# Magnetrol®

PACT*ware*™ PC Software

Installation and Operating Manual • DTM Software Tutorial

Device Type Managers (DTMs) for

- *Eclipse® Guided Wave Radar*
- *Pulsar® & Model R82 Pulse Burst Radar*
- *Modulevel® Electronic Displacer*
- *Echotel® Model 355 Ultrasonic Non-Contact*
- *Jupiter® Magnetostrictive*
- *Thermatel® Model TA2 Mass Flow Meter*

HART COMMUNICATION PROTOCOL

FOUNDATION
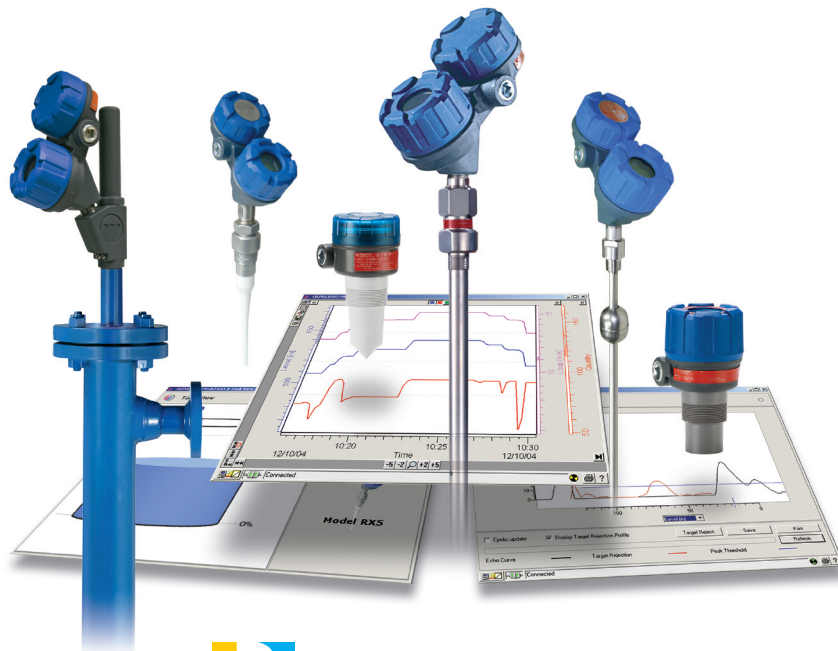
ECLIPSE® GUIDED WAVE RADAR — pulsar® PULSE BURST RADAR — MODEL R82 PULSE BURST RADAR — MODEL 355 NON-CONTACT ULTRASOUND — Modulevel® BUOYANCY — ENHANCED Jupiter® MAGNETOSTRICTION — MODEL TA2 THERMAL DISPERSION

PACT*ware*™ Installation Instructions
(including HART® Communication DTM, and Corresponding device DTMs)

1.0   Introduction

1.1   What is FDT, PACT*ware*™, and DTM?

- FDT (Field Device Tool) is an interface code that describes the standardization between frame programs (e.g., PACT*ware*™) and DTMs (Device Type Manager).

- PACT*ware* (Process Automation Configuration Tool) is a frame program. It is a device-independent software program that communicates with all approved DTMs.

- DTM (Device Type Manager) is not a stand-alone program but a device-specific software driver designed to operate within a frame program such as PACT*ware*. It includes all special information needed to communicate with a specific device (e.g., Pulsar RX5). There are two basic categories of DTMs—Communication (HART, FOUNDATION fieldbus™, PROFIBUS®, etc.) and Field Device (e.g., Pulsar RX5 Radar transmitter).

1.2   Minimum System Requirements

Following are general requirements for proper operation of this program:

- Pentium® II 500 MHz processor
- 128 MB RAM
- 120 MB free hard disk space
- Windows® XP/2000 (Service Pack 1)/NT 4.0 (Service Pack 6)
- Graphic Resolution 1024 × 768 (16-bit color)
- Internet Explorer 5.0

1.2.1 HART Communications
- RS232-HART or USB-HART serial interface
- HART communication DTM
- Transmitter with current HART revision

1.2.2 FOUNDATION fieldbus™ Communications
- National Instruments NI-FBUS card with PCMCIA Interface
- FOUNDATION fieldbus Communications DTM
- Appropriate FOUNDATION fieldbus Device DTM
- Transmitter with correct FOUNDATION fieldbus revision
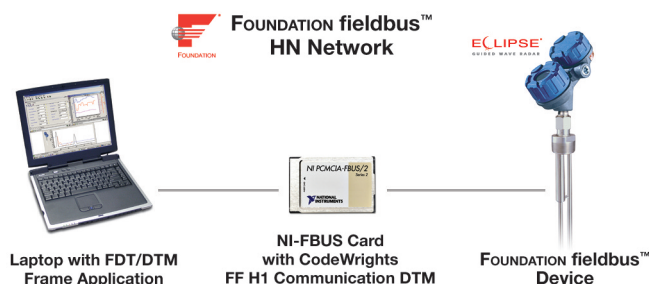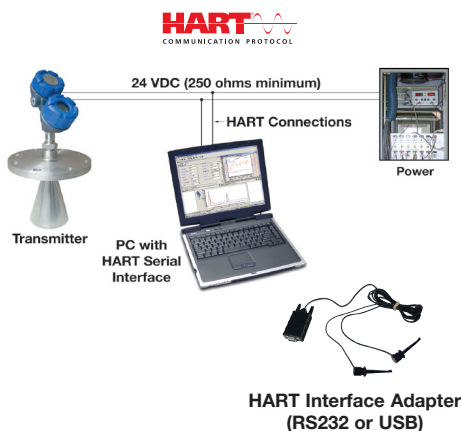
1.3   Connections

The diagrams at left show typical hardware configurations. Observe all safety codes when attaching to instrument loops in hazardous areas or when measuring flammable media. Computers are not intrinsically safe devices.

HART
COMMUNICATION PROTOCOL

24 VDC (250 ohms minimum)

HART Connections

Power

Transmitter

PC with HART Serial Interface

HART Interface Adapter (RS232 or USB)

FOUNDATION fieldbus™ HN Network

E(LIPSE GUIDED WAVE RADAR

NI PCMCIA-FBUS/2

Laptop with FDT/DTM Frame Application

NI-FBUS Card with CodeWrights FF H1 Communication DTM

FOUNDATION fieldbus™ Device

2.0 Installation

- Close all programs
- Uninstall any previous versions of PACT*ware* and Magnetrol DTMs before installing the new versions
- When in doubt use Default selections

2.1 From CD

Figure 1

The Install program should begin automatically after inserting CD into computer. If it does not, proceed using the following steps:

- Windows START (bottom left of screen).
- Choose RUN (Windows 7 users: right-click Start icon, open Windows Explorer, find and select CD Drive from Computer menu).
- If your CD Drive letter is D use the following (if not, substitute the proper drive letter).
- Enter D:\MII_DTM_Setup.exe for the North American version or D:\ NV_DTM_Setup for the European version and press ENTER.
- The Magnetrol Master CD opening screen will appear (Figure 1).
- Select Install from the PACT*ware* panel.
- Ensure all necessary components are checked for installation
- Note that numerous individual programs will be installed. There will be a slight pause at the completion of each.
- Read and accept the Export Control restrictions and EULA when prompted (Figure 2).

2.2 Download from Magnetrol.com

- Navigate to Products/Software/PACT*ware*
- Press the Download button
- Read and accept the Export Control restrictions and EULA when prompted (Figure 2)
- Install necessary files (PACT*ware* & Magnetrol DTM Library)

Figure 2

3.0 Startup (HART® or FOUNDATION fieldbus™)

Before PACT*ware* can be used, at least one communication DTM (e.g., HART or FOUNDATION fieldbus) and one device DTM must be installed.

PACT*ware* is started by either double-clicking the link or via the Windows Start menu by opening <Programs> in the installed program group with the entry PACT*ware* 2.0 FDT 1.2.

3.1 Using PACT*ware*™ with FOUNDATION fieldbus™

To use PACT*ware* for FOUNDATION fieldbus™ communication:

1. Start by installing the National Instruments Communication Manager software. See National Instruments manual *Getting Started with Your PCMCIA-FBUS and the NI-FBUS™ Software* for more information.

2. Before starting PACT*ware*, ensure that appropriate settings are made with the National Instruments Interface Configuration Utility:
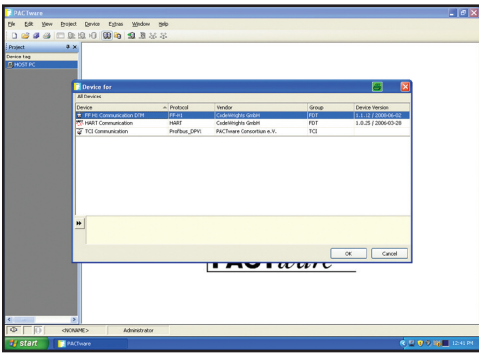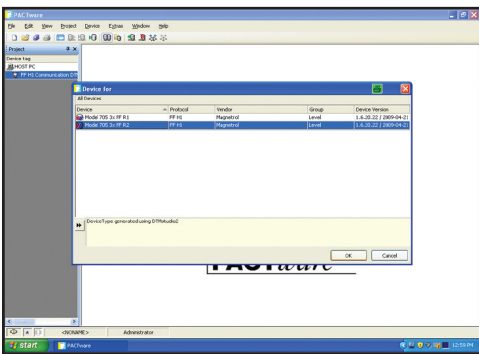
Figure 3
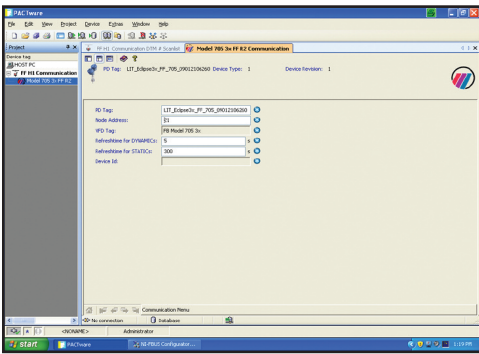**Communication DTM Window**

Figure 4
Device DTM Window

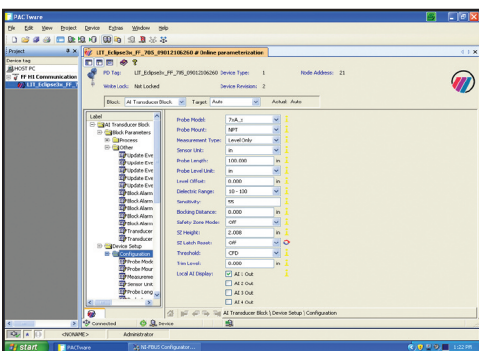**Figure 5**
Tag and Address Information

Figure 6
Online Parameterization

If only PACT*ware* is connected to the bus:
    Device address = Fixed
    Device Type = Link Master Device
   **Usage** = NI-FBUS

If other host systems are connected to the bus:
    Device address = Visitor
    Device Type = Basic Device
    Usage = NI-FBUS

3. Run NI_FBUS Communications Manager by double-clicking on the desktop icon.
   a. A window will appear which will acknowledge successful start-up after several seconds.
   b. The window will then close and an icon will appear at the right-hand side of the bottom Windows toolbar.

4. Run PACT*ware* by double-clicking on the desktop icon.

5. Right-click on the HOST PC icon, then click on Add Device.

6. Choose the FF H1 Communication DTM from the Communication DTM list, then click OK (See Figure 3).

7. Right-click on the <FF H1 Communication DTM> line, and then click Add Device.

8. From the Device DTM list, choose:
   a. The Model 705 3x FF R1 DTM for Revision 1 FF devices.
   b. The Model 705 3x FF R2 DTM for Revision 2 FF devices (with PID Block) (See Figure 4).

9. Right-click on the <FF H1 Communication DTM> line.
   a. Scoll down to Additional Functions, then click on Scan List.
   b. Press Refresh to start the scan process.
   c. Press Yes at the Communication DTM connection prompt.
   d. Leave the Scan List window open.

10. Right-click on the Model 705 3x/1.00 FF DTM line.
    a. Scroll down to Additional Functions, then click on Communication.

11. Enter the TAG information from the Scan List window to the PD TAG location in the Communications window. The information must be typed in exactly as it is shown.

12. Double-click on the FOUNDATIONFIELDBUSHIDEVICE line in the Scan List window, then click on DATALINKADDRESS.
    a. Enter the address shown in the NODEID into the Node Address location in the Communication Window (See Figure 5).

13. Close both the Scan List and Communications windows.

14. Right-click on the Model 705 3x FF line, and then click Connect. The line will now be shown in bold.

15. Right-click on the Model 705 3x FF line, and then click Parameter, Online parameterization.
    a. The word Connected will be shown on the lower left hand corner of the window (See Figure 6).

16. The FF DTM can now be navigated and operated as the HART DTM.

4.0 PACT*ware* DTM Software Tutorial

The tutorial will aid in understanding the basic operation of PACT*ware* and the Magnetrol DTMs.

Once PACT*ware* is installed, this tutorial is also available within the program for future reference by clicking on the   icon at the bottom right corner of any open Device window.

This tutorial explains the operation of PACT*ware* with various DTMs. The instructions also apply to all Magnetrol DTMs. Some content is specific to a particular product and DTM.

4.1 Layout

Project Window   **Device Window**

Figure 7

The work area for the PACT*ware* frame program is indicated below within the red outline (see Figure 7). The Project Window is the area on the left portion of the screen that resembles a Windows file manager. The image shows the HOST PC connected to a HART driver and a Pulsar radar transmitter.

The work area for the device window displays the DTM transmitter screens as indicated below within the blue outline. The sample screen below shows the ONLINE PARAMETERIZATION, ECHO CURVE, and PROCESS TREND windows.
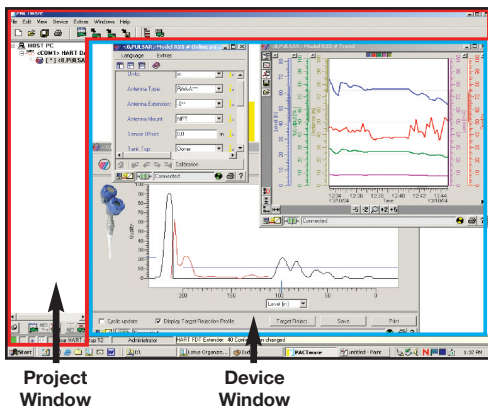
4.2 Typical Operation

(program installed, running and device connected to PC via HART serial interface)

Windows-based programs have numerous ways to accomplish the same task (icons, drop-down menus, right-click). The following procedure will describe one approach to build a project:

- In the project window click on HOST PC to highlight. Then right-click to show menu and select ADD DEVICE (see Figure 8).

Figure 8
Adding a DTM

- A dialog box will appear with a list of communication options. Choose the HART Communication DTM from the list: "<COM1> HART Driver" will appear in the project window attached to the HOST PC.

NOTE: If the expected communication DTMs do not appear in the dialog box, you must force the program to search for them on the computer.

1. **Ensure all proper DTMs are installed on the computer**
2. **UPDATE the Device Catalog**
   - **Choose VIEW/DEVICE CATALOG (F3)**
   - **Press UPDATE DEVICE CATALOG (Figure 9)**

Now, all Device DTMs installed on the computer can be accessed by the program. This update routine should be run any time new DTMs are installed.

Once the HART DTM is added to the project window, click on "HART Com1 HART Driver" to highlight, then right-click and select ADD DEVICE. A dialog box with a list of available Device DTMs will appear. Choose "Model RX5": "Model RX5" will appear in the project window attached to the HART communication DTM.
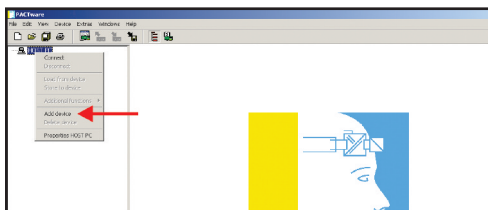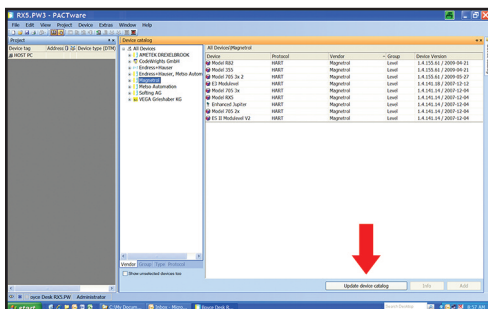

Figure 9
Update Device Catalog

The project tree is now complete for one device but is not communicating. Click on "Model RX5" to highlight then right-click and select CONNECT. All connected devices in the project window (HOST PC/HART DRIVER/RX5 transmitter) will become bold showing they are now communicating and ready for use.

ERROR MESSAGE: "Connection to device could not be established" can be caused by the following:

- Transmitter is not powered.

- HART serial interface is not connected.

- HART serial interface and DTM are using different serial ports (COM1, COM2,…). Determine what COM port the computer is using: **START/Control Panel/System/Hardware/Device Manager/Ports** (Windows 7: **START/Control Panel/Device Manager/Ports**). Note the COM port number. Return to the PACT*ware* application. At the top left area of the Project window, right-click on the HART DTM while it is highlighted (e.g., "HART Com5"). Select PARAMETER and verify that the COM port number listed under Serial Interface matches the one in Control Panel.

- Loop resistance is < 250 ohms, the minimum required by HART; add resistance to loop.

- Transmitter and DTM are using different Poll addresses.

It may be necessary to DISCONNECT from the loop and then CONNECT again to establish communications.

4.3   Most Commonly Used Screens

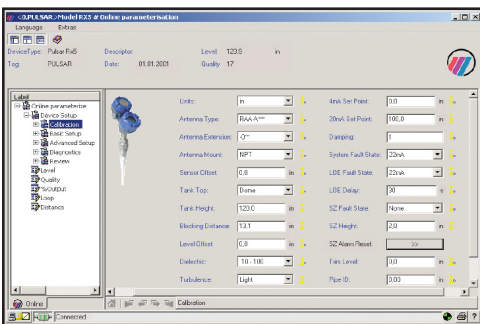All of the following screens are accessed by clicking on Device in the top menu bar.

Online Parameterization

From the DEVICE menu, choose PARAMETER, then ONLINE PARAMETERIZATION to open this window (see Figure 10).

- Size the window if necessary for optimal viewing.

- Double-click on the ONLINE PARAMETERIZE menu on the left of the project window.

- Double-click on DEVICE SETUP.

- Double-click on CALIBRATION—this will display all basic user parameters necessary for proper operation (not required for Model TA2).

Note that when changes are made in the data boxes, the information is not sent to the transmitter or saved until the ENTER key is pressed. Pressing the ESCAPE key will revert any changes back to the currently saved settings.

DEVICE/ADDITIONAL FUNCTIONS/SAVE ONLINE PARAMETERS can be used to store this information as a text file (*.RTF) at C:\Program Files\Magnetrol\DTMs\Model RX5\. This process takes a longer period of time if many windows are open. This time can be reduced by closing the dynamically updated windows such as TANK VIEW and ONLINE PARAMETERS.

Figure 10
Online Parameterization

4.3   Most Commonly Used Screens (cont.)

Offline Parameterization

From the DEVICE menu, choose PARAMETER, then OFFLINE
PARAMETERIZATION to open this window.

OFFLINE PARAMETERIZATION works in much the same way as ONLINE.
Parameters can be developed offline and then downloaded to any transmitter
online by using the command DEVICE / STORE TO DEVICE.

Parameters can also be transferred from one transmitter to another by getting the
information from transmitter #1 using DEVICE / LOAD FROM DEVICE. These
parameters can then be sent to transmitter #2 by using DEVICE / STORE TO DEVICE.

Pre-Configuring Transmitter Data

The OFFLINE PARAMETERIZATION window can be used to pre-configure one or
multiple transmitters. Use the following procedure:

- Develop a PACT*ware* project. At the host PC:
    - add communication DTM (e.g., HART); ensure COM port matches
      that being used by Windows.
    - add Device DTM (e.g., Eclipse 3x)

- Highlight the Device DTM (e.g., Eclipse 3x) in the project window and
  right-click

- Go to PARAMETER/PARAMETERIZATION

- Click on OFFLINE PARAMETERIZATION, which will reveal the complete
  list of parameters

- Choose the proper parameters for this device. Be sure to give the device a
  unique tag.

- Select FILE/SAVE AS and save the project as a unique file (*.PW3 or *.PW4)
  for this specific transmitter.

- To load pre-configured data to the transmitter:
    - Ensure PC is properly connected to the transmitter and communicating
    - Open the *.PW3/*.PW4 file for the specific transmitter
    - Click on DEVICE/STORE TO DEVICE or click on the STORE TO
      DEVICE icon.

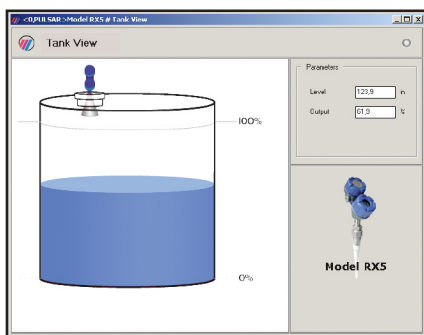- Confirm proper values were loaded to the transmitter

Tank View *(not available for Model TA2)*

From the **Device** menu, choose ADDITIONAL FUNCTIONS, then
TANK VIEW to open this window.

Figure 11 displays a common operating window graphically showing the %Output
of level.

Figure 11
Tank View

Echo Curve

From the DEVICE menu, choose ADDITIONAL FUNCTIONS, then ECHO CURVE to open this window (see Figure 12).

The Echo Curve is an extremely useful tool for advanced configuration and troubleshooting. Press the Refresh button in the bottom right corner of the Echo Curve Window to establish the initial screen.
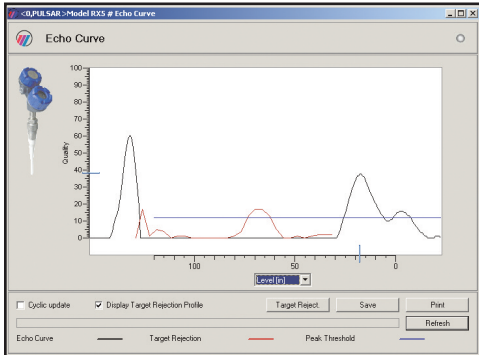

Figure 12
Echo Curve

Key features of the Echo Curve screen:

- After pressing the Refresh button, the light in the upper right blinks green when the device is communicating properly and red if there are communication errors.

- The X-axis shows LEVEL or DISTANCE. The left side of the scale represents the top of the vessel. LEVEL/DISTANCE can be toggled by using the drop-down box under the center of the X-axis.

- The Y-axis shows the QUALITY (signal strength) on a scale of 0–100. Quality values of 20–90 are typical. This value will vary (e.g., it will degrade when the liquid level changes from placid to turbulent).

- Light blue markers on the X and Y axes indicate what echo the transmitter has determined to be the LEVEL and its corresponding QUALITY.

- The blue horizontal line indicates the Peak Threshold. Only peaks above this value will be considered as valid echoes.

- Echo Curve information is shown in black.

- **FALSE TARGET REJECTION:** shown in red (if the Display Target Rejection Profile box is checked) during Refresh.

- **CYCLIC UPDATE:** checking this box allows the Echo Curve display to update on a continuous basis. Use this option sparingly:
  - Echo Curve cannot be saved when Cyclic Update is active.
  - No other parameter updates (e.g., Process Trend) occur while Cyclic Update is active.

- **DISPLAY TARGET REJECTION PROFILE:** enabled by checking this box and refreshing the screen. The FALSE TARGET REJECTION curve will always stop approximately 1 foot (300mm) short of the chosen Level echo. A flat red line means no False Target Rejection profile has been run.

- **TARGET REJECT:** a FALSE TARGET REJECTION profile may be initiated by clicking this button. See TARGET REJECTION in next section for complete details.

- **SAVE:** the Echo Curve can be saved as a bitmap (*.bmp) file for later reference or sending to the factory for analysis.

- **PRINT:** press this button to print a paper copy of the Echo Curve.

- **REFRESH:** gathers fresh echo curve data from transmitter.

- **COMMENTS:** up to 250 characters of description/comments can be added for reference.

- **ZOOM:** allows the waveform to zoom in on the level signal.

The light blue LEVEL indicator may sometimes show a slightly different value than the actual LEVEL for various reasons. The most common is the actual LEVEL value may be subjected to more averaging than the Echo Curve. Use this screen for advanced calibration and troubleshooting, not tank monitoring.

Figure 13
Echo Curve – No False Target Rejection

Figure 14
Target Rejection

Figure 15
**Echo Curve – After running
False Target Rejection**

4.3   Most Commonly Used Screens (cont.)

Target Rejection (Pulsar only)

From the DEVICE menu, choose ADDITIONAL FUNCTIONS, then TARGET REJECTION to open this window (see Figure 13).

An effective TARGET REJECTION profile is important to the proper operation of the device. Run the FTR (False Target Rejection) when the tank level is at or near empty. This will capture the maximum number of targets in the vessel. Run the FTR even if the tank is at or near full, then re-run when the tank is near empty. This will help optimize certain operational parameters.

A flat red line indicates that no False Target Rejection profile has been run (see Figure 10).

In this example a false echo (Level=68.0, Quality=17) has signal strength strong enough to be detected as a level. This must be eliminated to enable the actual level to be measured.

- Initiate the **FTR**: this can be done from the ECHO CURVE window by pressing the Target Reject button or from DEVICE/ADDITIONAL FUNCTIONS/TARGET REJECTION.

- In the left side file menu area, double-click on TARGET REJECTION to display SELECT (see Figure 14).

Click on SELECT. This displays four options:

- **ENABLE** or **DISABLE**: a FTR profile can be made active or inactive using these buttons.

- **EMPTY**: choose this if tank is completely empty; the FTR routine will scan to the bottom of the vessel.

- **PARTIAL**: choose this for any condition other than empty. The FTR routine will scan down to the LEVEL value.

In this example you would choose **PARTIAL** since there is a liquid level at approximately 18 inches (see Figure 15).

The FTR routine searches all valid targets and presents them to the user:

- In this example the first target is 68 inches with a Quality of 17; this is the false target; choose NO and OK.

- Second target is 18.7 with a Quality of 38; this is the actual Level; choose YES and OK. Confirm by choosing YES again.

- If you review all targets without choosing one, you must start again by selecting PARTIAL.

- Choose YES to HART control loop warning.

- After a few seconds the routine will be complete and another HART control loop message is displayed.

- Close this FALSE TARGET REJECTION window and return to the ECHO CURVE.

- Make sure the DISPLAY TARGET REJECTION PROFILE is checked then REFRESH screen. The new data shows the FTR profile and the device has locked on to the actual LEVEL.

A complete list of targets can also be viewed at **DEVICE/PARAMETER/ONLINE PARAMETERIZATION**. Double-click on Online Parameterize (at the left of window), then Device Setup, then Calibration, then Targets.

The Level where False Target Rejection was last run can be found at TARGET REJECTION LEVEL in the DIAGNOSTICS window.
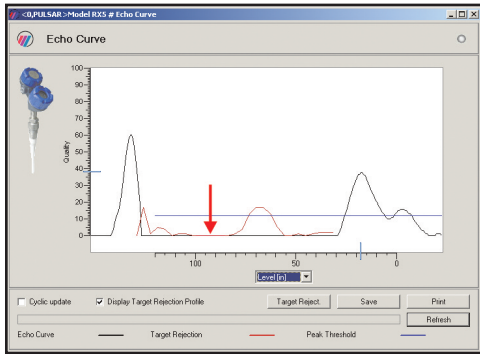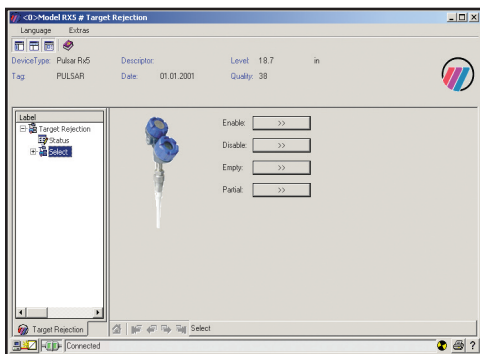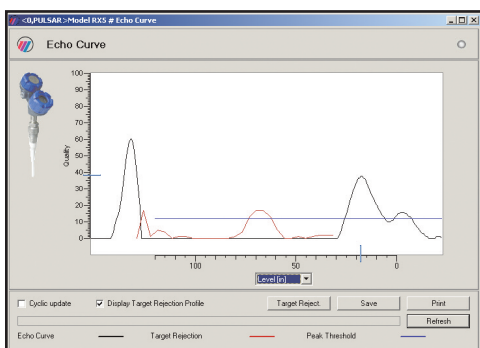
4.3   Most Commonly Used Screens (cont.)

Process Trend

Figure 16
Process Trend

From the **Device** menu, choose **Additional Functions,** then **Process Trend** to open this window.

All key data can be trended. Features of the **PROCESS TREND** window (see Figure 16) include:

1. Five key data series (Level, Quality, %Output, Loop and Distance) can be viewed or hidden by selecting the five corresponding color buttons at the top center of the window.

    Model TA2 only: PV, Signal, PV Loop, PV% Range, SV

2. All scales can be adjusted using the following convention:

    • LEFT-click and drag to adjust the left side of scale while anchoring the right. (This also works on vertical scales.)

    • RIGHT-click and drag to adjust the right side of scale while anchoring the left. (This also works on vertical scales.)

    • Click BOTH mouse buttons and drag to move scale fully right/left (or up/down)

3. Various Default scale values can be set using these icons.

4. Adjust Process Trend screen appearance.

5. Set Data Curve assignment (if desired).

6.   will save the Process Trend information currently displayed on screen as an image (*.bmp file). Note that *.bmp files are typically large and not always suitable for e-mail. Saving as *.emf will yield a smaller file size.

7.   will save all data accumulated while the Process Trend window has been open as a data file (*.txt). This allows the user, or factory personnel, to review and manipulate data within the Process Trend window. This is typically a smaller file than a *.bmp making it more suitable as an email attachment. However, this data file will be quite large if trending over a long period of time.

8. Open any saved Process Trend files.

    Some DTMs offer separate off-line Trend screens (Additional Functions/Offline Process Trend). This permits viewing of previously collected Trend data while the online Process Trend is visible.

CAUTION: Opening a *.txt file from within the PROCESS TREND window will replace any existing information and suspend the gathering of new information. Do not open a file from within the PROCESS TREND window if you are in process of gathering important data.

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9. Zoom IN and OUT.

10. Set latest sample of Process Trend data to right edge of window.

Process Trend data is being saved ONLY when the Process Trend window is OPEN; NO data is saved when window is closed. When closing Process Trend window, you will be prompted to save current data.

Process Trend data is interrupted when the **CYCLIC** box is checked in the Echo Curve window.
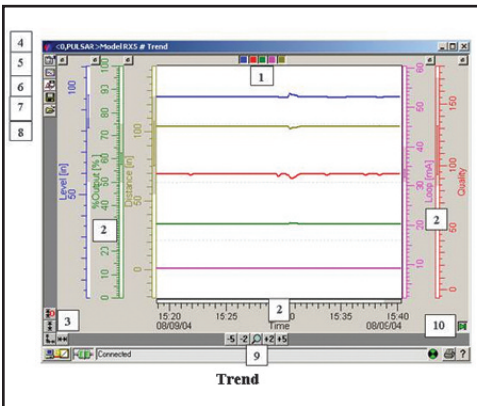

Figure 17
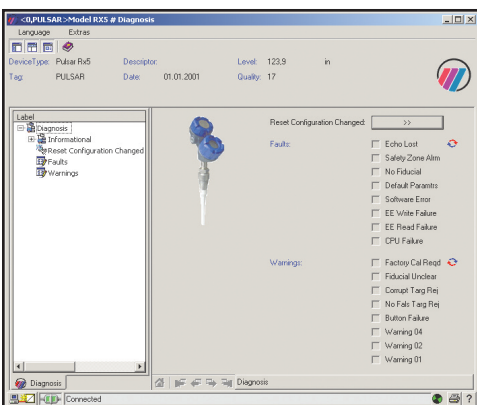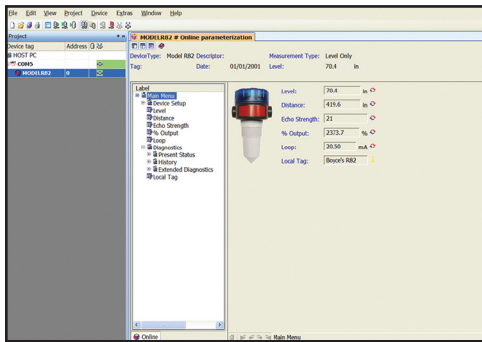**Diagnosis**

Figure 18
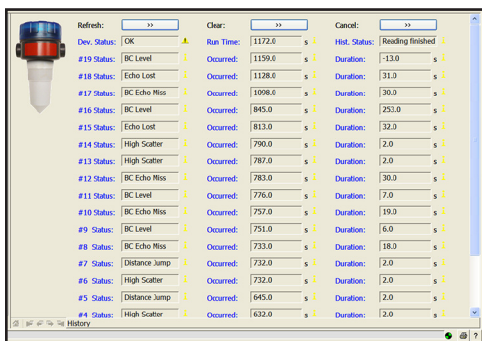**Online Parameterization/Main Menu**

Figure 19
History

CAUTION: Always disconnect or disable any control systems that could be affected by the device before storing parameters to the device.

Device/Diagnosis

From the **Device** menu, choose **Diagnosis** to open this window (see Figure 17).

The Diagnosis screen allows examination of all Faults, Warnings, and Informational messages.

 Refer to Instruction Manual for further information on Faults and Warnings.

History (Models 355, R82, and TA2)

From the **Device** menu, choose **Online Parameters**.
Expand the Main Menu, expand **Diagnostics**, choose **History** (See Figure 18).
Press **Refresh** button to populate page with latest information (See Figure 19).

Features of the History page include:

1. Device Status: shows highest priority diagnostic message or OK if no messages.

2. Run Time: time accumulated (seconds or hours) since last power-up.

3. Occurred and Duration: when an event happened and for how long.

4. List of up to 19 events: #1 is oldest.

Consult factory personnel for proper interpretation of this information.

5.0 Troubleshooting (including factory review of data)

This program offers a wealth of information critical to effective troubleshooting. If a problem should arise and factory assistance is necessary for analysis, be prepared to save and email the following files:

- *.PW3 or *.PW4 FILE: this contains all PACT*ware* project information and transmitter configuration parameters

- **ONLINE PARAMETERS**: the complete list of configuration data.

- **PROCESS TREND:** information that includes the time of upset/error condition.

- **ECHO CURVE:** showing upset/error condition (when possible).

- **ERROR MONITOR:** (VIEW/ERROR MONITOR) including upset/error condition.

6.0 Advanced Functions

The following functions are for advanced configuration of multiple devices. Use the ONLINE PARAMETERIZATION window for sending typical parameter changes.

 EDIT DEVICE PARAMETER: opens the ONLINE or OFFLINE PARAMETERIZATION window for the selected device. (If the device is connected, the ONLINE PARAMETERIZATION window is opened, otherwise the OFFLINE PARAMETERIZATION window is opened).

 LOAD FROM DEVICE: loads device parameters from the currently connected device to the OFFLINE PARAMETERIZATION window of the DTM.

 STORE TO DEVICE: sends the device parameters from the OFFLINE PARAMETERIZATION window of the current DTM to the currently connected device. Ensure the OFFLINE parameters are appropriate values before sending.

Additional useful commands:

DEVICE/ADDITIONAL FUNCTIONS/SAVE ONLINE PARAMETERS: This command saves current ONLINE PARAMETERS to C:\Program Files\Magnetrol\DTMs\Model RX5\as a text file (*.RTF). This process can be time-consuming if many windows are open. Time can be reduced by closing dynamically updated windows like TANK VIEW and ONLINE PARAMETERS. The PROCESS TREND window may be left open.

DEVICE/ADDITIONAL FUNCTIONS/SAVE OFFLINE PARAMETERS: This command saves current OFFLINE PARAMETERS to C:\Program Files\Magnetrol\DTMs\Model RX5\ as a text file (*.RTF).

7.0 HELP screens

There are four types of HELP available. Following is an explanation of the type of help from each of the icons.
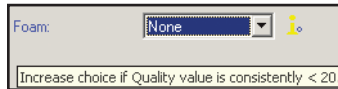

PDF file of Pulsar or Eclipse Installation and Operating manual

HTML Help files specific to the Pulsar or Eclipse transmitter DTM
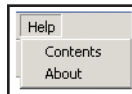
HTML Help files specific to **PACT*ware***

Hover cursor over a configuration parameter for a few seconds and a Tool Tip will appear giving parameter-specific Help. Clicking on Parameter will open Instruction manual.

Help @ Magnetrol

- FAQs: http://www.magnetrol.com/support/pactware/FAQs
- Email: PACTware@magnetrol.com
- Phone: 800-624-8765

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