

Programming Manual

DigitalFlow™ XMT868i

Ultrasonic Flow Transmitter for Liquids (1 & 2-Channel)



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Typographical Conventions

Note: These paragraphs provide information that provides a deeper understanding of the situation, but is not essential to the proper completion of the instructions.

IMPORTANT: These paragraphs provide information that emphasizes instructions that are essential to proper setup of the equipment. Failure to follow these instructions carefully may cause unreliable performance.



CAUTION! This symbol indicates a risk of minor personal injury and/or damage to the equipment unless these instructions are followed carefully.



WARNING! This symbol indicates a risk of serious personal injury unless these instructions are followed carefully.

Safety Issues



WARNING! It is the responsibility of the user to follow all site rules and applicable regulatory requirements.



IMPORTANT Any instructions on grounding and cable termination in this manual are necessary for compliance with global EMC / RFI standards. Such compliance may be required by National EMC / RFI legislation.

Local Safety Standards

The user shall ensure that he operates the equipment in accordance with the applicable local codes, standards, regulations, or laws.

Qualification of Personnel

Ensure that all personnel have applicable training to use the equipment.

Personal Safety Equipment

Ensure that operators and maintenance personnel have all safety equipment applicable.

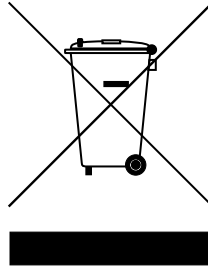
Unauthorized Operation

Ensure that unauthorized personnel cannot gain access to the operation of the equipment.

Environmental Compliance

Waste Electrical and Electronic Equipment

This apparatus required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment. To avoid the dispersal of these substances into our environment and to reduce the pressure on natural resources, we encourage you to use an appropriate “take-back” resource recovery scheme. These schemes will reuse or recycle most of the materials of your end-of-life equipment in an environmentally responsible way. The crossed-out wheeled bin symbol marked on the product invites you to use such a scheme.



If you need more information on the collection, reuse and recycling systems, please contact your local waste management administration.

As part of its commitment to the environment and the EU's WEEE Directive 2012/19/EU, Panametrics participates in a take-back scheme.

Please visit <https://panametrics.com/health-safety-and-environment-hse> for take-back instructions and more information about this initiative.

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Chapter 1. Programming Site Data

1.1 Introduction

The Model XMT868i flow transmitter must be properly installed and programmed, as described in the *Startup Guide*, before it can provide accurate flow rate measurements. After completing the installation and initial setup, use this chapter to program the advanced features of the Model XMT868i's *Keypad Program*.

The *Keypad Program* provides access to the various programmable features of the Model XMT868i. Step-by-step programming instructions are presented in this chapter. Refer to the appropriate section for a discussion of the following menu features:

- **Channel-ACTIV** - activate one or both channels and select the desired measurement method
- **Channel-SYSTM** - enter the individual channel parameters
- **Channel-PIPE** - enter the pipe parameters
- **Channel-I/O** - set up the inputs and outputs
- **Channel-SET UP** - set the signal limits, response times and activating mass flow.
- **GLOBL-SYSTM** - enter the system units
- **GLOBL-I/O** - set up error handling, option cards and display
- **GLOBL-COMM** - set the serial port and MODBUS parameters

As a programming aid, a complete set of menu maps for the **PROG** menu is included in Appendix A, *Menu Maps*. The specific figure numbers will be referenced throughout this chapter, as required.

1.2 Programming Methods

You can use two methods for programming the XMT868i flowmeter:

- The infrared keypad (shown in *Figure 1 on page 2*), which permits direct communication with the XMT868i
- IMPORTANT:** The XMT868i's infrared keypad permits programming of the instrument through the glass faceplate without removing the cover. Thus, all programming procedures may be performed while the unit is installed in a hazardous area.
- PanaView™, a PC-based software program that communicates with the XMT868i using its RS232/RS485 serial Ethernet port.

Although the displays differ, the general procedures are the same for the keypad and PanaView methods. This chapter provides detailed keypad programming instructions. If you are using PanaView, please refer to Appendix C, *Programming with PanaView*, and/or the *PanaView User's Manual* for complete instructions.

1.2.1 Keypad Program

Along with the 2-line, 16-character LCD, the XMT868i includes a 6-key infrared keypad. The decal cutout for each key contains an infrared transmitter LED, an infrared phototransistor and a visible red LED. If an operator presses his finger or other reflective object against the glass, directly over a key, infrared light from the emitter is redirected back through the enclosure window to the sensor. Use the infrared keypad to navigate through the user program. The menu map may be followed in sequence, or the four arrow keys may be used to scroll through the prompt screens. *Figure 1* shows the front of the XMT868i, with the infrared keypad.

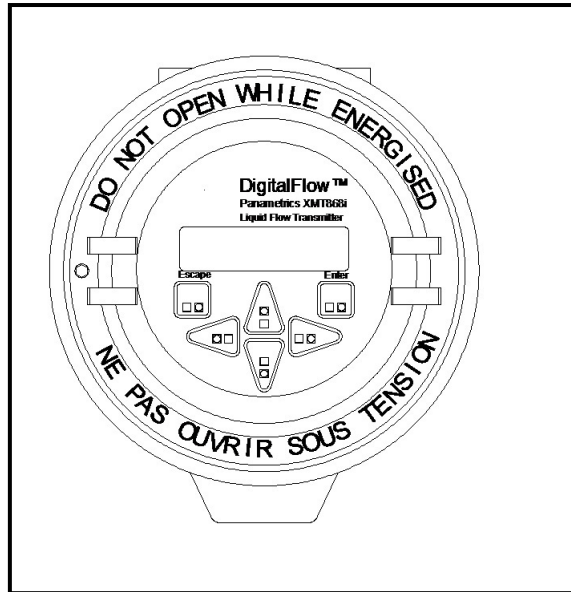


Figure 1: XMT868i Enclosure Screen

Programming of the **ACTIV**, **SYSTM**, and **PIPE** submenus of the **CHx** menus and the **GLOBL-SYSTM** menu are required for basic operation of the Model XMT868i. Failure to accurately enter all of the necessary information will result in unreliable flow data. Therefore, be sure to complete at least the sections of this chapter pertaining to those three submenus.

Note: *Because it is so essential, instructions for programming the **ACTIV**, **SYSTM**, and **PIPE** submenus of the **CHx** menus and the **GLOBL-SYSTM** submenus are also included in the Startup Guide. If that programming has already been completed, skip those sections in this chapter.*

Except for the three submenus noted above, it is not necessary to program the Model XMT868i flowmeter in any particular order. Therefore, the sections of this chapter need not be completed in sequence. Enter the keypad program as described in *Accessing the Keypad Program* on the next page and proceed immediately to any section of interest.

Note: *Be sure to record all the programming data entered in this chapter in Appendix B, Data Records.*

1.2.2 Accessing the Keypad Program

Six keys on the infrared keypad enable users to program the XMT868i:

- **[Enter]** - confirms choice of a specific option and data entry within the option
- **[Escape]** - allows users to exit from a specific option without entering unconfirmed data
- **[△]** and **[▽]** - enable users to highlight a specific window in the display option or to scroll through a list of options (parameters, letters, numbers) in a menu
- **[<]** and **[>]** - enable users to scroll to a specific option, among choices in an option, or to a character in a text entry. Also, if the **[<]** key is pressed when the cursor position (underlined) is at the first digit of the bottom LCD line, the previous parameter is displayed and can be edited.

When you power up the XMT868i, the initial screen shows the model and software version:

Panametrics XMT868i X3A.STD

The meter then starts to display measured parameters.

CHI	VEL	EI
10.00		Ft/s

To enter the *Keypad Program*, press the **[Escape]** key, followed by the **[Enter]** key, and the **[Escape]** key again. Each successive key must be pressed within 10 seconds of the prior key. The *Keypad Program* window appears:

KEYPAD PROGRAM		
PROG	◀ 1 ▶	

Press **[Enter]** to begin programming in the **Channel** or **Global** menus.

IMPORTANT: If the keypad has not been pressed for 10 minutes, the XMT868i exits the Keypad Program and returns to displaying measurements. The meter retains any configuration changes that were confirmed with the **[Enter]** key, and restarts as if the operator had completed the programming cycle.

1.3 Entering Data in the Channel Menu

The **Channel** menu is used to enter data specific to each channel. Refer to *Figure 28 on page 71* and remember to record all programming data in Appendix B, *Data Records*.

Note: *In this manual, only the programming of Channel 1 will be described. To program Channel 2 of a 2-Channel meter, simply repeat the same procedures presented for Channel 1.*

1.3.1 Selecting the Channel Measurement Method

The **ACTIV** submenu permits selection of the desired measurement method.

1. In the *Keypad Program*, scroll to **PROG** and press **[Enter]**.
2. In the **PROG** menu, scroll to the desired channel (**CH1** or **CH2**) and press **[Enter]**.

Note: *In the 1-Channel XMT868i, **CH2** does not appear.*

3. In the **Channel PROGRAM** menu, scroll to **ACTIV** and press **[Enter]**.
4. The option offers two choices: **OFF** and **TRANS** (Transit-Time). Scroll to the desired option for this channel and press **[Enter]**.

Note: *In the 1-Channel XMT868i, **OFF** does not appear.*

The XMT868i returns to the **Channel PROGRAM** menu. Scroll to the **SYSTEM** option.

1.3.2 Entering Data in the Channel System Option

1. From the **Channel PROGRAM** menu, scroll to **SYSTM** and press **[Enter]**.
2. The first prompt asks for the *Channel (Site) Label*. Use the four arrow keys to enter the desired label (in any numeric or text combination up to five characters), and press **[Enter]**.
3. The next prompt asks for the *Channel (Site) Message*. Use the four arrow keys to enter up to 15 characters, and press **[Enter]**.
4. The program now asks if you want the *Energy Option*, which enables flow measurement in a heating or cooling system. Scroll to *Off* or *On*, and press **[Enter]**.
5. The next prompt asks for the *Volumetric Units*. Scroll through the units (from the list shown in *Table 1*) and press **[Enter]** when you reach the desired unit.

Note: Refer to the **SYSTM** option of the **GLOBL** menu to choose between English and metric measurements.

Table 1: Available Volumetric Units

English Volumetric Units	Metric Volumetric Units
GAL/S - U.S. Gallons per Second	L/S = Liters per Second
GAL/M - U.S. Gallons per Minute	L/M = Liters per Minute
GAL/H - U.S. Gallons per Hour	L/H = Liters per Hour
MGD - Mega U.S. Gallons per Day	ML/D = Mega Liters per Day
ft ³ /s - Cubic Feet per Second	m ³ /s = Cubic Meters per Second
ft ³ /m - Cubic Feet per Minute	m ³ /m = Cubic Meters per Minute
ft ³ /h - Cubic Feet per Hour	m ³ /h = Cubic Meters per Hour
ft ³ /d - Cubic Feet per Day	m ³ /d = Cubic Meters per Day
Mf ³ /d - Mega Cubic Feet per Day	Mm ³ /d = Mega Cubic Meters per Day
BBL/S - Barrels per Second	BBL/S = Barrels per Second
BBL/M - Barrels per Minute	BBL/M = Barrels per Minute
BBL/H - Barrels per Hour	BBL/H = Barrels per Hour
BBL/D - Barrels per Day	BBL/D = Barrels per Day
MBL/D - Mega Barrels per Day	MBL/D = Mega Barrels per Day
A-I/S - Acre-inches per second	N/A
A-I/M - Acre-inches per minute	N/A
A-I/H - Acre-inches per hour	N/A
A-I/D - Acre-inches per day	N/A
A-F/S - Acre-feet per second	N/A
A-F/M - Acre-feet per minute	N/A
A-F/H - Acre-feet per hour	N/A
A-F/D - Acre-feet per day	N/A

6. Scroll to the desired number of *Vol Decimal Digits* (digits to the right of the decimal point) in the volumetric flow display, and press **[Enter]**.
7. Scroll to the desired *Totalizer Units* for the totalized flow rate display (listed in *Table 2*), and press **[Enter]**.

Table 2: Totalizer Units

English	Metric
GAL - U.S. Gallons	L - Liters
MGAL - Mega U.S. gallons	ML - Megaliters

Table 2: Totalizer Units(Continued)

English	Metric
ft ³ - Cubic Feet	m ³ - Cubic Meters
Mft ³ - Mega Cubic Feet	Mm ³ - Mega Cubic Meters
BBL - Barrels	BBL - Barrels
MBBL - Megabarrels	MBBL - Megabarrels
AC-IN - Acre-inches	
AC-FT - Acre-feet	

8. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the totalized flow rate display, and press **[Enter]**.

The program now varies, depending on whether you have activated *Mass Flow* (see the *Programming Manual* for details) or the *Energy Option*.

- If you have activated *Mass Flow*, continue to step 1 on the next page.
- If you have activated the *Energy Option* (but not *Mass Flow*), skip to step 1 on *Section 1.3.2.1*.
- If you have activated neither option, the XMT868i returns to the **Channel PROGRAM** window.

1.3.2.1 Programming the Mass Flow Option

1. Scroll to the desired *Mass Flow Units* for flow rate display (listed in *Table 3*), and press **[Enter]**.

Table 3: Available Mass Flow Units

English	Metric
LB = Pounds	Kilograms
KLB = KiloPounds (Thousands of Pounds)	Tonnes = Metric Tons (1000 KG)
MMLB = MegaPounds	
TONS (2000 LB)	

2. Scroll to the desired *Mass Flow Time Units* (from seconds to days), and press **[Enter]**.
3. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the mass flow rate display, and press **[Enter]**.
4. Scroll to the desired *Mass Totals* (units for the totalized mass flow rate display, listed in *Table 3*), and press **[Enter]**.
5. Scroll to the desired number of *Mass Decimal Digits* (digits to the right of the decimal point) in the totalized mass flow rate display, and press **[Enter]**.

The program varies, depending on whether or not you have enabled the *Energy Option*.

- If you have not enabled the option, the XMT868i returns to the **Channel PROGRAM** window. Proceed to the **PIPE** option.
- If you have enabled the option, continue to the next page.

1.3.2.2 Programming the Energy Option

1. Scroll to the desired *Power Units* (listed in Table 4) and press **[Enter]**.

Table 4: Available Power Units

English	Metric
kBTUh = Thousands of BTUs/hour	kCALs = Kilocalories/second
MMBTU = Mega BTUs/hour	kCALm = Kilocalories/minute
kW = Kilowatt	kCALh = Kilocalories/hour
TONS = Tons (2000 LB)	kCALd = Kilocalories/day
	MCALs = Megacalories/second
	MCALm = Megacalories/minute
	MCALh = Megacalories/hour
	MCALd = Megacalories/day
	kW = Kilowatt
	MW = Megawatt

2. Scroll to the desired number of *Power Decimal Digits*, and press **[Enter]**.
3. Scroll to the desired *Energy (Total)* units (shown in Table 5), and press **[Enter]**.

Table 5: Available Total Energy Units

English	Metric
kBTU = Thousands of BTUs	kCAL = Kilocalories
MMBTU = Mega BTUs/hour	MCAL = Megacalories
kWHr = Kilowatt-hour	kWHr = Kilowatt-hour
TONS = Tons (2000 LB)	MWHr = Megawatt-hour

4. Scroll to the desired number of *Energy Decimal Digits*, and press **[Enter]**.
5. If you are using a heating or cooling system, scroll to the appropriate selection (*Heat* or *Cool*) and press **[Enter]**.
6. The final prompt asks whether you want to conduct *Flow Measurement* at the point of **RTN** (Return, where the liquid exits) or of **SPPLY** (Supply, where the liquid enters). Scroll to the appropriate choice, and press **[Enter]**.

You have completed entering data in the **SYSTEM** option. The meter returns to the **Channel PROGRAM** menu.

1.3.3 Entering Pipe Parameters

Enter the transducer and pipe parameters using the **PIPE** submenu. While following the programming instructions, refer to *Figure 29 on page 72*.

1. From the **Channel PROGRAM** menu, scroll to the **PIPE** option and press **[Enter]**.
2. The first prompt asks for the *Transducer Number*.
 - For a standard transducer, enter the number engraved on the transducer head in the right pane, and press **[Enter]**.
 - If there is no number engraved on the transducer head, press the right arrow key to scroll to the *Special* option, enter an assigned number (from 91 to 99), and press **[Enter]**.

IMPORTANT: Special transducers, which have no engraved number on the head, are rarely used. Examine the transducer head carefully for a number.

The menu now varies, depending on your selection in step 2.

- If you entered the number for a standard clamp-on transducer, proceed to the *Pipe Material* prompt in step 4.
- If you entered the number for a standard wetted transducer, proceed to the *Pipe OD* prompt in step 5.
- If you entered the number for a special transducer, proceed to step 3 below.

1.3.3.1 Special Transducers

Note: For special transducers, Panametrics will supply a transducer data sheet with programming information.

3. For special transducers:
 - a. The program first asks for the *Wedge Type*. Press the appropriate transducer type (Rayleigh clamp-on, shear clamp-on, or wetted).

Note: Panametrics will supply the information required for steps b through f with the transducers.

- b. Press the appropriate *Frequency* (from 500 kHz to 5 MHz).
 - c. Enter the *Time Delay* (T_w) value supplied by Panametrics and press **[Enter]**.

If you have selected a special wetted transducer, the program now goes to step 5. But if you have selected a clamp-on transducer, three more prompts appear.

- d. Enter the *Wedge Angle* of the transducer (the angle of the ultrasonic transmission, in degrees) and press **[Enter]**.
 - e. Enter the *Wedge Temperature* and press **[Enter]**.
 - f. Enter the *Wedge Soundspeed* and press **[Enter]**.

1.3.3.2 Pipe Material

4. Scroll to the appropriate *Pipe Material* from the supplied list. For some materials (shown in *Table 6*), the program displays additional selections. At the desired choice, press **[Enter]**.

Table 6: Pipe Material Choices

Material	Types
Steel	Carbon Steel Stainless Steel
Iron	Ductile Iron Cast Iron
Copper	no additional selection required
Aluminum	no additional selection required
Brass	no additional selection required
Copper Nickel	70%Cu/30%Ni - 70/30 Copper/Nickel 90%Cu/10%Ni - 90/10 Copper/Nickel
Glass	Pyrex Heavy Silicate Flint Light Borate Crown
Plastic	Nylon Polyethylene Polypropylene PVC (Polyvinyl Chloride), CPVC Acrylic
OTHER	Enter the soundspeed of the pipe material and press [Enter] . If the soundspeed is unknown, refer to the <i>Sound Speeds and Pipe Size Data</i> manual (914-004).

1.3.3.3 Pipe OD

5. To select the appropriate *Pipe OD* unit type from the list shown in *Table 7*, scroll to the right side of the screen, and use the up and down arrow keys to step through the list. Press **[Enter]**. Then enter the known pipe outside diameter or circumference on the left side and press **[Enter]**.

Obtain the required information by measuring either the pipe outside diameter (OD) or circumference at the transducer installation site. The data may also be obtained from standard pipe size tables found in *Sound Speeds and Pipe Size Data* (914-004).

Table 7: Available Pipe OD Units

English	Metric
inch	mm = millimeters
feet	m = meters
in/PI = pipe circumference in inches	mm/PI = pipe circumference in millimeters
ft/PI = pipe circumference in feet	m/PI = pipe circumference in meters

6. Enter the known *Pipe Wall* thickness (in inches or mm) in the right pane and press **[Enter]**.

If you are using clamp-on transducers, skip to step 9 on the next page.

1.3.3.4 Path and Axial Lengths

7. To enter the *Path Length*:

- a. Use the [$\triangleright$] arrow key to highlight the path length unit type at the right of the screen. Then use the [$\triangle$] and [∇] arrow keys to scroll to the desired unit type (inches or feet for English measurements, or millimeters or meters for metric).
- b. Use the [$\triangleleft$] arrow key to return to the numeric entry on the left, and enter the path length of the ultrasonic signal. Press **[Enter]**.

Note: *If a spoolpiece was ordered with the meter, the transducer signal path length (P) and the transducer signal axial length (L) are engraved on the flowcell and/or are included in the documentation supplied with the meter. For on-site transducer installations, refer to Appendix C, Measuring P and L Dimensions, for instructions.*

8. In the same manner, enter the appropriate *Axial Length L* unit type and axial length of the ultrasonic signal, and press **[Enter]**. Skip to step 10 on the next page.

1.3.3.5 Pipe Lining

9. Scroll to the appropriate choice to indicate whether you have a *Pipe Lining*.
- a. If you have selected Yes, then select the *Lining Material* from the supplied list.
 - If **OTHER** is selected, enter the lining sound speed, and press **[Enter]**.
 - b. Then enter the lining thickness and press **[Enter]**.

1.3.3 Entering Pipe Parameters (cont.)

1.3.3.6 Tracking Windows

10. Press the appropriate choice to indicate whether you want *Tracking Windows*. These windows are used to detect the receive signal when you are unsure of the fluid sound speed.

1.3.3.7 Fluid Type

11. Press the appropriate *Fluid Type*. The selections for fluid type vary depending on whether:

- the *Energy Option* is **ON** or **OFF**; and
- the *Tracking Window* is enabled or disabled.

Refer to Table 9 if *Energy Option* is **OFF**, or to Table 9 on page 13 if *Energy Option* is **ON**.

Note: Some of the fluid types may require additional selections, as shown in the following tables.

Table 8: Fluid Types for ENERGY OFF

Tracking Windows =			
NO	Additional Selections	YES	Additional Selections
Water	Normal Water Sea Water If Normal Water is selected, enter the Water Temperature and press [Enter].	Water, 0–100C	No additional selections required.
Oil	Lube Oil Crude Oil	Water, 0–260C	No additional selections required.
Methanol (25 C)	No additional selections required.	Oil, Tracking	No additional selections required.
Ethanol (25C)	No additional selections required.	OTHER	Enter the Minimum Soundspeed and press [Enter]. Then enter the Maximum Soundspeed and press [Enter].
LN2	No additional selections required.		
Freon	No additional selections required.		
OTHER	Enter the fluid soundspeed and press [Enter].		

1.3.3.7 Fluid Type (cont.)

Table 9: Fluid Types for ENERGY ON

Tracking Windows =			
NO	Additional Selections	YES	Additional Selections
Water	Enter the Water Temperature and press [Enter].	Water, 0–260C	No additional selections required.
Water, Glycol Mixture	Enter the Fluid Soundspeed and press [Enter]. Then enter the Percentage of Water and press [Enter].	Water, Glycol Mixture	Enter the Percentage of Water and press [Enter].
OTHER	Enter the Fluid Soundspeed and press [Enter].	OTHER	Enter the Minimum Soundspeed and press [Enter]. Then enter the Maximum Soundspeed and press [Enter].

1.3.3.8 Reynolds Correction

12. Scroll to the appropriate choice to indicate whether you want *Reynolds Correction*.

- If *Off* is selected, enter the *Calibration Factor* and press **[Enter]**.
- If *Activ* is selected, the program asks for *KV Input Selection*. Scroll to *SIGS (Signals)*, *SOUND (Soundspeed)* or *STATC*.
 - If *SIGS* or *SOUND* is selected, enter the *Calibration Factor* and press **[Enter]**.
 - If *STATC* is selected, enter the *Kinematic Viscosity* and press **[Enter]**. Then enter the *Calibration Factor* and press **[Enter]**.
- For wetted transducers, the program returns to the **Channel PROGRAM** menu. You have completed entering **PIPE** parameters.
- For clamp-on transducers, proceed to step 13 below.

1.3.3.9 Number of Traverses

13. Scroll to the appropriate *Number of Traverses* (from 1 to 5) and press **[Enter]**.

14. Accept the value for the *Transducer Spacing* by pressing **[Enter]**.

Note: The XMT868i automatically calculates the transducer spacing. You should not enter a different value unless specifically instructed by the factory.

The XMT868i returns to the **Channel PROGRAM** menu. You have completed entering **PIPE** parameters.

Note: The site data programmed in this chapter is automatically stored in the meter's non-volatile RAM (NVR). If the power to the meter is disconnected, the same site data will be applied when the unit is next powered on.

1.3.4 Entering Input/Output Parameters

Enter the zero cutoff value and set up the temperature inputs using the **I/O** submenu. While programming these parameters, see *Figure 30 on page 73*.

IMPORTANT: If an option card in **Slot 1** fails to appear in this menu, it may be turned **OFF**. See the **GLOBL-I/O-OPTN** section on *Section 1.4.2.2* for setup instructions.

1.3.4.1 Zero Cutoff Value

Near a zero flow rate, the Model XMT868i's readings may fluctuate due to small offsets caused by thermal drift or similar factors. To force a zero display reading when there is minimal flow, enter a *zero cutoff value* as described in the following steps:

1. From the **Channel PROGRAM** menu, scroll to the **I/O** option in the center pane.
2. The program asks for the *Zero Cutoff*. Enter a value from 0 to 1 ft/sec (0 to 0.30 m/sec) for the zero cutoff and press **[Enter]**.
The recommended setting is 0.1 ft/sec (0.03 m/sec).

Proceed with one of the following:

- If the **ENERGY OPTION** is **OFF**, the display now returns to the **Channel** menu.
- If the **ENERGY OPTION** is **ON**, refer to **Temperature Input** below.

1.3.4.2 Temperature Input

The Model XMT868i can use either a fixed temperature value or a live temperature input to calculate energy. Complete the following steps to configure this input:

Note: *The site data programmed in this chapter is automatically stored in the meter's non-volatile RAM (NVR). If the power to the meter is disconnected, the same site data will be applied when the unit is next powered on.*

3. At the *Temp Supply* prompt, scroll to *Fixed* to enter a constant temperature value or on *Slot1* to select the output in **Slot 1** that will provide the live temperature input for the supply.

Note: *If Slot 1 contains an activated option card with an analog input assigned to **TEMP** or an **RTD** input, Slot 1 appears as an option at the above prompt. If the process temperature is stable, a fixed value may be used, but most applications require a live temperature input.*

1.3.4.2 Temperature Input (cont.)

4. One of the following two prompts will appear, depending on your selection in Step 3.
 - If *Fixed* was chosen, enter the known fixed process temperature and press **[Enter]**. The meter will only accept values from -328° to 1832°F (-200° to 1000°C).
 - If *Slot 1* was chosen, scroll to the desired temperature input (from A to D) and press **[Enter]**.
5. At the *Temp Return* prompt, scroll to *Fixed* to enter a constant temperature value or on *Slot1* to select the output in **Slot 1** that will provide the live temperature input for the return.

Note: *If Slot 1 contains an activated option card with an analog input assigned to **TEMP** or an **RTD** input, Slot 1 appears as an option at the above prompt. If the process temperature is stable, a fixed value may be used, but most applications require a live temperature input.*

6. One of the following two prompts will appear, depending on your selection in Step 3.
 - If *Fixed* was chosen, enter the known fixed process temperature and press **[Enter]**. The meter will only accept values from -328° to 1832°F (-200° to 1000°C).
 - If *Slot 1* was chosen, scroll to the desired temperature input (from A to D) and press **[Enter]**.

The program now returns to the **Channel PROGRAM** menu.

1.3.5 Entering Setup Parameters

The signal limits and response times for the Model XMT868i are specified using the **SET UP** submenu. While following the programming instructions, refer to *Figure 30 on page 73*. This submenu includes four options:

- **SIGNL** – set the parameters related to the transducer signal
- **AVRG** – specify the response of the meter to step changes
- **INIT** – initialize all parameters to default values
- **ADVAN** – enable mass flow, edit kinematic viscosity vs. sound speed table, activate K factors, and select transmit code length.

To enter the **SET UP** submenu, scroll to the **SET UP** option in the **Channel PROGRAM** menu and press **[Enter]**. Remember to record all programmed data in Appendix B, *Data Records*.

1.3.5 Entering Setup Parameters (cont.)

1.3.5.1 The SIGNAL Option

Use this option to set the limits for the incoming signal and other parameters affecting the transducer signal. For example, the programmed signal strength low limit may be used to determine the trigger point for an alarm.



CAUTION!

The SIGNAL default settings are suitable for most applications. Consult the factory before changing any of these parameters.

1. From the **SET UP** option menu, scroll to **SIGNAL** and press **[Enter]**.

2. Press **[Enter]** to accept the current **Signal Low Limit** value or enter a new value and press **[Enter]**.

The default value for the above parameter is 40, and values from -20 to 100 are acceptable. The **E1: LOW SIGNAL** error message appears when the signal strength falls below the programmed **Signal Low Limit** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

3. Press **[Enter]** to accept the current **Corr. Peak Limit** value or enter a new value and press **[Enter]**.

The default value for the above parameter is 100, and values from 0 to 500 are acceptable. The **E4: SIGNAL QUALITY** error message appears when the signal quality falls below the programmed **Cor. Peak Limit** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

4. Press **[Enter]** to accept the current **Sndspeed +- Lim.** value or enter a new value and press **[Enter]**.

The default value for the above parameter is 20%, and values from 1% to 50% are acceptable. The **E2: SOUNDSPEED** error message appears when the calculated fluid soundspeed differs from the fluid soundspeed entered in the **CHx-SYSTEM** menu by more than the programmed **Soundspeed +- Limit** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

5. Press **[Enter]** to accept the current **Vel Low Limit** value or enter a new value and press **[Enter]**.

The default value for the above parameter is -150.0 ft/sec. (-46 m/sec) and values from -500 to 500 ft/sec (-150 to 150 m/sec) are acceptable. The **E3: VELOCITY RANGE** error message appears when the calculated fluid velocity is less than the programmed **Velocity Low Limit** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

6. Press **[Enter]** to accept the current **Vel High Limit** value or enter a new value and press **[Enter]**.

The default value for the above parameter is 40.0 ft/sec (12.142 m/sec) and -100 to 100 ft/sec (-30.48 to 30.48 m/sec) are acceptable values. The **E3: VELOCITY RANGE** error message appears when the calculated fluid velocity exceeds the programmed **Vel High Limit** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes. Press **[Enter]** to accept the current **Accel. Limit** value or enter a new value and press **[Enter]**.

The default value for the above parameter is 15.0 ft/sec² (4.6 m/sec²) and values from 0 to 100 ft/sec² (0 to 30 m/sec²) are acceptable. The **E6: CYCLE SKIP** error message appears when the calculated fluid velocity changes by more than the programmed **Acceleration Limit** value from one reading to the next. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

7. Press **[Enter]** to accept the current **Amp. Discrim Low** value or enter a new value and press **[Enter]**.

The amplitude discriminator measures the transducer signal received by the Model XMT868i. The default value for the above parameter is 14, and values from 0 to 100 are acceptable. The **E5: AMPLITUDE** error message appears when the amplitude discriminator falls below the programmed **Amp. Discrim Low** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

8. Press **[Enter]** to accept the current **Amp. Discrim. High** value or enter a new value and press **[Enter]**.

The amplitude discriminator measures the transducer signal received by the Model XMT868i. The default value for the above parameter is 34, and values from 0 to 100 are acceptable. The **E5: AMPLITUDE** error message appears when the amplitude discriminator exceeds the programmed **AMP. DISCRIM HIGH** value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

9. Press **[Enter]** to accept the current **Delta T Offset** value or enter a new value and press **[Enter]**.

An offset between the upstream and downstream transit times is specified at this prompt. The default value for the above parameter is 0 μ sec, and values from -1000 to 1000 μ sec are acceptable.

10. Press **[Enter]** to accept the current **% of Peak** value or enter a new value and press **[Enter]**.

The percentage of peak used to calculate the transit times and Delta T is specified at this prompt. The default value for the above parameter is -40%, and values from -100 to 100% are acceptable.

Note: *This setting is a starting point for detecting the signal. The meter will automatically adjust this value if the calculated transit time is unacceptable. You can set the limits for this value using the MIN. PEAK% and MAX. PEAK% discussed on the next page.*

11. Scroll to the desired **XMIT Sample Size** (from 2 to 32) and press **[Enter]**

Both the upstream and downstream transducers transmit ultrasonic pulses in bursts, which consist of a series of transmit pulses. **XMIT Sample Size** determines how many bursts are sent in one direction before sending in the other direction. The default value for the above parameter is 8 and values of 2, 4, 8, 16 and 32 are available.

12. Press **[Enter]** to accept the current **# Errors Allowed** value or enter a new value (0 to 16) and press **[Enter]**.

Use this prompt to enter the number of errors the XMT868i can record before it displays an error message. The default value is 8.

13. Press **[Enter]** to accept the current **Min Peak% Limit** value or enter a new value and press **[Enter]**.

Use this prompt to enter the minimum percent of peak that the XMT868i can use to measure transit time. The XMT868i accepts values from -100 to 100.

14. Press **[Enter]** to accept the current **Max Peak% Limit** value or enter a new value and press **[Enter]**.

Use this prompt to enter the maximum percent of peak that the XMT868i can use to measure transit time. The XMT868i accepts values from -100 to 100.

After responding to the above prompt, the meter returns to the **SET UP** option window.

1.3.5.2 The AVRG Option

Use this option to specify the number of readings that occur before the meter will respond to a step change in flow rate. In general, the smaller the number of readings, the less steady the display will appear. Complete the following steps to set the response time:

1. From the **SET UP** option menu, scroll to the **AVRG** option and press **[Enter]**.
2. Scroll to the desired *Response Time* (from 1 to 60 sec, or **STATS** (statistics)) and press **[Enter]**.

For best results, select the **STATS** (statistics) option, as this increases the response time under steady flow conditions while still allowing a rapid response to changes in flow rate.

After responding to the above prompt, the meter returns to the **SET UP** option window.

1.3.5.3 The INIT Option

Use this option to initialize (reset) all of the parameters within the **SIGNL** menu back to their default values. Complete the following steps to reset all of the parameters:

1. From the **SET UP** option menu, scroll to **INIT** in the center pane.
2. Scroll to *No* to keep the current values or on *Yes* to reset all values to their default settings.

After responding to the above prompt, the meter returns to the **SET UP** window.

1.3.5.4 The ADVAN Option

This option enables you to enable the more advanced features of the meter. In this option you can do the following:

- calculate the kinematic viscosity (KV) based on signal strength or on soundspeed
- enter a table of K-factors (based on velocity or reynolds number) that compensates for non-linear flow rates
- enable mass flow (calculated for static fluid density)
- select the size of the transducer transmission signal.

1.3.5.5 The KV/xx Option

Note: To select either signal strength or soundspeed for kinematic viscosity calculations, go to *Reynolds Correction* in the **PIPE** submenu on Section 1.3.3.8.

Use this option to calculate the kinematic viscosity (KV) based on signal strength (SS) or on soundspeed, as selected in the *KV Input Selection* option of the **PIPE** option. To use this option, you must enter the KV vs. SS pairs in descending order of KV and ascending order of SS or soundspeed. For example, if pair 1 is KV = 10 centistrokes and SS = 62, then pair 2 must be KV $\leq$ 10 centistrokes and SS $\geq$ 62. The XMT868i accepts 2 to 20 pairs. Complete the following steps to enter KV and signal or soundspeed values:

1. From the **ADVAN** option menu, scroll to **KV/xx** and press **[Enter]**.
2. Press **[Enter]** to accept the current # of KV/SS Pairs or enter a new value (2 to 20) and press **[Enter]**.
3. Press **[Enter]** to accept the current *Sig Strength (or Soundspeed)* #01 value or enter a new value and press **[Enter]**. Enter the signal strength values in ascending order.

Note: For signal strength, the acceptable range is 50.0 to 85.0. For soundspeed, the acceptable range is 125 to 9000.

4. Press **[Enter]** to accept the current *Kinematic Viscosity* value or enter a new value (0.050 to 500) and press **[Enter]**. Enter the kinematic viscosity values in descending order.

The *Sig Strength (or Soundspeed)* and *Kin Viscosity* prompts repeat for each pair. After entering all the pairs, the meter returns to the **ADVAN** option.

1.3.5.6 The MULTK Factors Option

Use this option to enter a table of K-factors. K-factors are used to create a curve for the flow range (based on velocity or reynolds number) that compensates for non-linear flow rates. The meter accepts from 2 to 20 pairs. Complete the following steps to enter multiple K factors for velocity or reynolds values:

1. From the **ADVAN** option menu, scroll to **MULTK** and press **[Enter]**.
 2. Scroll to *Yes to Activate Multi K* or on *No* to disable this option, and press **[Enter]**.
- If **NO** was selected, the meter returns to the **ADVAN** window. If **YES** was selected, proceed to Step 3.
3. Scroll to the desired custom type: *CstV* (velocity) or *CstR* (reynolds)
 4. Scroll to *Yes to Edit the K-factor Table* or on *No* to retain the current K-factor table (and return to the **ADVAN** option) and press **[Enter]**.

Note: *If the necessary velocity/reynolds vs. K-factor data was not provided with the Model XMT868i's documentation, the K-factor table cannot be edited.*

If **NO** was selected, the meter returns to the **ADVAN** option. If **YES** was selected, proceed to Step 5.

5. Enter the *Number Of K-factors* (from 2 to 20) to be entered into the table, and press **[Enter]**.

Note: *When editing the K-factor table, the velocities must be entered in increasing order.*

6. Enter the *Velocity/Reynolds Value* for K-factor number "X" and press **[Enter]**.
7. Enter the *K-factor* corresponding to velocity/reynolds number "X" (0.333 to 3.0) and press **[Enter]**.

The *Velocity #* and *K Factor #* prompts repeat for each pair. After entering all the pairs, the meter returns to the **ADVAN** window.

1.3.5.7 The Mass Flow Option

Use this option to calculate mass flow from a static fluid density. Complete the following steps to enter the static density of the fluid:

1. From the **ADVAN** menu, scroll to **MASS** and press **[Enter]**.
2. Scroll to Yes to activate *Mass from Static* or on No to disable this option.
 - a. If you select Yes, enter the *Fluid Density* (0.062 to 624.220 lb/ft³ or 0.001 to 9.9675g/cc).
 - b. For either option, press **[Enter]**.

After responding to the above prompt, the meter returns to the **ADVAN** window.

1.3.5.8 The Code Length Option

Use this option to select the size of the transducer transmission signal. This option is helpful when measuring flow in small pipes. You can choose from the following selections:

- **AUTO** - The meter will automatically determine the code length (short or long) which is based on pipe size and transducer type.
- **SHORT** - is just few pulses with no code pattern built in. In some cases, the diameter of the pipe is so small that it does not give each transducer the necessary time to send a series of signals before receiving a series of signals. **SHORT** is also a good selection for pipes made of materials such as PTFE which tend to blur the signal pattern.
- **LONG** - is a series of approximately a dozen pulses that have a distinctive binary pattern, easily recognizable during auto correlation.

Complete the following steps to select the code length:

1. From the **ADVAN** option menu, scroll to **CODEL** and press **[Enter]**.
2. Scroll to the desired *Xmit Code Length* and press **[Enter]**. **AUTO** is the default.

After responding to the above prompt, the meter returns to the **ADVAN** window. Press **[Escape]** three times to return to the **Channel PROGRAM**, or four times to return to the *Keypad Program*.

1.4 Entering Data in the GLOBL Menu

The **GLOBL** menu is used to enter information that is not specific to any of the individual channels. Information programmed by using this menu is used to enter several general system parameters (e.g., English or metric units). For meters with 2 channels, this menu is also used to compute parameters such as the sum, difference or average of the channel 1 and channel 2 signals. When calculating the **SUM**, **DIF** or **AVE** readouts, data from the **Global-SYSTEM** submenu is used. Any conflicting data entered in the **Channel-SYSTEM** submenu is overridden.

The following submenus are included in the **GLOBL** menu:

- **SYSTEM** – use to specify the units of measure used in calculations
- **I/O** – used to set up error handling and to configure analog inputs and outputs
- **COMM** – used to set up the serial communications port and MODBUS parameters

To enter the **GLOBL** menu:

1. From the display screen, press **[Escape]**, **[Enter]**, **[Escape]** on the infrared keypad.
2. Press **[Enter]** to enter the **PROG** menu.
3. In the **PROG** menu, scroll to **GLOBL** and press **[Enter]**.

Then proceed to the appropriate section of this chapter for instructions. Refer to *Figure 31 on page 74* and *Figure 32 on page 75*, and remember to record all programming data in Appendix B, *Data Records*.

1.4.1 Entering GLOBL-SYSTEM Data

While completing these instructions, refer to *Figure 31 on page 74*.

1. From the **PROG** menu, scroll to **GLOBL**. Press **[Enter]**.
 2. Scroll to the **SYSTEM** option. Press **[Enter]**.
 3. The first prompt asks for a *Meter Message*. Enter a numeric or text message (up to 16 characters) in the right pane and press **[Enter]**.
 4. Scroll to the desired *System Units* selection (either metric or English) and press **[Enter]**. The XMT868i will display all parameters and measurements in the designated units.
- For a single-channel XMT868i, the program returns to the **Global PROGRAM** menu. For a 2-channel meter, proceed to step 5 on the next page.

1.4.1.1 Volumetric Units

5. Scroll to and scroll to the desired *Volumetric Units* for the flow rate display. *Table 10* lists the available volumetric units.

Table 10: Available Volumetric Units

English	Metric
GAL/S = gallons/second	L/S = Liter/sec
GAL/M = gallons/minute	L/M = Liter/min
GAL/H = gallons/hour	L/H = Liter/hr
MGD = million gallons/day	ML/D = million liters/day
ft ³ /s = Cubic ft/sec	m ³ /s = Cubic m/sec
ft ³ /m = Cubic ft/min	m ³ /m = Cubic m/min
ft ³ /h = Cubic ft/hr	m ³ /h = Cubic m/hr
ft ³ /d = Cubic ft/day	m ³ /d = Cubic m/day
Mf ³ /d = Mega cubic feet/day	Mm ³ /d = Mega cubic meters/day
BBL/S = Barrel/sec	BBL/S = Barrel/sec
BBL/M = Barrel/min	BBL/M = Barrel/min
BBL/H = Barrel/hr	BBL/H = Barrel/hr
BBL/D = Barrel/day	BBL/D = Barrel/day
MBL/D = Mega barrels/day	MBL/D = Mega barrels/day
A-I/S = Acre-inch/sec	
A-I/M = Acre-inch/min	
A-I/H = Acre-inch/hr	
A-I/D = Acre-inch/day	
A-F/S = Acre-feet/sec	
A-F/M = Acre-feet/min	
A-F/H = Acre-feet/hr	
A-F/D = Acre-feet/day	

6. Scroll to the desired number of *Vol Decimal Digits* (digits to the right of the decimal point) in the volumetric flow display, and press **[Enter]**.

1.4.1.2 Totalizer Units

7. Scroll to the desired *Totalizer Units* for the totalized flow rate display (listed in *Table 11*), and press **[Enter]**.

Table 11: Totalizer Units

English	Metric
GAL = Gallons	L = Liters
MGAL = Mega gallons	ML = Megaliters
ft ³ = Cubic feet	m ³ = Cubic meters
Mft ³ = Mega cubic feet	Mm ³ = Mega cubic meters
BBL = Barrels	BBL = Barrels
MBBL = Mega barrels	MBBL = Mega barrels
AC-IN = Acre-inches	
AC-FT = Acre-feet	

8. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the totalized flow display, and press **[Enter]**.

The program now varies, depending on whether you have activated *Mass Flow* (see the *Programming Manual* for details) or the *Energy Option* in one of the **Channel PROGRAM** options.

- If you have activated *Mass Flow*, continue to step 1 on the next page.
- If you have activated the *Energy Option* (but not *Mass Flow*), skip to step 1 on page 1-30.
- If you have activated neither option, the XMT868i returns to the **Global PROGRAM** window. Press **[Escape]** to return to the **PROG** menu.

1.4.1.3 Programming Mass Flow Data

1. Scroll to the desired *Mass Flow Units* for flow rate display (listed in *Table 12*), and press **[Enter]**.

Table 12: Available Mass Flow Units

English	Metric
LB = Pounds	KG = Kilograms
KLB = KiloPounds (Thousands of Pounds)	Tonne = Metric Tons (1000 KG)
MMLB = MegaPounds	
TONS (2000 LB)	

2. Scroll to the desired *Mass Flow Time Units* (from seconds to days), and press **[Enter]**.
3. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the mass flow rate display, and press **[Enter]**.
4. Scroll to the desired *Mass Totals* (units for the totalized mass flow rate display, listed in *Table 12*), and press **[Enter]**.
5. Scroll to the desired number of *Mass Decimal Digits* (digits to the right of the decimal point) in the totalized mass flow rate display, and press **[Enter]**.

The program varies, depending on whether or not you have enabled the *Energy Option*.

- If you have not enabled the option, the XMT868i returns to the **Global PROGRAM** window. Press **[Escape]** to return to the **PROG** menu.
- If you have enabled the option, continue to the next page.

1.4.1.4 Programming the Energy Option

1. Scroll to the desired *Power Units* (listed in Table 13) and press **[Enter]**.

Table 13: Available Power Units

English	Metric
kBTUh = Thousands of BTUs/hour	kCALs = Kilocalories/second
MMBTU = Mega BTUs/hour	kCALm = Kilocalories/minute
kW = Kilowatt	kCALh = Kilocalories/hour
TONS = Tons (2000 LB)	kCALd = Kilocalories/day
	MCals = Megacalories/second
	MCALm = Megacalories/minute
	MCALh = Megacalories/hour
	MCALd = Megacalories/day
	kW = Kilowatt
	MW = Megawatt

2. Scroll to the desired number of *Power Decimal Digits*, and press **[Enter]**.
3. Scroll to the desired *Total Energy Units* (shown in Table 14), and press **[Enter]**.

Table 14: Available Total Energy Units

English	Metric
kBTU = Thousands of BTUs	kCAL = Kilocalories
MMBTU = Mega BTUs/hour	MCAL = Megacalories
kWHr = Kilowatt-hour	kWHr = Kilowatt-hour
TONS = Tons (2000 LB)	MWHr = Megawatt-hour

4. Scroll to the desired number of *Energy Decimal Digits*, and press **[Enter]**.

You have completed entering selections in this option. The program returns to the **Global PROGRAM** menu.

1.4.2 Setting Up Inputs and Outputs

Set up the XMT868i's inputs and outputs using the **I/O** submenu. While following the programming instructions, refer to *Figure 31 on page 74* and *Figure 32 on page 75*. Remember to record all programmed data in Appendix B, *Data Records*. The **I/O** submenu consists of the following options:

- **Error Handling** – program the meter's response during an error condition
- **Options** – set up any option cards and the **Slot 0** analog outputs
- **LCD** – set up the LCD display (refer to Chapter 2, *Displaying Data*)

To enter the **I/O** submenu:

1. From the **PROGRAM** menu, scroll to **GLOBL** and press **[Enter]**.
2. Scroll to **I/O** and press **[Enter]**.

Note: In this section, **Slot 1** appears as an option only if a suitable option card is installed in Slot 1.

1.4.2.1 Setting Up Error Handling

This menu option lets you set how the XMT868i will handle the outputs for measurements and average (two-path) measurements during an error condition. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of the built-in error codes.

1. In the **Global I/O** option, scroll to **ERROR** and press **[Enter]**.
2. Scroll to the desired *Error Handling* selection (as shown in *Table 15* and *Table 16 on page 27*).
 - a. If you selected *Other*, enter the *4-20 mA Error Level* (the number of milliamps the analog output will put out during a fault condition). Enter a whole number between 0 and 22, and press **[Enter]**.

See *Table 15* and *Table 16 on page 27* for a description of the error handling options available and how the totalizers and display respond to them for a single and two-channel meter.

Table 15: Error Options and Responses, Single-Channel Meter

Option	Output Response	Totalizer Response
HOLD	Holds the last "good" reading	Holds the last "good" reading and continues to totalize, based on that reading
LOW	Forces the outputs to the low set point	Stops totalizing
HIGH	Forces the outputs to the high set point	Stops totalizing
HHIGH	Forces the outputs $\approx 10\%$ above the high set point	Stops totalizing
OTHER	Allows user to enter 4-20 mA error level in mA.	Sends analog outputs to entered mA level when a fault occurs.

1.4.2 Setting Up Inputs and Outputs (cont.) Setting Up Error Handling (cont.)

Table 16: Error Options and Responses for a 2-Channel Meter

When Measuring	Display Response	Totalizer Response When Error Handling is	
		HOLD	LOW, HIGH, HHIGH
CH1 or CH2 (vel, vol, etc.)	Holds last “good” reading.	Holds last “good” reading and continues to totalize based on that “good” reading.	Stops totalizing.
SUM	Adds two channels using the last “good” reading.	Holds last “good” reading and continues to totalize based on two channels.	Stops totalizing if either or both channels go into error.
DIF	Subtracts two channels using last “good” reading.	Holds last “good” reading and continues to totalize based on two channels.	Stops totalizing if either or both channels go into error.
AVE	See <i>Error Handling for Average Measurements</i> below.		

For a one-channel meter, after responding to the above prompt, the meter returns to the **Global I/O** prompt shown on the previous page. For a two-channel meter, proceed to step 3 below.

Error Handling for Average Measurements – AVE

The **2PATH ERROR HANDLING** option is intended for applications where two sets of transducers are installed in the same location in the same pipe to improve accuracy and the meter is operated in **AVE** mode. With this function enabled, the Model XMT868i performs error handling only if both channels are in error. If this function is disabled, error handling occurs when either channel goes into error.

- 3.** Scroll to *Yes* to enable *Two-path Error Handling*, or on *No* to disable this function, and press **[Enter]**.

Specific responses of the display and the totalizer to the two-path error handling option available at the above prompt are listed in *Table 17*.

Table 17: 2-Path Error Response Options

Option	Display Response	Totalizer Response
NO	Displays the average of CH1 and CH2 , regardless of the error state of either channel.	Outputs the average of CH1 and CH2 totals, regardless of the error state of either channel.
YES	- If one channel is in error, the other channel's value is displayed as the average. - If both channels are in error, the last average reading is held.	- If one channel is in error, totalizing continues. - If both channels are in error, totalizing stops.

After responding to the above prompt, the meter returns to the **Global I/O** option.

1.4.2.2 Setting Up Option Cards

The Model XMT868i has two built-in analog outputs, which are assigned to **Slot 0**. Also, a variety of input/output option cards may be installed in **Slot 1**. See Chapter 1, *Installation*, of the *Startup Guide* for a complete description of the available option cards.

To access this submenu, scroll to **OPTN** in the **I/O** option. To set up and/or scale the inputs and outputs, complete the following steps:

- Scroll to the desired *I/O Slot* to program the *I/O* functions in that slot, and press **[Enter]**.

Note: If an option card is not installed in Slot 1, the **Slot1** option does not appear at the above prompt.

Proceed to the appropriate section for programming instructions specific to the type of input or output selected above.

Analog Outputs

Complete the following steps to set up the analog outputs for any slot (refer to *Figure 31* on page 74):

1. Scroll to the desired *Output* (A or B), and press **[Enter]**.

Note: The set up of output A is used here as an example. Identical procedures would be used to set up output B.

2. Scroll to *Off* to disable Output A and return to step 1, or on *0-20 mA* or *4-20 mA* to specify the desired range for output A. In either case, press **[Enter]**.

Note: For a 1-Channel meter, proceed to step 4.

3. Scroll to the desired *Channel* option and press **[Enter]**. See *Table 18* for a description of the channel options available.

Table 18: Channel Options

Option	Description
CH1	Channel 1
CH2	Channel 2
SUM	CH1+CH2
DIF	CH1-CH2
AVE	(CH1+CH2)/2

4. Scroll to the desired *Measurement Name* and press **[Enter]**. (*Table 19* on page 28 provides a description of the available parameters.)

Note: All the options shown below will only appear if the *Mass Flow* and *Energy Options* are activated.

Table 19: Output Measurement Options

Option Bar Choice	Description
VEL	Flow Velocity
VOLUM	Volumetric Flow
+TOTL	Forward Totalized Volume Flow
-TOTL	Reverse Totalized Volume Flow
TIME	Total Flow Measurement Time
MDOT	Mass Flow
+MASS	Forward Totalized Mass Flow
-MASS	Reverse Totalized Mass Flow
POWER	Energy Flow Power
+ENRG	Forward Energy Flow
-ENRG	Reverse Energy Flow

Table 19: Output Measurement Options(Continued)

Option Bar Choice	Description
SS up	Signal strength for the upstream transducer.
SS do	Signal strength for the downstream transducer.
DAC up	AGC DAC count for upstream gain setting.
DAC do	AGC DAC count for downstream gain setting.
Soundspeed	Measured speed of sound in the fluid.
T up	Upstream ultrasonic signal transit time.
Tdown	Downstream ultrasonic signal transit time.
DELTAT	Transit time difference between upstream and downstream signals.
REYN#	Current velocity/reynolds number.
K (RE)	K factor, based on the Reynolds number.
PEAK%	Percentage of peak (set to +50 by default).
THETA3	Theta 3 is the angle between the ultrasonic beam and the normal to the pipe wall. It is calculated from the measured transit time and clamp-on parameters (clamp-ons only).
Qup	Displays the signal quality for the upstream transducer.
Qdown	Displays the signal quality for the downstream transducer.
AMPup	Displays the value for the signal amplitude of the upstream transducer.
AMPdn	Displays the value for the signal amplitude of the downstream transducer.
P#up	Displays signal peaks for the upstream transducer.
P#dn	Displays signal peaks for the downstream transducer.
NFup	Displays the normalization factor for the upstream transducer.
NFdn	Displays the normalization factor for the downstream transducer.
Cxdcr	Displays the speed of sound in the transducer (clamp-on only).
TEMPs	Displays the temperature for the supply input (energy measurement).
TEMPr	Displays the temperature for the return input (energy measurement).
Ts-Tr	Difference between supply input and return input measurement (energy measurement).
DENSs	Displays the density for the supply input (energy measurement).
DENSr	Displays the density for the return input (energy measurement).
DELTh	Displays the delta enthalpy which is the difference between the supply and return. Enthalpy is a measure of energy contained in the fluid (energy measurement).

Note: The measurement units that appear in these prompts are those selected in the **Global-System** menu earlier in this section.

5. Enter a measurement value for the *Base* (low) end of the analog output range and press **[Enter]**.
6. Enter a measurement value for the *Full* (high) end of the analog output range and press **[Enter]**.

After responding to the above prompt, the meter returns to the I/O option.

1.4.2.2 Setting Up Option Cards (cont.)

Option Card Analog Inputs

Complete the following steps to set up the analog inputs of an option card installed in **Slot 1** (refer to *Figure 32* on page 75):

1. Scroll to the desired *Input* (**A, B, C** or **D**) and press **[Enter]**.

Note: *The setup of Input A is used as an example. Identical procedures would be used to set up the remaining inputs.*

2. Enter a *Label* of up to eight characters for input A and press **[Enter]**.
3. Scroll to *Off* to disable **Input A** and return to step 1, or on *Temp* or *Spec* to designate it as a temperature or special input, and press **[Enter]**.

- OFF

If **OFF** was selected to disable input A, the meter returns to the *Input* prompt in step 1. Scroll to another input, or press **[Escape]** to move to another menu.

- TEMP

If **TEMP** was selected to set up input A as a live temperature input, complete steps 4 and 5 below:

4. Enter a temperature value for the *Base* (low) end of the analog input range and press **[Enter]**.
5. Enter a temperature value for the *Full Scale* (high) end of the analog input range and press **[Enter]**.

After responding to the above prompt, the meter returns to step 1. Press **[Escape]** to proceed to another menu or option.

- SPEC

If **SPEC** was selected to set up **Input A** as a live special input, complete steps 6 through 10 below:

6. Enter a *Name* for input A and press **[Enter]**.
7. Enter the *Units* of measurement for **Input A** and press **[Enter]**.
8. Enter a value for the *Base* (low) end of the analog input range and press **[Enter]**.
9. Enter a value for the *Full Scale* (high) end of the analog input range and press **[Enter]**.

After responding to the above prompt, the meter returns to step 1. Press **[Escape]** to proceed to another menu or option.

Option Card RTD Inputs

Option cards with RTD inputs have a temperature range of -148° to 660°F (-100° to 350°C). Complete the following steps to set up the RTD inputs of an option card installed in **Slot 1** (refer to *Figure 32 on page 75*):

1. Scroll to the desired *Input* (**A**, **B**, **C** or **D**) and press **[Enter]**.

Note: The setup of RTD input A is used here as an example. Identical procedures would be used to set up the remaining RTD inputs.

2. Enter a *Label* of up to eight characters for **Input A** and press **[Enter]**.
3. Scroll to *Off* to disable **Input A** and return to step 1, or on *Temp* to enable **Input A** as a live temperature input, and press **[Enter]**.
4. Enter a temperature value for the *Base* (low) end of the analog input range and press **[Enter]**.
5. Enter a temperature value for the *Full* (high) end of the analog input range and press **[Enter]**.

After responding to the above prompt, the meter returns to step 1. Press **[Escape]** to proceed to another menu or option.

1.4.2.2 Setting Up Option Cards (cont.)

Option Card Alarm Relays

Complete the following steps to set up the alarm relays of an option card installed in **Slot 1** (refer to *Figure 32* on page 75):

1. Scroll to the desired *Output* (**A, B, C** or **D**), and press **[Enter]**.

Note: The setup of **Alarm A** is used here as an example. Identical procedures would be used to set up the additional alarms.

2. Scroll to *Off* to disable Output A and return to step 1, or on *High, Low* or *Fault* to select the desired alarm type. Press **[Enter]**.
3. Scroll to *No* for standard alarm operation, or on *Yes* for *Failsafe* operation and press **[Enter]**. (See Chapter 1, *Installation*, of the *Startup Guide* for failsafe wiring instructions.)

For a 1-Channel meter, proceed to step 5.

4. Scroll to the desired *Channel* option, and press **[Enter]**. See *Table 20* for a description of the channel options available.

Table 20: Channel Options

Option	Description
CH1	Channel 1
CH2	Channel 2
SUM	CH1+CH2
DIF	CH1-CH2
AVE	$(CH1+CH2)/2$

Note: If **FAULT** was selected as the alarm type, the next two prompts do not appear. You have completed entering data in this option.

5. Scroll to the desired *Measurement Name*, and press **[Enter]**. (*Table 19* on page 28 provides a description of the available parameters.)

Note: The measurement units that appear in these prompts are those selected in the **Global-SYSTM** menu earlier in this section.

6. Enter a value for the *Trigger Point* of the alarm and press **[Enter]**.

After responding to the above prompt, the meter returns to step 1. Press **[Escape]** to proceed to another menu or option.

Option Card Totalizer Outputs

This type of output issues one pulse per selected volume of flow. The meter produces a pulse each time the programmed amount of flow passes through the pipe. Complete the following steps to set up the totalizer outputs of an option card installed in **Slot 1**:

1. Scroll to the desired *Output* (**A, B, C** or **D**), and press **[Enter]**.

Note: *The set up of output A is used as an example. Identical procedures would be used to set up the other outputs.*

2. Scroll to *Off* to disable **Output A** and return to step 1, or on *TTLZR* to set up **Output A** as a totalizer output. Press **[Enter]**.

For a 1-Channel meter, skip to step 4.

3. Scroll to the desired *Channel* option, and press **[Enter]**. See *Table 20 on page 32* for a description of the channel options available at the above prompt.
4. Scroll to the desired *Measurement Name*, and press **[Enter]**. (*Table 19 on page 28* provides a description of the available parameters.)

Note: *The measurement units that appear in these prompts are those selected in the **GLOBL-SYSTM** menu earlier in this section.*

5. Enter a value between 50 μsec and 500,000 μsec for *Min. Pulse On Time* (the frequency of the totalizer pulses) and press **[Enter]**.

Note: *A complete pulse consists of equal amounts of **ON** and **OFF** times. Choose a value that is compatible with the counter to be used.*

6. Enter a value for the number of measurement units represented by each pulse, and press **[Enter]**.

After responding to the above prompt, the meter returns to step 1. Press **[Escape]** to proceed to another menu or option.

Option Card Frequency Outputs

This type of output produces a frequency pulse that is proportional to the output measurement. Complete the following steps to set up the frequency outputs of an option card installed in **Slot 1** (see *Figure 32 on page 75*):

1. Scroll to the desired *Output* (**A**, **B**, **C** or **D**), and press **[Enter]**.

Note: *The set up of **Output A** is used as an example. Identical procedures would be used to set up the other outputs.*

2. Scroll to *Off* to disable **Output A** and return to step 1, or on *Frequency* to set up **Output A** as a frequency output. Press **[Enter]**.

For a 1-Channel meter, skip to step 4.

3. Scroll to the desired *Channel* option. See *Table 20 on page 32* for a description of the channel options available at the above prompt.
4. Scroll to the desired *Measurement Name*. (*Table 19 on page 28* provides a description of the available parameters.)

Note: *The measurement units that appear in these prompts are those selected in the **GLOBL-SYSTM** menu earlier in this section.*

5. Enter a flow rate value for the *Base* (low) end of the frequency output range and press **[Enter]**.
6. Enter a flow rate value for the *Full* (high) end of the frequency output range and press **[Enter]**.
7. Enter a value between 1 and 10,000 for the *Full Scale Frequency* and press **[Enter]**.

After responding to the above prompt, the meter returns to step 1. Press **[Escape]**:

- once to return to the **Global I/O** option:
- twice to return to the **Global PROGRAM** option:
- three times to return to the **PROG** menu:
- four times to return to the *Keypad Program* menu:
- five times to exit the *Keypad Program* and return to the XMT868i display.

1.4.3 Entering Communications Data

The Model XMT868i flowmeter is equipped with an RS232 or an RS485 serial interface. MODBUS (RS485), MODBUS/TCP, Ethernet and Foundation-Bus options are available. When the MODBUS, MODBUS/TCP or Foundation Field Bus options are present, the XMT868i may also have the standard RS232/RS485 serial interface. When the Ethernet option is present, the RS232/RS485 serial interface is not present.

Note: To set Fieldbus communications parameters, see Appendix E, Foundation Fieldbus Communications.

The serial port is used to transmit stored data and displayed readings to a personal computer by connecting the meter's serial interface to the serial port of the PC. In addition, the Model XMT868i can receive and execute remote commands, using *PanaView* software, using this link.

Use the **COMM** option to set the communications port and MODBUS parameters. While following the programming instructions, refer to *Figure 31* on page 74.

1.4.3.1 Setting Up the Serial Port

1. To enter this submenu from the **Global PROGRAM** menu, scroll to **COMM** and press **[Enter]**.
2. Enter a *Meter Address* number between 1 and 254 and press **[Enter]**. The default number is 1.

A meter address is only necessary for communication with the Panametrics *PanaView* software. See the *PanaView User's Manual* for more information.

IMPORTANT: If the meter address or baud rate is changed, communication with *PanaView* must be re-established with the new address number.

3. Scroll to the desired *Baud Rate* (300 to 19,200) and press **[Enter]**.

IMPORTANT: The Ethernet option requires that the meter's baud rate is set to the same rate as the Ethernet option. The factory default is 9600 baud. If a different baud rate is desired, first change the meter's rate, and then change the Ethernet's baud rate setting by using the Device Discovery utility.

- If you have the RS485 MODBUS option, proceed to step 4 on the next page.
- If you have the standard RS232 serial interface or optional Ethernet interface, the meter exits the **COMM** submenu and returns to the **Global PROGRAM** prompt.

1.4.3.2 Setting Up MODBUS (RS485) and MODBUS/TCP Communications

When equipped with an optional MODBUS output card, the XMT868i can transmit flow data serially to a flow computer, or SCADA, using a Gould-type RTU protocol. Thus only the MODBUS function command, 3 (read multiple registers), 6 (write multiple registers) is valid. The XMT868i uses the following format for the data exchange:

- The *Send* command (initiated by the host flow computer or controller) comes in the form:
[time delimiter]<Addr><3><First Register MSB>
<First Register LSB> <Register Count MSB>
<Register Count LSB><CRC Low><CRC High>[time delimiter]
- The *Response* (initiated by the host flow computer or controller) comes in the form:
[time delimiter]<Addr><3><Byte count><Data.....>
<CRC Low><CRC High>[time delimiter]

The format for the returned data types is:

- Integer (16 bit Integer) <MSB><LSB>
1 Register – 16 bit integer
- Integer (32 bit Integer) <MSB><LSB><LSB><LSB>
2 Register – 32 bit integer
- Floating Point (FP) <EXP><MAN><MAN><MAN>
2 Registers – 32 bit IEEE floating point number

Use the steps below to configure MODBUS communications:

IMPORTANT: The XMT868i MODBUS communications settings chosen in the next four steps must match those of the MODBUS control system.

4. Scroll to the desired *MODBUS Baud Rate* and press [Enter].

IMPORTANT: The MODBUS./TCP interface requires a baud rate of 9600.

5. Scroll to the *MODBUS Parity* and press [Enter].

6. Scroll to the *MODBUS Stop Bits* and press [Enter].

7. Enter a MODBUS *Meter Address* (between 1 and 254) and press [Enter]. (The default address is 1.)

The meter returns to the **Global PROGRAM** prompt. Press [**Escape**] twice to return to the *Keypad Program*, and a third time to return to the meter display.

IMPORTANT: You must reboot the XMT868i to load the new settings.

Refer to the section *Requesting Parameters Using MODBUS* on Section 1.4.3.4 to retrieve data from the XMT868i using MODBUS.

1.4.3.3 Setting Up a MODBUS/TCP Connection

A modified XMT868i can use the MODBUS/TCP interface to communicate with an internal network. An optional MODBUS/TCP card with a unique MAC (IP) address (installed only in slot 2) includes an RJ45 connector. To connect the MODBUS/TCP-enabled XMT868i to the network, insert the jack of an RJ45 cable into the RJ45 connector, route the cable through a conduit hole with an appropriate cable clamp, and wire the other end of the cable to the LAN according to the manufacturer's instructions.

To establish MODBUS/TCP communications with the XMT868i, you must install the **Ruiping** software utility (available with your modified XMT868i) on a PC connected to the LAN. Once installed and running, the software displays all Ethernet devices currently connected to the subnet. You can identify the XMT868i by its MAC address, supplied as part of customer documentation. The default TCP Port is 502.

The default IP addressing for the XMT868i is DHCP (dynamic). If you need to assign a static IP address to the XMT868i, complete the following steps:

IMPORTANT: To assign a static IP address, the XMT868i must be connected to an Ethernet network with a dynamic address assignment mechanism (DHCP) first.

1. Run **Ruiping** software, and identify the XMT868i's current IP address.

Note: "Ruiping-e" will return the found IP addresses as well as the MAC address.

2. From a DOS command prompt, type: **telnet "ip address" 10000**
3. The **"Welcome to Net+Works Configuration Utility"** opens. Type in the login name and password.
 - a. **Login:** type **root**.
 - b. **Password:** type **Netsilicon**.
4. In the Main Menu:
 - a. Select **IP Parameters (1)**. Enter the desired IP changes and return to the Main Menu.
 - b. Select **Enable DHCP Client (3)**. Select N (2) to disable, then select 4 for Main Menu.
 - c. At the Main Menu, select 4 for **Quit**. Power cycle the XMT868i (i.e., turn the meter off and on) to apply the changes.

Refer to the section *Requesting Parameters Using MODBUS* on Section 1.4.3.4 to retrieve data from the XMT868i using MODBUS.

1.4.3.4 Requesting Parameters Using MODBUS

To request specific parameters from the XMT868i using the MODBUS, the control system must access the appropriate register number, as shown in Table 21. Only registers 1–84 are available with the XMT868i for MODBUS communications. Registers 508–512 are used by the XMT868i to store the MODBUS parameters.

Table 21: MODBUS Registers

MODBUS Reg #	DPR Hex Addr	Description	Units	Scaling (decimal places)	Size in Bytes
1		¹ Clear Totalizers	none	--	2 (16 bit signed)
2		CH1 Velocity	ft/s or m/s	2	4 (32 bit integer)
4		CH1 Volumetric	VOL_U	--	4 (IEEE 32 bit)
6		CH1 +Totals	TOT_U	Register 10	4 (32 bit integer)
8		CH1 -Totals	TOT_U	Register 10	4 (32 bit integer)
10		CH1 #T Digits	none	0	2 (16 bit integer)
11		CH1 Totalizer Time	sec	2	4 (32 bit integer)
13		² CH1 Error Value	none	0	2 (16 bit integer)
14		CH1 SSUP	none	1	4 (32 bit integer)
16		CH1 SSDN	none	1	4 (32 bit integer)
18		CH1 SNDSP	ft/s or m/s	0	4 (32 bit integer)
20		CH2 Velocity	ft/s or m/s	2	4 (32 bit integer)
22		CH2 Volumetric	VOL_U	--	4 (IEEE 32 bit)
24		CH2 +Totals	TOT_U	Register 28	4 (32 bit integer)
26		CH2 -Totals	TOT_U	Register 28	4 (32 bit integer)
28		CH2 # T Digits	none	0	2 (16 bit integer)
29		CH2 Totalizer Time	sec	2	4 (32 bit integer)
31		² CH2 Error Value	none	0	2 (16 bit integer)
32		CH2 SSUP	none	1	4 (32 bit integer)
34		CH2 SSDN	none	1	4 (32 bit integer)
36		CH2 SNDSP	ft/s or m/s	0	4 (32 bit integer)
38		³ AVG Velocity	ft/s or m/s	2	4 (32 bit integer)
40		³ AVG Volumetric	VOL_U	--	4 (IEEE 32 bit)
42		³ AVG+Totals	TOT_U	Register 46	4 (32 bit integer)
44		³ AVG-Totals	TOT_U	Register 46	4 (32 bit integer)
46		AVG #T Digits	none	0	2 (16 bit integer)
47		³ AVG Totalizer Time	sec	2	4 (32 bit integer)
49		⁴ AVG Error Value	none	0	2 (16 bit integer)
50		³ AVG SSUP	none	1	4 (32 bit integer)
52		³ AVG SSDN	none	1	4 (32 bit integer)
54		³ AVG SNDSP	ft/s or m/s	0	4 (32 bit integer)
56		CH1 Power	Power_u	--	4 (IEEE 32 bit)
58		CH1 +Energy	Energy_u	Register 62	4 (32 bit integer)
60		CH1 -Energy	Energy_u	Register 62	4 (32 bit integer)
62		CH1 # Energy Digits	none	0	2 (16 bit integer)

Table 21: MODBUS Registers(Continued)

MODBUS Reg #	DPR Hex Addr	Description	Units	Scaling (decimal places)	Size in Bytes
63		CH 1 TempS	°F or °C	2	4 (32 bit integer)
65		CH 1 TempR	°F or °C	2	4 (32 bit integer)
67		CH 1 TS-TR	°F or °C	2	4 (32 bit integer)
69		CH 1 DELTH	Btu/lb or J/gm	2	4 (32 bit integer)
71		CH 2 Power	Power_u	--	4 (IEEE 32 bit)
73		CH 2 +Energy	Energy_u	Register 77	4 (32 bit integer)
75		CH 2 -Energy	Energy_u	Register 77	4 (32 bit integer)
77		CH 2 # Energy Digits	none	0	2 (16 bit integer)
78		CH 2 TempS	°F or °C	2	4 (32 bit integer)
80		CH 2 TempR	°F or °C	2	4 (32 bit integer)
82		CH 2 TS-TR	°F or °C	2	4 (32 bit integer)
84		CH 2 DELTH	Btu/lb or J/gm	2	4 (32 bit integer)
508	3F6	⁵ MODBUS baud rate	none	0	2 (16 bit integer)
509	3F8	⁶ MODBUS parity	none	0	2 (16 bit integer)
510	3FA	⁷ MODBUS stop bits	none	0	2 (16 bit integer)
511	3FC	MODBUS meter addr	none	0	2 (16 bit integer)
512	3FE	RESERVED	none	---	---

:

Notes:

- 1. Clear Totalizers:** flag from the 8051 to clear totalizers in the 68332 memory.
- 2. Error Value:** see table in XMT868i manual for error codes
- 3. Average:**
average of channel 1 and channel 2 if both channels out of error,
channel 1 value if channel 2 is in error,
channel 2 value if channel 1 is in error,
zero if both channels in error.
- 4. Average Error Status:**
0 = both in error
1 = chan 2 in error,
2 = chan 1 in error,
3 = both ok
- 5. MODBUS baud rate:**
5 = 2400, 6 = 4800, 7 = 9600
- 6. MODBUS parity:**
0 = none, 1 = odd, 2 = even
- 7. MODBUS stop bits:**
1 = 1 stop bit, 2 = 2 stop bits
- 8. General:**
Registers are written if corresponding functions are actuated by the user. Registers for unactuated functions are initialized to zero at startup.

1.5 Exiting the User Program

After completing the **COMM** option, the XMT868i returns to the **Global PROGRAM** prompt. Press **[Escape]** twice to return to the *Keypad Program*, and a third time to return to the meter display. Then proceed to Chapter 3, *Operation*, of the *Startup Guide* for instructions on taking measurements, or refer to the appropriate chapters of this manual for detailed instructions on using the other features of the XMT868i flow transmitter.

Chapter 2. Displaying Data

2.1 Introduction

This chapter explains how to display measurement data using either of the available methods:

- **LCD Display** – show data on the built-in display
- **PanaView** – display data on a computer terminal using the optional PanaView software

2.2 Displaying Data with the LCD

When equipped with the Liquid Crystal Display (LCD), the Model XMT868i may be programmed to display up to four variables in sequence. In addition, the contrast of the LCD may be adjusted for optimum viewing. Proceed to the appropriate section for instructions.

2.2.1 Adjusting LCD Contrast

The LCD contrast may be adjusted through the *Keypad Program* to suit individual needs.

1. Press **[Escape]**, **[Enter]**, **[Escape]**.
2. In the *Keypad Program* window, scroll to **CNTRS** and press **[Enter]**.
3. Scroll to **DARKN** or **LITEN** and press **[Enter]** until the screen shows the desired contrast.
4. When you have achieved the desired contrast, scroll to **STORE** to retain the setting, or to **ABORT** to leave the menu without changing the setting. In either case, the XMT868i returns to the *Keypad Program*.
5. Then press **[Escape]** to return to the display screen.

2.2.2 Programming the LCD

Note: When you first initialize the XMT868i, the number of LCD parameters is set to OFF. You must program the LCD to display any measured parameters.

Through the *Keypad Program*, you can program the LCD display to display up to four variables in sequence. Complete the following steps to program the LCD display:

1. Power up the XMT868i and wait until it has initialized.
2. Press **[Escape]**, **[Enter]**, **[Escape]**.
3. In the *Keypad Program* window, scroll to **PROG** and press **[Enter]**.
4. In the **PROG** menu, scroll to **GLOBL** and press **[Enter]**.
5. Scroll to **I/O** and press **[Enter]**.
6. Scroll to **LCD** and press **[Enter]**.
7. The window now asks for the # of LCD Parameters. Scroll to the desired number (from **OFF** through **1-4** and **KEY**) and press **[Enter]**.

The **OFF** setting switches the measurement display off, while the **KEY** setting enables users to change the measurement display using the arrow keys, without accessing the *Keypad Program*. If you select **KEY**:

- To view a different parameter, press the **[△]** and **[▽]** keys to scroll through the various parameters.
- To scroll through the channel options on a two-channel XMT868i, press the **[<]** and **[>]** keys until you have reached the desired option.

For a 1-Channel XMT868i, the data for Channel 1 is displayed automatically, and you can skip to step 9. However, for a 2-Channel meter, the channel data to be displayed must be specified at the following prompt.

8. Scroll to the desired *Channel option*, as listed in Table 22.

Table 22: Channel Options

Option	Description
CH1	Channel 1
CH2	Channel 2
SUM	CH1+CH2
DIF	CH1-CH2
AVE	$(CH1+CH2)/2$

9. For each channel, select the desired *Measurement Parameter*, as shown in Table 19 on page 28.

Note: The measurement units that appear in these prompts are those selected in the **GLOBL-SYSTM** menu earlier in this section. Also, when differences in one channel's programming invalidate an output previously chosen for the other, the measurement defaults to the nearest selectable item in the parameter list.

The previous two prompts repeat until all of the specified **# of LCD Parameters** have been set up. When all of the display parameters have been set up, the meter returns to the **Global I/O** window. To leave the *Keypad Program*, press the **[Escape]** key three times.

After leaving the *Keypad Program*, the XMT868i will reset itself and will begin to display the parameters specified in this section. If more than one parameter was set up, each of the parameters will be displayed in sequence, with a pause of several seconds between display changes.

2.3 Displaying Data on a Computer Terminal

The flow rate data collected by the XMT868i may be displayed in various formats on a remote computer terminal using the meter's RS232/RS485 serial or Ethernet port. This requires the use of the optional PanaView software. Refer to the instructions below to display data using PanaView.

2.3.1 Preparing for PanaView Programming

Before you attempt to communicate with the XMT868i, be sure you have linked your PC to the XMT868i using its communication interface. For details on wiring the interface, refer to *Wiring the Serial Port* in the *Startup Guide*, and to the document *EIA-RS Serial Communications* (916-054). You must also install PanaView, as discussed in the *PanaView User's Manual* (910-211), and in Appendix C, *Programming the XMT868i Using PanaView™*.

1. Power up the XMT868i and wait until it has initialized.
2. Launch PanaView and wait until it initializes the XMT868i and displays the basic PanaView window.
3. As described in Appendix C, open the *Meter Browser* window and highlight the meter to be used.

At this time, any of PanaView's comprehensive data handling capabilities may be used. These include:

- collecting and displaying live data in text format
- collecting and displaying live data in graphical format
- collecting and logging live data
- displaying a log file in text format
- displaying a log file in graphical format

To access PanaView's data handling options, pull down the *Output* menu, as shown in *Figure 2*.

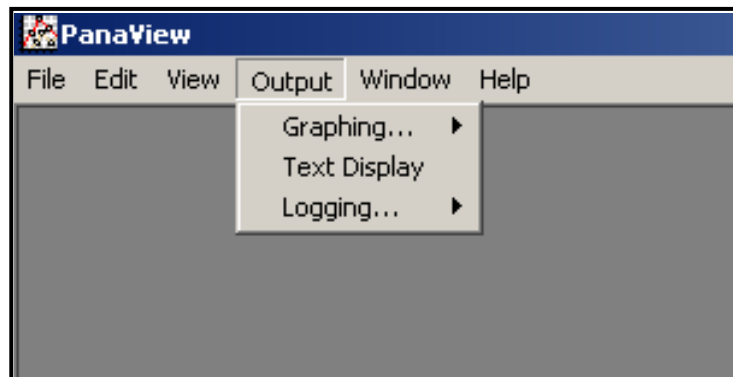


Figure 2: Output Menu

2.3.1 Displaying Data on a Computer Terminal (cont.)

Proceed directly to the appropriate section for instructions on either of the following output options:

- *Text Display* output, discussed below
- *Graphing* output on Section 2.3.3

Note: For information on the Logging output, see Chapter 3, Logging Data.

2.3.2 The Text Display Output

To collect data from the instrument and display it on a text screen, complete the following steps:

1. Complete Steps 1-3 on the previous page.
2. Pull down the *Output* menu and click on the *Text Display* option (see Figure 2 on page 43).

Note: The *Text Display* window that appears after Step 2 is actually stacked on top of any previously opened windows (such as the *Meter Browser* window).

3. Using the *Window* menu, arrange the open windows in the desired format. For this discussion, Figure 3 shows the *Text Display* window in its maximized (full-screen) size.

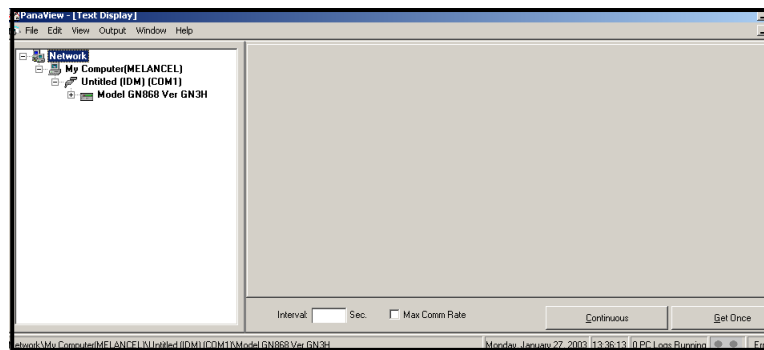


Figure 3: Text Display Window

Note: Figure 3 has been compressed both vertically and horizontally for improved clarity.

4. The left pane of the *Text Display* window contains the standard PanaView network tree. Expand this tree as far as necessary, and double click on the desired process parameter to display it in the right pane of the window.
5. Before actual data values can be displayed in the text pane, activate one of the following data collection modes (see Figure 3 on page 44):
 - Click on the **[Get Once]** option button at the bottom of the right pane in the *Text Display* window. The current value of the selected process parameter, as specified in the PanaView network tree, is displayed in the right pane of the *Text Display* window, or
 - Enter an *interval* in the text box at the bottom of the right pane in the *Text Display* window, or check the *Max. Comm Rate* box to collect readings as fast as the system allows (1 sec). Then, click on the **[Continuous]** option button to begin collecting data for display in the right pane of the *Text Display* window.

Note: Any value entered in the *Interval* text box is overridden if the *Max. Comm Rate* box is checked.

6. If the **[Continuous]** option was selected in Step 5 above, click on the **[Stop]** option button, which has replaced the original **[Continuous]** option button, to terminate data collection.

The *Text Display* window may be left open while other tasks are performed, or it may be closed by clicking on the lower **[X]** control button at the far right of the menu bar.

IMPORTANT: If you click on the upper **[X]** control button at the far right of the PanaView title bar, you will exit PanaView completely.

2.3.2.1 Displaying Multiple Process Parameters

The procedure for displaying a single process parameter in a text screen may be repeated to simultaneously display multiple process parameters. To do so, proceed as follows:

1. Display the first process parameter in a text screen, as described in the previous section.
2. Repeat Step 1 for any desired additional process parameters, by double clicking on them in the PanaView network tree. PanaView automatically tiles the multiple text screens in the right pane of the *Text Display* window.
3. As in any standard Windows application, the multiple text screens may be resized by dragging their borders. Also, the individual panes within a parameter's text screen may be resized by dragging the borders within that text screen.
4. To close an open text screen, right click anywhere within that screen (except in the title bar or the error section) and click on the **[Remove]** option that pops up in the context menu.

Note: *After resizing or removing any of the multiple text screens, the default tiled layout may be restored by opening the "Window" menu (see the PanaView User's Manual) and clicking on the "Tile Output Displays" option.*

2.3.2.2 Displaying Multiple Text Windows

The procedures for displaying one or more process parameters in a single *Text Display* window may be repeated to open multiple *Text Display* windows. To do so, proceed as follows:

1. To open another *Text Display* window, repeat the steps on page 2-5 and 2-6.
2. To display the desired process parameter(s) in the new window, repeat Steps 1-4 above.
3. Arrange the multiple *Text Display* windows as desired using the *Window* menu.

2.3.3 The Graphing Output

To collect data from the instrument and display it graphically in a new format, complete the following steps:

2.3.3.1 Setting Up a Graph

1. Perform Steps 1-3 on Section 2.3.1.
2. Pull down the *Output* menu and click on the *Graphing - New* option (see Figure 2 on page 43).

Note: The Graph window is stacked on top of any previously opened windows (such as the Meter Browser window).

3. Using the *Window* menu, arrange the open windows in the desired format. For this discussion, Figure 4 shows the Graph window in its maximized (full-screen) size.

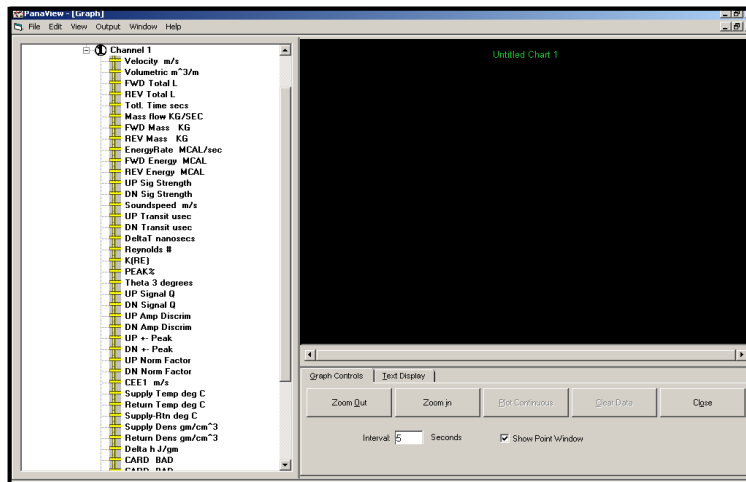


Figure 4: Graph Window

The *Graph* window shown above consists of three panes:

- *left pane* - PanaView network tree
- *top right pane* - graph with default chart style
- *bottom right pane* - graph controls or text display

Note: The three panes of the Graph window may be resized by simply dragging their borders.

2.3.3.2 Graphing Data

The PanaView network tree has already been described, and the display pane shows only a graph in the default style with no data points. The bottom right pane enables you to set up the graph. To begin graphing your data, proceed as follows:

1. Expand the network tree as far as necessary and double click on the process parameter to be graphed. The grid for the selected graph appears in the display pane, with *Time* as the x-axis and the parameter *Value* as the y-axis. In addition, a *legend* appears above the graph, which indicates the name, data point shape and line color for that parameter.
2. If desired, a second parameter may be added to the graph by repeating Step 1. In this case, the parameter "Value" is shown as a *right y-axis (Y2)*.

Note: *Although only two parameters may be graphed for any one meter channel, the same two parameters may also be graphed for any other active meter channels.*

3. To begin plotting data for the selected parameter(s), enter a time *Interval* for data sampling in the text box provided (the default value is 5 seconds).
4. Click on the **[Plot Continuous]** control button to begin graphing the selected process parameter(s) as a function of time, at the interval specified in Step 3.
5. While PanaView is graphing the data, the following actions may be taken from the control pane:
 - change the sampling interval by entering a new value
 - click on the **[Zoom Out]** control button to increase the size of the intervals shown on the x-axis
 - click on the **[Zoom In]** control button to decrease the size of the intervals shown on the x-axis

Note: *The zoom buttons may be clicked multiple times to enhance the effect.*

- click on the *Text Display* tab to view the data being graphed in the text format described in the previous section

When you have finished graphing your data, click on the **[Stop]** control button, which has replaced the original **[Plot Continuous]** control button.

For further information on setting up graph properties, refer to Chapter 5, *Displaying Data*, of the *PanaView User's Manual*.

2.3.4 Displaying Transducer Signals

Along with flow rate data, PanaView enables XMT868i users to read and plot transducer signals from the XMT868i.

- 1. From the *New Meter Browser*, highlight the XMT868i.
- 2. Right-click on the highlighted XMT868i and click on the *Properties* option, as shown in *Figure 5*.

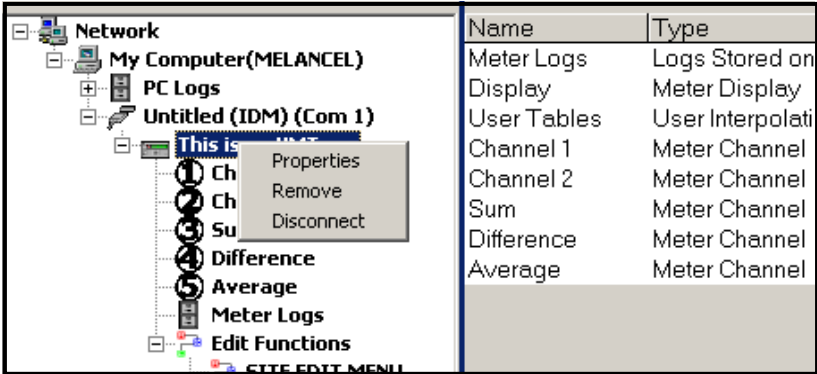


Figure 5: *Properties* Option in the *New Meter Browser*

The *Properties* window opens, as shown in *Figure 6*.

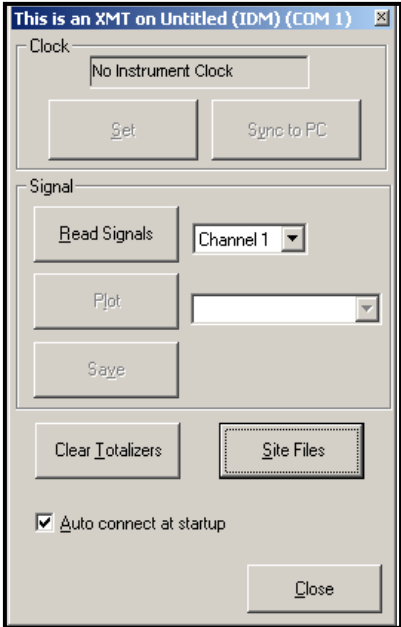


Figure 6: *Properties* Window

2.3.4.1 Reading Transducer Signals

3. To read a signal from the meter, click on the **[Read Signals]** button. (If the meter is a multi-channel instrument, open the Channel drop-down menu and click on the desired channel.) After a moment, the *Properties* window appears similar to *Figure 7*.

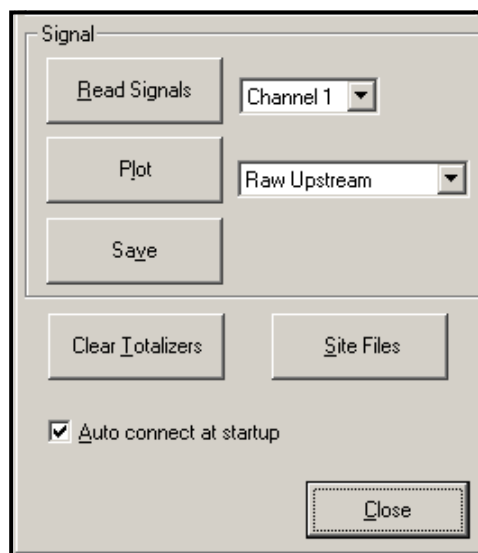


Figure 7: Active Signal Options

4. To select a different signal type, open the signal menu at the right (shown here with *Raw Upstream* highlighted) and click on the desired signal.

2.3.4.2 Plotting Transducer Signals

To plot the selected signal, click on **[Plot]**. A graphical window opens, as shown in *Figure 8*.

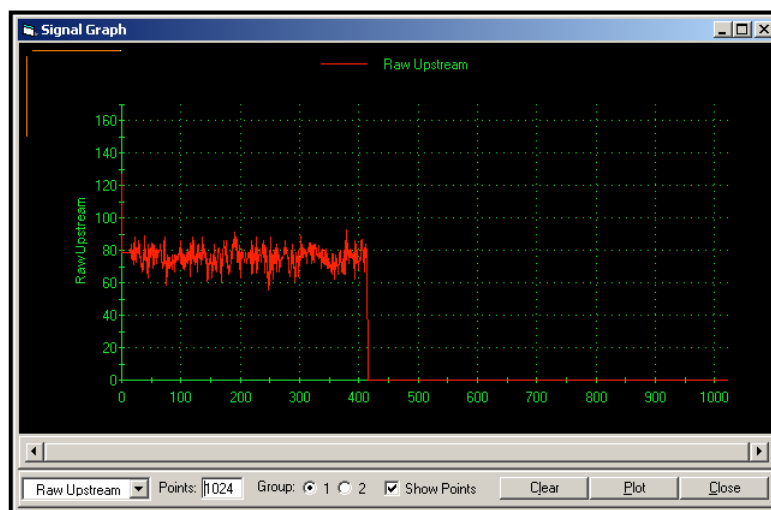


Figure 8: *Signal Graph* Window

2.3.4.3 Saving Transducer Signals

To save the raw signal, click on **[Save]**. A window opens similar to *Figure 9*. Enter the desired name, and click on **[Save]** to save the signal as a text file.

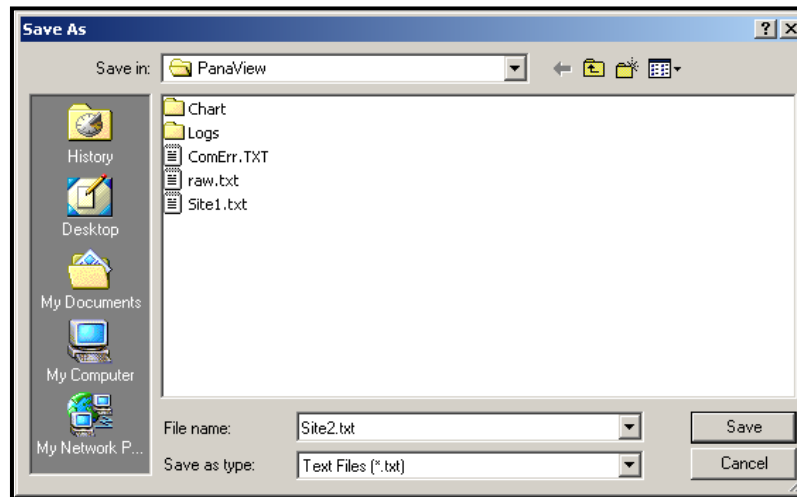


Figure 9: *Save As* Window

Chapter 3. Logging Data

3.1 Introduction

The XMT868i offers two options for logging data:

- If the Model XMT868i flowmeter is equipped with an optional *data logging card* in **Slot 2**, flow rate data can be recorded and stored in this memory in the form of a *log file*. After the specified data has been logged, the log file may be uploaded to PanaView using the RS232 link.
- PanaView can also create *PC log files* for storage on the PC's hard drive.

This chapter explains how to use the Model XMT868i's data logging capability with PanaView.

3.2 The Data Logging Option Card

In order to log data, the Model XMT868i must be fitted with an optional data logging option card in **Slot 2**. See Chapter 4, *Parts Replacement*, of the *Service Manual* for instructions on installing the card.

3.3 Logging Using PanaView

PanaView is capable of creating and viewing log files of the following types:

- **meter logs** – log files stored in the XMT868i memory, as discussed above
- **PC logs** – log files stored on your PC's hard drive (*Section 3.5*)

To create or view logs of the above types, proceed to the appropriate section of this chapter.

3.4 Creating Meter Logs

To create *Figure 11*, a new meter log, complete the following steps:

1. From the *New Meter Browser* in PanaView, expand the network tree and open the *Edit Functions* option (described on page C-6 of Appendix C, *Programming the XMT868i Using PanaView*). The menu will appear similar to *Figure 10*.

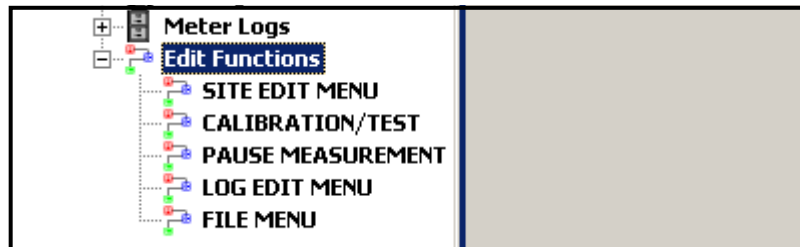


Figure 10: Edit Functions Menu for XMT868i with Logging Card

2. Double-click on the *Log Edit Menu*, as shown in *Figure 10*. The window appears similar to *Figure 11*.

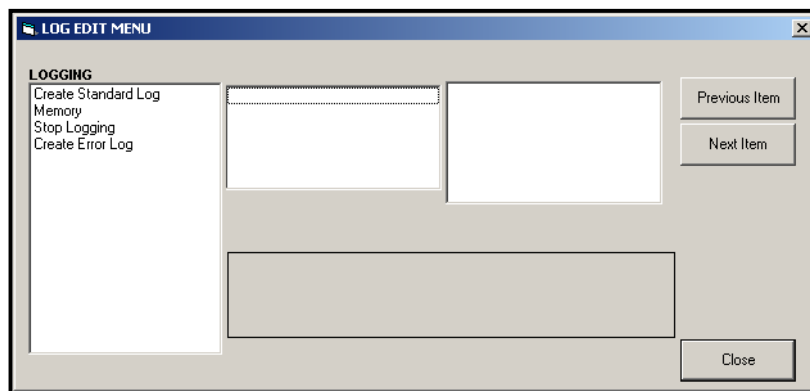


Figure 11: The *Log Edit Menu* Window

3.4.1 Creating a Standard Meter Log

3. To create a standard meter log, complete the following steps:
 - a. Double-click on the *Create Standard Log* option. The window now appears similar to *Figure 12*.

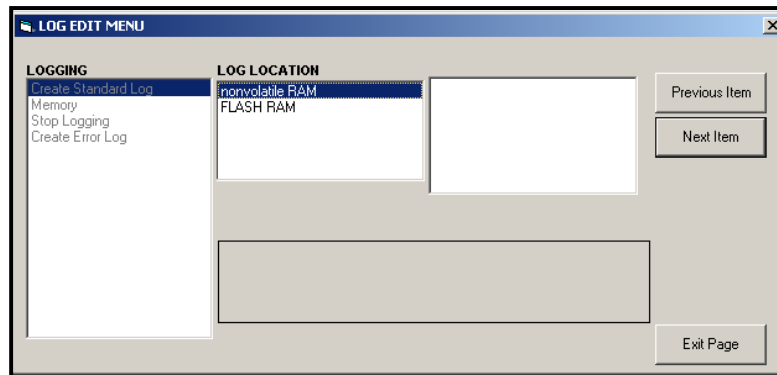


Figure 12: *Log Location* in the *Create Standard Log* Option

- b. PanaView first asks for the *Log Location*, either flash or non-volatile RAM. Double-click on the desired location.
- c. Now type the desired *Log Name* in the right window, and click **[Next Item]**.
- d. Type the desired *Log Message* in the right window, and click **[Next Item]**.
- e. PanaView now asks for the *Number of Variables* you wish to log. Type in the desired number (from 1 to 6), and click **[Next Item]**.
- f. Double-click on the desired *Channel* for the first variable.
- g. Scroll to and double-click on the desired *Measurement* to be logged.
- h. Repeat steps f and g for the specified number of variables.
 - If you select a forward or reverse total, PanaView asks if you want to *Reset Totals to 0*? Double-click on *Yes* or *No*.
- i. PanaView indicates a given *StartTime*. Double-click on *OK* to agree to the given time, on *Now* to start the log immediately, or on *Edit* to change the starting time.
 - If you select *Edit*, PanaView asks first for the desired *Hour*, then for the *Minute*, and finally for the *Second*. For each parameter, type the desired number in the right window, and click **[Next Item]** (or simply click **[Next Item]** to step through the parameters).

3.4.1 Creating a Standard Meter Log (cont.)

- j.** PanaView indicates a given *StartDate*. Double-click on *OK* to agree to the given day, on *Today* to start the log that day, or on *Edit* to change the starting date.
 - If you select *Edit*, PanaView asks first for the desired *Year*, then for the *Month*, and finally for the *Day*. For each parameter, type the desired number in the right window, (or scroll to and click on the desired month) and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
- k.** PanaView indicates a given *End Time*. Double-click on *OK* to agree to the given time, on *Now* to start the log immediately, or on *Timed* to indicate a specific duration.
 - If you select *Edit*, PanaView asks first for the desired *Hour*, then for the *Minute*, and finally for the *Second*. For each parameter, type the desired number in the right window, and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
 - If you select *Timed*, PanaView asks for the *Log Time* (duration). Scroll to and double-click on the desired length of time (from 10 minutes to 24 hours.) Then go to step m.
- l.** PanaView indicates a given *End Date*. Double-click on *OK* to agree to the given day, on *Today* to start the log that day, or on *Edit* to change the starting date.
 - If you select *Edit*, PanaView asks first for the desired *Year*, then for the *Month*, and finally for the *Day*. For each parameter, type the desired number in the right window, (or scroll to and click on the desired month) and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
- m.** Scroll to and double-click on the desired *Time Increment* (from 5 seconds to 24 hours). PanaView indicates that the log has been created, and returns to the *Log Edit Menu*.

If an erroneous value has been entered, PanaView displays a *Log Creation Error* message. Otherwise, the program indicates that the log has been created, and returns to the *Log Edit Menu*.

3.4.2 Creating an Error Log

To create an error meter log, complete the following steps:

1. Double-click on the *Create Error Log* option.
 - a. PanaView first asks for the *Log Location*, either flash or non-volatile RAM. Double-click on the desired location.
 - b. Now type the desired *Log Name* in the right window, and click **[Next Item]**.
 - c. Type the desired *Log Message* in the right window, and click **[Next Item]**.
 - d. PanaView now asks for the *Number of Variables* you wish to log. Type in the desired number (from 1 to 6), and click **[Next Item]**.
 - e. Double-click on the desired *Channel* for the first variable.
 - f. Scroll to and double-click on the desired *Measurement*.
 - g. Repeat steps e and f for the specified number of variables.
 - If you select a forward or reverse total, PanaView asks if you want to *Reset Totals to 0*? Double-click on Yes or No.
 - h. PanaView asks, *Is Log Circular*? Double-click on Yes or No.
 - i. PanaView indicates a given *StartTime*. Double-click on OK to agree to the given time, on *Now* to start the log immediately, or on *Edit* to change the starting time.
 - If you select *Edit*, PanaView asks first for the desired *Hour*, then for the *Minute*, and finally for the *Second*. For each parameter, type the desired number in the right window, and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
 - j. PanaView indicates a given *StartDate*. Double-click on OK to agree to the given day, on *Today* to start the log that day, or on *Edit* to change the starting date.
 - If you select *Edit*, PanaView asks first for the desired *Year*, then for the *Month*, and finally for the *Day*. For each parameter, type the desired number in the right window, (or scroll to and click on the desired month) and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
- Note:** If you have selected a circular log, PanaView now indicates that the log has been created, and returns to the Log Edit Menu.
- k. PanaView indicates a given *End Time*. Double-click on OK to agree to the given time, on *Now* to start the log immediately, or on *Timed* to indicate a specific duration.
 - If you select *Edit*, PanaView asks first for the desired *Hour*, then for the *Minute*, and finally for the *Second*. For each parameter, type the desired number in the right window, and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
 - If you select *Timed*, PanaView asks for the *Log Time* (duration). Scroll to and double-click on the desired length of time (from 10 minutes to 24 hours.) Then go to step m.
 - l. PanaView indicates a given *End Date*. Double-click on OK to agree to the given day, on *Today* to start the log that day, or on *Edit* to change the starting date.
 - If you select *Edit*, PanaView asks first for the desired *Year*, then for the *Month*, and finally for the *Day*. For each parameter, type the desired number in the right window, (or scroll to and click on the desired month) and click **[Next Item]** (or simply click **[Next Item] to step through the parameters**).
 - m. Scroll to and double-click on the desired *Time Increment* (from 5 seconds to 24 hours). PanaView indicates that the log has been created, and returns to the *Log Edit Menu*.

If an erroneous value has been entered, PanaView displays a *Log Creation Error* message. Otherwise, the program indicates that the log has been created, and returns to the *Log Edit Menu*.

3.4.3 Checking Log Memory

To check on the amount of log memory available, double-click on the *Memory* option in the *Log Edit Menu*. The right window indicates the number of bytes available in both NVR and Flash memory.

3.4.4 Stop Logging

To manually terminate logging, double-click on the *Stop Logging* option in the *Log Edit Menu*. PanaView displays the name of the currently active logs. Double-click on your choice, and then click on Yes when the program asks if you wish to stop logging.

3.5 Creating PC Logs

PC logs are created in a different menu from the meter logs described in the last section. To create a new PC log:

1. Open the *Output* menu (see *Figure 13*), and click on the *Logging* option.

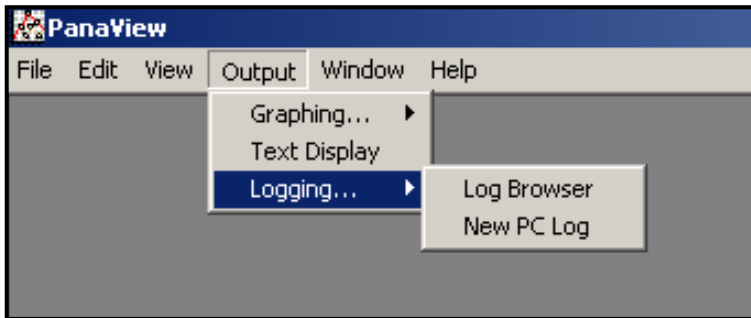


Figure 13: Selections in the Logging Option

You have two choices:

- Click on the *New PC Log* option and proceed to step 5, or
- Click on the *Log Browser* option. The dialog box shown in *Figure 14* appears.

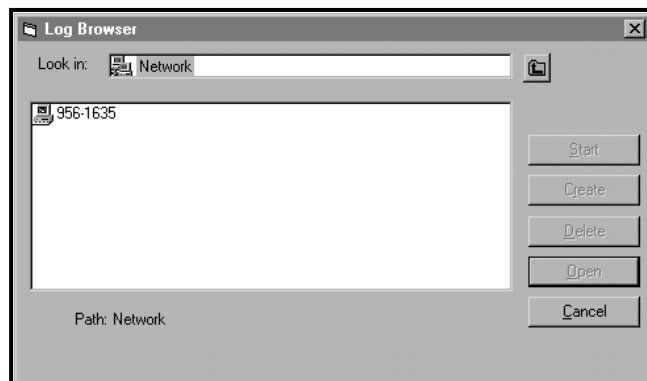


Figure 14: Computer Selection

Note: If no log files have yet been created or if a log file has not yet been selected from the list, all of the option buttons (except for **Cancel**) in the Log Browser dialog box are unavailable.

2. Double click on the *computer name* to advance to the dialog box shown in *Figure 15* on page 57.

3.5 Creating PC Logs (cont.)

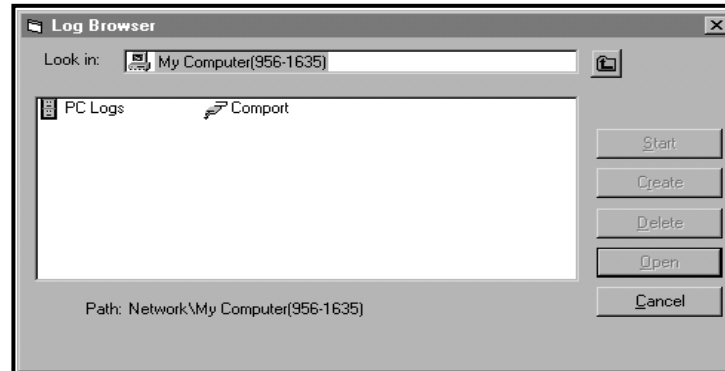


Figure 15: Log Type Selection

3. Double click on *PC Logs* to advance to the dialog box shown in Figure 16.

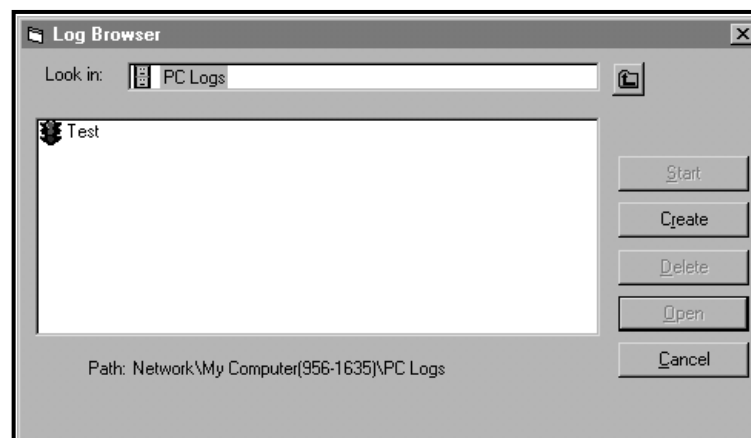


Figure 16: Create a PC Log

4. At the dialog box shown in Figure 16, click on the **[Create]** option button to create a new meter log.
5. Enter a log file name ("Sample" in this case) in the dialog box shown in Figure 17. Click on the **[OK]** option button.

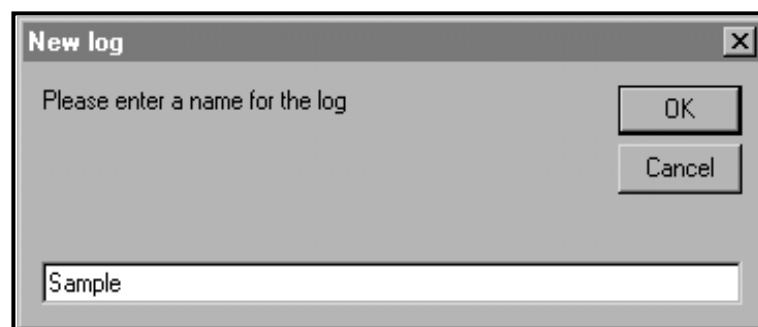


Figure 17: Log Name Dialog Box

6. At the resulting *PC Log* window shown in Figure 18, place a check mark in the text box to create a *circular log*, or leave this box empty to create a *linear log*.

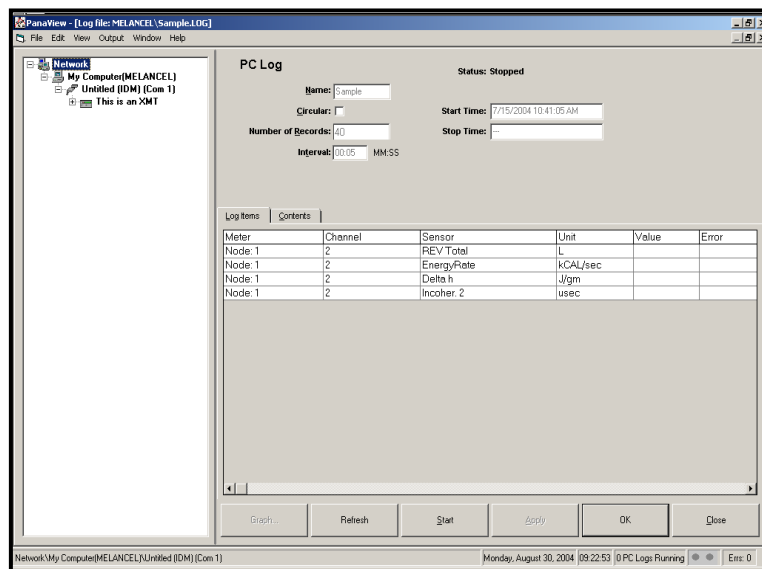


Figure 18: The PC Log Window

7. Enter a sampling *interval* in the text box shown in Figure 18.

Note: Start Time and Stop Time cannot be specified for PC logs. These options are inactive in the PC Log window.

8. Expand the network tree as far as necessary and double click on the process parameter(s) to be logged. As they are selected, the parameters are listed in the lower right pane of the *PC Log* window (make sure that the *Log Items* tab in this pane is selected).

Note: To add all the channel parameters to a given log, right-click on the desired channel. A pop-up button, "Add Group to Log," appears. Click on the button, and PanaView adds the entire set of channel parameters to the log.

9. Click on the **[Apply]** option button to record the log setup information, and then click on the **[Start]** option button to begin logging data immediately. (The *Start Time* automatically appears in the *PC Log* window.)

3.6 Viewing Meter Log Files

After one or more meter log files have been created, the logs may be viewed by using the *New Meter Browser* as follows:

1. From the *New Meter Browser* in PanaView, expand the network tree and click on the *Meter Logs* option. If you have created one or more logs, the tree will appear similar to *Figure 19*.

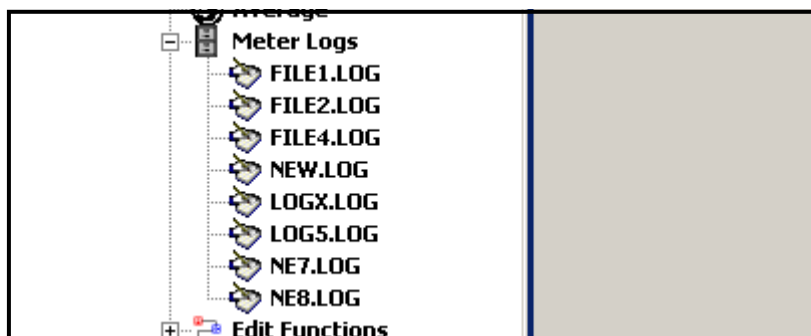


Figure 19: An Expanded Meter Logs Option

2. Double-click on the desired log. A window opens for the individual log, as shown in *Figure 20*.

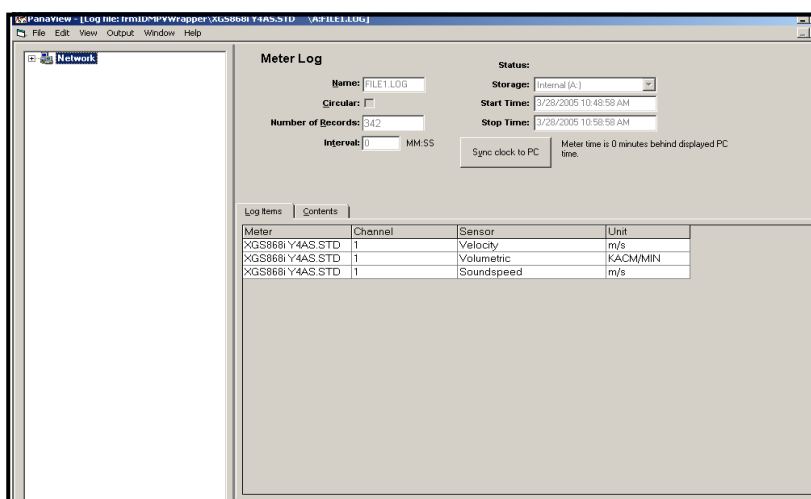


Figure 20: Data Window for an Individual Meter Log

- Click on the *Log Items* tab (see *Figure 20*) for a list of the parameters specified for logging.
- Click on the *Contents* tab (see *Figure 21* on page 60) for a list of all the data points logged to date for the parameter currently highlighted on the *Log Items* tab.
- Click on the **[Graph]** option button to display a graphical representation of the data logged to date.

Note: The graph is displayed in its own window, which is opened on top of the Meter Log window. For instructions on using the Graph Log window, refer to the Graphing Output section in Chapter 2 of the PanaView User's Manual.

Remember that only two parameters per channel may be graphed, and that the same two parameters must be graphed for each channel of a multi-channel graph display. When you have finished viewing the graph, click on the **[Close]** option button to close the Graph window and leave the log running. To review log details, click on the *Contents* tab. The window now appears similar to *Figure 21*.

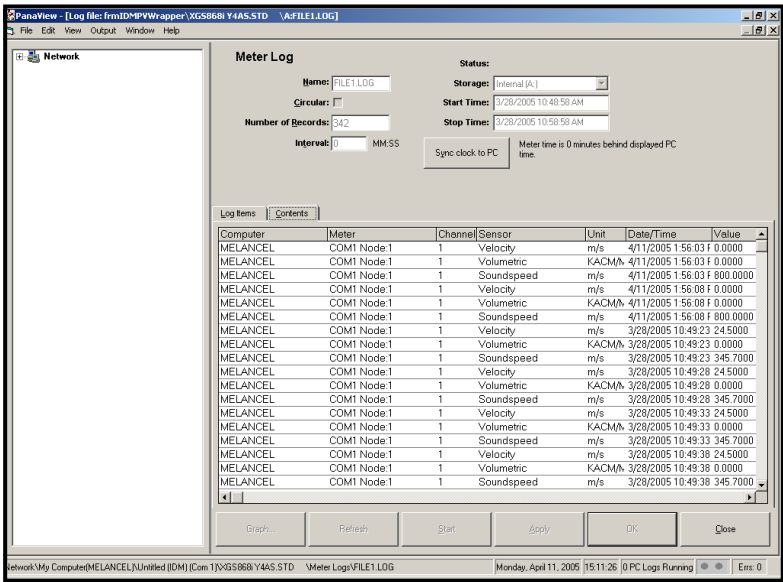


Figure 21: Typical Log Contents

3.7 Viewing PC Log Files

After one or more PC log files have been created, the logs may be viewed by using PanaView as follows:

1. You can access PC logs in two ways:
 - From the *New Meter Browser* in PanaView, expand the network tree and click on the *PC Logs* option. If you have created one or more logs, the tree will appear similar to *Figure 22*. Double-click on the log name to open the log, or
 - Pull down the *Output* menu (see *Figure 13* on page 56), and click on the *Log Browser* option. Advance to the *PC Logs* dialog box as described in previous sections. A screen similar to that shown in *Figure 23* appears.

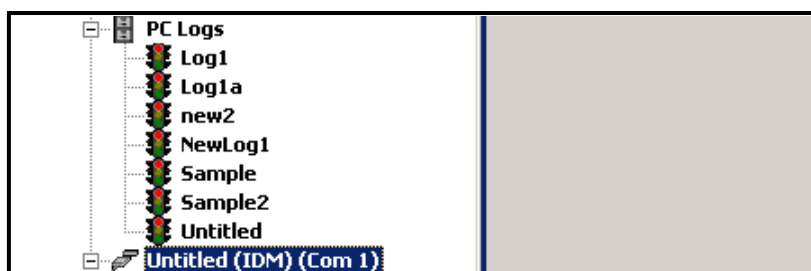


Figure 22: The Expanded PC Logs Option

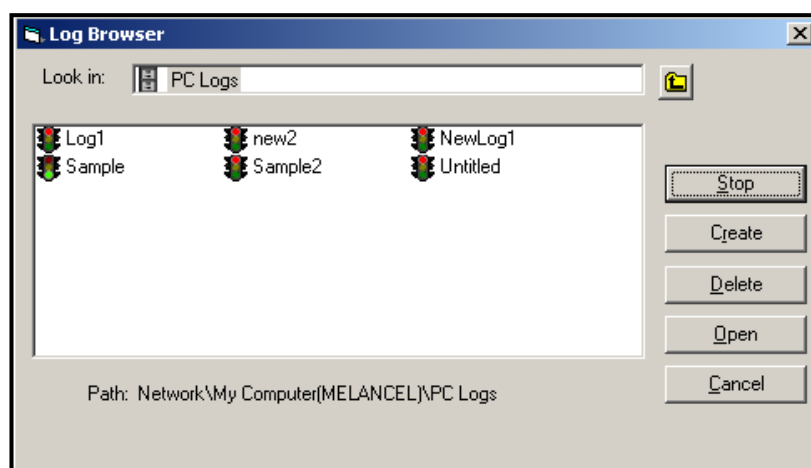


Figure 23: Selecting a Log File from the Log Browser

Notice that each of the log files in *Figure 22* and *Figure 23* has a traffic light icon next to its name. These icons indicate the current status of the log as follows:

- *red light* – log has not run to its specified stop time but has been manually stopped
 - *green light* – log is currently running but is not yet complete
2. In the *Log Browser*, after you highlight the name of the desired log file, the following option buttons become available:
 - **[start]** – resumes logging if the log is currently stopped
or
[stop] – stops logging, if the log is currently running
 - **[Delete]** – permanently deletes the log file
 - **[Open]** – opens the log in the *PC Log* window
 3. Click on one of the option buttons listed in Step 2 above.

You can monitor the progress of an ongoing log in several ways:

- Click on the *Log Items* tab (see *Figure 21* on page 60) for a list of the parameters specified for logging.

- Click on the *Contents* tab (see *Figure 21 on page 60*) for a list of all the data points logged to date for the parameter currently highlighted on the *Log Items* tab.
- Click on the **[Graph]** option button to display a graphical representation of the data logged to date.

Note: *The graph is displayed in its own window, which is opened on top of the PC Log window. For instructions on using the Graph Log window, refer to the Graphing Output section in Chapter 2 of the PanaView User's Manual.*

- Click on the **[Refresh]** option button to update the information shown on the *Contents* tab and in the *Graph Log* window. Any data logged since the last use of the **[Refresh]** option button is added to the list and to the graph.

Remember that only two parameters per channel may be graphed, and that the same two parameters must be graphed for each channel of a multi-channel graph display. When you have finished viewing the graph, click on the **[Close]** option button to close the *Graph* window and leave the log running.

4. To terminate the logging process, simply click on the **[stop]** option button, which has replaced the original **[Start]** option button. (The *Stop Time* automatically appears in the *PC Log* window.)

Because a PC log has no specific "*Stop Time*," the log will continue to run until it is manually stopped (unless the PC is turned off or you run out of hard drive space).

Chapter 4. Printing Data

4.1 Data Types for Printing

The Model XMT868i flowmeter has no ability to print any of its data directly. However, any of the data stored in its memory may be printed using the built-in RS232 communications port, using a computer terminal. In order to use the capability, the XMT868i must be linked to the computer terminal with the optional *PanaView* software.

Note: See *Chapter 1, Installation, of the Startup Guide for instructions on wiring the RS232 serial port. For additional information, refer to the EIA-RS Serial Communications Manual (916-054).*

After making the hardware connections and installing *PanaView* software, the following data may be output to a printer connected to the personal computer:

- live data in numeric or graphical format
- log file in numeric or graphical format
- site file in tabular format
- transducer signal array data in tabular format

For detailed instructions on printing any of the data types listed above, consult the *PanaView User's Manual*.

[no content intended for this page]

Chapter 5. Clearing Data

5.1 Introduction

This chapter explains how to purge totalized measurements, site data and/or log files from the XMT868i's memory.

Note: For detailed information on creating a log file, see Chapter 3, Logging Data. For detailed information on programming site data, see Chapter 1, Programming Site Data.

IMPORTANT: None of the clearing procedures described in this chapter can be undone. Be very sure that the exact consequences of a selected option are thoroughly understood before proceeding.

5.2 Clearing the XMT868i's Memory

If the XMT868i's available memory becomes nearly full, it may be necessary to purge some or all of the existing data from memory, before any additional data can be stored. In order to accomplish this task, proceed to the appropriate section for step-by-step instructions.

Note: Depending on the current configuration of the XMT868i, it may be possible to add additional memory by installing an option card in **Slot 2**. See Chapter 4, Parts Replacement, of the Service Manual for details.

5.2.1 Clearing Site Data

This feature has not yet been implemented, because the XMT868i currently has no capability to store site files in its own memory.

5.2.2 Clearing Log Files

To clear log files from the XMT868i or from the PC's memory, complete the following steps:

1. From PanaView, click on the *Logging* option in the *Output* menu. Then click on the *Log Browser* option, as shown in Figure 24.

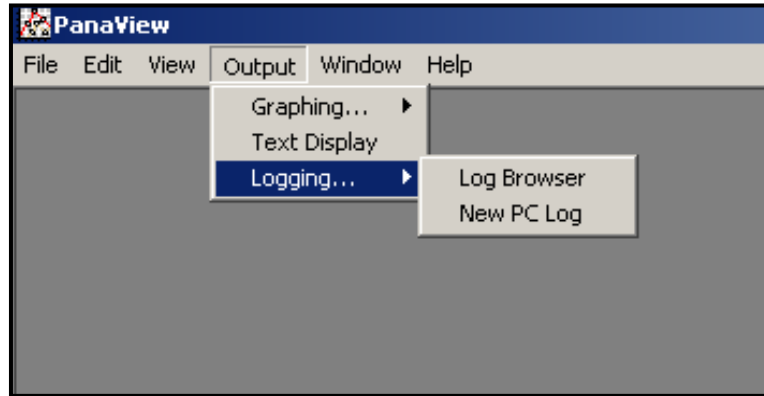


Figure 24: *Log Browser* in the *Logging* Option

2. Double-click on the *computer name* to move to the network level.
3. Double-click on *PC Logs* to access the stored PC logs, or on the *communication port name* and the *meter name* to access the stored meter logs. In either case, the *Log Browser* appears similar to Figure 25.

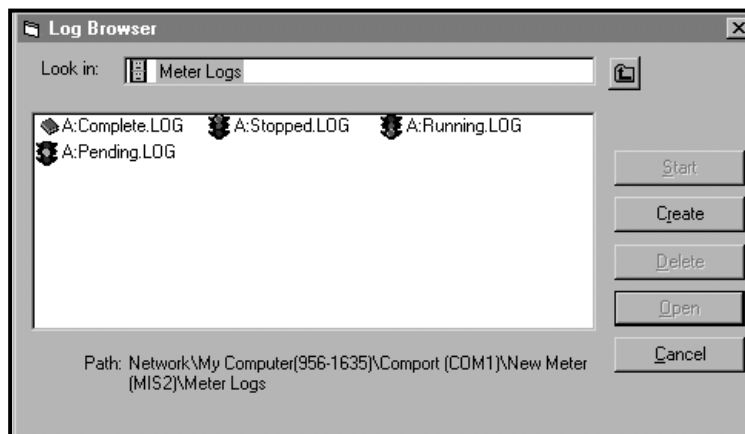


Figure 25: *Log Browser* Window

4. Highlight the log you wish to delete, and click on the [Delete] option button.

5.2.3 Clearing the Totalizers

You can clear the XMT868i's totalizers (i.e., reset specified totalized flow rates to zero) from either the LCD display or from PanaView. To reset totals from the display, complete the following steps:

1. Press **[Escape]**, **[Enter]**, **[Escape]**.
2. In the *Keypad Program*, scroll to **RESET** and press **[Enter]**.
3. The XMT868i asks *Reset Totals?* Scroll to **NO** or **YES (2)** and press **[Enter]** at the desired choice.

The XMT868i totalizers are reset to 0, and the meter returns to the *Keypad Program*. Press **[Escape]** to return to the data display.

To reset the totals from PanaView:

1. From the *New Meter Browser* in PanaView, highlight the XMT868i.
2. Open the *Edit* menu and select the *Properties* option, as shown in Figure 26.

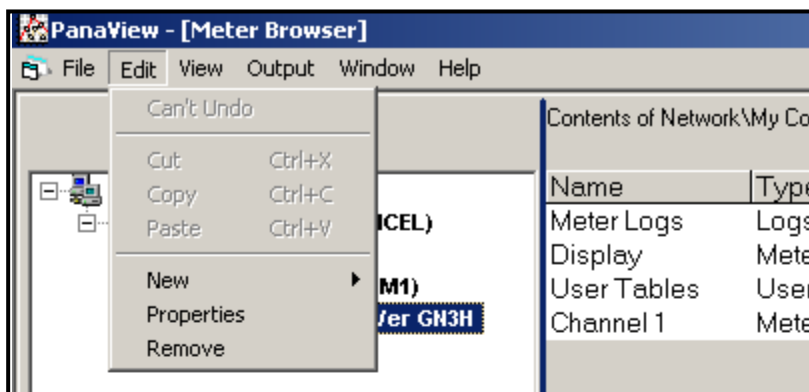


Figure 26: *Properties* Option in the *Edit* Menu

3. The *Properties* window appears similar to Figure 27. To clear the XMT868i totalizers, click on the **[Clear Totalizers]** button. The XMT868i totalizers are reset to 0.

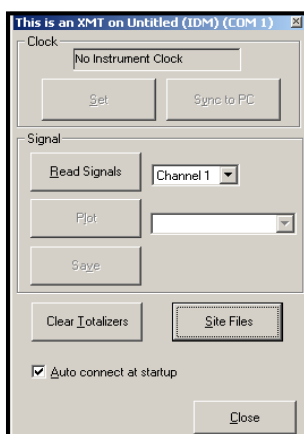


Figure 27: *Properties* Window

[no content intended for this page]

Appendix A. Menu Maps

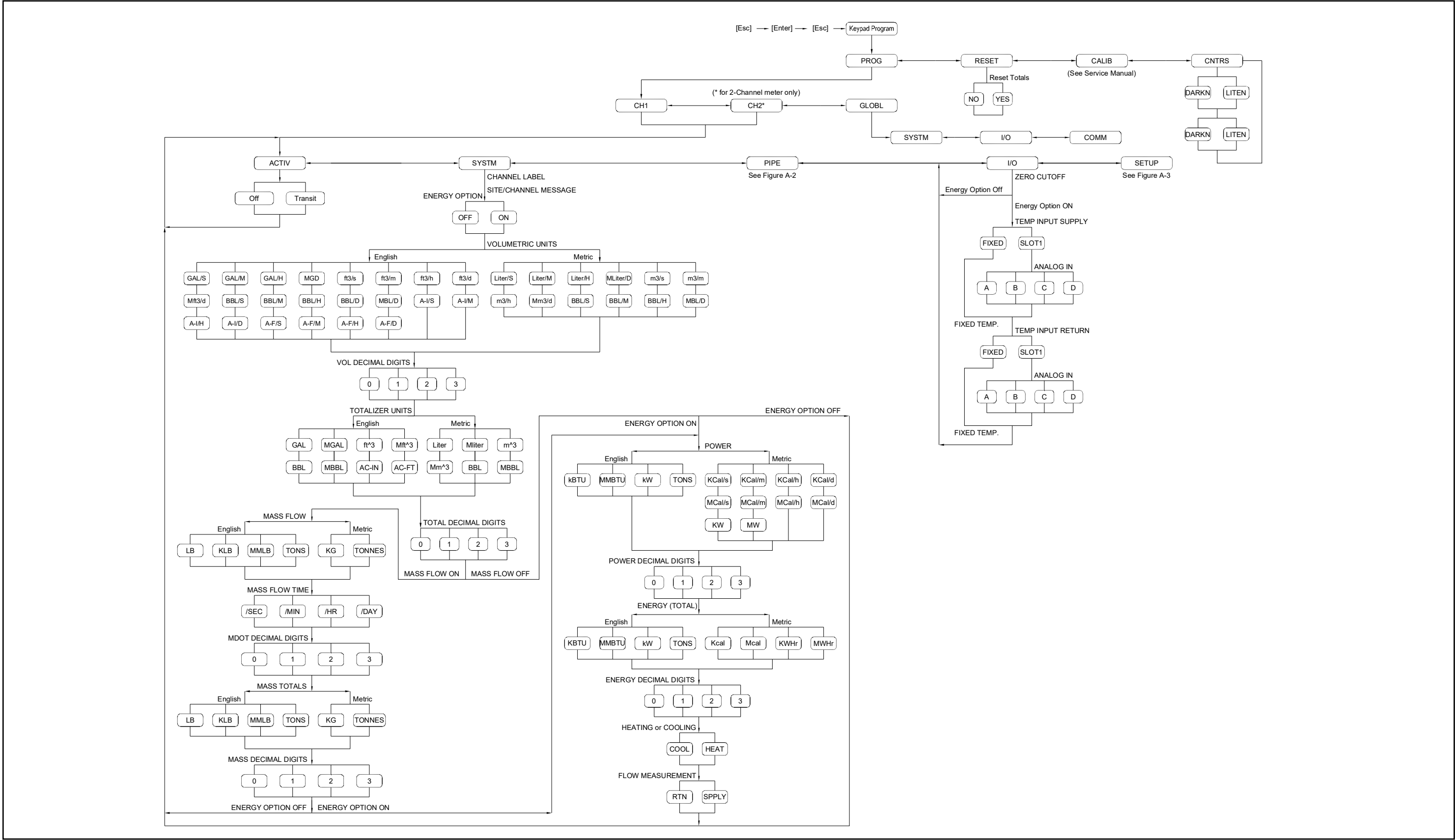


Figure 28: Channel X - ACTIV, SYSTM and I/O Menu Map

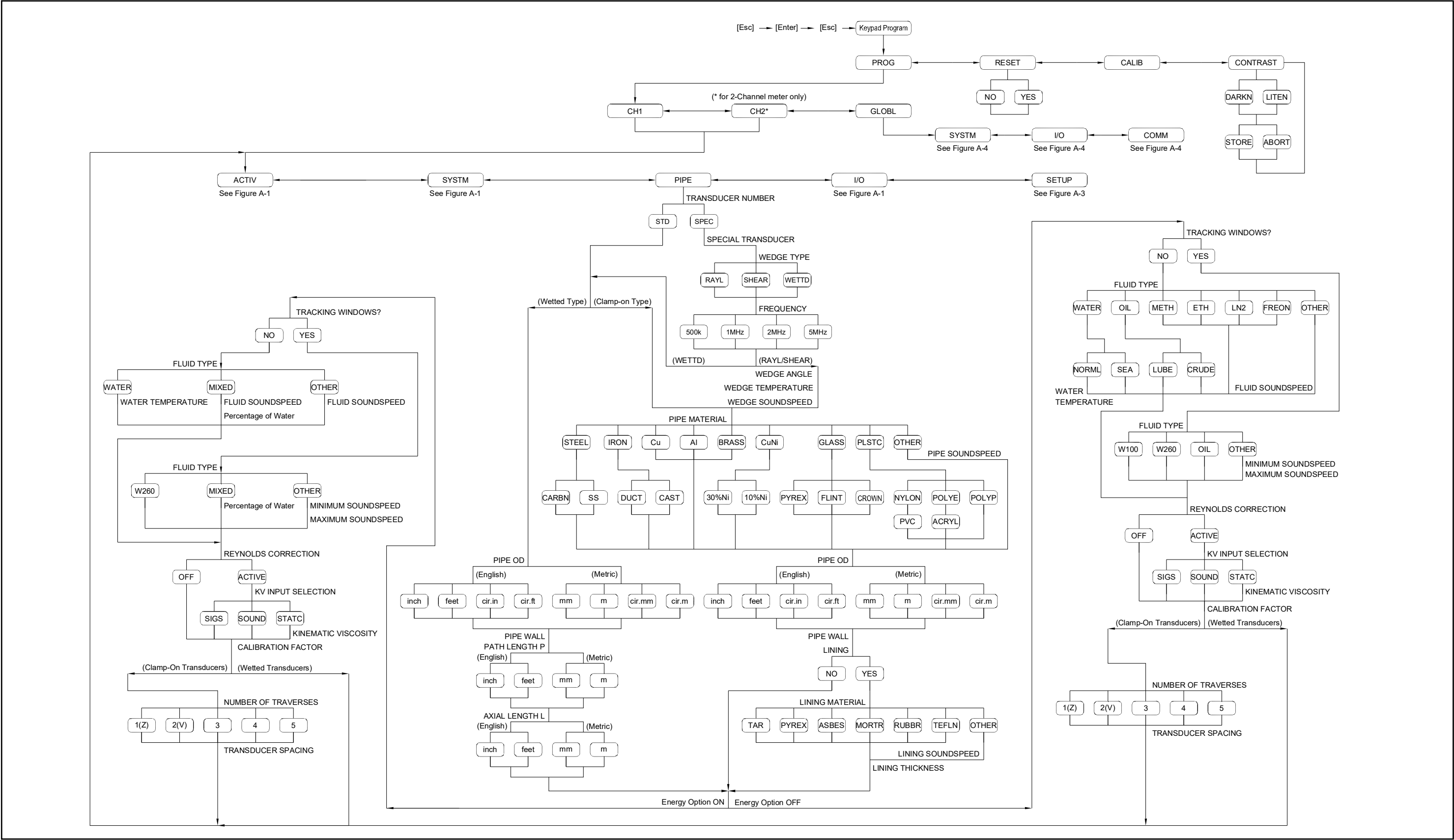


Figure 29: Channel X - PIPE Menu Map

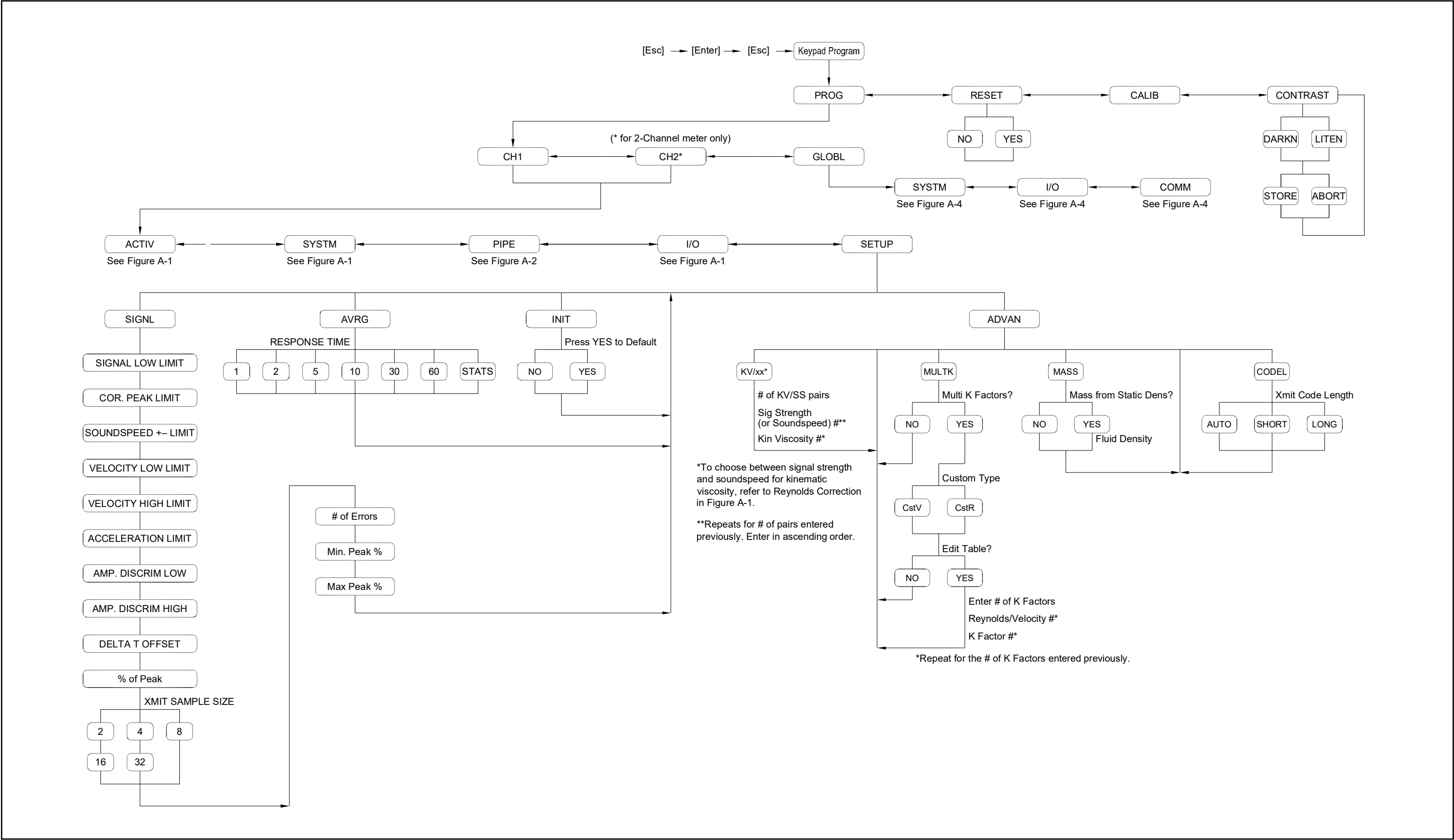


Figure 30: Channel X – SET UP Menu Map

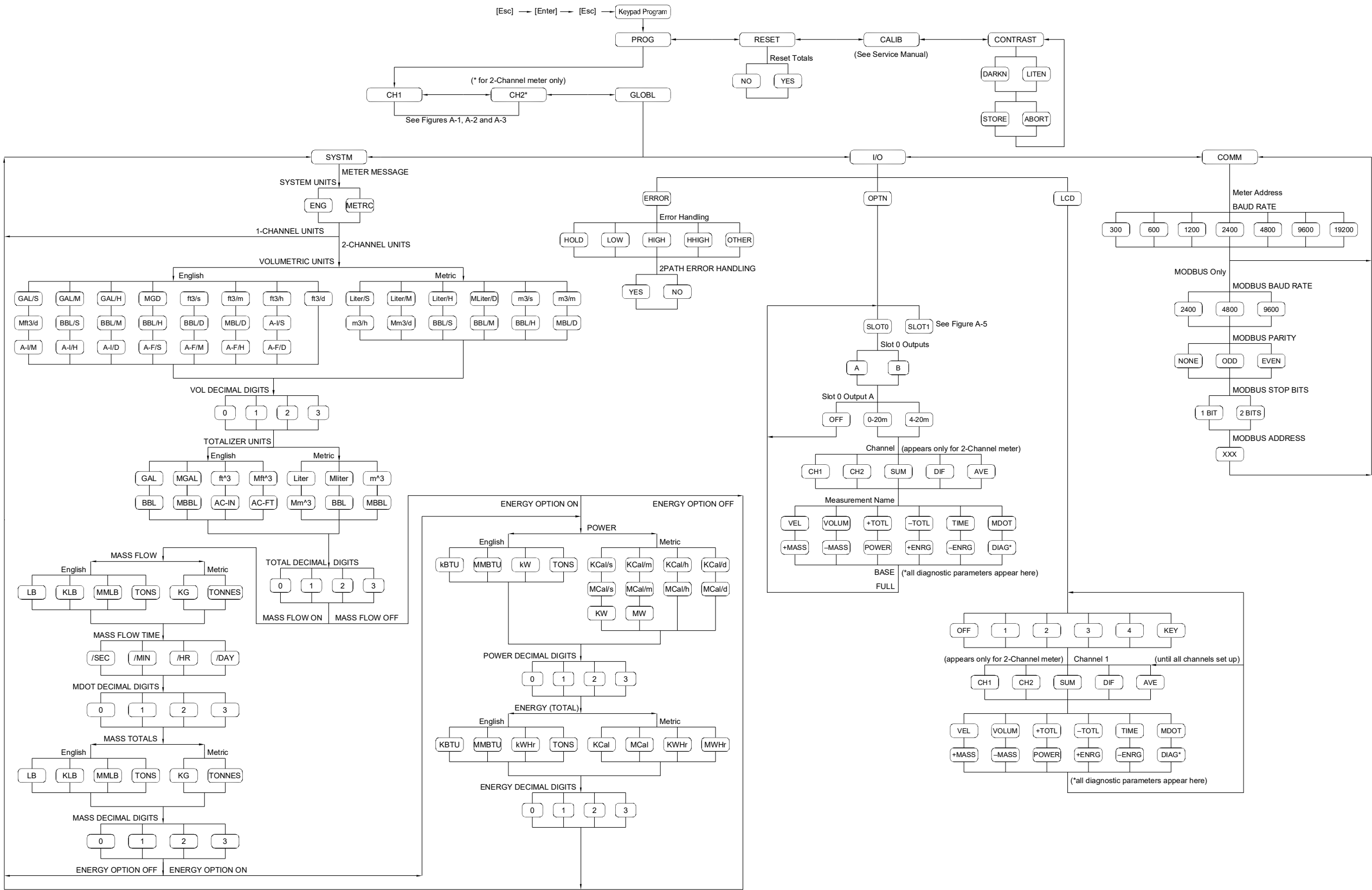


Figure 31: GLOBL - SYSTM, SLOT0 and COMM Menu Map

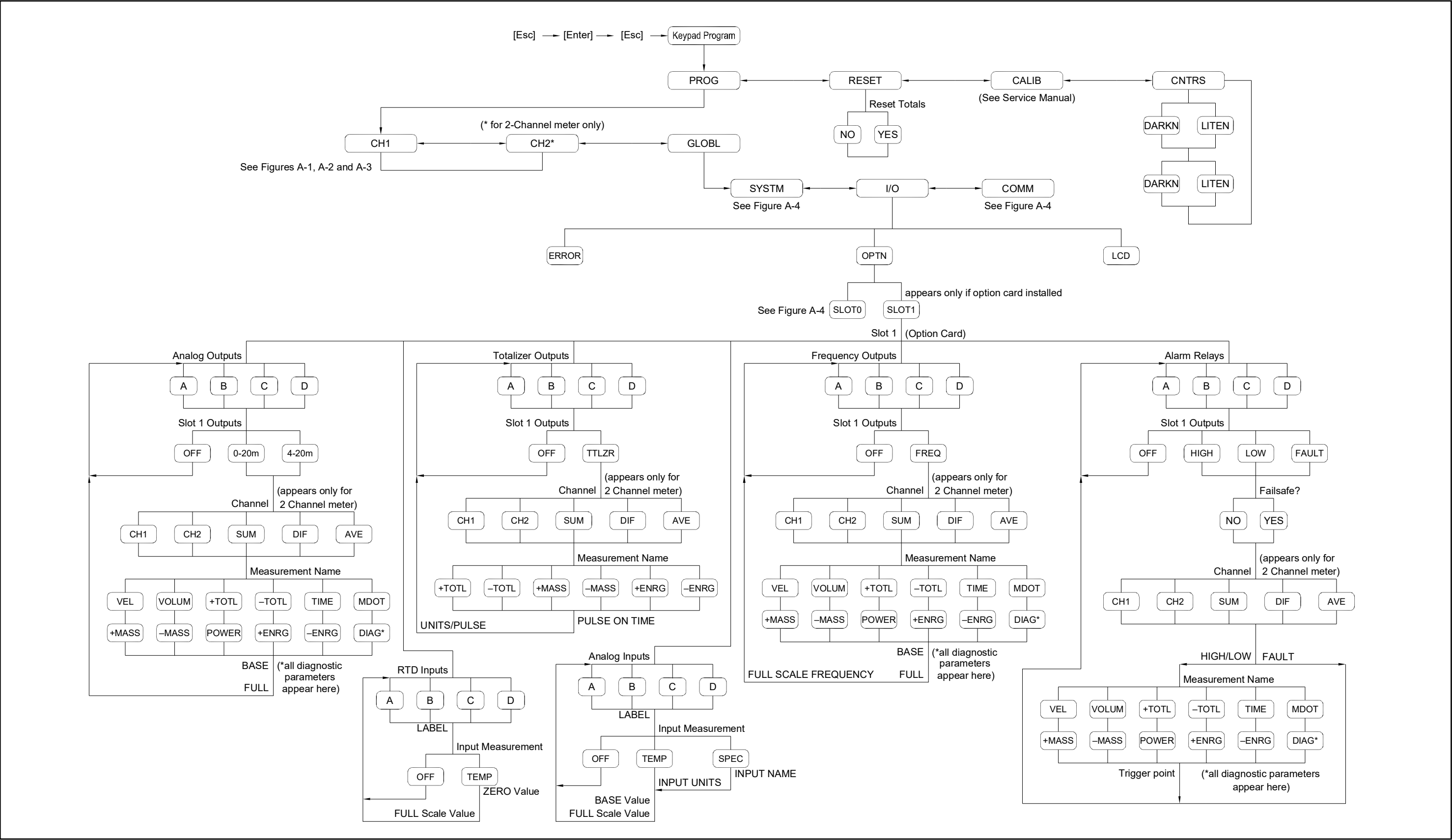


Figure 32: GLOBL - I/O Menu Map

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Appendix B. Data Records

B.1 Available Option Cards

The XMT868i can accommodate one option card in Slot 1 and one in Slot 2. The available configurations are listed in *Table 23*.

Table 23: Available Option Cards

Card #703-	Slot #	Configuration
1215-02	1	FF - 4 Frequency Outputs
1215-03		TT - 4 Totalizer Outputs
1215-04		FT - 2 Frequency Outputs/2 Totalizer Outputs
1215-05		FO - 2 Frequency Outputs
1215-06		TO - 2 Totalizer Outputs
1215-07		AA - 4 Standard Alarms
1215-09		FA - 2 Frequency Outputs/2 Standard Alarms
1215-11		TA - 2 Totalizer Outputs/2 Standard Alarms
1473-02		OI - 2 Current Inputs
1473-03		OR - 2 RTD Inputs
1473-04		TI - 2 Current Inputs/2 Totalizer Inputs
1473-05		TR - 2 RTD Inputs/2 Totalizer Inputs
1473-06		FI - 2 Current Inputs/2 Frequency Inputs
1473-07		FR - 2 RTD Inputs/2 Frequency Inputs
1473-08		AI - 2 Current Inputs/2 Standard Alarms
1473-10		AR - 2 RTD Inputs/2 Standard Alarms
1225-13		CO - 2 Current Outputs
1225-14		CF - 2 Current Outputs/2 Frequency Outputs
1225-15		CT - 2 Current Outputs/2 Totalizer Outputs
1225-16		CA - 2 Current Outputs/2 Standard Alarms
1430-03		RR - 4 RTD Inputs
1430-04		IR - 2 RTD Inputs/2 Current Inputs
1233-02		II - 4 Current Inputs
1272-02		CI - 2 Current Outputs/2 Current Inputs
1272-03		CR - 2 Current Outputs/2 RTD Inputs
1272-04		CIR - 2 Current Outputs/1 Current Input/1 RTD Input
1146-02/1332-02	2	128 KB Memory
1146-03/1332-03		2 MB Memory
1310-02/1345-04		MODBUS Communications Protocol
1477-03	2	MODBUS/TCP Communication
1477-01	2	Ethernet Communication
1475-01	2	Foundation Fieldbus

B.2 Option Cards Installed

Whenever an option card is installed or changed in the XMT868i flow transmitter, record the type of card and any additional setup information in the appropriate row of *Table 24*.

Table 24: Option Cards Installed

Slot #	Type of Option Card	Additional Setup Information
0	Analog Outputs (A, B)	
1		
2		

B.3 Site Data

After the Model XMT868i flow transmitter has been installed, specific site data must be entered using the *User Program*, prior to operation. Record that information in *Table 25*.

Table 25: Site Data

General Information					
Model #			Serial #		
Software Vers.			Setup Date		
GLOBAL-SYSTEM					
Meter Message			Vol. Dec. Digits		
System Units	English	Metric	Totalizer Units		
Vol. Units			Tot. Dec. Dig.		
GLOBAL-I/O-ERROR					
Error Handling			2-Path Error	No	Yes
GLOBAL-COMM					
Meter Address			MOD. Parity		
Baud Rate			MOD. Stop Bits		
MOD. Baud Rate			MOD. Address		
Channel x-ACTIV					
Channel 1			Channel 2 (if applicable)		
Channel Status	Off ¹	Trans	Channel Status	Off ¹	Trans
Channel x-SYSTEM					
Channel 1			Channel 2 (if applicable)		
Channel Label			Channel Label		
Chan. Message ²			Chan. Message ²		
Energy Option	On	Off	Energy Option	On	Off
Vol. Units			Vol. Units		
Vol. Dec. Digits			Vol. Dec. Digits		
Totalizer Units			Totalizer Units		
Tot. Dec. Dig.			Tot. Dec. Dig.		
Mass Flow			Mass Flow		
Mass Flow Time			Mass Flow Time		
MDOT Dec. Dig.			MDOT Dec. Dig.		
Mass Totals			Mass Totals		
Mass Dec. Digits			Mass Dec. Digits		
Power			Power		
Power Dec. Dig.			Power Dec. Dig.		
Energy (Total)			Energy (Total)		
Energy Dec. Dig.			Energy Dec. Dig.		
Heat. or Cool.			Heat. or Cool.		
Flow Meas.			Flow Meas.		
¹ not available for 1-Channel meter, ² "Site Message" for 1-Channel meter					

Table 25: Site Data(Continued)

Channel x-I/O							
Zero Cutoff			Temp. Input	Fixed ()	Live		
Channel x - Pipe/Transducer Parameters - PIPE							
Channel 1			Channel 2 (if applicable)				
Trans. Type	STD	SPEC	Trans. Type	STD	SPEC		
Transducer #			Transducer #				
Special Transducers			Special Transducers				
Wedge Type	Rayl	Shear	Wettd	Wedge Type	Rayl	Shear	Wettd
Frequency Hz			Frequency Hz			Frequency Hz	
Trans. Tw			Trans. Tw			Trans. Tw	
Wedge Angle			Wedge Angle			Wedge Angle	
Wedge Sndspd			Wedge Sndspd			Wedge Sndspd	
Pipe Material			Pipe Material			Pipe Material	
All Clamp-On and Wetted Transducers			All Clamp-On and Wetted Transducers				
Pipe O.D.			Pipe O.D.			Pipe O.D.	
Pipe Wall			Pipe Wall			Pipe Wall	
Path Length (P)			Path Length (P)			Path Length (P)	
Axial Length (L)			Axial Length (L)			Axial Length (L)	
Trans. Angle			Trans. Angle			Trans. Angle	
Lining	Yes	No	Lining	Yes	No	Lining	
Lining Material			Lining Material			Lining Material	
Lining Sndspd			Lining Sndspd			Lining Sndspd	
Lining Thickness			Lining Thickness			Lining Thickness	
Track. Window.	Yes	No	Track. Window.	Yes	No	Track. Window.	
Fluid Type			Fluid Type			Fluid Type	
Other/Sndspd			Other/Sndspd			Other/Sndspd	
% of Water			% of Water			% of Water	
Reynolds Corr.	Off	Active	Reynolds Corr.	Off	Active	Reynolds Corr.	
KV Input Sel.	Table	Static	KV Input Sel.	Table	Static	KV Input Sel.	
Kin. Visc.			Kin. Visc.			Kin. Visc.	
Cal. Factor			Cal. Factor			Cal. Factor	
# of Traverses			# of Traverses			# of Traverses	
Trans. Spacing			Trans. Spacing			Trans. Spacing	
Depth of Reflect.			Depth of Reflect.			Depth of Reflect.	
CHx-SETUP-AVRG							
Response Time							
Channel x-SETUP-ADVANCED FEATURES-KV/SS							
KV/SS Pairs				KV/SS Pairs			
#	Sig. Strength/ Soundspeed	Kin. Visc.		#	Sig. Strength/ Soundspeed	Kin. Visc.	
1				1			

2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		
11				11		
12				12		
13				13		
14				14		
15				15		
16				16		
17				17		
18				18		
19				19		
20				20		

Channel x-SETUP-ADVANCED FEATURES -MULTIK

Custom Type	CstV	CstR		Custom Type	CstV	CstR
K-Factor Table				K-Factor Table		
K-Factor #	Vel./Reyn.	K Factor		K-Factor #	Vel./Reyn.	K Factor
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		
11				11		
12				12		

CHx-SETUP-ADVAN-MULTIK (cont.)

K-Factor #	Vel./Reyn.	K Factor		K-Factor #	Vel./Reyn.	K Factor
13				13		
14				14		
15				15		
16				16		

Table 25: Site Data(Continued)

17				17		
18				18		
19				19		
20				20		
CHx-SETUP-ADVAN-MASS						
Mass Flow	No	Yes		Mass Flow	No	Yes
Static Density				Static Density		
CHx-SETUP-ADVAN-CODEL						
Code Length	Auto	Short	Long	Code Length	Auto	Short Long

Appendix C. Programming the XMT868i Using PanaView™

C.1 Introduction

The Model XMT868i flow transmitter must be properly installed and programmed, as described in the *Startup Guide*, before it can provide accurate flow rate measurements. After completing the installation and initial setup, use this chapter to program the advanced features of the Model XMT868i's using the PanaView™ software program. Refer to the appropriate section for a discussion of the following menu features:

- Channel-Status - activate one or both channels and select the desired measurement method
- Channel-System - enter the individual channel parameters
- Channel-Pipe - enter the pipe parameters
- Channel-I/O - set up the inputs and outputs
- Channel-Setup - set the signal limits, response times and activating mass flow.
- Global-System - enter the system units
- Global-I/O - set up error handling, option cards and display
- Global-Comm - set the serial port and MODBUS parameters

As a programming aid, a complete set of menu maps for the PROG menu is included in Appendix D, *PanaView Menu Maps*. The specific figure numbers will be referenced throughout this chapter, as required.

C.2 Programming Using PanaView™

You can program the XMT868i using PanaView™, a PC-based, non-resident software program that communicates with the XMT868i through its RS232/RS485 serial or Ethernet port.

C.2.1 Preparing for PanaView Programming

Before you attempt to communicate with the XMT868i, be sure you have linked your PC to the XMT868i using its communication interface. For details on wiring the interface, refer to *Wiring the Serial Port* in the *Startup Guide*, and to the document *EIA-RS Serial Communications* (916-054). You must also install PanaView, as discussed in the *PanaView User's Manual* (910-211).

C.2.2 Setting Up the Serial Communications Port

Use the steps below to establish PanaView communications with the XMT868i.

1. Launch PanaView, as discussed in Chapter 3, *Initial Setup*, of the *PanaView User's Manual*.
2. Open the *New Meter Browser* window in the *File* menu and expand the network tree. Then, highlight the *My Computer(Name)* branch by clicking on it.
3. Pull down the *Edit* menu by clicking on it in the menu bar.
4. Click on the *New* menu option to select it, and a submenu opens with two choices on it (see *Figure 33*).

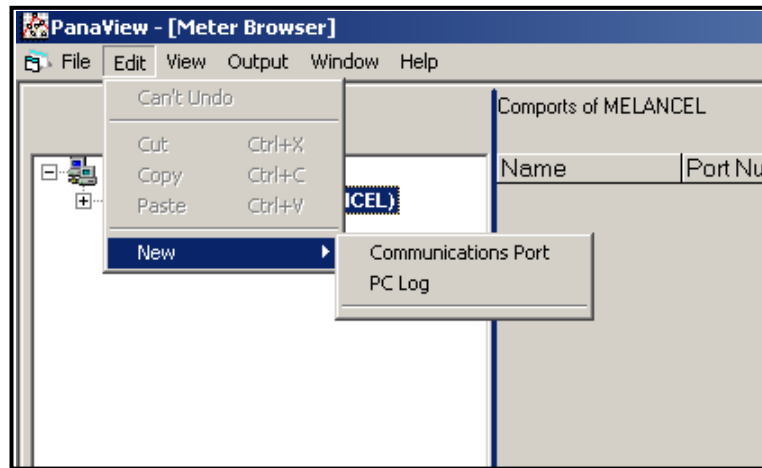


Figure 33: Edit Menu

5. Click on the *Communications Port* option to select it. The *Setup Communications* screen appears similar to *Figure 34*.

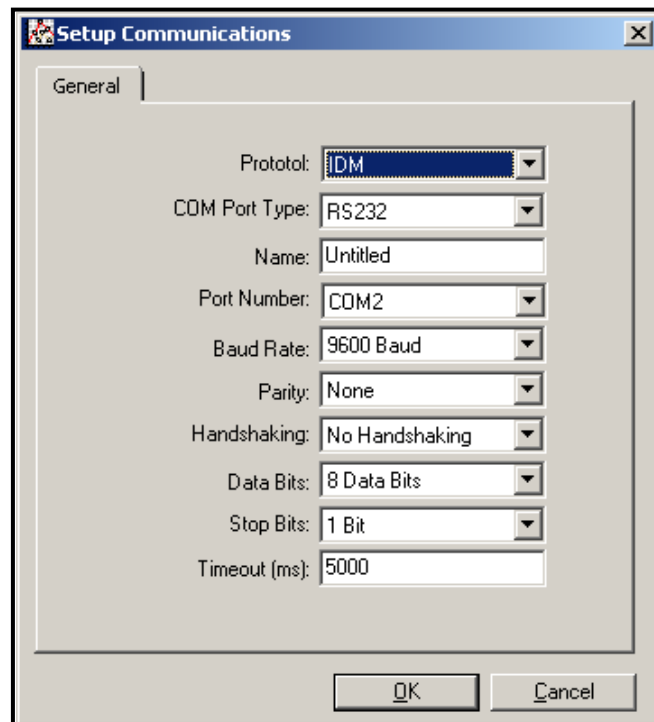


Figure 34: *Setup Communications* Screen

6. Open the Protocol menu (the first of the drop-down menus) and click on *IDM*.

7. Open the COM Port Type menu and click on the desired type (or on *TCP/IP*, if the XMT868i is using an Ethernet connection).

Note: If you select *TCP/IP*, the menu changes. Proceed to the next page.

8. Select any suitable available baud rate. A baud rate of 19,200 is appropriate for almost all applications. However, if you experience periodic communication reliability problems, you may wish to consider lowering the baud rate on your instrument and in PanaView.

IMPORTANT: Be sure all the communications port settings match those made in setting up the meter's serial port.

9. Click on [OK] to complete data entry.

C.2.3 Setting up Ethernet Communications

If you have selected *TCP/IP* in step 6 on the previous page, the Setup Communications window appears similar to Figure 35.

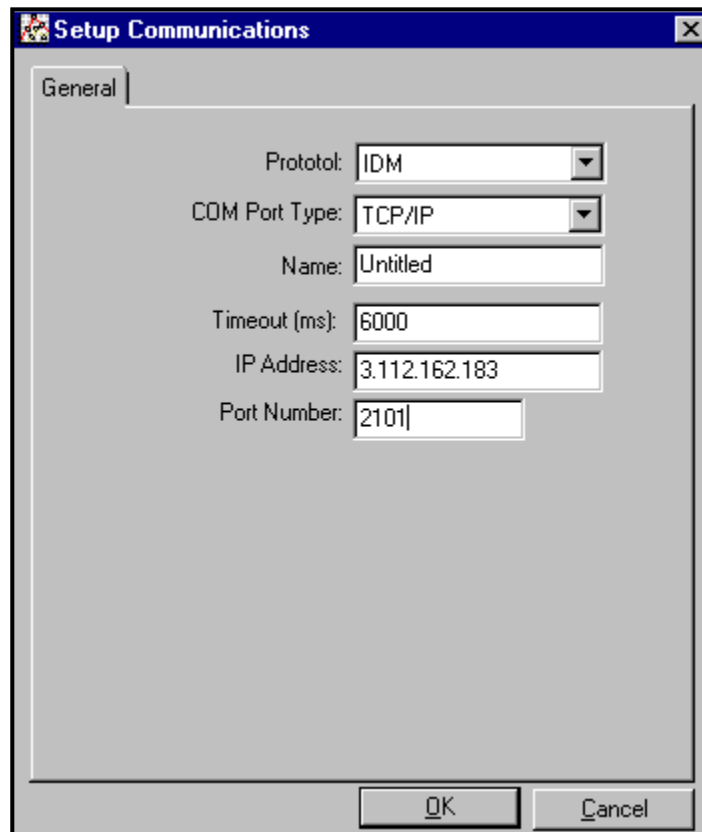


Figure 35: Setup Communications for TCP/IP

1. Type in the desired *Name* and *Timeout* (in milliseconds).
2. In the *IP Address* text box, enter the IP address. If the IP address is unknown, run the Device Discovery software utility. All units found will be identified by their MAC address and the assigned IP address. In the *Port Number* box, enter 2101 (the default value).
3. Click [OK] to complete data entry.

IMPORTANT: If you are using Ethernet communications, be sure the XMT868i is set up with the default communications parameters: 9600 baud, no parity, no handshaking, 8 data bits and 1 stop bit. The port number must match the "Enable Raw TCP access using TCP Port" assignment shown under the Device Discovery "TCP Server Settings" menu (Configuration>Serial Ports>Port).

C.2.4 Modifying Ethernet Parameters

To establish Ethernet communications with the XMT868i or to modify its IP parameters, you will need to install the Ethernet Device Discovery software utility (available with your XMT868i) on a PC connected to the LAN. Once installed and running, the software displays all Ethernet devices currently connected to the subnet. You can identify the XMT868i by its MAC address, supplied as part of customer documentation. The default IP Port is 2101.

The default IP addressing for the XMT868i is DHCP (dynamic). If you need to assign a static IP address to the XMT868i, complete the following steps:

IMPORTANT: To assign a static IP address, the XMT868i must be connected to an Ethernet network with a dynamic address assignment mechanism (DHCP) first.

1. Run Ethernet Device Discovery software, and identify the XMT868i's current IP address.
2. Open your Internet browser (Internet Explorer, Netscape, or other) and type the XMT868i IP address in the Address box.
3. The Connect ME Configuration and Management window opens. Two text boxes ask for the user name and password.
 - a. In the Username text box, type root.
 - b. In the Password text box, type dbps.
4. At the left of the window, click on Network.
5. The IP Settings window opens. In the text boxes for IP Address, Subnet Mask, and Default Gateway, type in the new information. Click Apply. The software applies the new address.

C.3 Adding the XMT868i

To add the XMT868i on the IDM-configured communications port, complete the following steps:

1. Highlight the communication port to which the meter will be added by clicking on it, and then open the *Edit* menu on the menu bar (if the communication port is not highlighted first, the *New Meter* option is not active in the *Edit* menu).
2. Click on the *New* option in the *Edit* menu (see Figure 36).

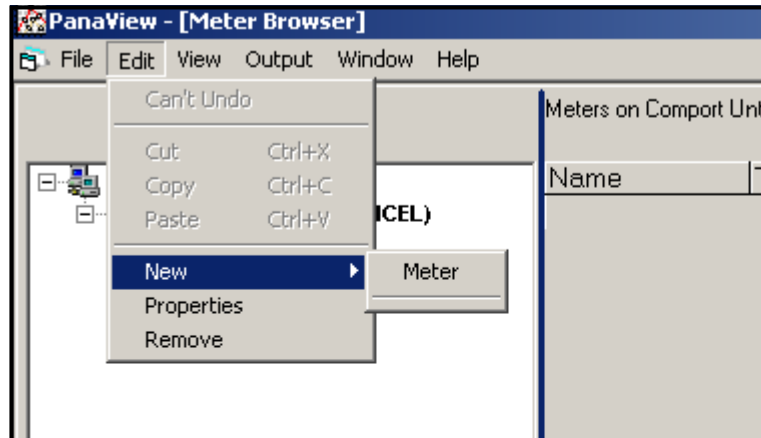


Figure 36: *New* Option in the *Edit* Menu

3. After clicking on the *New* option, the *Meter* menu option appears. Click on this option to select it.
4. The *New IDM Meter* screen (shown in Figure 37) opens. Enter the Network ID number for the meter, and click [OK].

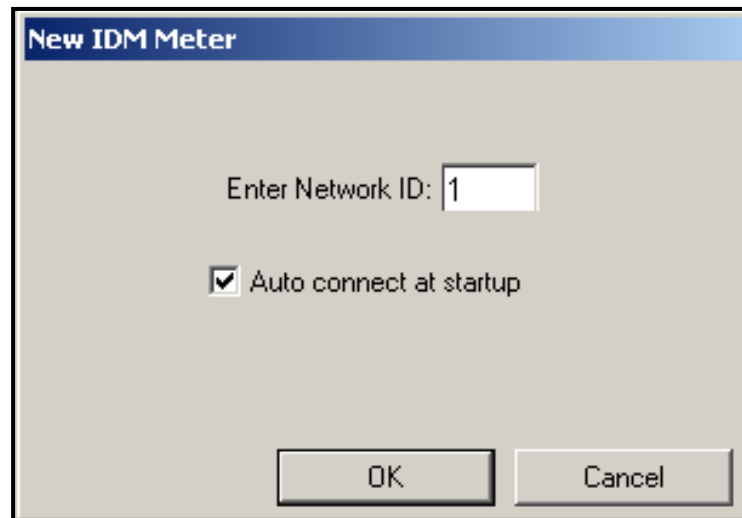


Figure 37: *New IDM Meter* Screen

C.3 Adding the XMT868i (cont.)

IMPORTANT: The Network ID number must match the Network ID programmed in the meter's Communications menu.

If the initialization is successful, the *Meter Browser* shows a listing similar to *Figure 38*.

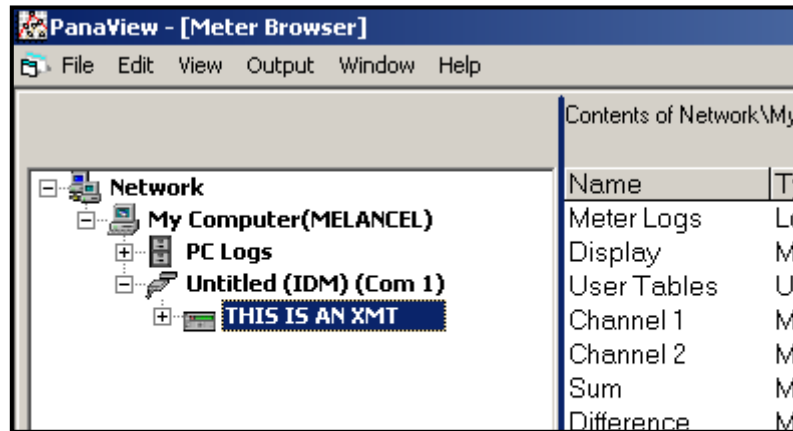


Figure 38: The Updated Network Tree

However, if the settings do not match, or there is some other difficulty, a screen appears similar to *Figure 39*.

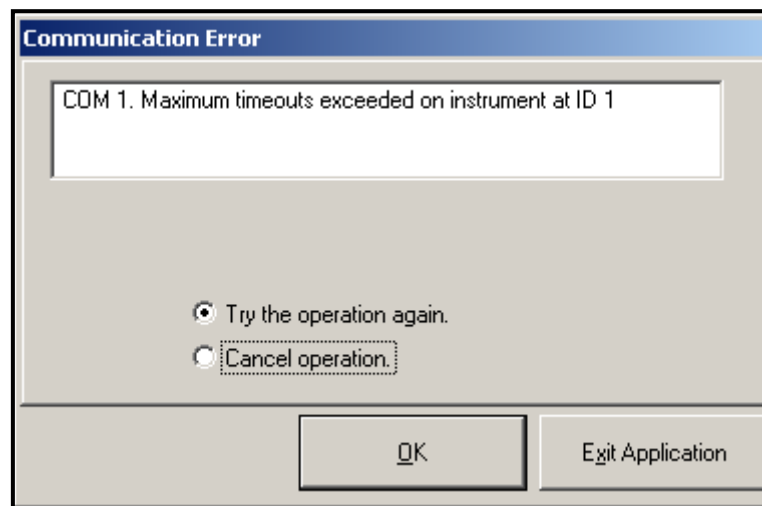


Figure 39: Communication Error Screen

The screen offers the options of trying again or of canceling the operation. Click on the desired choice, and then on [OK] to confirm the choice or on [Exit Application] to close PanaView.

C.4 Entering the User Program With PanaView

Note: Be sure to record all the programming data entered in this chapter in Appendix B, Data Records.

Programming of the Status, System, and Pipe submenus of the Channel menu and the Global-System menu are required for basic operation of the Model XMT868i. Failure to accurately enter all of the necessary information will result in unreliable flow rate data. Therefore, be sure to complete at least the sections of this chapter pertaining to those three submenus. Except for those three submenus, it is not necessary to program the Model XMT868i flowmeter in any particular order. Therefore, the sections of this chapter need not be completed in sequence. Enter the user program as described below and proceed immediately to any section of interest.

To begin entering data into the XMT868i using PanaView:

1. From the meter tree in the *New Meter Browser* (see Figure 38 on page 88), click on the XMT entry. The screen now appears similar to Figure 40.

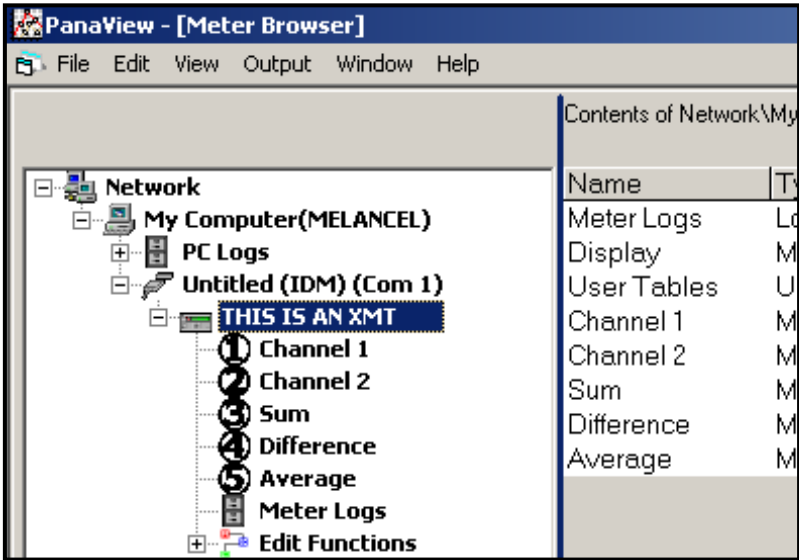


Figure 40: Meter Tree with *Edit Functions* Option

2. Expand the *Edit Functions* option. The window now appears similar to that shown in Figure 41 on page 90.

C.4 Entering the User Program With PanaView (cont.)

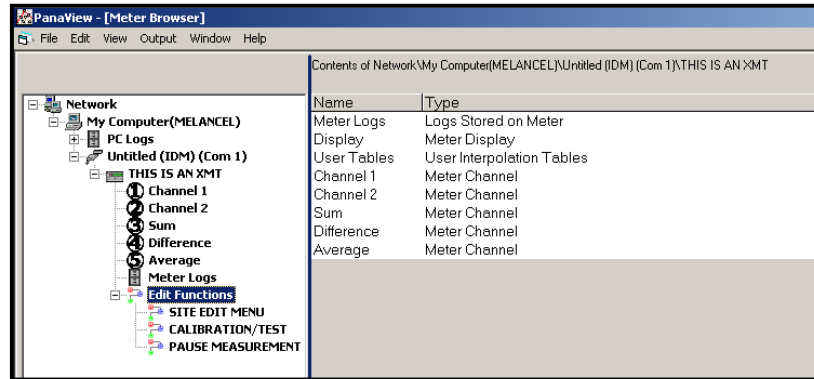


Figure 41: Menus in the *Edit Functions* Option

3. To enter data into the user program, double-click on the *Site Edit Menu*. The window appears similar to *Figure 42*.

Note: For a 1-Channel XMT868i, the Channel 2 option does not appear.

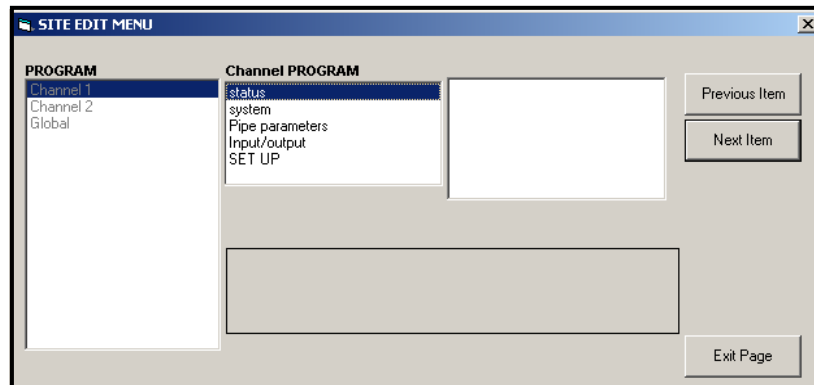


Figure 42: The *Site Edit Menu* Window

4. To enter a particular menu (Channel 1, Channel 2, or Global), highlight and double-click on the desired menu in the left pane. For example, clicking on Channel 1 in *Figure 42* opens the list of options shown in the center pane.
5. To enter a particular option:
 - a. Highlight and double-click on the desired option in the center pane. *Figure 43 on page 91* shows the first entry (Transducer Number) in the *Pipe Parameters* option. The title above the center pane lists the current entry, while the center pane displays the available selections for that entry.
 - b. Click on the desired choice; if the entry requires a numeric or text value, change the value displayed in the right pane.

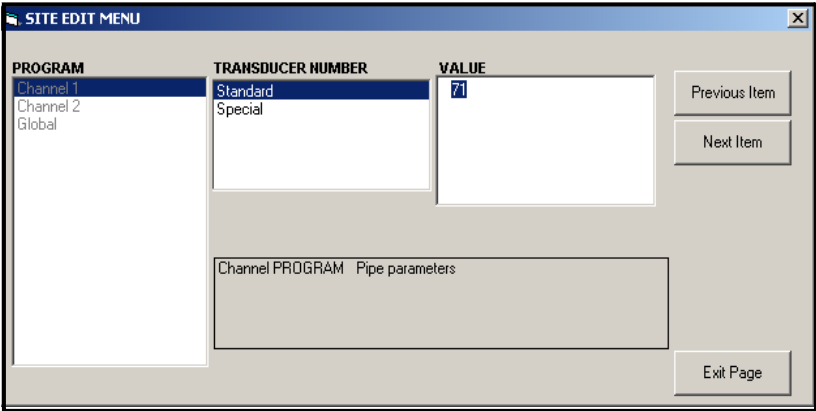


Figure 43: The Pipe Parameters Option in the *Site Edit Menu*

- c. Do one of the following:
- Click on [Next Item] to proceed to the next menu item,
 - or
 - Click on [Previous Item] to return back through the menu to a previous item.

Note: If you click on either [Next Item] or [Previous Item] without changing the settings, the current settings remain unchanged.

As you step through the menu, the bottom panel lists the current settings you have modified or left unchanged, as shown in *Figure 44*. If you modify or step through more than five items, a scroll bar at the right of the panel lets you review the earlier settings.

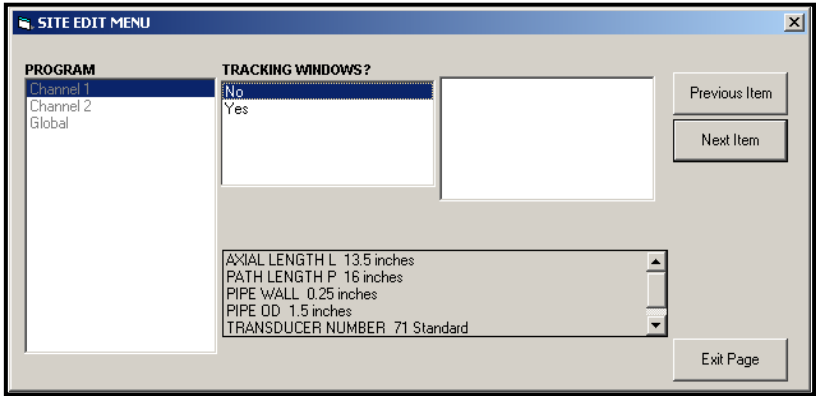


Figure 44: *Site Edit Menu* with Current Settings

6. When you have completed entering parameters in a given option, click [Exit Page] to close the option. You can then double-click on another option, or click [Close] to close the window.
- You can double-click on another menu to modify its settings, or return to the *New Meter Browser*. Proceed to the following sections to enter data in the Channel or Global menus.

C.5 Entering Data in the Channel Menu

The Channel menu is used to enter data specific to each channel. See *Figure 53 on page 135*, *Figure 54 on page 136* and *Figure 55 on page 137*, and remember to record all programming data in Appendix B, *Data Records*.

Note: In this manual, only the programming of Channel 1 will be described. To program Channel 2 of a 2-Channel meter, simply repeat the same procedures presented for Channel 1.

C.5.1 Selecting the Channel Measurement Method

The Status submenu permits selection of the desired measurement method.

1. In the *Site Data Menu*, double-click on the desired channel.
2. Highlight and double-click on the Status option in the center pane. The window now appears similar to *Figure 45*.

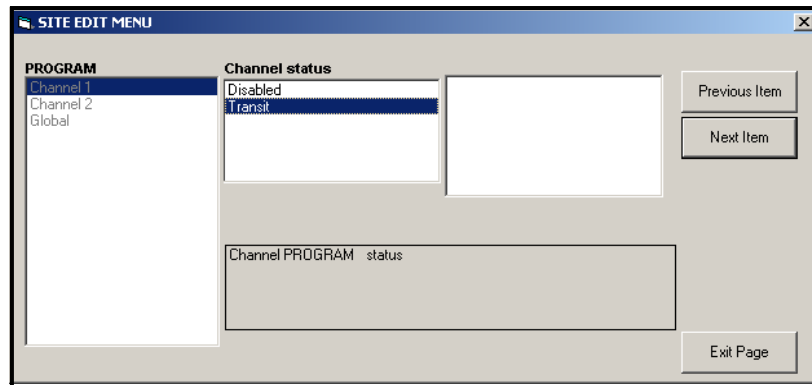


Figure 45: The *Status* Option in the Channel Menu

3. Double-click on the desired option. PanaView returns to the Channel menu shown in *Figure 42 on page 90*. Proceed to the System option.

C.5.2 Entering Data in the Channel System Option

1. From the Channel menu, highlight and double-click on the System option in the center pane.
2. The first prompt asks for the *Channel Label*. Enter the desired label (in any numeric or text combination up to three characters) in the right pane, and click [Next Item].
3. The next prompt asks for the *Channel Message*. Enter the desired text, and click [Next Item].
4. The program now asks if you want the *Energy Option*, which enables flow measurement in a heating or cooling system. Double-click on *Off* or *On*.
5. The next prompt asks for the *Volumetric Units*. Scroll through the available units (from the list shown in Table 26) and double-click on the desired units.

Note: Refer to the System option of the Global menu to choose between English or metric measurements.

Table 26: Available Volumetric Units

English	Metric
Gal/sec	Liter/sec
Gal/min	Liter/min
Gal/hr	Liter/hr
Mega Gal/day	MegaLiter/day = million liters/day
Cubic ft/sec = cubic feet/second	Cubic m/sec = cubic meters/second
Cubic ft/min = cubic feet/minute	Cubic m/min = cubic meters/minute
Cubic ft/hr = cubic feet/hour	Cubic m/hr = cubic meters/hour
Cubic ft/day = cubic feet/day	Cubic m/day = cubic feet/day
Mega Cubic ft/day = millions cubic feet/day	Mega Cubic m/day = million cubic meters/day
Barrel/sec	Barrel/sec
Barrel/min	Barrel/min
Barrel/hr	Barrel/hr
Barrel/day	Barrel/day
Mega Barrel/day = million barrels/day	Mega Barrel/day = million barrels/day
Acre-inch/sec	
Acre-inch/min	
Acre-inch/hr	
Acre-inch/day	
Acre-feet/second	
Acre-feet/min	
Acre-feet/hr	
Acre-feet/day	

C.5.2 Entering Data in the Channel System Option (cont.)

6. Double-click on the desired number of *Decimal Digits* (digits to the right of the decimal point) in the volumetric flow display.
7. Double-click on the desired *Totalizer Units* for the totaled flow rate display (listed in *Table 27*).

Table 27: Totalizer Units

English	Metric
Gallons	Liters
MegaGallons = million gallons	Megaliters = million liters
Cubic feet	Cubic m
MegaCubicFt = million cubic feet	MegaCubicm = million cubic meters
Barrels	Barrels
Megabarrels = million barrels	Megabarrels = million barrels
Acre-inches	
Acre-feet	

8. Double-click on the desired number of *Decimal Digits* (digits to the right of the decimal point) in the totaled flow rate display.

The program now varies, depending on whether you have activated MASS FLOW (see the *Programming Manual* for details) or the ENERGY OPTION.

- If you have activated MASS FLOW, continue to step 1 on the next page.
- If you have activated the ENERGY OPTION (but not MASS FLOW), skip to step 1 on *Section C.5.2.2*.
- If you have activated neither option, PanaView returns to the Channel PROGRAM window shown in *Figure 42* on *page 90*. Proceed to the Pipe option.

C.5.2.1 Programming the Mass Flow Option

1. Double-click on the desired *Mass Flow Units* for flow rate display (listed in *Table 28*).

Table 28: Available Mass Flow Units

English	Metric
Pounds	Kilograms
KiloPounds = Thousands of Pounds	Tonnes = Metric Tons (1000 KG)
MillionPounds	
TONS (2000 LB)	

2. Double-click on the desired *Mass Flow Time Units*.
3. Double-click on the desired number of *Decimal Digits* (digits to the right of the decimal point) in the mass flow rate display.
4. Double-click on the desired *Mass Total Units* for the totalized mass flow rate display (listed in *Table 28*).
5. Double-click on the desired number of *Mass Decimal Digits* (digits to the right of the decimal point) in the totalized mass flow rate display.

The program varies, depending on whether or not you have enabled the Energy Option.

- If you have not enabled the option, PanaView returns to the Channel PROGRAM window shown in *Figure 42 on page 90*. Proceed to the Pipe option.
- If you have enabled the option, continue to the next page.

C.5.2.2 Programming the Energy Option

1. Double-click on the desired *Power Units* (listed in Table 29).

Table 29: Available Power Units

English	Metric
kBTU/hr = Thousands of BTUs/hour	kCALs = Kilocalories/second
MMBTU/hr = Mega BTUs/hour	kCALm = Kilocalories/minute
kWATT = Kilowatt	kCALh = Kilocalories/hour
TONS = Tons (2000 LB)	kCALd = Kilocalories/day
	MCals = Megacalories/second
	MCALm = Megacalories/minute
	MCALh = Megacalories/hour
	MCALd = Megacalories/day
	kW = Kilowatt
	MW = Megawatt

2. Double-click on the desired number of *Power Decimal Digits*.
3. Double-click on the desired *Total Energy Units* (shown in Table 30).

Table 30: Available Total Energy Units

English	Metric
kBTU = Thousands of BTUs	kCalories = Kilocalories
MMBTU = Millions of BTUs	MCalories = Megacalories
kWATT-Hr = Kilowatt-hour	kWATT-Hr = Kilowatt-hour
TONS = Tons (2000 LB)	MWATT-Hr = Megawatt-hour

4. Double-click on the desired number of *Energy Decimal Digits*.
5. Double-click to choose a *Heating or Cooling System*.
6. The final prompt asks whether you want to conduct *Flow Measurement* at the point of Return (where the liquid exits) or of Supply (where the liquid enters). Double-click on the appropriate choice.

You have completed entering data in the System option. PanaView returns to the Channel PROGRAM menu shown in Figure 42 on page 115. Proceed to the next page to enter Pipe parameters.

C.5.3 Entering Pipe Parameters

Enter the transducer and pipe parameters using the Pipe submenu. While following the programming instructions, refer to *Figure 54 on page 136*.

1. From the Channel menu, highlight and double-click on the Pipe Parameters option in the center pane.
2. The first prompt asks for the *Transducer Number*.
 - For a standard transducer, double-click on the *Standard* option in the center pane. Then enter the number engraved on the transducer head in the right pane, and click on [Next Item].
 - If there is no number engraved on the transducer head, double-click on the *Special* option, enter an assigned number (from 91 to 99), and click on [Next Item].

IMPORTANT: Special transducers, which have no engraved number on the head, are rarely used. Examine the transducer head carefully for a number.

The menu now varies, depending on your selection in step 2.

- If you entered the number for a standard clamp-on transducer, proceed to the *Pipe Material* prompt in step 4.
- If you entered the number for a standard wetted transducer, proceed to the *Pipe OD* prompt in step 5.
- If you entered the number for a special transducer, proceed to step 3 below.

C.5.3.1 Special Transducers

3. For special transducers:
 - a. The program first asks for the Wedge Type. Double-click on the appropriate transducer type (Rayleigh clamp-on, shear clamp-on, or wetted).

Note: Panametrics will supply the information required for steps b through f with the transducers.

- b. Double-click on the appropriate Frequency (from 500 kHz to 5 MHz). The frequency is required to transmit an excitation voltage at the transducer's natural frequency.
 - c. Enter the Time Delay (T_w) value supplied by Panametrics and click on [Next Item].

T_w is the time required for the transducer signal to travel through the transducer and its cable. This time delay must be subtracted from the transit times of the upstream and downstream transducers to ensure an accurate measurement.

If you have selected a special wetted transducer, the program now goes to step 5. But if you have selected a clamp-on transducer, three more prompts appear.

- d. Enter the transducer *Wedge Angle* (the angle of the ultrasonic transmission, in degrees) and click on [Next Item].
 - e. Enter the *Wedge Temperature* and click on [Next Item].
 - f. Enter the *Wedge Soundspeed* and click on [Next Item].

C.5.3.2 Pipe Material

4. Double-click on the appropriate *Pipe Material* from the supplied list. For some materials (shown in *Table 31*), the program displays additional selections.

Table 31: Pipe Material Choices

Material	Types
Steel	Carbon Steel Stainless Steel
Iron	Ductile Iron Cast Iron
Copper	no additional selection required
Aluminum	no additional selection required
Brass	no additional selection required
Copper Nickel	70%Cu/30%Ni - 70/30 Copper/Nickel 90%Cu/10%Ni - 90/10 Copper/Nickel
Glass	Pyrex Heavy Silicate Flint Light Borate Crown
Plastic	Nylon Polyethylene Polypropylene PVC (Polyvinyl Chloride), CPVC Acrylic
OTHER	Enter the soundspeed of the pipe material and click on [Next Item]. If the soundspeed is unknown, refer to the <i>Sound Speeds and Pipe Size Data</i> manual (914-004).

C.5.3.3 Pipe OD

5. Click on the appropriate *Pipe OD Unit* type in the center pane from the list shown in *Table 32*. Then enter the known pipe outside diameter or circumference in the right pane and click on [Next Item].

Obtain the required information by measuring either the pipe outside diameter (OD) or circumference at the transducer installation site. The data may also be obtained from standard pipe size tables found in *Sound Speeds and Pipe Size Data* (914-004).

Table 32: Available Pipe OD Units

English	Metric
inch	mm
feet	meters
circum.in = pipe circumference in inches	circum.mm = pipe circumference in millimeters
circum.ft = pipe circumference in feet	circum.m = pipe circumference in meters

6. Enter the known *Pipe Wall Thickness* (in inches or mm) in the right pane and click on [Next Item].

If you are using clamp-on transducers, skip to step 9 on the next page.

C.5.3.4 Path and Axial Lengths

7. Click on the appropriate *Path Length* unit type in the center pane. Then enter the path length of the ultrasonic signal in the right pane and click on [Next Item].

Note: If a spoolpiece was ordered with the meter, the transducer signal path length (P) and the transducer signal axial length (L) are engraved on the flowcell and/or are included in the documentation supplied with the meter. For on-site transducer installations, refer to Appendix C, Measuring P and L Dimensions, in the Startup Guide for instructions.

8. Click on the appropriate *Axial Length* unit type in the center pane. Then enter the axial length of the ultrasonic signal in the right pane and click on [Next Item].

C.5.3.5 Pipe Lining

9. Double-click on the appropriate choice to indicate whether you have a *Pipe Lining*.

- a. If you have selected Yes, then select the *Lining Material* from the supplied list.
 - If OTHER is selected, enter the lining sound speed, and click on [Next Item]. Then enter the lining thickness and click on [Next Item].

C.5.3.6 Tracking Windows

10. Double-click on the appropriate choice to indicate whether you want *Tracking Windows*. These windows are used to detect the receive signal when you are unsure of the fluid sound speed.

C.5.3.7 Fluid Type

- 11.** Double-click on the appropriate *Fluid Type*. The selections for fluid type vary depending on whether:
- the ENERGY OPTION is ON or OFF; and
 - the TRACKING WINDOW is enabled or disabled.

Refer to *Table 33* if ENERGY OPTION is OFF, or to *Table 34* if ENERGY OPTION is ON.

Note: Some of the fluid types may require additional selections, as shown in the following tables.

Table 33: Fluid Types for ENERGY OFF

Tracking Windows =			
NO	Additional Selections	YES	Additional Selections
Water	Normal Water Sea Water If Normal Water is selected, enter Water Temperature and click on [Next Item].	Water, 0–100C	No additional selections required.
Oil	Lube Oil Crude Oil	Water, 0–260C	No additional selections required.
Methanol (25 C)	No additional selections required.	Oil	No additional selections required.
Ethanol (25C)	No additional selections required.	OTHER	Enter the Minimum Soundspeed and click on [Next Item]. Then enter the Maximum Soundspeed and click on [Next Item].
LN2	No additional selections required.		
Freon	No additional selections required.		
OTHER	Enter the fluid soundspeed and click on [Next Item].		

Table 34: Fluid Types for ENERGY ON

Tracking Windows =			
NO	Additional Selections	YES	Additional Selections
Water	Enter the Water Temperature and click on [Next Item].	Water, 0–260C	No additional selections required.
Water, Glycol Mixture	Enter the Fluid Soundspeed and click on [Next Item]. Then enter the Percentage of Water and click on [Next Item].	Water, Glycol Mixture	Enter the Percentage of Water and click on [Next Item].
OTHER	Enter the Fluid Soundspeed and click on [Next Item].	OTHER	Enter the Minimum Soundspeed and click on [Next Item]. Then enter the Maximum Soundspeed and click on [Next Item].

C.5.3.8 Reynolds Correction

12. Double-click on the appropriate choice to indicate whether you want *Reynolds Correction*.

- If *Off* is selected, enter the *Calibration Factor* and click on [Next Item].
- If *Active* is selected, the program asks for *KV Input Selection*. Double-click on either *Use KV/SS Table*, *Use KV/C3 (Soundspeed) Table*, or *Static*.
- If one of the table options is selected, enter the *Calibration Factor* and click on [Next Item].
- If *Static* is selected, enter the *Kinematic Viscosity* and click [Next Item]. Then enter the *Calibration Factor* and click [Next Item].

Then, proceed to one of the following sections:

- For wetted transducers, the program returns to the Channel menu. You have completed entering pipe parameters.
- For clamp-on transducers, proceed to step 13.

C.5.3.9 Number of Traverses

13. Double-click on the desired *Number of Traverses* (from 1 to 5).

14. Enter the value for the *Transducer Spacing* and click on [Next Item]. You have completed entering pipe parameters.

C.5.4 Entering Input/Output Parameters

Enter the zero cutoff value and set up the temperature, pressure and quality inputs using the Input/Output submenu. While programming these parameters, refer to *Figure 53 on page 135*.

IMPORTANT: If an option card in Slot 1 fails to appear in this menu, it may be turned OFF. See the Global-I/O-Options section on *Section C.6.0.6* for setup instructions.

C.5.4.1 Zero Cutoff Value

Near a zero flow rate, the Model XMT868i's readings may fluctuate due to small offsets caused by thermal drift or similar factors. To force a zero display reading when there is minimal flow, enter a *zero cutoff value* as described in the following steps:

1. From the Channel menu, highlight and double-click on the Input/Output option in the center pane.
2. The program asks for the *Zero Cutoff*. Enter a value from 0 to 1 ft/sec (0 to 0.30 m/sec) for the zero cutoff and click [Next Item]. The recommended setting is 0.1 ft/sec (0.03 m/sec).

Proceed with one of the following:

- If the ENERGY OPTION is OFF, the display now returns to the Channel menu.
- If the ENERGY OPTION is ON, refer to *Temperature Input* below.

C.5.4.2 Temperature Input

The Model XMT868i can use either a fixed temperature value or a live temperature input to calculate energy. Complete the following steps to configure this input:

Note: *The site data programmed in this chapter is automatically stored in the meter's non-volatile RAM (NVR). If the power to the meter is disconnected, the same site data will be applied when the unit is next powered on.*

3. At the *Temp Input Supply* prompt, double-click on *Fixed* to enter a constant temperature value or on *Slot1* to select the output in Slot 1 that will provide the live temperature input for the supply.

Note: *If Slot 1 contains an activated option card with an analog input assigned to TEMP or an RTD input, Slot 1 appears as an option at the above prompt. If the process temperature is stable, a fixed value may be used, but most applications require a live temperature input.*

4. One of the following two prompts will appear, depending on your selection in Step 3.
 - If *Fixed* was chosen, enter the known fixed process temperature and click [Next Item]. The meter will only accept values from -328° to 1832°F (-200° to 1000°C).
 - If *Slot 1* was chosen, double-click on the desired temperature input (from A to D).

5. At the *Temp Input Return* prompt, double-click on *Fixed* to enter a constant temperature value or on *Slot1* to select the output in Slot 1 that will provide the live temperature input for the return.

Note: If Slot 1 contains an activated option card with an analog input assigned to TEMP or an RTD input, Slot 1 appears as an option at the above prompt. If the process temperature is stable, a fixed value may be used, but most applications require a live temperature input.

6. One of the following two prompts will appear, depending on your selection in Step 3.
 - If *Fixed* was chosen, enter the known fixed process temperature and click [Next Item]. The meter will only accept values from -328° to 1832°F (-200° to 1000°C).
 - If *Slot 1* was chosen, double-click on the desired temperature input (from A to D).

The program now returns to the Channel menu.

C.5.5 Entering Setup Parameters

The signal limits and response times for the Model XMT868i are specified using the Set Up submenu. While following the programming instructions, refer to *Figure 55 on page 137*. This submenu includes four options:

- Signal – set the parameters related to the transducer signal
- V Averaging – specify the response of the meter to step changes
- Default Setup – initialize all parameters to default values
- Advanced Features – enable mass flow, edit kinematic viscosity vs. sound speed table, activate K factors, and select transmit code length.

To enter the Set Up submenu, highlight and double-click on the Set Up option in the center pane of the Channel menu. Remember to record all programmed data in Appendix B, *Data Records*.

C.5.5.1 The Signal Option

Use this option to set the limits for the incoming signal and other parameters affecting the transducer signal. For example, the programmed signal strength low limit may be used to determine the trigger point for an alarm.



CAUTION! The Signal default settings are suitable for most applications. Consult the factory before changing any of these parameters.

1. From the Set Up option menu, highlight and double-click on *Signal* in the center pane.
2. Click [Next Item] to accept the current Signal Low Limit value or enter a new value and click [Next Item].

The default value for the above parameter is 20, and values from -20 to 100 are acceptable. The E1: LOW SIGNAL error message appears when the signal strength falls below the programmed Signal Low Limit value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

3. Click [Next Item] to accept the current Corr. Peak Limit value or enter a new value and click [Next Item].

The default value for the above parameter is 100, and values from 0 to 500 are acceptable. The E4: SIGNAL QUALITY error message appears when the signal quality falls below the programmed Cor. Peak Limit value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

4. Click [Next Item] to accept the current Soundspeed $\pm$ Limit value or enter a new value and click [Next Item].

The default value for the above parameter is 20%, and values from 1% to 50% are acceptable. The E2: SOUNDSPEED error message appears when the calculated fluid soundspeed differs from the fluid soundspeed entered in the CHx-SYSTM menu by more than the programmed Soundspeed $\pm$ Limit value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

5. Click [Next Item] to accept the current Velocity Low Limit value or enter a new value and click [Next Item].

The default value for the above parameter is -150.0 ft/sec. (-46 m/sec) and values from -500 to 500 ft/sec (-150 to 150 m/sec) are acceptable. The E3: VELOCITY RANGE error message appears when the calculated fluid velocity is less than the programmed Velocity Low Limit value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

- 6.** Click [Next Item] to accept the current Velocity High Limit value or enter a new value and click [Next Item].

The default value for the above parameter is 150.0 ft/sec (46 m/sec) and -500 to 500 ft/sec (-150 to 150 m/sec) are acceptable values. The E3: VELOCITY RANGE error message appears when the calculated fluid velocity exceeds the programmed Velocity High Limit value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

- 7.** Click [Next Item] to accept the current Acceleration value or enter a new value and click [Next Item].

The default value for the above parameter is 15.0 ft/sec² (4.6 m/sec²) and values from 0 to 100 ft/sec² (0 to 30 m/sec²) are acceptable. The E6: CYCLE SKIP error message appears when the calculated fluid velocity changes by more than the programmed ACCELERATION LIMIT value from one reading to the next. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

- 8.** Click [Next Item] to accept the current Amp. Discrim Low value or enter a new value and click [Next Item].

The amplitude discriminator measures the transducer signal received by the Model XMT868i. The default value for the above parameter is 14, and values from 0 to 100 are acceptable. The E5: AMPLITUDE error message appears when the amplitude discriminator falls below the programmed Amp. Discrim Low value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

- 9.** Click [Next Item] to accept the current Amp. Discrim High value or enter a new value and click [Next Item].

The amplitude discriminator measures the transducer signal received by the Model XMT868i. The default value for the above parameter is 34, and values from 0 to 100 are acceptable. The E5: AMPLITUDE error message appears when the amplitude discriminator exceeds the programmed AMP. DISCRIM HIGH value. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of error codes.

- 10.** Click [Next Item] to accept the current Delta T Offset value or enter a new value and click [Next Item].

An offset between the upstream and downstream transit times is specified at this prompt. The default value for the above parameter is 0 µsec, and values from -1000 to 1000 µsec are acceptable.

- 11.** Click [Next Item] to accept the current % of Peak value or enter a new value and click [Next Item].

The percentage of peak used to calculate the transit times and Delta T is specified at this prompt. The default value for the above parameter is 50%, and values from -100 to 100% are acceptable.

Note: *This setting is a starting point for detecting the signal. The meter will automatically adjust this value if the calculated transit time is unacceptable. You can set the limits for this value using the MIN. PEAK% and MAX. PEAK% discussed on the next page.*

- 12.** Double-click on the desired XMIT Sample Size (from 2 to 32).

Both the upstream and downstream transducers transmit ultrasonic pulses in bursts, which consist of a series of transmit pulses. XMIT Sample Size determines how many bursts are sent in one direction before sending in the other direction. The default value for the above parameter is 8 and values of 2, 4, 8, 16 and 32 are acceptable.

- 13.** Click [Next Item] to accept the current # of Errors value or enter a new value (0 to 16) and click [Next Item].

Use this prompt to enter the number of errors the XMT868i can record before it displays an error message. The default value is 8.

- 14.** Click [Next Item] to accept the current Minimum Percent of Peak value or enter a new value and click [Next Item].

Use this prompt to enter the minimum percent of peak that the XMT868i can use to measure transit time. The XMT868i accepts values from -100 to 100.

- 15.** Click [Next Item] to accept the current Maximum Percent of Peak value or enter a new value and click [Next Item].

Use this prompt to enter the maximum percent of peak that the XMT868i can use to measure transit time. The XMT868i accepts values from -100 to 100.

After responding to the above prompt, the meter returns to the Set Up option window.

C.5.5.2 The V Averaging Option

Use this option to specify the number of readings that occur before the meter will respond to a step change in flow rate. In general, the smaller the number of readings, the less steady the display will appear. Complete the following steps to set the response time:

1. From the Set Up option menu, highlight and double-click on *V Averaging* in the center pane.
2. Double-click on the desired *Response Time* (from 1 to 60 sec).

For best results, select the STATS (statistics) option, as this increases the response time under steady flow conditions while still allowing a rapid response to changes in flow rate.

After responding to the above prompt, the meter returns to the Set Up option window.

C.5.5.3 The Default Setup Option

Use this option to initialize (reset) all of the parameters within the Set Up menu back to their default values. Complete the following steps to reset all of the parameters:

1. From the Set Up option menu, highlight and double-click on *Default Setup* in the center pane.
2. Double-click on *No* to keep the current values or on *Yes* to reset all values to their default settings.

After responding to the above prompt, the meter returns to the Set Up option window.

The Advanced Features Option

This option enables you to enable the more advanced features of the meter. In this option you can do the following:

- calculate the kinematic viscosity (KV) based on signal strength (SS) or soundspeed (C3)
- enter a table of K-factors (based on velocity or reynolds number) that compensates for non-linear flow rates
- enable mass flow (calculated for static fluid density)
- select the size of the transducer transmission signal.

The KV/xx Option

Note: To choose between signal strength and soundspeed for kinematic viscosity calculations, refer to *Reynolds Correction in the Pipe submenu on Section C.5.3.8*.

Use this option to calculate the kinematic viscosity (KV) based on signal strength (SS) or soundspeed (C3). To use this option, you must enter the KV vs. SS pairs in descending order of KV and ascending order of SS (or C3). For example, if pair 1 is KV = 10 centistokes and SS = 62, then pair 2 must be KV $\leq$ 10 centistokes and SS $\geq$ 62. The XMT868i accepts 2 to 20 pairs. Complete the following steps to enter KV and SS or soundspeed values:

1. From the Advanced Features option menu, highlight and double-click on *Enter KV/xx Values* in the center pane.
2. Click [Next Item] to accept the current # of KV/SS Pairs or enter a new value (2 to 20) and click [Next Item].
3. Click [Next Item] to accept the current *Sig Strength #01* value or enter a new value (50.0 to 85.0) and click [Next Item]. Enter the signal strength values in ascending order.
4. Click [Next Item] to accept the current *Kinematic Viscosity* value or enter a new value (0.050 to 500) and click [Next Item]. Enter the kinematic viscosity values in descending order.

The *Sig Strength* and *Kin Viscosity* prompts repeat for each pair. After entering all the pairs, the meter returns to the *Advanced Features* option.

The Multiple K Factors Option

Use this option to enter a table of K-factors. K-factors are used to create a curve for the flow range (based on velocity or reynolds number) that compensates for non-linear flow rates. The meter accepts from 2 to 20 pairs. Complete the following steps to enter multiple K factors for velocity or reynolds values:

1. From the Advanced Features option menu, highlight and double-click on *Multiple K Factors* in the center pane.
2. Double-click on *Yes to Activate Multi K Factors* or on *No* to disable this option.

If NO was selected, the meter returns to the *Advanced Features* window. If YES was selected, proceed to Step 3.

3. Double-click on the desired *Custom Type* (velocity or reynolds).
4. Double-click on *Yes to Edit* the K-factor *Table* or on *No* to retain the current K-factor table (and return to the *Advanced Features* window).

Note: *If the necessary velocity/reynolds vs. K-factor data was not provided with the Model XMT868i's documentation, the K-factor table cannot be edited.*

If NO was selected, the meter returns to the *Advanced Features* window. If YES was selected, proceed to Step 5.

5. Enter the *Number Of K-factors* (from 2 to 20) to be entered into the table, and click [Next Item].

Note: *When editing the K-factor table, the velocities must be entered in increasing order.*

6. Enter the *Velocity/Reynolds Value* for K-factor number "X" and click [Next Item].
7. Enter the *K-factor* corresponding to velocity/reynolds number "X" (0.333 to 3.0) and click [Next Item].

The *Velocity #* and *K Factor #* prompts repeat for each pair. After entering all the pairs, the meter returns to the *Advanced Features* window.

The Mass Flow Option

Use this option to calculate mass flow from a static fluid density. Complete the following steps to enter the static density of the fluid:

1. From the Advanced Features option menu, highlight and double-click on *Massflow from Static* in the center pane.
2. Double-click on *Yes* to activate *Mass from Static* or on *No* to disable this option.
 - a. If you select *Yes*, enter the *Fluid Density* (0.062 to 624.220) and click [Next Item].

After responding to the above prompt, the meter returns to the Advanced Features window.

The Code Length Option

Use this option to select the size of the transducer transmission signal. This option is helpful when measuring flow in small pipes. You can choose from the following selections:

- AUTOMATIC - The meter will automatically determine the code length (short or long) which is based on pipe size and transducer type.
- SHORT CODE- is just few pulses with no code pattern built in. In some cases, the diameter of the pipe is so small that it does not give each transducer the necessary time to send a series of signals before receiving a series of signals. SHORT is also a good selection for pipes made of materials such as PTFE which tend to blur the signal pattern.
- LONG CODE - is a series of approximately a dozen pulses that have a distinctive binary pattern, easily recognizable during auto correlation.

Complete the following steps to select the code length:

1. From the Advanced Features option menu, highlight and double-click on *Code Length* in the center pane.
2. Double-click on the desired *Xmit Code Length*. AUTO is the default.

After responding to the above prompt, the meter returns to the Advanced Features window. Click [Exit Page] three times to return to the *User Program*.

C.6 Entering Data in the Global Menu

The Global menu is used to enter information that is not specific to any of the individual channels. Information programmed using this menu is used to enter several general system parameters (e.g., English or metric units). For meters with 2 channels, this menu is also used to compute parameters such as the sum, difference or average of the channel 1 and channel 2 signals. When calculating the SUM, DIF or AVE readouts, data from the Global-System submenu is used. Any conflicting data entered in the Channel-System submenu is overridden.

The following submenus are included in the Global menu:

- System - use to specify the units of measure used in calculations
- I/O - used to set up error handling and to configure analog inputs and outputs
- Comm - used to set up the serial communications port and MODBUS parameters

To enter the Global menu, double-click on the Global entry in the left pane of the *Site Edit Menu* window. Then proceed to the appropriate section of this chapter for instructions. Refer to *Figure 56 on page 138* and *Figure 57 on page 139*, and remember to record all programming data in Appendix B, *Data Records*.

C.6.0.1 Entering Global-System Data

While completing these instructions, refer to menu map *Figure 56 on page 138*.

1. In the *Site Data Menu*, double-click on the Global entry.
2. Highlight and double-click on the System option in the center pane. The window now appears similar to *Figure 46*.

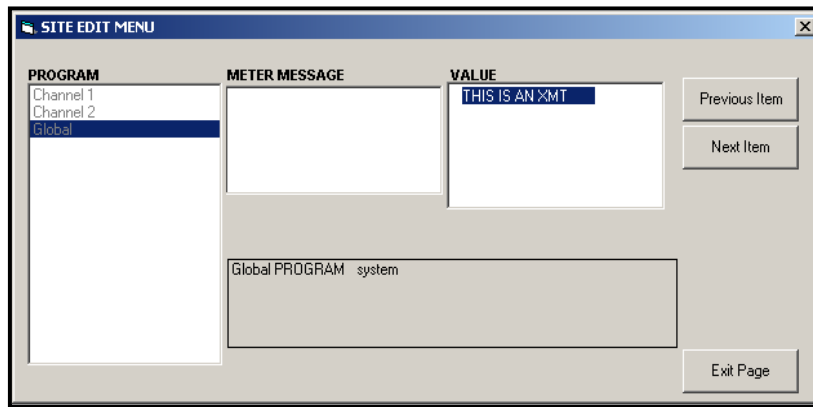


Figure 46: The System Option in the Global Menu

3. The first prompt asks for a *Meter Message*. Enter a numeric or text message (up to 16 characters) in the right pane and click [Next Item].
4. Double-click on the desired *System Units* selection (either metric or English). The XMT868i will display all parameters and measurements in the designated units.
 - For a single-channel XMT868i, the program returns to the Global program menu. Click [Exit Page].
 - For a 2-channel meter, proceed to step 5 on the next page.

C.6.0.2 Volumetric Units

5. Scroll to and double-click on the desired *Volumetric Units* for the flow rate display. *Table 35* lists the available volumetric units.

Table 35: Available Volumetric Units

English	Metric
Gal/sec = gallons/second	Liter/sec
Gal/min = gallons/minute	Liter/min
Gal/hr = gallons/hour	Liter/hr
MegaGal/day = million gallons/day	MegaLiter/day = million liters/day
Cubic ft/sec	Cubic m/sec
Cubic ft/min	Cubic m/min
Cubic ft/hr	Cubic m/hr
Cubic ft/day	Cubic m/day
Mega Cubic ft/day = million cubic feet/day	Mega Cubic m/day = million cubic meters/day
Barrel/sec	Barrel/sec
Barrel/min	Barrel/min
Barrel/hr	Barrel/hr
Barrel/day	Barrel/day
Megabarrel/day = million barrels/day	Megabarrel/day = million barrels/day
Acre-inch/sec	
Acre-inch/min	
Acre-inch/hr	
Acre-inch/day	
Acre-feet/sec	
Acre-feet/min	
Acre-feet/hr	
Acre-feet/day	

6. Double-click on the desired number of *Decimal Digits* (digits to the right of the decimal point) in the volumetric flow display.

C.6.0.3 Totalizer Units

7. Double-click on the desired *Totalizer Units* for the totalized flow rate display (listed in *Table 36*).

Table 36: Totalizer Units

English	Metric
Gallons	Liters
MegaGallons = million gallons	Megaliters
Cubic feet	Cubic meters
MegaCubicFt = million cubic feet	Mega Cubic m = million cubic meters
Barrels	Barrels
Megabarrels = million barrels	Megabarrels = million barrels
Acre-inches	
Acre-feet	

8. Double-click on the desired number of *Decimal Digits* (digits to the right of the decimal point) in the totalized flow display.

The program now varies, depending on whether you have activated Mass Flow (see the *Programming Manual* for details) or the Energy Option in one of the Channel PROGRAM options.

- If you have activated Mass Flow, continue to step 1 on the next page.
- If you have activated the Energy Option (but not Mass Flow), skip to step 1 on *Section C.6.0.5*.
- If you have activated neither option, the XMT868i returns to the Global PROGRAM window. Click on [Exit Page] to return to the *User Program*.

C.6.0.4 Programming Mass Flow Data

1. Double-click on the desired *Mass Flow Units* for flow rate display (listed in *Table 37*).

Table 37: Available Mass Flow Units

English	Metric
LB = Pounds	KG = Kilograms
KLB = KiloPounds (Thousands of Pounds)	Tonne = Metric Tons (1000 KG)
MMLB = MegaPounds	
TONS (2000 LB)	

2. Double-click on the desired *Mass Flow Time Units* (from seconds to days).
3. Double-click on the desired number of *Decimal Digits* (digits to the right of the decimal point) in the mass flow rate display.
4. Double-click on the desired *Mass Totals* (units for the totalized mass flow rate display, listed in *Table 37*).
5. Double-click on the desired number of *Mass Decimal Digits* (digits to the right of the decimal point) in the totalized mass flow rate display.

The program varies, depending on whether or not you have enabled the Energy Option.

- If you have not enabled the option, the XMT868i returns to the Global PROGRAM window. Click on [Exit Page] to return to the *User Program*.
- If you have enabled the option, continue to the next page.

C.6.0.5 Programming the Energy Option

1. Double-click on the desired *Power Units* (listed in Table 38).

Table 38: Available Power Units

English	Metric
kBTU/h = Thousand BTUs/hour	kCALs = Kilocalories/second
MMBTU = Mega BTUs/hour	kCALm = Kilocalories/minute
kWATT = Kilowatt	kCALh = Kilocalories/hour
TONS = Tons (2000 LB)	kCALd = Kilocalories/day
	MCals = Megacalories/second
	MCALm = Megacalories/minute
	MCALh = Megacalories/hour
	MCALd = Megacalories/day
	kW = Kilowatt
	MW = Megawatt

2. Double-click on the desired number of *Power Decimal Digits*.
3. Double-click on the desired *Total Energy Units* (shown in Table 39).

Table 39: Available Total Energy Units

English	Metric
kBTU = Thousand BTUs	kCAL = Kilocalories
MMBTU = Million BTUs	MCAL = Megacalories
kWHr = Kilowatt-hour	kWHr = Kilowatt-hour
TONS = Tons (2000 LB)	MWHr = Megawatt-hour

4. Double-click on the desired number of *Energy Decimal Digits*.

You have completed entering selections in this option. The program returns to the Global PROGRAM menu.

C.6.0.6 Setting Up Inputs and Outputs

Set up the XMT868i's inputs and outputs using the I/O submenu. While following the programming instructions, refer to *Figure 56 on page 138* and *Figure 57 on page 139*. Remember to record all programmed data in Appendix B, *Data Records*. The I/O submenu consists of the following options:

- Error Handling – program the meter's response during an error condition
- Options – set up any option cards and the Slot 0 analog outputs
- Display – set up the LCD display (refer to Chapter 2, *Displaying Data*)

To enter the I/O submenu:

1. In the *Site Data Menu*, double-click on the Global entry.
2. Highlight and double-click on the Input/Output option in the center pane.

Note: In this section, Slot 1 appears as an option only if a suitable option card is installed in Slot 1.

C.6.0.7 Setting Up Error Handling

This menu option lets you set how the XMT868i will handle the outputs for measurements and average (two-path) measurements during an error condition. See Chapter 2, *Error Codes*, in the *Service Manual* for a discussion of the built-in error codes.

1. From the Input/Output option, highlight and double-click on the *Error Handling* option in the center pane.
2. Double-click on the desired *Error Handling* selection (as shown in *Table 40* below and *Table 40 on page 114*).
 - a. If you selected *Error Level in mA*, enter the 4–20 mA *Error Level* (the number of milliamps the analog output will put out during a fault condition). Enter a whole number between 0 and 22, and click [Next Item].

See *Table 40* below and *Table 41 on page 115* for a description of the error handling options available and how the totalizers and display respond to them for a single and two-channel meter.

Table 40: Error Options & Responses, Single-Channel Meter

Option	Output Response	Totalizer Response
Hold Last Value	Holds last “good” reading	Holds last “good” reading and continues to totalize, based on that reading
Force Low	Forces the outputs to the low set point	Stops totalizing
Force High	Forces the outputs to the high set point	Stops totalizing
Force High High	Forces the outputs $\approx 10\%$ above the high set point	Stops totalizing
Error Level in mA	Allows user to enter 4–20 mA error level in mA.	Sends analog outputs to entered mA level when a fault occurs.

C.6.0.8 The Error Option (cont.)

Table 41: Error Options and Responses, 2-Channel Meter

When Measuring	Display Response	Totalizer Response When Error Handling is	
		HOLD	LOW, HIGH, HHIGH
CH1 or CH2 (vel, vol, etc.)	Holds last "good" reading.	Holds last "good" reading and continues to totalize based on that "good" reading.	Stops totalizing.
SUM	Adds two channels using the last "good" reading.	Holds last "good" reading and continues to totalize based on two channels.	Stops totalizing if either or both channels go into error.
DIF	Subtracts two channels using the last "good" reading.	Holds last "good" reading and continues to totalize based on two channels.	Stops totalizing if either or both channels go into error.
AVE	See Error Handling for Average Measurements below.		

For a one-channel meter, after responding to the above prompt, the meter returns to the Global I/O prompt shown on the previous page. For a two-channel meter, proceed to step 3 below.

Error Handling for Average Measurements – AVE

The 2PATH ERROR HANDLING option is intended for applications where two sets of transducers are installed in the same location in the same pipe to improve accuracy and the meter is operated in AVE mode. With this function enabled, the Model XMT868i performs error handling only if both channels are in error. If this function is disabled, error handling occurs when either channel goes into error.

- 3.** Double-click Yes to enable *Two-path Error Handling*, or on No to disable this function.

Specific responses of the display and the totalizer to the two-path error handling option available at the above prompt are listed in Table 42.

Table 42: 2-Path Error Response Options

Option	Display Response	Totalizer Response
NO	Displays the average of CH1 and CH2, regardless of the error state of either channel.	Outputs the average of CH1 and CH2 totals, regardless of the error state of either channel.
YES	- If one channel is in error, the other channel's value is displayed as the average. - If both channels are in error, the last average reading is held.	- If one channel is in error, totalizing continues. - If both channels are in error, totalizing stops.

After responding to the above prompt, the meter returns to the Input/Output option menu.

C.6.0.9 Setting Up Option Cards

The Model XMT868i has two built-in analog outputs, which are assigned to Slot 0. Also, a variety of input/output option cards may be installed in Slot 1. See Chapter 1, *Installation*, of the *Startup Guide* for a complete description of the available option cards.

To access this submenu, double-click on the *Options* entry in the Input/Output submenu. This menu option is used to set up and/or scale the inputs and outputs. To accomplish this, complete the following steps:

- Double-click on the desired *I/O Slot* to program the I/O functions in that slot.

Note: If an option card is not installed in Slot 1, the Slot1 option does not appear at the above prompt.

Proceed to the appropriate section for programming instructions specific to the type of input or output selected above.

Analog Outputs

Complete the following steps to set up the analog outputs for any slot (refer to *Figure 56 on page 138*):

1. Double-click on the desired *Output* (A or B).

Note: The set up of Output A is used here as an example. Identical procedures would be used to set up output B.

2. Double-click on *Off* to disable Output A and return to step 1, or on *0–20 mA* or *4–20 mA* to specify the desired range for output A.

Note: For a 1-Channel meter, proceed to step 4.

3. Double-click on the desired *Channel* option. See *Table 43* for a description of the channel options available.

Table 43: Channel Options

Option	Description
Channel 1	Channel 1
Channel 2	Channel 2
Add Channels	CH1+CH2
Subtract Channels	CH1-CH2
Average Channels	$(CH1+CH2)/2$

4. Double-click on the desired *Measurement Name*. (*Table 44 on page 117* provides a description of the available parameters.)

Note: All the options shown below will only appear if the Mass Flow and Energy Options are activated.

Table 44: Output Measurement Options

Option Bar Choice	Description
Velocity	Flow Velocity
Volumetric	Volumetric Flow
FWD Total	Forward Totalized Volume Flow
REV Total	Reverse Totalized Volume Flow
Time	Total Flow Measurement Time
Mass Flow	Mass Flow
FWD Mass	Forward Totalized Mass Flow
REV Mass	Reverse Totalized Mass Flow
Energy Rate	Energy Flow Power
FWD Energy	Forward Energy Flow
REV Energy	Reverse Energy Flow
UP Sig Strength	Signal strength for the upstream transducer.
DN Sig Strength	Signal strength for the downstream transducer.
UP DAC	AGC DAC count for upstream gain setting.
DN DAC	AGC DAC count for downstream gain setting.
Soundspeed	Measured speed of sound in the fluid.
UP Transit	Upstream ultrasonic signal transit time.
DN Transit	Downstream ultrasonic signal transit time.
DeltaT	Transit time difference between upstream and downstream signals.
Reynolds #	Current velocity/reynolds number.
K (RE)	K factor, based on the Reynolds number.
PEAK%	Percentage of peak (set to +50 by default).
Theta 3	Theta 3 is the angle between the ultrasonic beam and the normal to the pipe wall. It is calculated from the measured transit time and clamp-on parameters (clamp-ons only).
UP Signal Q	Displays the signal quality for the upstream transducer.
DN Signal Q	Displays the signal quality for the downstream transducer.
UP Amp Discrim	Displays the value for the signal amplitude of the upstream transducer.
DN Amp Discrim	Displays the value for the signal amplitude of the downstream transducer.
UP +- Peak	Displays signal peaks for the upstream transducer.
DN +- Peak	Displays signal peaks for the downstream transducer.
UP Norm Factor	Displays the normalization factor for the upstream transducer.
DN Norm Factor	Displays the normalization factor for the downstream transducer.
CEEI	Displays the speed of sound in the transducer (clamp-on only).
Supply Temp	Displays the temperature for the supply input (energy measurement).
Return Temp	Displays the temperature for the return input (energy measurement).
Supply-Rtn	Difference between supply input and return input measurement (energy measurement).
Supply Dens	Displays the density for the supply input (energy measurement).
Return Dens	Displays the density for the return input (energy measurement).
Delta h	Displays the delta enthalpy which is the difference between the supply and return. Enthalpy is a measure of energy contained in the fluid (energy measurement).

Note: *The measurement units that appear in these prompts are those selected in the Global-System menu earlier in this section.*

5. Enter a flow rate value for the *Base* (low) end of the analog output range and click on [Next Item].

6. Enter a flow rate value for the *Full* (high) end of the analog output range and click on [Next Item].

After responding to the above prompt, the meter returns to step 1. Click on [Exit Page] to proceed to another menu or option.

Option Card Analog Inputs

Complete the following steps to set up the analog inputs of an option card installed in Slot 1 (refer to *Figure 57* on page 139):

1. Double-click on the desired *Input* (A, B, C or D).

Note: *The setup of Input A is used as an example. Identical procedures would be used to set up the remaining inputs.*

2. Enter a *Label* of up to eight characters for Input A and click on [Next Item].
3. Double-click on *Off* to disable Input A and return to step 1, or on *Temp* or *Spec* to designate it as a temperature or special input.

- OFF

If OFF was selected to disable input A, the meter returns to the *Input* prompt in step 1. Double-click on another input, or click on [Exit Page] to move to another menu.

- TEMP

If TEMP was selected to set up input A as a live temperature input, complete steps 4 and 5 below:

4. Enter a value for the *Base* (low) end of the analog input range and click [Next Item].
5. Enter a value for the *Full Scale* (high) end of the analog input range and click [Next Item].

After responding to the above prompt, the meter returns to step 1. Click on [Exit Page] to proceed to another menu or option.

- SPEC

If SPEC was selected to set up input A as a live special input, complete steps 6 through 9 below:

6. Enter a *Name* for Input A and click [Next Item].
7. Enter the *Units* of measurement for Input A and click [Next Item].
8. Enter a temperature value for the *Base* (low) end of the analog input range and click [Next Item].
9. Enter a temperature value for the *Full Scale* (high) end of the analog input range and click [Next Item].

After responding to the above prompt, the meter returns to step 1. Click [Exit Page] to proceed to another menu or option.

Option Card RTD Inputs

Option cards with RTD inputs have a temperature range of -148° to 660°F (-100° to 350°C). Complete the following steps to set up the RTD inputs of an option card installed in Slot 1 (refer to *Figure 57 on page 139*):

1. Double-click on the desired *Input* (A, B, C or D).

Note: *The setup of RTD Input A is used here as an example. Identical procedures would be used to set up the remaining RTD inputs.*

2. Enter a *Label* of up to eight characters for input A and click on [Next Item].
3. Double-click on *Off* to disable Input A and return to step 1, or on *Temp* to enable Input A as a live temperature input.
4. Enter a temperature value for the *Zero* (low) end of the analog input range and click [Next Item].
5. Enter a temperature value for the *Full Scale* (high) end of the analog input range and click [Next Item].

After responding to the above prompt, the meter returns to step 1. Click [Exit Page] to proceed to another menu or option.

Option Card Alarm Relays

Complete the following steps to set up the alarm relays of an option card installed in Slot 1 (refer to *Figure 57* on page 139):

1. Double-click on the desired *Output* (A, B, C or D).

Note: *The set up of Alarm A is used here as an example. Identical procedures would be used to set up the additional alarms.*

2. Double-click on *Off* to disable Output A and return to step 1, or on *High*, *Low* or *Fault* to select the desired alarm type.
3. Double-click on *No* for standard alarm operation, or on *Yes* for *Failsafe* operation. (See Chapter 1, *Installation*, of the *Startup Guide* for failsafe wiring instructions.)

For a 1-Channel meter, proceed to step 5.

4. Double-click on the desired *Channel* option. See *Table 45* for a description of the channel options available.

Table 45: Channel Options

Option	Description
Channel 1	Channel 1
Channel 2	Channel 2
Add Channels	CH1+CH2
Subtract Channels	CH1-CH2
Average Channels	$(CH1+CH2)/2$

Note: *If FAULT was selected as the alarm type, the next two prompts do not appear. You have completed entering data in this option.*

5. Double-click on the desired *Measurement Name*. (*Table 44* on page 117 provides a description of the available parameters.)

Note: *The measurement units that appear in these prompts are those selected in the Global-System menu earlier in this section.*

6. Enter a value for the *Trigger Point* of the alarm and click on [Next Item].

After responding to the above prompt, the meter returns to step 1. Click [Exit Page] to proceed to another menu or option.

Option Card Totalizer Outputs

This type of output issues one pulse per selected volume of flow. The meter produces a pulse each time the programmed amount of flow passes through the pipe. Complete the following steps to set up the totalizer outputs of an option card installed in Slot 1:

1. Double-click on the desired *Output* (A, B, C or D).

Note: *The set up of Output A is used as an example. Identical procedures would be used to set up the other outputs.*

2. Double-click on *Off* to disable Output A and return to step 1, or on *Totalizer* to set up output A as a totalizer output. For a 1-Channel meter, skip to step 4.

3. Double-click on the desired *Channel* option. See Table 45 on page 121 for a description of the channel options available at the above prompt.

4. Double-click on the desired *Measurement Name*. (Table 44 on page 117 provides a description of the available parameters.)

Note: *The measurement units that appear in these prompts are those selected in the Global-System menu earlier in this section.*

5. Enter a value between 50 μsec and 500,000 μsec for *Pulse On Time* (the frequency of the totalizer pulses) and click on [Next Item].

Note: *A complete pulse consists of equal amounts of ON and OFF times. Choose a value that is compatible with the counter to be used.*

6. Enter a value for the number of measurement units represented by each pulse, and click [Next Item].

After responding to the above prompt, the meter returns to step 1. Click [Exit Page] to proceed to another menu or option.

Option Card Frequency Outputs

This type of output produces a frequency pulse that is proportional to the output measurement. Complete the following steps to set up the frequency outputs of an option card installed in Slot 1 (see *Figure 57 on page 139*):

1. Double-click on the desired *Output* (A, B, C or D).

Note: *The set up of Output A is used as an example. Identical procedures would be used to set up the other outputs.*

2. Double-click on *Off* to disable Output A and return to step 1, or on *Frequency* to set up Output A as a frequency output.

For a 1-Channel meter, skip to step 4.

3. Double-click on the desired *Channel* option. See *Table 45 on page 121* for a description of the channel options available at the above prompt.
4. Double-click on the desired *Measurement Name*. (*Table 44 on page 117* provides a description of the available parameters.)

Note: *The measurement units that appear in these prompts are those selected in the Global-System menu earlier in this section.*

5. Enter a flow rate value for the *Zero* (low) end of the frequency output range and click [Next Item].
6. Enter a flow rate value for the *Full* (high) end of the frequency output range and click [Next Item].
7. Enter a value between 1 and 10,000 for the *Full Scale Frequency* and click [Next Item].

After responding to the above prompt, the meter returns to step 1. Click [Exit Page]:

- once to return to the Global I/O option:
- twice to return to the Global PROGRAM option:
- three times to return to the *Site Edit Menu*:
- four times to exit the *Site Edit Menu*.

C.6.0.10 Changing the LCD Display

In addition to displaying data directly through the text display or graphs (see Chapter 2), PanaView enables you to change the parameters shown on the IREX display.

1. From the Input/Output option, highlight and double-click on the *Display* option in the center pane.
2. The window now asks for the # of LCD Parameters. Highlight and double-click on the desired number (from LCD OFF through 1-4 and KEYPAD).

The OFF setting switches the measurement display off, while the KEYPAD setting enables users to change the measurement display using the IREX arrow keys, without accessing the *Keypad Program*. If you select KEYPAD:

- To view a different parameter, press the [Δ] or [∇] keys on the IREX keypad to scroll through the various parameters.
- To scroll through the channel options on a two-channel XMT868i, press the [$\triangleleft$] or [$\triangleright$] keys on the IREX keypad until you have reached the desired option.

For a 1-Channel XMT868i, the data for Channel 1 is displayed automatically, and you can skip to step 4. However, for a 2-Channel meter, the channel data to be displayed must be specified at the following prompt.

3. Scroll to the desired *Channel option*, as listed in Table 46.

Table 46: Channel Options

Option	Description
CH1	Channel 1
CH2	Channel 2
SUM	CH1+CH2
DIF	CH1-CH2
AVE	$(CH1+CH2)/2$

4. For each channel, select the desired *Measurement Parameter*, as shown in Table 44 on page 117.

Note: The measurement units that appear in these prompts are those selected in the GLOBL-SYSTM menu earlier in this section. Also, when differences in one channel's programming invalidate an output previously chosen for the other, the measurement defaults to the nearest selectable item in the parameter list.

The previous two prompts repeat until all of the specified # of LCD Parameters have been set up. When all of the display parameters have been set up, PanaView returns to the Global I/O window. Click [Exit Page]:

- once to return to the Global I/O option:
- twice to return to the Global PROGRAM option:
- three times to return to the *Site Edit Menu*:
- four times to exit the *Site Edit Menu*.

C.6.0.11 Entering Communications Data

The Model XMT868i flowmeter is equipped with an RS232 or an RS485 serial interface. MODBUS (RS485), MODBUS/TCP, Ethernet and Foundation-Bus options are available. When the MODBUS, MODBUS/TCP or Foundation Field Bus options are present, the XMT868i may also have the standard RS232/RS485 serial interface. When the Ethernet option is present, the RS232/RS485 serial interface is not present.

The serial port is used to transmit stored data and displayed readings to a personal computer by connecting the meter's serial interface to the serial port of the PC. In addition, the Model XMT868i can receive and execute remote commands, using *PanaView* software, using this link.

Use the Comm port submenu to set the communications port and MODBUS parameters. While following the programming instructions, refer to *Figure 56 on page 138*.

C.6.0.12 Setting Up the Serial Port

1. To enter this submenu from the Global menu, highlight and double-click on the Comm port option in the center pane.
2. Enter a *Meter Address* number between 1 and 254 and click [Next Item]. The default number is 1.

A meter address is only necessary for communication with the Panametrics *PanaView* software. See the *PanaView User's Manual* for more information.

IMPORTANT: If the meter address or baud rate is changed, communication with *PanaView* must be re-established with the new address number.

3. Double-click on the desired *Baud Rate* (from 300 to 19,200).

IMPORTANT: The Ethernet option requires that the meter's baud rate is set to the same rate as the Ethernet option. The factory default is 9600 baud. If a different baud rate is desired, first change the meter's rate, and then change the Ethernet's baud rate setting by using the Device Discovery utility.

If you have the RS485 MODBUS option, or MODBUS/TCP option proceed to step 4 below. If you have the standard RS232 serial interface or optional Ethernet interface, the meter exits the Comm Port submenu and returns to the Global PROGRAM prompt.

Note: The XMT868i MODBUS communication settings chosen in the next four steps must match those of the MODBUS control system.

4. Double-click on the desired *MODBUS Baud Rate* (from 2400 to 9600).

IMPORTANT: The MODBUS/TCP interface requires a baud rate of 9600.

5. Double-click on the desired *MODBUS Parity* (None, Odd or Even).
6. Double-click on the desired *MODBUS Stop Bits* (1 or 2).
7. Enter the desired *MODBUS Address*.

The meter exits the Comm port submenu and returns to the Global window. Click [Exit Page] once to return to the *Site Edit Menu*, and [Close] to exit the *Site Edit Menu*.

IMPORTANT: You must reboot the XMT868i to load the new settings.

Refer to the section *Requesting Parameters Using MODBUS* on the following page to retrieve data from the XMT868i using MODBUS.

C.6.0.13 Requesting Parameters Using MODBUS

To request specific parameters from the XMT868i using the MODBUS, the control system must access the appropriate register number, as shown in *Table 47*. Only registers 1–84 are available with the XMT868i for MODBUS communications. Registers 508–512 are used by the XMT868i to store the MODBUS parameters.

Table 47: MODBUS Register

MODBUS Reg #	DPR Hex Addr	Description	Units	Scaling (decimal places)	Size in Bytes
1		¹ Clear Totalizers	none	--	2 (16 bit signed)
2		CH1 Velocity	ft/s or m/s	2	4 (32 bit integer)
4		CH1 Volumetric	VOL_U	--	4 (IEEE 32 bit)
6		CH1 +Totals	TOT_U	Register 10	4 (32 bit integer)
8		CH1 -Totals	TOT_U	Register 10	4 (32 bit integer)
10		CH1 #T Digits	none	0	2 (16 bit integer)
11		CH1 Totalizer Time	sec	2	4 (32 bit integer)
13		² CH1 Error Value	none	0	2 (16 bit integer)
14		CH1 SSUP	none	1	4 (32 bit integer)
16		CH1 SSDN	none	1	4 (32 bit integer)
18		CH1 SNDSP	ft/s or m/s	0	4 (32 bit integer)
20		CH2 Velocity	ft/s or m/s	2	4 (32 bit integer)
22		CH2 Volumetric	VOL_U	--	4 (IEEE 32 bit)
24		CH2 +Totals	TOT_U	Register 28	4 (32 bit integer)
26		CH2 -Totals	TOT_U	Register 28	4 (32 bit integer)
28		CH2 # T Digits	none	0	2 (16 bit integer)
29		CH2 Totalizer Time	sec	2	4 (32 bit integer)
31		² CH2 Error Value	none	0	2 (16 bit integer)
32		CH2 SSUP	none	1	4 (32 bit integer)
34		CH2 SSDN	none	1	4 (32 bit integer)
36		CH2 SNDSP	ft/s or m/s	0	4 (32 bit integer)
38		³ AVG Velocity	ft/s or m/s	2	4 (32 bit integer)
40		³ AVG Volumetric	VOL_U	--	4 (IEEE 32 bit)
42		³ AVG+Totals	TOT_U	Register 46	4 (32 bit integer)
44		³ AVG-Totals	TOT_U	Register 46	4 (32 bit integer)
46		AVG #T Digits	none	0	2 (16 bit integer)
47		³ AVG Totalizer Time	sec	2	4 (32 bit integer)
49		⁴ AVG Error Value	none	0	2 (16 bit integer)
50		³ AVG SSUP	none	1	4 (32 bit integer)
52		³ AVG SSDN	none	1	4 (32 bit integer)
54		³ AVG SNDSP	ft/s or m/s	0	4 (32 bit integer)
56		CH1 Power	Power_u	--	4 (IEEE 32 bit)
58		CH1 +Energy	Energy_u	Register 62	4 (32 bit integer)
60		CH1 -Energy	Energy_u	Register 62	4 (32 bit integer)
62		CH1 # Energy Digits	none	0	2 (16 bit integer)

Table 47: MODBUS Register

MODBUS Reg #	DPR Hex Addr	Description	Units	Scaling (decimal places)	Size in Bytes
63		CH 1 TempS	°F or °C	2	4 (32 bit integer)
65		CH 1 TempR	°F or °C	2	4 (32 bit integer)
67		CH 1 TS-TR	°F or °C	2	4 (32 bit integer)
69		CH 1 DELTH	Btu/lb or J/gm	2	4 (32 bit integer)
71		CH 2 Power	Power_u	--	4 (IEEE 32 bit)
73		CH 2 +Energy	Energy_u	Register 77	4 (32 bit integer)
75		CH 2 -Energy	Energy_u	Register 77	4 (32 bit integer)
77		CH 2 # Energy Digits	none	0	2 (16 bit integer)
78		CH 2 TempS	°F or °C	2	4 (32 bit integer)
80		CH 2 TempR	°F or °C	2	4 (32 bit integer)
82		CH 2 TS-TR	°F or °C	2	4 (32 bit integer)
84		CH 2 DELTH	Btu/lb or J/gm	2	4 (32 bit integer)
508	3F6	⁵ MODBUS baud rate	none	0	2 (16 bit integer)
509	3F8	⁶ MODBUS parity	none	0	2 (16 bit integer)
510	3FA	⁷ MODBUS stop bits	none	0	2 (16 bit integer)
511	3FC	MODBUS meter addr	none	0	2 (16 bit integer)
512	3FE	RESERVED	none	---	---

Notes:

- Clear Totalizers:** flag from the 8051 to clear totalizers in the 68332 memory.
- Error Value:** see table in XMT868i manual for error codes
- Average:**
average of channel 1 and channel 2 if both channels out of error,
channel 1 value if channel 2 is in error,
channel 2 value if channel 1 is in error,
zero if both channels in error.
- Average Error Status:**
0 = both in error
1 = chan 2 in error,
2 = chan 1 in error,
3 = both ok
- MODBUS baud rate:**
5 = 2400, 6 = 4800, 7 = 9600
- MODBUS parity:**
0 = none, 1 = odd, 2 = even
- MODBUS stop bits:**
1 = 1 stop bit, 2 = 2 stop bits
- General:**
Registers are written if corresponding functions are actuated by the user. Registers for unactuated functions are initialized to zero at startup.

C.7 Exiting the Site Edit Menu

After leaving the Global submenu, PanaView returns to the *Site Edit Menu*. Click [Close] to exit the *Site Edit Menu*. Then proceed to Chapter 3, *Operation*, of the *Startup Guide* for instructions on taking measurements, or refer to the appropriate chapters of this manual for detailed instructions on using the other features of the XMT868i flow transmitter.

C.8 Saving Site Data

The XMT868i holds setup parameters for a single internal site, called *Working*. Through PanaView, users can store site file data in a PC and reload it into the XMT868i. To save or reload site data using PanaView:

- 1. In the *New Meter Browser*, highlight the XMT868i.
- 2. Right-click on the highlighted XMT868i and select the *Properties* option, as shown in *Figure 47*.

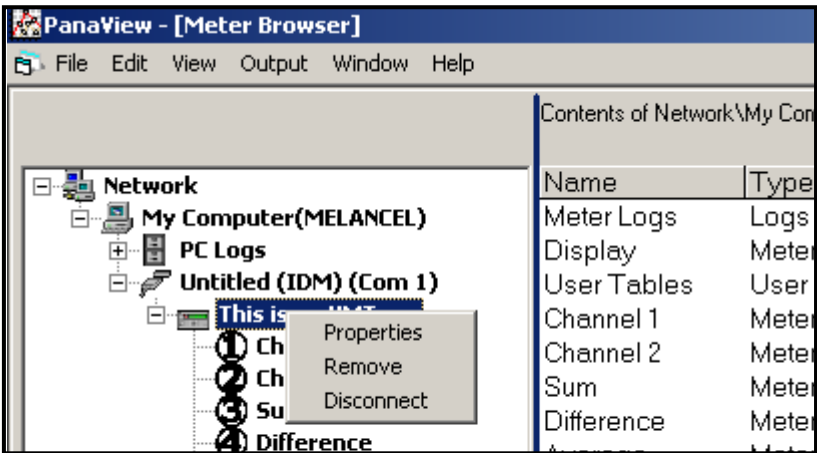


Figure 47: Properties Option

The window now appears similar to *Figure 48*.

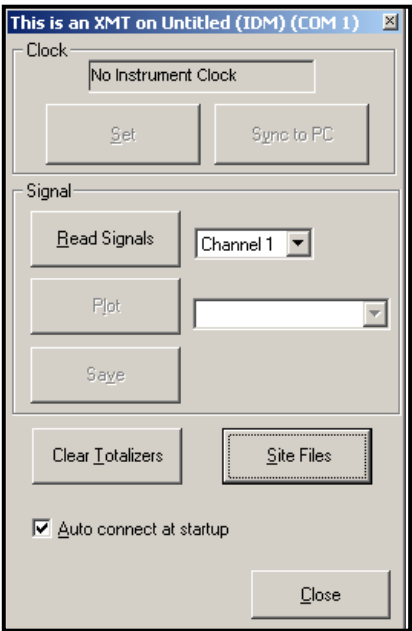


Figure 48: Properties Window

- 3. Click on the [Site Files] button. The *Site File Operations* window (shown in *Figure 49*) opens.

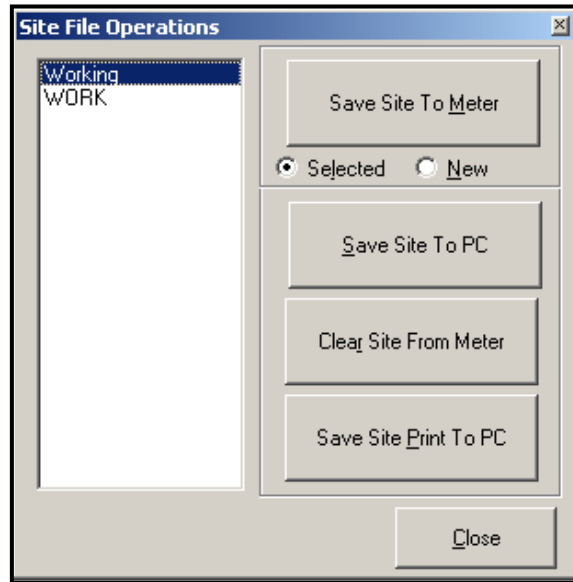


Figure 49: Site File Operations Window

C.8.1 Saving Current Site Data to the Meter

To save existing site data to the meter:

1. Select the radio button for *Selected* and highlight an existing site in the left pane.
2. Then click on the [Save Site to Meter] button. A screen opens similar to Figure 50.

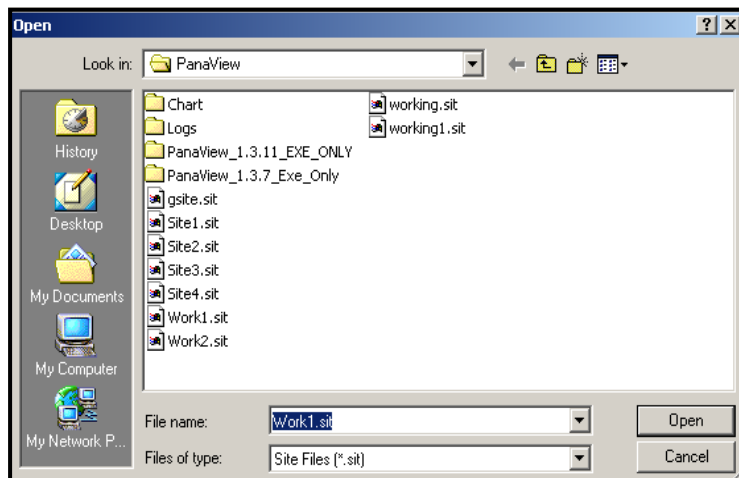


Figure 50: Site File Selection

3. Highlight the desired site and click [Open]. PanaView sends the site to the meter.

C.8.2 Saving New Site Data to the XMT868i

To save new site data to the meter:

1. Select the radio button for *New* and click on the [Save Site to Meter] button.
2. A window opens similar to *Figure 51*. Enter the desired name, and click [OK].

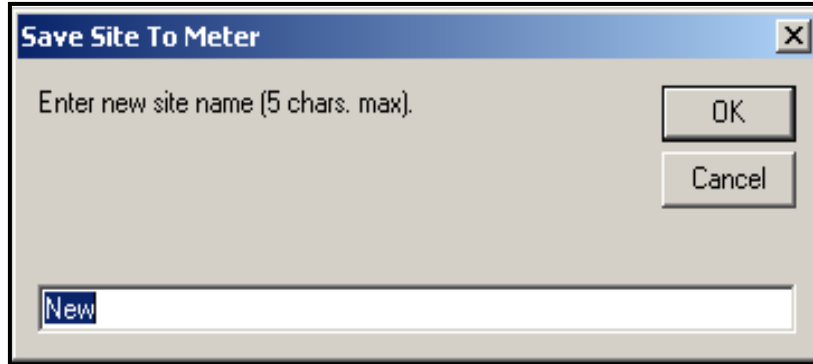


Figure 51: Site Name Entry Window

3. The *Site File Selection* window (*Figure 49 on page 130*) opens. Highlight a site file with the desired settings, and click [Open]. The site file becomes the *Working* site in the meter with the desired settings.

C.8.3 Saving a Site to the PC

To save a site to the PC:

1. Highlight the desired site in the left pane. (See *Figure 49 on page 130*.)
2. Click [Save Site to PC]. A window opens similar to *Figure 50 on page 130*.
3. Enter the desired site name and click [Save]. PanaView saves the site in the PanaView folder unless otherwise specified.

Note: If you have created a site on the meter after opening the Site File Operations window, you must close and reopen the window to click on the new site.

Clearing a Site from the Meter

As the XMT868i has only one site (*Working*) at any time, it is not possible to remove this site. To change site parameters, first save a site to the PC (as discussed in *Saving a Site to the PC* on the previous page), and then save the site to the XMT868i (as discussed in *Saving New Site Data to the XMT868i* on the previous page).

C.8.4 Saving Site Data in Text Form

To store the data from a site file as a text file for display or printout:

1. Highlight the site in the left pane. (See *Figure 49* on page 130.)
2. Click on [Save Site Print to PC].
3. The *Site File Selection* window (as in *Figure 50* on page 130) opens. Enter the desired site name (now with a .prt suffix) and click on [Save]. PanaView displays a text version of the site, as shown in *Figure 52*.

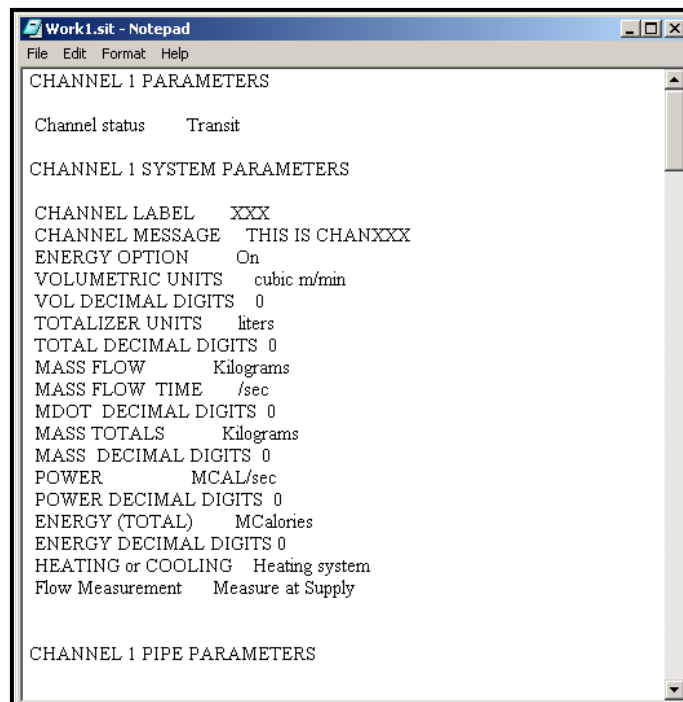


Figure 52: Printout of Site File

4. Click [Close] once to close the *Site File Operations* window, and a second time to close the *Properties* window and return to the *Meter Browser*.

Appendix D. PanaView Menu Maps for the XMT868i

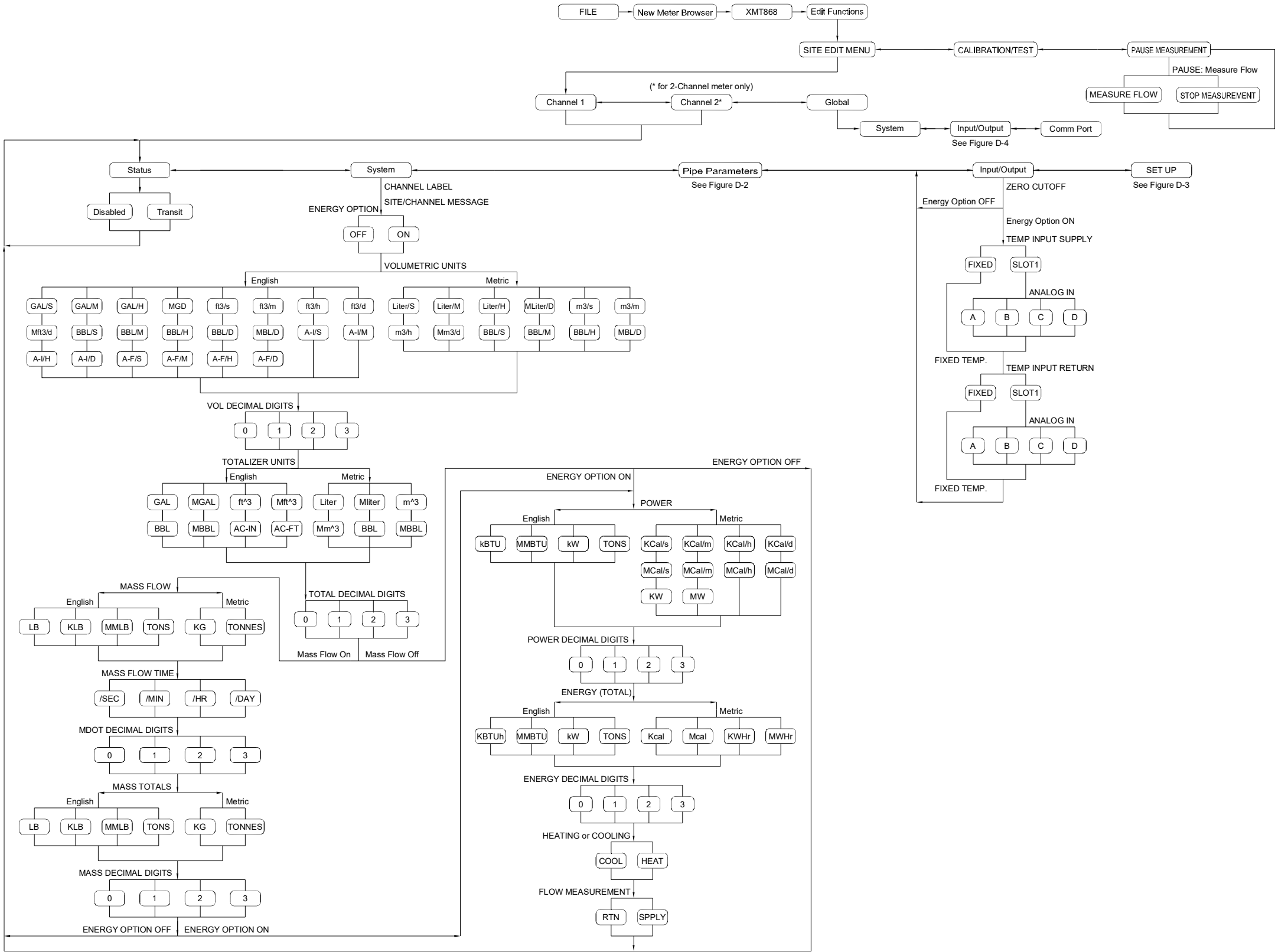
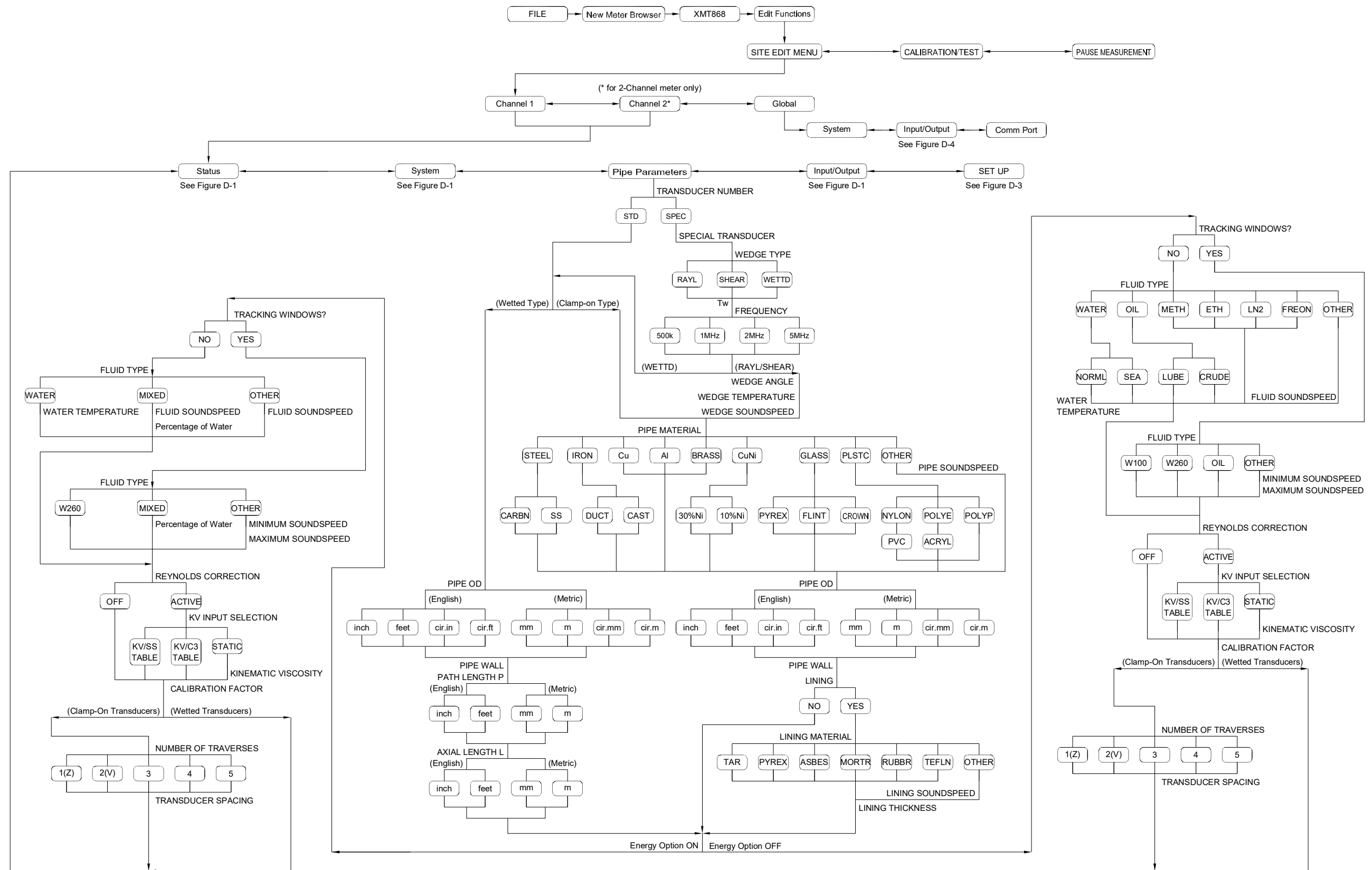


Figure 53: Channel X - STATUS, SYSTEM and INPUT/OUTPUT Menu Map



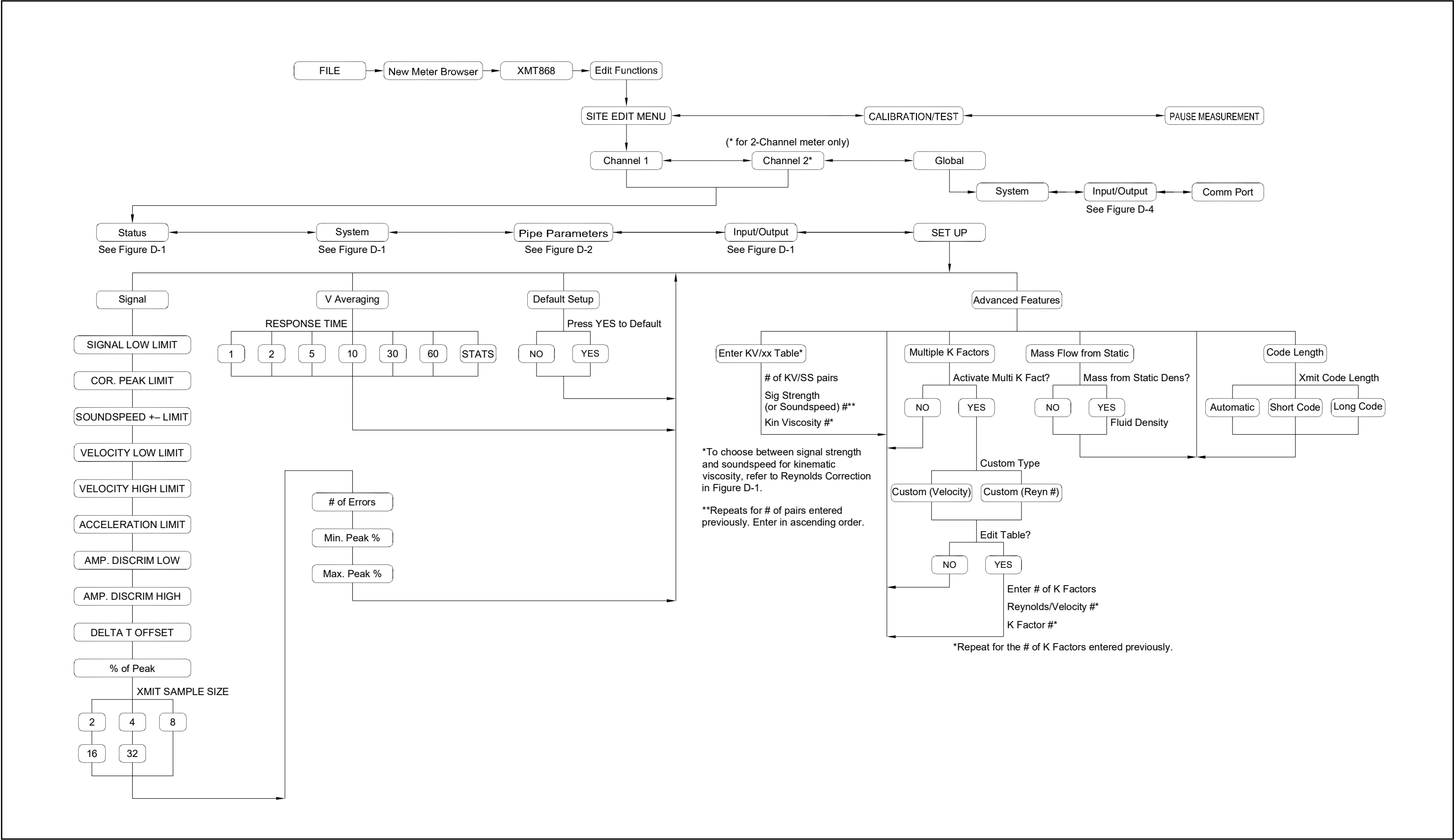


Figure 55: Channel X - SETUP Menu Map

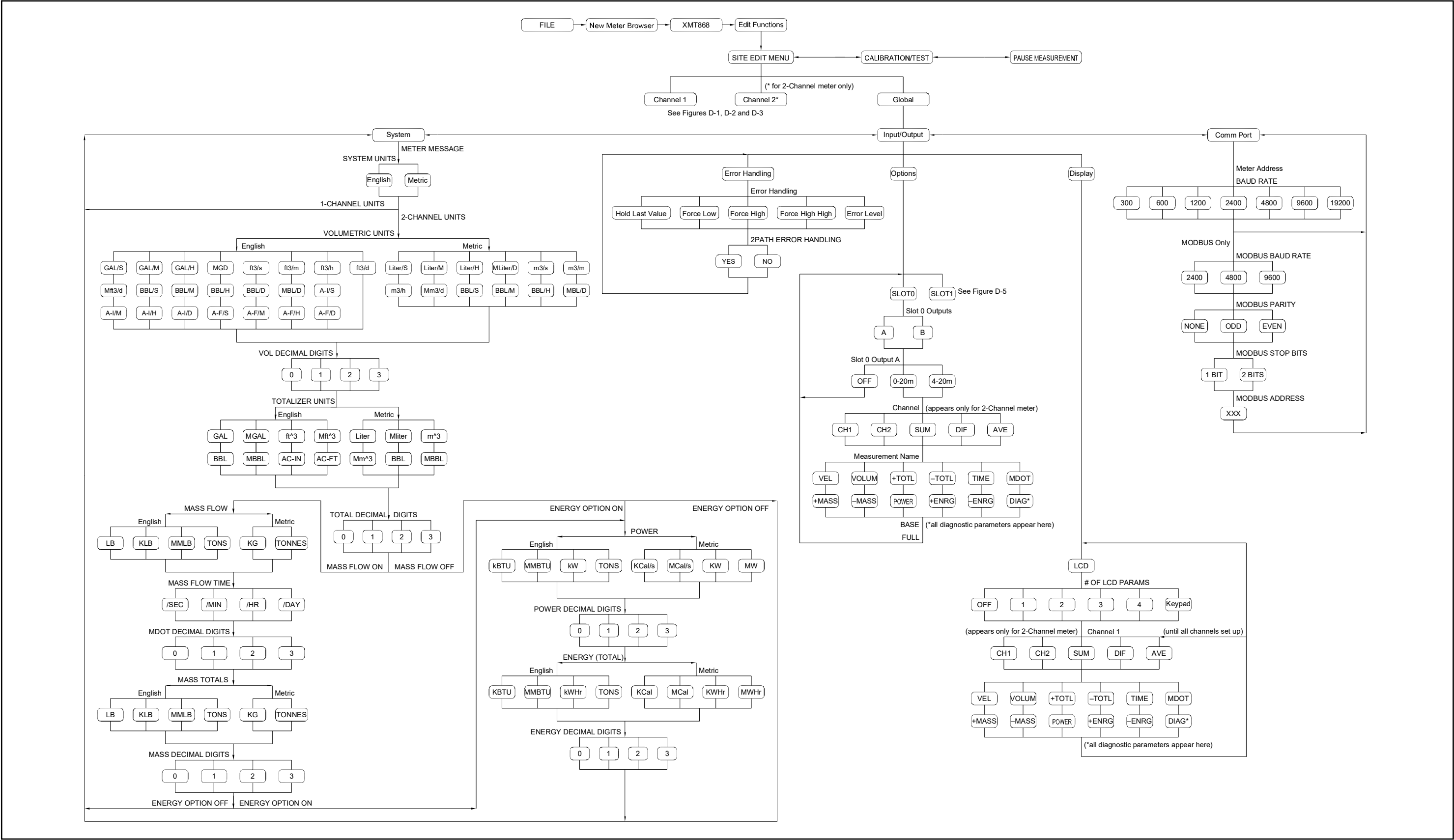


Figure 56: GLOBAL – SYSTEM, ERROR, DISPLAY, SLOT0, ERROR, DISPLAY, COMM PORT Menu Map

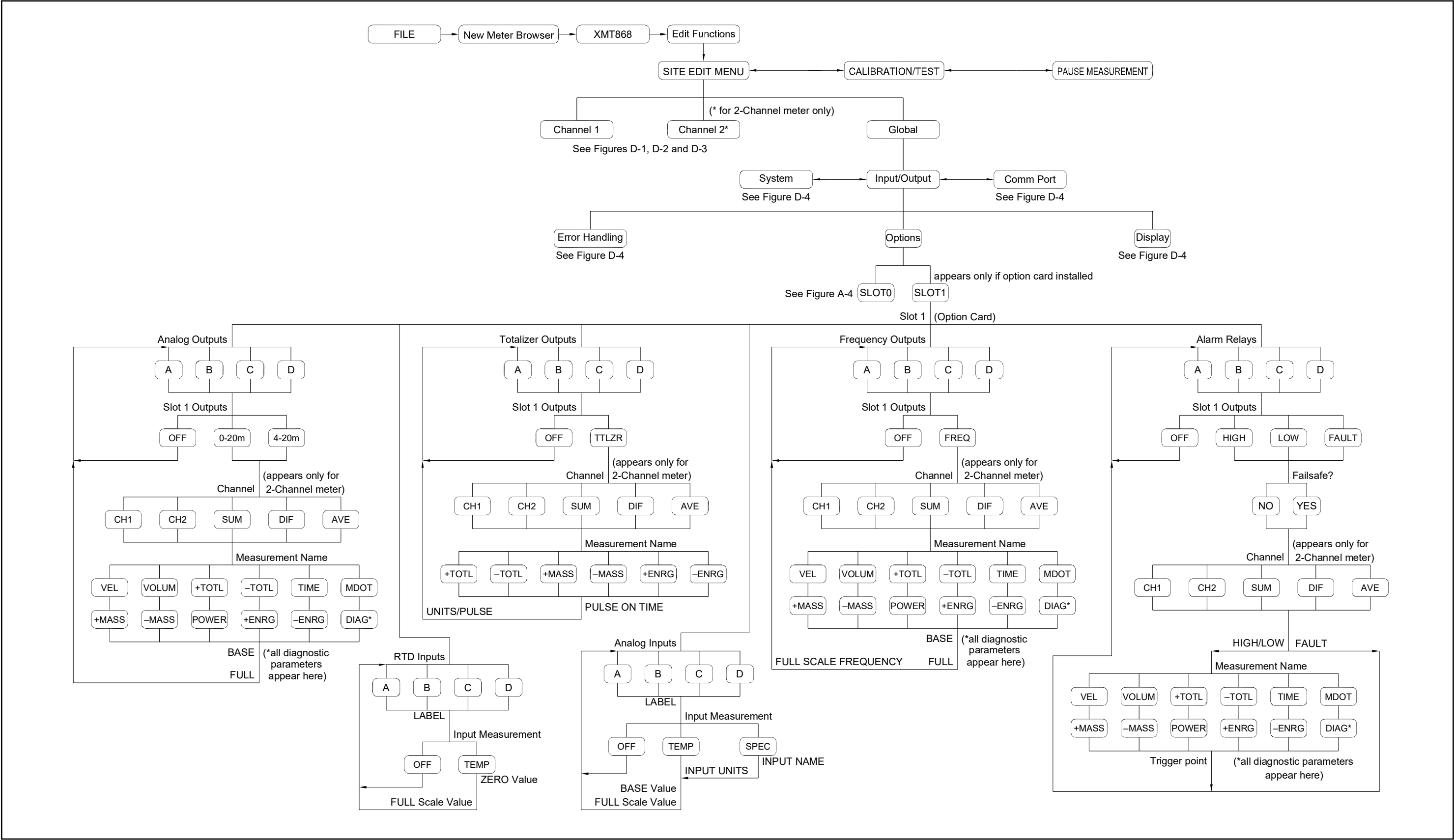


Figure 57: GLOBAL - I/O-OPTIONS SLOT1 Menu Map

[no content intended for this page]

Appendix E. Foundation Fieldbus Communications

E.1 Introduction

Foundation Fieldbus provides a means of communicating with the flowmeter. The patent numbers which apply are 5,909,363 and 6,424,872.

This Foundation Fieldbus device supports 2 Analog Input (AI) blocks, which can be configured to supply the following measurements on the network (see *Table 48*).

Table 48: Available Fieldbus Measurements

Description	Units	Description	Units	Description	Units
Ch1 Velocity	ft/s or m/s*	Ch2 Velocity	ft/s or m/s*	Avg Velocity	ft/s or m/s*
Ch1 Volumetric	VOL_U	Ch2 Volumetric	VOL_U	Avg Volumetric	VOL_U
Ch1 + Totals	TOT_U	Ch2 + Totals	TOT_U	Avg + Totals	TOT_U
Ch1 - Totals	TOT_U	Ch2 - Totals	TOT_U	Avg - Totals	TOT_U
Ch1 Tot Digits**	none	Ch2 Tot Digits**	none	Avg Tot Digits**	none
Ch1 Totalizer Time	seconds	Ch2 Totalizer Time	seconds	Avg Totalizer Time	seconds
Ch1 Error Value	none	Ch2 Error Value	none	Avg Error Value	none
Ch1 SSUP	none	Ch2 SSUP	none	Avg SSUP	none
Ch1 SSDN	none	Ch2 SSDN	none	Avg SSDN	none
Ch1 SNDSP	ft/s or m/s*	Ch2 SNDSP	ft/s or m/s*	Avg SNDSP	ft/s or m/s*
Ch1 Power	POWER_U	Ch2 Power	POWER_U		
Ch1 + Energy	ENERGY_U	Ch2 + Energy	ENERGY_U		
Ch1 - Energy	ENERGY_U	Ch2 - Energy	ENERGY_U		
Ch1 TempS	Deg F or C*	Ch2 TempS	Deg F or C*		
Ch1 TempR	Deg F or C*	Ch2 TempR	Deg F or C*		
Ch1 TS-TR	Deg F or C*	Ch2 TS-TR	Deg F or C*		
Ch1 DELTH	But/lb J/gm	Ch2 DELTH	But/lb J/gm		

*Metric or English units are determined by the XMT868i flowmeter setup, programmed in the GLOBL menu (SYSTM option).

** Totalizer digits are available for informational purposes only, Respective totals are automatically scaled by the Tot Digits value selected in the XMT868i flowmeter setup, programmed in the Chx or GLOBL menu (SYSTM option).

VOL_U, TOT_U, POWER_U and ENERGY_U are determined by the units chosen for these measurements in the XMT868i flowmeter setup. See Chapter 1 for parameter setup.

E.2 Configuration Utility Setup

The following is an *example* setup using National Instruments Configuration Utility v3.1.

Figure 58 shows the Configuration Utility with a flowmeter on the network (Panametrics Flow-XMT).

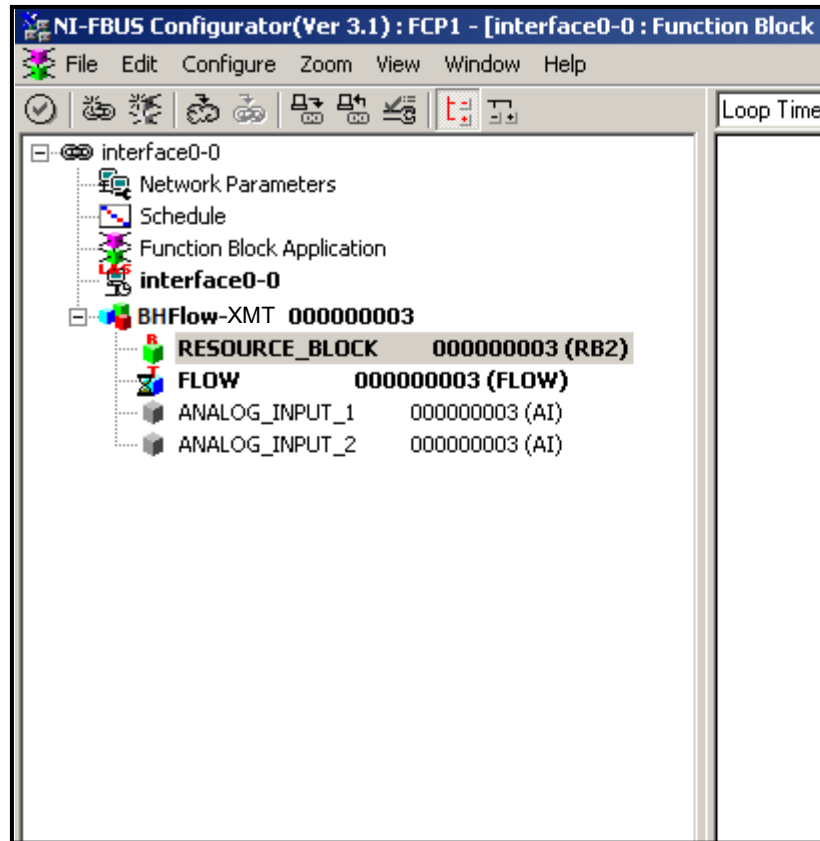


Figure 58: Configuration Utility Setup Example

Note: The following procedures assume that the device has been placed in the OOS (out-of-service) mode before executing.

E.3 Selecting the Desired Measurements

To set the measurement unit for each AI:

1. Double click on the **FLOW** Transducer Block (in the tree under **GEFlow-XMT**).
2. Select the **Others** tab and open the drop down list for the **PRIMARY_SELECTOR** and **SECONDARY_SELECTOR** (refer to Figure 59 on page 143).
3. Choose the unit from the list (see Figure 59 on page 143).

This unit will correspond to the unit that is available in the AI block for network connection. The **PRIMARY_SELECTOR** unit will correspond to **ANALOG_INPUT_1** and the **SECONDARY_SELECTOR** will correspond to **ANALOG_INPUT_2**.

4. After the desired measurements have been selected for the **PRIMARY** and **SECONDARY_SELECTOR**, choose the unit system (**UNIT_SELECTOR** above the **PRIMARY_SELECTOR**) that has been programmed in the flowmeter (English or SI).

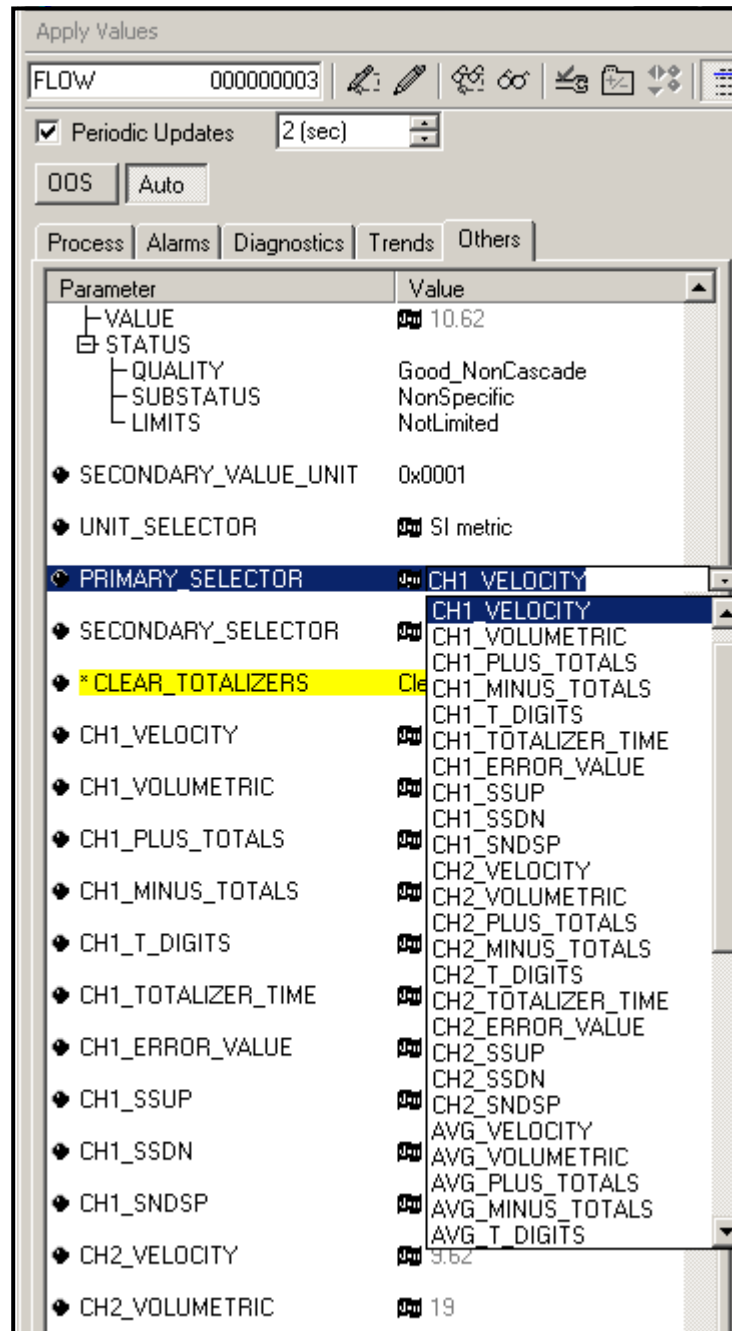


Figure 59: Primary Selector Drop Down List

E.4 Selecting Units for AI Blocks

To select the units for the individual AI blocks:

1. Double click on the AI block for which you wish to set the units (**ANALOG_INPUT_1** or **ANALOG_INPUT_2** in the tree under **Panametric Flow-XMT**; see Figure 58 on page 142).
2. Select the **Scaling** tab and set the unit for the measurement based on the flowmeter settings.

For example, if the flowmeter was set to use the metric unit system and the **PRIMARY_SELECTOR** was set to use **VELOCITY** you would choose **m/s** for the unit as shown in Figure 60.

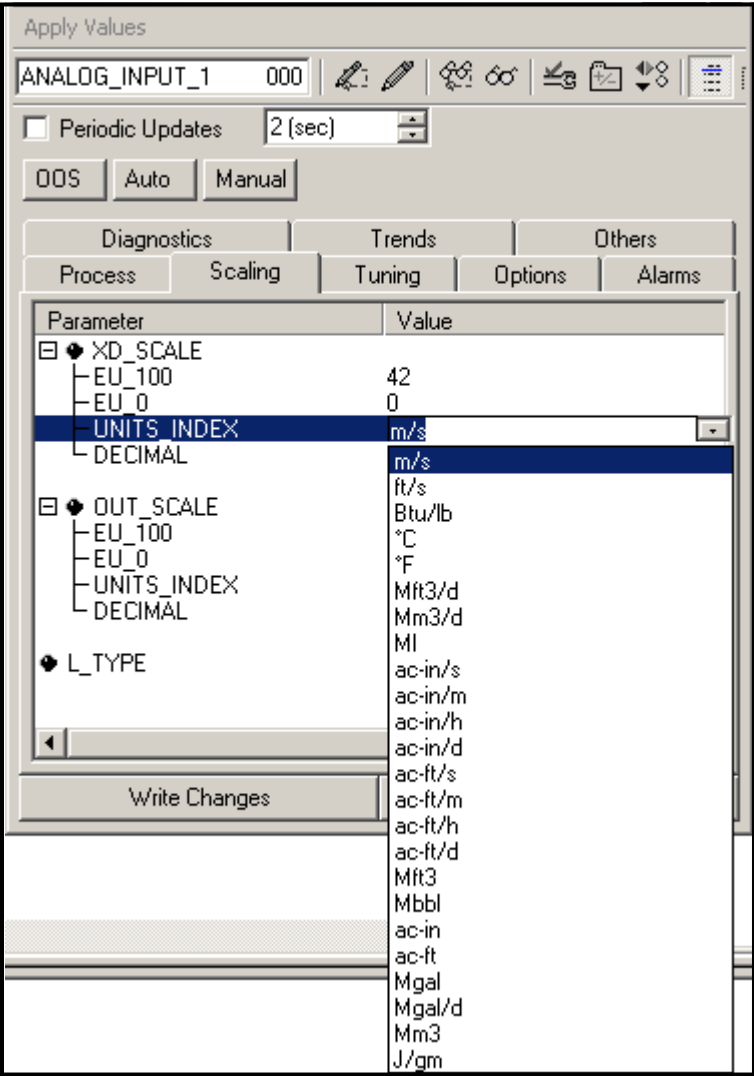


Figure 60: Units Index Drop Down List

E.5 Resetting Instrument Totalizers

To reset the instrument totalizers:

1. Double click on the **FLOW** transducer block (in the tree under **GEFlow-XMT**; see *Figure 58 on page 142*).
2. Select the **Others** tab and scroll down to the **CLEAR_TOTALIZERS** listing.
3. Select **Clear** from the drop down list box (see *Figure 61*).
4. After the totals have been reset, select **Normal** from the drop down list box to resume total accumulation.

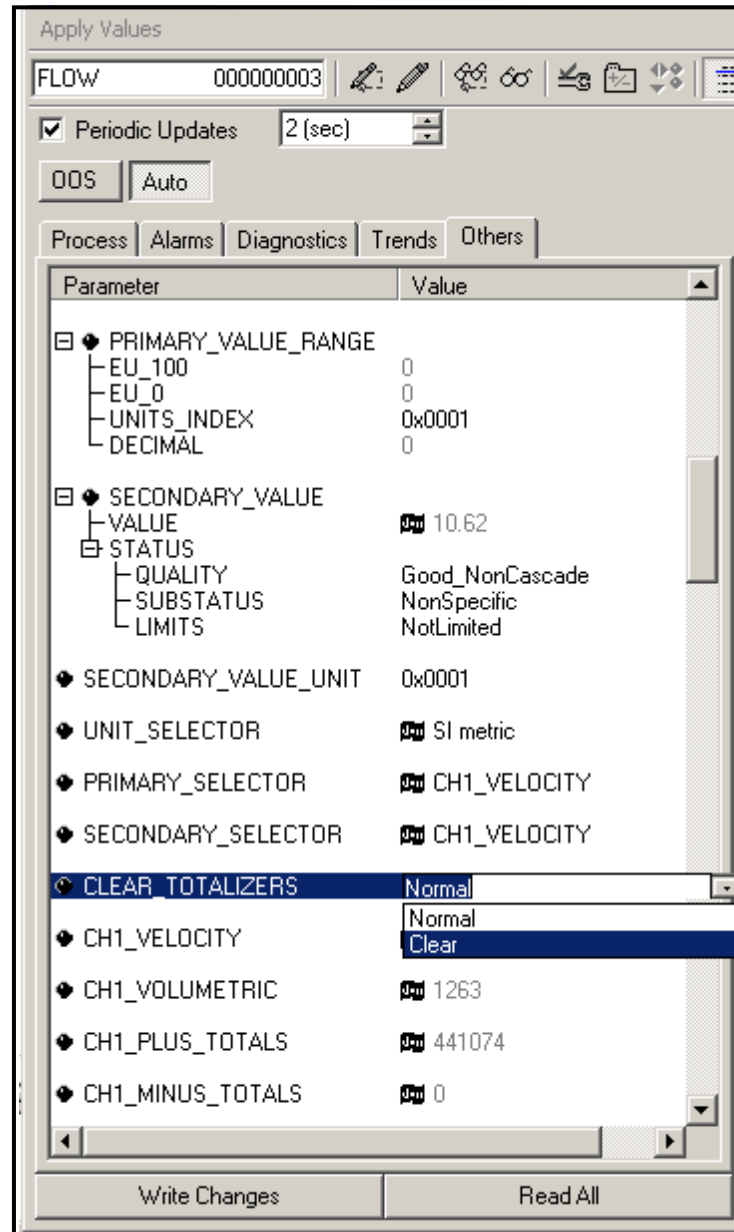


Figure 61: Clear Totalizers Drop Down List

E.6 Function Block Application

Figure 62 is an example setup using the **Function Block Application** editor. The flowmeter AI blocks, along with the AO and PID of another device on the network, are displayed. We have connected the **AI_1 OUT** of the flowmeter to the **CAS IN** of the AO block. We have also connected the **AI_2 OUT** of the flowmeter to the **CAS IN** of the PID block.

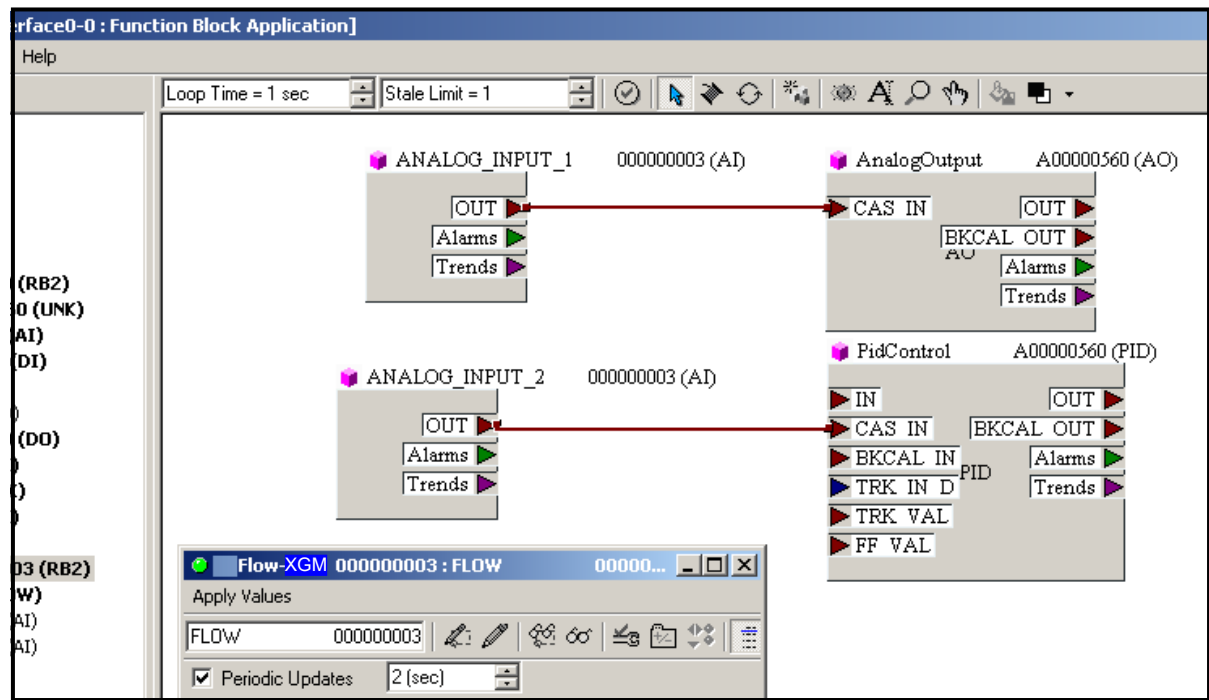


Figure 62: Function Block Application

A		Default Setup Submenu
Acceleration	104	Advanced Features Option
Acceleration Limit	16	Delta T Offset
ACTIV Submenu	4	Displaying Data
ADVAN Option	18	Displaying Text
Advanced Features Option	18, 105	E
Code Length Option	20, 107	Edit Menu
KV/xx Option	18, 105	Energy Option
Mass Flow Option	20, 107	Energy Option, Programming
Multiple K Factors Option	19, 106	in Global Menu (PanaView)
Alarm Relays	32, 121	in GLOBL Menu
Alarms Card, Setting Up	32, 121	in PanaView
Amp. Discrim High	16, 104	Enter Key
Amp. Discrim Low	16, 104	Entering System Data in PanaView
Analog Inputs Card, Setting Up	30, 119	Error Handling
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Axial Length	11	Ethernet, Setting up with PanaView
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B		Fluid Type
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C		Frequency
C3 Table	18	for Special Transducers
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Channel Measurement Method	4	G
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Set Up Submenu	15, 103	Comm Port Submenu
Channel Message	5	I/O Submenu
in PanaView	93	in PanaView
Channel X		System Submenu
ACTIV Menu Map	71	Global System Submenu
I/O Menu Map	71	Global-I/O-Error
PIPE Menu Map	72	GLOBL
SET UP Menu Map	73	COMM Menu Map
SYSTM Menu Map	71	I/O Menu Map
Clearing Totalizers	67	Menu
Clearing Transmitter Memory	65	SLOT0 Menu Map
Log File	66	SYSTM Menu Map
Site Data	65	GLOBL-I/O-Error
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Comm Port Submenu	35, 125	Graphing Data
Communications Port		I
Setting Up	84	I/O (Global) Submenu
Setting Up MODBUS	36	Error Option
Communications, Setting Up	35	LCD Option
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D		I/O Submenu
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Displaying Using PanaView	43, 44	Zero Cutoff Value, Entering
Default Setup Option	18, 105	INIT Option
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in PanaView	114	Minimum Percent of Peak	104
	K	MODBUS	125
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Liquid Crystal Display (Transmitter)	41	Frequency	34, 123
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