value. Review the other fields on this screen:

Field	Description	
Point	Identifies the point (differential pressure, static pressure, or temperature) being verified.	
Action	Shows the activity (here, Verify) being performed as well as various values:	
	Actual	Shows the current value from the sensor.
	Expected	Shows the expected value (as entered in the Dead Weight/Tester Value field).
	Deviation	Shows the difference between the expected value and the actual value. (Deviation = Expected – Actual.)
	% Deviation	Shows the deviation as a percentage of range.
	Note: Click **Log Verify** to add lines to this screen.	
Dead Weight/Tester Value	Sets the expected value against which the system tests. **Note**: This is the Expected value in the Action field.	
Live Reading	This **read-only** field shows the current reading from the sensor.	
Deviation	This **read-only** field shows the deviation between the expected and actual values. (%Deviation = Deviation ÷ [(Span EU – Zero EU) x 100%]) Use this value to determine the need for calibration or adjustment.	
Log Verify	Click to write displayed data to the Event Log.	

6. Click **Log Verify** to write the displayed data to the Event Log.
7. Click **Done** when you have completed the verification. The system displays the Calibrate screen.
8. Click **Calibrate** if the values resulting from step 4 are outside the contractual limits. The system displays a Set Zero screen:

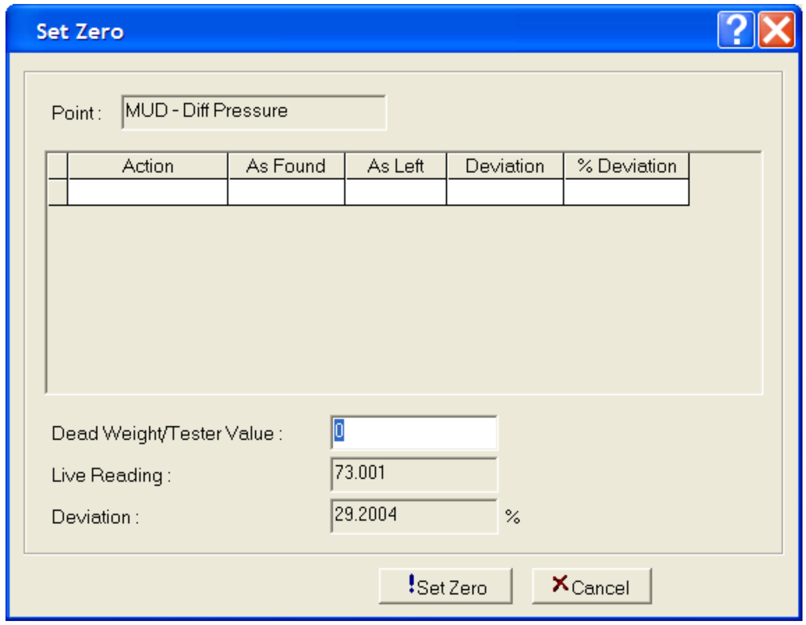


Figure 7-38. Set Zero Calibration

9. Complete the **Dead Weight/Tester Value** field using a pre-defined zero calibration point.
10. Click **Set Zero**. The system adds a line to the online display, changes the value in the **Dead Weight/Tester Value** field to the pre-defined zero value, and changes the button label to **Set Span**.
11. Click **Set Span**. The system adds a line to the online display, changes the value in the **Dead Weight/Tester Value** field to the pre-defined span value, and changes the button label to **Set Mid1**.
12. If appropriate, define up to three midpoints for calibration. Review the following fields on the screen:

Field	Description
Point	Identifies the point (differential pressure, static pressure, or temperature) being calibrated.

Field	Description	
Action	Shows the activity being performed as well as various values:	
	As Found	Shows the sensor's initial value.
	As Left	Shows the sensor's value after calibration.
	Deviation	Shows the difference between the As Found value and the As Left value.
	% Deviation	Shows the difference between the As Found and As Left values as a percentage.
Dead Weight/Tester Value	Sets the expected value against which the system calibrates. **Note**: This is the Expected value in the Action field.	
Live Reading	This **read-only** field shows the current reading from the sensor.	
Deviation	This **read-only** field shows the deviation between the expected and actual values. (%Deviation = Deviation ÷ [(Span EU – Zero EU) x 100%])	

13. Click **Done** when you have completed the calibration. The Calibrate screen displays.

14. If the calibration results indicate that you need to adjust the sensor, click **Zero Shift/Offset/RTD Bias** (depending on the point you are adjusting). The system displays a Set Zero Shift (Offset) screen.

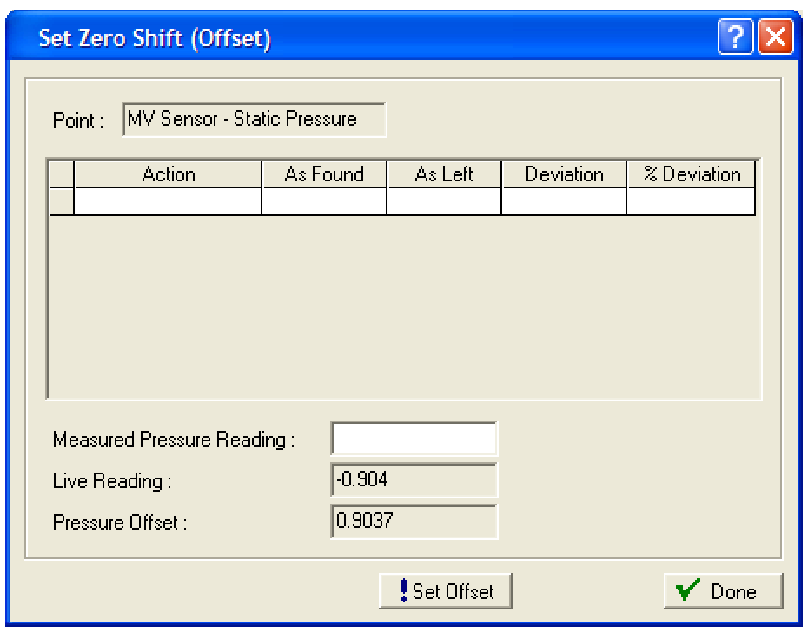


Figure 7-39. Set Zero Shift (Offset)

15. Perform one of the following:

For…	Choose…
Differential Pressure	Click **Set Offset**.
Static Pressure	Complete the **Measured Pressure Reading** field.
Temperature	Complete the **Temperature Standard Reading** field.

16. Click **Set Offset** (for static pressure and temperature). Review the following fields.

Field	Description	
Point	Identifies the point (differential pressure, static pressure, or temperature) being adjusted.	
Action	Shows the activity being performed as well as various values:	
	As Found	Shows the sensor's initial value.
	As Left	Shows the sensor's value after calibration.
	Deviation	Shows the difference between the As Found value and the As Left value.
	% Deviation	Shows the difference between the As Found and As Left values as a percentage.
Temperature Standard Reading	Sets the temperature as read from a calibrated temperature probe. **Note**: This field displays **only** for temperature points.	
Measured Pressure Reading	Sets the pressure as read from a calibrated pressure sensor. **Note**: This field displays **only** for static pressure points.	
Live Reading	This **read-only** field shows the normal temperature or pressure, as taken from the FB107.	
Temperature Bias	This **read-only** field shows the difference between the live temperature reading and the entered standard temperature reading that ROCLINK 800 applies to the temperature value. **Note**: This field displays **only** for temperature points.	
Pressure Offset	This **read-only** field shows the difference between the live pressure reading and the measured pressure reading that ROCLINK 800 applies to the pressure value. **Note**: This field displays **only** for static pressure points.	
Deviation	This **read-only** field shows the difference between the live pressure or temperature reading and the measured pressure or temperature reading.	

17. Click **Done**. ROCLINK 800 displays the Calibrate screen. This completes the calibration process.

7.8.6 Multi-Variable Sensor Alarms Tab

Use this tab to establish limits for differential pressure, pressure, temperature, and RBX alarms.

1. Select the **Alarms** tab. The Alarms screen displays.

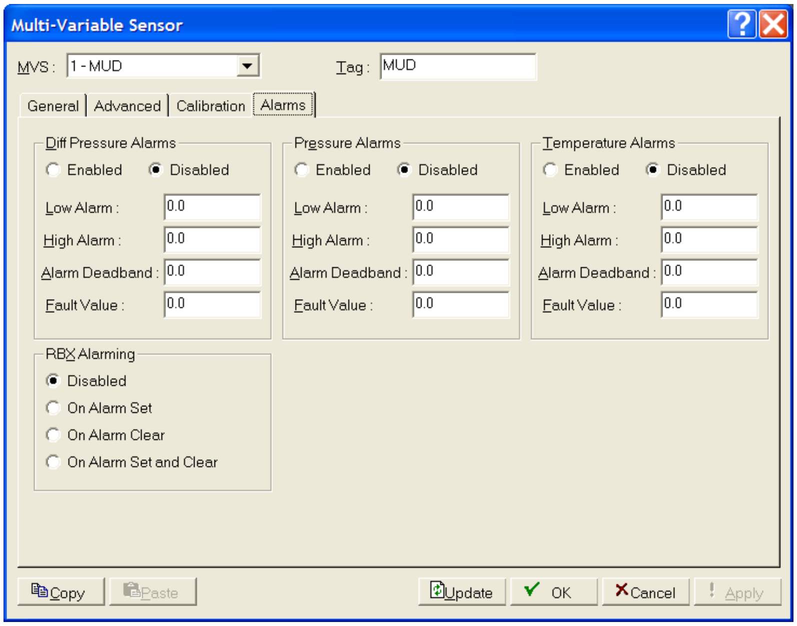


Figure 7-40. Multi-Variable Sensor, Alarms tab

2. Review the following fields for your organization's values:

Field	Description
Enabled/Disabled	Sets whether, for the particular input, alarms are active. Valid values are **Enabled** (configure alarms using the set parameters) or **Disabled** (do not generate an alarm, regardless of configuration). The system logs alarms to the alarm log. To conserve log space, enable alarms only when necessary. **Note**: If you disable an alarm, the system does not generate an alarm for this point, regardless of the alarm configuration. Alarm statuses display in the **read-only** Status field on the General tab.
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a Low alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a High alarm..

Field	Description
Alarm Deadband	Sets, in engineering units, an inactive zone above the Low Alarm limit and below the High Alarm limit. The Alarm Deadband prevents the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This prevents the Alarm Log from being over-filled with data.
Fault Value	Sets the point's value on failure. If a point fails and you have previously set the value on the Advanced tab's Action on Failure field to **Set to Fault Value**, the system uses the value entered in this field as the EU value for that point. **Note**: Fault Values are only used in Modify Limits.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: **Disabled** – Turns off RBX alarming. This is the **default**. **On Alarm Set** – Generates an RBX message to the host when the point **enters** an alarm condition. **On Alarm Clear** – Generates an RBX message to the host when the point **leaves** an alarm condition. **On Alarm Set and Clear** – Generates an RBX message to the host when the point **enters** or **leaves** an alarm condition. **Note**: RBX Alarming requires you to configure the communications port. Refer to *Section 3.4.3, Comm Ports RBX Tab.*

3. Click **Apply** if you change any parameters on this screen.

7.9 Control Menu

Use the Control menu options to configure FST Registers and PID Loops.

Note: The FB107 currently does not support the Radio Power Control and DS800 menu options.

7.9.1 Function Sequence Table (FST) Registers

Use the FST Registers screen to configure FST registers and add timers and other execution controls. Refer to *Appendix B* for a detailed discussion of these screens and the FST Editor.

Select **Configure** > **Control** > **FST Registers**. The FST Registers screen displays.

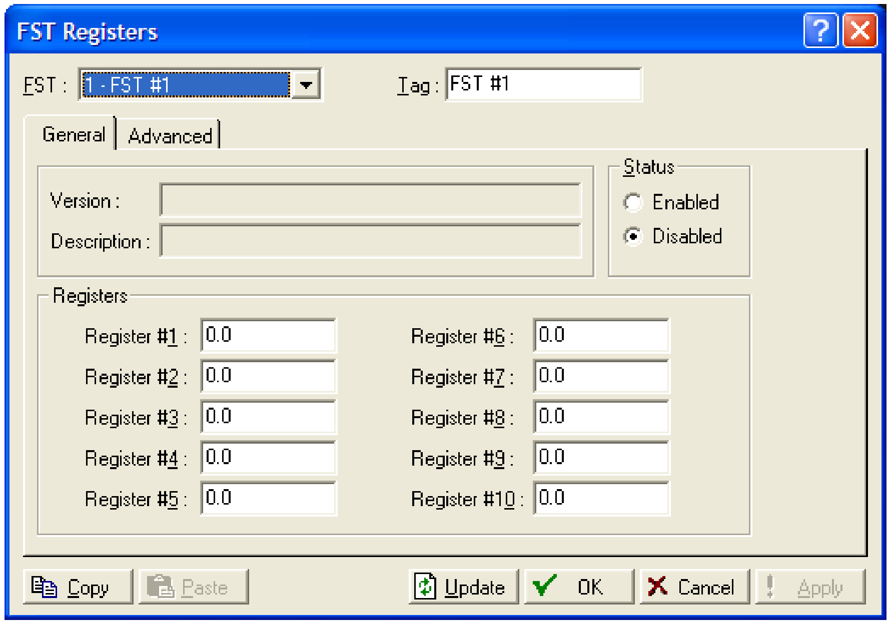


Figure 7-41. FST Registers

The FST Registers screen has two tabs. Use each tab to configure a component of the FST.

- Use the **General** tab to configure and enable the FST registers.
- Use the **Advanced** tab to add timers, execution controls, and other features to the FSTs.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

7.9.1.1 FST Registers General Tab

The FST Registers screen initially displays the General tab. Use this tab to enable and configure the FST registers.

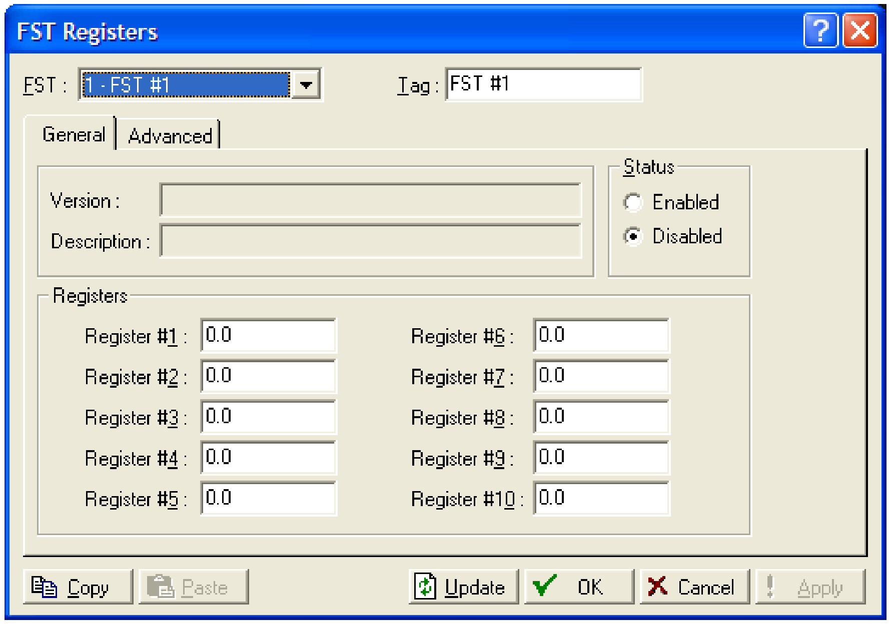


Figure 7-42. FST Registers, General tab

1. Review the following fields for your organization's values.

Field	Description
FST	Selects the FST to configure. Click ▼ to display all available FSTs.
Tag	Sets the ten-character identifier for the FST.
Version	This **read-only** field shows the version (if assigned) of the FST on download.
Description	This **read-only** field shows the description (if assigned) for the FST on download.
Status	Sets the current state and enables you to start or stop the FST. Valid values are **Enabled** (FST is active) or **Disabled** (FST is not active). **Note**: If you change the value in this field, you must also click **Apply**.
Registers #1 through #10	Provides up to 10 storage points for FST floating point values. Use FST registers to store calculated or manually-entered values. You can also those values from one FST to another. For example, an FST can write values to the registers and also read the values stored in the FST Register storage points. Registers may be read from, or written to, any FST configured for the FloBoss.

2. Click **Apply** if you changed any parameters on this screen.
3. Proceed to *Section 7.9.1.2, FST Registers Advanced Tab*.

7.9.1.2 FST Registers Advanced Tab

Use the Advanced tab to add timers, execution controls, and other features to the FSTs.

1. Select the **Advanced** tab. The Advance screen displays.

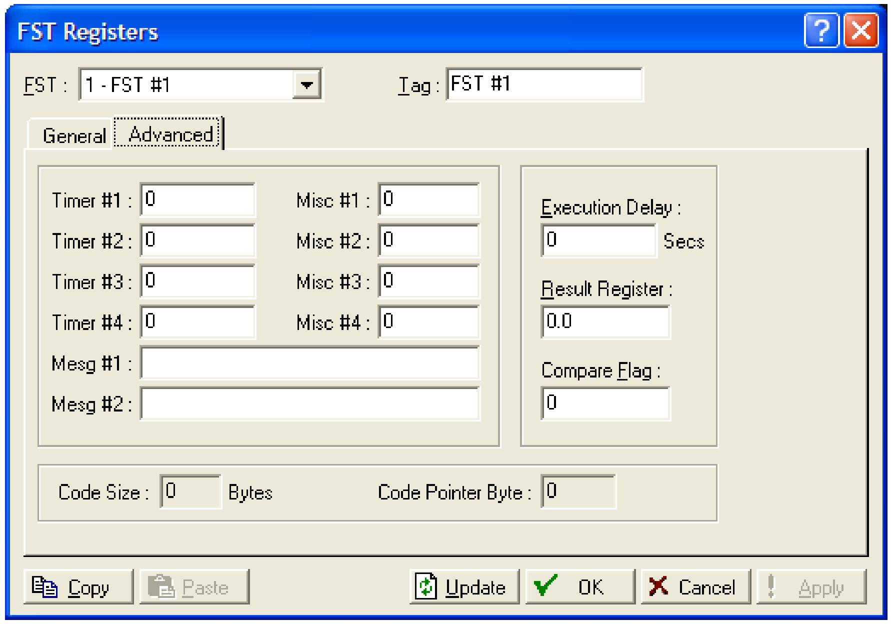


Figure 7-43. FST Registers, Advanced tab

2. Review the following fields for your organization's values.

Field	Description
Timer #1 through #4	Sets up to four countdown timers that signal certain periods or times have elapsed. You set the time, and the FST updates the time. These four timers, when set to values greater than **0**, decrement by 1 every cycle time. The scan period determines the cycle times.
Misc #1 through #4	Sets up to four unsigned 8-bit integers (with valid values from 0 to 255) the FST can use for global storage.
Mesg #1 and #2	Provides two 30-character fields for storing messages that display in the FST Message area.
Execution Delay	Sets a period, in seconds, between the execution of successive FST command steps. The default is **0** seconds. The **minimum** delay is **0.1**.
Result Register	Sets a special-purpose register that stores the floating point result from the most currently executed command. The Result Register (RR) may also be known as the Signal Value Analog (SVA).
Compare Flag	Sets a special-purpose 8-bit register that stores an integer representing the numbers 0 through 255. The logic commands manipulate the Compare Flag. The Compare Flag may also be known as the Signal Value Discrete (SVD).
Code Size	This **read-only** field shows the number of bytes the FST uses.
Code Pointer Byte	This **read-only** field shows the pointer byte for the FST.

3. Click **Apply** if you changed any parameters on this screen.

7.9.2 Proportional, Integral, and Derivative (PID) Loops

Proportional, Integral, and Derivative (PID) controls enable you to provide smooth and stable operation for feedback control loops that employ a regulating device, such as a control valve or a motor. The typical use for PID is to control a process variable to a setpoint.

PID is the most common control methodology in process control. PID is a continuous feedback loop that keeps the process flowing normally by taking corrective action whenever any deviation from the desired value ("setpoint") of the process variable (rate of flow, temperature, voltage, and such) occurs. An "error" occurs when an operator manually changes the setpoint or when an event (such as a valve opening or closing) or a disturbance changes the load, thus causing a change in the process variable.

The PID controller receives signals from sensors and computes corrective action to the actuators from a computation based on the error (proportional), the sum of all previous errors (integral) and the rate of change of the error (derivative).

7.9.2.1 Enabling PID Loops

Before you can configure a PID loop, you must **first** enable the FloBoss to recognize them.

1. Select **ROC** > **Information**. The Device Information screen displays.
2. Select the **Points** tab. The Points screen displays.

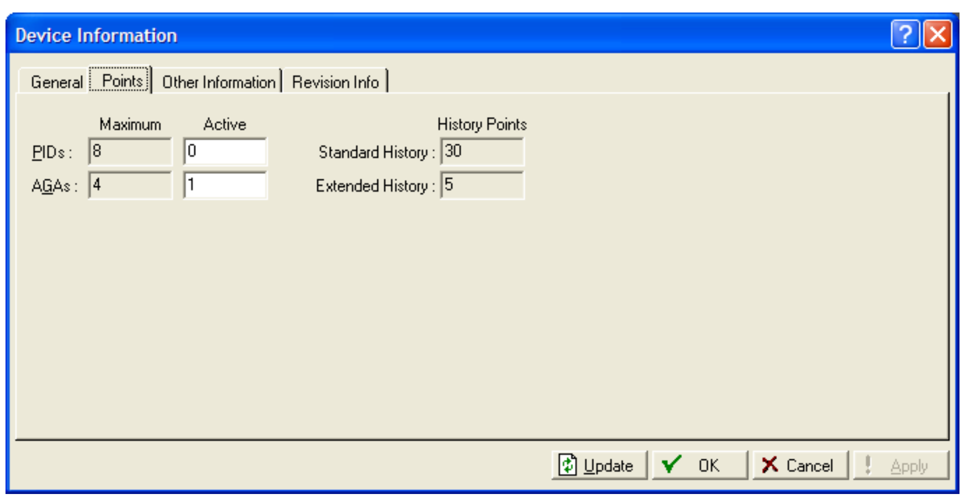


Figure 7-44. Device Information, Points tab

3. Complete the PIDs Active field with the number of PIDs you want to configure.

Note: The **read-only** Maximum field shows the maximum number of PIDs you can define.

4. Click **Apply** to save the value and then **OK** to close the Device Information screen and return to the ROCLINK 800 menu.

7.9.2.2 Configuring PID Loops

Select **Configure** > **Control** > **PID Loop**. The PID Loop screen displays.

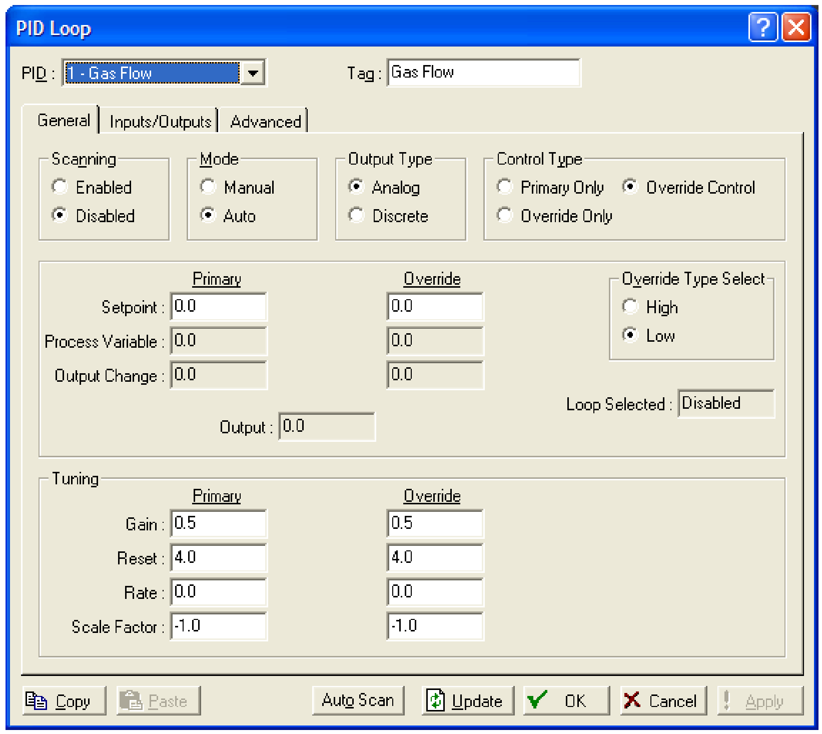


Figure 7-45. PID Loop

For any given PID point you can define two separate PID loops, Primary Only and Override Only. You indicate which loop is active with a selection in the Control Type field. Primary Only disables the Override Control loop (if defined), leaving only the Primary loop active. Similarly, Override Only disables the Primary loop, leaving only the Override loop active.

If you select Override Control in the Control Type field, **both** loops are active. The system then selects a change in output based on either a low or high limit selection, configured in the Override Type Select field.

To control the regulating device, the PID control loop uses either one analog output **or** two discrete outputs. If you use discrete output control, one DO provides open/forward control and the other DO provides close/reverse control. (You define these outputs on the PID Loop screen’s Inputs/Outputs tab.)

Each active PID loop acquires its process variable input and calculates the change in output required to maintain its setpoint. If you enable Override Control, what calculation result the system applies to the output depends on whether you select the High or Low option in the Override Type Select field.

If you have chosen an **analog** output type, the system adds the selected change in output to the current value of the output. If you have chosen a **discrete** output type, the system sends the change in output to one of the two discrete outputs. The magnitude of the correction determines the amount of time that an output is energized. A positive correction routes to the open/forward DO. A negative correction routes to the close/reverse DO.

One application of Override PID control allows pressure control to override flow control when the pressure exceeds a setpoint value. For example, the system selects the output of the Primary flow control loop until the pressure input approaches the Override setpoint of 700 PSIG. As the pressure input approaches its setpoint, the pressure loop tries to close the valve and take over control at the point when the output calculated by the pressure loop is less than the output calculated by the flow loop. Control returns to the Primary flow control loop, when the change in output required to maintain the override setpoint no longer outweighs the flow loop's attempts to maintain its setpoint.

Through the use of an FST, you may implement a switchover algorithm. When the input exceeds a predetermined switchover value, the FST can switch the mode to Override only. When the FST determines that the input value is no longer in a critical range, the PID mode can be switched back to Primary only.

7.9.2.3 PID Loop General Tab

The PID Loop screen initially displays the General tab. Use this tab to configure general PID loop parameters.

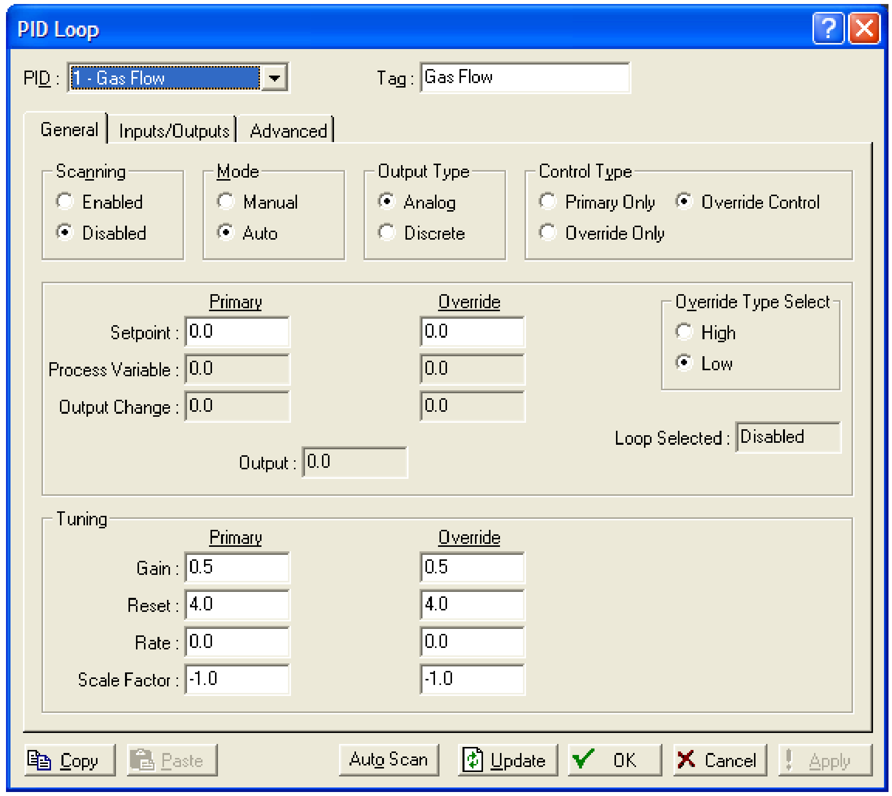


Figure 7-46. PID Loop, General tab

1. Review the following fields for your organization's values.

Field	Description
PID	Selects the PID point to configure. Click ▼ to display all available PIDs. **Note**: The selection in this field applies to each tab on this screen.
Tag	Sets the ten-character identifier for the PID. **Note**: The selection in this field applies to each tab on this screen.
Scanning	Sets controls for scanning the on and off status of the PID loop. Valid values are **Enabled** (output is calculated and updates sent to the output point) or **Disabled** (no new output is calculated and no update is sent to the output point.). **Note**: Enable scanning only **after** you have defined the process variable and output values of a Primary Only loop **or** the process variable, override, and output values for a dual control loop.

Field	Description
Mode	Sets the mode for the PID loop. Valid values are **Manual** (no loops are active and the system writes the PID output parameter to the assigned control output, allowing you to adjust the output as required) or **Auto** (PID loops are active as configured under Control Type; you enter the setpoint of the loops and the system automatically sends any change in the calculated output to the configured output point).
Output Type	Sets the output type for the PID loop. Valid values are **Analog** (the system writes the PID output to the assigned analog output point EU value) or **Discrete** (the system writes the PID output to the assigned DO Open Point EU value if the change in output is positive or writes to the assigned DO Close Point EU value if the change in output is negative). Any discrete outputs must be configured as Timed Duration Outputs [TDO].
Control Type	Sets the control type for PID loop. Valid values are: **Primary Only** – Sets the Primary loop as the only active loop. The system uses the output the Primary loop calculates to adjust the control output. **Override Only** – Sets the Override loop as the only active loop. The system uses the output the Override loop calculates to adjust the control output. **Note**: This control type is used mainly for tuning the Override loop or when loop selection is controlled by an FST or other logic external to the PID algorithm. **Override Control** – Sets both the Primary and Override loops as active. The system compares the outputs from the two loops and uses either the lesser or greater of the two outputs (based on the selection in the Override Type Select field) to adjust the control output.
Primary Setpoint	Defines a setpoint for controlling the Primary PID loop's process variable. **Note**: This field **does not** display if you select **Override Only** as a Control Type.
Override Setpoint	Defines a setpoint for controlling the Override PID loop's process variable. **Note**: This field **does not** display if you select **Primary Only** as a Control Type.

Field	Description
Process Variable	This **read-only** field shows the value and units for the Primary or Override process variable, as defined on the Inputs/Outputs tab. **Note**: If you select **Primary Only** as a Control Type, the Override Process Variable field **does not** display. Likewise, if you select **Override Only** as a Control Type, the Primary Process Variable field **does not** display.
Output Change	This **read-only** field shows the calculated change in output from the associated loop. You define these values on the Inputs/Outputs tab. **Note**: If you select **Primary Only** as a Control Type, the Override Output Change field **does not** display. Likewise, if you select **Override Only** as a Control Type, the Primary Output Change field **does not** display.
Output	This **read-only** field shows, for Auto Mode, the current output of the PID Loop. **Note**: In Manual Mode, enter a value at which the output should remain.
Override Type Select	Sets the control output for the Override Type. Valid values are **High** (system selects as the control output the higher of the Primary Output Change value or the Override Output Change value) or **Low** (system selects as the control output the lesser of the Primary Output Change value or the Override Output Change value).
Loop Selected	This **read-only** field shows the active PID loop.
Tuning	Sets parameters the system uses to tune each PID loop. **Note**: The Primary Tuning fields **do not** display if you choose **Override Only** as a Control Type. Likewise, the Override Tuning fields **do not** display if you choose **Primary Only** as a Control Type.
Gain	Sets proportional gain as the ratio of the change in output to the change in the error. Typically calculated as either (Primary Process Variable – Primary Setpoint) or (Override Process Variable – Override Setpoint).
Reset	Sets integral gain or reset as the ratio of the change in output to the change in the integral of the error with respect to time.) This value is in terms of repeats per minute. Typically calculated as either (Primary Process Variable – Primary Setpoint) or (Override Process Variable – Override Setpoint).

Field	Description
Rate	Sets the derivative gain or rate as the ratio of the change in output to the change in the error **with respect to time**. This value is in terms of minutes. Typically calculated as (Primary Process Variable ÷ Primary Setpoint) or (Override Process Variable ÷ Override Setpoint).
Scale Factor	Sets values representing the ratio of the output span to input (Process Variable) span. The sign of the number specifies the action of the loop: negative for reverse action (the default), or positive for direct action. Reverse action causes the PID loop point to produce a "decrease" in output (to close a valve, for example) when the process variable exceeds the setpoint.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.9.2.4, PID Loop Inputs/Outputs Tab*.

7.9.2.4 PID Loop Inputs/Outputs Tab

Use this tab to define and control inputs and outputs on the PID.

1. Select the **Inputs/Outputs** tab. The Inputs/Outputs screen displays.

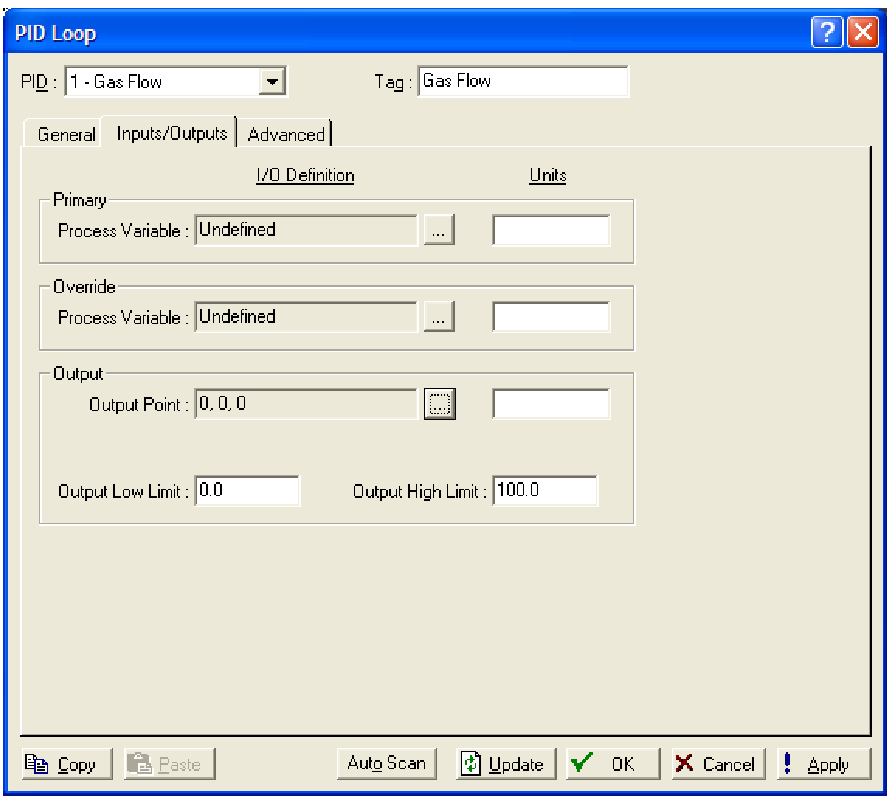


Figure 7-47. PID Loop, Inputs/Outputs tab

2. Review the following fields for your organization's values.

Field	Description
Primary Process Variable	Click **…** to select a process variable for the Primary PID loop, which displays on the General tab.
Primary Units	Sets the units for the Primary process variable.
Override Process Variable	Click **…** to select a process variable for the Override PID loop, which displays on the General tab.
Override Units	Sets the units for the Override process variable.
Output Point	Click **…** to select an analog output point for the loop. **Note**: This field displays **only** if you select **Analog** as an Output Type on the General tab.
DO Open Point/ DO Close Point	Click **…** to select a discrete open point and discrete close point for the loop. These values, respectively, open or close the valve or other device. You **must** configure these values as TDO (Time Duration Output) discrete output mode. **Note**: These fields display **only** if you select **Discrete** as an Output Type on the General tab.
Units	Sets the units for the analog or discrete output points.
Output Low Limit	Sets the low limit for the analog or discrete output. If a change in output causes the current value to drop below this value, the system sets the output to this value.
Output High Limit	Sets the high limit for the analog or discrete output. If a change in output causes the current value to rise below this value, the system sets the output to this value.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.9.2.5, PID Loop Advanced Tab*.

7.9.2.5 PID Loop Advanced Tab

Use this tab to define advanced loop control features.

1. Select the **Advanced** tab. The Advanced screen displays.

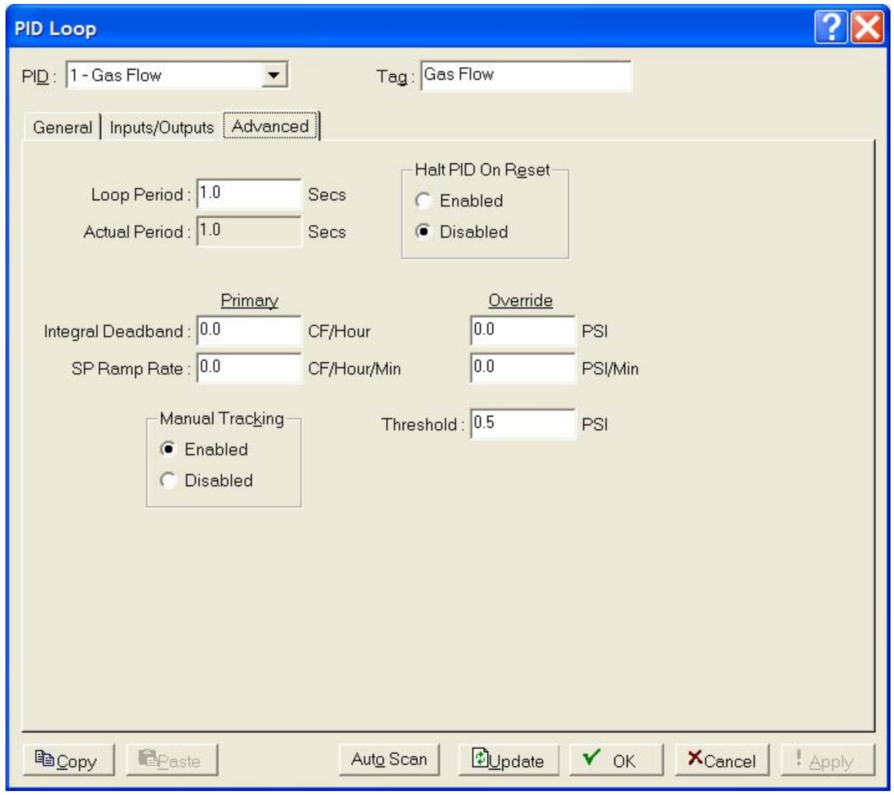


Figure 7-48. PID Loop, Advanced tab

2. Review the following fields for your organization's values.

Field	Description
Loop Period	Sets, in seconds, the period of time between executions of the PID algorithm. This is the amount of time between executions from the beginning of one execution to the beginning of the next. **Note**: If you select Override Control, both loops executed in this time period.
Actual Period	This **read-only** field shows the actual amount of time (in seconds) from the beginning of the last execution of the loop to the beginning of the current execution of the loop.
Halt PID On Reset	Sets the status of the PID control loop following a power restart or a warm start. Valid values are **Enabled** (activate the PID loop) or **Disabled** (do not activate the PID loop).
Primary Integral Deadband	Sets a "window" around the setpoint for the Primary PID. When the process variable is within this window, the system does not recalculate a change in output. If you enter **5**, the deadband is a region of 5 units above and 5 units below the setpoint in which the process variable can move without affecting the output.

Field	Description
Primary SP Ramp Rate	Sets the maximum rate at which the Primary PID setpoint can ramp to a new value. Maximum rate is in EU per minute where engineering units are the units of the process variable.
Override Integral Deadband	Sets a "window" around the setpoint for the Override PID. When the process variable is within this window, the system does not recalculate a change in output. If you enter **5**, the deadband is a region of 5 units above and 5 units below the setpoint in which the process variable can move without affecting the output.
Override SP Ramp Rate	Sets the maximum rate at which the Override PID setpoint can ramp to a new value. Maximum rate is in EU per minute where engineering units are the units of the process variable.
Threshold	Sets the threshold to prevent premature selection of the Override loop. If the Override process variable is outside of this threshold on the safe side of the Override setpoint, the system always selects the Primary loop. However, if the Override process variable is within the threshold of the Override setpoint or is on the unsafe side of that setpoint, the system can select the Override loop. **Note**: If you set the override Threshold to **0.0**, the system uses the high/low value of the Override Type Select field (defined on the General tab) to select the appropriate change, regardless of the error in the Override loop.
Manual Tracking	Sets how the system tracks setpoint and process variable values in moving between Auto and Manual Modes (defined on the General tab). Valid values are **Enabled** (sets the Primary loop's setpoint equal to the process variable when the PID point is in Manual mode) or **Disabled** (does not equalize these values). This is typically used to eliminate a value "bump" when transferring from Manual to Auto mode.

3. Click **Apply** if you change any parameters on this screen.

7.9.2.6 Example PID Configuration

The following example describes how to configure a PID point and associated inputs and outputs to implement flow control with pressure override to protect against over-pressuring the line.

In this example, the Primary process variable (Primary PV) is the volumetric flow rate per day obtained from an orifice meter run point. The system obtains the Override process variable (Override PV) from the static pressure value from an MVS or analog input. Both the Primary and Override loops require you to define a setpoint (the value at which you wish to control the loop). The example describes the process for setting up either discrete or analog control for the control output.

If a **4 to 20 mA signal to an I/O converter** controls the control valve:

- Configure an analog output with the appropriate Low and High Reading EU (engineering units). The units can either be in terms of the valve position (0 to 100%) or in terms of flow capacity (0 to 1000 MCF/Day).
- Set the Output Type on the PID screen to Analog.
- On the Inputs/Outputs tab, define an output point TLP using as an analog input, the desired Logical Number, and EU Value parameter.

If a **motorized actuator on the valve** controls the control valve:

- Configure two discrete output points for the open and close contacts as TDO (Time Duration Output) DOUT types. Set the Low Reading Time to the minimum amount of time (in seconds) the TDO can be energized to move the motor. Set the High Reading Time to the amount of time (in seconds) the TDO must be energized for full travel. Set the Low and High Reading EU values. The units can either be in terms of the valve position (0 to 100%) or in terms of flow capacity (0 to 1000 MCF/Day).
- Set the Output type on the PID screen to Discrete. Under DO Open Point and DO Close Point, select a TLP with Point Type of **Discrete Outputs**, the desired logical number, and EU Value parameter.
- Configure the PID point with a Control Type of Override Control. This causes available fields to appear on the PID screen to enter the I/O definition of the process variable and setpoint for both the Primary and Override loops. Select a TLP with Point Type of **Orifice Meter Run Values**, the desired Logical Number, and a parameter of **Flow Rate Per Day** for the Primary process variable. For the Override process variable, select a TLP with Point Type of **MVS**, the desired Logical Number, and a parameter of **SP Reading**. Leave the Setpoint I/O Definition undefined, because you enter the values. The setpoint for the Primary loop is the desired amount of flow per day. The setpoint for the Override loop is the pressure value where control should switch to the override loop. Set the Loop Period in seconds, typically one-fourth of the time required for the actuator to move the valve from fully open to fully closed.
- On the Tuning tab, select the Override Type Select of **Low**. This selects the lower of the change in outputs from the primary and secondary loops. As the pressure approaches the Override setpoint, the pressure (Override) loop pinches back the output. At the point that the pressure loop requests an output change less than the flow (primary) loop, the output from the pressure loop is selected and controls the valve. Set the Scale Factor for each of the Primary and Override loops as (span of output)/(span of input).

Both loops have scale factors, which permit the control action to close the valve when the process variable is above the setpoint. With the scale factor set according to the above formula, the initial settings for gain, reset, and rate produce stable control (under most circumstances). Gain controls the magnitude of the initial change in output for a given change in the process variable (or setpoint). Reset controls the magnitude of the change in output based on the continuing difference between the process variable and the setpoint over time. You can then adjust these values to produce the desired control actions.

7.10 Configuring History Points

The History options allow you to copy and store to the historical database (for up to 35 days) data values and calculated variables stored in the current value database. You then configure the historical database to log only the values that need to be logged. The system logs values in the standard (minute, hourly, daily) time base of the FloBoss, unless you use FST control. By using the FST Editor utility, the period in which the data is logged can be placed under FST program control.

Note: Configure the History Points for each meter run to allow the EFM Report utility to properly access data.

Select **Configure** > **History Points**. The History Setup screen displays.

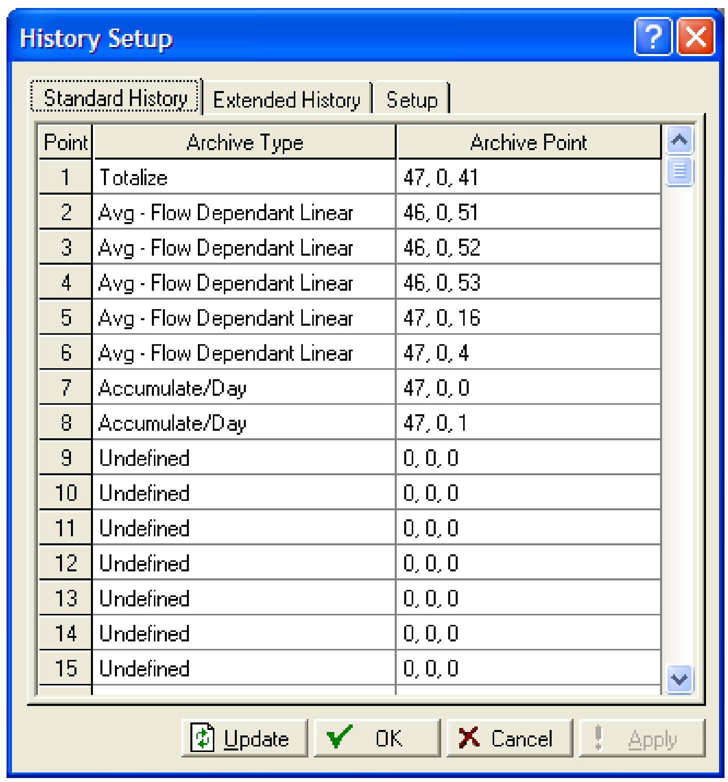


Figure 7-49. History Setup

Use this screen to define the History Points archived for any numeric parameter in the FloBoss and to select which archiving method the system uses for each parameter.

7.10.1 History Setup Setup Tab

ROCLINK 800 saves history information to either of two databases, Standard and Extended History. Use the Setup tab to configure what information the system saves to which database. For that reason, we discuss the Setup tab before discussing the Standard History or Extended History tabs.

History is one block of memory divided into two areas, one for standard history and one for extended history. Standard history uses all of the memory that it requires for the configured number of points. Extended history only receives the surplus memory not used by the standard history. Additionally, you can configure (within boundaries) the number of entries/logs available to Standard and Extended History.

You can select the number of history points to archive, the number of points, the number of days to archive, and whether history data logs at the beginning of the period or the end of the period.

Note: When you make changes on the Setup tab ROCLINK 800 automatically performs a **Cold Start & Clear History** when you click **Apply**. The system displays a dialog box to remind you of this. To avoid losing data, save any changes you make on the Setup tab before you proceed to any other tab on the History Setup screen.

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1. Select the **Setup** tab on the History Setup screen. The Setup screen displays.

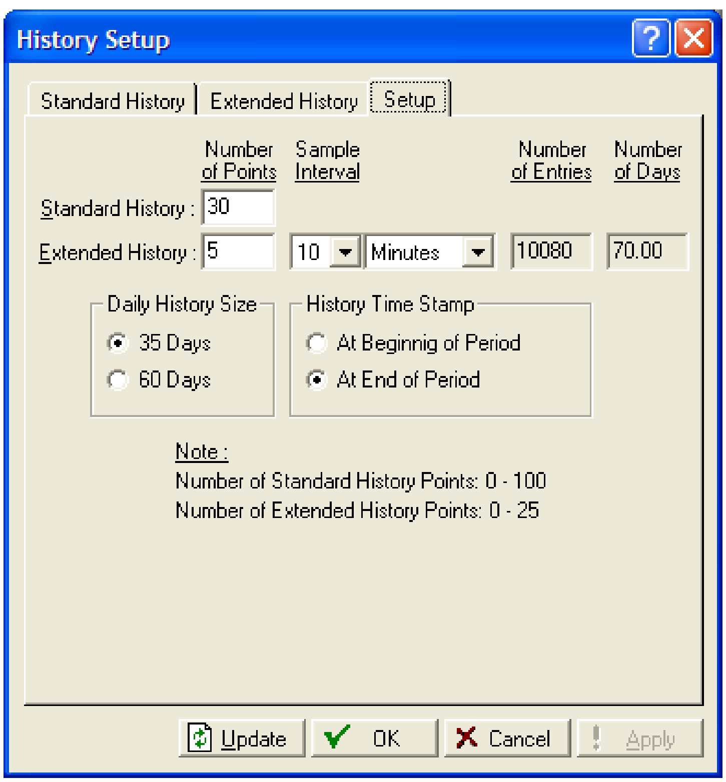


Figure 7-50. History Setup, Setup tab

2. Review the following fields for your organization's values.

Note: When you configure the number of Standard and Extended history points, specify enough points to meet **both** your immediate need and any foreseeable changes. Changing the number of points later requires you to run **Cold Start & Clear History**. If you must change the number of points, make a back-up of the history log **before** you make any changes.

Field	Description
Standard History Number of Points	Sets the number of Standard History points the system uses. You can define up to **100** points; the default is **30**. Although the first eight Standard History Points are pre-configured, you can change them. The Standard History database logs entries for each point at three intervals: minute, hour, day. Additionally, at contract hour every day the database logs a min/max entry. The min/max values are from today and yesterday; the minute values are from the last 60 minutes, the hourly values are from the last 35 hours, and the daily values are from the last 35 or 60 days.
Extended History Number of Points	Sets the number of Extended History points the system uses. You can define up to **25** points; the default is **5**. Extended History archiving provides a monitoring resolution that is similar to a chart recorder. The default interval for Extended History is **10 minutes**. **Note**: If you are replacing a chart recorder, select a 10 minute interval for 4 points. The Extended History database creates one entry for each point at the user-specified interval. Use the **Sample Interval** field to determine how frequently samples occur, to a maximum of 25 points of user-selectable minute or second values from the last 35 or 60 days. The system can maintain a maximum of 10080 Extended History log entries. The maximum number of days depends on the Sample Interval.Use the **Daily History Size** field to select the number of days to archive (35 or 60). Use the **History Time Stamp** field to determine whether history data logs at the beginning or the end of the period.

Field	Description
Sample Interval	Sets how frequently the system samples for Extended History data. The intervals are **1**, **2**, **3**, **4**, **5**, **10**, **12**, **15**, **20**, **30**, and **60** in either **minutes** or **seconds**. The default is every **10 minutes**. **Note**: The more frequent the sample, the fewer days of history are available. If you sample every 60 minutes with 10080 maximum log entries, you have 420 days. But if you sample each second with 10080 maximum log entries, you have 10080 seconds or 0.117 days.
Number of Entries	This **read-only** field shows how many Standard and Extended History points you have defined. The value dynamically changes as you change the number of history points. The maximum number of entries is **10080**.
Number of Days	This **read-only** field shows the number of days of Standard and Extended History the system can maintain, based on your current settings.
Daily History Size	Sets the number of days Standard History can hold up to 100 points of user-selectable data. Valid values are **35** or **60** days; the default is **35** days.
History Time Stamp	Sets whether the system logs ("stamps") history data from the beginning of a period or from the end of the period. This option affects both Standard and Extended History values. For example, if you select **At End of Period**, the system time-stamps data it collects from 8:00 to 9:00 as **9:00**.

3. Click **Apply** if you change any parameters on this screen.

Note: If you make changes on the Setup tab you **must** run **Cold Start & Clear History** on the ROC Flags screen (**ROC** > **Flags**). The system displays dialog boxes to walk you through the process. To avoid losing data, save any changes you make on the Setup tab before you proceed to any other tab on the History Setup screen.

4. Proceed to *Section 7.10.2, History Setup Standard History Tab*.

7.10.2 History Setup Standard History Tab

Use the Standard History tab to define up to 100 Standard History points.

Note: Use the Setup tab to define the total number of Standard History points. The first eight Standard History points are pre-defined for a EFM report on meter run #1, but can be reassigned to suit your application. Refer to *Table 7-1*.

Select the **Standard History** tab. The Standard History screen displays.

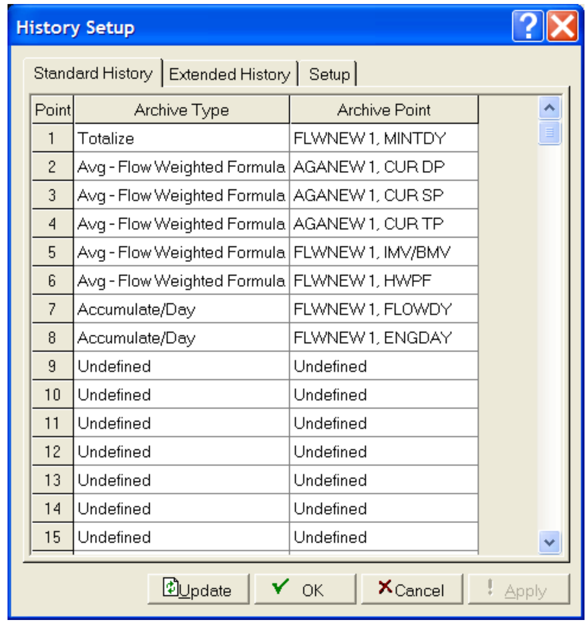


Figure 7-51. AGA 3 History Setup, Standard History tab

Table 7-1. EFM History Points (AGA 3)

History Point Definition	Point Type	Logical Number	Parameter	Archive Type	Archive Point
Flowing Minutes Today	Meter Flow Values	FLWNEW1	Minutes Today	Totalize	FLWNEW1, MINTDY
Meter Input Differential Pressure	Meter Configuration Parameters	AGANEW1 - Meter #1	hw|Uncorrected Flow Rate	Average Flow Dependent Linear	AGANEW1, CUR DP
Meter Input Static Pressure	Meter Configuration Parameters	AGANEW1 - Meter #1	Pf - Static Pressure	Average Flow Dependent Linear	AGANEW1, CUR SP
Meter Input Temperature	Meter Configuration Parameters	AGANEW1 - Meter #1	Tf - Temperature	Average Flow Dependent Linear	AGANEW1, CUR TP
IMV or BMV	Meter Flow Values	FLWNEW1	IMV | BMV	Average Flow Dependent Linear	FLWNEW1, IMV/BMV
hwPf Pressure Extension	Meter Flow Values	FLWNEW1	hwPf - Pressure Extension	Average Flow Dependent Linear	FLWNEW1, HWPF
Instantaneous Flow	Meter Flow Values	FLWNEW1	Flow Rate per Day	Accumulate/Day	FLWNEW1, FLOWDY
Instantaneous Energy	Meter Flow Values	FLWNEW1	Energy Rate per Day	Accumulate/Day	FLWNEW1, ENGDAY

- FLW stands for the flow calculation point type.
- DP stands for differential pressure point type.
- SP stands for static pressure point type.
- TP stands for temperature point type.

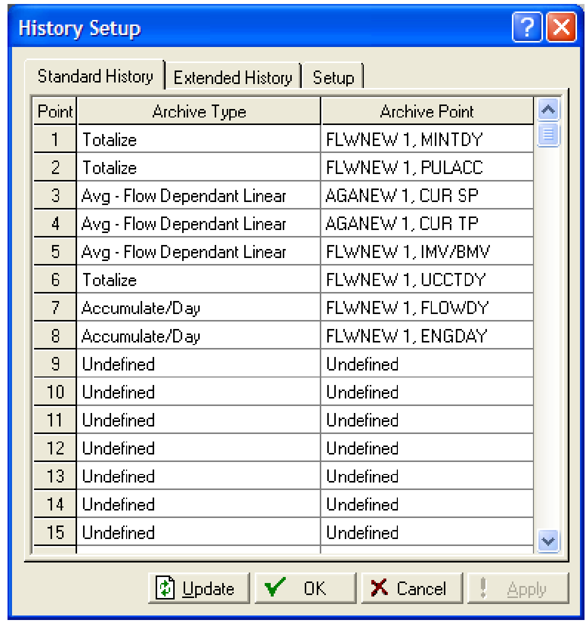


Figure 7-52. AGA 7 History Setup, Standard History tab

Table 7-2. EFM History Points (AGA 7)

History Point Definition	Point Type	Logical Number	Parameter	Archive Type	Archive Point
Flowing Minutes Today	Meter Flow Values	FLWNEW1	Minutes Today	Totalize	FLWNEW1, MINTDY
Total Pulses	Meter Flow Values	AGANEW1 - Turbine #1	Pulses Accumulated	Totalize	FLWNEW1, PULACC
Meter Input Static Pressure	Meter Configuration Parameters	AGANEW1 - Turbine #1	Pf - Static Pressure	Average Flow Dependent Linear	AGANEW1, CUR SP
Meter Input Temperature	Meter Configuration Parameters	AGANEW1 - Turbine #1	Tf - Temperature	Average Flow Dependent Linear	AGANEW1, CUR TP
IMV or BMV	Meter Flow Values	FLWNEW1	IMV | BMV	Average Flow Dependent Linear	FLWNEW1, IMV/BMV
Uncorrected Pulses	Meter Flow Values	FLWNEW1	Uncorrected Today	Totalize	FLWNEW1, UCCTDY
Instantaneous Flow	Meter Flow Values	FLWNEW1	Flow Rate per Day	Accumulate/Day	FLWNEW1, FLOWDY
Instantaneous Energy	Meter Flow Values	FLWNEW1	Energy Rate per Day	Accumulate/Day	FLWNEW1, ENGDAY

- FLW stands for the flow calculation point type.
- SP stands for static pressure point type.
- TP stands for temperature point type.

You can configure the historical database to log only the values that you require. Unless you implement FST controls, the values log in the standard (minute-hourly-daily) time base of the FloBoss. By using the FST Editor utility, you can place the period at which the data logs under FST program control.

The FB107 maintains the following types of historical databases:

- Minimum/Maximum (Min/Max) Database.
- Minute Database.
- Extended.
- Hourly Database.
- Daily Database.
- The Min/Max Database is for viewing only and cannot be saved to a disk file.

You can collect history values from the FB107 using ROCLINK 800 or other third-party host systems. Select **View** > **History** selection to directly view history from the device or from a previously saved disk file.

Several options are available for the type of history values archived (listed under the Archive Type heading). Linear averaging is available for all parameters. Meter run parameters may be averaged using one of the four averaging techniques recommended in *API Chapter 21, Section 1* (flow dependent linear, flow dependent formulaic, flow weighted linear, and flow weighted formulaic).

You can accumulate (integrate) parameters that represent a rate (engineering units/time period) to give total values when you specify a time period for the rate. You can totalize parameters that represent an accumulated total by taking the difference between the value at the end of the current logging period and the value at the end of the previous logging period. Finally, you can log the current value of any parameter at the end of each logging period.

Table 7-3 details various kinds of archive types on the Standard History screen. These archive types specify how the system calculates logged data.

Table 7-3. Archive Types

Archive Type	Description
Undefined	Point not configured.
Avg – Flow Dependant Linear	Discards samples when there is no measurable flow and performs a straightforward (linear) average of the remaining samples to compute the minute and hour values. This is the default method for calculating the average for the flow input and is the simplest and most commonly used method. For **differential meters** with analog input values, no flow conditions are defined as the differential pressure meter input less than or equal to the Low Flow Cutoff. For **pulse meters** with a pulse input values, no flow conditions are defined as the no flow time elapsing without receiving a pulse. A linear average of all samples is performed if there is no flow during the logging period.

Archive Type	Description
Avg – Flow Dependant Formulaic	Discards samples for periods when there is no flow (like the Flow-Dependent Linear method), but when calculating the average, this method typically takes the square root of each sample before averaging the samples together and then squares the result. This formulaic method typically produces a slightly lower value than the linear method.
Avg – Flow Weighted Linear	Determines a relative "weight" for each sample (without discarding any samples) by first multiplying the sample by a flow value (square root of the differential pressure measured during the sample period) and then calculates a linear average by dividing the sum of the flow-weighted sample by the sum of the flow values. This results in minute and hourly values that are more reflective of short periods of high flow.
Avg – Flow Weighted Formulaic	Combines the flow-weighting action with the formulaic averaging technique, both of which were described previously.
Avg – Linear	Averages one-second samples to compute minute, periodic, and daily values.
Accumulate/Second	Sums one-second samples of a per second rate value over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/second.
Accumulate/Minute	Converts the one-second samples of a per minute rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/minute.
Accumulate/Hour	Converts the one-second samples of a per hour rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/hour.
Accumulate/Day	Converts the one-second samples of a per day rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/day.
Current Value	Logs a snapshot of the current sampled value.
Totalize	Logs the difference between the current value at the end of the period and the current value at the last logging interval.
Minimum Value	Archives the minimum value read.
Maximum Value	Archives the maximum value read.
FST Data	Allocates space for the FST to write values to the periodic archive using the WDB command. **Note**: The number of periodic entries in the segment determines the number of values that can be written. The FST determines which index in the periodic archive to write to independently of the segment's current index.
FST Time - Minute	Allocates space for the FST to write time-stamps to the periodic archive using the WTM command. **Note**: The number of periodic entries in the segment determines the number of time-stamps that can be written. The value takes the format MM:DD:HH:MM. The FST determines which index in the periodic archive to write to independently of the current index for the segment.

Archive Type	Description
FST Time - Second	Allocates space for the FST to write time-stamps to the periodic archive using the WTM command. **Note**: The number of periodic entries in the segment determines the number of time-stamps that can be written. The value takes the format DD:HH:MM:SS. The FST determines which index in the periodic archive to write to independently of the current index for the segment.

Once you have determined what archive type to use, set the archive point by clicking the TLP button that displays at the right-hand side of each Archive Point field. This displays a Select TLP dialog box you use to configure the associated TLP.

7.10.3 History Setup Extended History Tab

Use the Extended History tab to define up to 30 additional values for the FB107 to record.

Select the **Extended History** tab. The Extended History screen displays.

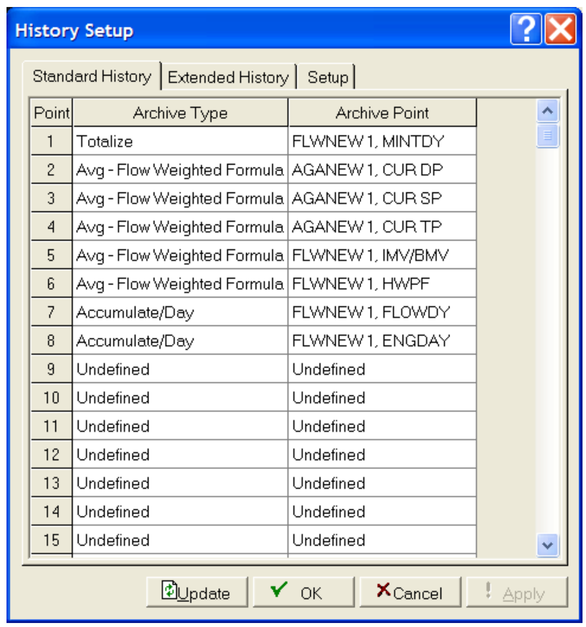


Figure 7-53. History Setup, Extended History tab

See *Section 7.10.2, History Setup Standard History Tab* for a description of the fields on this screen.

7.10.4 Configuring History: An Example

Following is a quick step-by-step example for configuring history.

1. Verify that you are on-line with the FloBoss.
2. Select **Configure** > **History Points**.
3. Click the **Setup** tab. The Setup screen displays.

4. Enter the required number of **Standard History Points**.

5. Enter the required number of **Extended History Points**.

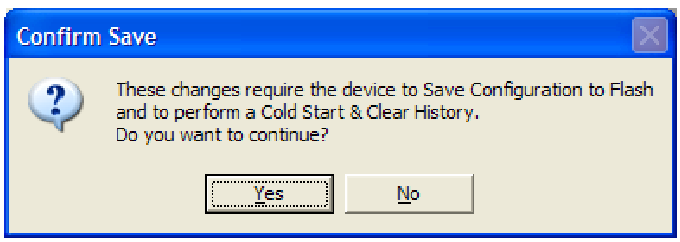
Note: Specify enough Standard and Extended History Points to accommodate your present application and any foreseeable changes. Changing the number of points later initiates a **Cold Start & Clear History**. If you must change the number of points later, make a back-up of the history log **before** you make changes.

6. Define the **Sample Interval** for the history points.

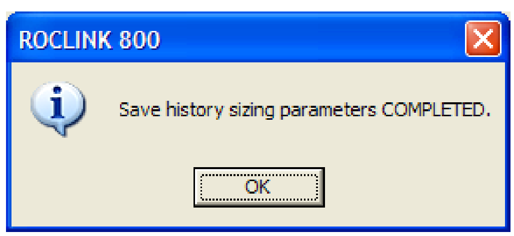
7. Review the values displayed in the **Number of Entries** and **Number of Days** fields to determine whether they are adequate for your application. If not, adjust the number of defined history points and sampling interval.

Note: The **Number of Entries** and **Number of Days** fields dynamically adjust their values, depending on the total number of defined history points and the sampling interval.

8. Click **Apply.** The system displays a dialog box reminding you that your changes require a Cold Start & Clear History.



9. Click **Yes** to continue. The system performs a Cold Start and Clear History and displays a dialog box when complete:



10. Click **OK** to continue.

11. Click the **Standard History** tab. The Standard History screen displays.

12. Select Archive Types and assign Archive Points, if you are configuring more than the eight pre-configured points.

13. Click **Apply**.

14. Select the **Extended History** tab. The Extended History screen displays.

15. Assign Archive Types and Archive Points.

16. Click **Apply**.

This completes the process of configuring history points.

7.11 Opcode Table

Use the Opcode table to group data being polled for more efficient communications. You can assign parameters from different point types to the opcode table data points, which can substantially reduce the number of polls from a host computer.

Note: Use of the term *opcode* in this context **does not** refer to the operator identification codes in ROC protocols.

1. Select **Configure** > **Opcode Table**. The Opcode Table Settings screen displays.

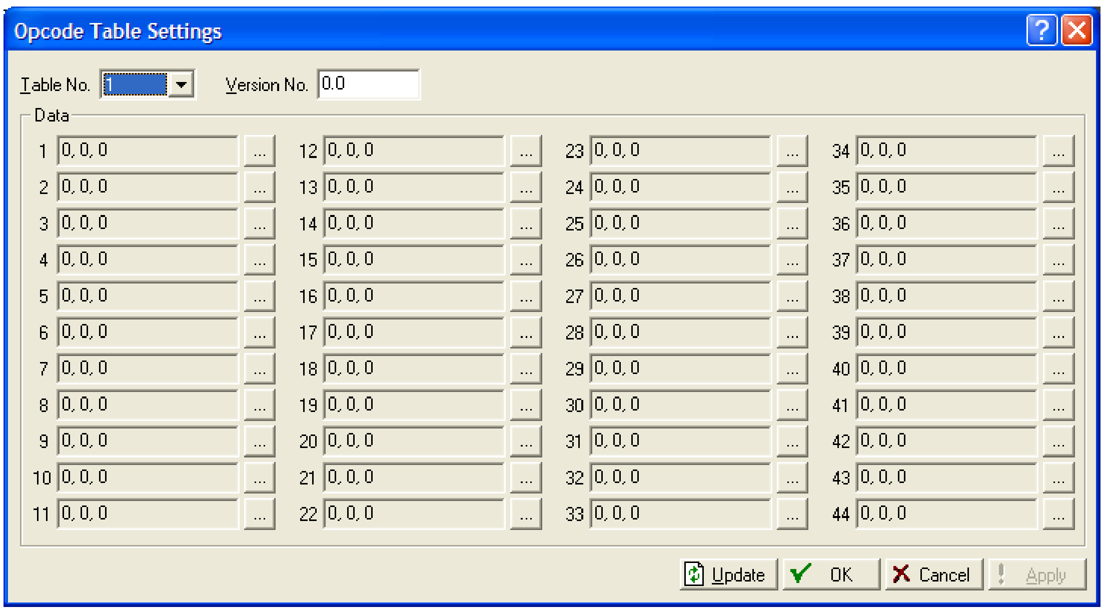


Figure 7-54. Opcode Table Settings

2. Review the following fields for your organization's values.

Field	Description
Table No.	Selects an opcode table. You can define up to 8 opcode tables.
Version No.	Associates a version number with the opcode table. By default, the version number (a floating point number) is one less than the number of the opcode table. **Note**: If you change the configuration of data points, update the version number of the table.

Field	Description
Data	Assigns a TLP value to each opcode data point. Click the TLP button to display a Select TLP dialog box. Use the dialog box to map TLP values into the opcode table data point. If a host computer asks for a specific opcode data point, the FloBoss returns the value that is referred by the mapped TLP.

3. Click **Apply** if you change any parameters on this screen.

7.12 Modbus Communications

This section describes how to configure the FB107 to communicate using the Modbus protocol and integrate the FB107 and Modbus devices into the same host/slave system.

Note: A FloBoss can act as a Modbus **slave** device on LOI, COM1, COM2, and COM3, and as a Modbus **host** device on COM1, COM2, and COM3.

In addition to a general configuration screen, you can use the options in this section to define Modbus registers, history, and the Modbus master/slave relationship.

7.12.1 Modbus Configuration

Use this option to set basic Modbus communication parameters. The General tab sets the basic communication parameters. The Scale Values tab allows you to enter eight low and high floating-point scale values with one low and high integer values for converting floating-point numbers to a scaled integer. Select **Configure** > **Modbus** > **Configuration**. The Modbus Configuration screen displays.

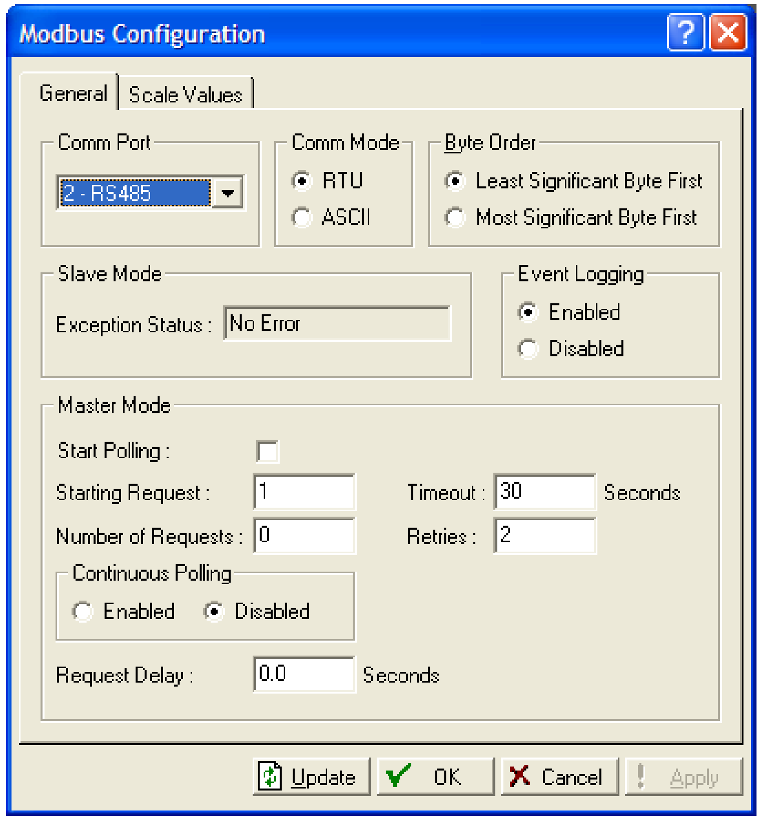


Figure 7-55. Modbus Configuration

The Modbus Configuration screen has two tabs. Use each tab to configure a Modbus component.

- Use the **General** tab to configure Modbus communication parameters.
- Use the **Scale Values** tab to convert floating point numbers to scaled integers.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save the configuration to permanent memory in case you must perform a cold start.

7.12.2 Modbus Configuration General Tab

The Modbus Configuration screen initially displays the General tab. Use this tab to configure basic Modbus communication parameters.

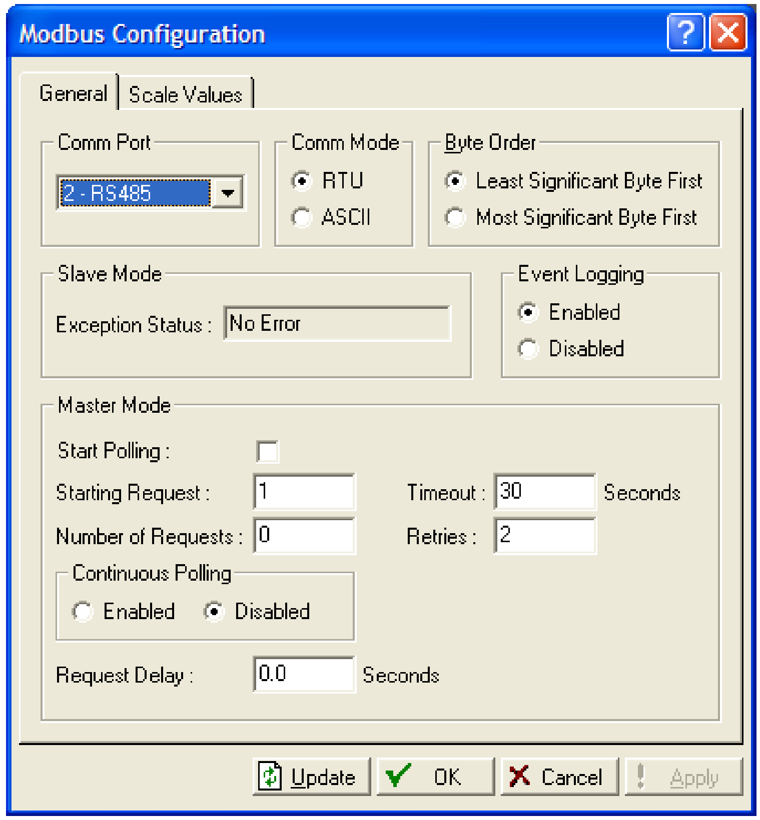


Figure 7-56. Modbus Configuration, General tab

1. Review the following fields for your organization's values.

Note: This screen initially displays with **Local Port** as the default comm port. The example screen uses the RS485 choice so that all the possible fields on this screen display.

Field	Description
Comm Port	Selects a comm port to configure. Click ▼ to display all defined comm ports. **Note**: This screen's Master Mode frame **does not** display if you select either **Local Port** or **LCD Port** as a comm port option.

Field	Description
Comm Mode	Sets the communications mode for the selected comm port. The Modbus protocol supports two modes of transmission, **ASCII** and **RTU**. **RTU** is the default. **Note**: You must configure all devices in the same communications network with the same mode of transmission. Additionally, In either ASCII or RTU mode, the transmitting device places the Modbus message into a frame that has a known beginning and ending point. See *Table 7-4, Modbus Message Framing*.
	ASCII — **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange mode represents each 8-bit byte of data as two ASCII characters that are the hexadecimal representation of the value. This allows the messages to be read with the use of a dumb terminal, but uses twice as many characters as the RTU mode. Each character sent is composed of a start bit, 7 or 8 data bits, and one or two stop bits with Even, Odd, or No parity. ASCII mode uses Longitudinal Redundancy Checking (LRC) error checking.
	RTU — **R**emote **T**erminal **U**nit mode allows for greater character density and better data throughput than ASCII for the same baud rate. Each message is transmitted in a continuous stream. Data is sent in 8-bit binary characters. RTU mode uses Cyclic Redundancy Check (CRC) error checking. By default, RTU is enabled.

Table 7-4. Modbus Message Framing

ASCII Message Framing

Begin of Frame	Address	Function	Data	LRC Error Check	End
:	2 Characters	2 Characters	N Characters	2 Characters	CRLF

RTU Message Framing

Begin of Frame	Address	Function	Data	CRC Error Check	End
T1-T2-T3-T4	1 Byte	1 Byte	N * 1 Byte	2 Bytes	T1-T2-T3-T4

Field	Description
Byte Order	Sets the order of data bytes in a transmission or requests, which can be reversed. This only affects the Data field of a Modbus message and has no effect on the data bytes for Function Codes 01, 02, and 05. Valid values are **Least Significant Byte First** (places the Least Significant Byte first; this is the default value) and **Most Significant Byte First** (places the Most Significant Byte first).
Exception Status	This **read-only** field shows the error message for the last Modbus message received. **Note**: This field applies only in Slave mode.
Event Logging	Sets whether the system logs to the Event log all parameter changes made via Modbus. Valid values are **Enabled** (logs all events) or **Disabled** (does not log events). **Enabled** is the default.
Start Polling	Controls whether the system begins a Modbus Master polling sequence. The default is off. The system clears this field when the polling sequence completes. **Note**: You must have previously selected **Modbus Master** as the port owner on the Comm Port screen (**ROC** > **Comm Ports)**. The ROC begins polling at the value defined in the Starting Request field and proceeds through the entries in the table.
Starting Request	Sets a beginning value from which the Modbus Master polling sequence begins. This number corresponds to a line number on the Modbus Master Table associated with this comm port.
Number of Requests	Sets the total number of requests the Modbus Master makes for this polling sequence. This value specifies the total number of lines in the Master tables on which to execute the polls. The default value **0** prevents the polling from occurring. **Note**: You can define up to three Modbus Master tables for this comm port. The tables are contiguous. If you indicate more requests that are on a single table, the system accesses the second or third table to complete the request. For more information, see *Section 7.12.7, Modbus Master Table*.
Timeout	Sets the amount of time, in seconds, that the Master (Host) waits to receive a valid message after the FloBoss sends a request to a device. **Note**: Do not enter **0** (zero) in this field.
Retries	Sets the number of times (after the initial try) that the Master FloBoss attempts to establish communications with the specified device before reporting a timeout error. Valid values are between **0** and **25**; the default is **2**.

Field	Description
Continuous Polling	Indicates whether the system continually executes the Modbus Master polling sequence. Valid values are **Enabled** (polling occurs continually) or **Disabled** (polling occurs only as requested). **Note**: Use the **Request Delay** field to schedule the continual polling.
Request Delay	Sets a delay time, in seconds, between polling request sequences. This field is valid **only** when you **enable** Continuous Polling. **Note**: The system consideres each line in a Modbus Master Table as a request.

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 7.12.3, Modbus Configuration Scale Values Tab*.

7.12.3 Modbus Configuration Scale Values Tab

Use the Scale Values tab to define eight low and high floating-point scale values, each with a low and high integer values, used to convert floating-point numbers to a scaled integer.

The system uses integer scale values and the float scale values in conjunction with one another whenever you use the Convert Code 1 through 8. In older Modbus devices, the system exchanged data without applying scaling using raw A/D counts sent between devices.

Scaling factors allow values to be exchanged between Modbus, emulating raw, unscaled values. For example, a 4 to 20 mA loop might have a raw A/D value in which 4 mA equaled 800 counts and 20 mA equaled 4095 counts. At midrange (12 mA), the raw A/D count would be 2448. If this AI signal was representative of a 0 to 250 pound pressure, 4 mA would equal 800 counts (or 0 PSIG), 20 mA would equal 4095 counts (or 250 PSIG), and midrange at 12 mA would equal 2448 counts (or 125 PSIG).

Convert Codes 1 to 8 support both reads and writes.

1. Select the **Scale Values** tab. The Scale Values screen displays.

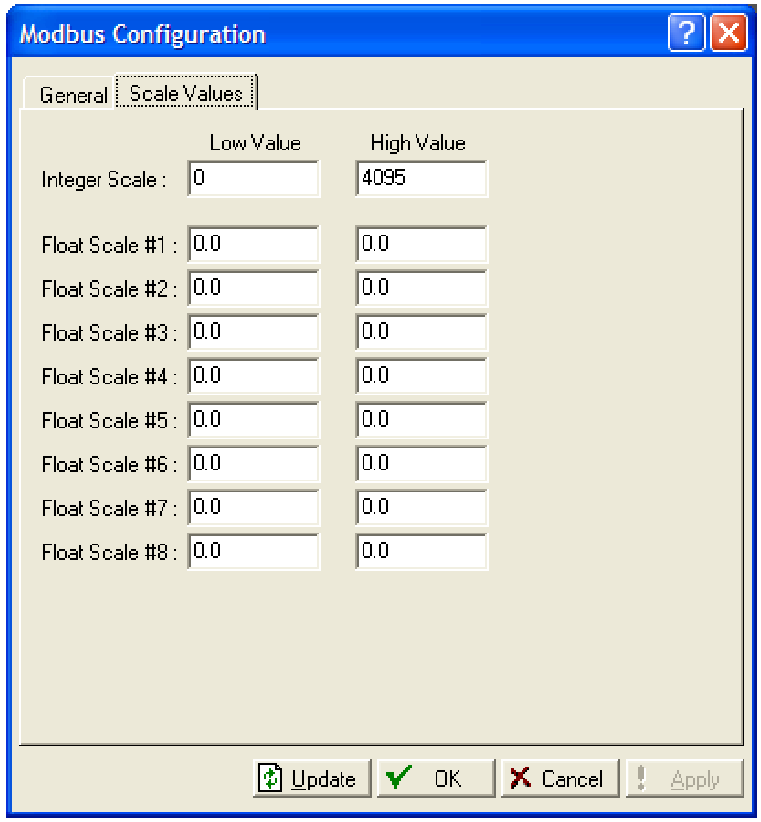


Figure 7-57. Modbus Configuration, Scale Values tab

2. Review the following fields for your organization's values.

Field	Description
Low Value and **High Value**	Sets values the system uses to scale analog I/O to integer values with an implied decimal point. The **Low Value** represents the lowest integer value and the High Value represents the highest integer value used the scale the data. The High Value and Low Value fields are signed integers and can range from **–32768** to **32767**.
Float Scale #	Scales data in conjunction with the Low and High Integer Scale values. Provide high and low values for each float scale #. For host systems that do not accept floating-point numbers, you can specify eight sets of floating-point ranges for values. This allows the host to read and set floating-point values (such as PID setpoints, softpoint values, and flow values) as integer values. The system converts floating-point values to integers by configuring a register or range of registers with the Conversion field set in the Modbus Registers definition configuration to a Convert Code from 1 to 8. The system uses the following equations to convert **floating point values to integers**. Float Range = High Value Float Scale – Low Value Float Scale (for example, 100.0 = 120.0 – 20.0)

Field	Description
	Integer Range = High Value Integer Scale – Low Value Integer Scale (for example, 6000 = 7000 – 1000) Adjusted Reading = Float Reading – Low Value Float Scale (for example, 50.0 = 70.0 – 20.0) Integer = [(Integer Range x Adjusted Reading) ÷ Float Range] + Low Integer Scale (for example, 3500 = [(6000 x 50.0) ÷ 100.0] + 1000) The system uses the following equations to convert **integers to floating point values**: Float Range = High Value Float Scale – Low Value Float Scale (for example, 100.0 = 120.0 – 20.0) Integer Range = High Value Integer Scale – Low Value Integer Scale (for example, 6000 = 7000 – 1000) Adjusted Integer = Integer Sent – Low Value Integer Scale (for example, 3000 = 4000 – 1000) Float Value = [(Adjusted Integer x Float Range) ÷ Integer Range] + Low Float Scale (for example, 70.0 = [(3000 x 100) ÷ 6000] + 20)

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.12.4, Modbus Registers*.

7.12.4 Modbus Registers

Use Modbus Register tables to map Modbus registers to specific TLP numbers. You can map one line in the Modbus Register table to more than one register or TLP pair by using either Point Indexing or Parameter Indexing.

- **Point Indexing** maps the starting register to the selected TLP. Subsequent registers (through the ending register) map to the same point type and parameter and increment the **point logical** number.
- **Parameter Indexing** maps the starting register to the selected TLP. Subsequent registers, (through the ending register) map to the same point type and point logical number and increment the **parameter** number.

Point Indexing Example

When using **Point Indexing** the configuration of

Starting Register	Ending Register	Device Parameter(s)	Indexing	Conversion
100	103	AIN, 4-1, EU	Point	0

specifies four registers (100, 101, 102, and 103) that are mapped to a group of analog input (AIN) values in engineering units (EU) starting at the analog input in the fourth module location, first position (4-1):

- Register 100 = EU of AIN point in location 4-1.
- Register 101 = EU of AIN point in location 4-2.
- Register 102 = EU of AIN point in location 4-3.
- Register 103 = EU of AIN point in location 4-4.

Parameter Indexing Example

When using **Parameter Indexing** the configuration of

Starting Register	Ending Register	Device Parameter(s)	Indexing	Conversion
109	114	FST 1, R1	Parameter	1

specifies six registers (109, 110, 111, 112, 113, and 114) that are mapped to a group of FST 1 parameters starting at FST Register 1:

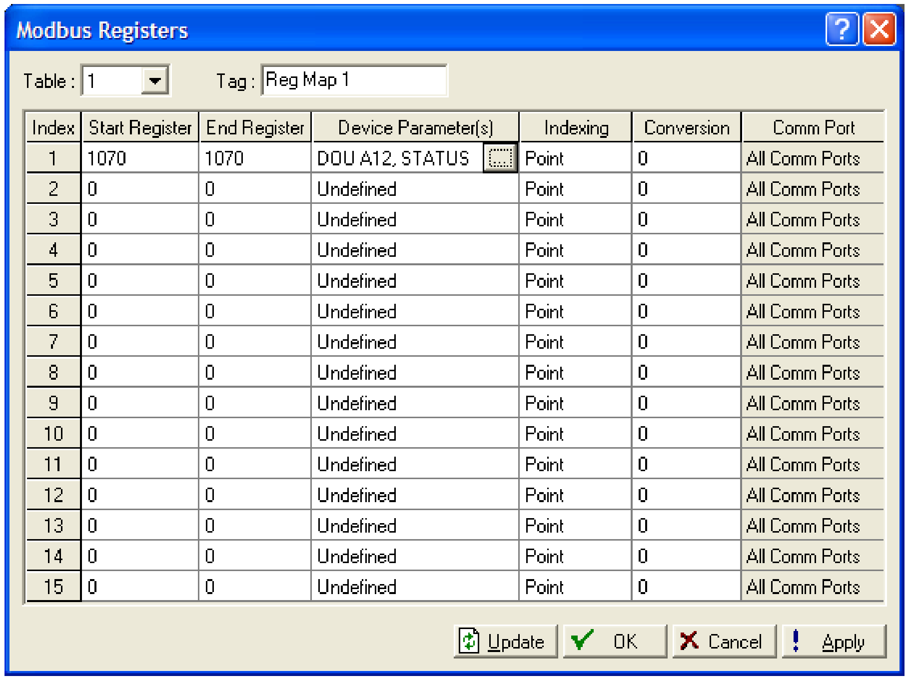
- Register 109 = Register 1 of FST Point Number 1.
- Register 110 = Register 2 of FST Point Number 1.
- Register 111 = Register 3 of FST Point Number 1.
- Register 112 = Register 4 of FST Point Number 1.
- Register 113 = Register 5 of FST Point Number 1.
- Register 114 = Register 6 of FST Point Number 1.

Use conversion code 1 (Float to Integer, Float Scale 1) to convert the floating point value to an integer before the response message returns to the host. Once you map a register, you can reference it in any Modbus request, providing the data type of the TLP is appropriate for the Function Code.

Note: If the native FloBoss data type does not meet the requirements of the Modbus host device, conversion codes are available to convert the data to the required data type. Refer to *Section 7.12.6, Modbus Conversion Codes*.

When a device receives a Modbus request, it searches for the referenced register(s). If it finds a register number match, it builds a response based on the device point type and parameter configured in the table. If the device cannot find a register number match, it returns an error message.

1. Select **Configure** > **MODBUS** > **Registers**. The Modbus Registers screen displays.



Index	Start Register	End Register	Device Parameter(s)	Indexing	Conversion	Comm Port
1	1070	1070	DOU A12, STATUS	Point	0	All Comm Ports
2	0	0	Undefined	Point	0	All Comm Ports
3	0	0	Undefined	Point	0	All Comm Ports
4	0	0	Undefined	Point	0	All Comm Ports
5	0	0	Undefined	Point	0	All Comm Ports
6	0	0	Undefined	Point	0	All Comm Ports
7	0	0	Undefined	Point	0	All Comm Ports
8	0	0	Undefined	Point	0	All Comm Ports
9	0	0	Undefined	Point	0	All Comm Ports
10	0	0	Undefined	Point	0	All Comm Ports
11	0	0	Undefined	Point	0	All Comm Ports
12	0	0	Undefined	Point	0	All Comm Ports
13	0	0	Undefined	Point	0	All Comm Ports
14	0	0	Undefined	Point	0	All Comm Ports
15	0	0	Undefined	Point	0	All Comm Ports

Figure 7-58. Modbus Registers

2. Review the following fields for your organization's values.

Field	Description
Table	Selects a table to which you map regsters. You can define up to 12 register tables for an FB107. Each table entry can define multiple registers by using either Point Indexing or Parameter Indexing. By making the registers continuous (when the Start Register address of a new line is one greater than the End Register address of the previous line) you can create a continuous data table for Modbus Function Codes 3, 4, or 16 (see *Table 7-5*) up to the limit of 240 bytes per request. This type of data table allows access to all its data with one request. Map Periodic (Hourly) or Daily History Index registers to the TLP for the Periodic Index (Point Type 124, Parameter 5) or Daily Index (Point Type 124, Parameter 6).

Table 7-52. Modbus Function Codes

Code	Meaning	Action
01	Read Logic Coil Status	Obtain current status (ON/OFF) of a group of logic coils (outputs).
02	Read discrete input status	Obtain current status (ON/OFF) of a group of discrete inputs.
03	Read Output Registers (Holding)	Obtain current binary value in one or more holding registers.
04	Read Input Registers	Obtain current binary value in one or more input registers.
05	Force Single Logic Coil	Force logic coil to a state of ON or OFF. Acknowledge Alarm or Event request.
06	Preset Single Holding Register	Place a specific binary value into a holding register.

Code	Meaning	Action
15	Force Multiple Logic Coils	Force a series of consecutive logic output coils to defined ON or OFF states.
16	Preset Multiple Holding Registers	Place specific binary values into a series of consecutive holding registers.

Field	Description
Tag	Sets a 10-character alphanumeric identifier for this table.
Start Register	Sets the first data register in the address span. Any number from 0 to 65535 is valid. You can duplicate register numbers as long as you assign them to **separate** communication ports. Number The tables should be numbered from smallest to largest. In certain Modbus Host devices, the register 40101 is actually transmitted as "100." The value "100" should be placed in the Start Address field because the FloBoss uses the actual number sent by the Host. For example, the Host device requests the Starting Register 500 through Ending Register 700. The Starting Register is 400 and the Ending Register is 700. All register numbers requested by the Host (500 through 700) are valid and would be responded to because the requested register numbers match or fall in between the Start Register and Ending Register numbers (400 through 700).
End Register	Sets the last register in the address span. Compute the value for this field by adding the total number of registers used to the Start Register number and subtracting 1.
Device Parameter	Defines the parameter of the point types to set or to acquire. Be aware of the different data types (Character, Integer, Long, Float) and the size of the data types. Use the TLP button to select parameters. This field indicates the type of data associated with an address (defined by the Start Register through the End Register). When the host requests a valid range of register numbers, the function code tells the slave what to do and between which registers (Start Register through End Register).

Field	Description
Indexing	Sets a block of register values as successive Logical Point Numbers or Parameters without having to define each separately. Valid values are **Point Indexing** or **Parameter Indexing**. **Point Indexing** maps the Start Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Point Type and Parameter and increment the point Logical Number. **Parameter Indexing** maps the Start Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Point Type and point Logical Number, and increment the Parameter Number.
Conversion	Sets the type of conversion performed (if any) , on data before it is either sent to the Host or written to the FloBoss device. The conversions are used to allow for differences in data types between the Master and Slave devices. Conversion Codes affect Function Codes 3, 4, 6, 8, and 16.
Comm Port	This **read-only** field shows the comm ports affected by the register.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.12.5, Modbus History Table*.

7.12.5 Modbus History Table

Use the Modbus History Table to configure the Hourly and Daily history values, event records, and alarm records for retrieval using function code 03 of the Modbus protocol.

To simplify setup, ROCLINK 800 predefines several registers, which you can reconfigure to your organization's requirements:

- Daily Index = Register 7160
- Hourly Index = Register 7161
- Extended Index = Register 7162
- Events/Alarms = Register 32
- Current Date = Register 7046
- Current Time = Register 7047
- Hourly Data = Register 703
- Daily Data = Register 704

You may also configure the Hourly and Daily registers for up to ten groups of history points. The Current Date and Current Time values may be useful when you need the date and time as floating point numbers in the formats, respectively, of DDMMYY and HHMM.

Note: Before you configure the Modbus History, complete the History Setup screen (**Configure** > **History Points)**.

1. Select **Configure** > **MODBUS** > **History**. The Modbus History Table screen displays.

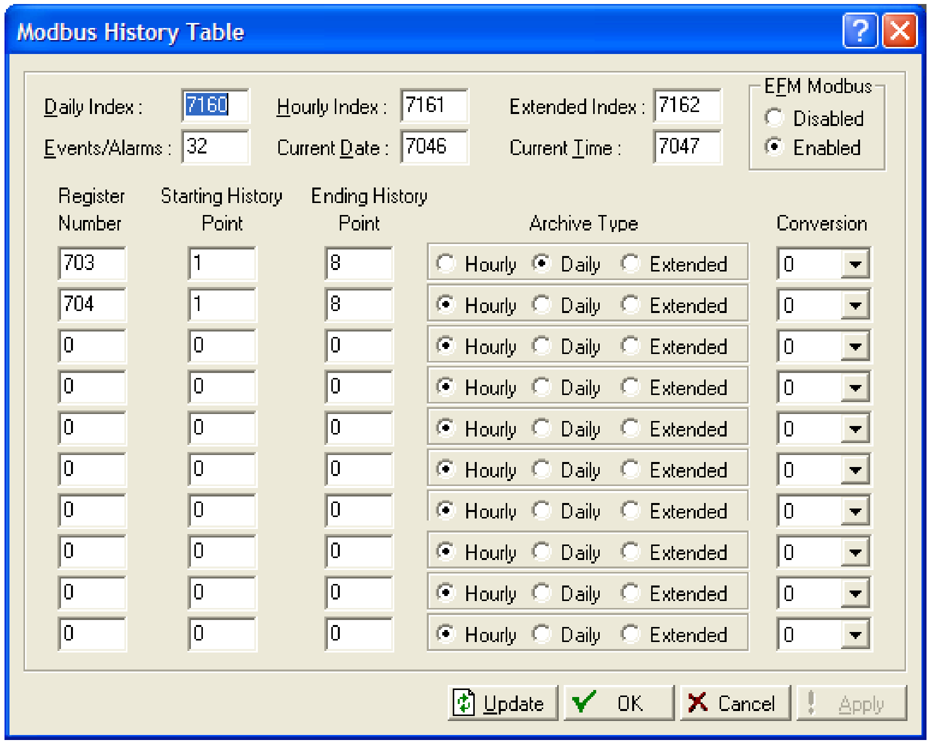


Figure 7-59. Modbus History Table

2. Review the following fields for your organization's values.

Field	Description
Daily Index	Sets the register number to acquire daily index values. The default is **7160**.
Hourly Index	Sets the register number to acquire hourly index values. The default is **7161**.
Extended Index	Sets the register number to acquire extended history values. The default is **7162**.
Events/Alarms	Sets the register number to acquire the most current event and alarm log entry. The default is **32**.
Current Date	Sets the register number to acquire the current date. The default is **7046**.
Current Time	Sets the register number to acquire the current time. The default is **7047**.
EFM Modbus	Sets whether the system uses the RAS EFM Modbus reporting option for date and time. Valid values are **Enabled** (use the EFM Modbus option) or **Disabled** (use standard Modbus reporting). The default is **Enabled**.

Table 7-6. Modbus History, Event, and Alarm Functionality

Function Code	Register Field	Data Field	Description
03	32 – Event/Alarm Register	Ignored[1]	Response contains Event and Alarm records[2]. Maximum number of bytes returned is 240 (12 records of 20 bytes each). Events are returned before Alarms are returned. The format is displayed in *Table 7-12, Modbus Events and Alarms Log Contents*.
05	32 – Event/Alarm Register	Ignored	After Events and Alarms have been returned, there must be an acknowledgment made so that the same Events and Alarms are not returned on the next request.
03	703 – Daily History	Daily History Archive Register Index (0 to 34)	Response contains two floating point values for the time and date stamp of the history archive (time stamp = HHMMSS and date stamp = MMDDYY) and floating point values for each of the defined History Points for that History Archive Register.
03	704 – Hourly History	Hourly or Periodic History Archive Register Index (0 to 839)	Response contains two floating point values for the time and date stamp of the history archive (time stamp = HHMMSS and date stamp = MMDDYY) and floating point values for each of the defined History Points for that History Archive Register.
03	X – Extended History	Extended History Archive Register Index (0 to Max)	Response contains two floating point values for the time and date stamp of the history archive (time stamp = HHMMSS and date stamp = MMDDYY) and floating point values for each of the defined History Points for that History Archive Register.

1. The Hourly (periodic) Index, Daily Index, Event, and Alarm Log data fields are used to address a history index number.

2. The Event and Alarm Log record consists of the bytes shown in *Table 7-12, Modbus Events and Alarms Log Contents*. *Table 7-13, Event & Alarm Change Bit Map Contents* breaks down the bit map in bytes 1-2.

Field	Description
Register Number	Sets the register number to acquire the group of history points defined by the values in the Starting History Points and Ending History Points fields.
Starting History Point	Sets the starting history point (first retrieved history point) for a group of points, as defined in the Register Number field. You must complete both this field and the Ending History Points field, and the value in the Ending History Points field must be different and larger than this value.
Ending History Point	Sets the ending history point (last retrieved history point) for a group of points, as defined in the Register Number field. You must complete both this field and the Starting History Points field, and the value in the Starting History Points field must be different and smaller than this value.
Archive Type	Sets the type of history returned from the Modbus request. Select **Hourly** or **Daily** to return Standard History Points; select **Extended** to return Extended History Points.

Field	Description
Conversion	Sets the type of data conversion required (if any) before the data returns to the host or is written to the FloBoss. Conversions allow floating point values to be transmitted or received as integer values. Refer to *Section 7.12.6, Modbus Conversion Codes*.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.12.6, Modbus Conversion Codes.*

7.12.6 Modbus Conversion Codes

Modbus conversion codes convert data into a format that is compatible to a Modbus device.

Use the Conversion field (located on either the Modbus Registers or Modbus History screen) to specify the type of conversion required, if any, on the data before it is either sent to the Host or written to the FloBoss device. Conversions account for differences in data types between the master and slave devices.

Conversion codes 65 to 72 allow a 4-byte IEEE formatted floating-point number to be sent or received in two Modbus registers with the byte orders configurable. A check is made to ensure that an even number of registers is requested, that the Start Register number does not begin in the middle of a register pair, and that the number of registers does not exceed the number of registers configured.

Table 7-7. Modbus Convert Codes

Convert Code	Description	Slave Function	Definition
0	No Conversion	N/A	N/A
1	Float to integer, Float Scale 1	3,4	The Float to Integer conversion changes FloBoss floating point data to an integer for transmission to the Host. The number of the Convert Code specifies which floating point scaling value is to be used for the conversion.
2	Float to integer, Float Scale 2	3,4	
3	Float to integer, Float Scale 3	3,4	
4	Float to integer, Float Scale 4	3,4	
5	Float to integer, Float Scale 5	3,4	
6	Float to integer, Float Scale 6	3,4	
7	Float to integer, Float Scale 7	3,4	
8	Float to integer, Float Scale 8	3,4	

Convert Code	Description	Slave Function	Definition
25	Any type to Float, No Scaling	3,4,6,16	When using Function Code 03 or 04, this conversion changes any data type (unsigned or signed Character, Integer, or Long) in the ROC to a specific point value for transmission to the Host. When using Function Code 6 or 16, this conversion changes a transmitted floating point value to the correct data type for the ROC TLP.
26	Any type to Signed Short Integer	3,4,6,16	
27	Any type to Signed Long Integer	3,4,6,16	
28	Any type to Unsigned Short Integer	3,4,6,16	
29	Any type to Unsigned Long Integer	3,4,6,16	
30 to 32	No Conversion	N/A	N/A
65	IEEE Floating Point Number	3,4,16	Code 65 places byte 0 and byte 1 in register xxxxx; byte 2 and byte 3 are placed in register xxxxx + 1. This places a 4-byte floating point value into two, 2-byte registers to allow integer values to be transmitted. Code 66 does the same as Code 65 regardless of the Byte Order field in the Modbus Configuration screen. Register xxxxx byte 0, byte 1 Register xxxxx + 1 byte 2, byte 3
66	IEEE Floating Point Number	3,4,16	
67	IEEE Floating Point Number	3,4,16	Code 67 reverses byte 0 and byte 1 order in register xxxxx; reverses byte 2 and byte 3 order in register xxxxx + 1. This places a 4-byte floating point value into two, 2-byte registers to allow integer values to be transmitted. Code 68 does the same as Code 67 regardless of the Byte Order field in the Modbus Configuration screen. Register xxxxx byte 1, byte 0 Register xxxxx + 1 byte 3, byte 2
68	IEEE Floating Point Number	3,4,16	
71	IEEE Floating Point Number	3,4,16	Code 71 reverses byte 2 and byte 3 order in register xxxxx; reverses byte 0 and byte 1 order in register xxxxx + 1. This places a 4-byte floating point value into two, 2-byte registers to allow integer values to be transmitted. Code 72 does the same as Code 71 regardless of the Byte Order field in the Modbus Configuration screen. Register xxxxx byte 3, byte 2 Register xxxxx + 1 byte 1, byte 0
72	IEEE Floating Point Number	3,4,16	
73	IEEE Floating Point Number	3,4.6,16	FloBoss 103/104 Only. Convert Codes 73 and 74 send the IEEE formatted floating point number as four bytes with a single register request. Only the byte order is changed: Function Code 73 loads register xxxxx in byte 2, byte 3, byte 0, byte 1 order. Function Code 74 does the same as Function Code 73 regardless of the Byte Order field in the Modbus Configuration screen.
74	IEEE Floating Point Number	3,4,6,16	
75 to 255	No Conversion	N/A	N/A

7.12.7 Modbus Master Table

The Modbus Master mode of operation allows a FloBoss to simulate a master device that can poll other devices for data and to store that data within the ROC in any valid TLP. The FloBoss can also send commands to set outputs and write data to a slave device.

Note: You can configure the Modbus Master functionality on COM1, COM2, and COM3.

Each command can transmit or receive up to 240 bytes of data. ROCLINK 800 supports Modbus function codes 1, 2, 3, 4, 5, 6, 15, and 16. Function codes 1 to 4 **request** data from slaves, while function codes 5, 6, 15, and 16 **transmit** data to a slave device.

Each master request you configure uses data read from or written to registers defined in the Modbus Registers table. When using Modbus function codes 1 to 4, the FloBoss reads data from a slave device and writes it to the TLP specified in the Modbus Registers table. When using Modbus function codes 5, 6, 15, and 16, the FloBoss reads data from the TLP specified in the Modbus Registers table and writes it to the slave device.

You can use an FST or User C program to schedule Modbus master requests. Enable the comm port on the Comm Port screen (**ROC** > **Comm Ports**). Set the Start Polling option on the Modbus Configuration screen (**Configure** > **Modus** > **Configuration**) if continuous polling is desired. Alternately, you can manage, enable, or disable master polling using a control application. Using FSTs, the FloBoss can dial other Modbus slave devices at regular intervals.

1. Select **Configure** > **MODBUS** > **Master Table**. The Modbus Master Table screen displays.

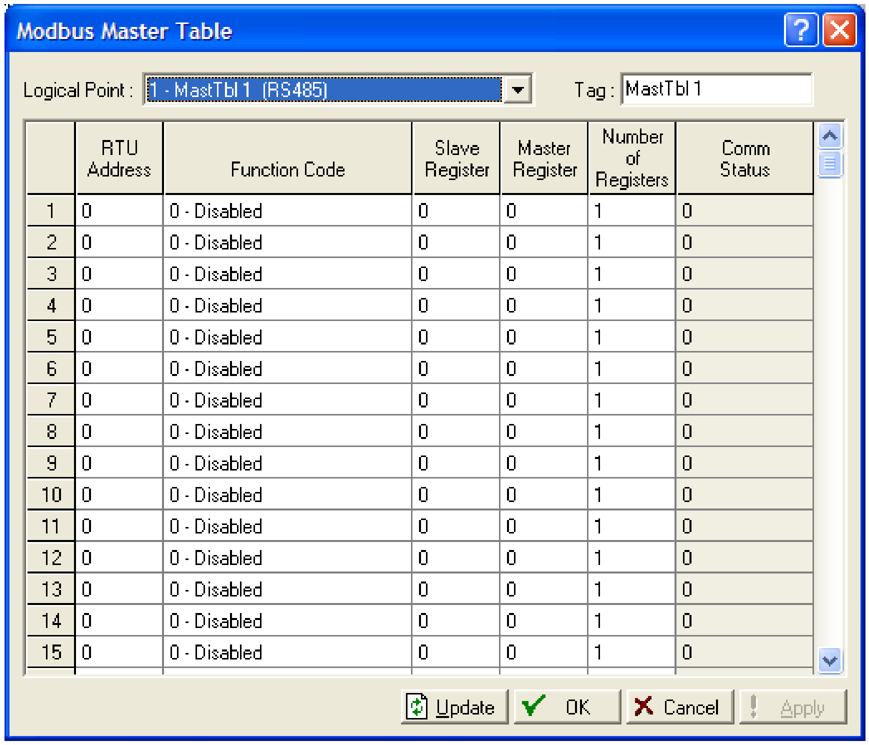


Figure 7-60. Modbus Master Table

2. Review the following fields for your organization's values.

Field	Description
Logical Point	Sets the logical point for the communication port. **Note**: You can define up to three logical points for Modbus master and slave functionality on COM1, COM2, and COM3.
Tag	Sets a 10-character alphanumeric identifier for the master table.
RTU Address	Sets the RTU address for the slave device to be queried.
Function Code	Sets the Modbus function code to be sent to the slave device. Click ▼ at the right edge of this field to display all valid function codes.
Slave Register	Sets the starting register number from which data is drawn from the slave device.
Master Register	Sets the starting register number into which data is stored on the master device.
Number of Registers	Sets the total number of registers to poll.
Comm Status	This **read-only** field shows the status of the query. See *Table 7-8*.

Table 7-8. Status of Host Request or Command

Status	Description
0	Inactive or start of transmission
1	Receive timeout error

Status	Description
2	Received Address check
3	Received Function Number check
4	Number of expected bytes check
5	Receiving Slave response
6	CRC or LRC check
7	CRC or LRC check
8	Valid Slave response
128	Write Device Data error
129	Access Device Data error
130	Host Function Table error
131	Transmit Timeout error
144	Transmit or Receive buffer overflow
145	Invalid Function Number in request

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 7.12.8, Modbus Events and Alarms*.

7.12.8 Modbus Events and Alarms

To view the Modbus Event Log and Alarm Log, select **Configure** > **Modbus** > **History**.

The record formats for the event log and alarm log are the same size and have similar contents. The first word in a record is a bit map in which bit 9 indicates if the log record is an event (1) or an alarm (0). The meanings of the other bits are specific to either the event or the alarm log records. Refer to *Table 7-13. Event & Alarm Change Bit Map Contents*.

The FB107 supports Modbus using the EFM extensions method for retrieving alarms and events. When the FB107 receives a Function Code 03 request referencing the defined Events and Alarms Register (usually 32), the FB107 begins to collect records, first from the event log and then from the alarm log, starting where the last poll left off. The FB107 collects records until **either** there are no more new events and alarms **or** the it collects the maximum of 12 records. The FB107 sends the information back to the host, which in return replies with Function Code 05, referencing the same Events and Alarms Register, indicating that the points have been received and that the host is ready for the next 12 records.

The following paragraphs detail how ROCLINK 800 places event log and alarms log information in Modbus event and alarm messages and how (or what) is generated upon the event or alarm condition.

Normal Event Record

Following is a normal event record format:

Bit Map		Register		Time as float				Date as float				Old Value as float				New Value as float			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

System Text Events

When you set the System Command Change Bit (bit 7) in the Operator Change Bit Map of the event, it sets the register number for all System Command Change events to the Event/Alarm Register number (default is 32).

Bit Map		Register		Time as float				Date as float					Code	Text						
0	1	2	3		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

ROCLINK 800 uses this format for the following event codes:

- 144 Initialization Sequence
- 146 Initialize From Defaults
- 147 ROM CRC Error
- 148 Database Initialization
- 150 Program Flash
- 248 Text Message
- 249 Download Configuration
- 250 Upload Configuration
- 251 Calibration Timeout
- 252 Calibration Cancel
- 253 Calibration Success

FST Events

For FST Events, the code is the FST number (1 to 6). Unused is set to zero.

Bit Map		Register		Time as float				Date as float				Code		Unused		Value as float			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Time Related System Events

Time represents the number of seconds since January 1, 1970. Unused is set to zero.

Bit Map		Register		Time as float				Date as float				Code		Unused		Time as time_t			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Events are formatted as:

- 145 All Power Removed
- 200 Clock Set

Alarms

Use the Alarms table to determine the alarming source. The Register number for all unmapped Alarms is set to the Event/Alarm Register number (default is 32).

Following is a normal alarm record format:

Bit Map		Register		Time as float				Date as float				Value as float				Unused			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Unmapped Parameter Alarms

If the alarming point is not mapped to a Modbus Register, identify the point using the following table. The TLP is the source TLP of the alarm. The type is set to 1.

Bit Map		Register		Time as float				Date as float				Value as float				TLP			Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

FST Alarms

If the Alarm is an FST Alarm, ROCLINK 800 uses the following format. The FST Number is the source FST Number that generated the alarm. Unused is set to zero and the type is set to 2.

Bit Map		Register		Time as float				Date as float				Value as float				FST#	Unused		Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

User Text Alarms

If the Alarm is a User Text Alarm, the following format will be used. Text is filled in with seven bytes of User Text and the Type will be set to 3.

Bit Map		Register		Time as float				Date as float				Text							Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

User Value Alarms

If the alarm is a User Value Alarm it uses the following format. Unused is set to zero and the Type is set to 4.

Bit Map		Register		Time as float				Date as float				Value as float				Unused			Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Reading Events and Alarms Register

The Modbus request to read the Event Log and Alarm Log uses the standard read Function Codes 03 or 04 and the Register Number defined in the History Access configuration. In this request, the number of registers is included to maintain format compatibility, but is ignored by the receiving FloBoss.

Twenty bytes are returned for each event and alarm in the response. Up to 12 events and alarms can be returned in a single response. If no events and alarms have occurred since the last collection, the response contains zero (0) data bytes.

For the date stamp in the events and alarms returned, the year (YY) is really the number of years since 1980. For example, if the current year is 2007, the year (YY) for the date stamp would be 27.

Following is an example of a request for events and alarms with the history access event/alarm register defined as 32 (0x0020 hex).

Table 7-9. Host Event/Alarm Request Example Message

Message Field	Device Address	Function Code	Register Offset	Num Reads (ignored)		Error Check	
Bytes	1	1	2	2		2	
TX Order			MS LS	MS	LS	LS	MS
Value	01H	03H	00H 20H	00H	01H	CRC-16	

The following example shows a response returning three events and alarms.

Table 7-10. Event/Alarm Response Example Message

Message Field	Device Address	Function Code	Byte Count	Data		Error Check
Bytes	1	1	1	(20 bytes per event or alarm)		2
TX Order				Integers — MS	LS	LS MS
					Floats — Selectable	
Value	01H	03H	3CH			CRC-16

Acknowledging Events and Alarms

After the host has correctly received event and alarm data, it transmits an acknowledgement message to the ROC to clear these events and alarms from the Modbus buffer.

Until acknowledged, the ROC continues to send the same event and alarm records to the host. The Modbus acknowledgement (to clear the Event Log and Alarm Log buffer) uses Function Code 05 and the Register Number defined in the History Access configuration. In this request the data value is always one (1).

Table 7-11. Event and Alarm Acknowledgement Response Example Message

Message Field	Device Address	Function Code	Register		Data		Error Check	
Bytes	1	1	2		2		2	
TX Order			MS	LS	MS	LS	MS	LS
Value	01H	05H	00H	20H	FFH	00H	CRC-16	

Table 7-12. Modbus Events and Alarms Log Contents

Byte	Contents of Event Log Record	Contents of Alarm Log Record
1 to 2	Operator change (Event Log) bit map (16-bit integer) – Refer to *Table 7-13. Event & Alarm Change Bit Map Contents*.	Alarm change bit map (16-bit integer) – Refer to *Table 7-13. Event & Alarm Change Bit Map Contents*.
3 to 4	Modbus Register number of variable (16-bit integer)	Modbus Register number of variable (16-bit integer)
5 to 8	Time Stamp (HHMMSS; 32-bit floating point)	Time Stamp (HHMMSS; 32-bit floating point)
9 to 12	Date Stamp (MMDDYY; 32-bit floating point)	Date Stamp (MMDDYY; 32-bit floating point)

Byte	Contents of Event Log Record	Contents of Alarm Log Record
13 to 16	Previous value of variable (32-bit floating point)	Current (alarmed) value of variable (32-bit floating point)
17 to 20	Current (New) value of variable (32-bit floating point)	Unused at the current time (zero filled when transmitted to the Master)

Table 7-13. Event & Alarm Change Bit Map Contents

Bit	Operator Change Bit Map	Alarm Change Bit Map
0	Fixed value – change to an EU value on an I/O point in Manual Mode	Not Used
1	Zero scale – change to the 0% Adjusted on an AO or AI	Not Used
2	Full scale – change to the 100% Adjusted on an AO or AI	Not Used
3	Operator entry work value – change to any parameter other than those described	Not Used
4	Boolean fixed bit – change to Status in DO or DI	Not Used
5	Fixed/variable flag – change to Manual Mode for an I/O point	Manual Alarm
6	Table entry change – change to Modbus Function Tables	Status Change Alarm
7	System command change – events logged by system (Power up)	No Flow Alarm
8	Not Used	Point Fail Alarm
9	Operator change (Event Log) identifier bit	0 for Alarm
10	Low Low Limit – change to Low Low Alarm parameter	Low Low Alarm
11	Low Limit – change to Low Alarm parameter	Low Alarm
12	High Limit – change to High Alarm parameter	High Alarm
13	High High Limit – change to High High Alarm parameter	High High Alarm
14	Rate of Change Limit – change to Rate Alarm parameter	Rate Alarm
15	Not Used	Set/Clear Alarm (1 = Set or 0 = Clear)

7.13 LCD User List

Note: You can configure the LCD user lists, but you cannot display the LCD user lists without the optional FB107 LCD (“Touchpad”). For complete documentation on configuring and using the Touchpad, refer to the *FloBoss™ 107 Flow Manager LCD Program User Manual*, Form A6236.

Use the Configure menu’s LCD User List option to configure displays on the optional Touchpad.

The Touchpad has three operating modes: Standard, Basic List Mode (BLM), and Chart. Standard mode requires that you complete a log-on sequence to access user list information. BLM mode automatically scrolls through a display of up to 32 parameter values you define. Finally, Chart enables the Touchpad to serve as a dynamic, real-time chart recorder displaying a variety of history points you define.

7.13.1 LCD User List (Standard)

You can define up to four user lists, which you can access after you log onto the Touchpad. Each user list provides easy access to up to 16 parameter values (or a total of 64 parameters).

To define the contents of each user list:

1. Select **Configure** > **LCD User List** > **Standard**. The LCD User List screen displays.

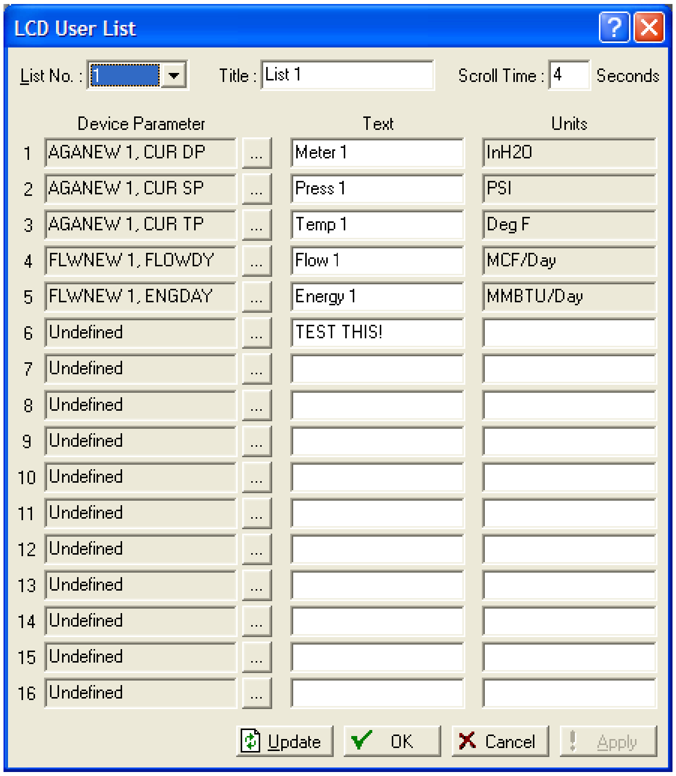


Figure 7-61. LCD User List

2. Complete the following fields to define the contents of each user list.

Field	Description
List No.	Sets the number of the LCD User List you want to configure. Click ▼ to display all defined lists. You can define up to four user lists.
Title	Sets a 10-character alphanumeric identifier for the user list.
Scroll Time	Indicates the number of seconds the Touchpad displays each parameter set before scrolling to the next parameter set. (Typically the Touchpad displays two parameters at a time.) Valid values are **0** (do not scroll) to **255**. **Note**: If you set this value to **0**, you must use the ↑ and ↓ keys on the Touchpad to manually scroll through the parameters defined in the list.

Field	Description
Device Parameter	Sets the parameter that you want to display on the Touchpad. Click **…** to display a Select TLP screen you can use to define the parameter.
Text	Sets a 10-character alphanumeric identifier for the parameter.
Units	This **read-only** field shows the engineering units for the associated parameter.

3. Click **Update** if you make any changes to this screen.
4. Click **OK** to close the LCD User List screen.

7.13.2 LCD User List – BLM

In basic list mode (BLM), the Touchpad continually displays a series of up to 32 parameters you define. This enables service technicians to quickly review a dynamic display of current values without logging onto the Touchpad.

To define the BLM display:

1. Select **Configure** > **LCD User List** > **BLM**. The LCD User List - BLM screen displays.

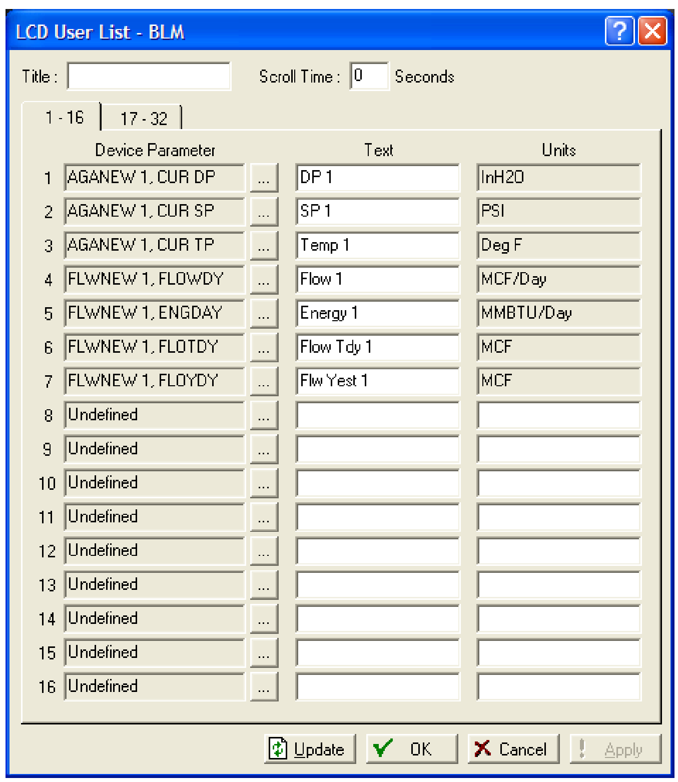


Figure 7-62. LCD User List - BLM

2. Complete the following fields to define the first 16 parameters of the BLM list.

Field	Description
Title	Sets a 10-character alphanumeric identifier for the list.
Scroll Time	Indicates the number of seconds the Touchpad displays each parameter set before scrolling to the next parameter set. (Typically the Touchpad displays two parameters at a time.) Valid values are **0** (do not scroll) to **255**. **Note**: If you set this value to **0**, you must use the ↑ and ↓ keys on the Touchpad to manually scroll through the parameters defined in the list.
Device Parameter	Sets the parameter that you want to display on the Touchpad. Click **…** to display a Select TLP screen you can use to define the parameter.
Text	Sets a 10-character alphanumeric identifier for the parameter.
Units	This **read-only** field shows the engineering units for the associated parameter.

3. Click the **17-32** tab to define 16 additional parameters.
4. Click **Update** if you make any changes to this screen.
5. Click **OK** to close the LCD User List – BLM screen.

7.13.3 LCD User List – Chart

In Chart mode, the Touchpad functions as a chart recorder, displaying historical or dynamic values for up to 16 parameters you define. To access the chart function, you must first log onto the Touchpad.

To define the chart display:

1. Select **Configure** > **LCD User List** > **Chart**. The LCD User List - Chart screen displays.

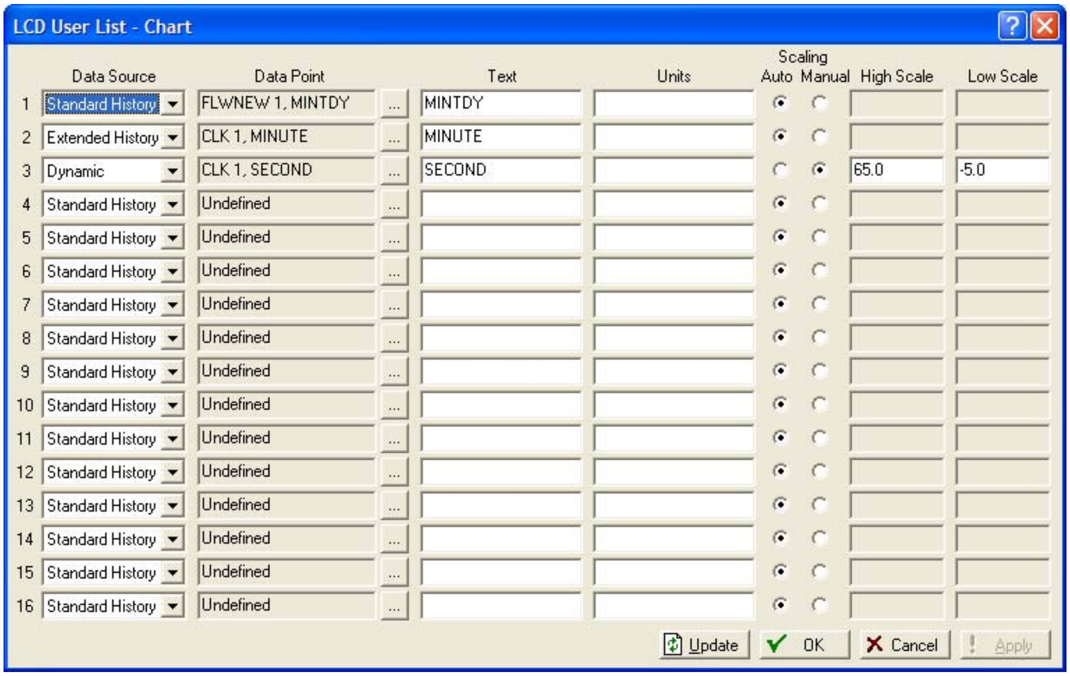


Figure 7-63. LCD User List - Chart

2. Complete the following fields to define the chart display values.

Field	Description	
Data Source	Sets the source for data included in the chart. Valid values are:	
	Standard History	Sets a standard history point to chart. Click **…** to open a Select History Point dialog box you can use to select a valid standard history point.
	Extended History	Sets an extended history point to chart. Click **…** to open a Select History Point dialog box you can use to select a valid extended history point.
	Dynamic	Sets a dynamic data point to chart. Click **…** to open a Select TLP dialog box you can use to select a valid TLP.
Data Point	This **read-only** field shows the data point selected.	
Text	Sets a 10-character alphanumeric identifier for the data point.	
Units	This **read-only** field shows the engineering units for the associated parameter.	
Scaling	Indicates whether the system applies automatic or manual scaling factors to the charted results. Valid values are **Auto** (apply automatic values) or **Manual** (apply defined values).	
High Scale	Sets the high scaling value for the data point. **Note**: This field is available only if you select **Manual** as a scaling option.	

Field	Description
Low Scale	Sets the low scaling value for the data point. **Note**: This field is available only if you select **Manual** as a scaling option.

3. Click **Update** if you make any changes to this screen.
4. Click **OK** to close the LCD User List – Chart screen.

Chapter 8 – The Meter Menu

Use the Meter menu options to define, configure, and calibrate meter runs; review meter runs; and perform plate changes.

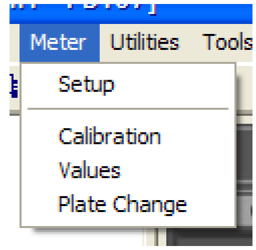


Figure 8-1. Meter Menu

In This Chapter

8.1 Configuring the Meter Setup

Use Meter Setup to configure meter runs. The Meter configuration screens contain the functions directly associated with measuring and logging flow, including setup of American Gas Association (AGA), American Petroleum Institute (API), or International Standards Organization (ISO) calculation configuration parameters, and calibrating the meter depending on the device that you are configuring.

The FloBoss 107 can support up to four pulse or differential meters. *Table 8-1* shows the units of the flow parameters in Metric and US engineering units (EUs).

Table 8-1. Meter Run Engineering Units (EU)

Flow Parameter	U.S. Units	Metric Units
Meter Input (AGA3, ISO5167)	InH2O	kPa
Meter Input (AGA7)	MCF/Day	kM3/Day
Static Pressure	PSIG or PSIA	kPaG or kPaA
Temperature	Deg F	Deg C

Flow Parameter	U.S. Units	Metric Units
Instantaneous Volume/Hour	CF/Hour	M3/Hour
Instantaneous Volume/Day	MCF/Day	kM3/Day
Instantaneous Energy/Hour	BTU/Hour	MJ/Hour
Instantaneous Energy/Day	MMBTU/Day	GJ/Day
Volume Flow Today/Yesterday	MCF	kM3
Energy Today/Yesterday	MMBTU	GJ
Viscosity	Lbm/Ft-Sec	Cp
Diameters	Inches	Millimeters
Elevation	Feet	Meters
Inst Mass/Hour	Lb/Hour	Kg/Hour
Inst Mass/Day	Mlb/Day	Tonnes/Day
Mass Flow Today/Yesterday	Mlb	Tonnes
Density	Lb/Cf	Kg/M3
Heating Value	BTU/CF or BTU/Lb	MJ/M3 or MJ/Kg

To configure the meter runs, select **Meter** > **Setup**. The Meter Setup screen displays:

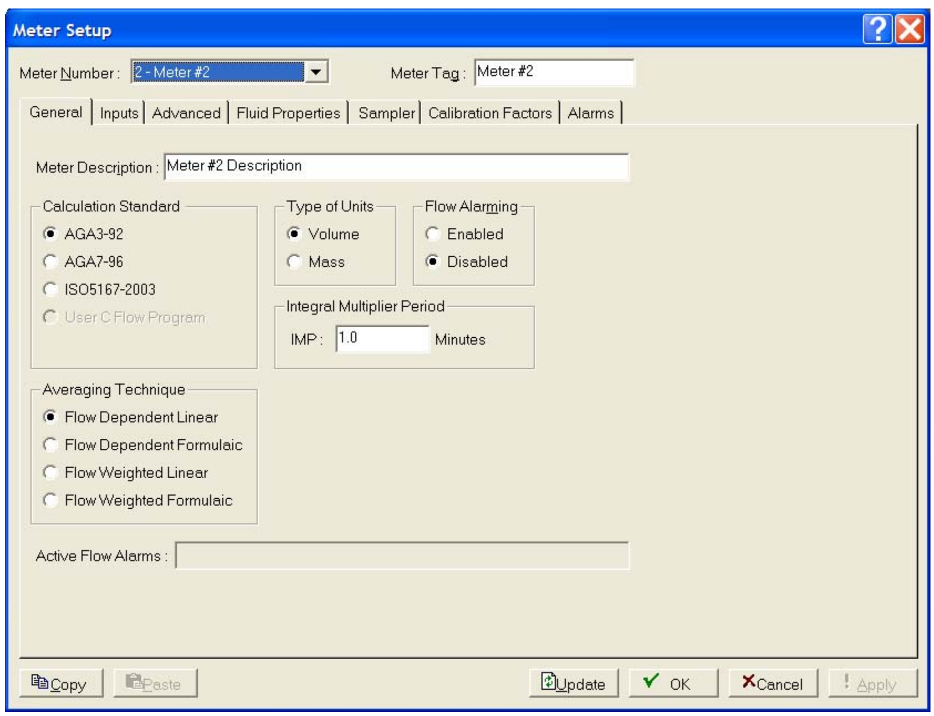


Figure 8-2. Meter Setup

Note: You can also access this screen by clicking an individual meter icon on the configuration tree.

Configure the parameters on each tab as they relate to your application.

- Use the **General** tab to set basic parameters for the meter.

- Use the **Inputs** tab to define the field inputs for differential pressure (AGA3, ISO 5167), uncorrected volume or mass (AGA7), static pressure, and temperature to be used in the flow calculation.
- Use the **Advanced** tab to specify additional parameters for the meter.
- Use the **Fluid Properties** tab to define the mole percentages for up to twenty gas components, as well as the Heating Value Basis, the Heating Value, and the Specific Gravity.
- Use the **Sampler** tab to set up the discrete output (DO-2) of the FB107 to send a pulse output to another device, such as an odorizer, and control a gas sampler for a meter run.

  Note: To use this feature, select **Enabled** under Sampler Control.
- Use the **Calibration Factors** tab displays parameters that allow you to select and perform calculation of optional flow adjustment factor to compensate for the difference in condition between the meter location and the location where the calibration instruments were certified.
- Use the **Alarms** tab to set alarm parameters for the meter.

Note: After you configure a meter and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC** > **Flags** screen) to save the configuration to permanent memory in case you must perform a cold start.

8.1.1 Meter Setup General Tab

Use the General tab to define basic parameters for the meter. The General tab displays when you first access the Meter Setup screen.

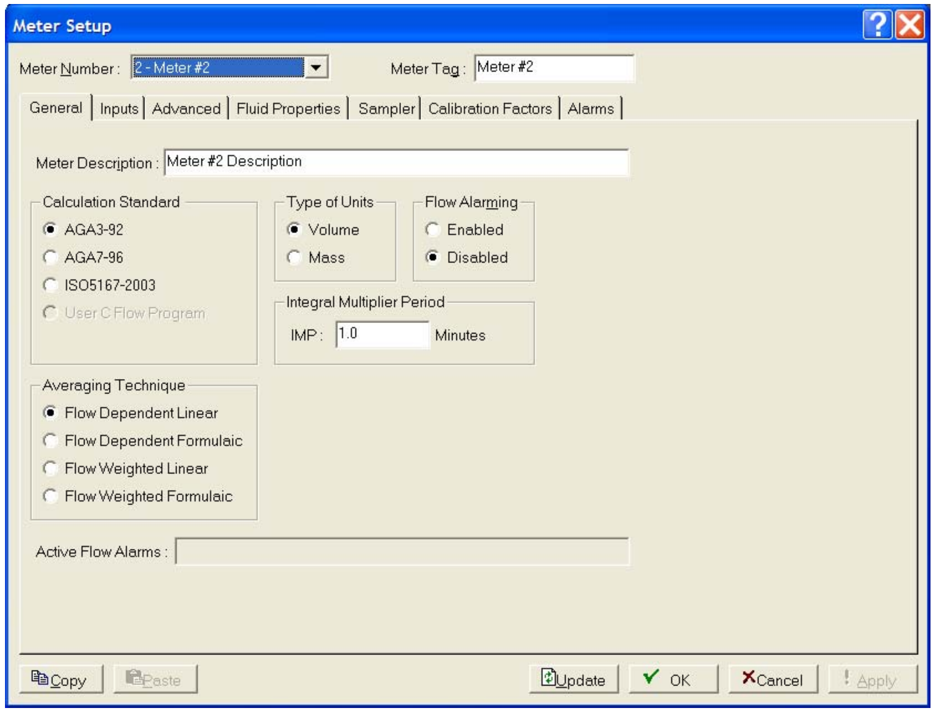


Figure 8-3. Meter Setup, General Tab

1. Review the following fields for your organization's values:

Field	Description	
Meter Number	Selects the number of the meter to be configured. **Note**: This selection in this field applies to each tab on this screen.	
Meter Tag	Sets a short (10 alphanumeric characters) identifier for the meter. **Note**: This selection in this field applies to each tab on this screen.	
Meter Description	Sets a unique description, up to 30 alphanumeric characters in length, that further identifies or provides information about this meter.	
Calculation Standard	Sets the standard the system uses for flow calculations. Valid values are:	
	AGA3-92	AGA3 (1992) for orifice or differential metering.
	AGA7-96	AGA7 (1996) for turbine, pulse, rotary, or other linear meters.
	ISO5167-2003	ISO5167-2003 firmware calculates flow.
	User C Flow Program	User C program calculates flow.
	Note: The calculation of flow in a meter run depends on the type of FloBoss or ROC being configured.	

Field	Description
Type of Units	Sets the units for the meter that you are configuring. Valid values are **Volume** (volume metering device like a turbine meter) or **Mass** (Micro Motion Coriolis Mass Meter or similar mass meter).
Flow Alarming	Enables or disables flow alarming for the meter. If you enable alarms, use the Alarms tab to configure the alarms. If Enabled, alarms also log to the Alarm Log. If you disable alarms, no alarm generates for this meter, regardless of the alarm configuration. However, the system displays alarm conditions in the Active Flow Alarms field.
Integral Multiplier Period	Sets, in minutes, how frequently the system calculates the combined correctional factors known as the Integral Multiplier Value (IMV) (per the API measurement standard *Chapter 21, Section 1*) for the orifice flow equation. The default IMP is **15** minutes; it can be no **more** than **60** minutes in length and cannot be **less** than **1** minute. The system calculates the **Integral Value** (IV) portion of the flow equation once per second. **Note**: This option displays **only** if you select either **AGA3-92** or **ISO5167-2003** as the calculation standard.
Base Multiplier Period	Sets, in minutes, how frequently the system calculates the turbine calculations of the combined correctional factors, known as the Base Multiplier Value (BMV) (per the API measurement standard *Chapter 21*, *Section 1)* for the turbine flow equation. The default BMP is **15** minutes; it can be no more than **60** minutes in length and cannot be less than **1** minute. **Note**: This option displays **only** if you select **AGA7-97** as the calculation standard. The BMV is multiplied by the actual (uncorrected) volume to arrive at the quantity accumulated for the period. To determine if flow was occurring over the BMP, the system views the number of counts over the period. If there is an absence of counts or you have set the BMP shorter than the normal time it takes to get a pulse, the following occurs: ▪ Meter run is defined in a No Flow condition. ▪ Accumulated flow is stored as zero for historical data over that time period. ▪ Accumulated Energy is stored as zero for historical data over that time period.

Field	Description	
Averaging Technique	Sets an averaging technique for the meter run. Valid values are:	
	Flow Dependant Linear	This is the simplest and most commonly used method. This method discards samples for periods when there is no measurable flow, and performs a straightforward (linear) average of the remaining samples to compute the minute and hour values. The value specified in the Low Flow Cutoff of the Meter setup determines the values. When no flow occurs, all values are sampled.
	Flow Dependant Formulaic	This method discards samples for periods when there is no flow. However, in calculating the average, this method typically takes the square root of each sample before averaging the samples together, and then squares the result. This formulaic method produces a slightly lower value than the linear method.
	Flow Weighted Linear	This method does not discard any samples; instead, it "weights" each sample by multiplying it by a flow value (square root of the differential pressure measured during the sample period). Next, a linear average is calculated by dividing the sum of the flow-weighted sample by the sum of the flow values. This result includes minute and hourly values that are more reflective of short periods of high flow.
	Flow Weighted Formulaic	This method combines the flow-weighting action with the formulaic averaging technique, both of which were described previously.
Active Flow Alarms	This **display-only** field shows any alarm currently active. For example, **Low** indicates that the calculated flow is below the Low Alarm limit. Other alarms can include **High**, **No Flow**, and **Manual Mode**.	

2. Click **Apply** if you change any parameters on this screen.
3. Proceed to *Section 8.1.2, Meter Setup Inputs Tab*.

8.1.2 Meter Setup Inputs Tab

Use the Inputs tab to define the field inputs for differential pressure, uncorrected volume, static pressure, and temperature, which the system uses in the flow calculation.

1. Select the **Inputs** tab. The Inputs screen displays.

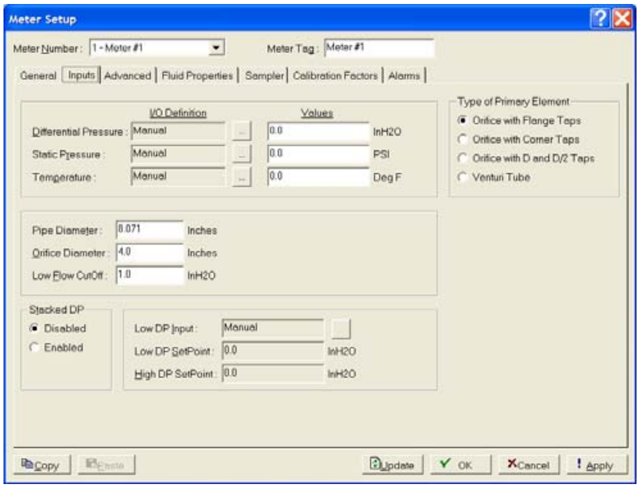


Figure 8-4. Meter Setup, Inputs tab (Orifice Meter)

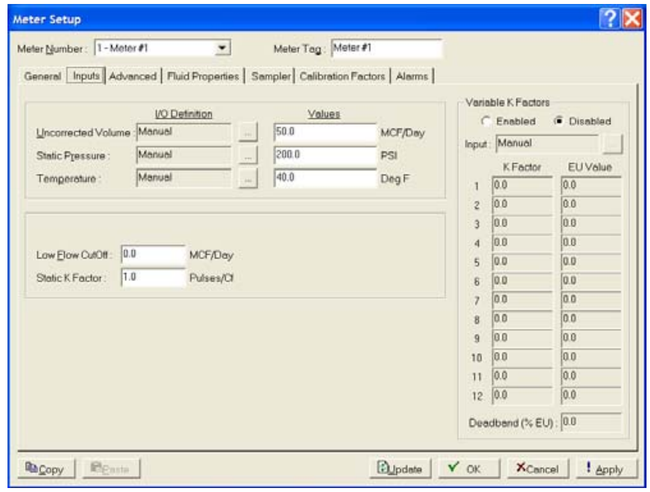


Figure 8-5. Meter Setup, Inputs tab (Turbine Meter)

Note: Which screen displays depends on the calculation standard you selected on the General tab. Select **AGA3-92** or **ISO5167-2003** (orifice calculations) to display *Figure 8-4*. Select **AGA7-92** (turbine calculations) to display *Figure 8-5*.

2. Review the following fields for your organization's values.

Field	Description
Differential Pressure	Sets the input that senses the differential pressure (or high differential pressure, if you enabled Stacked DP). Click **…** to display a Select TLP dialog box you use to assign the input. The system assumes the units for the input to be inches of water column (In H_20) or kPa. If Manual appears, use the Values field to enter an engineering units value for the meter input. Otherwise, the Values field indicates the current input value. **Note**: This field displays **only** for an **orifice** meter.
Uncorrected Volume	Sets the input that senses the input (typically pulses) from a turbine meter. Click **…** to display a Select TLP dialog box you use to assign the input. The system assumes the units for the input to be MCF per day (1000 ft^3/day) or 1000 cubic meters per day (kM^3/day). If Manual appears, use the Values field to enter an engineering units value for the meter input. Otherwise, the Values field indicates the current input value, based on non-adjusted pulses from the turbine meter.

Field	Description
	Note: This field displays **only** for a **turbine** meter.
Static Pressure	Sets the input that senses static pressure. Click **…** to display a Select TLP dialog box you use to assign the input. The system assumes the units for the input to be PSIG/PSIA or kPaG/kPaA. If Manual appears, use the Values field to enter a engineering units value for the static pressure input. Otherwise, the Values field indicates the current input value.
Temperature	Sets the input that senses the temperature of the flowing gas. Click **…** to display a Select TLP dialog box you use to assign the input. The system assumes units for the input to be degrees Fahrenheit or degrees Celsius. If Manual appears, use the Values field to enter an engineering units value for the temperature input. Otherwise, the Values field indicates the current input value.
Type of Primary Element	Sets the element type associated with the orifice meter. **Note**: This field displays **only** for an **orifice** meter.
Pipe Diameter	Sets the inside diameter for the pipe near the orifice plate in this meter run. The units are inches or millimeters. **Note**: This field displays **only** for an **orifice** meter.
Orifice Diameter	Sets the diameter of the orifice plate in this meter run. The units are inches or millimeters. **Note**: This field displays **only** for an **orifice** meter.
Low Flow Cutoff	Sets the low flow cutoff point. When the differential pressure value of the metering device is less than this value, the system sets the calculated flow rate to zero and, if alarming is enabled, records a No Flow alarm in the Alarm Log. For the **AGA3-92** or **ISO5167-2003** standard, this value is in terms of inches of water column or kPa. For the **AGA7-96** standard, this value is in terms of MCF/day.
Static K Factor	Sets a K factor, expressed as counts/pulses per unit volume (such as 4 pulses per cubic foot or 235 pulses/ft^3), that the AGA7 calculations use for various low and high flow conditions, as received from a specified input. The K Factor **cannot** be less than zero. The system assumes units for the input to be either in ft^3 or m^3. If you disable the Variable K Factor, the system uses the Static K Factor. **Note**: This field displays **only** for a **turbine** meter.

Field	Description
Stacked DP	Enables the use of standard differential pressure transmitters for low and high pressure ranges. Valid values are Enabled (use stacked DP transmitters) or Disabled (do not allow use of stacked DP transmitters). **Note**: This field displays **only** for an **orifice** meter.
Low DP Input	Sets the input for monitoring low differential pressure. Click **…** to display a Set TLP dialog box you use to assign the input. You must **Enable** the Stacked DP parameter must to use this input or you can leave this input in Manual Mode when you **Disable** Stacked DP. **Note**: This field displays **only** for an **orifice** meter.
Low DP Setpoint	Sets the differential pressure point at which the system switches over to the low differential pressure input. When the High DP input is active and the High DP reading drops below this value, the Low DP input becomes the active input. The system assumes the units for this input to be inches of water column (In H_2O) or kPa. **Note**: This field displays **only** for an **orifice** meter.
High DP Setpoint	Sets the differential pressure point at which the system switches over to the high differential pressure input. When the Low DP input is active and the Low DP reading rises above this setpoint, the High DP input becomes the active input. The system assumes the units for this input to be inches of water column (In H_2O) or kPa. **Note**: This field displays **only** for an **orifice** meter.
Variable K Factors	Enables the variable K Factor and sets the K Factor values over a range to be measured. If this field is **Disabled**, the system uses the Static K Factor. The AGA7 calculations use a K Factor. You can specify a variable K factor to keep the K Factor value more linear by equating it to a EU Value, as received from a specified Input. The K Factor values **cannot** be less than zero. **Note**: This field displays **only** for a **turbine** meter.

3. Click **Apply** if you change any parameters on the screen.
4. Proceed to *Section 8.1.3, Meter Setup Advanced Tab*.

8.1.3 Meter Setup Advanced Tab

Use the Advanced tab to specify additional meter parameters.

1. Select the **Advanced** tab. The Advanced screen displays.

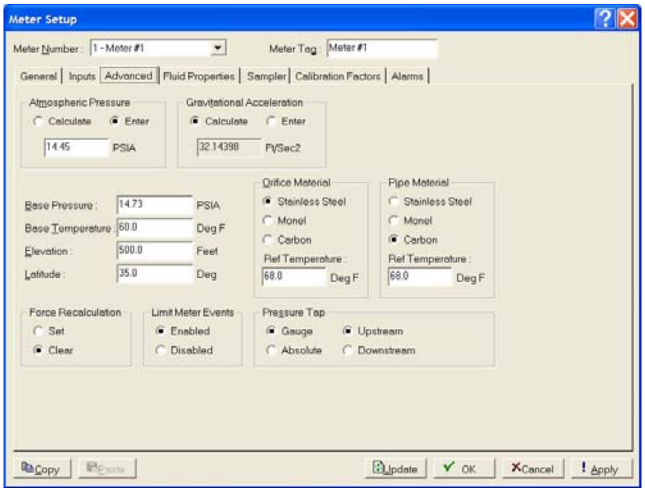


Figure 8-6. Meter Setup, Advanced tab (Orifice Meter)

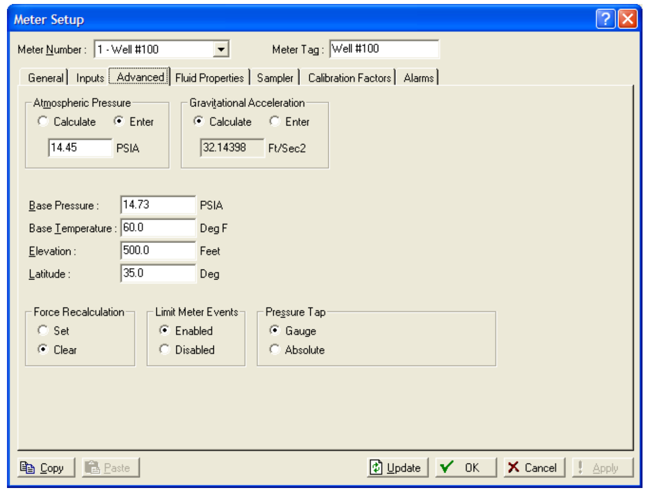


Figure 8-7. Meter Setup, Advanced tab (Turbine Meter)

Note: Which screen displays depends on the calculation standard you selected on the General tab. Select **AGA3-92** or **ISO5167-2003** (orifice calculations) to display *Figure 8-6*. Select **AGA7-96** (turbine calculations) to display *Figure 8-7*.

2. Review the following fields for your organization's values.

Field	Description
Atmospheric Pressure	Sets how the system determines the value of atmospheric pressure at the metering location. Valid values are **Calculate** (the system uses the value in the Elevation field) or Enter (calculates the value from the value or **Enter** (use the specified pressure value). If entered, the value must be greater than zero, and is expressed in PSIA.
Gravitational Acceleration	Sets how the system determines the value for gravitational acceleration at the metering location. Valid values are **Calculate** (the system calculates the value from Elevation and Latitude) or **Enter** (use the specified acceleration value). If entered, the value must be greater than zero, and is expressed in ft/sec^2 or M/sec^2.
Base Pressure	Sets the base pressure as specified in the gas contract, expressed as PSIA.
Base Temperature	Sets the base temperature as specified in the gas contract, expressed as degrees Fahrenheit or degrees Celsius.
Elevation	Sets the elevation of the metering location, expressed in feet or in meters. This value is required for the calculation of atmospheric pressure and gravitational acceleration.
Latitude	Sets the geographical location for the metering location, expressed as degrees and minutes separated by a decimal point (such as **46.15** for 46 minutes and 15 degrees).

Field	Description
Orifice Material	Indicates the material from which the orifice is made. Nearly all natural gas applications use stainless steel orifice plates. You must also complete the **Ref Temperature** field. This indicates the reference temperature at which the bore diameter of the orifice plate was measured, expressed in degrees Fahrenheit or degrees Celsius. **Note**: This field displays **only** for a **turbine** meter.
Pipe Material	Indicates the material from which the orifice meter tube material is made. Nearly all natural gas applications use carbon steel meter tube. You must also complete the **Ref Temperature** field. This indicates the reference temperature at which the internal diameter of the pipe was measured, expressed in degrees Fahrenheit or degrees Celsius. **Note**: This field displays **only** for a **turbine** meter.
Force Recalculation	Forces (after you select this value **and** click **Apply**) the system to fully recalculate the flow without waiting for the next normal recalculation. You set normal recalculation periods using the Integral Multiplier Period or the Base Multiplier Period fields on the General tab of the Meter Setup screen. After a forced recalculation, the system zeros accumulations logs the flow value as a new entry. **Note**: The system automatically resets this parameter to **Clear** after the recalculation completes.
Limit Meter Events	Sets the logging of AGA events. The system logs AGA limit events when an input to the AGA calculation is either outside the specified limits or the calculation fails. Valid values are **Enabled** (log all AGA limit events) or **Disabled** (ignore AGA calculation related events). **Note**: Disabling this parameter prevents the event log from filling with AGA limit events.
Pressure Tap	Indicates the pressure tap type and location for this meter run. Valid values are: **Gauge/Absolute** – Indicates the type of pressure tap. This choice must match the static pressure type as actually measured by the sensor. Order the MVS sensor, DVS sensor, or other pressure transmitter to provide absolute or gauge measurements. **Upstream/ Downstream** – Indicates the location of the orifice static pressure tap in relation to the orifice and normal flow. **Upstream** is the default. **Note**: This field displays **only** for an **orifice** meter.

3. Click **Apply** if you change any parameters on the screen.
4. Proceed to *Section 8.1.4, Meter Setup Fluid Properties Tab*.

8.1.4 Meter Setup Fluid Properties Tab

Use the Fluid Properties tab to define the mole percentages of up to 21 gas components, as well as the Heating Value Basis, the Heating Value, and the Specific Gravity.

Note: If other runs have similar characteristics, you can use Copy and Paste to create gas quality configurations.

1. Select the **Fluid Properties** tab. The Fluid Properties screen displays.

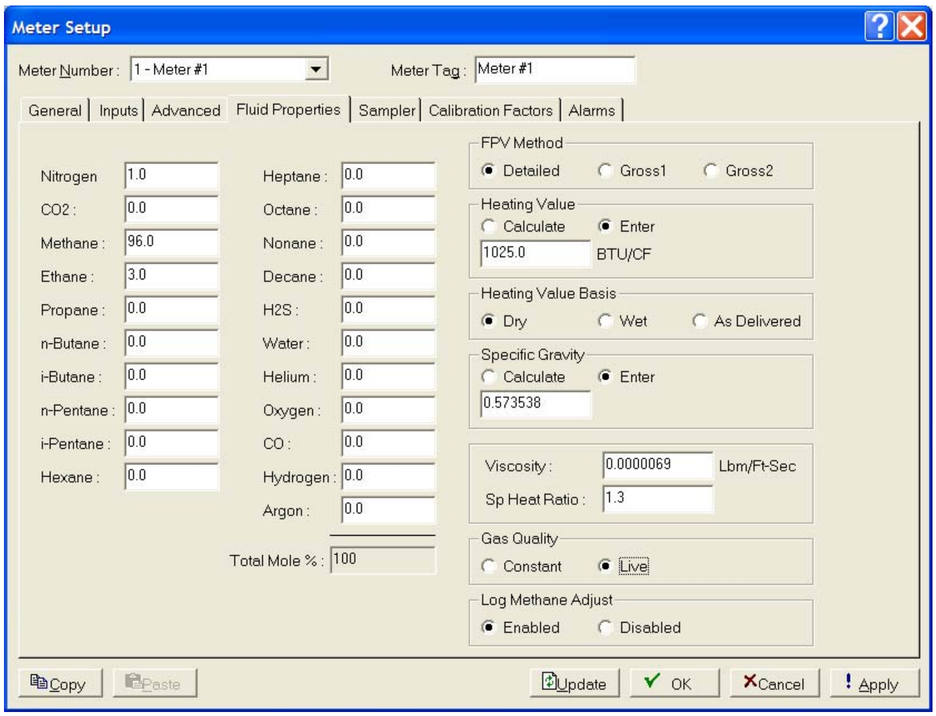


Figure 8-6. Meter Setup, Fluid Properties tab

2. Review the following fields for your organization's values.

Field	Description	
Gas Component	Sets the mole percent for each gas component. The default values are **96%** Methane, **3%** Ethane, and **1%** Nitrogen. Under the system default AGA8 detailed method of properties calculations, the value in the Total Mole % field must equal 100% after you define (or accept the default) mole percentages.	
FPV Method	Sets the method of determining a compressibility factor for AGA calculations. Value values are:	
	Detailed	Requires the natural gas composition in mole percent to be entered for all components.

Field	Description	
FPV Method (continued)	**Gross1**	Uses the specific gravity of the natural gas; the real gas gross heating value per unit volume; and the mole % of CO_2 as the quantity of non-hydrocarbon components.
	Gross2	Uses the specific gravity of the natural gas; the real gas gross heating value per unit volume; and the mole % of CO_2 and the mole % of N_2 as the quantity of non-hydrocarbon components.
	Note: If you choose either **Gross1** or **Gross2**, you must manually enter values for Specific Gravity and Heating Value on this screen. Gross2 requires a value for Heating Value only for calculating the gas energy flow. While the Detailed method provides the highest accuracy in a broad range of measurement conditions, you can use either of the Gross methods when: ▪ Temperature is between 0 °C and 54 °C (32 °F and 130 °F). ▪ Pressure is between 0 and 8274 kPa (0 and 1200 PSIA). ▪ Gas composition is within the Normal range, as defined in the 1992 AGA8 report.	
Heating Value	Sets how the system determines the heating value for a specified quantity of gas. Valid values are **Calculate** (allow the system to calculate the heating value from the gas composition data) or **Enter** (use the value specified in the energy calculation). **Note**: Use the Type of Units parameter on the General tab to toggle between volume or mass measurement in English units (expressed as BTU/CF or BTU/Lb) and metric units (MJ/m^3 or MJ/Kg).	
Heating Value Basis	Identifies the property basis the system used to determine the heating value for the flow or energy calculations. Valid values are:	
	Dry	No water vapor present in gas.
	Wet	Saturated water vapor present in gas. **Note**: When you select this option, the FB107 calculates the mole percentage of water based on the algorithm from IAPWS—IF97 standards and adjusts the other mole percentages accordingly.
	As Delivered	Gas may contain some water vapor.

Field	Description
Specific Gravity	Sets the ratio of the molar mass of the gas to the molar mass of the air, a value used in the flow calculation. Valid values are **Calculate** (the system calculates the value) and **Enter** (use the specific value for the flow calculation). **Note**: If you select **Enter**, the value should represent the gas at standard conditions and cannot be less that 0.07.
Viscosity	Sets the dynamic viscosity of the flowing gas. Units of measure are either lbm/Ft-Sec (for English units) or cP (for metric units).
Sp Heat Ratio	Sets the specific heat ratio of the gas (defined as the specific heat of the gas at constant pressure divided by the specific heat of the gas at constant volume). Accepted practice for natural gas applications is to use a value of 1.3, which was used to develop the expansion factor tables in the AGA 3 Report – Part 3. If entered, the value must be greater than zero.
Gas Quality	Sets the source for determining gas quality readings. Valid values are **Constant** (readings are entered in the event log) or **Live** (readings come from a gas chromatograph or are periodically downloaded from a host and are not entered in the event log).
Log Methane Adjust	Logs automatic system adjustments to methane percentages. Valid values are **Enabled** (log adjustments) or **Disabled** (allow adjustments but do not log them).

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 8.1.5, Meter Setup Sampler Tab*.

8.1.5 Meter Setup Sampler Tab

Use the Sampler tab to set up the discrete output (DO) to send a pulse output to another device, such as an odorizer, and to control a gas sampler for a meter run.

Note: To use this option, select the Enabled option in the Sample Control field.

1. Select the **Sampler** tab. The Sampler screen displays.

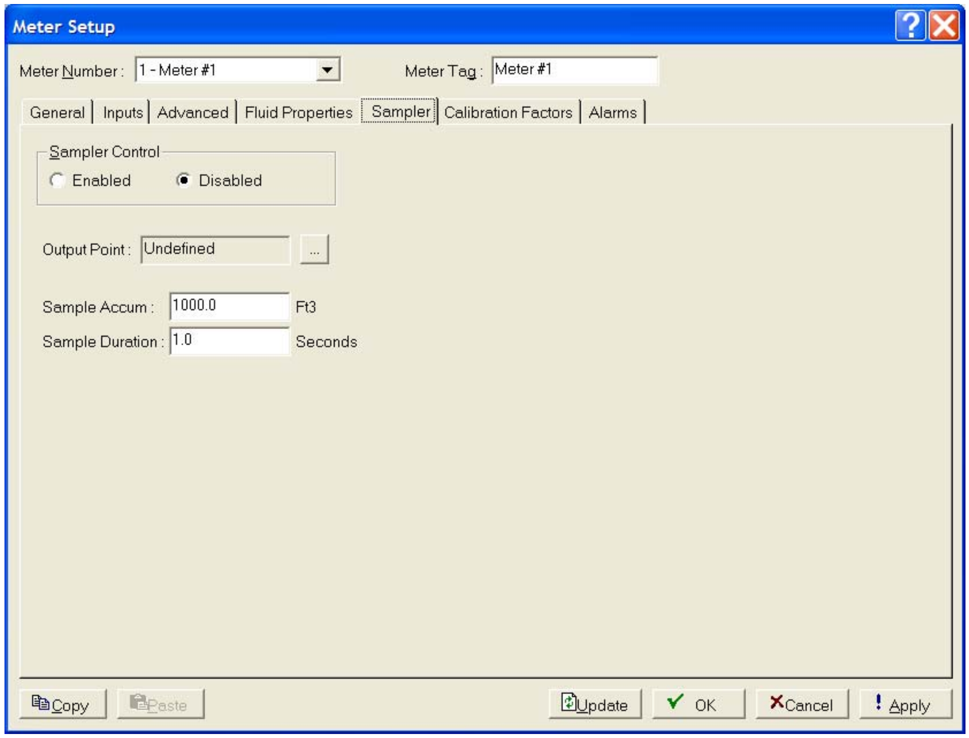


Figure 8-7. Meter Setup, Sampler tab

2. Review the following fields for your organization's values.

Field	Description
Sampler Control	Allows the sampler to override the DO located on the CPU I/O assembly or on an I/O module. Valid values are **Enabled** (override CPU-based I/O) or **Disabled** (permit CPU-based I/O). The default is **Disabled**.
Output Point	Sets the DO point to be used. Click **…** to display a Select TLP dialog box you use to define the point.
Sample Accum	Sets the volume of gas to be metered between pulses, expressed either in cubic meters or cubic feet. For example, if an odorizer needs to track every 100 cubic feet of gas being metered, enter **100**. The Sampler Volume Accum value is based upon the instantaneous flowrate.
Sample Duration	Sets, in seconds, how long the pulse to the device needs to remain on. Whenever the sampler exceeds the defined accumulated volume (Sample Accum), the system turns on the discrete output for the amount of time set in this field.

3. Click **Apply** if you change any parameters on this screen.

4. Proceed to *Section 8.1.6 Meter Setup Calibration Factors Tab*.

8.1.6 Meter Setup Calibration Factors Tab

Use the Calibration Factors tab to define instrument-specific parameters that can affect calibration of the meter inputs.

1. Select the **Calibration Factors** tab. The Calibration Factors screen displays.

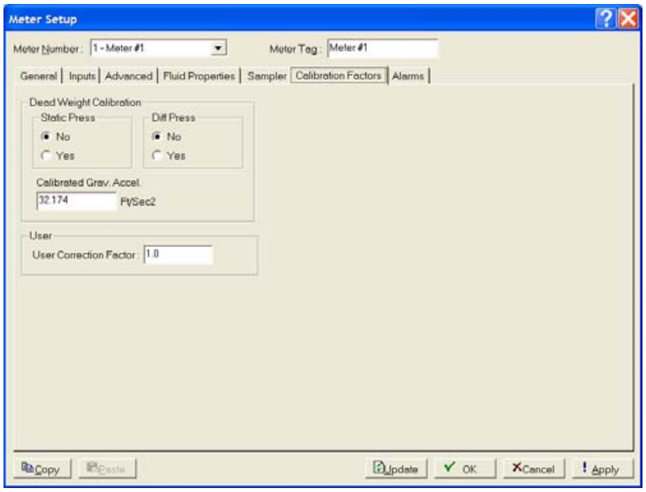


Figure 8-8. Meter Setup, Calibration Factors tab (Orifice Meter)

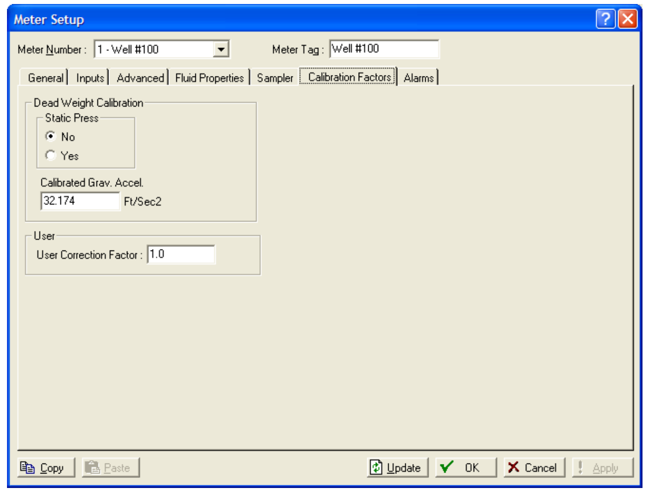


Figure 8-9. Meter Setup, Calibration Factors tab (Turbine Meter)

Note: Which screen displays depends on the calculation standard you selected on the General tab. Select **AGA3-92** or **ISO5167-2003** (orifice calculations) to display *Figure 8-8*. Select **AGA7-96** (turbine calculations) to display *Figure 8-9*.

2. Review the following fields for your organization's values.

Field	Description
Dead Weight Calibration: Static Pressure	Sets whether any corrections occur for local gravity's effects on dead weight calibrations to static pressure. The system multiplies the factor Fpwl by the base volume flow equation. The system uses the factor Fpwl to correct for the effect of local gravity on the weights of a dead weight calibrator, which are usually sized for use at a standard gravitational force or at some specified gravitational force. A correction factor must then be applied to correct the calibrations to the local gravitational force. **Note**: When a dead weight calibrator is used for the differential pressure **and** the static pressure, both must be corrected for local gravity. This involves using Fpwl twice.

Field	Description
Dead Weight Calibration: Diff Pressure	Sets whether any corrections occur for local gravity's effects on dead weight calibrations to differential pressure. **Note**: This field displays **only** for an **orifice** meter. For each selection, the system multiplies the factor Fpwl by the base volume flow equation once for each selection. The system uses the factor Fpwl to correct for the effect of local gravity on the weights of a dead weight calibrator, which are usually sized for use at a standard gravitational force or at some specified gravitational force. A correction factor must then be applied to correct the calibrations to the local gravitational force. When a dead weight calibrator is used for the differential pressure **and** the static pressure, both must be corrected for local gravity. This involves using Fpwl twice.
Calibrated Grav Accel	Sets a gravitational acceleration value if the tester value differs from the indicated value. The system assumes the units to be Ft/Sec^2 or m/Sec^2.
User Correction Factor	Sets a factor the system multiplies by the base volume flow equation to make a desired adjustment to the flow. **Note**: If you use the default value of **1**, the system does not apply any correction.

3. Click **Apply** if you change any parameters on this screen.
4. Proceed to *Section 8.1.7 Meter Setup Alarms Tab*.

8.1.7 Meter Setup Alarms Tab

Use the Alarms tab to configure alarm parameters. You can either enable or disable alarming for each meter run. You can configure alarms for the individual meter runs and identify meter-specific alarm conditions.

If you enable alarms, the system logs alarms on the alarm log. To conserve log space, enable alarms only when required. If you disable alarms, the system does not generate an alarm for this point, regardless of the alarm configuration. However, the system displays alarm conditions in the Active Alarms field on the Meter Setup screen's General tab.

Even if you do not plan to use all the alarms, check and adjust the value of each alarm to prevent the generation of false alarms.

1. Select the **Alarms** tab. The Alarms screen displays.

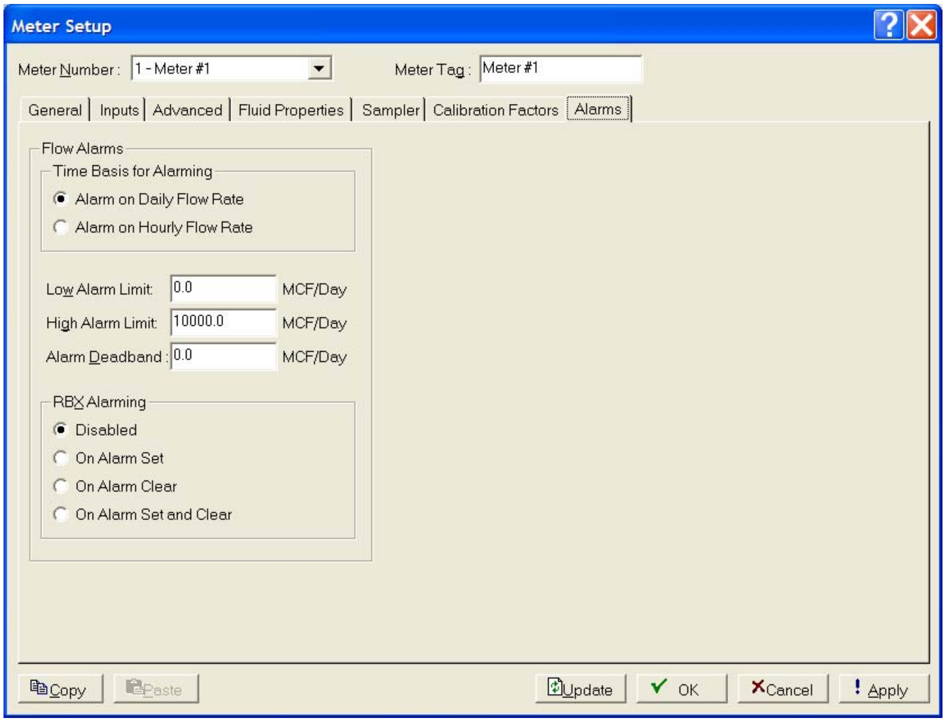


Figure 8-10. Meter Setup, Alarms tab

2. Review the following fields for your organization's values.

Field	Description
Time Basis for Alarming	Sets how frequently the system generates alarms. Valid values are **Alarm on Daily Flow Rate** or **Alarm on Hourly Flow Rate**. The default is **Alarm on Daily Flow Rate**.
Low Alarm Limit	Sets the value to which the calculated flowrate must fall to generate a low alarm. For the FB107, the system assumes the engineering units for the input to be MCF per day (1000 ft^3/day) or cubic meters per day (m^3/day).
High Alarm Limit	Sets the value to which the calculated flowrate must rise to generate a high alarm. For the FB107, units assumed for the input are MCF per day (1000 ft^3/day) or cubic meters per day (m^3/day).
Alarm Deadband	Sets a value that defines an inactive zone above the Low Alarm limits and below the High Alarm limits. This deadband prevents the system from setting and clearing the alarm continuously when the input value is oscillating around the alarm limit. For the FB107, units assumed for the input are MCF per day (1000 ft^3/day) or cubic meters per day (m^3/day)
RBX Alarming	Sets the Spontaneous Report-by-Exception (RBX or SRBX) alarming options for the meter run. **Note**: SRBX Alarming requires you to properly configure your communications ports. Valid values are: **Disabled** — RBX Alarming is turned off.

Field	Description	
	On Alarm Set	When the point **enters** an alarm condition, the FB107 generates a Spontaneous-Report-by-Exception message to the host.
	On Alarm Clear	When the point **leaves** an alarm condition, the FB107 generates a Spontaneous-Report-by-Exception message to the host.
	On Alarm Set and Clear	In either condition, an RBX message generates to the host.

3. Click **Apply** if you change any parameters on this screen.
4. Click **OK** to display the FB107 graphic.
5. This completes the process of configuring the meters. Proceed to *Section 8.2, Calibration Basics*.

8.2 Calibration Basics

Use the Calibration option to verify the accuracy of your input within contractual parameters, to calibrate those inputs to desired parameters, or to establish calculation adjustment factors to assure the inputs are within desired parameters.

The calibration routine provides Verify, Calibrate, and Zero Shift/Offset/RTD Bias functions for AI, MVS, and RTD inputs. You can calibrate differential pressure (orifice metering may be High or Low Differential Pressure, depending on the device), static pressure, or temperature readings for each meter run. Calibration parameters include zero, span, and up to three midpoints.

The system automatically logs all new calibration values in the Event Log and optionally to a calibration log.

Select **Meter** > **Calibration**. The Meter Calibration screen displays.

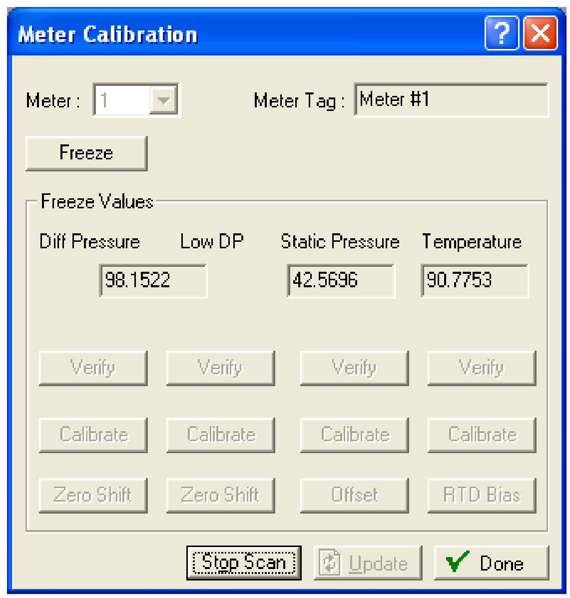


Figure 8-11. Meter Calibration

Note: ROCLINK 800 removes input categories from the Freeze Values frame of this screen depending on the selected meter. For orifice meters, you can calibrate differential pressure, static pressure, and temperature inputs. For a turbine meter, you can calibrate static pressure and temperature inputs. When calibrating stacked differential pressure, you can calibrate either high differential pressure (Diff Pressure) input or low differential pressure (Low DP) input.

Field	Description
Meter	Selects the meter for verification or calibration. Click ▼ to display all defined meter runs.
Meter Tag	This **read-only** field shows the short description associated with the selected meter.
Freeze	Click to stop the system from updating the values of the analog, MVS, and temperature (RTD) inputs during verification or calibration.
Freeze Values	These **read-only** fields show the value received from the analog input, MVS, or RTD input when the **Update** button was last clicked. The system uses these values in ongoing processing (such as flow calculations, history logging, or control) while calibration occurs.
Verify	Click to start the verification process.
Calibrate	Click to start to calibration process.
Zero Shift/Offset/ RTD Bias	Click to set adjustment factors for the input.
Auto Scan/ Stop Scan	Click to automatically request values each second from the meter. The request continues until you click **Freeze**.

⚠ **Caution** **If you have an MVS transmitter or a DVS sensor, refer to *Chapter 6, Sensor/Transducer Accessories*, in the *ROC/FloBoss Accessories Instruction Manual* (Form A4637) for the recommended way to remove or restore the device from or to working pressure during calibration. Failure to follow recommendations may damage the device.**

8.2.1 Verifying an Input

To verify an input:

1. Select **Meter** > **Calibration**. The Meter Calibration screen displays.
2. Select a meter input to verify.

Note: ROCLINK 800 retains or removes the appropriate inputs from the Meter Calibration screen. The following example verifies a temperature sensor for a turbine meter.

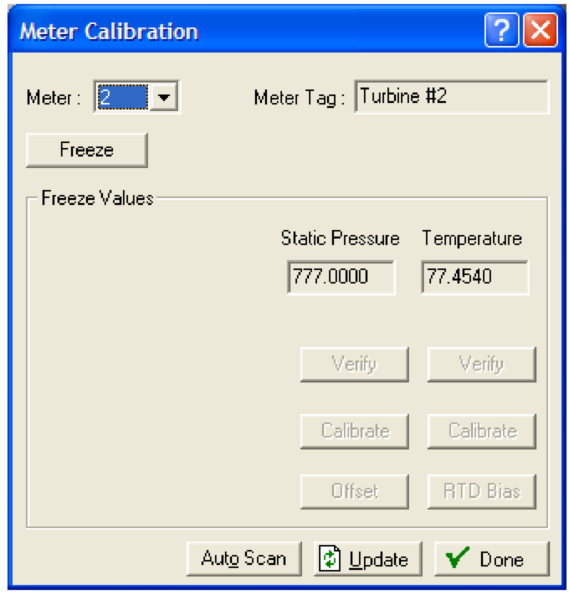
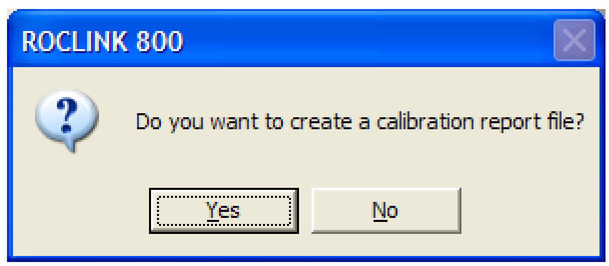


Figure 8-12. Turbine Meter Verification

3. Click **Freeze**. ROCLINK 800 displays a dialog asking if you want to create a calibration report file:



4. Click **Yes** to display a Save As dialog box and specify a storage location for the report, which you can review later. Click **No** to proceed with verification without generating a report. ROCLINK 800 displays the Meter Calibration screen with frozen values and active buttons.

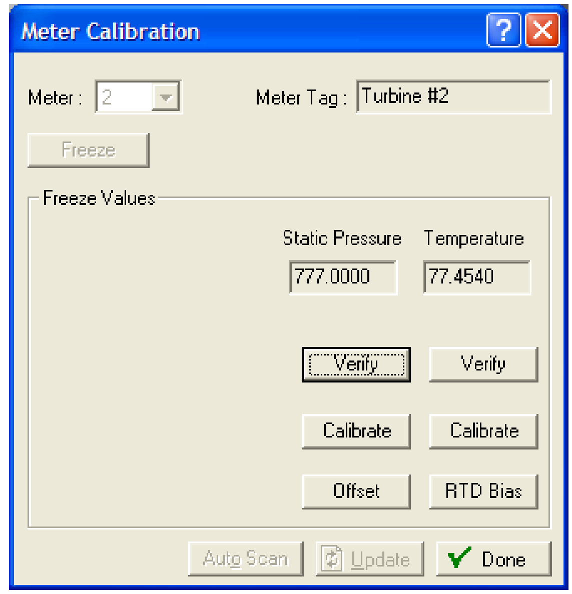


Figure 8-13. Verification – Frozen Values

5. Click **Verify**. A Verify screen displays.

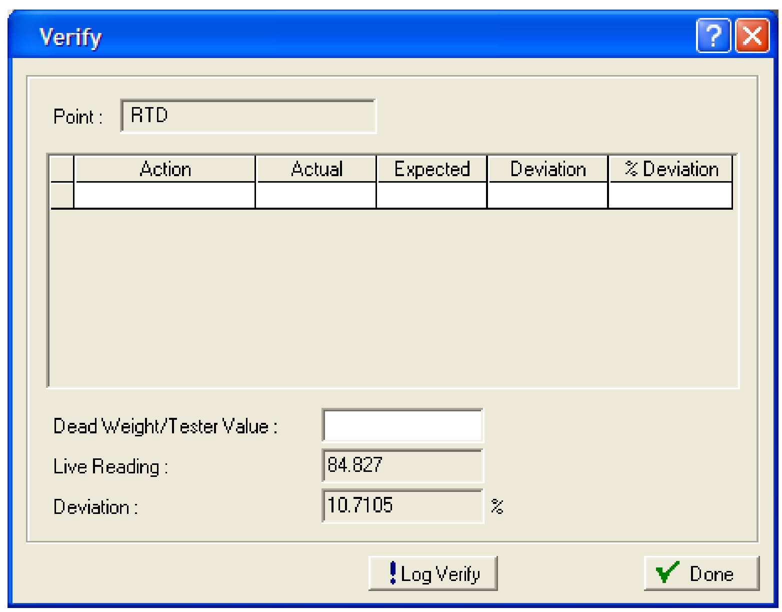


Figure 8-14. Verify

6. Complete the **Dead Weight/Tester Value** field with a value against which the test equipment verifies.

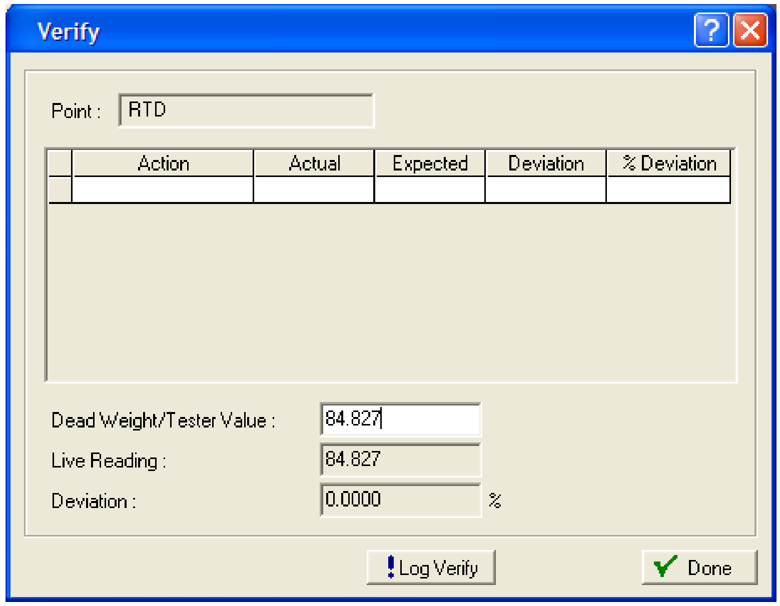


Figure 8-15. Dead Weight/Tester Value

When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it to the value in the **Live Reading** field (obtained from the temperature probe) and calculating the percentage deviation between the two values.

7. Click **Log Verify**. ROCLINK 800 completes the first log entry on the screen.

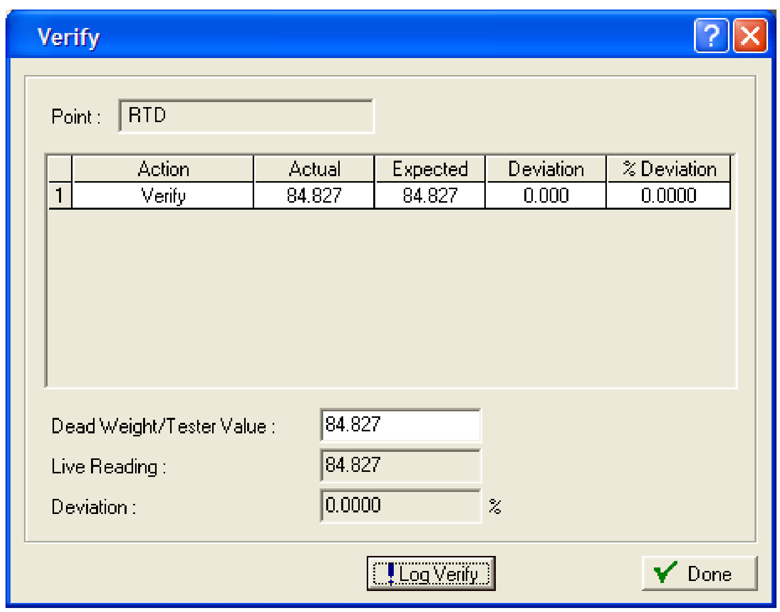


Figure 8-16. Verify Log Entry

Field	Description
Action	Indicates the current action. Valid values are **Verify** or **Calibrate**.

Field	Description
Actual	Displays the value in the **Live Reading** field.
Expected	Displays the value in the **Dead Weight/Tester Value** field.
Deviation	Displays the amount of deviation between the actual and expected values.
% Deviation	Displays a percentage deviation between the Actual and Expected values.

8. As the live reading value changes, click **Log Verify** as many times as necessary to establish the verification log.

Typically you verify the same points you calibrate (zero, span, and mids). Temperature might be an example (–100, 200, 50). For each test point, you set your test equipment to produce the expected value, enter that expected value in the **Tester Value** field, wait for live input to stabilize, and then click **Log Verify**. You can verify as many points as you want.

Note: If you have chosen to save the verification log, ROCLINK 800 saves it in the location you specified in step 3.

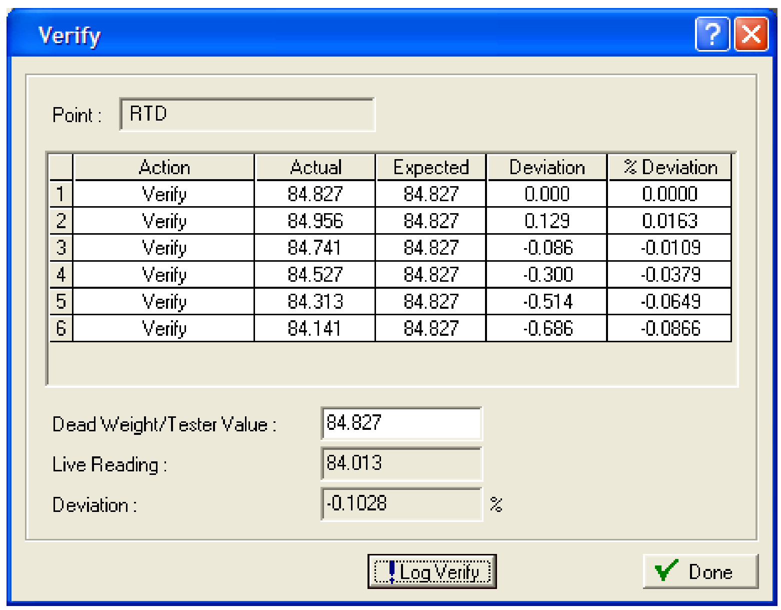


Figure 8-17. Verify Log Entry

9. Review the verification log and determine whether the results are within contractual limits. If they are not, you may need to calibrate the temperature probe. See *Section 8.2.2, Calibrating an Input*.

10. Click **Done**. The Meter Calibration screen displays.

8.2.2 Calibrating an Input

Caution **If you have a Multi Variable Sensor (MVS), refer to the Sensor Calibration section in the FloBoss Accessories Instruction Manual (Form A4637) for the recommended way to remove/restore the MVS from/to working pressure during calibration. Failure to follow recommendations may cause sensor damage.**

If you are calibrating a pressure input, isolate the sensor from the process. Set up the pressure calibrator and make the necessary connections to the sensor.

If you are calibrating a temperature input, disconnect the RTD sensor and connect a decade box (or comparable equipment) to the FB107's RTD terminals.

Following verification, you may determine that the input needs to calibrated. A standard calibration requires you to define a zero and a span point; you can also define up to three midpoints which can represent 25%, 50%, and 75% of the span.

Note: You can exit a calibration without saving the changes. The system retains the previous calibration settings but logs the event in the event log.

To calibrate an input (in this example, the static pressure input):

1. Select **Meter** > **Calibration**. The Calibration screen displays.
2. Select a meter input to calibrate.

Note: ROCLINK 800 retains or removes the appropriate inputs from the Meter Calibration screen. The following example calibrates a static pressure sensor for a turbine meter.

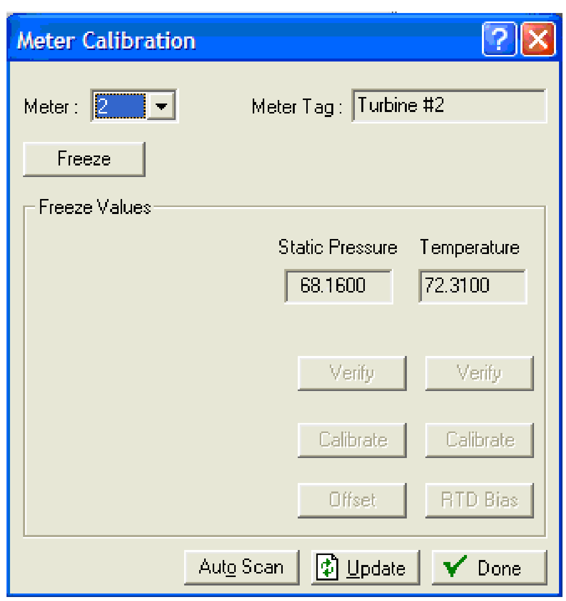
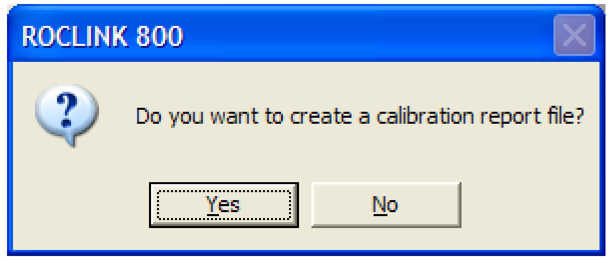


Figure 8-18. Turbine Meter Calibration

3. Click **Freeze**. ROCLINK 800 displays a dialog asking if you want to create a calibration report file.



4. Click **Yes** to display a Save As dialog box and specify a storage location for the report, which you can review later. Click **No** to proceed with verification without generating a report. ROCLINK 800 displays the Meter Calibration screen with frozen values and active buttons.

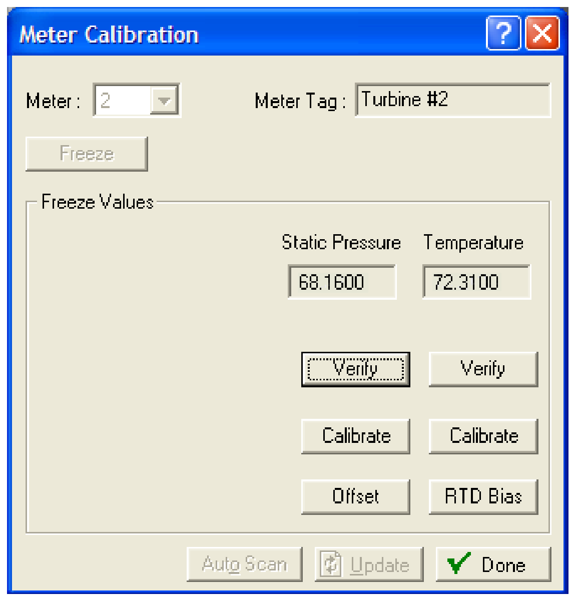


Figure 8-19. Calibration – Frozen Values

5. Click **Calibrate**. A Set Zero screen displays.

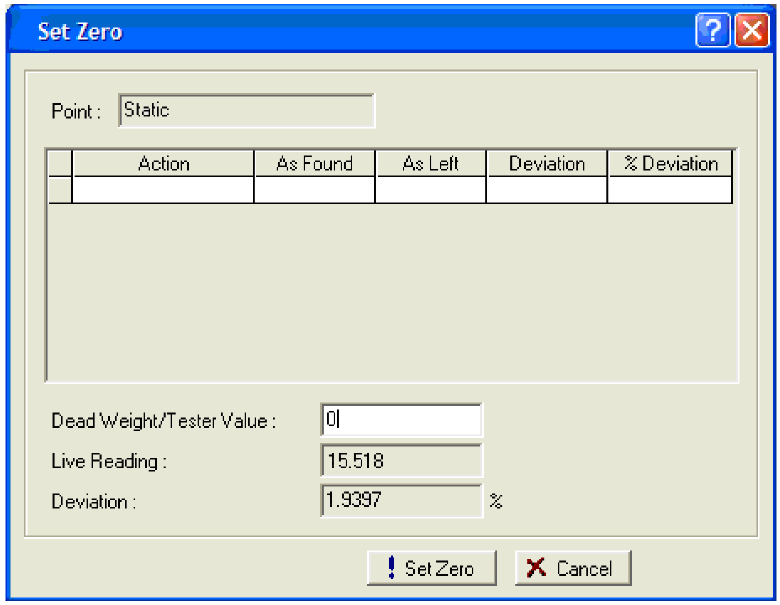


Figure 8-20. Set Zero

Note: You can click **Cancel** to exit the calibration without saving the changes. The system retains the previous calibration settings but logs the event in the event log.

6. Set test equipment to produce the expected results.

7. Complete the **Dead Weight/Tester Value** field. This value represents the low range (0%) of the instrument's measurement range.

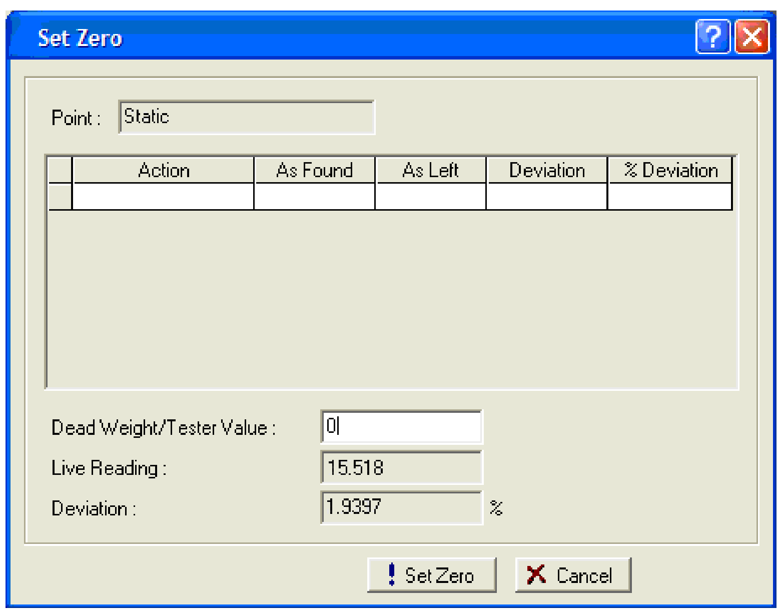


Figure 8-21. Dead Weight/Tester Value

When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once each second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

8. Click **Set Zero** when the live reading stabilizes. ROCLINK 800 adds the first line in the calibration log, renames the screen to **Set Span**, and changes the label on the **Set Zero** button to **Set Span**.

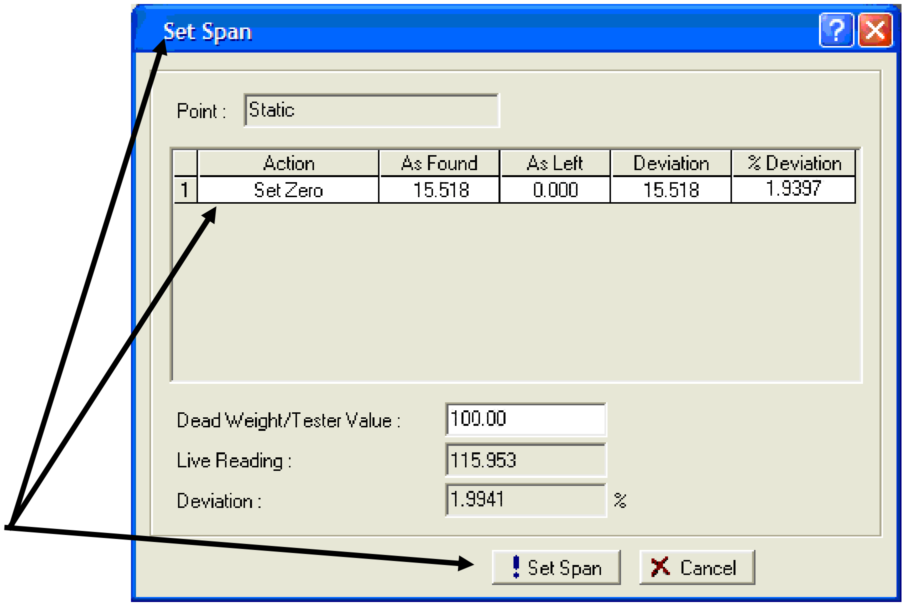


Figure 8-22. Set Span

9. Set test equipment to produce the expected results.
10. Complete the **Dead Weight/Tester Value** field with a value represents the upper limit (100% or "span") of the instrument's measurement range.

Note: ROCLINK 800 provides **100** as a default span value. Edit this default as necessary.

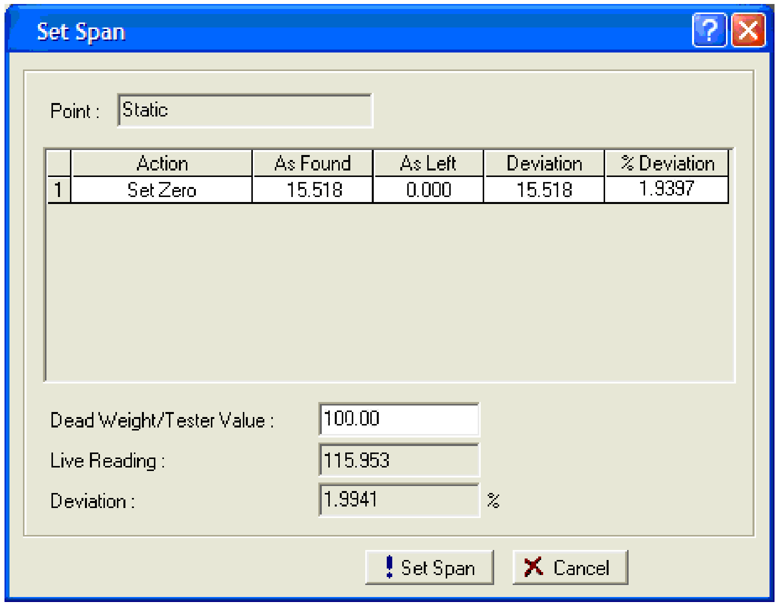


Figure 8-23. Set Span

When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once each second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

11. Click **Set Span** when the live reading stabilizes. ROCLINK 800 adds the next line in the calibration log, renames the screen, and changes the label on the **Span** button to **Set Mid 1**.

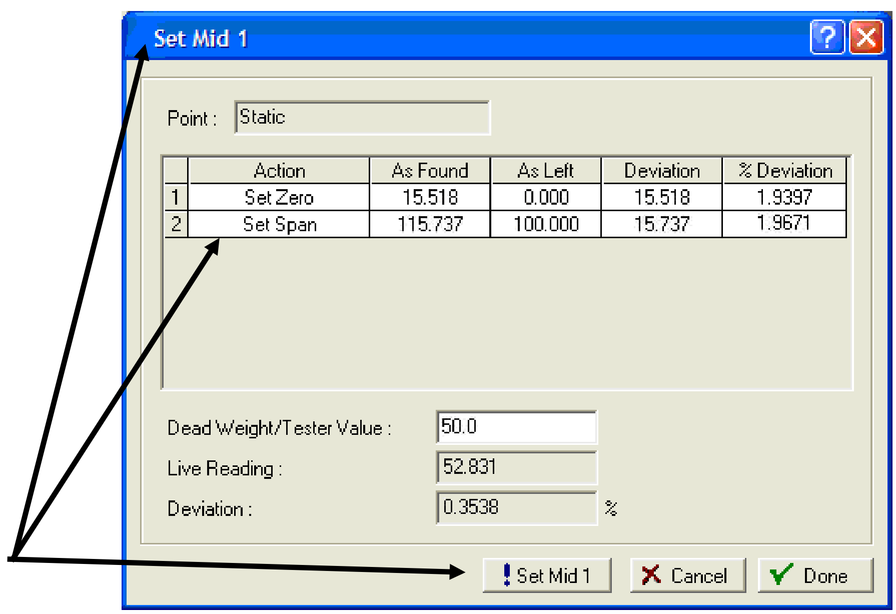


Figure 8-24. Set Span

Note: You can click **Done** at this point to complete the calibration or continue the calibration and define up to three calibration midpoints.

12. Set test equipment to produce the expected results.

13. Complete the **Dead Weight/Tester Value** field with the first midpoint calibration value (which in this example represents 50% of the instrument's range).

Note: ROCLINK 800 provides the previous midpoint value as a default value. Edit this default as necessary.

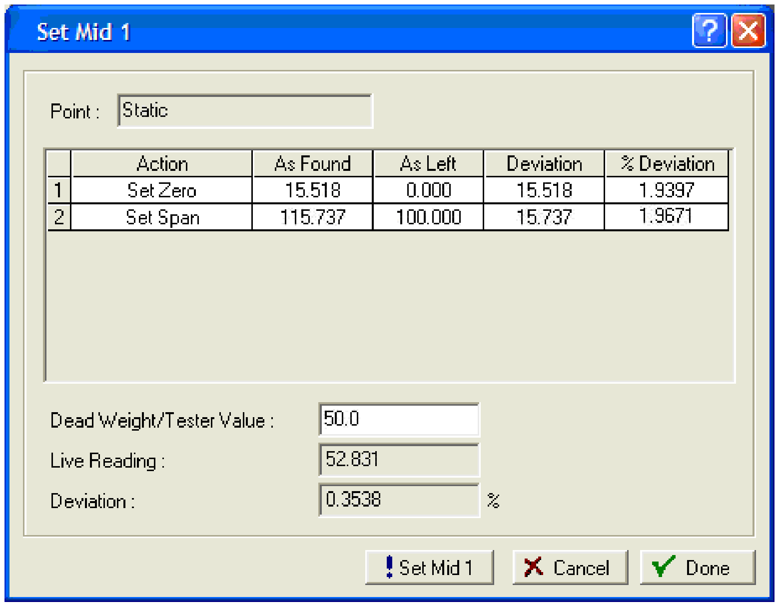


Figure 8-25. Set Midpoint 1

When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once per second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

14. Click **Set Mid 1** when the live value stabilizes. ROCLINK 800 adds the next line in the calibration log, renames the screen, and changes the label on the **Set Mid 1** button to **Set Mid 2**.

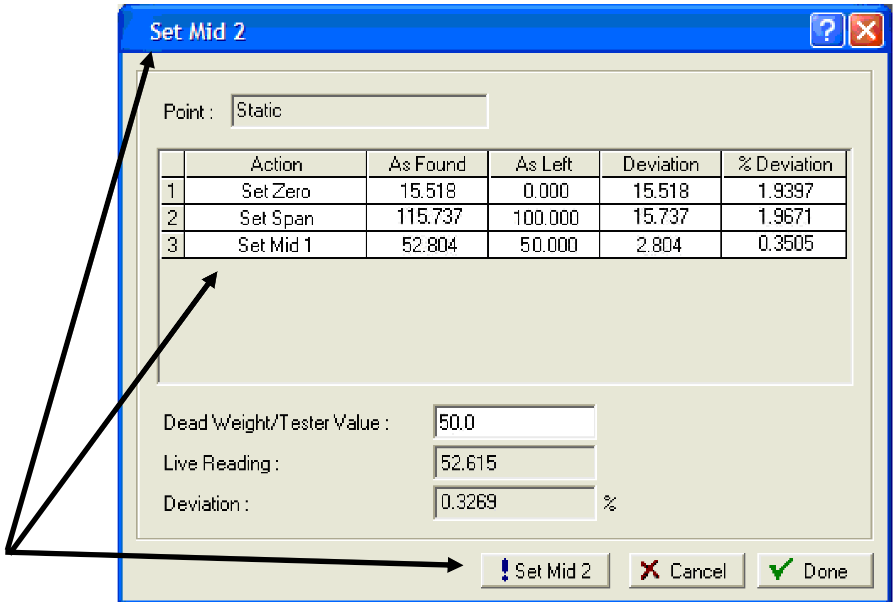


Figure 8-26. Set Midpoint 1

Note: To define up to two more midpoints, repeat steps 13 and 14.

15. Click **Done** when you have sufficient calibration information. The Meter Calibration screen displays.

Note: Following a calibration, you may re-run a verification to demonstrate to the customer that the measurement results are now within contractual parameters.

8.2.3 Zero Shift, Offset, and RTD Bias

Use these buttons on the Meter Calibration screen to make adjustments to calibrated values. These allow you to adjust the calibrations at flowing conditions. The following example shows a zero shift adjustment.

Note: Because these adjustments can affect the contractual delivery of product, exercise caution in using these options.

1. From the Meter Calibration screen, click **Offset**. The Set Zero Shift (Offset) screen displays.

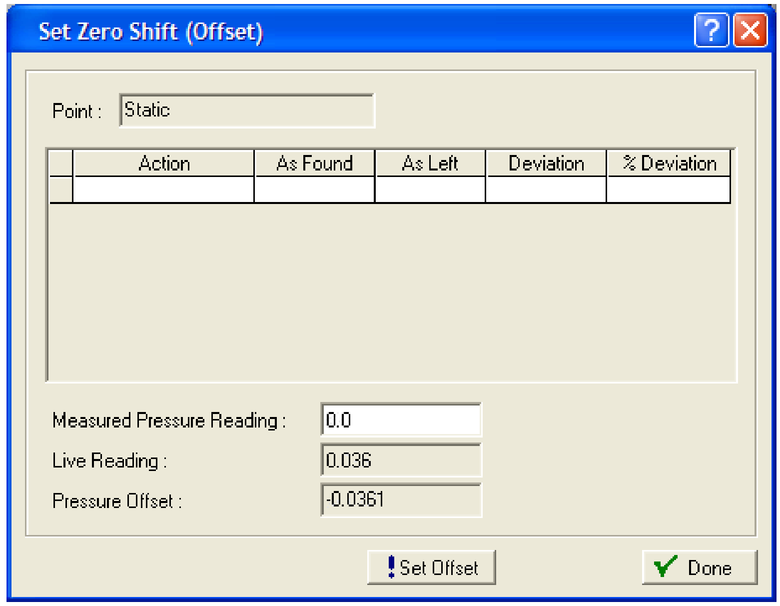


Figure 8-27. Set Zero Shift

2. Complete the Measured Pressure Reading field with a line pressure value obtained from an independent pressure measurement device and begin monitoring the value in the Pressure Offset field. Each second the system compares the live reading against the value you enter. When the value in the Pressure Offset field stabilizes, press **Set Offset**. ROCLINK 800 sets the pressure offset and adds a line to the calibration log.

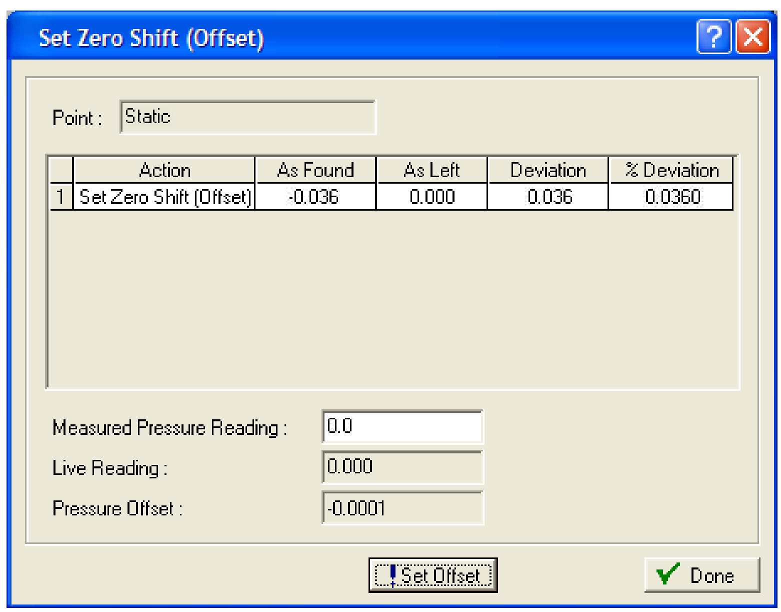


Figure 8-28. Set Zero Shift

3. The system then reflects this offset as an adjustment in calculations and lists this value on the AI Calibration Values screen (**Utilities** > **AI Calibration Values**):

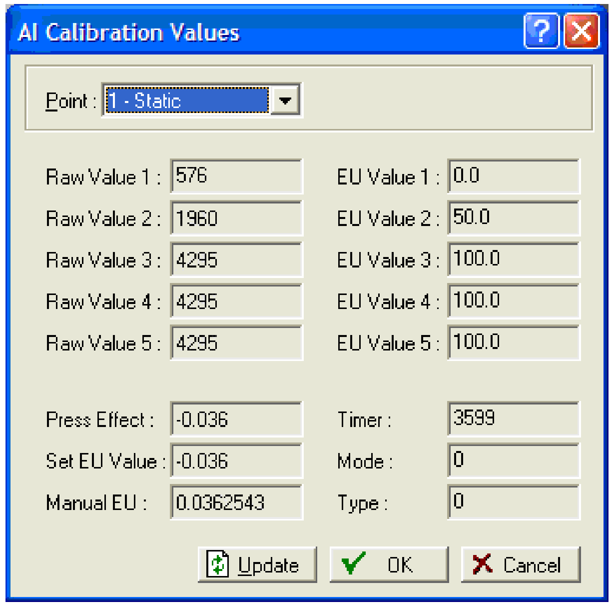


Figure 8-29. Set Zero Shift

8.3 Meter Values

The Meter Values screen displays a variety of values from the orifice or turbine meter. You can use these for diagnostics or monitoring. Click **Update** to refresh the displayed values. These may be used for diagnostics or monitoring

1. Select **Meter** > **Values**. The Meter Values screen displays.

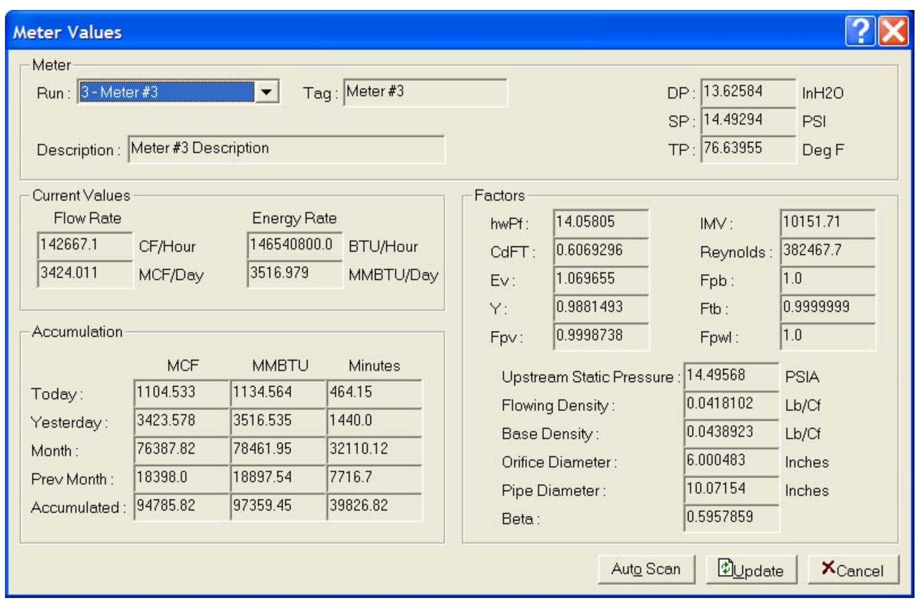


Figure 8-30. Meter Run Values Example

2. Click ▼ in the Run field to select a defined orifice or turbine meter.

3. Review the screen's contents. You can click **Update** to refresh the display on demand or **Auto Scan** to start updating the display once per second.
4. Click **Cancel** to return to the FB107 graphic.

8.4 Plate Change

Use the Plate Change option to change the size of an orifice plate under flowing or non-flowing conditions.

1. Select **Meter** > **Plate Change**. The Plate Change screen displays.

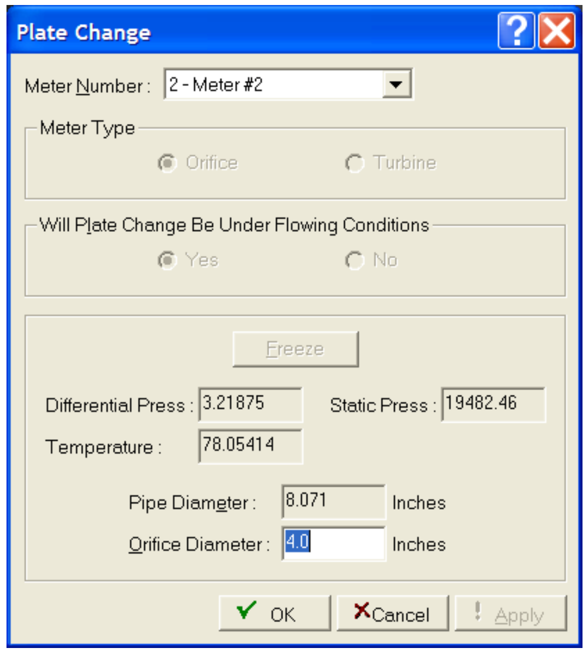


Figure 8-31. Plate Change

2. Review the following fields for your organization's values.

Field	Description
Meter Number	Sets the meter number to be changed. Click ▼ to display all defined meters.
Meter Type	Sets the meter (orifice or turbine).
Will Plate Change…	Indicates the conditions during the plate change. Valid values are **Yes** (plate change occurs during flowing conditions) or **No** (plate change occurs during non-flowing conditions). **Note**: If you choose **Yes**, you can freeze inputs for the duration of the plate change.

Field	Description
Freeze	Click to freeze input values for the duration of the plate change. **Note**: This button is active **only** if you are performing the plate change under flowing conditions. The system holds all I/O values in Manual Mode at the current value. Click **OK** to return values to an active state at the completion of the plate change.
Differential Press	This **read-only** field shows the frozen differential pressure value during the plate change.
Static Press	This **read-only** field shows the frozen static pressure value during the plate change.
Temperature	This **read-only** field shows the frozen temperature value during the plate change.
Pipe Diameter	This **read-only** field shows the size of the pipe diameter for the selected meter.
Orifice Diameter	Sets, in inches or millimeters, the exact size of the orifice diameter of the new plate.

3. Click **Apply** if you change any parameters on this screen.
4. Click **OK** when you complete the plate change. If you have frozen values, this returns system values to flowing conditions.

Chapter 9 – The Utilities Menu

Use the Utilities menu options to update firmware, manage software licenses, convert EFM files, manage user programs, set ROCLINK 800 security, view AI and MVS calibration values, access the FST Editor, and monitor communications.

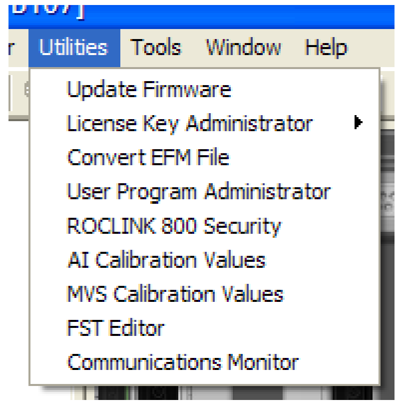


Figure 9-1. Utilities Menu

Note: Refer to *Appendix B, The FST Editor*, for detailed information on using FSTs.

In This Chapter

9.1 Update Firmware

Use the **Update Firmware** option to update the internal software (stored in Flash ROM) of FB107 components by loading the update from a file.

Note: This option **does not** update ROCLINK 800 software.

Caution

The Update Firmware option disables measurement and control while updating.

It is a good practice to preserve the contents of the event and alarm logs. Save them to a file (Collect Data) BEFORE you update any firmware. You cannot reload event logs or alarm logs.

1. Create a backup copy of the firmware update disk or download the firmware file from the Remote Automation Solutions website (*www.EmersonProcess.com/Remote*).
2. Read the **README** text file included with the firmware update.
3. Select **Utilities** > **Update Firmware**. The Update Firmware screen displays.

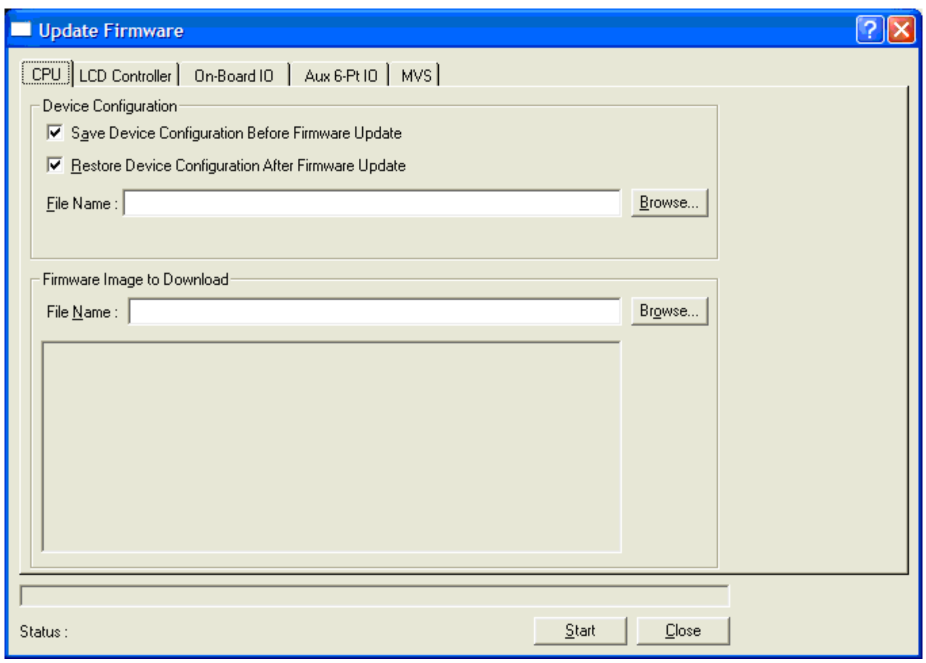


Figure 9-2. Update Firmware

Note: By default, the system selects the Device Configuration options **Save Device Configuration Before Firmware Update** and **Restore Device Configuration After Firmware Update**. This saves your current configuration, calibration, communication settings, and FSTs to the file name you specify.

4. Click **Browse** to select or specify a file name the system uses to save and restore the system configuration file. The default location is C:\Program Files\ROCLINK800. The default file extension is **.800**.

Note: You can also save the configuration to Flash memory using the Flags screen (**ROC** > **Flags**).

5. In the Firmware Image to Download frame, click **Browse** to specify the location of the updated firmware code. The default file extension is **.bin**.

Note: You can obtain firmware updates either from your factory representative or from the Remote Automation Solution SupportNet website (access *www.EmersonProcess.com/Remote* and select the **Support** option). Regardless of source, you must store the firmware update files on your PC before you can apply them.

6. Once you select a firmware upgrade, ROCLINK 800 completes the lower portion of the Firmware Image to Download frame with information related to that upgrade. Review the information to make sure you want to apply that upgrade.
7. Click **Start**. The system displays a confirmation dialog box.
8. Click **Yes** to confirm the firmware update.

Note: The loading process typically takes several minutes. **Do not disturb your FB107 during this time**.

When the firmware load completes, a completion dialog box displays.

9. Click **OK** to accept the dialog box.

ROCLINK 800 automatically loads the configuration files into the FB107 (if you selected the Restore Device Configuration option) and records the actions in the event log.

When the backup reload completes, a "Reconnect to Device Completed" message displays in the Status field at the bottom of the Update Firmware screen. ROCLINK 800 also adds an "Updated" flag to the information displayed in the Firmware Image to Download frame. You can also verify the upgrade on the Device Information screen (**ROC** > **Information** > **Revision Info**).

10. If you saved the configuration to Flash memory, ROCLINK 800 performs a cold start to reload the configuration.

Note: If you selected the **Restore Device Configuration After Firmware Update** option on the Update Firmware screen, this step is not required.

11. Check the configuration and FSTs. If they are not correct, reload them (using File > Download) from the files you created in Step 4.
12. Save the configuration (using **ROC** > **Flags** > **Save Configuration**) to permanent FB107 memory.

9.1.1 Update Firmware CPU Tab

The Update Firmware screen initially displays the CPU tab. Use this tab to view the currently installed firmware version and, if necessary, download a new firmware image.

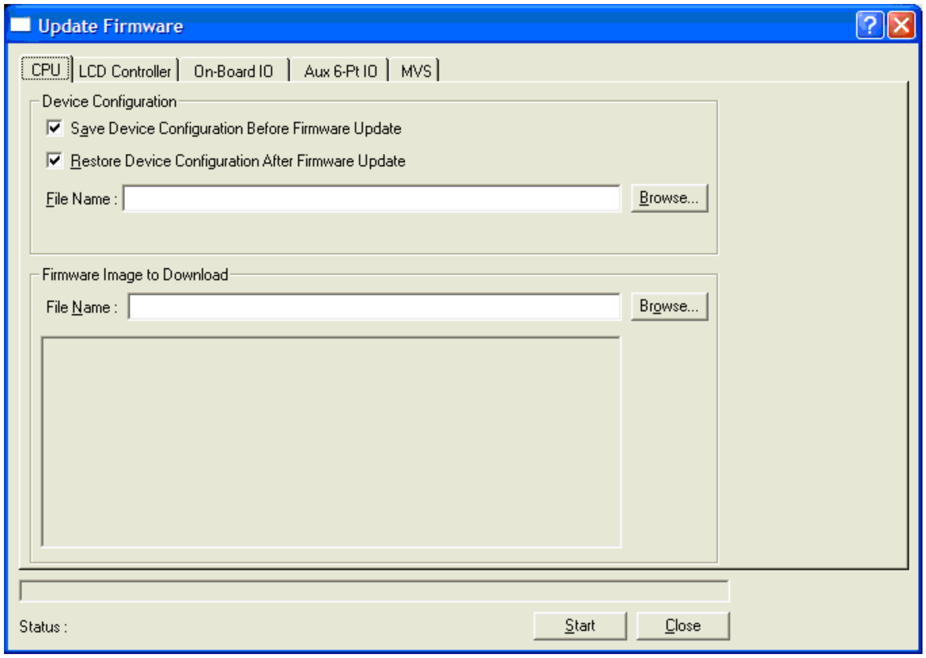


Figure 9-3. Update Firmware, CPU tab

9.1.2 Additional Update Firmware Tabs

The additional tabs on the Update Firmware screen display the hardware installed in the FB107 (see *Figure 9-4*, which shows the Aux 6-Pt IO tab) and enable you to update the firmware for the selected hardware. These additional tabs include:

Tab	Description
LCD Controller	Updates the firmware for the optional Liquid crystal display (the “Touchpad”).
On-Board IO	Updates the firmware for the CPU’s optional internal input/output including system analog inputs, communications, and the RTD.
Aux 6-Pt IO	Updates the firmware for the I/O modules. The tab lists each module and its current slot (see *Figure 9-4*).
MVS	Updates the firmware for the optional Multi-Variable Sensor module.

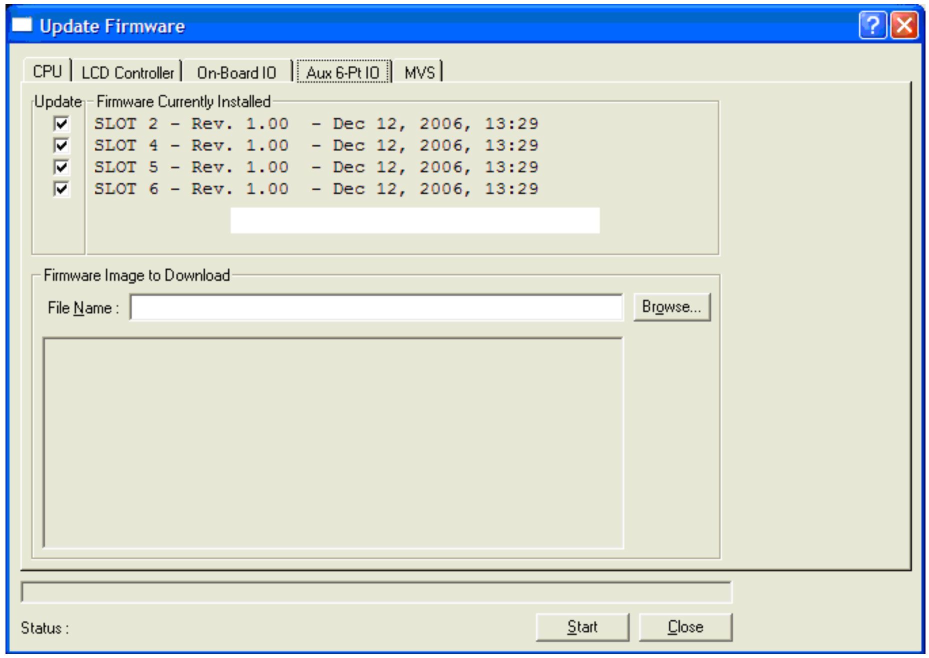


Figure 9-4. Update Firmware, Additional tabs

9.2 License Key Administrator

Use ROCLINK 800's License Key Administrator screens to view and manage information on any software licenses currently installed on the FB107. Some applications require that you install a license in the CPU to run the application. This license software is specific to these applications and is the property of the individual vendor (shown in the Vendor Name field on the License Key Administrator screens).

9.2.1 Distributing Software Licenses

RAS (and other authorized vendors) can distribute software licenses either on security-enhanced universal serial bus (USB) drives known as "keys" or as 105-character strings.

Key-based FB107 software licenses delivered on security-enhanced USB keys, which connect to the USB port on your PC, have both benefits and limitations.

RAS uses encrypted USB keys to distribute software licenses. This prevents unauthorized access to software licenses if the keys are lost or stolen. Typically, key-based licenses do not have an expiration date, since they are intended to provide permanent access to an application.

USB keys can contain up to 255 iterations of a program (and up to four different programs). Using ROCLINK 800, you can install or remove these iterations onto a number of FB107s or even move the iterations to other encrypted USB keys. The security-enhanced USB key provides an excellent medium for quickly and securely distributing software licenses to a large geographic area.

String-based FB107 software licenses delivered as 105-character strings (or "files") also have both benefits and limitations.

First, these strings are encrypted and can be safely emailed for rapid receipt. Typically, string-based licenses have an expiration date, since they are intended for demonstrations or evaluations or to provide temporary access to an application.

Each string contains the license for a specific software application, but there is no limit to the number of iterations of that license on the string. This enables you to copy the application to demonstration devices, knowing that the license has an expiration date.

Regardless of the delivery method, you use the two License Key Administrator screens to install and manage software licenses on your FB107.

9.2.2 Installing a License (Key-based)

To install a USB key-based license on the FB107:

1. Insert the USB license key in a USB port on your PC.
2. Select **Utilities** > **License Key Administrator** > **Transfer Between Device and Key** from the ROCLINK 800 menu bar. The Transfer Licenses Between a Device and a Key screen displays.

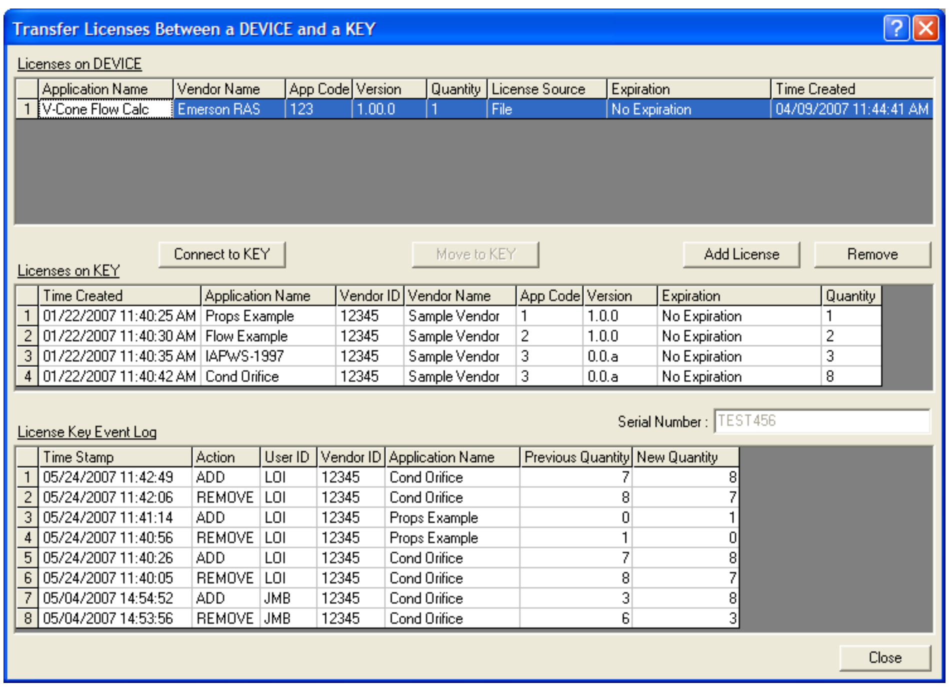


Figure 9-5. Transfer Licenses Between a Device and a Key

Note that this screen has three sections. The upper portion (**Licenses on Device**) shows any software licenses currently installed on the FB107. The middle portion (**Licenses on Key**) shows software licenses on the license key. The lower portion of the screen (**License**

Key Event Log) provides a rolling log of the last eight events related to this license key.

3. Select the key-based license you want to transfer to the FB107 (**Props Example**, as shown in *Figure 9-6*).
4. Click **Move to Device**. ROCLINK moves the license from the key to the FB107 and updates the screen.

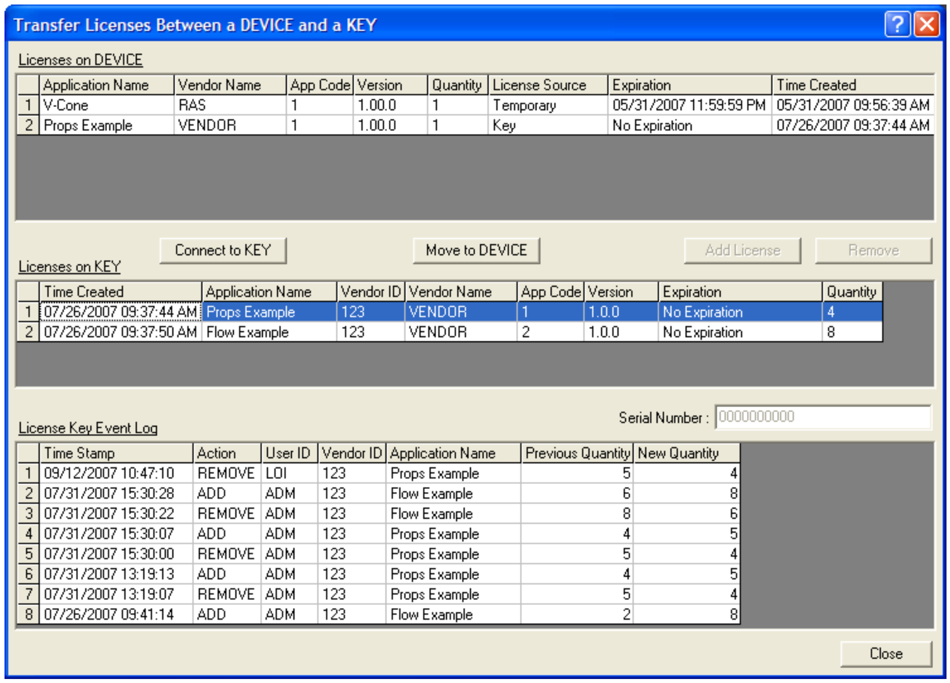


Figure 9-6. License Installed

Note: An FB107 can hold up to six different licenses, although you can install only **one** instance of each license on the FB107. When you click **Move to Device**, ROCLINK 800 moves only **one** instance of the license onto the FB107 and automatically decreases the license quantity on the USB key by one.

You can also use this same screen to move a license from an FB107 and place it on a USB license key.

5. Select the device-based license you want to remove. Note that ROCLINK 800 re-labels the **Move to Device** button as **Move to Key**.

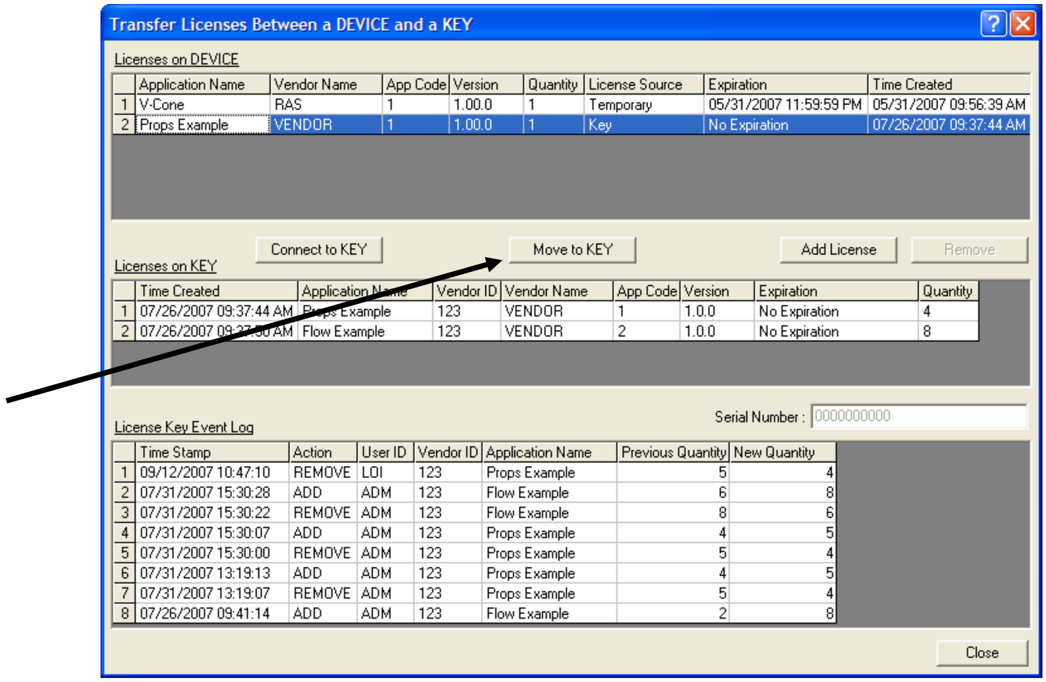


Figure 9-7. License Moved

6. Click **Move to Key**. ROCLINK moves the license from the device to the key and updates the screen.

Fields The fields and buttons on the Transfer Licenses Between a Device and a Key screen provide additional information about the software licenses.

Field	Description
Application Name	Shows the name of the software application (such as **Flow Example**).
Vendor Name	Identifies the company that developed or distributed this application.
App Code	Indicates a code the vendor or developer has associated with the particular application. Refer to the vendor's application documentation for a meaning of the application code. **Note**: Do not mistake the Application Code for the license quantity.
Version	Indicates the version number of this application.
Quantity	Indicates the number of licenses assigned to this application. **Note**: ROCLINK 800 manages this value as you install or move licenses.
License Source	Indicates the original source for the software license. Valid values are **Key** (the license came from a USB key and has no expiration date), **File** (the license came from a string and has no expiration date), or **Temporary** (the license came from either a string or key but has an expiration date.

Field	Description
Expiration	Indicates the date the license expires and becomes invalid for use.
Time Created	Shows the date and time the application was compiled.
Connect to Key	Click to refresh the screen display. If you insert a USB license key while displaying this screen, click **Connect to Ke**y to allow ROCLINK 800 to refresh the Licenses on Key portion of the screen with the contents of the inserted USB license key.
Move to Device or **Move to Key**	Click to move the selected license from the license key to the FB107. **Note**: ROCLINK 800 re-labels this button as **Move to Key** if you select a license currently installed on the FB107. ROCLINK 800 also grays out this button if you select a permanent (non-moveable) license.
Add License	Click to add either a key-based or string-based license to the FB107 or move a string-based license to a key (if allowable). This button activates when you click on the device, and opens a dialog box for the load. **Note**: You can move a string-based license from the FB107 to a USB key **only** if the license is not registered to the specific FB107.
Remove	Click to remove the selected permanent (file-based) license from the FB107. **Note**: ROCLINK 800 grays out this button if you select a moveable (USB key-based) license. You can transfer a moveable license to a USB key, but you cannot remove it. If you need to restore a permanent license, you can re-install it from the PC file location where you stored it.
Serial Number	Shows the serial number for the USB license key.
Close	Click to close the Transfer Licenses Between a Device and a Key screen and display the FB107 graphic.

9.2.3 Installing a License (String-based)

Note: You must have previously obtained a 105-character string-based license to successfully complete this process.

To install a string-based license on the FB107:

1. Select **Utilities** > **License Key Administrator** > **Transfer Between Device and Key** from the ROCLINK 800 menu bar. The Transfer Licenses Between a Device and a Key screen displays.

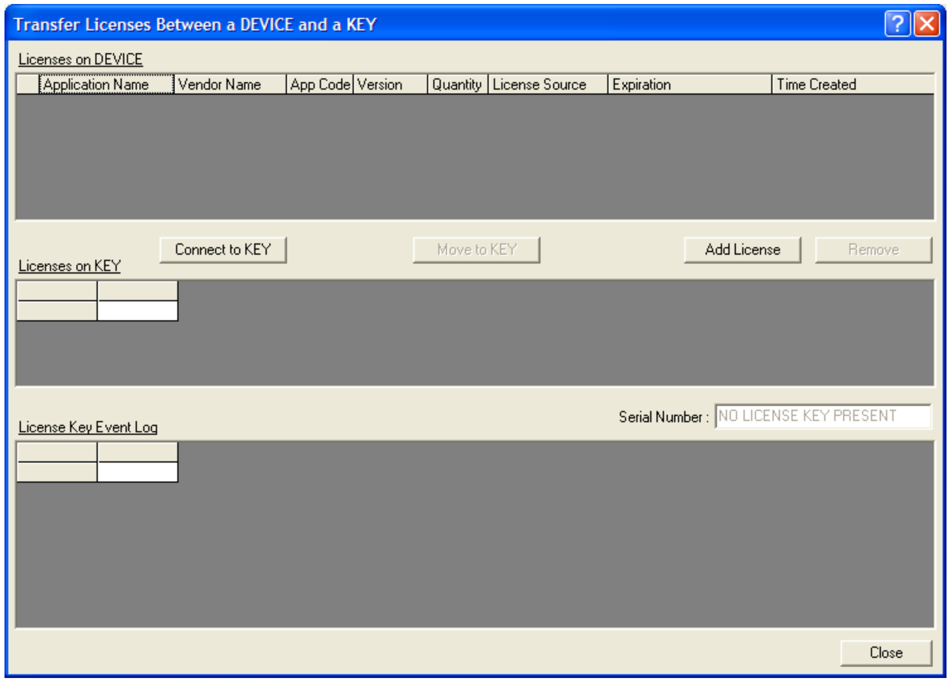


Figure 9-8. Transfer Licenses Between a Device and a Key

2. Click **Add License**. The Enter License String dialog box displays.

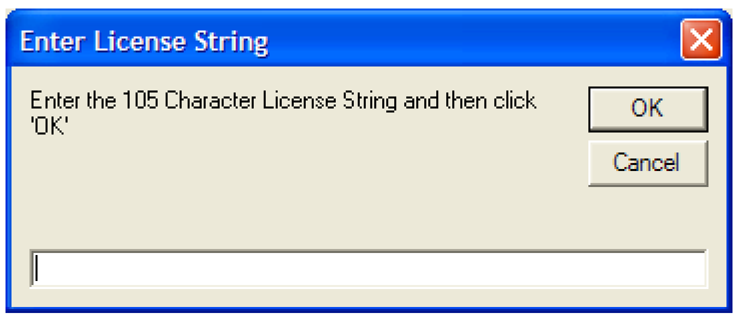


Figure 9-9. Enter License String

3. Enter the 105-character license string in the dialog box and click **OK**. ROCLINK 800 immediately installs the license on the FB107:

Note: Use the Windows Copy and Paste functions to decrease the chances of mis-keying the character string.

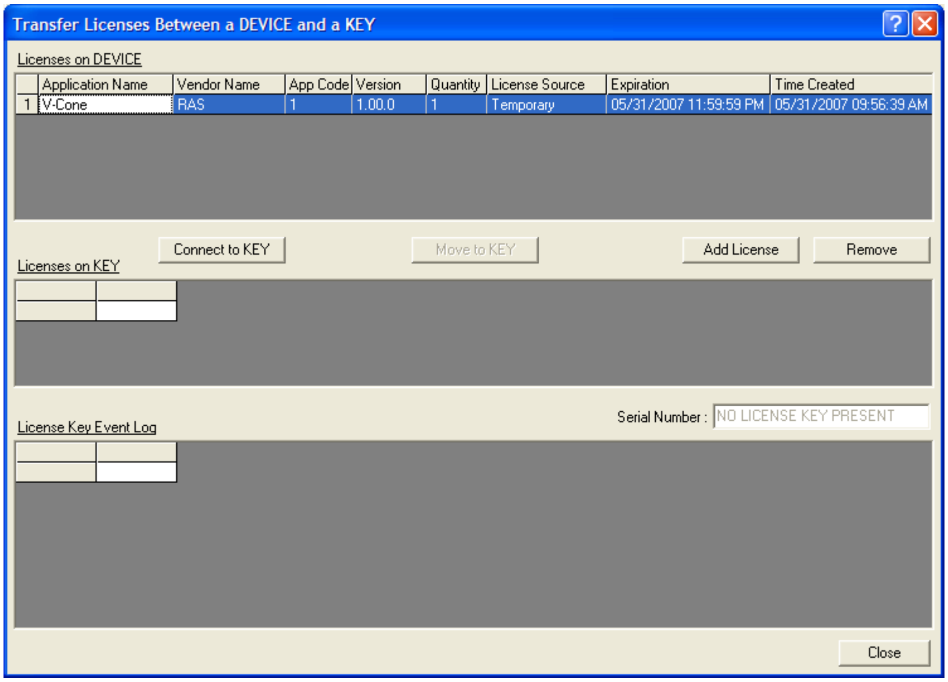


Figure 9-10. Installed String-based License

9.2.4 Transferring Licenses

With sufficient security authority, you can transfer moveable licenses from one USB license key to another. This is helpful when you need to perform field upgrades. You must have two available USB ports on your PC and use enhanced security USB license key drives.

To transfer a license from one license key to another:

1. Insert the USB license keys in available USB ports on your PC.

   Note: ROCLINK 800 designates the **first** USB key you install as License Key 1 and the **second** USB key you install as License Key 2.

2. Select **Utilities** > **License Key Administrator** > **Transfer Between Keys** from the ROCLINK 800 menu bar. The Transfer Licenses Between Keys screen displays.

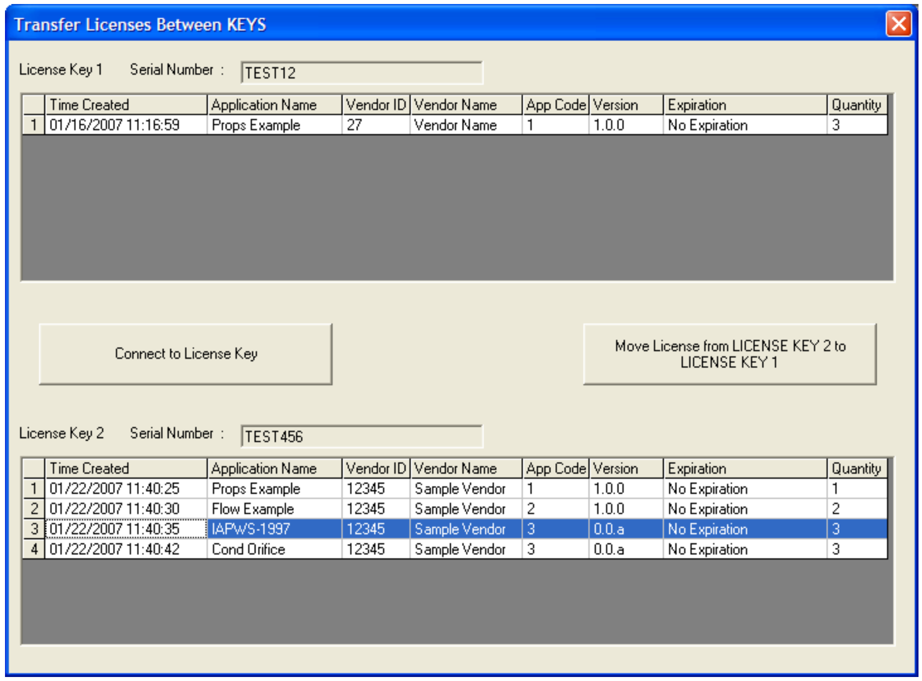


Figure 9-11. Transfer Licenses Between Keys

This screen has two sections. The upper portion (**License Key 1**) shows any software licenses on the first license key. The lower portion (**License Key 2**) shows any software licenses on the second license key.

3. Select a license to transfer (in this case, **IAPWS-1997** on License Key 2).

4. Click **Move License from License Key 2 to License Key 1**. ROCLINK 800. Since this license actually has three distinct licenses (as shown in the Quantity field), ROCLINK 800 displays a dialog box you use to indicate the number of licenses to transfer.

   Note: ROCLINK 800 relabels this button if you select a license on key 1 to transfer to key 2.

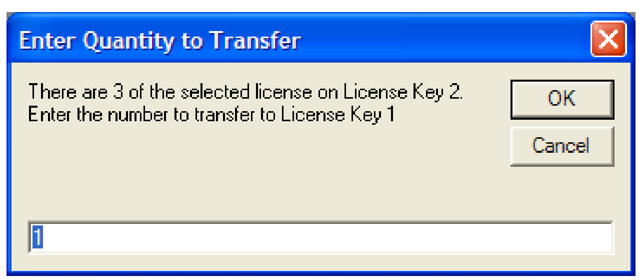


Figure 9-12. Number of Licenses

5. Indicate the number of licenses (**Quantity**) you want to transfer and click **OK**. ROCLINK 800 transfers the license and refreshes the screen.

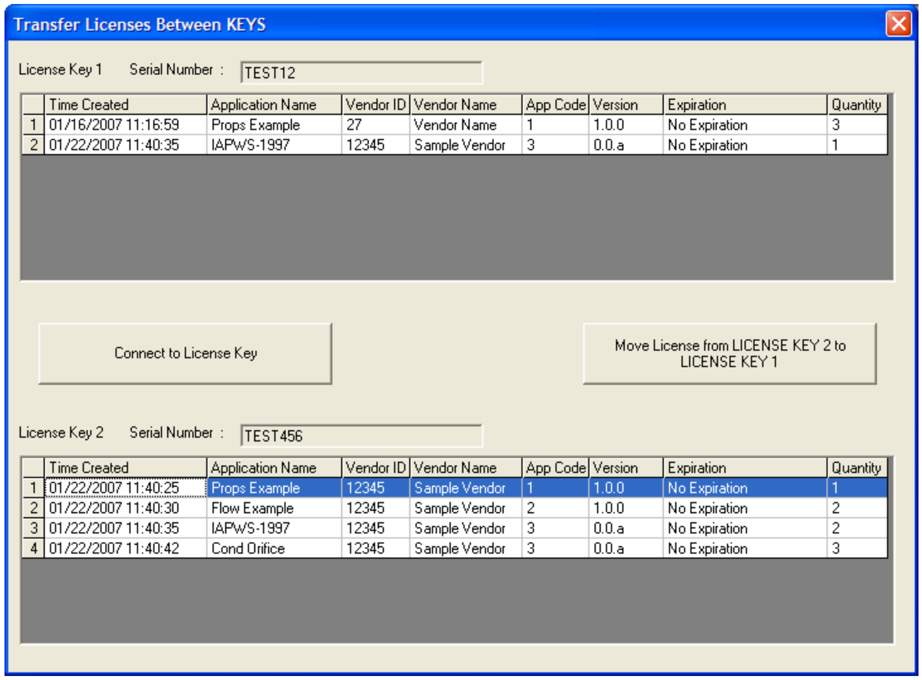


Figure 9-13. License Transferred

6. Review the Quantity fields and note that License Key 1 now has **one** IAPWS-1997 license and that License Key 2 now has **two** IAPWS-1997 licenses.

9.2.5 Removing a License

For internal security, ROCLINK 800 protects software licenses. You **cannot** actually delete a license you have installed from a USB key (a "moveable" license). Instead, you can transfer it from the FB107 back onto a USB key. Refer to *Section 9.2.4, Transferring Licenses*.

However, you **can** remove a software license you have installed from a string. Remember that the license you installed on the FB107 is actually a copy of the original license, which still resides on your PC. Additionally, a USB key can contain up to 255 separate iterations of a license. A string-based license has no limit on the number of reuses.

To remove a license:

1. Select **Utilities** > **License Key Administrator** > **Transfer Between Device and Key** from the ROCLINK 800 menu bar. The Transfer Licenses Between a Device and a Key screen displays.
2. Review the Transfer Mode field at the top of the screen and select a permanent license (here, **V-Cone Flow Calc**). Note that ROCLINK 800 activates the **Remove** button.

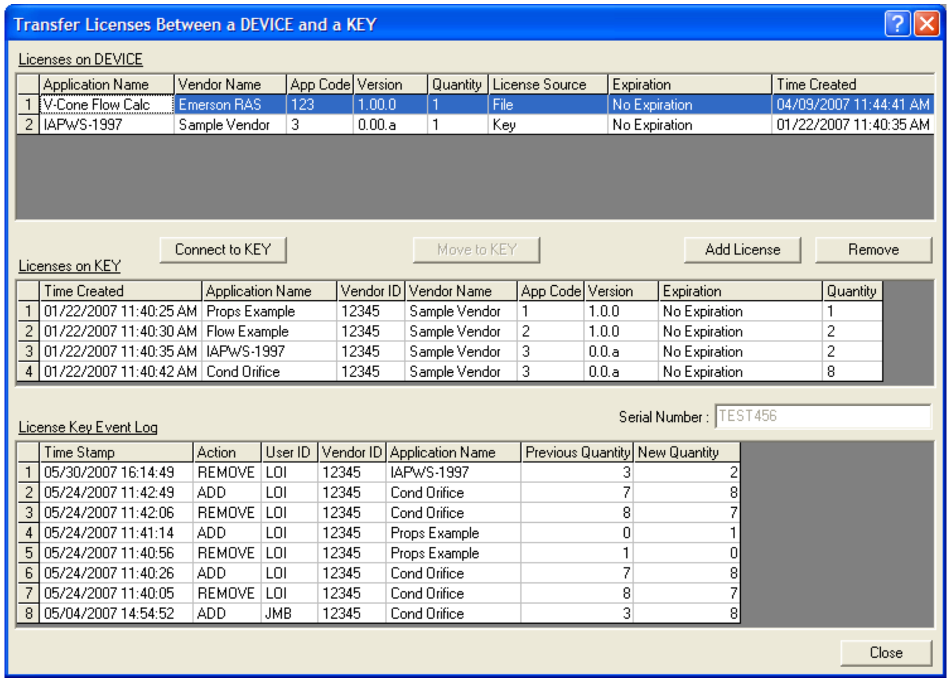


Figure 9-14. Transfer Licenses Between a Device and a Key

3. Click **Remove**. A Confirm Remove License dialog box displays.

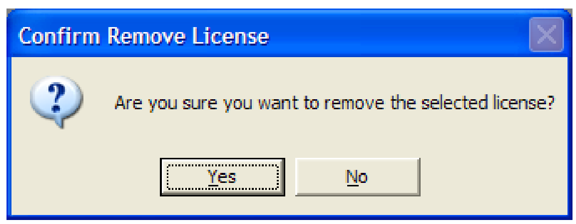


Figure 9-15. Confirm Remove License Dialog

4. Click **Yes**. A second confirmation dialog displays:

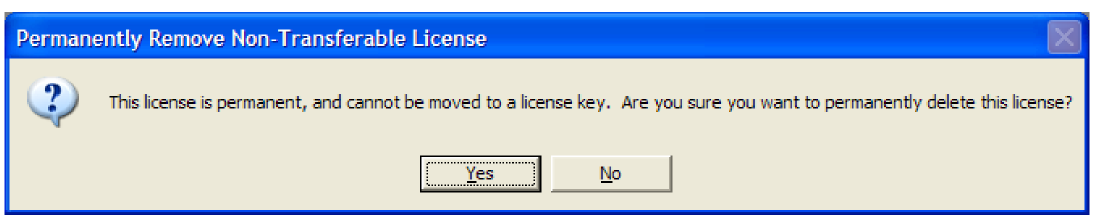


Figure 9-16. Confirm Removal Dialog

5. Click **Yes**. ROCLINK 800 displays the Transfer Licenses Between a Device and a Key screen, showing that the license for V-Cone Flow Calc (the permanent license) is gone.

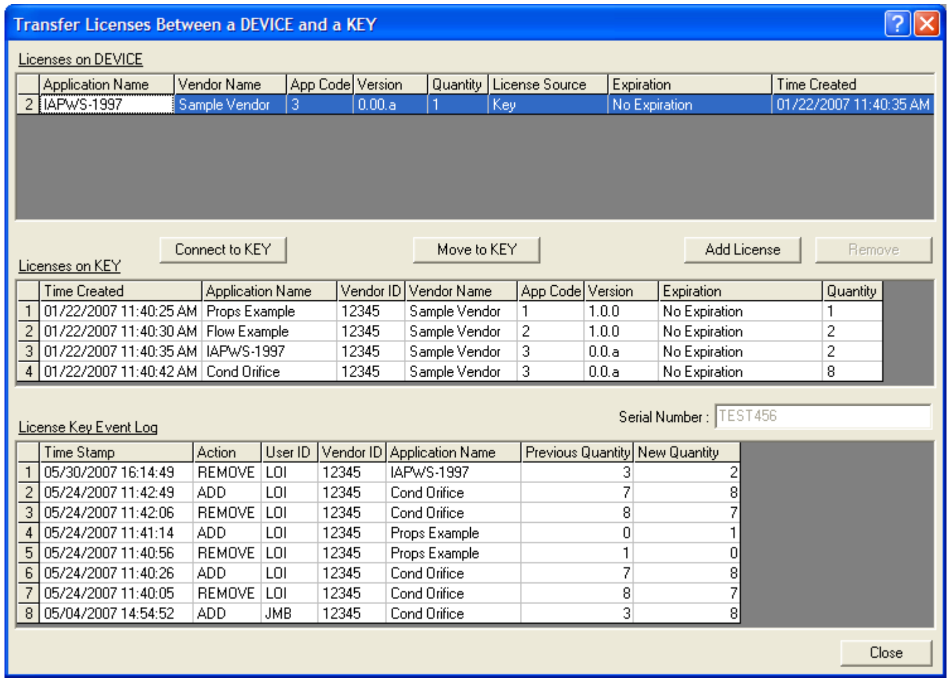


Figure 9-17. License Removal Completed

Note: Although you have removed this license from the FB107, the file you used to install the license still resides on your PC. You have deleted **only** the installed license iteration, **not** the original license.

9.3 Converting EFM Report Files

Use the **Convert EFM File** option to convert EFM Report files (.EFM database file) to the Flow-Cal or .AGA/.DET report file format.

1. Select **Utilities** > **Convert EFM File**. The Convert EFM File screen displays.

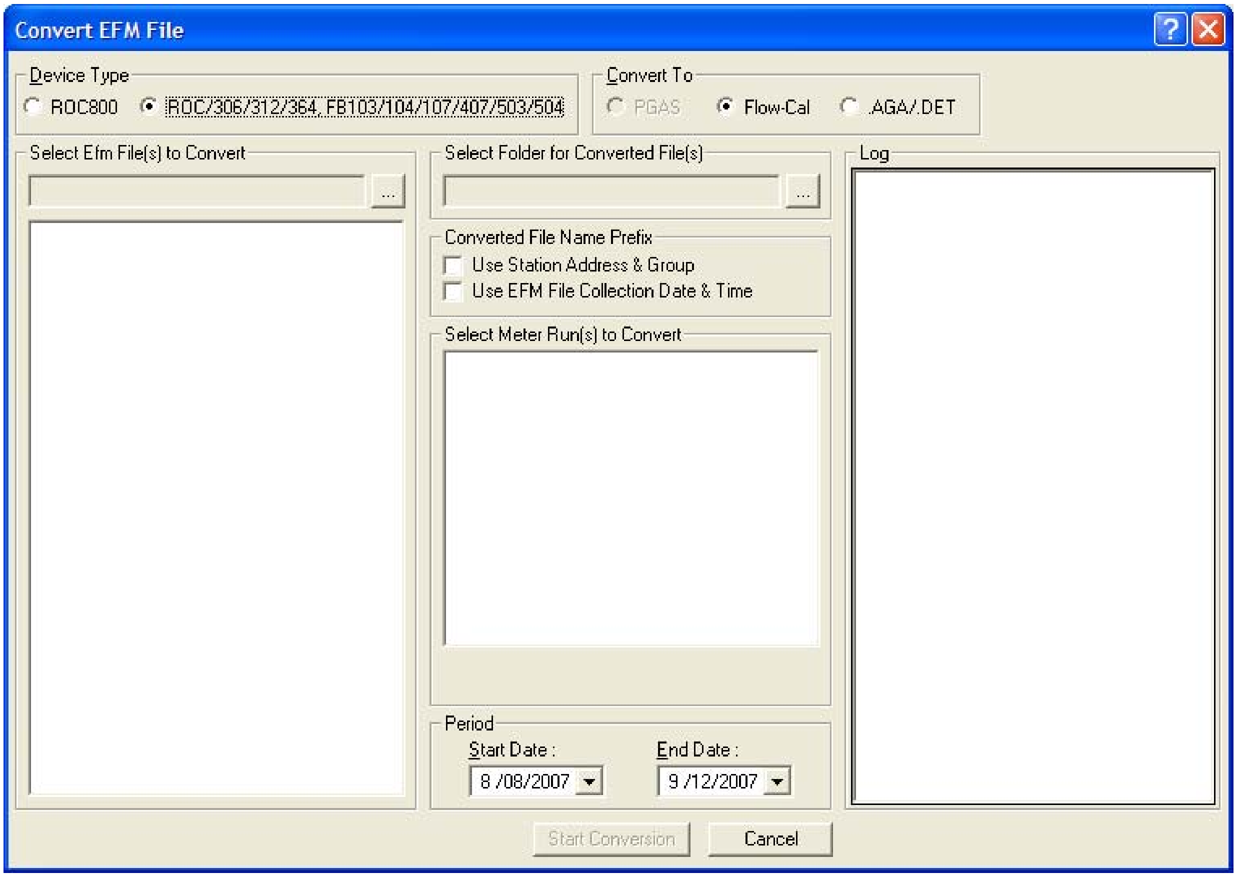


Figure 9-18. Convert EFM File

2. Select the appropriate device type (**ROC306/312/364, FB103/104/107/407/503/504)** in the Device Type frame.
3. Select a conversion option in the Convert To field.

Note: The .AGA/.DET option contains standard history points for the meter run. The Flow-Cal option requires that you indicate the meters involved and provide a start and stop date for the involved files.

4. Click **…** in the **Select Efm File(s) to Convert** field. The Select EFM Files to Convert screen displays.

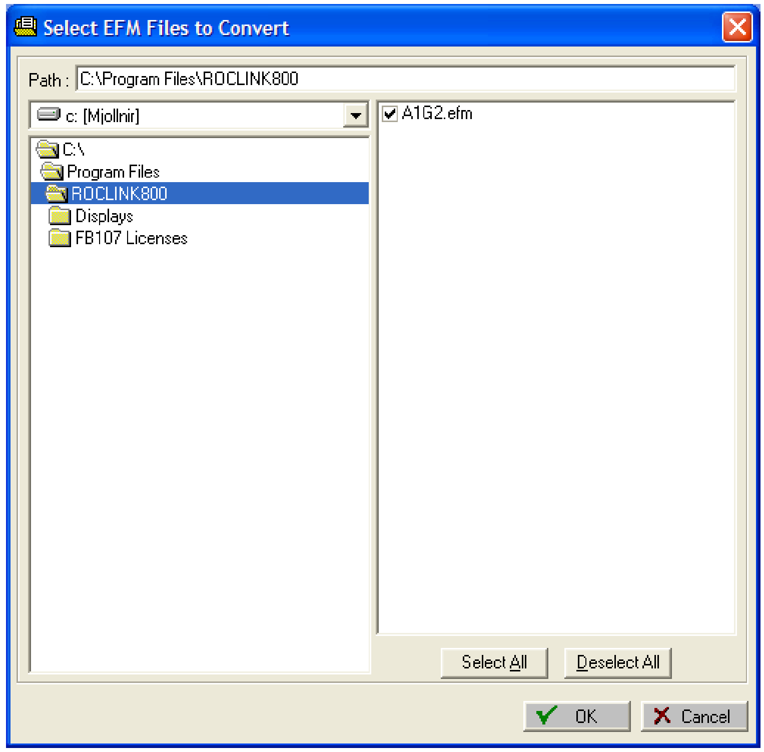


Figure 9-19. Select EFM Files to Convert

5. Use this screen to locate and select the EFM files stored on your PC.

Note: By default, ROCLINK 800 selects all the displayed files. Click **Deselect All** to individually select specific files.

6. Click **OK**. The system internally validates each file type. If any of the files are invalid, an error message displays. If this occurs, click **OK**. The system automatically removes any invalid files and displays a log in the Log frame at the right side of the screen.

7. Click **…** in the **Select Folder for Converted File(s)** field. The Select Folder for Converted Files screen displays.

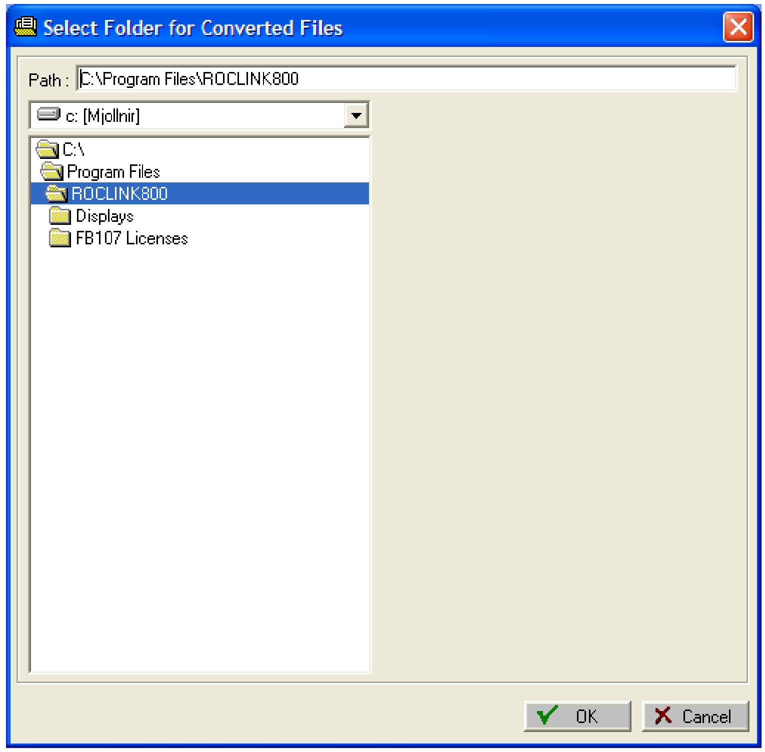


Figure 9-20. Select Folder for Converted Files

8. Select the folder in which ROCLINK 800 should store the converted files and click **OK**.

> **Note:** If you have selected **.AGA/.DET** as a format, skip to step 12. If you have selected Flow-Cal as a format, proceed to the next step.

9. Select the options for file name prefix. If applicable, you can select **both Station Address & Group** and **EFM File Collection Date & Time**.

10. Select the meter runs.

> **Note:** By default, ROCLINK 800 selects **all** the displayed meter runs. Click **Deselect All** to individually select specific runs.

11. Select a starting and ending period for the records to be converted. Click ▼ to display a calendar.

12. Click **Start Conversion**. ROCLINK 800 converts the files using the options you have selected. When the conversion completes, a message appears in the Log frame on the right-hand side of the screen and a message displays.

13. Click **OK** and click **Cancel** to display the FB107 graphic.

Note: Click **Cancel** to stop a conversion in progress. ROCLINK 800 displays a dialog box (click **OK**) to acknowledge the cancellation.

9.4 User Program Administrator

User programs provide the FB107 with extended functions and applications (such as gas chromatograph support or GOST calculations). Use this option to download, start, stop, and remove user programs.

Note: Extensive documentation covering configuration and usage information accompanies each user program.

1. Select **Utilities** > **User Program Administrator**. The User Program Administrator screen displays.

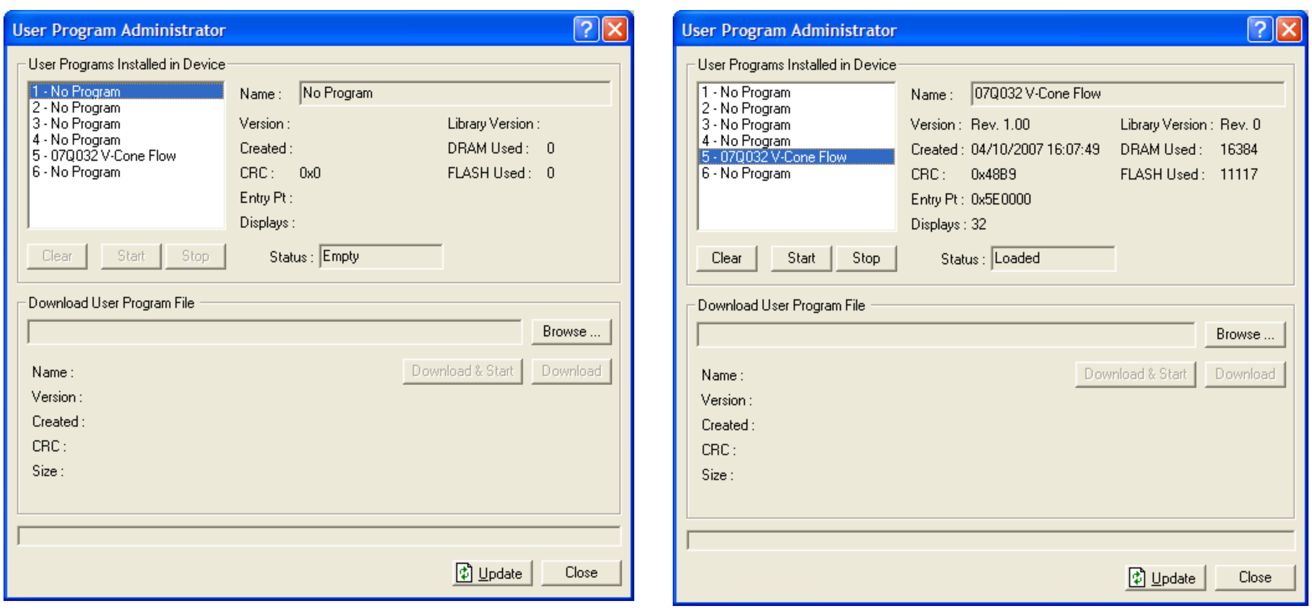


Figure 9-21. User Program Administrator

2. Review the following fields for your organization's values.

Field	Description
User Programs Installed in Device	Displays any user programs currently installed in the FB107. If you select a currently installed program (for

Field	Description	
	example, 07Q0232, V-Cone Flow), the system completes the upper portion of the screen, as shown on the right-hand portion of *Figure 9-21*.	
Status	This **read-only** field indicates the status of the selected program. Valid values are:	
	Empty	No program installed.
	Loaded	Program installed but not running.
	Running	Program active.
	License Not Found	Program requires a license to operate (see *Section 9.2*).
Clear	Click to delete the selected user program from memory.	
Start	Click to start the selected user program.	
Stop	Click to stop the selected user program from running.	
Download User Program File	Identifies the program file to be downloaded.	
Download & Start	Click to download **and** start the identified user program running.	
Download	Click to download but **not** start the identified user program. **Note**: If you download several programs, they may need to be started in a particular order. Use this button to download without starting the programs.	

3. Click **Close** to display the FB107 graphic.

9.4.1 Downloading a User Program

You can use the User Program Administrator screen to download a user program to the FB107.

Note: For the FB107, ROCLINK 800 automatically determines in which of six slots to install a downloaded program.

1. Select **Utilities** > **User Program Administrator**. The User Program Administrator screen displays.
2. Click **Browse** in the Download User Program File frame. The Select User Program File screen displays.

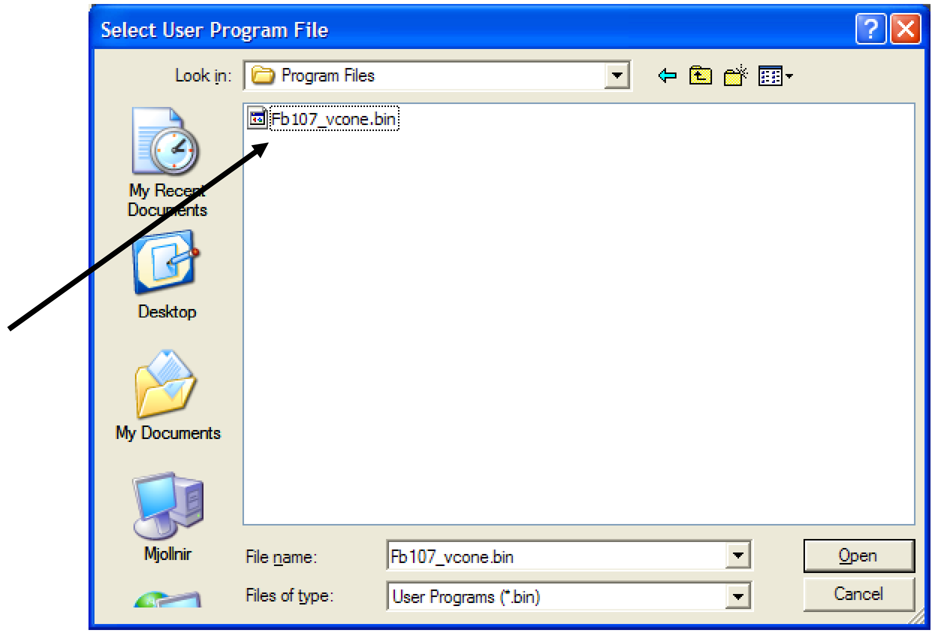


Figure 9-22. Select User Program File

Note: User Program files are typically located in the Program Files folder on the distribution CD. The screen displays the names of all files that have the .bin extension.

---

3. Select a file name to load and click **Open**. The User Program Administrator screen displays.

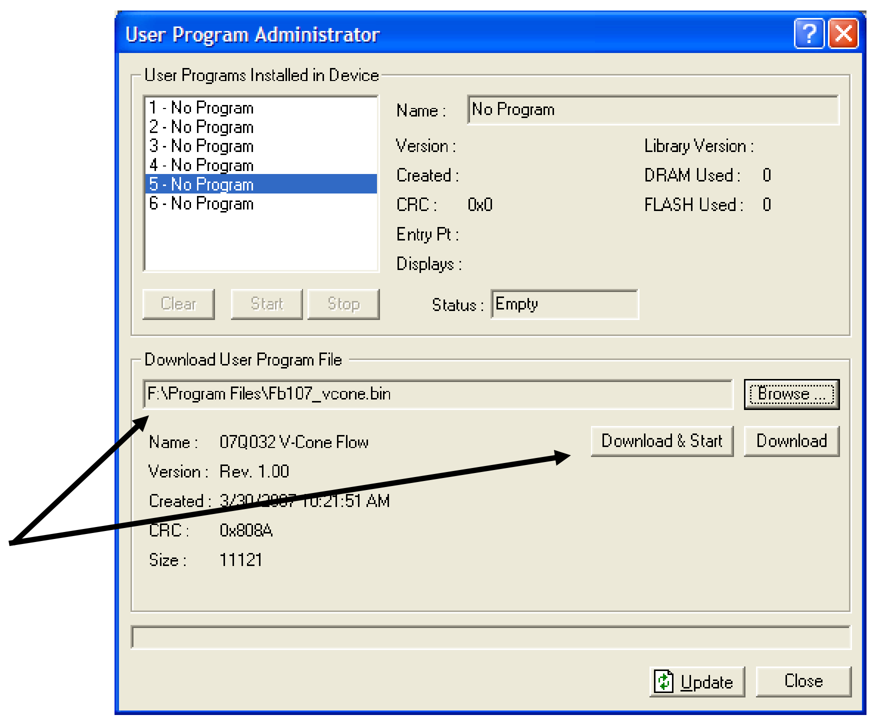


Figure 9-23. User Program Administrator

4. Click **Download & Start** to download and automatically start the selected user program (or click **Download** to download the user program without starting it). A message dialog displays.

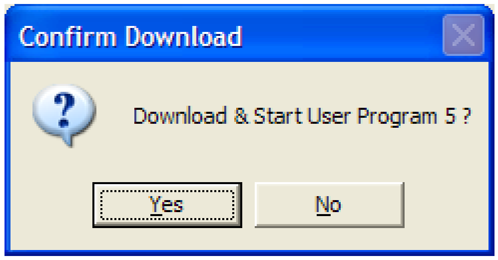


Figure 9-24. Confirm Download

Note: ROCLINK 800 automatically assigns the program number.

---

5. Click **Yes** to begin the download. During the download, the program performs a warm start, creates an event in the Event Log, and—when the download completes—displays the following message.

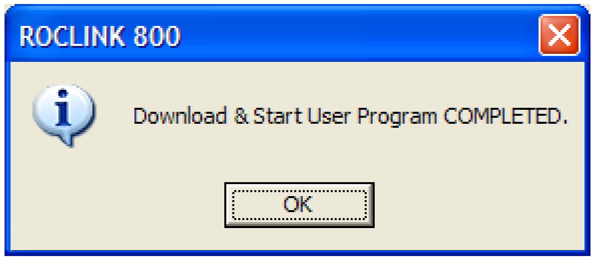


Figure 9-25. Successful Download Confirmation

6. Click **OK**. The User Program Administrator screen displays (see *Figure 9-26)*. Note that:

- The User Programs Installed in Device frame now identifies the loaded program.
- The Status field indicates that the program is running.

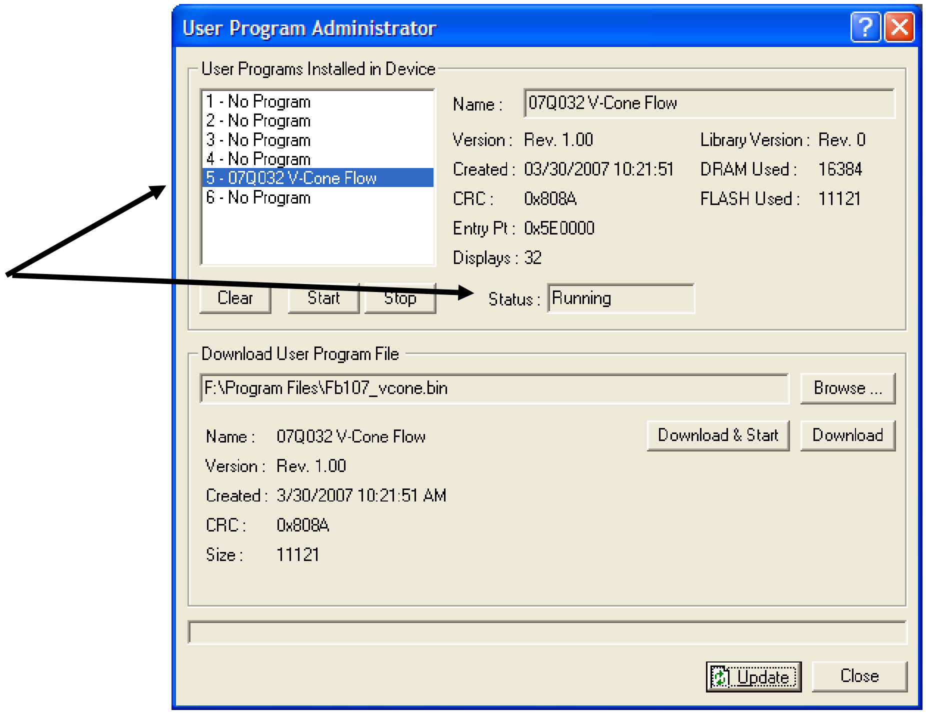


Figure 9-26. User Program Administrator

7. Access ROCLINK 800's Flags screen (**ROC** > **Flags**), click **Save Configuration,** and click **Yes**. This ensures that the program automatically restarts after a cold start.

9.5 ROCLINK 800 Security

Use this option to access a table and define up to 32 user IDs with passwords and levels of system access. For a complete description of system security, refer to *Section 3.7, Security*.

1. Select **Utilities** > **ROCLINK 800 Security**. The ROCLINK 800 Security screen displays.

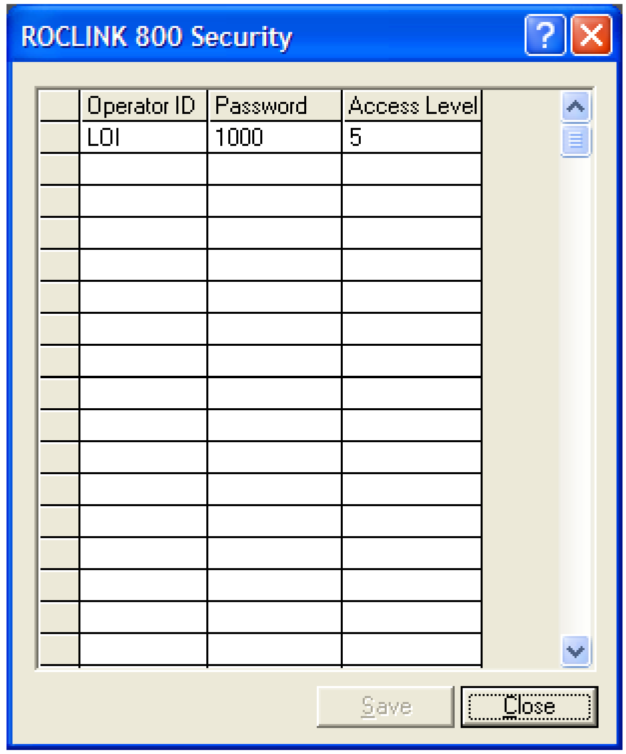


Figure 9-27. ROCLINK 800 Security

Note: The default Operator ID is **LOI**. The default Password is **1000**, and the default access level is **5**.

---

2. Enter three alphanumeric characters for the Operator ID, which is typically the initials of the person who operates the device. Each Operator ID must be unique and case-sensitive.
3. Enter four numeric characters (between **0000** and **9999**) to define the password for this ID. More than one user can have the same password.
4. Enter the desired access level for the operator ID. **0** is the lowest (least inclusive) access level and allows access to the fewest number of screens. **5** is highest (most inclusive) access level and allows access to all screens.

Note: Each access level permits access to screens at that level and any inherited from lower access levels. For example, an operator ID with access level 3 can access screens with levels 0, 1, 2, and 3. Refer to *Table 3-2* for a listing of menu options and their security levels.

---

5. Click **Save** if you have changed the contents of this screen.
6. Click **Close** to display the FB107 graphic.

9.6 Analog Input Calibration Values

Use this option to review all the calibration values for a specific analog input point.

1. Select **Utilities** > **AI Calibration Values**. The AI Calibration Values screen displays.

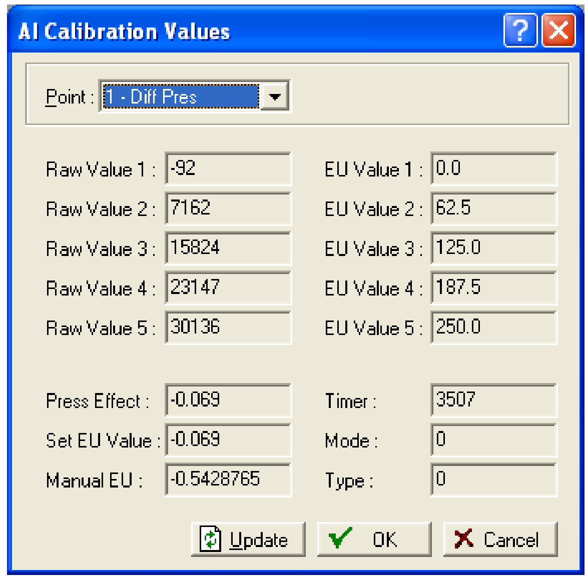


Figure 9-28. AI Calibration Values

2. Review the following fields for your organization's values.

Field	Description
Point	Click ▼ to select the AI point to view.
Raw Value (1 – 5)	These **read-only** fields show the calibrated raw A/D input, where Value 1 is the lowest calibrated input and Value 5 is the highest calibrated input.
Press Effect	This **read-only** field shows the **zero shift** adjustment value for a differential pressure input. This value is an offset to the calibrated EU Values, and compensates for the effect of working static pressure on a DP transmitter that was calibrated at atmospheric pressure.
Set EU Value	This **read-only** field shows the Tester Value specified for the last calibration.
Manual EU Value	This **read-only** field shows the Live Reading for the last calibration.
EU Value (1 – 5)	These **read-only** fields show the five calibration settings in Engineering Unit values, converted from the raw values, based on the low reading EU and the high reading EU defined for the point. Value #1 is the zero value, value #5 is the span value, and values 2, 3, and 4 are midpoint values.

Field	Description	
Timer	This **read-only** field shows the last inactivity count-down in seconds (typically starting from 3600 seconds) that occurred during the last calibration session. Had the countdown reached 0, time-out would have taken place, automatically ending the calibration mode.	
Mode	This **read-only** field shows the status of the calibration. Valid values are:	
	0	Use Current Calibration
	1	Start Calibration
	2	Calibrate
	3	Restore Previous Calibration
	4	Stop Calibration
Type	This **read-only** field shows the currently set calibration value. Valid values are:	
	0	Inactive (no value)
	1	Zero
	2	Span
	3	Midpoint 1
	4	Midpoint 2
	5	Midpoint 3
	6	Zero Shift

3. Click **OK** to display the FB107 graphic screen.

9.7 MVS Input Calibration Values

Use this option to display a screen that shows all the current calibration values for MVS sensor points.

1. Select **Utilities** > **MVS Calibration Values**. The MVS Calibration screen displays.

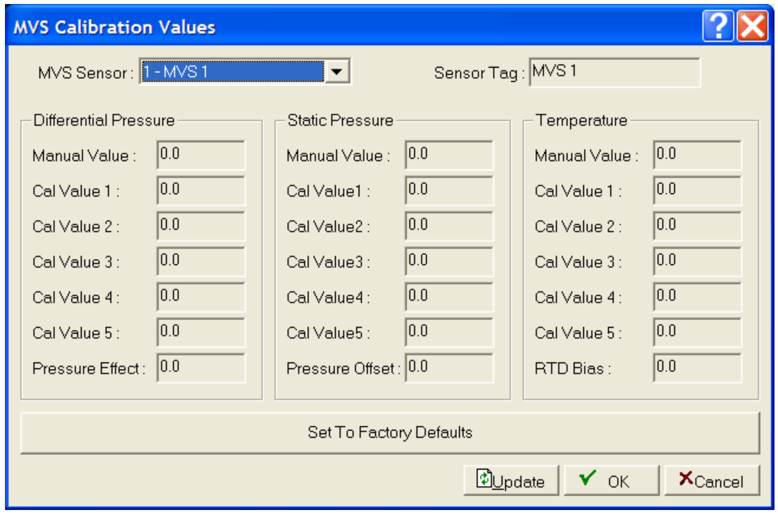


Figure 9-29. MVS Calibration Values

2. Review the following fields for your organization's values.

Field	Description
MVS Sensor	Click ▼ to select the MVS sensor point (sensor number) to view.
Sensor Tag	This **read-only** field shows the label associated with the chosen MVS sensor point.
Differential Pressure	These **read-only** fields display the **Differential Pressure** calibration values the selected MVS sensor currently uses. **Note**: **Manual Value** represents the value of the input at the time of the last meter "Freeze."
Static Pressure	These **read-only** fields display the **Static Pressure** calibration values the selected MVS sensor uses. **Note**: **Manual Value** is the value of the input at the time of the last meter "Freeze."
Temperature	These **read-only** fields display the **Temperature** calibration values the selected MVS sensor currently uses. **Note**: *Manual Value* is the value of the input at the time of the last meter "Freeze."
Set To Factory Defaults	Click to return MVS calibration values to their original values and reset the MVS. **Note**: You must answer **Yes** to a verification dialog before the reset occurs. When the reset completes, a verification dialog box displays. This resets the MVS address to the default value of **1** and the Sensor Tag to **MV Sensor**.

3. Click **OK** to display the FB107 graphic screen.

9.8 FST Editor

ROCLINK 800's Function Sequence Table (FST) provides an instruction list programming language you can use to define and perform a set of specific actions when a set of conditions exists.

Note: Refer to *Appendix B, The FST Editor*, for FST commands and more detailed information.

9.9 Communications Monitor

Select **Utilities** > **Communications Monitor** to display the data bytes (in hexadecimal format) sent and received from the ROCLINK 800 software during that operation.

Note: Refer to the *ROC Protocol Manual*, Form A4199, for further information on protocol requirements.

Bytes sent are shown in black; bytes received are shown in red. Data received since the last good response (and before a request) are shown in aqua.

Right-click on the display a menu that allows you to **Copy** highlighted data, **Clear All** data, or **Unselect**. You can then paste copied data into a file for analysis.

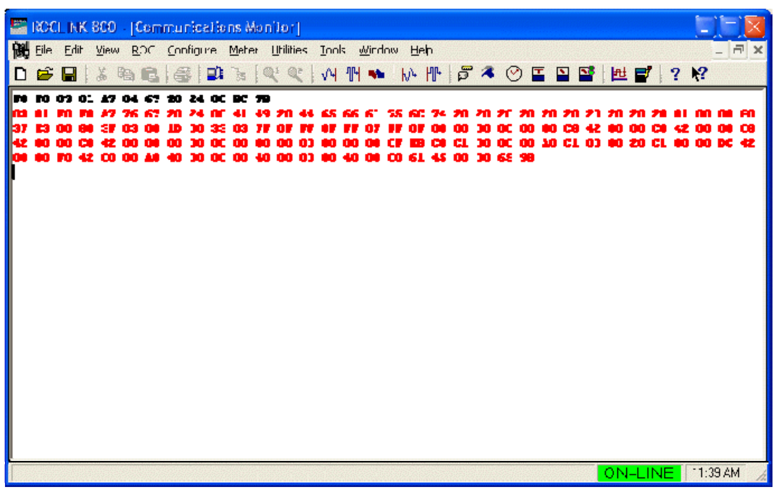


Figure 9-30. Communications Monitor

Chapter 10 – The Tools Menu

Use the Tools menu option to configure how your TLP options display and to customize your toolbars.

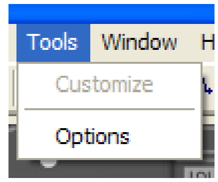


Figure 10-1. Tools Menu

In This Chapter

10.1 Customize

This ROCLINK 800 menu option is currently unavailable.

10.2 Options

ROCLINK 800 enables you to display TLP selections as either text or numbers (see Figure 10-2).

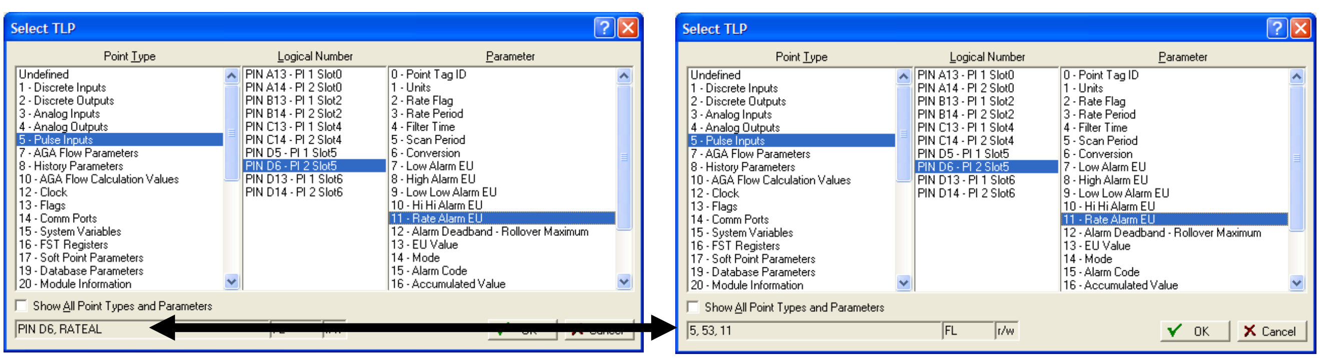


Figure 10-2. TLP Displays

Select **Tools** > **Options** to display the Options dialog box.

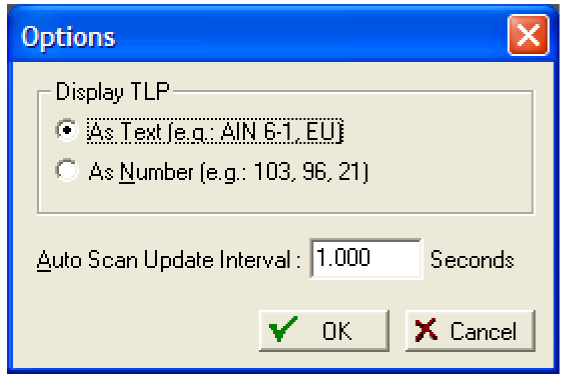


Figure 10-3. Options

Field	Description
Display TLP	Displays values on the Select TLP screen as either text or numbers. See *Figure 10-2*.
Auto Scan Update Interval	Sets, in seconds, the time interval at which the Auto Scan feature (present on numerous ROCLINK 800 screens) polls a FloBoss 107.

Chapter 11 – The Window Menu

Use the Windows menu options to configure how your screens display and to select the ROCLINK 800 screen you desire to view.

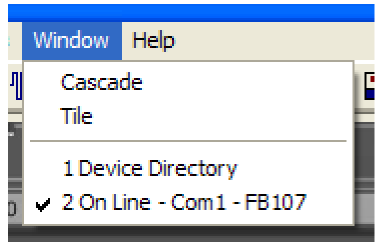


Figure 11-1. Window Menu

In This Chapter

11.1 Cascade

Select **Window** > **Cascade** to view all open ROCLINK 800 windows in a Cascade view.

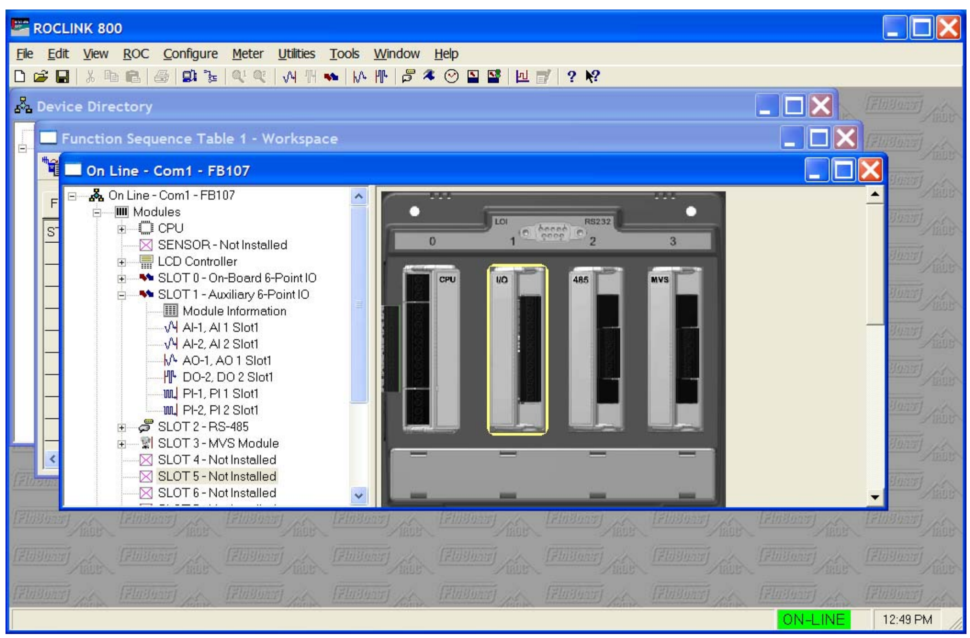


Figure 11-2. Cascade

Button	Description
	Minimizes the size of the window and places it at the bottom of the screen.
	Maximizes the size of the window to fill the screen area.

Button	Description
	Restores the original size of the window.
	Closes a window.

11.2 Tile

Select **Window** > **Tile** to view all open ROCLINK 800 windows in a Tile view.

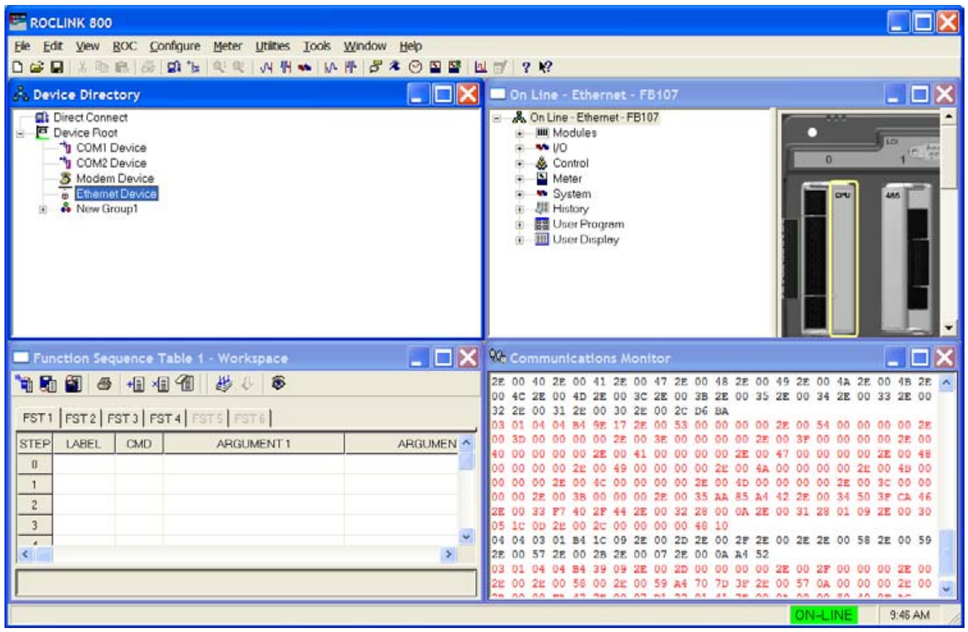


Figure 11-3. Tile

11.3 Active View

To switch between active views in ROCLINK 800, select **Window** > **View**. A check mark appears next to the active view (as shown in *Figure 11-4*). A view must be active before you can alter information on that screen.

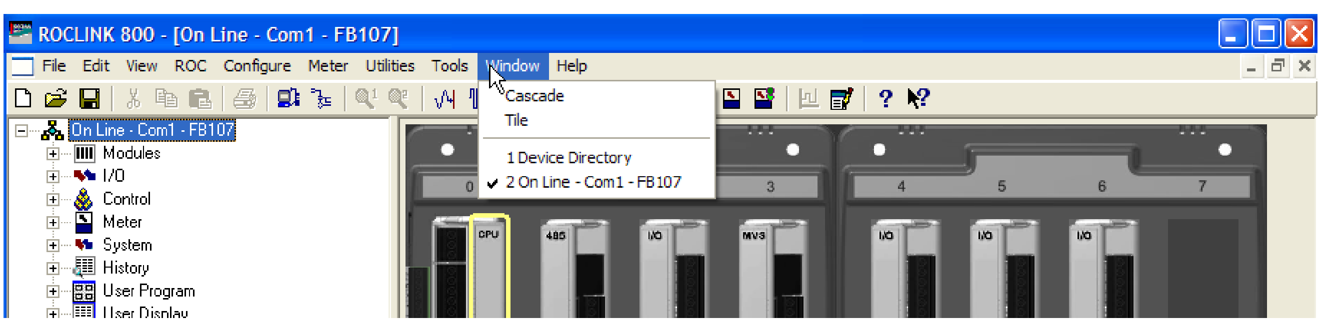


Figure 11-4. Active View

Chapter 12 – The Help Menu

Use the Help menu to access the on-line help system and view the About ROCLINK 800 screen.

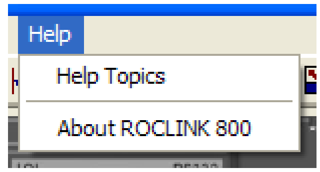


Figure 12-1. Help Menu

In This Chapter

12.1 Help Topics

ROCLINK 800 has a comprehensive help system. To acquire help using the menu structure, click **Help Topics** from the Help menu. To display context-sensitive help on a specific issue, select the item, parameter, field, or button, and press **F1**.

When you select **Help** > **Help Topics**, you display the ROCLINK 800 main help screen. A table of contents for all help topics appears on the left of the help topic contents. The Help Topics consist of parameter names and menu options. Note that some topic names have been abbreviated. For example: analog input functions appear with "AI" in front of the name, such as in AI Alarms, AI Scanning, or AI-analog inputs.

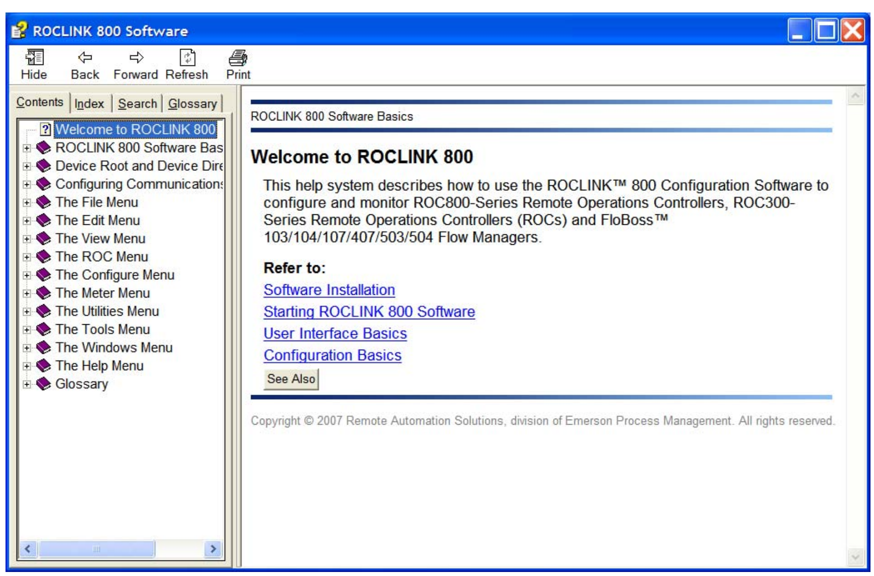


Figure 12-2. ROCLINK 800 Software Help

12.2 About ROCLINK 800

Select **Help** > **About ROCLINK 800** to display the About ROCLINK 800 dialog box.

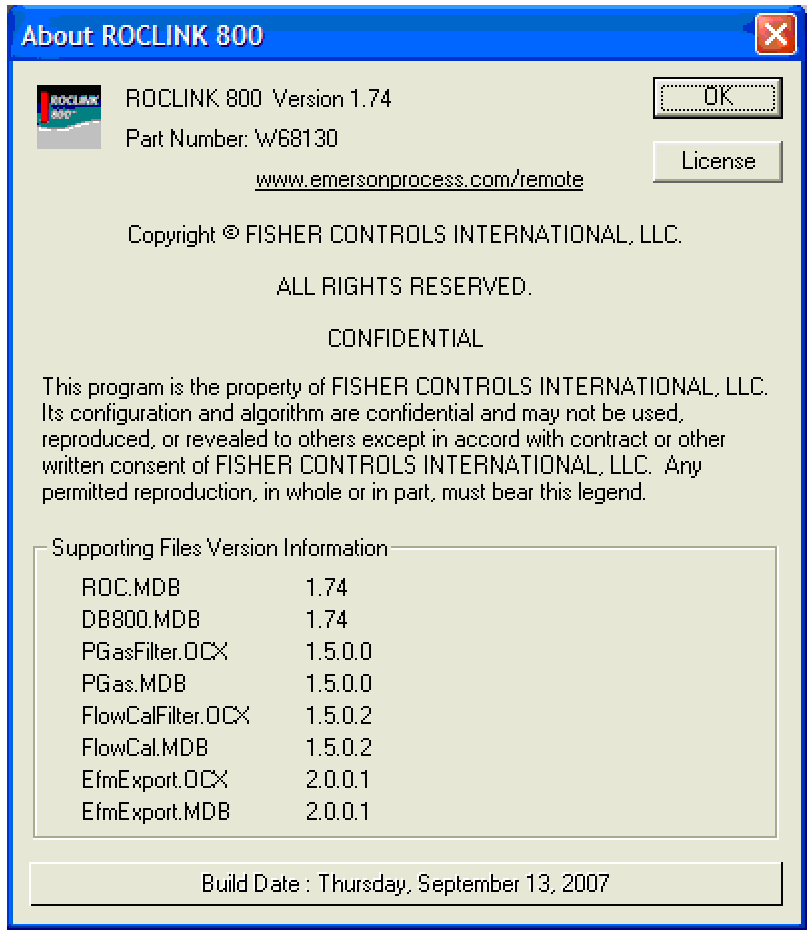


Figure 12-3. About ROCLINK 800

The dialog box displays a variety of information, including the version number, license agreement, creation (software build) date, and version information for supporting files. Click **OK** to close the dialog box.

Note: *Figure 12-3* represents the current version as of the publication date of this manual. Newer versions may be available. Consult with your LBP.

Appendix A – Glossary

> **Note:** This is a generalized glossary of terms. Not all the terms may necessarily correspond to the particular device or software described in this manual. For that reason, the term "ROC" is used to identify all varieties of Remote Operations Controllers.

A

A/D Analog to Digital signal conversion.

ABS Acrylonitrile Butadiene Styrene.

ADC Analog to Digital Converter. Used to convert analog inputs (AI) to a format the flow computer can use.

Additive A liquid that is injected into a primary liquid component in relatively small quantities, usually less than four percent of the delivered volume total. Additives are injected into the primary liquid component by an injector mechanism which places a known, fixed volume of the additive into the primary liquid component stream for each injector pulse received from the DL8000 Preset.

AGA American Gas Association. A professional organization that oversees the AGA3 (orifice), AGA5 (heating value), AGA7 (turbine), AGA8 (compressibility), and AGA11 (ultrasonic) gas flow calculation standards. See http://www.aga.org.

AWG American Wire Gauge.

AI Analog Input.

AO Analog Output.

Analog Analog data is represented by a continuous variable, such as an electrical current signal.

Annubar A device that uses Pitot tubes to measure the gas flow rate within a pipeline. The gas volume is calculated from the difference between the flowing pressure and the static pressure of the gas.

AP Absolute Pressure.

API American Petroleum Institute. See http://www.api.org.

Area A user-defined grouping of database entities.

Arm A movable pipe or hose assembly used at a tanker truck loading island (also: *swing arm, loading arm*). The arm can be designed for either top loading or bottom loading to the tanker compartments. A *swing arm* can be positioned to load at either side of the loading island or the parked state.

ASCII American (National) Standard Code for Information Interchange.

Attribute A parameter that provides information about an aspect of a database point. For example, the alarm attribute is an attribute that uniquely identifies the configured value of an alarm.

B

Batch A preset, quantity-based product delivery or blended component delivery of a single recipe.

Blend Stream A product stream blended of both gasoline and ethanol.

Blending	The process of mixing two or more liquid components to form a composite delivered stream. The DL8000 controls blending based on a predetermined recipe by either the sequential (automatic or manual) or the inline (proportional or non-proportional) method. The quantity of each component in a blend is typically greater than two to four percent of the blended product. Injection of very small quantities of liquids, less than four percent of the blended product, is usually controlled by the additive injection process.
BMV	Base Multiplier Value, used in AGA7 (turbine) calculations.
BPS	Bits Per Second, associated with baud rate.
BTU	British Thermal Unit, a measure of heat energy.
Built-in I/O	I/O channels that are fabricated into the ROC and do not require a separate option. Also called “on-board” I/O.

C

CID2	Class I, Division 2 hazardous area
CF	Compare Flag; stores the Signal Value Discrete (SVD).
CMOS	Complementary Metal Oxide Semiconductor, a type of microprocessor used in a ROC.
Coil	Digital output, a bit to be cleared or set.
COL	Ethernet Packet Collision.
COM	Communications port on a personal computer (PC).
COMM	Communications port on a ROC used for host communications.
Comm Module	Module that plugs into a ROC to provide a channel for communications via a specified communications protocol, such as EIA-422 (RS-422) or HART.
Component	Any liquid metered and controlled by the DL8000. Liquid hydrocarbons refined from crude oil and LPGs (such as propane) are usually referred to as *products*. Components are base products or tank products stored at a distribution terminal. The component is measured before being blended with other components. Additives may be injected before (upstream of) or after (downstream of) the component meter.
Configuration	Refers either to the process of setting up the software for a given system or the result of performing this process. The configuration activity includes editing the database, building schematic displays and reports, and defining user calculations. Typically, the software set up of a device that can often be defined and changed. Can also mean the hardware assembly scheme.
Configuration Tree	In ROCLINK 800, the graphical display that appears when a configuration file opens (also *Directory Tree*). It is a hierarchical branching (“tree-style”) method for navigating within the configuration screens.
CPU	Central Processing Unit.
CRC	Cyclical Redundancy Check error checking.
Crosstalk	The amount of signal that crosses over between the receive and transmit pairs, and signal attenuation, which is the amount of signal loss encountered on the Ethernet segment.
CSA	Canadian Standards Association. See http://www.csa.ca.
CSMA/CD	Carrier Sense Multiple Access with Collision Detection.
CTS	Clear to Send modem communications signal.

D

D/A	Digital to Analog signal conversion.
DB	Database.

dB	Decibel. A unit for expressing the ratio of the magnitudes of two electric signals on a logarithmic scale.
DCD	**Data Carrier Detect** modem communications signal. In addition, **Discrete Control Device** – A discrete control device energizes a set of discrete outputs for a given setpoint and matches the desired result against a set of discrete inputs (DI).
DCE	Data Communication Equipment.
Deadband	A value that is an inactive zone above the low limits and below the high limits. The purpose of the deadband is to prevent a value (such as an alarm) from being set and cleared continuously when the input value is oscillating around the specified limit. This also prevents the logs or data storage location from being over-filled with data.
Device Directory	In ROCLINK 800, the graphical display that allows navigation through the PC Comm Ports and ROC Comm Ports set up screen.
DI	Discrete Input.
Discrete	Input or output that is non-continuous, typically representing two levels (such as on/off).
DMM	Digital multimeter.
DO	Discrete Output.
Download	The process of sending data, a file, or a program from a PC to a ROC.
DP	Differential Pressure.
DSR	Data Set Ready modem communications signal.
DTE	Data Terminal Equipment.
DTR	Data Terminal Ready modem communications signal.
Duty Cycle	Proportion of time during a cycle that a device is activated. A short duty cycle conserves power for I/O channels, radios, and so on.
DVM	Digital voltmeter.
DVS	Dual-Variable Sensor. A device that provides static and differential pressure inputs to a ROC.

E

EDS	Electronic Static Discharge.
EEPROM	Electrically Erasable Programmable Read-Only Memory, a form of permanent memory on a ROC.
EFM	Electronic Flow Metering or Measurement.
EIA-232 (RS-232)	Serial Communications Protocol using three or more signal lines, intended for short distances. Concerning RS232D and RS232C, the letters C or D refer to the physical connector type. D specifies the RJ-11 connector where a C specifies a DB25 type connector.
EIA-422 (RS-422)	Serial Communications Protocol using four signal lines.
EIA-485 (RS-485)	Serial Communications Protocol requiring only two signal lines. Can allow up to 32 devices to be connected together in a daisy-chained fashion.
EMF	Electro-Motive Force.
EMI	Electro-Magnetic Interference.
ESD	Electro-Static Discharge.
EU	Engineering Units. Units of measure, such as MCF/DAY.

F

FCC	Federal Communications Commission. See http://www.fcc.gov.

Firmware	Internal software that is factory-loaded into a form of ROM. In a ROC, the firmware supplies the software used for gathering input data, converting raw input data values, storing values, and providing control signals.
FlashPAC module	ROM and RAM module for a ROC300-Series unit that contains the operating system, applications firmware, and communications protocol.
Flash ROM	A type of read-only memory that can be electrically re-programmed. It is a form of permanent memory (requires no backup power). Also called Flash memory.
FloBoss	A microprocess-based device that provides flow calculations, remote monitoring, and remote control. A FloBoss is a type of ROC.
FM	Factory Mutual.
Force	Write an ON/OFF, True/False, or 1/0 value to a coil.
FPV	Compressibility Factor.
FSK	Frequency Shift Keypad.
FST	Function Sequence Table, a type of user-written program in a high-level language designed by Emerson Process Management's Remote Automation Solutions Division.
Ft	Foot or feet.

G

GFA	Ground Fault Analysis.
GND	Electrical ground, such as used by the ROC unit's power supply.
GP	Gauge Pressure.
Gross Quantity	The *indicated quantity times* the *meter factor* derived from a meter proving of the flow meter at a specific flow rate. *Calculation:* gross quantity = indicated quantity *times* meter factor.

H

HART®	Highway Addressable Remote Transducer.
Holding Register	Analog output number value to be read.
Hw	Differential pressure.
Hz	Hertz.

I, J

IC	Integrated Circuit. Also, Industry Canada (more recently known as Measurement Canada), an organization that grants custody transfer approvals on certain ROC units.
ID	Identification.
IEC	Industrial Electrical Code or International Electrotechnical Commission. See http://www.iec.ch.
IEEE	Institute of Electrical and Electronic Engineers. A professional organization that, in conjunction with the International Standards Organization (ISO), establishes and maintains the Open System Interconnection (OSI) reference model and an international standard for the organization of local area networks (LANs). Refer to http://www.ieee.org.
IMV	Integral Multiplier Value, used in AGA3 (orifice) calculations.
Indicated Quantity	The change in the flow meter reading that occurs during a product flow measurement operation. (Not displayed by the DL8000 calculation: indicated quantity = end reading *minus* start reading.)
Input	Digital input, a bit to be read.

Input Register Input numeric value to be read.

I/O Input/Output.

I/O Module Module that plugs into an I/O slot on a ROC to provide an I/O channel.

IP-252 *Institute of Petroleum* standard 252. A British standard for pulse fidelity and security for pulse output type flow meters. Program codes 233 and 234 define the operation of this function.

Note: Equivalent standard is API Manual of Petroleum Measurement Standards / Chapter 5 - Metering /

IRQ Interrupt Request. Hardware address oriented.

ISO International Standards Organization. See http://www.iso.ch.

IV Integral Value.

K

KB Kilobytes.

KHz KiloHertz.

K-factor The pulses per unit quantity generated by a pulse output type flow meter (also *system factor*). The nominal value is determined by flow meter design and factory water flow calibration. The "average" K-factors for the flow meters are usually indicated on the flow meter nameplates.

L

LCD Liquid Crystal Display.

LDP Local Display Panel, a display-only device that plugs into ROC300 (via a parallel interface cable) used to access information stored in the ROC.

LED Light-Emitting Diode.

Load **For sequential blending**: In multi-component blending, a load is the completed delivery of one component of a batch. The completion of loading all components in the batch completes the batch delivery. If the recipe only loads one component, a load corresponds to a batch delivery.

For inline blending: Each component of the blend is loaded simultaneously. Depending on the blend ratio, the low-proportion components are loaded completely during the time that the high proportion component(s) are being loaded. After loading of the highest proportion component has been terminated, all component loads and the batch delivery are complete.

Loading Island Also l*oading rack;* an installation of one or more loading arms or risers used to deliver liquid components to a tanker vehicle located on one or both sides of the island, depending on the design of the island.

Loading Riser The related instruments and devices, located in a meter stream, that provide the liquid component loading capability to a mobile tanker vehicle.

Note: The flow meter piping can also be installed horizontally, if desired.)

Load Spot Also *bay or lane*; one side of a loading island, a position where a tanker vehicle parks for a loading operation. One load spot can have one or more loading arms.

Local Port Also *LOI*; the serial EIA-232 (RS-232) port on the ROC through which local communications are established, typically for configuration software running on a PC.

Logical Number The point number the ROC and ROC Plus protocols use for I/O point types are based on a physical input or output with a terminal location; the point numbers for all other point types are "logical" and are simply numbered in sequence.

LNK Ethernet has linked.

LOI	Local Operator Interface (or Local Port). Refers to the serial EIA-232 (RS-232) port on the ROC through which local communications are established, typically for configuration software running on a PC.
LPM	Lightning Protection Module; a device that provides lightning and power surge protection for ROCs.
LRC	Longitudinal Redundancy Checking error checking.

M

m	Meter.
mA	Milliamp(s); one thousandth of an ampere.
MAC Address	Media Access Control Address; a hardware address that uniquely identifies each node of a network.
Manual mode	For a ROC, indicates that the I/O scanning has been disabled.
MAU	Medium Attachment Unit.
MCU	Master Controller Unit.
Meter Factor	A number obtained by dividing the actual volume of liquid passed through a flow meter during a meter proving operation by the volume registered by the flow meter. The meter factor is used in flow calculations to correct the *indicated volume* (end flow meter registration minus start flow meter registration) to the observed *gross volume* (actual flow meter throughput at operating conditions). Meter factor = (Meter prover volume corrected to standard conditions) ÷ (Flow meter indicated volume corrected to std conditions)
Meter Proving	A procedure used to determine the meter factor for a flow meter. The K-factor (exact number of pulses per a volume unit that a flow meter generates) is determined at the factory. The K-factor is used to derive a mathematical factor, known as meter factor, which is used to adjust results of the internal flow calculations the DL8000 performs. **Note**: The flow meter is not re-calibrated; determining the meter factor allows the operator to manually re-calibrate the DL8000 so that the flow meter's nonadjustable calibration characteristic [pulses per volume unit (K-factor)] are incorporated into the flow calculations.
Modbus	A popular device communications protocol developed by Gould-Modicon.
MPU	Micro-Processor Unit.
mm	Millimeter.
MMBTU	Million British Thermal Units.
msec	Millisecond, or 0.001 second.
MVS	Multi-Variable Sensor. A device that provides differential pressure, static pressure, and temperature inputs to a ROC for orifice flow calculations.
mV	Millivolts, or 0.001 volt.
mW	Milliwatts, or 0.001 watt.

N

NEC	National Electrical Code.
NEMA	National Electrical Manufacturer's Association. See http://www.nema.org.

O

OH	Off-Hook modem communications signal.
Off-line	Accomplished while the target device is not connected (by a communications link). For example, "off-line configuration" refers to configuring an electronic file that is later loaded into a ROC.

Ohms	Units of electrical resistance.
On-line	Accomplished while connected (by a communications link) to the target device. For example, “on-line configuration” refers to configuring a ROC800-Series unit while connected to it, so that you can view the current parameter values and immediately load new values.
Opcode	Type of message protocol the ROC uses to communicate with the configuration software, as well as host computers with ROC driver software.
Operator Interface	Also LOI or Local Port; the serial EIA-232 (RS-232) port on the ROC through which local communications are established, typically for configuration software running on a PC.
Orifice meter	A meter that records the flow rate of gas through a pipeline. The flow rate is calculated from the pressure differential created by the fluid passing through an orifice of a particular size and other parameters.

P, Q

Parameter	A property of a point that typically can be configured or set. For example, the Point Tag ID is a parameter of an Analog Input point. Parameters are normally edited by using configuration software running on a PC.
PC	Personal Computer.
Permissive	A discrete signal from a device that is input to a discrete input in the DL8000. The DL8000 uses this signal to allow a product delivery to be initiated or allow a product delivery to continue. Permissive contacts are *CLOSED* in the normal or safe state and *OPEN* in the abnormal or unsafe state.
Pf	Flowing pressure.
P/DP	Pressure/Differential Pressure.
PI	Pulse Input.
PID	Proportional, Integral, and Derivative control feedback action.
PIT	Periodic Timer Interrupt.
PLC	Programmable Logic Controller.
Point	Software-oriented term for an I/O channel or some other function, such as a flow calculation. Points are defined by a collection of parameters.
Point Number	The physical location of an I/O point (module slot and channel) as installed in the ROC.
Point Type	Defines the database point to be a specific type of point available to the system. The point type determines the basic functions of a point.
Preset	Number value previously determined for a register. Also: A generic term that describes the functional instrument group to which the DL8000 belongs. The term originated from mechanical and electrical preset counters. The DL8000 provides much more versatility and capability compared to a simple mechanical or electrical preset counter.
PRI	Primary PID control loop.
Primary Blend Stream Component	A blended product measured by a primary blend stream meter.
Primary Blend Stream Meter	A meter measuring the gasoline-ethanol blend.
Protocol	A set of standards that enables communication or file transfers between two computers. Protocol parameters include baud rate, parity, data bits, stop bit, and the type of duplex.

PSTN	Public Switched Telephone Network.
PT	Process Temperature.
PTT	Push-to-Talk signal.
Pulse	Transient variation of a signal whose value is normally constant.
Pulse Interface module	A module that provides line pressure, auxiliary pressure, and pulse counts to a ROC.
PV	Process Variable or Process Value.
Quantity	The resulting amount of product measured after compensation for operational temperature and pressure, indicated in one of the following corrected units: cubic meters, liters, barrels, gallons.

R

Rack	A row of slots on a ROC into which I/O modules can be plugged. Racks are given a letter to physically identify the location of an I/O channel (such as “A” for the first rack). Built-in I/O channels are assigned a rack identifier of “A” while diagnostic I/O channels are considered to be in “E” rack.
RAM	Random Access Memory. RAM is used to store history, data, most user programs, and additional configuration data.
RBX	Report-by-exception. RBX always refers to Spontaneous RBX in which the ROC contacts the host to report an alarm condition.
RR	Results Register; stores the Signal Value Analog (SVA).
Recipe	A pre-entered delivery/blending/control description that allows the DL8000 to automatically control the product quantity or total quantity based on percentages of multiple components during a batch delivery operation. The DL8000 supports up to thirty recipes.
RFI	Radio Frequency Interference.
RI	Ring Indicator modem communications signal.
ROC	Remote Operations Controller microprocessor-based unit that provides remote monitoring and control.
ROCLINK 800	Microsoft® Windows®-based software used to configure functionality in ROC units.
ROM	Read-only memory. Typically used to store firmware. Flash memory.
Rotary Meter	A positive displacement meter used to measure flow rate, also known as a Roots meter.
RTC	Real-Time Clock.
RTD	Resistance Temperature Device.
RTS	Ready to Send modem communications signal.
RTU	Remote Terminal Unit.
RTV	Room Temperature Vulcanizing, typically a sealant or caulk such as silicon rubber.
RS-232	Serial Communications Protocol using three or more signal lines, intended for short distances. Also referred to as the EIA-232 standard.
RS-422	Serial Communications Protocol using four signal lines. Also referred to as the EIA-422 standard.
RS-485	Serial Communications Protocol requiring only two signal lines. Can allow up to 32 devices to be connected together in a daisy-chained fashion. Also referred to as the EIA-485 standard.
RX or RXD	Received Data communications signal.

S

SAMA	Scientific Apparatus Maker's Association.
Script	An uncompiled text file (such as keystrokes for a macro) that a program interprets in order to perform certain functions. Typically, the end user can easily create or edit scripts to customize the software.
Side Stream	The controlled stream, often called the ethanol product. The side stream is metered and can be controlled and measured.
Side Stream Component	A mix component measured by both a side stream meter and a primary blend stream meter. Ethanol is often referred as a side stream component.
Side Stream Meter	A meter that measures the side component (ethanol).
Smart module	A module, typically for the ROC800-Series or FloBoss 107 devices, having an on-board processor which can execute a program.
Soft Points	A type of ROC point with generic parameters that can be configured to hold data as desired by the user.
SP	Setpoint, or Static Pressure.
SPI	Slow Pulse Input.
SPK	Speaker.
SRAM	Static Random Access Memory. Stores data as long as power is applied; typically backed up by a lithium battery or supercapacitor.
SRBX	Spontaneous Report-By-Exception. SRBX always refers to Spontaneous RBX in which the ROC contacts the host to report an alarm condition.
Standard Quantity	The *gross quantity* corrected to standard temperature and/or pressure. This is a quantity measurement. *Calculation:* standard quantity = gross quantity *times* CTLM (correction factor for the effect of temperature on the liquid in the meter) *times* CPLM (correction factor for the effect of pressure on the liquid in the meter)
SVA	Signal Value Analog. Stored in the Results Register, it is the analog value that is passed between functions in an FST.
SVD	Signal Value Discrete. Stored in the Compare Flag, it is the discrete value that is passed down the sequence of functions in an FST.
System Variables	Configured parameters that describe the ROC; set using ROCLINK software.

T

T/C	Thermocouple Input.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TDI	Time Duration Input.
TDO	Time Duration Output.
Tf	Flowing temperature.
TLP	Type (of point), Logical (or point) number, and Parameter number.
Transaction	Group of one or more consecutive batch deliveries for accounting purposes. The batches that comprise a transaction always use one recipe, one additive selection, and one loading side. An example of a transaction is the delivery of multiple batches to different compartments in a single tanker vehicle.
Turbine meter	A device used to measure flow rate and other parameters.
TX or TXD	Transmitted Data communications signal.

U

Upload	Send data, a file, or a program from the ROC to a PC or other host.

V-Z

V	Volts.
Volume	The actual space occupied by the product measured, indicated in one of the following actual units: cubic meters, liters, barrels, gallons.
Wild Stream	Wild stream is the uncontrolled stream, often referring to the gasoline product. This is because the gasoline product cannot be exclusively metered, controlled, or measured.
Wild Stream Component	A product component measured as part of (Primary Blend Stream Component – Side Stream Component) a primary blend stream component by a primary blend stream meter is called a wild stream component. Gasoline is referred as wild stream component.

Appendix B – The FST Editor

ROCLINK 800's Function Sequence Table (FST) provides an instruction list programming language you can use to define and perform a set of specific actions when a set of conditions exists.

In This Chapter

B.1 FST Editor Overview

You can write FSTs specifically for applications that require special control features, such as logic sequencing capability. For example, you can use an FST for emergency shutdown control when a parameter exceeds a low or high limit or in any application that requires logic sequencing capability. You program and configure FSTs using the FST Editor, which is included in ROCLINK 800 (**Utilities** > **FST Editor**).

An FST defines the input-to-output (I/O) relationships in the FloBoss through a set of user-selected instructions, called *functions*. Functions define the specific actions to be performed and are executed in their specified sequence. Functions normally execute in top-to-bottom order; however, the sequence may be altered by certain decision-making functions. Functions consist of a *command*, an *argument*, and an optional *label*.

You build an FST from a library of commands that provide mathematical and logical operations, database access operations, historical commands, testing, branching operations, and control-related operations. *Table B-1* displays the FloBoss FST capabilities.

Table B-1. Device-specific FST Functionality

Maximum Number of FSTs	Maximum Byte Size per FST	Maximum Line Length*
4	3000	400

* Maximum number of steps

Each FST may consist of as many functions as can fit into the memory reserved for the FSTs. Reserved memory is pre-determined by the FloBoss with a set amount of steps allocated for each FST. The byte size of an FST displays in the Code Size field on the Advanced tab of the FST Registers screen (**Configure** > **Control** > **FST Registers**).

Because of the potential loading increase on the system, we recommend that you monitor the Master Processor Unit (MPU) loading, displayed on the Other Information tab on the Device Information screen (**ROC** > **Information**) to ensure that the FST is not consuming too much of the MPU's resources.

Note: To reduce processor loading, use WAIT (WT) commands. Include an END command at the end of your FST.

As the sequence of functions executes, two memory locations store **intermediate** results from one function to the next.

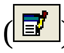
- One location, called the **Results Register (RR)**, stores a floating-point value referred to as the Signal Value Analog (SVA).
- The other location, called the **Compare Flag (CF)**, stores a discrete value called the Signal Value Discrete (SVD).

Depending on the command, the Results Register (RR) and the Compare Flag (CF) may be loaded, stored, tested, modified, or left unchanged.

Note: Since restart always clears FST registers (including the Run Flag), use softpoints to load initial values for the FST.

B.1.1 Using the FST Editor

Using the FST Editor, you create, compile, debug, and download FSTs to the device. The FST Editor consists primarily of a workspace and menus, similar in structure to spreadsheet programs. The FST Editor also allows you to monitor and trace of an FST while it runs.

Select **Utilities** > **FST Editor** or click the FST Editor button () to launch the FST Editor. The FST Editor screen displays.

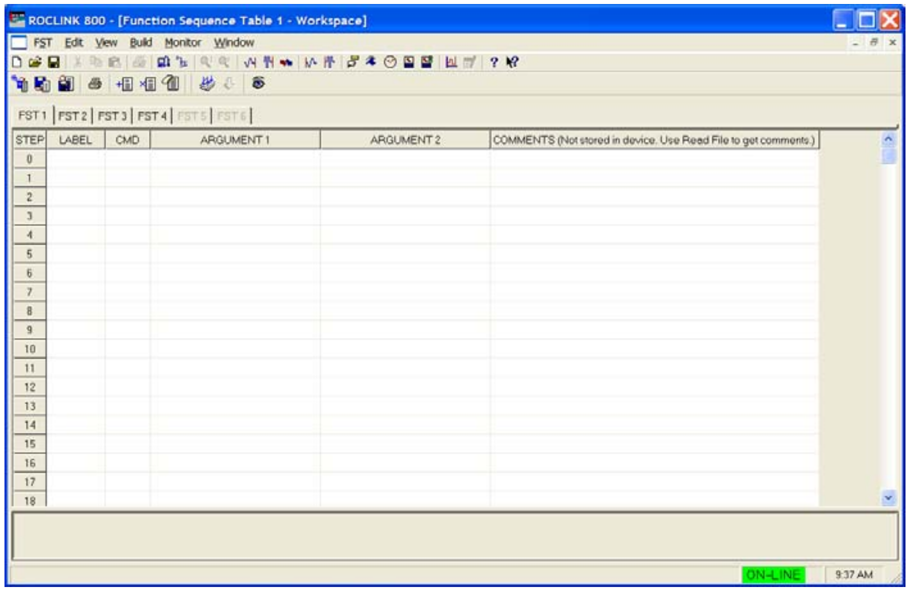


Figure B-1. FST Editor

The FST Editor provides a workspace, menus, and buttons for creating a Function Sequence Table. The title bar at the top of the workspace window identifies the FST being created or edited.

The workspace area is a table, divided into rows and columns with the intersection called a *cell*. Cells are denoted by a box containing the cursor and a gray line around the cell. Use **Tab** and the arrow keys to move between cells, or you can go directly to a cell by clicking it with the mouse.

The Header Line of the workspace contains the function structure column names. The STEP column contains the numbers that correspond to the number of rows or steps available in the workspace.

The LABEL, CMD, ARGUMENT1, and ARGUMENT2 columns correspond to the structure of the functions. The Comment column allows you to insert comments about the FST.

Note: Comments are not downloaded (sent) to the FB107; they are only included in the FST when you save it to a file.

Table B-2. Workspace and Output Keystrokes

Key	Action
→	Move cursor to the right cell or character.
←	Move cursor to the left cell or character.
↑	Move cursor to the cell above it.
↓	Move cursor to the cell below it.
Backspace	Delete the previous character.
Ctrl + Home	Move cursor to top left cell of Workspace.
Ctrl + End	Move cursor to bottom right cell of Workspace.
Delete	Delete character in front of the cursor position.
End	Within a cell, move cursor to the right-most position within the cell. Within a row, move cursor to the right-most position in the row
Enter	Process saves contents of cell entry and moves to the next cell.
Esc	Undo entry and display original or prior contents of the cell.
F1	Help.
Home	Within a cell, move cursor to the left-most position within the cell. Within a row, move cursor to the left-most position within the row.
Page Down	Display next page of Workspace.
Page Up	Display previous page of Workspace
Tab	Move to the next cell.

FST Function Structure

Each function consists of a STEP number, a LABEL (optional), a command (CMD), and up to two arguments (ARGUMENT1 and ARGUMENT2). See *Table B-3*.

Table B-3. FST Function Structure

STEP	LABEL	CMD	ARGUMENT 1	ARGUMENT 2
0				

The FST program automatically provides the step numbers for each FST. You complete the other fields in the structure to build a function.

Note: **Do not skip any steps**. The FST program treats a blank step as the **end** of a program and does not compile correctly.

B.1.2 FST Label Field

The optional Label field allows you to uniquely identify a function. A label consists of up to six alphanumeric characters in any combination. A common practice is to use the label to identify the action the function performs. For example, the label "PUMPON" describes a function that activates a pump.

Note: Do **not** use the names of commands as labels.

Labels enable branching, the ability to direct the execution to a function other than the next function in the sequence. *Table B-4* shows an example of branching. Step 0 instructs the program to GO to the label PMPOFF, as established by Argument 1 in step 0. The program then branches to step 2, where the LABEL PMPOFF is located, and performs that function.

Table B-4. FST Label Field

STEP	LABEL	CMD	ARGUMENT 1	ARGUMENT 2
0		GO	PMPOFF	
1	PUMPON	DO	DOU 4-1	1
2	PMPOFF	DO	DOU 4-2	0

B.1.3 FST Command Field

The FST command (**CMD**) field specifies the action a function takes. Each command cell provides a drop-down list that shows the function commands and provides a brief description of how they operate on the RR, CF, and Argument values. You can also type commands directly. *Table B-5* shows the use of the GO command. Refer to *Table B-9* for a summary of each command.

Table B-5. FST Command Field

STEP	LABEL	CMD	ARGUMENT 1	ARGUMENT 2
0		GO	PMPOFF	
	.			
	.			
12	PMPOFF	VAL	3	

B.1.4 FST Argument Fields

Depending on the command, arguments can be unused, references to parameters in the FloBoss (TLPs), numerical constants, or ASCII characters.

Once you select a command, the argument cell requires that you either typing a numerical constant or ASCII text or click the TLP button for data selection.

Depending on whether you have selected TLPs to display as numbers or as text (via **Tools** > **Options** in ROCLINK 800), the TLP appears in the argument cells as a number sequence or as a text abbreviation of the Type, Point number and Parameter.

For example, the text abbreviation of the status parameter of discrete input module 4 channel 1 would be DIN4-1,STATUS. The Data #3 parameter for softpoint 3 would be SFP 3,DATA3.

B.1.5 FST Comment Fields

Use the Comment field to enhance readability and provide a place to document the purpose of an FST, Step, group of Steps, and save information within the FST. Comments are discarded when an FST is compiled and downloaded to the device. Comments remain with the FST when it is saved to a disk file.

FST Function Examples

A *function* consists of a command, its associated arguments, and an optional label. In the example shown in *Table B-6*, the Value (VAL) command in Step 0 writes the current process value of analog input (module 3, channel 1) in EUs to the Result Register (RR), which is implied. The label in this example (CKHIAL) serves only as a comment, since no other function branches to it.

Table B-6. FST Function Examples

STEP	LABEL	CMD	ARGUMENT1	ARGUMENT2
0	CKHIAL	VAL	AIN 3-1,EU	
1		>=	AIN 3-1,HIAL	PUMPON

In this example, when the RR value from step 1 equals or exceeds (>=) the High Alarm value (VAL) in step 2 and the High Alarm limit (**HIAL)** condition is met, the FST branches to the **PUMPON** label to turn the pump on.

Note: Refer to the *FST User Manual* (Form A4625) for additional examples.

Basic Rules for Creating FSTs

You should be aware of several rules when creating FSTs.

- An END command is required at the end of every FST. The END command tells the FST to return to the top of the first step and begin to run from the first line at step 0 or to the step where the FST begins. However, you can use a branching function to force the FST to immediately return to step 0 if you do not want to wait for the next execution cycle to begin. If an END command is not present, the FST Editor automatically adds the END command when compiling.
- The first blank line found in an FST is automatically converted to the END command. Any commands following a blank line are lost.
- Each FST can have only one END.
- Avoid internal loops and direct the program flow to the END Command. Use Wait states (WT command) to suspend operation of the FST whenever possible to reduce MPU processor overload, especially in a loop in which a condition is being repeatedly checked.
- Configure the I/O parameters before referencing them in an FST.

- When using any branching command (GO, <, >, <=, >=, ==), make sure that you have defined the label that the command references.

B.1.6 FST Storage and Restart

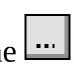
This section details what FST configuration data is stored when a write to Internal Configuration Memory (EEPROM) is performed, and what happens to the FST after a Cold Start, Warm Start, or after upgrading the FloBoss firmware.

- **Write to Internal Config Memory –** FSTs are permanently saved to memory.
- **Warm Start –** If an FST is saved to memory and it is active (running) when a restart occurs, FSTs automatically restart at the beginning STEP.
- **Cold Start –** On a Cold Start, FST Registers will be cleared, but will be restored from Internal Config Memory if valid. However, if you perform a “Cold Start & Clear FSTs” or a “Cold Start & Clear ALL” type of Cold Start, the FSTs are permanently cleared from Internal Config Memory.
- **Upgrading Firmware –** If an FST is saved to memory and it is active (running) when a firmware upgrade occurs, FSTs will be turned off and need to be MANUALLY restarted.

B.1.7 Creating an FST

You can create an FST either by entering the steps in a blank workspace or by editing an existing file from a device or from a disk file.

To create an FST while on-line with an FB107:

1. Start the ROCLINK 800 software and connect to the device.
2. Select **Utilities** > **FST Editor**.
3. Select the tab of the FST (FST 1 through FST 6, depending on the device).
4. Fill in each step with the appropriate labels, commands, tags, and arguments.
   - When you select the Command field, the  button appears. Click this button to display a list of commands from which to choose. Alternately, you can type the three-character command in the Command field.
   - Depending upon which command you choose, the argument fields prompt you to type in a label, choose a TLP, or enter some other data.
   - The Label field is optional, but are may be required if you are using a label within a command. Enter all required labels to prevent a compile error.
   - Place an End command at the end of your FST.

B.1.8 Creating an FST from an Existing File

Use the following steps to create an FST by editing an existing FST. You may use either a FST from the device or a FST file on your PC.

If you are using a file from the device, connect the FB107 to the computer running ROCLINK 800 software.

1. Select **Utilities** > **FST Editor**.
2. Select **File** > **Read** > **From File** or **File** > **Read** > **From Device**.
3. Open an existing FST file with the .FST extension.
4. Edit each step with the appropriate command, label, and arguments.
   - The Label field is optional, but are may be required if you are using the label within a command. Enter all required labels to prevent a compile error.
   - When you select the Command field, the  button appears. Click this button to display a list of commands from which to choose. Alternately, you can type the three-character command in the Command field.
   - Depending upon which command you choose, the Argument fields prompt you to type in a label, choose a TLP, or enter some other data.
   - Place an End command at the end of your FST.

B.1.9 Compiling to Build and Viewing an FST

To build and compile an FST:

Select **FST Build** > **Compile** or click **Build**.

The compiled file displays in the **Output** FST field. If invalid points exist in the FST during compilation, you receive an error indicating which Point Number is missing.

Note: If an error occurs during the compile process, the Output field lists the error type and the cell in question turns red. Correct all errors and recompile.

Compile errors occur when you:

- Enter invalid arguments or commands in the FST.
- Perform a compile. The error displays in the Output field.
- Open an FST from a FloBoss or disk file.

B.1.10 Downloading the FST to the FloBoss

To download the FST to FloBoss memory:

1. Click **Download** on the toolbar or select **File** > **Download**.

2. If the FST currently loaded is operating, you will be prompted to stop the FST and continue with the download or to stop the FST without downloading.

3. Enter the Version number and Description of the FST, for later identification, and click **OK**.

Note: This step is not required, but is extremely helpful when you need to identify or debug your FST.

Following the download, you will be prompted to start the FST or you can start the FST in Monitor Mode or the FST Register screen. To verify the FST logic, you may desire to start the FST in Trace Mode.

B.1.11 Saving an FST

To save the FST as an individual disk file:

1. Select **FST** > **Save** as or click the **Write to file** button in the FST Editor (see *Figure B-1*).

2. Enter the File name and click **Save**. The FST file will be saved with an .fst extension.

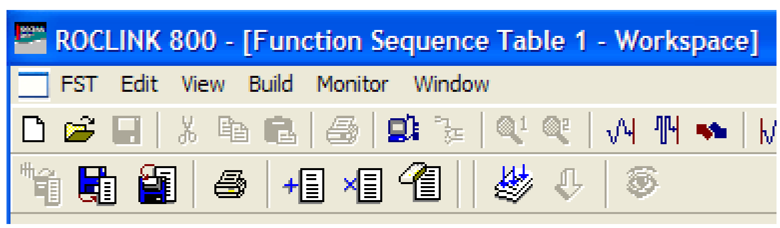


Figure B-2. FST Editor Toolbar

B.1.12 Starting the FST

Once an FST is compiled (**Build** > **Compile**) without errors and is downloaded to the FloBoss, you must start the FST before it can run.

1. Connect the FloBoss to the computer running ROCLINK 800.

2. Select **Configure** > **Control** > **FST Register**.

3. Select the desired **FST** from the drop-down list box.

4. Select the **Status Enabled** radio button.

5. Click **Apply** and click **OK**.

B.1.13 Stopping an FST

To stop the execution of an FST:

1. Connect the FloBoss to the computer running ROCLINK 800.

2. Select **Configure** > **Control** > **FST Register**.

3. Select the desired **FST** from the drop-down list box.
4. Select the **FST Status Disabled** radio button.
5. Click **Apply** and click **OK**.

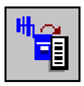
B.1.14 Deleting an FST using Clear

To permanently delete an FST:

1. Select **FST** > **Clear**.
2. Select the desired **FST** (FST1 to FST4).

B.1.15 Reading an FST From Device

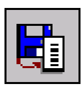
The FST menu allows you to select FSTs to Read.



Select **FST** > **Read** > **From Device** to retrieve the contents of the FloBoss memory and load the FST in the selected Workspace.

B.1.16 Reading an FST From File

The FST menu allows you to select FSTs to Read.



Select **FST** > **Read** > **From File** to retrieve the contents of a disk file and display the FST in the selected Workspace.

Notes:

- If invalid points exist in the FST, you receive an error indicating which Point Number is missing.
- The Output view is populated with data when a Compile operation is performed or when an FST is read from the FloBoss.

B.1.17 Closing an FST

Select **FST** > **Close** to exit the FST Editor or Monitor screen.

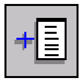
B.1.18 Printing an FST

In the FST Editor, select **FST** > **Print Preview** to print an FST or export it to a file. A printed FST can help you in troubleshooting.

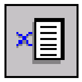
When the Print Preview screen appears, click the Print button to send the FST to a printer. You may also select the PDF, Excel, or RTF buttons to export the FST as a file in those formats.

B.1.19 Altering an FST Menu

The FST Editor Edit menu provides options for altering a FST.



Select **Edit** > **Insert Step** to place a blank line in the Workspace before the current line. Use this option to add a function between two existing functions.



Select **Edit** > **Delete Step** to delete the current line from the Workspace.

Select **Edit** > **Erase Workspace** to erase the contents of the current Workspace permanently. You can save the FST to a file before you erase the Workspace.

Caution **Avoid using the Windows Cut (Ctrl+X), Copy (Ctrl+C), and Paste (Ctrl+V) commands to manipulate text in the FST Editor. Also, be aware that the FST Editor does not insert but OVERWRITES existing fields.**

Monitor and **Trace** are two additional modes of operation for the FST Editor. Monitor mode allows you to continually view the present contents of the FST structure in the device as it is modified. Trace mode allows you to examine execution of an FST one step at a time for debugging purposes.

B.1.20 Troubleshooting an FST

An execution error, which occurs when the FST references a Point Number that has been removed or changed, will stop an FST.

If a compile error occurs during the compile process (**Build** > **Compile**), the Output field lists the error type and the cell in question turns red. Execution errors are caused by changes in the FloBoss configuration after the download of an FST. This may include removal of I/O or other logical points the FST uses.

In Monitor mode, the Run Flag Status (RF) indicates execution errors:

RF	Meaning
0	Indicates the FST is not running.
1	Indicates the FST is running.
5	Indicates the FST has shut down due to an invalid point reference (usually an out-of-place or unexpected I/O).
8	Indicates the FST Editor has initiated Trace mode.

When an FST fails (as indicated by an RF value of 5), you can view at which Instruction Pointer (IP) the FST failed.

B.2 FST Monitor Mode

When on-line, use the FST Monitor menu to select which FST to monitor; turn Trace mode on and off; close the FST; pause or resume an FST; monitor registers, timers, miscellaneous registers, messages; or to compare flag options.

To start Monitor mode to display the selected FST, select the desired FST from the Monitor menu while on-line with the FloBoss or click the Monitor button from within the open workspace to monitor that FST. You can edit FST fields located on the right side of the Monitor screen by highlighting the field, typing the value, and pressing **Enter**. The new value is written to the FST and read back on the next update.

The Help Status Line at the top of the Monitor indicates the status of the Monitor and Trace Modes.

The Parameter and Data fields include:

Field	Description
CF	Compare Flag, an 8-bit integer representing the numbers 0 through 255. Often referred to as the Signal Value Discrete (SVD).
CF Bny	The Compare Flag displays as both the integer value and the binary value (bit 7 to the left and bit 0 to the right).
RF	Run Flag. Valid values are: **0** Indicates the FST is not running. **1** Indicates the FST is running. **5** Indicates FST has shut down due to an invalid point reference (usually an out-of-place or unexpected I/O). **8** Indicates the FST Editor has initiated Trace mode. When an FST fails (as indicated by an RF value of 5), you can view at which Instruction Pointer (IP) the FST failed.
IP	Instruction Pointer. Indicates the storage location in the FST of the next function to be executed. One storage location is used for each byte that stores the function.
Size	The number of bytes reserved for the FST program in bytes. Equivalent to the end pointer value minus the start pointer value.
Brk	The delay, in 100 millisecond intervals, between the execution of successive FST Commands or functions.
RR	The Results Register or accumulator, sometimes referred to as the Signal Value Analog (SVA), is a floating-point value passed between functions or FSTs.
R1 through **R10**	Ten floating-point registers for each FST. The floating-point registers are used for global storage, and register contents can be called into any of the FSTs configured for a FloBoss.
Timer 1 through **Timer 4**	Four timers. When set greater than “0”, they decrement by “1” every 100 milliseconds. A timer can be set using the Set Timer (ST) Command or by saving the RR (Results Register) directly to the timer

Field	Description
	parameter using the SAV Command. The Check Timer (CT) Command is used to compare the timer to “0”. When greater than “0”, it branches to the desired LABEL.
MSG1	Character field for storing a message.
MSG2	Not used by the FST. A value can be written to MSG2 using the FST Registers point or a ROC Display field and viewed while monitoring or tracing the FST.
MSG Data	Displays any values associated with MSG1.
MISC 1 through **MISC 4**	Single-byte registers that can be written to and the value can be used by the FST. Valid value is 0 to 255.

Table B-7. Monitor and Trace Mode Keystrokes

Key	Action	Key	Action
↑	Move cursor to the cell above it.	**End**	Move cursor to the right-most cell.
↓	Move cursor to the cell below it.	**F1**	Help.
Ctrl + **End**	Display last entry in Workspace.	**F6**	Execute current FST command.
Ctrl + **Home**	Display beginning of Workspace.	**Home**	Move cursor to the left-most cell.
Page Down	Display next page of Workspace.	**Page Up**	Display previous page of Workspace.

B.3 FST Trace Mode

In Trace mode, you can view at which Instruction Pointer (IP) the FST failed. Print the FST to assist in troubleshooting.

When on-line, the FST Editor uses a Trace mechanism that provides the ability to debug FST program logic. Trace executes the FST function indicated by the Instruction Pointer (IP), moves the Instruction Pointer to the next FST function to be executed, and then stops. You are given the opportunity to examine the results of the FST function and determine the next FST function to be executed. The location of the action depends on the nature of the command. The action may be traced to the history log, I/O value, Point Numbers, softpoint, and so on.

The command executed is determined by comparing the Instruction Pointer (IP) shown on the Monitor screen to a list of all Instruction Pointers and their corresponding commands. Trace thereby verifies proper execution and sequencing of the FST functions.

Note: Before entering Trace mode, print out an Instruction Pointer listing of the FST.

After entering Trace mode from a newly compiled FST, the FST starts at the first STEP. After entering Trace mode from an executing FST, the FST starts at the STEP being executed.

Note: When you attempt to Trace an FST that contains WT, BRK, ST, or CT commands, a pause in the sequencing can occur until the command conditions are met.

Other Trace commands include:

- Select **Monitor** > **Trace On** to turn on Trace mode.
- Select **Monitor** > **Pause** to stop the FST at the current command.
- Select **Monitor** > **Resume** to start the FST at the current command.
- Select **Monitor** > **Trace Off** to turn off Trace mode.
- Select **Monitor** > **Next Step** to turn off Trace mode.

B.4 FST Command Library

Commands are identified by a name that consists of one or more characters or mathematical symbols. In the FST Editor, select the CMD field and perform one of the following:

- Type the Command.
- Click the ... button.

This opens a list of commands, the command names, and their descriptions (actions). See *Table B-8*, which describes the terms RR and CF used in the command descriptions (actions).

Table B-9 presents each command name along with a brief description (action), the Arguments (ARGUMENT1 or ARGUMENT2) required, and the effect each operation has on the RR and CF. In the explanation of the operation, if RR or CF is not mentioned, then the current content is not affected and remains unchanged. In general, the CF is affected only by logical commands.

Table B-8. FST Command Library Conventions

Convention	Description
RR (in)	The value or contents of the Results Register (RR), Signal Value Analog (SVA) prior to execution of the function (command).
RR (out)	Output value from Results Register (RR).
CF (in)	The value or contents of the Compare Flag (CF), Signal Value Discrete (SVD), prior to execution of a function (command).
CF (out)	The contents of the Compare Flag (CF), following execution of the function (command).

Table B-9. FST Command Summary

Category	Command	Action
Math	+	RR = RR + ARGUMENT1 (add)
	–	RR = RR – ARGUMENT1 (subtract)
	*	RR = RR * ARGUMENT1 (multiply)
	/	RR = RR / ARGUMENT1 (divide)
	**	RR = RR raised to power of ARGUMENT1

Category	Command	Action
	ABS	RR = Absolute value of RR
	EXP	RR = "e" (2.71828) raised to power of RR
	INT	RR = Integer value of RR
	LOG	RR = Log (base 10) of RR
	LN	RR = Natural Log of RR
	SQR	RR = Square root of RR
	P3	RR = 3rd-order polynomial (R1, R2, R3, R4)
Logical	NOT	SVD = NOT SVD (0 ≥ 1; > 0 ≥ 0)
	AND	SVD = SVD AND ARGUMENT1
	OR	SVD = SVD OR ARGUMENT1
	XOR	SVD = SVD XOR ARGUMENT1
Comparison	==	If RR = ARGUMENT1, go to ARGUMENT2 LABEL
	!=	If RR <> ARGUMENT1, go to ARGUMENT2 LABEL
	<	If RR < ARGUMENT1, go to ARGUMENT2 LABEL
	<=	If RR <= ARGUMENT1, go to ARGUMENT2 LABEL
	>	If RR > ARGUMENT1, go to ARGUMENT2 LABEL
	>=	If RR >= ARGUMENT1, go to ARGUMENT2 LABEL
Time	ST	Set Timer # ARGUMENT1 to ARGUMENT2 100 mSec intervals
	CT	If Timer # ARGUMENT1 > 0, go to LABEL ARGUMENT2
	WT	Suspend FST execution for ARGUMENT1 sec
	DWK	RR = Day of Week (1=Sunday, 7=Saturday)
	MND	RR = Minutes since midnight
Control	AO	Set AO# ARGUMENT1 output = ARGUMENT2 EUs
	DO	Set DO# ARGUMENT1 status = ARGUMENT2
	TDO	Force discrete output Recalculation
Database	VAL	RR = Value specified in ARGUMENT1
	SAV	Write RR to variable specified in ARGUMENT1
	RDB	Read History Value into RR
	WDB	Write RR Value to History
	WTM	Write Current Time to History
	DHV	Read Daily History Value into RR
	DHT	Read Daily History Time Stamp into RR
	PHV	Read Periodic History Value into RR
	PHT	Read Periodic History Time Stamp into
	MHV	Read Minute History Value into RR
	DIS	Read Starting Daily History Index into RR
	DIN	Read Number of Daily History Indexes into RR
	PIS	Read Starting Periodic History Index into RR
	PIN	Read Number of Periodic History Indexes into RR
	GTE	Extract Time Element from Time Stamp into RR
Miscellaneous	GO	Jump to STEP pointed to by ARGUMENT1 LABEL
	MSG	MSG String #1 = ARG1; MSG Data = ARG2

Category	Command	Action
	END	End of FST...restart at beginning
	BRK	Delay ARGUMENT1 100 mSec intervals
	ALM	Log 10-character message and a current value
	EVT	Log 10-character message and a current value

B.4.1 FST Control-Related Commands

Use analog output (AO), discrete output (DO), and Timed Duration Output (TDO) control-related commands to control outputs.

Table B-10. FST Control-Related Commands

Name	Description	Arguments	Results
AO	Analog output. Sets the analog output point EUs to the argument value. If the analog output is in Manual, no output is sent.	1. Output: AO Point Database Value 2. Input: Database or Constant Value	AO Output (ARG1) = ARG2 RR(out) = RR(in) SVD(out) = SVD(in)
DO	Discrete output. Sets the discrete output point status to the argument value. If the discrete output is in Manual, no output is sent.	1. Output: DO Point Database Value 2. Input: Database or Constant Value	DO Output (ARG1) = ARG2 RR(out) = RR(in) SVD(out) = SVD(in)

Note: To trigger outputs, use the corresponding output command (see *Table B-9*). These commands trigger the mechanism that changes the output value.

The analog output (AO) command sends the analog value specified in ARGUMENT2 to the analog Point Number specified in ARGUMENT1. The analog value is not sent if the analog Point Number is in Manual Mode. The check for Manual Mode is included as a safety feature and permits the FST to continue operation if the device connected to the analog output is being serviced.

If a PID loop is controlling the analog output, placing the PID loop into Manual Tracking Mode allows the FST to send a value to the output parameter of the PID. For other active PID modes, the FST and PID will be in conflict.

FST Mathematical Commands

The mathematical commands provide simple arithmetic or mathematical operations. Such operations include addition (+), subtraction (–), multiplication (*), division (/), raise to power (**), absolute value (ABS), “e” raised to a power (EXP), truncate to integer (INT), base 10 logarithm (LOG), natural logarithm (LN), square root (SQR), and 3rd-order polynomial (P3).

Note: No operation occurs with the LOG, LN, power (**), and SQR commands if the Results Register is less than or equal to zero.

Table B-11. FST Mathematical Commands

Name	Description	Arguments	Results
+	Add value to RR(in)	1. Input: Database or Constant Value	RR(out) = RR(in) + ARG1 SVD(out) = SVD(in)
–	Subtract value from RR(in)	1. Input: Database or Constant Value	RR(out) = RR(in):ARG1 SVD(out) = SVD(in)
*	Multiply RR(in) by value	1. Input: Database or Constant Value	RR(out) = RR(in) * ARG1 SVD(out) = SVD(in)
/	Divide RR(in) by value	1. Database or Constant Value	If ARG1 = 0.0: RR(out) = RR(in), SVD(out) = SVD(in)
			Otherwise: RR(out) = RR(in) / ARG1
**	Raise RR(in) to a power	1. Input: Database or Constant Value	RR(out) = RR(in) ** ARG1
ABS	Absolute Value of RR(in)	None	RR(out) = |RR(in)| SVD(out) = SVD(in)
EXP	"e" to the power of RR(in)	None	RR(out) = e ** RR(in) SVD(out) = SVD(in)
INT	Integer part of RR(in)	None	RR(out) = (int) RR(in) SVD(out) = SVD(in)
LOG	Logarithm (base 10) of RR(in)	None	If RR(in) > 0.0: RR(out) = LOG[RR(in)], SVD(out) = SVD(in) Otherwise: RR(out) = RR(in), SVD(out) = SVD(in)
LN	Natural Logarithm of RR(in)	None	If RR(in) > 0.0: RR(out) = LN[RR(in)], SVD(out) = SVD(in) Otherwise: RR(out) = RR(in), SVD(out) = SVD(in)
SQR	Square Root of RR(in)	None	If RR(in) >= 0.0: RR(out) = SQRT[RR(in)], SVD(out) = SVD(in) Otherwise: RR(out) = RR(in), SVD(out) = SVD(in)
P3	3rd-order Polynomial	None	RR(out) = [reg1 * (RR(in) ** 3)] + [reg2 * [RR(in) ** 2)] + [reg3 * [RR(in) ** 1)] + reg4 where reg1 through reg4 are the current constant values of Register 1 through Register 4 of the respective FST SVD(out) = SVD(in)

FST Logical Commands

You can store a discrete value called the Signal Value Discrete (SVD) in the **Compare Flag (CF)**. The SVD is stored as an 8-bit byte. The CF is true whenever non-zero, and the CF is false when zero.

Logical commands operate upon the Compare Flag (CF). Prior to execution of a logical command, the CF must be loaded with an 8-bit value by using the SAV command.

The bit-wise logical commands (AND, OR, NOT, and XOR) apply Boolean operations on two 8-bit integers, bit-by-bit. The two 8-bit integers are the CF and the value defined by ARGUMENT1 of the logical command. Note that this value is then converted by the software into an 8-bit unsigned integer. This value is used as a binary number 8 bits long as described next.

Each bit is weighted as a power of two, and the bit position determines which power of two. The bit, either 0 or 1, is multiplied by the respective bit weight. The resulting binary number is read from right to left, with the right-most bit representing bit 0, and the left-most bit representing bit 7.

For example, the integer 42 is equivalent to the binary number 00101010 as shown next, where bit 0 is the right-most bit:

Bit Binary # * Weight =
Bit 7 = 0 * 2^7 = 0 * 128 = 0
Bit 6 = 0 * 2^6 = 0 * 64 = 0
Bit 5 = 1 * 2^5 = 1 * 32 = 32
Bit 4 = 0 * 2^4 = 0 * 16 = 0
Bit 3 = 1 * 2^3 = 1 * 8 = 8
Bit 2 = 0 * 2^2 = 0 * 4 = 0
Bit 1 = 1 * 2^1 = 1 * 2 = 2
Bit 0 = 0 * 2^0 = 0 * 1 = 0

Total = 42

Table B-12. FST Logical Commands

Name	Description	Arguments	Results
NOT	Logical NOT of SVD(in)	None	If SVD(in) > 0, SVD(out) = 0 Otherwise: SVD(out) = 1 RR(out) = RR(in)
AND	Logical AND ARG1 with SVD(in)	1. Input: Database or Constant Value	RR(out) = RR(in),
OR	Logical OR ARG1 with SVD(in)	1. Input: Database or Constant Value	RR(out) = RR(in), SVD(out) = [SVD(in) OR ARG1]
XOR	Logical XOR ARG1 with SVD(in)	1. Input: Database or Constant Value	RR(out) = RR(in), SVD(out) = [SVD(in) XOR ARG1]

FST Comparison Commands

Use comparison commands to compare values. Comparison commands conditionally compare two values, and branch to a different sequence of commands if the comparison is determined to be **true**. Otherwise, if the comparison is determined to be **false**, no branching occurs and the next command in sequence is executed. Comparison commands test values for equivalence (==), non-equivalence (!=), less than (<), less than or equal to (<=), greater than (>) , and greater than or equal to (>=).

Table B-13. FST Comparison Commands

Name	Description	Arguments	Results
==	Test If RR(in) equals ARG1. Note that this command performs in a bit-wise fashion, so two floating Point Numbers displayed as equal may not match.	1. Input: Database or Constant Value 2. LABEL	If RR(in) = ARG1, Goto ARG2 Otherwise: continue to next command SVD(out) = SVD(in)
!=	Test If RR(in) Not Equal to ARG1.	1. Input: Database or Constant Value 2. LABEL	If RR(in) != ARG1, Goto ARG2 Otherwise: continue to next command RR(out) = RR(in) SVD(out) = SVD(in)
<	Test If RR(in) less than ARG1.	1. Input: Database or Constant Value 2. LABEL	If RR(in) < ARG1, Go to ARG2 Otherwise: continue to next command RR(out) = RR(in) SVD(out) = SVD(in)
<=	Test If RR(in) less than or equal to ARG1.	1. Input: Database or Constant Value 2. LABEL	If RR(in) <= ARG1, Go to ARG2 Otherwise: continue to next command RR(out) = RR(in) SVD(out) = SVD(in)
>	Test If RR(in) greater than ARG1.	1. Input: Database or Constant Value 2. LABEL	If RR(in) > ARG1, Go to ARG2 Otherwise: continue to next command RR(out) = RR(in) SVD(out) = SVD(in)
>=	Test if RR(in) greater than or equal to ARG1.	1. Input: Database or Constant Value 2. LABEL	If RR(in) >= ARG1, go to ARG2 Otherwise: continue to next command RR(out) = RR(in) SVD(out) = SVD(in)

FST Time-Related Commands

Use time-related commands (FST Timers) to implement simple time-related operations, such as setting Timers, checking Timers, determining if Timers have elapsed, wait time before continuing, and imposing a delay upon each command executed.

Timers are used to branch the FST to a specific Label after a specified period of time following an action. Up to four Timers are available for use in an FST and each Timer has a time interval of 100 milliseconds. Each FST Timer decreases by 1 interval if the Timer value is greater than 0.

Command	Description

Command	Description
Set Timer (ST)	The **ST** command sets any one of the four available Timers for any of the available FSTs. ARGUMENT1 specifies the number of the Timer to set and ARGUMENT2 specifies the number of intervals to which the Timer is set.
Check Timer (CT)	When executing a loop repeatedly in an FST, it is recommended a timer (**CT**) be included so the loop executes only once every time interval. This prevents the loop from executing several times within the allotted task period, eliminating unnecessary calculations that could deprive time from other tasks.
Wait (WT)	The Wait (**WT**) command imposes a delay, entered in seconds and tenths of seconds, before executing the next command. For example, entering a value of 0.1 implies a 100-millisecond delay and a value of 1.0 implies a one-second delay.
Day of Week (DWK) and **Minutes Since Midnight (MND)**	These commands are written to the Results Register. For **DWK**, 1=Sunday through 7=Saturday.

Table B-14. FST Time-Related Commands

Name	Description	Arguments	Results
ST	Set Timer for specified FST with value in 100 mSec intervals.	1. Output: FST Point Database Value 2. Input: Database or Constant Value	FST Timer (ARG1) = ARG2 RR(out) = RR(in) SVD(out) = SVD(in)
CT	Check Timer for specified FST with value in 100 mSec intervals.	1. Input: FST Point Database Value 2. LABEL	If FST Timer (ARG1) = 0, continue to next command. Otherwise, Goto ARG2. RR(out) = RR(in) SVD(out) = SVD(in)
WT	Wait – suspend FST until specified number of seconds (ARG1) have elapsed. The number of seconds can be from 0.1 to 999,999.	1. Input: Database or Constant Value	Delay ARG1 seconds RR(out) = RR(in) SVD(out) = SVD(in)
DWK	Day of Week – sets RR (out) to the day of the week (1=Sunday, 7=Saturday). **Note**: The DWK function requires that you correctly set the real-time clock.	None	RR(out) = Day of Week SVD(out) = SVD(in)
MND	Minutes Since Midnight – sets RR (out) to the number of minutes past midnight.	None	RR(out) = Minutes SVD(out) = SVD(in)

FST Miscellaneous Commands

Use the miscellaneous commands to move around FSTs and end FSTs. Miscellaneous commands provide operations, such as an unconditional go to (GO), message to local display panel (MSG), alarms (ALM), and event (EVT) generation, end of the FST (END), and delay (BRK).

Command	Description
GO	Executes an unconditional branch to the LABEL in ARGUMENT1. Branching can direct the FST to a step before or after the current step.
Message	Provides a 30-character message and value for viewing on the local display panel.
Break	Imposes a delay (Break period), in 100-millisecond intervals, before executing the next command. Once the break period is set to a value other than zero, a delay in 100-millisecond or 1 second intervals occurs between the executions of each subsequent command.
End	Completes execution of the FST and waits for the next FST execution cycle before returning to the first STEP of the FST. The END command can only be used once in an FST. If omitted, End is appended to the FST by the FST Editor at compile time following the first empty Command field.
Alarm and Event Log	Log a 10-character message and the current value of the selected parameter to the respective log.

Table B-15. FST Miscellaneous Commands

Name	Description	Arguments	Results
GO	Go to specified LABEL.	1. LABEL	Goto ARG1 RR(out) = RR(in) SVD(out) = SVD(in)
BRK	Break delays execution of each command after this one for the number of 100 millisecond intervals defined by ARGUMENT1.	1. Input: Database or Constant Value	FST break time = ARG1 RR(out) = RR(in) SVD(out) = SVD(in)
END	End of FST returns to first command.	None	Execute FST starting with first command. RR(out) = RR(in) SVD(out) = SVD(in)
MSG	LCD Message sends message (ARGUMENT1) and value (ARGUMENT2) to local display panel. One 30 character message can be sent by each FST as shown next: xxxxxxxxxxxxxxxxxx xxxxxxxx ARG2 VAL yyyyyyyy zzzzz.zz SCAN NEXT PREV MENU xxxx ...message yyyy ...FST Tag name zzzz ...ARGUMENT2 value	1. Input: Message 2. Input: Database or Constant Value	FST Message String(ARG1) FST Message Value(ARG2) RR(out) = RR(in) SVD(out) = SVD(in)
ALM	Log Alarm records message	1 .Input: Message	Log Alarm(ARG1, ARG2)

Name	Description	Arguments	Results
	(ARGUMENT1) and value (ARGUMENT2) in the Alarm Log. Only the first 10 characters of the 30 character messages are used.	2. Input: Database or Constant Value	RR(out) = RR(in) SVD(out) = SVD(in)
EVT	Log Event records message (ARGUMENT1) and value (ARGUMENT2) in the Event Log. Only the first 10 characters of the 30 character message are used.	1. Input: Message 2. Input: Database or Constant Value	Log Event(ARG1,ARG2) RR(out) = RR(in) SVD(out) = SVD(in)

Note: The ALM and EVT functions can quickly overfill the allotted log space of alarms and events. It is important to assure that these two functions do not operate continuously.

FST Database Commands

Database commands provide access to the configuration and historical databases. Operations include reading and writing configuration parameters and reading, writing, storing values from historical databases, and time stamping values to a History Point.

Command	Description
VAL	Loads the Results Register (RR) with the value defined in ARGUMENT1. ARGUMENT1 can be a constant or any database parameter available to the FST. The value defined in ARGUMENT1 is converted to floating point data type and written to the Results Register.
SAV	Writes the Results Register (RR) value to any database parameter available to the FST as defined in ARGUMENT1.
WDB, WTM, and RDB	These historical database commands, Write to Historical Database (**WDB**), Write Time to Historical Database (**WTM**), and Read Historical Database (**RDB**), allow you to establish a non-periodic history database (one that has no specific time interval), a periodic history database (one that has a specific time interval), or a storage array for data (similar to a softpoint). For the FST historical database commands to work, a History Point has to be configured correctly for a FST History Point as either FST Time Archive Type or FST Data Archive Type. Refer to *Section B.4.2, Defining a FST History Point*. The FST for a History Point uses one of the historical database commands and two Arguments. ARGUMENT1 contains the history database point number. ARGUMENT1 can be a constant or a parameter with a value between **1** through **87**.
ARGUMENT2	Provides an index or pointer to the history storage array. The history storage array holds entries taken at either set intervals (typically daily, hourly, and each minute) or user-configurable intervals. For information on the intervals and number of entries, refer to the history database specifications instruction

Command	Description
	manual. **ARGUMENT2** should be a Soft point or FST register. The history point defined by ARGUMENT1 will be logged at the index location defined by **ARGUMENT2**.

Table B-16. FST Database Commands

Name	Description	Arguments	Results
VAL	Load RR sets the RR(out) to the argument value.	1. Input: Database or Constant Value	RR(out) = ARG1 SVD(out) = SVD(in)
SAV	Store RR sets the argument to the RR(in).	1. Output: Database Value	ARG1 = RR(in) RR(out) = RR(in) SVD(out) = SVD(in)
RDB	Read Historical Database sets the RR(out) to the historical database value of the specified database point (ARGUMENT1) and the specified pointer (ARGUMENT2) to the historical database value. Applies to historical database points defined for the FST only. If ARGUMENT2* is a floating database value (for example: @FST1, FST SEQ# 1, R8), the command increments ARGUMENT2 to the next historical database value and sets it to 0 when the number of archived historical periods are exceeded. Otherwise, no effect occurs to ARGUMENT2. **Note**: Each ARGUMENT2 must be unique.	1. Input: Database or Constant Value 2. Output: Database or Constant Value	For FST History Point: RR(out) = History Value(ARG1,ARG2) For floating database value ARG2: If ARG1 >= No. of archived periods (ARG1), then ARG2 = 0 Otherwise, ARG2 = ARG2 + 1 For all other cases: RR(out) = RR(in) SVD(out) = SVD(in)
WDB	Write To Historical Database sets the RR(in) to the value of the database point (ARGUMENT1) and the pointer (ARGUMENT2). Applies to historical database points defined for the FST only. If ARGUMENT2* is a floating database value (for example: @FST1, FST SEQ# 1, R8), the command increments ARGUMENT2 to the next historical database value and sets it to 0 when the number of archived historical periods are exceeded. Otherwise, no effect occurs to ARGUMENT2. **Note**: Each ARGUMENT2 must be unique.	1. Output: Database or Constant Value 2. Output: Database or Constant Value	For FST History Point: History Value (ARG1, ARG2) = RR(in). For floating database value ARG2: If ARG2 >= No. of archived periods (ARG1), then ARG2 = 0. Otherwise, ARG2 = ARG2 + 1. For all other cases: RR(out) = RR(in) SVD(out) = SVD(in)
WTM	Write Time To Historical Database sets the value of the database point (ARGUMENT1) and the pointer (ARGUMENT2) to the historical database time string with either minutes or seconds resolution. The time format for minute's resolution is [min,hr,day,mon] and for	1. Output: Database or Constant Value 2. Output: Database or Constant Value	For FST History Point: If minute resolution, then History Value (ARG1, ARG2 = minute format. Otherwise: History Value (ARG1,ARG2) = second format. For floating database value ARG2:

Name	Description	Arguments	Results
	seconds resolution is [sec,min,hr,day]. Applies to historical database points defined for the FST only. If ARGUMENT2* is a floating database value (for example: @FST1, FST SEQ# 1, R8), the command increments ARGUMENT2 to the next historical database value and sets it to 0 when the number of archived historical periods are exceeded. Otherwise, no effect occurs to ARGUMENT2. **Note**: Each ARGUMENT2 must be unique.		If ARG2 >= number of archived periods (ARG1), then ARG2 = 0. Otherwise: ARG2 = ARG2 + 1. For all other cases: RR(out) = RR(in) SVD(out) = SVD(in)

B.4.2 Defining a FST History Point

When defining history database points for WDB, WTM, and RDB, you must define at least one History Point as an FST Time type (minute or second) to provide a time stamp for the values logged. The time stamps represent what time each portion of the accumulated data was logged.

To define an FST History Point:

1. Select **Configure** > **History Points**.
2. Select the desired History Point.
3. Click the **Archive Type** TLP button and select **FST Time** or **FST Data**.
4. Click the **Archive Point** TLP button and select any TLP, such as FST Register 2 to contain the data or time stamp. The Archive Point selection is ignored by the FST.
5. Click **OK**.

Historical Commands

The FST for a History Point uses one of the historical database commands and two Arguments. **ARGUMENT1** typically contains the history database History Point number with a value between **1** through **200**.

ARGUMENT2 is the History Index or database pointer to the history storage array. The history storage array holds entries taken at either set intervals (typically daily, hourly, and each minute) or user-configurable intervals.

For the **DHV**, **DHT**, **PHV**, **PHT**, and **MHV** commands, select the History Segment and the corresponding History Point that you desire to log in Argument 1. In Argument 2, select either a database point or a constant value, which is the actual History Index where the data resides in the historical database.

The Minute History Value (**MHV**) History Index is the same as the minute of the hour. Read the clock's minutes to get the last History Index value. For example, if it is 8:10 then the History Index is 10.

For the Extract Time Element (**GTE**) command, select the database point or a constant value, which is the actual History Index value where the data resides in the historical database. In Argument 2, select the Time Element to log the exact time of the database point or History Index value. The GTE command is used to extract the time element from the time stamp received back from the CHT and PHT commands.

For **DIS**, **DIN**, **PIS**, and **PIN** commands, select the History Segment and the corresponding History Point that you desire to log in Argument 1. In Argument 2, select the Month and Date on which to log the History Index value.

To acquire the Daily History Value (**DHV**), perform a Starting Daily Index (DIS) command to locate the starting History Index value for a specific day. Using the DIS History Index value, use the DHV command to locate the Daily History Value.

To find specific data in history, such as the data entered at 9:00 AM yesterday, first use the Starting Periodic Index (**PIS)** command to find the starting History Index value for yesterday's date and then count forward nine to acquire the History Index value for 9:00 AM. Use this new History Index with the Periodic History Value (**PHV**) command to locate the data.

Table B-17. FST Historical Commands

Name	Description	Arguments	Results
DHV	Daily History Value	1. Input: History Segment, History Point 2. Input: DB Point or Constant (History Index)	Stores value in RR. Halts on invalid History Index.
DHT	Daily History Time Stamp	1. Input: History Segment, History Point 2. Input: DB Point or Constant (History Index)	Stores value in RR. Halts on invalid History Index.
PHV	Periodic History Value	1. Input: History Segment, History Point 2. Input: DB Point or Constant (History Index)	Stores value in RR. Halts on invalid History Index.
PHT	Periodic History Time Stamp	1. Input: History Segment, History Point 2. Input: DB Point or Constant (History Index)	Stores value in RR. Halts on invalid History Index.
MHV	Minute History Value	1. Input: History Segment, History Point 2. Input: DB Point or Constant (History Index)	Stores value in RR. Halts on invalid History Index.
DIS	Starting Daily Index	1. Input: History Segment, History Point 2. Input: Month/Day	Stores value in RR. Returns –1 if Month/Day not found.
DIN	Number of Daily Indexes	1. Input: History Segment, History Point 2. Input: Month / Day	Stores value in RR. Returns –1 if Month/Day not found.
PIS	Starting Periodic Index	1. Input: History Segment, History Point 2. Input: Month / Day	Stores value in RR. Returns –1 if Month/Day not found.
PIN	Number of Periodic	1. Input: History Segment, History Point	Stores value in RR.

Name	Description	Arguments	Results
	Indexes	2. Input: Month / Day	Returns –1 if Month/Day not found.
GTE	Extract Time Element	1. Input: DB Point or Constant (History Index) (Time in Seconds since 1/1/1970) 2. Input: Time Element	Stores value in RR. Valid Time Elements: 0 – Month 1 – Day 2 – Year 3 – Hour 4 – Minute 5 – Second

B.5 Example FST

This example FST shows how to configure history and then write an FST to submit data to the historical database.

1. Access the History Setup screen (**Configure** > **History Points**). The History Setup screen displays.

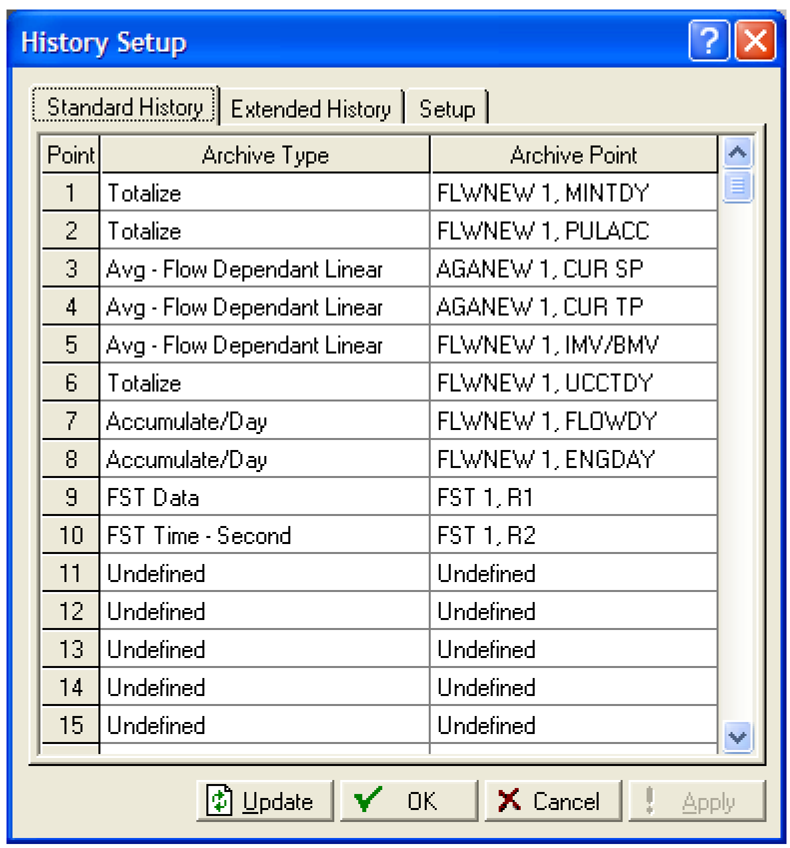


Figure B-3. History Setup

2. Add two new definitions, one for point 9 (FST Data at FST 1, R1) and one for point 10 (FST Time – Second at FST 1, R2). You use these points when you define the FST.

3. Access the FST Editor (**Utilities** > **FST Editor**). A blank FST Editor screen displays.

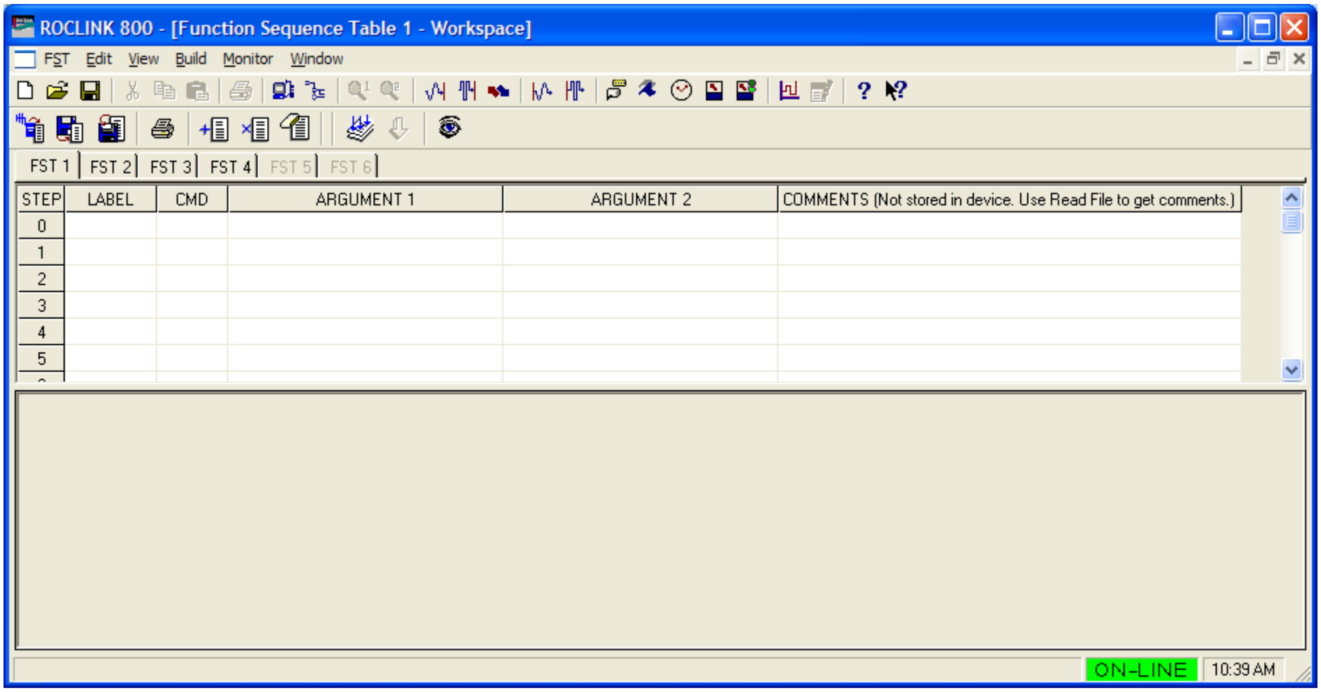


Figure B-4. Blank FST Editor

4. Complete steps 0 through 4 with the commands and arguments as shown below:

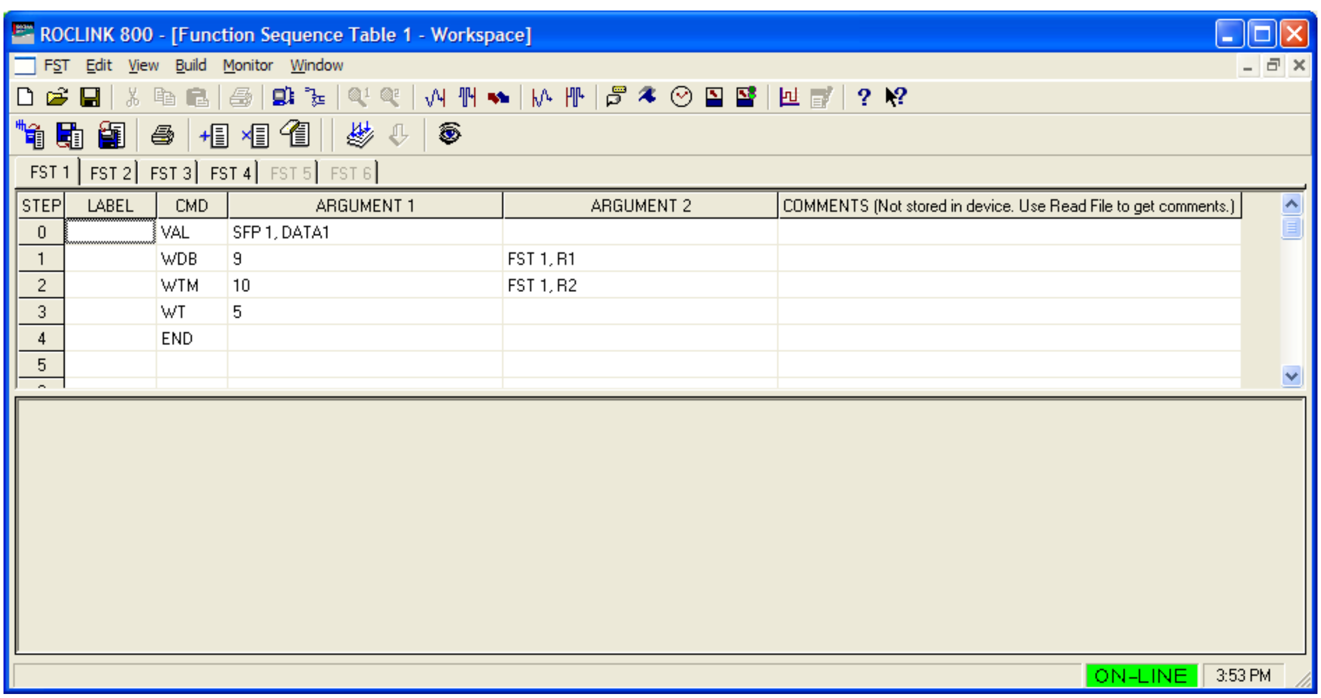


Figure B-5. Sample FST

a. Get the value (**VAL**) from softpoint 1, data 1, and save it to the first results register.

b. Write the value saved in the Results Register to the historical database (**WDB**), placing it at point **9** (FST Data at FST 1, R1, as defined on the History Setup screen in *Figure B-3*). The system also creates an historical index for point 9 in FST1.

Note: For steps b and c, you must use the **number** of the point as Argument 1.

c. Write the current time (**WTM**) to the historical point **10** (FST Time – Second at FST 1, R2, as defined on the History Setup screen). The system also creates an historical index for point 10 in FST1.

Note: It is possible (and very likely) that the historical time intervals will not match the same intervals the FST uses when it records historical data. This step gives the periodic history report a time stamp when the FST records data.

d. Suspend the FST execution (**WT**) for 5 seconds.

e. Stop the FST execution (**END**) and restart at step 0.

5. Click the **Compile FST** button () on the FST Editor menu bar. The FST Editor compiles the FST and determines whether it contains any errors in the area below the FST:

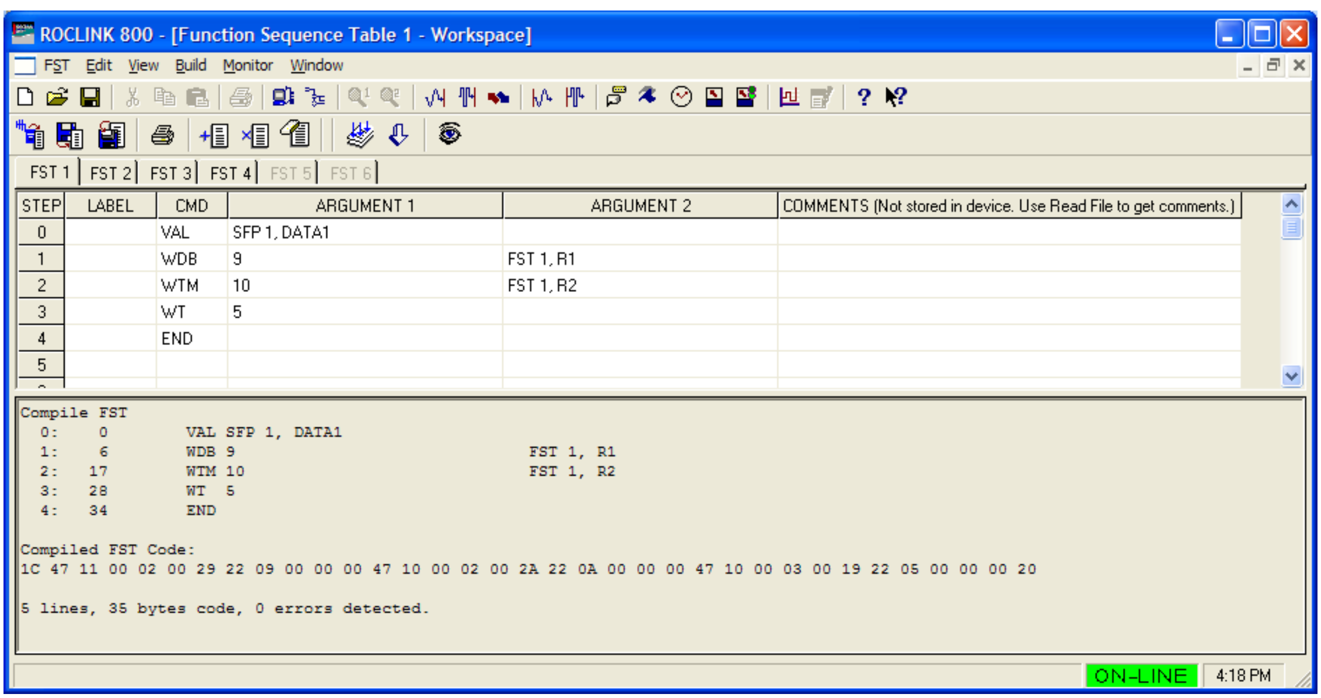


Figure B-6. Compiled FST

6. Click the **Save to .FST** button () on the FST Editor menu bar. A Save As dialog box displays.

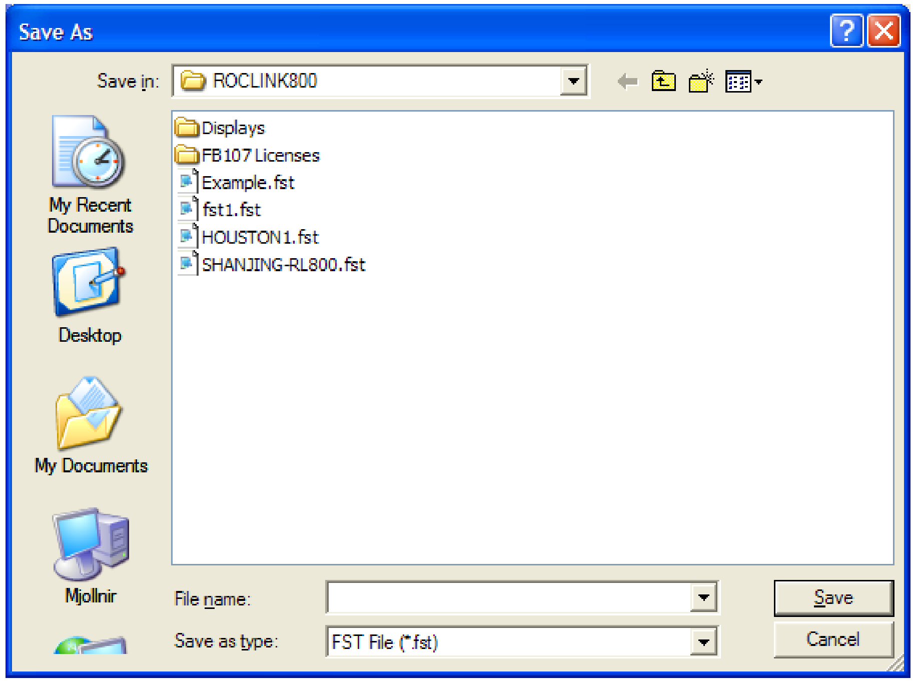


Figure B-7. Save As

7. Use this screen to name and save your FST. When you click **Save**, the FST Editor displays.

Finally, you have to download the FST to the FB107 to make it active.

8. Click the **Download** button () on the FST Editor menu bar. An FST Details dialog box displays.

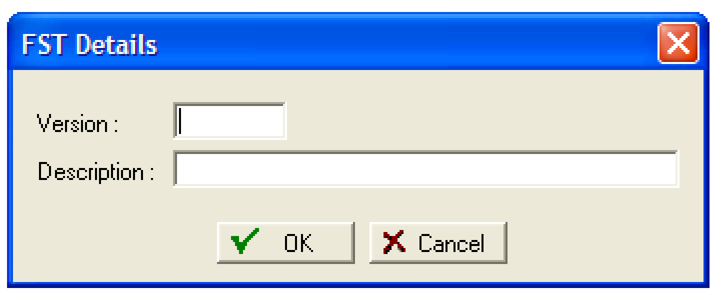


Figure B-8. FST Details

9. Complete at very least the Description field, providing a brief (up to 40 characters) description of the FST.

Note: If you anticipate developing several versions of an FST, complete the Version field so you can easily tell one version from another.

10. Click **OK**. When the download completes, ROCLINK 800 prompts you to start the FST.

Figure B-9. FST Download completed

At this point the FST is stored in one of the four FST “slots” in the FB107. Click **Yes** to start the FST or **No** to return to the FST Editor.

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If you have comments or questions regarding this manual, please direct them to your local sales representative or contact:

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