

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

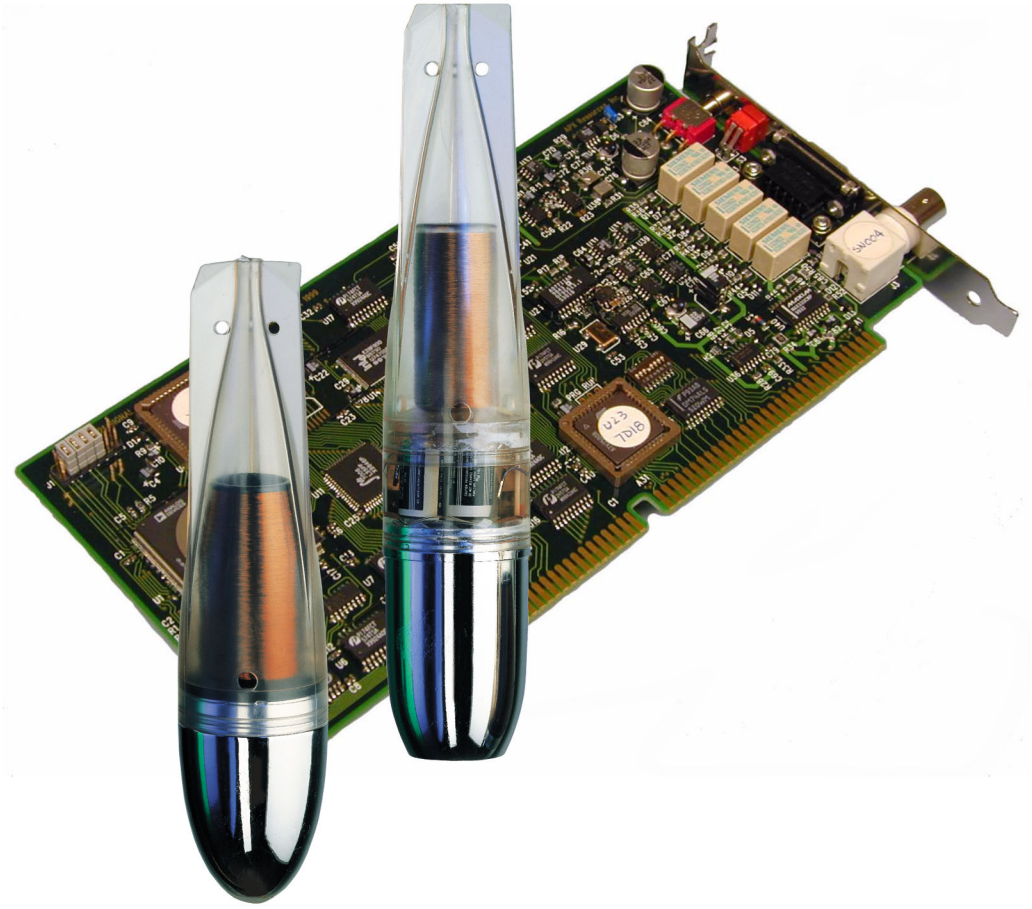
Find the *Lockheed Martin / Sippican MK21* at our website: ***Click HERE***

MK-21/ISA

Bathythermograph Data Acquisition System

Installation, Operation and Maintenance Manual

P/N 308195, Rev. A



sippican, inc.

Sea-Air Systems Division

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The information, descriptions and illustrations in this manual are the property of Sippican, Inc., and may be disclosed only to those persons or organizations specifically authorized by Sippican. Duplication of any part of this manual is strictly prohibited unless authorized in writing by Sippican.

The WinMK21 Data Acquisition and Post-Processing Software program may be used or copied only in accordance with the terms of the license.

Windows is a registered trademark of Microsoft Corporation.

©Copyright 2003 by Sippican, Inc.

Sippican, Inc.
Sea-Air Systems Division
Seven Barnabas Road
Marion, MA 02738

Telephone: (508) 748-1160
Fax: (508) 748-3626

www.sippican.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TABLE OF CONTENTS

PREFACE xiii

About This Manual xiii
Minimum System Computer Requirements xiv
Notes, Warnings and Cautions xiv
Safety Precautions xv
How to Contact Sippican, Inc. xv

SECTION 1

SYSTEM OVERVIEW 1-1

1.1 MK21 Interface Board and Connector Box Specifications 1-2
1.2 MK21 Interface Board Connectors 1-3
1.3 WinMK21 Data Acquisition and Post-Processing Software 1-3
1.3.1 Graphics and Launch Information Displays 1-4
1.3.2 Operating Modes 1-5
1.4 Expendable Probes 1-5
1.4.1 XBT Probe 1-6
1.4.2 XSV Probe 1-7
1.4.3 XCTD Probe 1-8
1.5 Test Canisters 1-9
1.6 Launchers 1-10
1.6.1 LM-2A Deck-Mounted Launcher 1-10
1.6.2 LM-3A Hand-Held Launcher 1-11
1.6.3 LM-4A Hull-Mounted Launcher 1-12

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 2

INSTALLING THE MK21 INTERFACE BOARD AND WINMK21 2-1

2.1 Unpacking and Installing the MK21 Interface Board 2-1
2.2 Installing WinMK21 2-2
2.3 Installing the MK-21 ISA Driver on Your Computer 2-5
2.3.1 Installing the MK-21 ISA Driver for Windows XP 2-5
2.3.2 Installing the MK-21 ISA Driver for Windows 2000 2-11
2.4 Starting WinMK21 2-17
2.5 Exiting from WinMK21 2-17
2.6 Verifying Proper Operation of the MK21 Interface Board 2-18

SECTION 3

INSTALLATION AND TEST 3-1

3.1 Setting up and Connecting the Computer 3-1
3.1.1 Finding a Location for the Computer 3-1
3.1.2 Connecting an Isolated Power Source to the Computer . . 3-1
3.1.3 Connecting the Launcher Cable to the MK21 Interface Board 3-2
3.2 Unpacking and Installing the LM-2A Deck-Mounted Launcher 3-5
3.2.1 Mounting the LM-2A 3-5
3.2.2 Grounding the LM-2A 3-7
3.2.3 Routing the LM-2A Launcher Cable 3-7
3.3 Unpacking and Installing the LM-3A Hand-Held Launcher 3-8
3.4 Unpacking and Installing the LM-4A Hull-Mounted Launcher 3-8
3.4.1 Mounting the LM-4A 3-9
3.4.2 Grounding the LM-4A 3-9
3.4.3 Routing the LM-4A Launcher Cable 3-12

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.5 Verifying System Operation 3-12
3.5.1 Verifying Operation using an XBT Test Canister 3-12
3.5.2 Verifying Operation using an XCTD-1 Test Canister 3-13
3.6 Preparing to Reship the Launcher and Probes 3-14
3.6.1 Preparing to Reship a Launcher 3-14
3.6.2 Preparing to Reship Probes 3-15
3.7 Storing the Launchers and Probes 3-15
3.7.1 Storing the LM-2A Deck-Mounted Launcher 3-15
3.7.2 Storing the LM-3A Hand-Held Launcher 3-15
3.7.3 Storing the LM-4A Thru-Hull Launcher 3-15
3.7.4 Storing Probes 3-15

SECTION 4

OPERATION 4-1

4.1 Turning On the Computer and Starting WinMK21 4-1
4.2 Exiting from WinMK21 and Turning Off the Computer 4-3
4.3 Launching a Probe 4-4
4.3.1 STEP 1—Initiate a New Probe Drop 4-4
4.3.2 STEP 2—Select or Verify the Probe Type 4-5
4.3.3 STEP 3—Verify the Data File Name 4-6
4.3.4 STEP 4—Update or Verify the Launch Information 4-7
4.3.5 STEP 5—Load the Probe 4-8
4.3.6 STEP 6—Launch the Probe 4-9
4.3.7 STEP 7—Wait for Terminal Depth or Stop Data Acquisition 4-10
4.3.8 STEP 8—Transmit the Data 4-10
4.3.9 STEP 9—Perform Post Processing of Data 4-11
4.3.10 STEP 10—Edit the Launch Information 4-11
4.3.11 STEP 11—Load Another Probe or Exit from WinMK21 . . 4-12
4.4 Post Processing 4-12
4.4.1 Opening a Data File 4-13
4.4.2 Viewing the Data Profiles and Numeric Displays 4-14
4.4.3 Scaling and Zooming in on the Graphics Display 4-14
4.4.4 Comparing Two Data Profiles 4-16

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.4.5 Displaying Tabulated Data 4-16
4.4.6 Filtering the Data 4-16
4.4.7 Editing the Launch Information 4-16
4.4.8 Printing the Data Profiles 4-17
4.4.9 Generating an Export Data File 4-17
4.4.10 Transmitting the Data File 4-17

SECTION 5
WINMK21 MENUS AND COMMANDS 5-1
5.1 Real-Time Data Acquisition Window 5-2
5.2 Menu Bar 5-2
5.2.1 File Menu 5-3
5.2.1.1 *New Drop* 5-3
5.2.1.2 *Open* 5-3
5.2.1.3 *Close* 5-3
5.2.1.4 *Save* 5-3
5.2.1.5 *Save As* 5-4
5.2.1.6 *Export* 5-4
5.2.1.7 *Transmit* 5-4
5.2.1.8 *Print Setup* 5-5
5.2.1.9 *Print Preview* 5-5
5.2.1.10 *Print* 5-5
5.2.1.11 *Exit* 5-5
5.2.2 Options Menu 5-5
5.2.2.1 *Probe - Selection* 5-6
5.2.2.2 *Probe - Attributes* 5-7
5.2.2.3 *Probe Attributes - Pressure Point* 5-9
5.2.2.4 *Probe Attributes - Calibration Coefficients* 5-10
5.2.2.5 *Analog XCTD and XCTD Deep Calibration Coefficients* 5-10
5.2.2.6 *Digital XCTD Calibration Coefficients* 5-10
5.2.2.7 *T-12 Calibration Coefficients* 5-11
5.2.2.8 *System Parameters* 5-12
5.2.2.9 *System Parameters - MK21 Interface Board Port Address* 5-14

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.10 *Data Transmit Parameters* 5-14
5.2.2.11 *User Interface Parameters* 5-16
5.2.2.12 *Graph Scaling - Defaults* 5-17
5.2.2.13 *Post-processing Parameters* 5-18
5.2.2.14 *Launch Information Parameters* 5-18
5.2.2.15 *Launch Information - Custom Information Labels* 5-20
5.2.2.16 *Navigation Input Parameters* 5-21
5.2.2.17 *Communications Port Parameters* 5-22
5.2.3 Actions Menu 5-23
5.2.3.1 *Terminate* 5-23
5.2.3.2 *MK21 I/O Board* 5-23
5.2.3.3 *MK21 I/O Board - Initiate* 5-23
5.2.3.4 *MK21 I/O Board - Standby* 5-24
5.2.4 Tools Menu 5-24
5.2.4.1 *Diagnostic* 5-24
5.2.4.2 *Diagnostic - Log To Disk* 5-24
5.2.4.3 *Diagnostic Parameters* 5-25
5.2.4.4 *Convert* 5-26
5.2.4.5 *Read EEPROM (XCTD Probes only)* 5-28
5.2.4.6 *Update Firmware* 5-29
5.2.4.7 *Identifying the Current Firmware Version* 5-30
5.2.5 Profile Menu 5-32
5.2.5.1 *Scaling* 5-32
5.2.5.2 *Default Scaling* 5-32
5.2.5.3 *Auto Scaling* 5-34
5.2.5.4 *Zoom Out Scaling* 5-35
5.2.5.5 *Set Scaling* 5-36
5.2.5.6 *Tabular Data* 5-36
5.2.5.7 *Original Profile* 5-36
5.2.5.8 *Noise Reduced Profile* 5-37
5.2.5.9 *Averaged Profile* 5-38
5.2.5.10 *Salinity Profile* 5-38
5.2.5.11 *Sound Velocity Profile* 5-39
5.2.5.12 *Density Profile* 5-39
5.2.5.13 *Pressure Point - Overview* 5-40

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.14 *Pressure Point - Set* 5-40
5.2.5.15 *Pressure Point - Auto-Find* 5-40
5.2.5.16 *Pressure Point - Undo* 5-41
5.2.5.17 *Overlay - Overview* 5-41
5.2.5.18 *Overlay - Set* 5-41
5.2.5.19 *Overlay - Remove* 5-42
5.2.6 Window Menu 5-42
5.2.7 Help Menu 5-42
5.3 WinMK21 Tool Bar 5-43
5.4 Dialog Overview 5-44
5.4.1 Launch Information 5-44
5.4.2 System Status 5-44
5.4.3 Navigation Input Status 5-45
5.5 Additional Information Overview 5-47
5.5.1 Restore Storage File 5-47
5.5.2 Configuration Log File 5-48
5.5.3 Password Protection 5-48
5.5.4 Probe Filenames 5-49
5.5.5 Raw Data Format 5-50
5.5.6 Export Data Format 5-50
5.5.7 Depth Equation 5-51
5.5.8 Terminal Depth 5-52
5.5.9 Navigation Input Reference - NMEA 0183 5-53
5.6 MK21 Interface Board Port Address 5-54
5.6.1 Determine Available Port Address for Use by MK21 Interface Board 5-54
5.6.2 Changing the Port Address Settings in the WinMK21 Application or MK21 Device Driver 5-55
5.6.3 Changing the Port Address Settings on the MK21 Interface Board 5-55
5.6.4 Sample Port Address Settings 5-57

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 6
SERIAL-BINARY DATA TRANSMISSION DESCRIPTION

6.1 Physical Requirements 6-1
6.2 Protocol Requirements 6-1
6.3 Message Requirements 6-2
6.3.1 XBT Header Message Format 6-2
6.3.2 XSV Header Message Format 6-3
6.3.3 Data Message Format 6-3
6.3.4 Data Out-of-Range Messages 6-3
6.3.5 Temperature Range 6-4
6.3.6 Sound Velocity Range 6-4
6.3.7 Processing Algorithm 6-4

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LIST OF FIGURES

FIGURE 1-1: *The MK-21/ISA Bathythermograph Data Acquisition System with the Available Launchers* 1-2

FIGURE 1-2: *Graphics and Launch Information Displays in the Main Window at the End of an XCTD Probe Drop* 1-4

FIGURE 1-3: *XBT Probe* 1-6

FIGURE 1-4: *XSV Probe* 1-7

FIGURE 1-5: *XCTD Probe* 1-8

FIGURE 1-6: *The LM-2A Deck-Mounted Launcher* 1-10

FIGURE 1-7: *The LM-3A Hand-Held Launcher* 1-11

FIGURE 1-8: *The LM-4A Hull-Mounted Launcher* 1-12

FIGURE 3-1: *Connecting the Isolation Transformer to the Computer* 3-2

FIGURE 3-2: *Connector Box (Sippican P/N 306146-1) with Prewired Interface Cable* 3-3

FIGURE 3-3: *LM-2A Deck-Mounted Launcher Mounting Locations* 3-6

FIGURE 3-4: *LM-2A Deck-Mounted Launcher Installation Guide* 3-7

FIGURE 3-5: *LM-4A Thru-Hull Launcher Installation Guide* 3-10

FIGURE 3-6: *LM-4A Thru-Hull Launcher Installation Notes* 3-11

FIGURE 4-1: *Probe Launch and Data Acquisition Sequence Flow Diagram* 4-2

FIGURE 4-2: *The WinMK21 Main Window* 4-3

FIGURE 4-3: *Realtime Data Acquisition Window—Load Probe* 4-5

FIGURE 4-4: *The Select Surface Probe Type Dialog Box* 4-6

FIGURE 4-5: *The Launch Information Parameters Dialog Box* 4-8

FIGURE 4-6: *Realtime Data Acquisition Window—Launch Probe* 4-9

FIGURE 4-7: *Realtime Data Acquisition Window—Collecting MK21 Data* 4-10

FIGURE 4-8: *Post Processing Window* 4-11

FIGURE 4-9: *Post Processing Window* 4-13

FIGURE 4-10: *Selecting an Area of the Graphics Display to Zoom in on* 4-15

FIGURE 4-11: *Zooming in on an Area of the Graphics Display* 4-15

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LIST OF TABLES

TABLE 1-1: *XBT Probe Types and Capabilities* 1-6
TABLE 1-2: *XSV Probe Types and Capabilities* 1-7
TABLE 1-3: *XCTD Probe Types and Capabilities* 1-8
TABLE 1-4: *Test Canister Types* 1-9
TABLE 3-1: *Launcher Cable Connection Information* 3-4
TABLE 4-1: *Data File Name Prefixes* 4-7

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

PREFACE

About This Manual

This manual describes how to install and operate the MK-21/ISA Bathythermograph Data Acquisition System along with how to install and operate the WinMK21 Data Acquisition and Post-Processing Software on a PC to acquire, process, view, analyze, and archive data from expendable oceanographic instruments. It is provided for informational and reference purposes only and is as accurate as reasonably possible. It is also subject to change without notice.

This manual is divided into the following six sections:

Section 1: System Overview. Provides a general overview of the MK-21/ISA Bathythermograph Data Acquisition System, the WinMK21 Data Acquisition and Post-Processing Software, and Sippican's expendable oceanographic probes.

Section 2: Installing the MK21 Interface Board and WinMK21. Provides detailed instructions on how to install a MK21 interface board in your computer, how to install WinMK21 and the MK-21 ISA driver, and how to start and exit from WinMK21. In addition, a procedure is provided for verifying proper operation of the MK21 interface board.

Section 3: Installation and Test. Provides instructions on how to set up your computer and connect it to an isolated power source, and how to unpack, mount and ground an LM-2A, LM-3A or LM-4A launcher and connect it to the MK21 interface board in the computer. In addition, procedures are included for verifying operation of the system before launching a probe.

Section 4: Operation. Describes how to operate the WinMK21 Data Acquisition and Post-Processing Software to launch an expendable probe and acquire and process the data from it.

Section 5: WinMK21 Help. Includes the same information provided by the WinMK21 Software Reference component of the online Help.

Section 6: Serial-Binary Data Transmission Description. Specifies the interface requirements for WinMK21 and an external serial device to achieve the serial-binary data transmission between them.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Minimum System Computer Requirements

The recommended minimum system computer requirements for WinMK21 to operate efficiently include the following:

- Microsoft Windows 98/Me/NT/2000/XP
- Pentium III 700 Mhz processor
- 64 MB of RAM
- 200 MB of available hard drive space
- VGA monitor with 1024 x 768 of resolution
- Available ISA slot
- Mouse
- RS-232 serial port for navigation input and/or data transmission
- Parallel printer port

Notes, Warnings and Cautions

Where applicable, notes, warnings and cautions are provided as follows:



NOTE *Provides you with recommendations or general information that is supplemental to the information provided.*



WARNING *Alerts you to the possibility of injury or death to yourself or to others.*



CAUTION *Alerts you to the possibility of damage to equipment or to data.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Safety Precautions

The general safety precautions listed below apply to the overall operation, installation and maintenance of the MK-21/ISA. All operators should observe these precautions when operating or servicing it.

Never do the following:

NEVER remove or replace the MK21 interface board with the computer turned on or with the AC power cable plugged into a power outlet.

NEVER service or adjust the MK-21/ISA alone.

NEVER allow the MK21 interface board to get wet.

NEVER attempt to force the MK21 interface board into the ISA connector of the computer as it could damage either the board or the connector socket.

NEVER touch the contact pins of the MK21 interface board as the board is electrostatic discharge (ESD) sensitive.

How to Contact Sippican, Inc.

Sippican welcomes your comments. Please contact Ocean Support at Sippican to offer any comments or suggestions about this manual or to request technical support. Ocean Support can be contacted using any of the following means:

Mail

Ocean Support
Sippican, Inc.
Sea-Air Systems Division
Seven Barnabas Road
Marion, MA 02738

Email

oceansupport@sippican.com

Telephone

(508) 748-1160

Facsimile

(508) 748-3626

For more information about Sippican and our products, visit our Web site at **www.sippican.com**.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 1
SYSTEM OVERVIEW

The MK-21/ISA Bathythermograph Data Acquisition System is a portable data acquisition system that measures and outputs ocean temperature, conductivity and sound velocity versus depth using expendable probes that are launched from surface ships. The measurements can be displayed on a PC that has a MK21 interface board installed and is running the WinMK21 Data Acquisition and Post-Processing Software. WinMK21 provides a convenient, user friendly means of displaying the data in real time and recording the data on disk for later analysis. Any person having general knowledge of basic PC operating systems can operate WinMK21, which is included on a CD with the MK21 interface board.

This section provides a general overview of the MK-21/ISA Bathythermograph Data Acquisition System, including brief descriptions of the following:

- MK21 interface board connectors
- WinMK21 Data Acquisition and Post-Processing Software
- XBT, XSV and XCTD expendable probes
- Test canisters
- LM-2A, LM-3A and LM-4A launchers

The MK21 interface board, when installed in an available ISA slot of the PC, inputs and processes the data from Sippican XBT, XSV and XCTD probes launched from Sippican LM-2A, LM-3A and LM-4A launchers. And with the WinMK21 Data Acquisition and Post-Processing Software installed on the computer, profiles of temperature verses depth, sound velocity verses depth, and temperature and conductivity verses depth can be displayed, stored on disk, output on a serial port of the computer, and printed. The MK-21/ISA Bathythermograph Data Acquisition System, along with the available launchers, is illustrated in Figure 1-1.

An optionally supplied connector box is available with the MK-21/ISA. The connector box provides an alternate ground connection for the installed launcher and is prewired with an interface cable that connects to the MK21 interface board. A watertight junction box may be used instead of the connector box.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

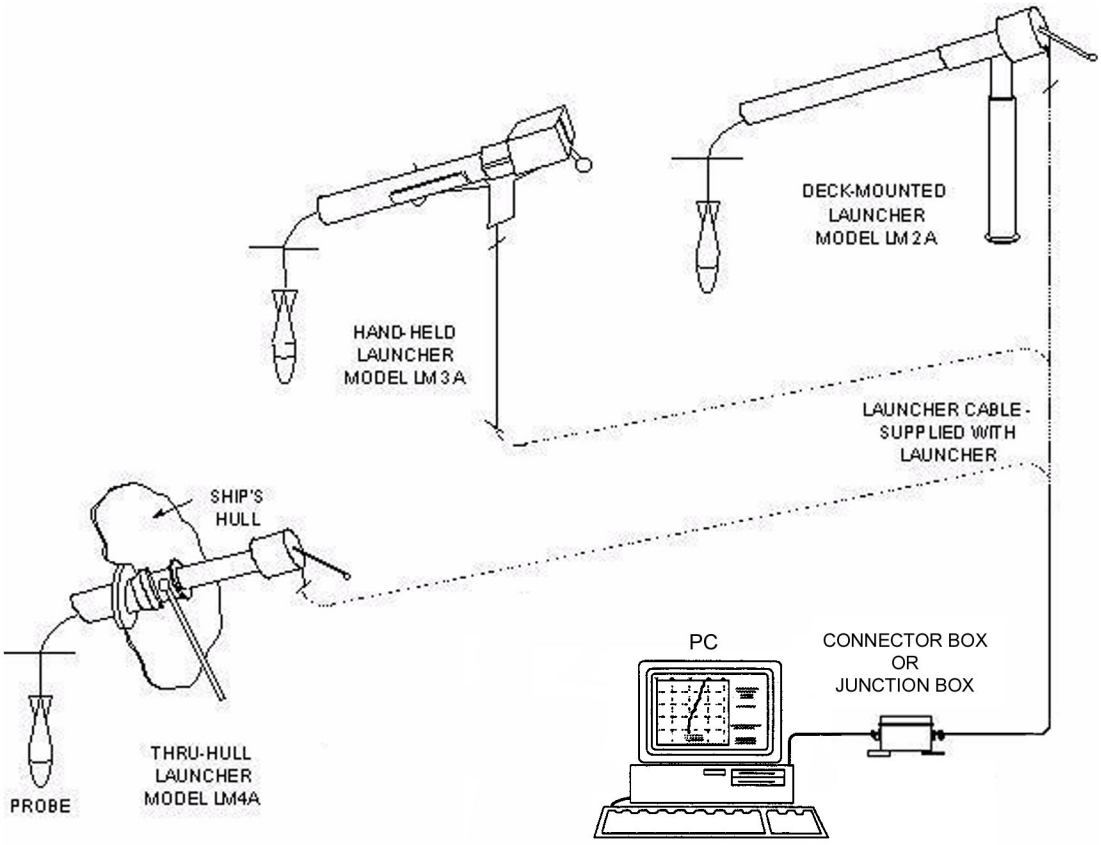


FIGURE 1-1: ***The MK-21/ISA Bathythermograph Data Acquisition System with the Available Launchers***

1.1 MK21 Interface Board and Connector Box Specifications

The general specifications for the MK21 interface board (p/n 305935-1) are the following:

Interface connection:	ISA
Computer operating system requirements:	Windows 98/Me/NT/2000/XP
Operating temperature range:	0°C to 40°C (32°F to 104°F)
Storage temperature range:	-10°C to 65°C (14°F to 149°F)
Relative humidity:	0–90% noncondensing
AUDIO connector:	BNC
CONNECTOR BOX connector:	DB-9S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The connector box is available in two configurations: with a 3.0-meter prewired interface cable (P/N 306146-1) and with a 6.1-meter prewired interface cable (P/N 306146-2). The connector box also includes a binding post for grounding and a 4-postion terminal strip for making the launcher connection to the MK21 interface board.

The general specifications for the connector box are the following:

Size:	5.5 in. long by 4.0 in. wide by 2.5 in. high
Weight:	1 lb, 1 oz (0.48 kg), with 3.0-meter interface cable
Interface cable connector:	DB-9P

1.2 MK21 Interface Board Connectors

The MK21 interface board provides the following two connectors on the expansion card bracket:

AUDIO IN:	Connects to the output of a Sippican MK-10A Data Acquisition System for air-launched probes. A mating BNC connector and cable are required.
CONNECTOR BOX:	Connects to an optionally supplied connector box (P/N 306146-1 or P/N 306146-2) or to a junction box, either of which is wired to a LM-2A, LM-3A or LM-4A launcher. A DB-9P mating connector and cable are required and are supplied with the connector box.

1.3 WinMK21 Data Acquisition and Post-Processing Software

The MK-21/ISA Bathythermograph Data Acquisition System includes the WinMK21 Data Acquisition and Post-processing Software on a CD for installation on a desktop PC. The CD also includes MK-21 ISA drivers for installation on a computer running Windows 98/Me/NT/2000/XP. You must install a MK-21 ISA driver so your computer can interface with the MK21 interface board.

Through the ISA connection to the MK21 interface board, WinMK21 controls the MK21 interface board and all of its data acquisition functions. In addition, WinMK21 inputs the data from the MK21 interface board, provides real-time display and post-processing of the data, stores the data on disk, and can output the data on a serial port of the computer, and print the data. With WinMK21 running on the computer, WinMK21 is ready to acquire new data.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.3.1 Graphics and Launch Information Displays

After launching a probe, it descends through the water and collects measurements in real time. The data can be viewed in real time as profiles in the Graphics display in the Main window as shown in Figure 1-2, which displays the temperature and conductivity verses

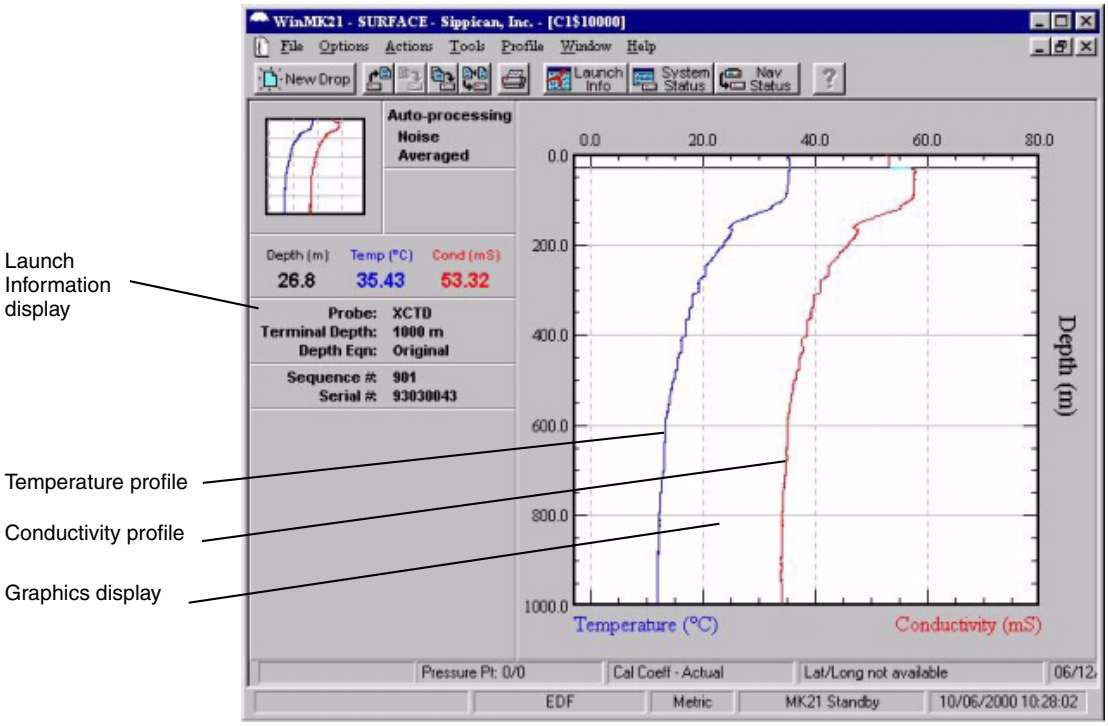


FIGURE 1-2: ***Graphics and Launch Information Displays in the Main Window at the End of an XCTD Probe Drop***

depth profiles acquired by an XCTD probe. In addition, the Launch Information display provides critical information about the drop. All of the measured data and all of the launch information are automatically recorded on the hard drive at the end of the drop for later use with spreadsheets and other analytical tools.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.3.2 Operating Modes

WinMK21 operates in two modes: Data Acquisition and Post Processing. In Data Acquisition mode, "Realtime Data Acquisition" is displayed in the Title bar of the Main window. In Post-Processing mode, the name of the open file is displayed.

Data Acquisition mode encompasses the loading of a probe into its launcher, the launching of a probe and the acquiring of data throughout its descent. In Data Acquisition mode WinMK21 detects when a probe is loaded and, after launching the probe, it detects when it enters the water. During the descent the data are displayed in the Graphics display as shown in Figure 1-2 and recorded on the hard drive. The data can also be output on a serial port. At the end of the probe drop, WinMK21 automatically switches to Post Processing mode. No operator intervention is required during the entire descent.

Post-Processing mode allows you to display the stored profiles of previous probe drops, and it allows you to perform various data analysis, presentation and export operations.

1.4 Expendable Probes

Sippican expendable probes are small oceanographic sensors that are housed in tubular protective canisters. There are three types of probes that are available for use with the MK-21/ISA: an XBT probe, which measures water temperature; an XSV probe, which measures sound velocity in the water; and an XCTD probe, which measures both water temperature and conductivity. The probes free-fall in the ocean at a known rate while collecting the data.

To launch a probe from a vessel, the canister containing the probe is first inserted into one of the Sippican launchers—an LM-2A Deck-Mounted Launcher, an LM-3A Hand-Held Launcher, or an LM-4A Thru-Hull Launcher. Contacts on the canister provide the electrical connections to the launcher which is connected by cable to the MK21 interface board. When the probe is ready to be launched, the operator pulls a release pin out of the canister, and the probe slides out of the canister into the water. The probe's hydrodynamic shape allows it to descend through the water at a stable and known rate, enabling continuous calculation of its depth throughout the entire descent. As the probe descends, its sensors continuously measure the water temperature, the sound velocity, or the temperature and conductivity. The measurements are transmitted by a wire back to the MK21 interface board. The wire dereels both from a spool in the probe as the probe descends and from a spool in the canister as the vessel from which the probe was launched moves along the surface. This dual spooling technique enables the wire to remain stationary in the water. More than a mile of wire can be contained inside a probe less than half a meter in length. Soon after the probe reaches it’s maximum depth, its wire breaks and the probe continues its descent to the ocean floor.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.4.1 XBT Probe

The expendable bathythermograph (XBT) probe, which is shown in Figure 1-3, measures water temperature verses water depth. And in regions of known and constant salinity, WinMK21 can calculate and display sound velocity verses depth from the temperature data acquired by an XBT probe. The probe contains a temperature sensing thermistor connected to a two-conductor insulated wire that is wound on two spools, a spool inside the probe and a spool inside the canister with the probe. The nose of the probe is a seawater electrode which provides an electrical ground path to the MK21 interface board and enables the MK21 interface board to detect when the probe enters the water.

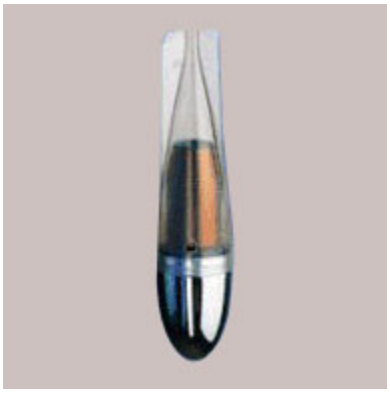


FIGURE 1-3: ***XBT Probe***

There are several types of XBT probes. They vary in their maximum depths and the maximum vessel speeds at which they can be launched. The available XBT probes and their performance characteristics are listed in Table 1-1.

TABLE 1-1: ***XBT Probe Types and Capabilities***

TYPE	APPLICATION	MAXIMUM DEPTH	MAXIMUM VESSEL SPEED
T-4	Standard Navy applications	1500 ft (460 m)	30 knots
T-5	Deep ocean scientific and military	6000 ft (1830 m)	6 knots
Fast Deep	Enhanced depth and vessel speed	3280 ft (1000 m)	20 knots
T-6	Oceanography	1500 ft (460 m)	15 knots
T-7	Special military applications	2500 ft (760 m)	15 knots
Deep Blue	Medium deep oceanography	2500 ft (760 m)	20 knots
T-10	Commercial fisheries	660 ft (200 m)	10 knots
T-11 (fine structure)	Extra fine depth resolution	1500 ft (460 m)	6 knots
T-12	Fast ship launch speed, deep ocean	6560 ft (2000 m)	20 knots

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.4.2 XSV Probe

The expendable sound velocity (XSV) probe, which is shown in Figure 1-4, measures sound velocity in water verses depth. Applications include antisubmarine warfare (ASW), coastal mine countermeasures and oceanographic research. It is particularly useful in regions where salinity varies with depth, making calculation of sound velocity from XBT data impractical. The XSV uses an active electronic sensor in the probe and a single-conductor insulated wire to transmit sound velocity data to the MK21 interface board. An internal battery provides power for the probe's electronics. Similar to the XBT, the XSV uses two wire spools, one inside the probe and one inside the canister with the probe.



FIGURE 1-4: ***XSV Probe***

The XSV measures the speed of sound in water using a piezoelectric transducer inside the probe's nose. The sensor is in the path of the flowing water as the probe descends and is pulsed at 6.5 MHz, producing an acoustic signal. The signal travels a known distance and is reflected back to the transducer. The reflected signal is detected which triggers another 6.5-MHz pulse. This cycle is repeated continuously, causing the transducer to "sing-around" at a frequency from 27 kHz to 30 kHz, depending on the water temperature, salinity and depth. The sing-around frequency, which is linearly proportional to sound velocity, is counted down to a low audio range of 210 Hz to 233 Hz and transmitted to the MK21 interface board, which converts the frequency into sound velocity.

There are three types of XSV probes. They vary in their maximum depths and the maximum vessel speeds at which they can be launched. The available XSV probes and their performance characteristics are listed in Table 1-2.

TABLE 1-2: ***XSV Probe Types and Capabilities***

TYPE	APPLICATION	MAXIMUM DEPTH	MAXIMUM VESSEL SPEED
XSV-01	ASW and Oceanography	2790 ft (850 m)	15 knots
XSV-02	Deep ocean scientific and military	6560 ft (2000 m)	15 knots
XSV-03	Enhanced depth resolution	2790 ft (850 m)	5 knots

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.4.3 XCTD Probe

The expendable conductivity/temperature (XCTD) probe, which is shown in Figure 1-5, measures water temperature and conductivity verses water depth. From the XCTD data, WinMK21 can calculate and display salinity, water density and sound velocity. The XCTD uses a conductivity cell to measure water conductivity and a high-stability, fast-response thermistor to measure water temperature. An internal, microprocessor-based circuit converts the sensor outputs into digital signals that are transmitted to the MK21 interface board over a two-conductor insulated wire. An internal battery provides the required power. Similar to the XBT, the XCTD uses two wire spools, one inside the probe and one inside the canister with the probe.



FIGURE 1-5: ***XCTD Probe***

Each XCTD probe is calibrated against temperature and conductivity standards in a set of saltwater baths. The calibration data for each probe are used to determine the unique calibration coefficients for the probe's conductivity cell and thermistor. The calibration coefficients, along with the probe's serial number, terminal depth and drop rate coefficients, are permanently stored in a memory circuit in the probe. The memory is automatically accessed by the MK21 interface board when the canister containing the XCTD probe is loaded into a launcher. The coefficients are used during the probe's descent to accurately calculate the acquired conductivity and temperature data. The drop rate coefficients are used to determine the water depth during the descent. WinMK21 also stores the serial number with the temperature and conductivity data.

There are two types of XCTD probes. They are listed in Table 1-3.

TABLE 1-3: ***XCTD Probe Types and Capabilities***

TYPE	APPLICATION	MAXIMUM DEPTH	MAXIMUM VESSEL SPEED
XCTD-1	Navy and oceanographic	3280 ft (1000 m)	10 knots
XCTD-2	Deep ocean scientific and military	6070 ft (1850 m)	3.5 knots

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.5 Test Canisters

The test canisters are self-contained, reusable probe simulators which are used to verify the operation of the MK-21/ISA Bathythermograph Data Acquisition System. They provide the operator with operational confirmation without expending actual probes. Specifically, the test canisters verify the proper operation of the launcher, the cabling, the MK21 interface board, and the WinMK21 Data Acquisition and Post-Processing Software. Three test canisters are available: an XBT Test Canister, an XCTD-1 Test Canister and an XCTD-2 Test Canister. The test canisters resemble the actual probe canisters. The XBT Test Canister, however, is bright red.

The XBT Test Canister contains a precision resistor with the same resistance value as a thermistor that is in 1.5°C (±0.1°C) water. The XCTD-1 and XCTD-2 Test Canisters contain battery powered electronics which simulate a probe drop in water of about 15°C and conductivity of about 40 mS/cm. For an XCTD-1 Test Canister, the electronics are activated by a toggle switch on one end of the canister. For an XCTD-2 Test Canister, the electronics are activated by a toggle switch and by pulling the release pin. An indicator illuminates when the electronics is active.

The three test canisters are listed in Table 1-4.

TABLE 1-4: ***Test Canister Types***

TEST CANISTER TYPE	APPLICATION	EXPECTED OUTPUT
XBT Test Canister	System verification and fault isolation	1.5°C (±0.1°C)
XCTD-1 Test Canister		Approximately 15°C and 40 mS/cm
XCTD-2 Test Canister		

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.6 Launchers

Three types of Sippican launchers are available for surface ship applications: an LM-2A Deck-Mounted Launcher, which is easily installed on the deck of any vessel; an LM-3A Hand-Held Launcher, which is portable and allows you to easily position it such that it does not interfere with other equipment; and an LM-4A Thru-Hull Launcher, which is the standard launcher for all military vessels and is installed below deck for safety and convenience when launching probes under heavy weather conditions.

1.6.1 LM-2A Deck-Mounted Launcher

The LM-2A Deck-Mounted Launcher is illustrated in Figure 1-6. It consists of a launch tube, a breech, a breech adapter, a stanchion, and a 100-foot electrical cable for connection to the MK21 interface board. The LM-2A is mounted so the launch tube protrudes beyond the edge of the ship's deck. To load a probe the launch operator opens the breech, inserts the canister containing the probe into the launcher, making sure the release pin is aligned with the slot in the launcher, and then closes the breech. The connection to the three contacts on the probe canister is made automatically by pins in the breech when the breech is closed. To launch the probe the operator pulls the pin out of the canister, allowing the probe to slide out of the launch tube and into the water. At the end of the probe drop, the operator breaks the trailing wire free. The spent canister should be retained in the launcher to protect the contacts until a new probe is loaded.

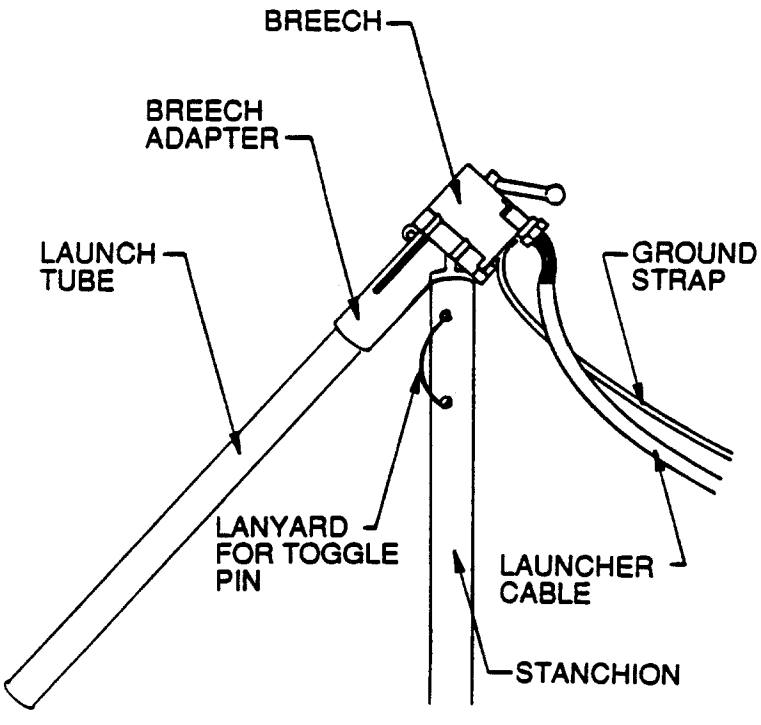


FIGURE 1-6: ***The LM-2A Deck-Mounted Launcher***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.6.2 LM-3A Hand-Held Launcher

The LM-3A Hand-Held Launcher is a lightweight, easy to use alternative to the LM-2A Deck-Mounted Launcher. The LM-3A is illustrated in Figure 1-7. It consists of a body, a yoke, a contact pin assembly, a contact lever, and a 50-foot electrical cable for connection to the MK21 interface board. A longer cable can be supplied upon request.

The LM-3A is intended for use on vessels where a permanent LM-2A Deck-Mounted Launcher installation is impractical. To load a probe, the launch operator first raises the contact lever to extend the yoke forward, then lays the canister containing the probe into the cradle such that the end cap of the canister fits into the yoke end of the launcher and the loop of the release pin is positioned in the release pin slot. Next, the operator swings the contact lever down, pulling the yoke and canister toward the rear of the launcher. The contact pins penetrate the insulation on the back of the canister, making a reliable electrical connection with the canister contacts. To launch the probe, the operator holds the launcher over the edge of the deck and pulls the release pin out of the canister, allowing the probe to slide out of the canister and into the water. The operator must hold the launcher and canister far enough over the edge of the deck to ensure the wire does not come in contact with any part of the ship for the duration of the probe's descent. At the end of the probe drop, the operator breaks the trailing wire free. The spent canister should be retained in the launcher to protect the contacts until a new probe is loaded.

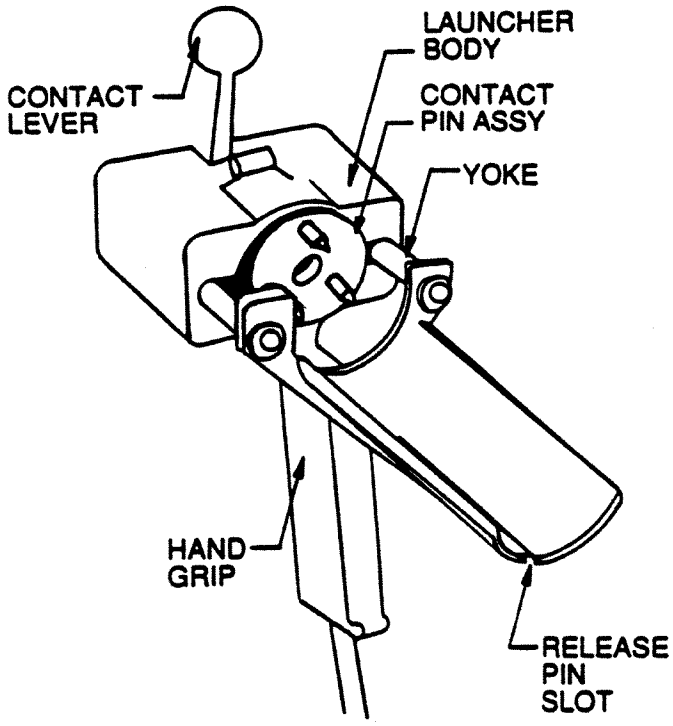


FIGURE 1-7: ***The LM-3A Hand-Held Launcher***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.6.3 LM-4A Hull-Mounted Launcher

The LM-4A Hull-Mounted Launcher is intended for permanent installation on ocean going vessels. The LM-4A is illustrated in Figure 1-8. It provides the launch operator complete isolation from the weather. If the LM-4A is installed near the computer, a single operator can handle all launcher and MK-21/ISA tasks. The LM-4A includes a 100-ft electrical cable for connection to the MK21 interface board.

The LM-4A consists of a breech and a breech adapter that are essentially the same as on the LM-2A Deck-Mounted Launcher. The launch tube, which penetrates the hull, is made of urethane and is mounted on a ship's adapter and a manually operated ball valve. The adapter, which is welded to the interior plating of the ship's hull, provides a rigid mount for the entire assembly. To load a probe the launch operator first opens the ball valve, then the breech, and inserts the canister containing the probe into the launcher, making sure the release pin is aligned with the slot in the launcher. The operator then closes the breech. The connection to the three contacts on the probe canister is made automatically by pins in the breech when the breech is closed. To launch the probe the operator pulls the pin out of the canister, allowing the probe to slide out of the launch tube and into the water. At the end of the probe drop, the operator opens the breech, removes the spent canister, breaks the trailing wire free, letting it fall through the launch tube, and then closes the breech and ball valve. It is essential to make sure the ball valve is clear of wire before it is closed. Closing the valve with wire present is likely to damage the valve. The breech and ball valve should remain closed at all times except during the launch and descent of a probe.

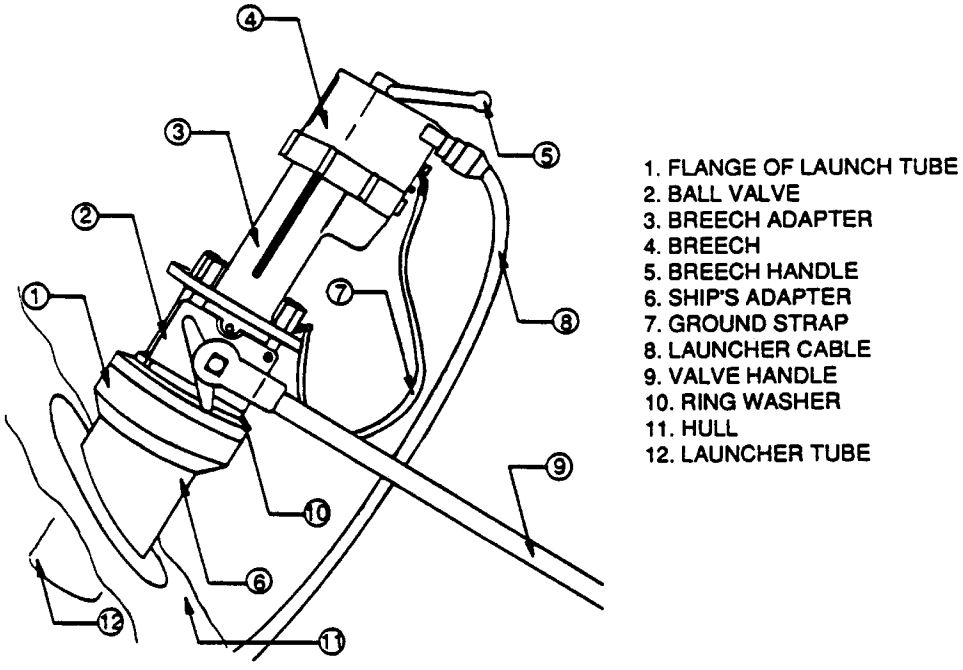


FIGURE 1-8: ***The LM-4A Hull-Mounted Launcher***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 2
INSTALLING THE MK21 INTERFACE BOARD AND WINMK21

This section provides detailed instructions on how to install a MK21 interface board in your computer, how to install WinMK21 and the MK-21 ISA driver, and how to start and exit from WinMK21. In addition, a procedure is provided for verifying proper operation of the MK21 interface board.

2.1 Unpacking and Installing the MK21 Interface Board

Unpack the MK21 interface board and inspect it for damage. Report any damage to Sippican. Do not install the MK21 interface board in your computer if it appears damaged.

CAUTION *The MK21 interface board is electrostatic discharge (ESD) sensitive. Follow ESD handling procedures when working with the MK21 interface board.*

To install the MK21 interface board:

1. Discharge any static electricity from your body by touching a grounded metal surface, such as an exposed metal surface of your computer.
2. Turn off the computer and disconnect the power cord
3. Open the computer case. Refer to your computer manual for instructions if required.
4. Locate an unused ISA expansion slot. Refer to your computer manual if you need help in locating one.
5. Remove the screw securing the expansion slot cover and remove the cover. Save the screw.
6. Insert the MK21 interface board into the slot and seat it firmly. Avoid touching the contact pins of the board.
7. Secure the MK21 interface board to the rear panel with the screw that was removed earlier.
8. Close the computer case.

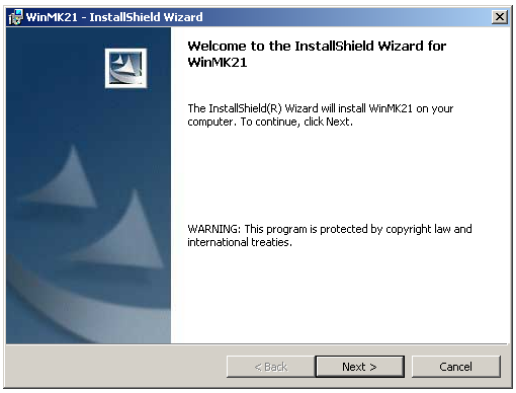
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2.2 Installing WinMK21

To install WinMK21:

1. Exit all programs and turn off any virus protection or screen saver software.
2. Insert the *WinMK21 for Windows* CD into your CD-ROM drive.

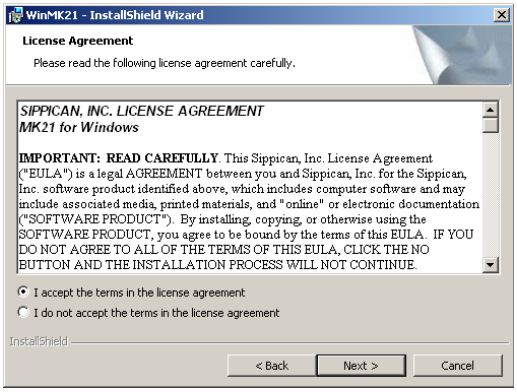
   The installation program should start automatically and the *Welcome* dialog box should open:



   If the installation program does not start automatically, select Start and then choose Run to open the *Run* dialog box. In the *Run* dialog box type d:setup, where "d" is the drive letter of your CD-ROM drive, and then click **OK**. The *Welcome* dialog box should open.

3. Click **Next** in the *Welcome* dialog box.

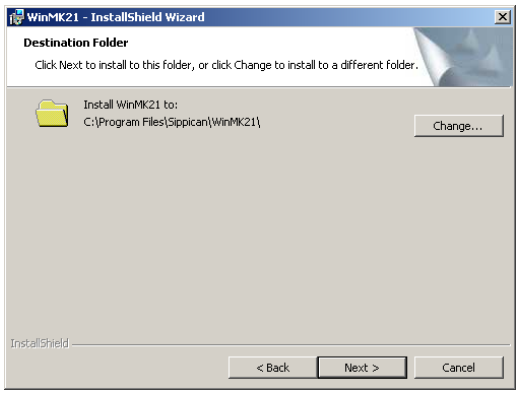
   The *License Agreement* dialog box opens:



4. Select the **I accept the terms in the license agreement** option, and then click **Next** if you accept this Sippican, Inc. Software License Agreement.

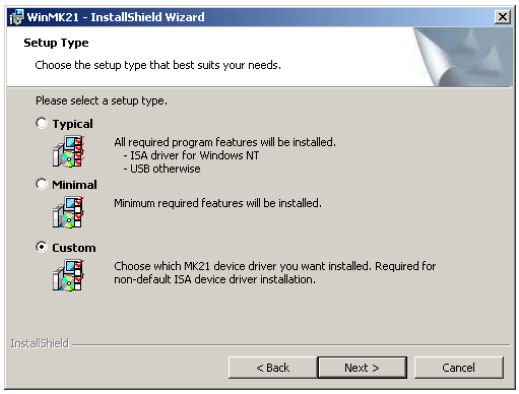
   The *Destination Folder* dialog box opens:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



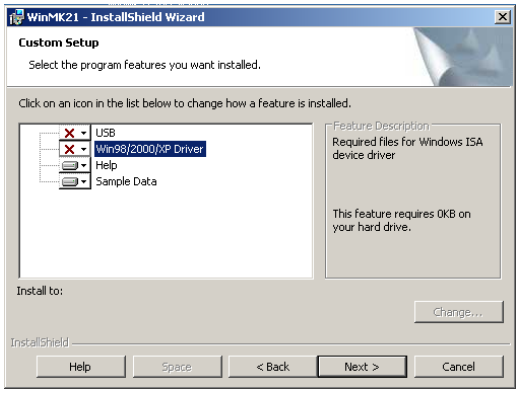
5. Click **Next** to accept the recommended directory to install WinMK21. Or instead, if you want to install the program in a different directory, click **Change**, choose the directory, and then click **Next**.

   The *Setup Type* dialog box opens:



6. Select the **Custom** option, and then click Next.

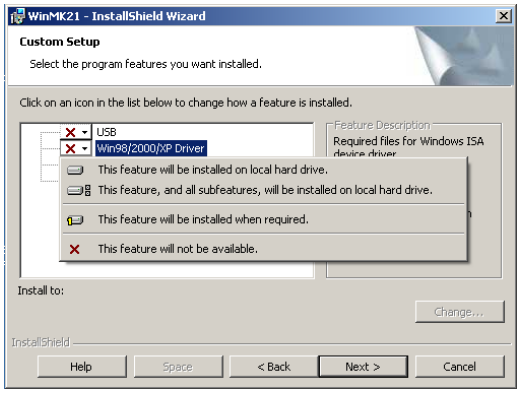
   The *Custom Setup* dialog box opens:



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

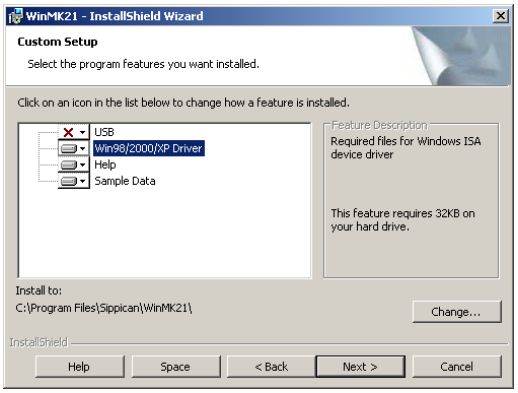
7. Select **Win98/2000/XP driver**, and then click the down arrow next to it.

A pop-up menu appears:



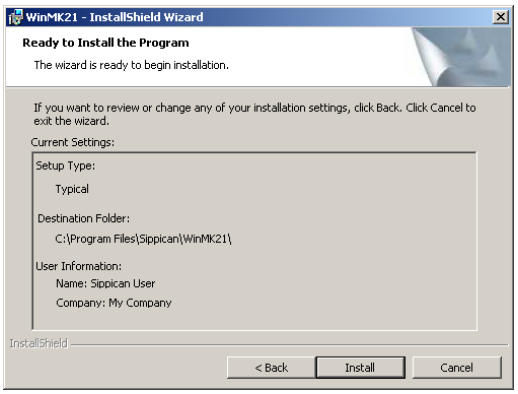
8. Click **This feature will be installed on local hard drive**.

The pop-up menu closes and the *Custom Setup* dialog box displays the hard drive icon for the **Win98/2000/XP driver**:



9. Click **Next**.

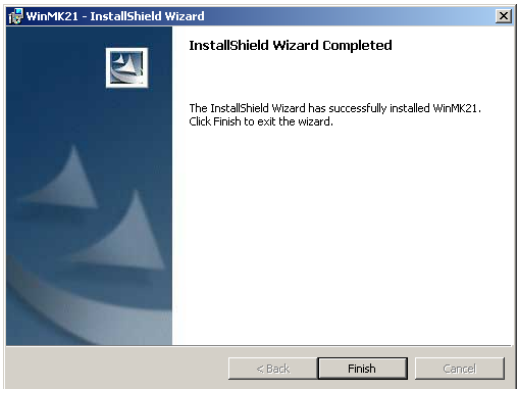
The *Ready to Install the Program* dialog box opens:



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

10. Click **Install** to install WinMK21.

    The WinMK21 program files are copied to the specified destination directory, and then the *InstallShield Wizard Completed* dialog box opens:



11. Click **Finish**.

    WinMK21 finishes installing.

2.3 Installing the MK-21 ISA Driver on Your Computer

For your computer to communicate properly with the MK21 interface board, you must install a MK-21 ISA driver. Drivers are provided for installation on a computer running Windows 98/Me/NT/2000/XP. These drivers are automatically copied to the computer's hard drive when WinMK21 is installed.

After installing the MK-21 ISA driver, you should verify proper operation of the MK21 interface board. Instructions are provided below for installing the MK-21 ISA driver and for verifying proper operation of the MK21 interface board.

2.3.1 Installing the MK-21 ISA Driver for Windows XP

To install the MK-21 ISA driver on a computer running Windows XP:

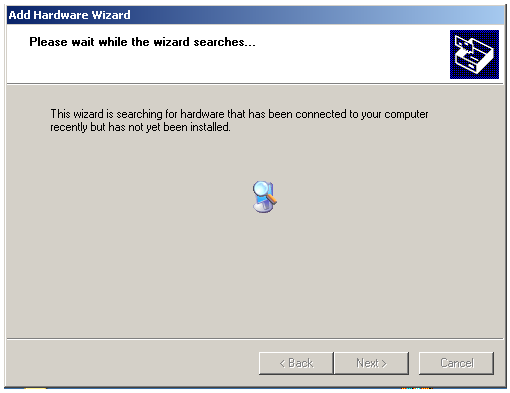
1. Remove the *WinMK21 for Windows* CD from your CD-ROM drive.
2. Start Windows XP.
3. Click *Start*, select *Control Panel*, and then choose *Printers and Other Hardware*.
4. Choose *Add Hardware* from the *See Also* menu.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

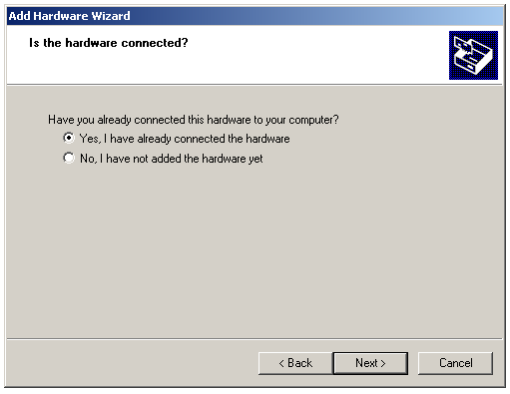


5. Click **Next**.

   Windows attempts to locate the hardware device.

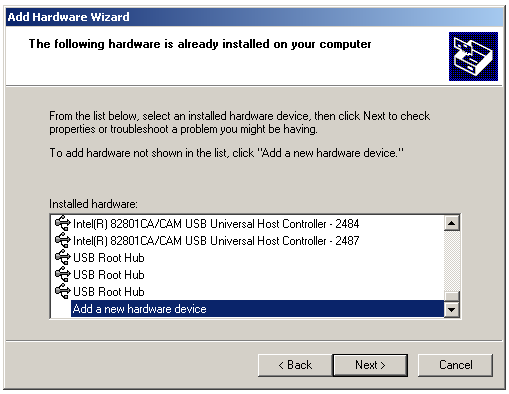


6. Click **Next** when the button is available.

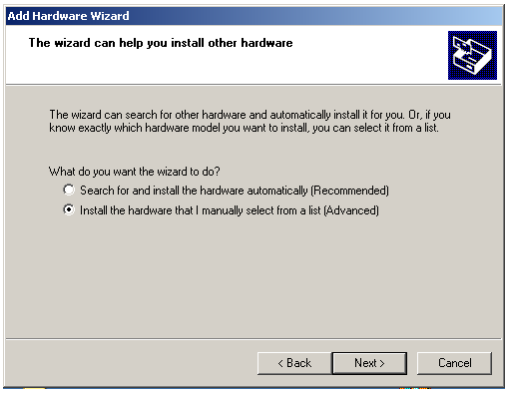


7. Select the **Yes, I have already connected the hardware** option, and then click **Next**.

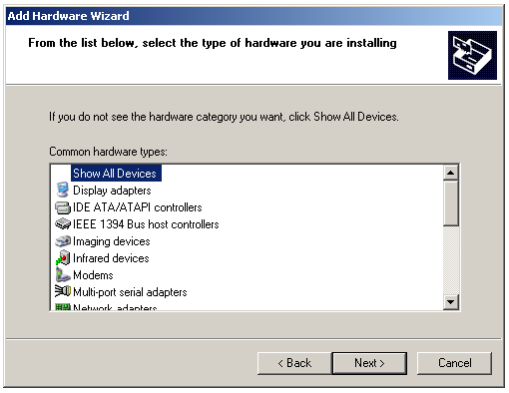
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



8. Select *Add a new hardware device*, and then click **Next**.

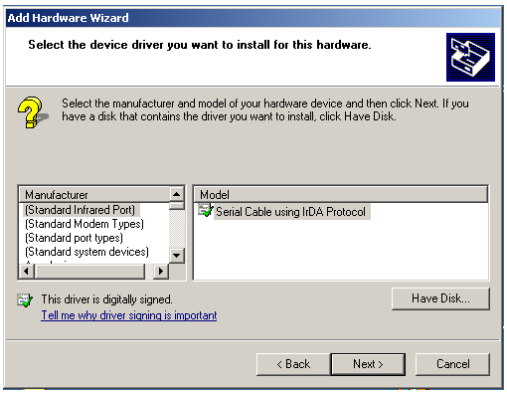


9. Select the **Install the hardware that I manually select from a list (Advanced)** option, and then click **Next**.

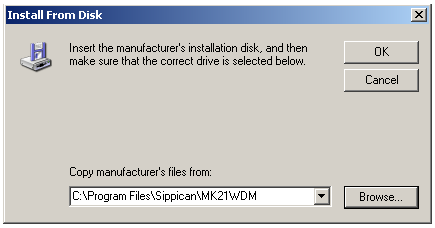


10. Select *Show All Devices*, and then click **Next**.

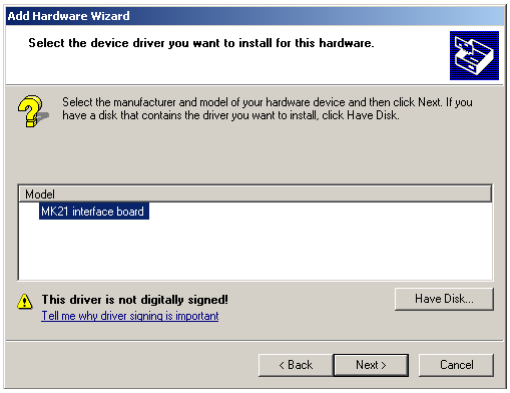
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



11. Click **Have Disk**.

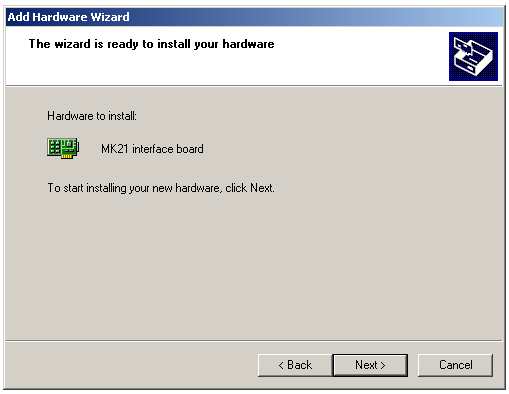


12. Verify that C:\Program Files\Sippican\MK21WDM is displayed in the **Copy manufacturer's files from** text box, and then click **OK**.

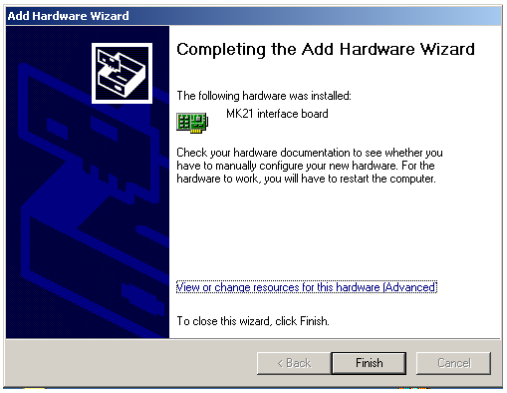


13. Select MK21 interface board, and then click **Next.**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



14. Click **Next**.



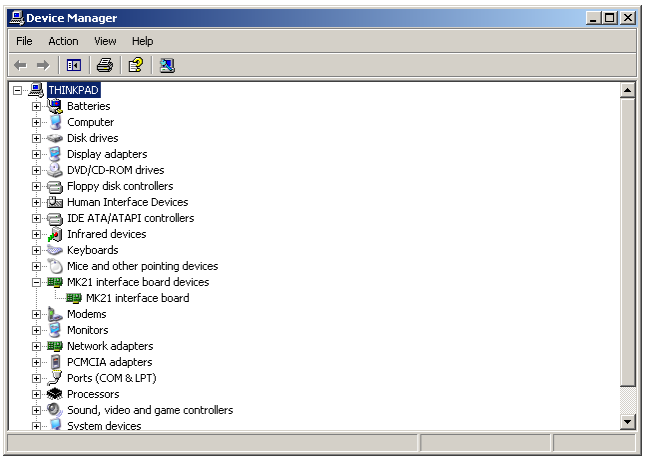
15. Click **Finish**. The MK-21 ISA driver for Windows XP finishes installing.

    If you are required to change the port address of the MK21 interface board, continue with the steps below. Normally you should not have to change the port address.

16. Click *Start*, select *Settings*, and then choose *Control Panel*.

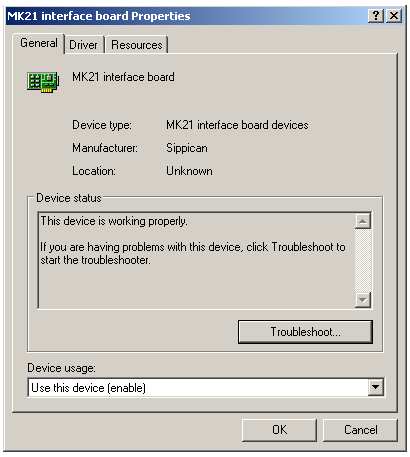
17. Choose *System*, and then click the **Hardware** tab in the *System Properties* dialog box.

18. Click **Device Manager.**

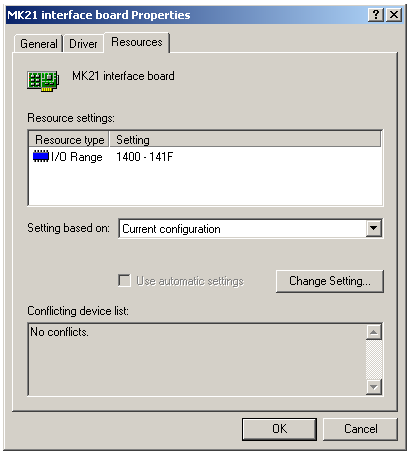


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

19. Double click *MK21 interface board devices*, right click *MK21 interface board*, and then choose *Properties* from the pop-up menu.

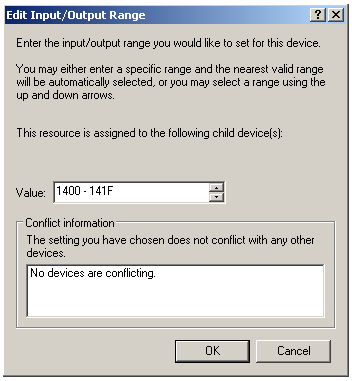


20. Click the **Resources** tab.



21. Select a new configuration, such as *Basic configuration 0000* in the **Settings based on** drop-down list box, and then select *I/O Range* in the **Resource settings** list.

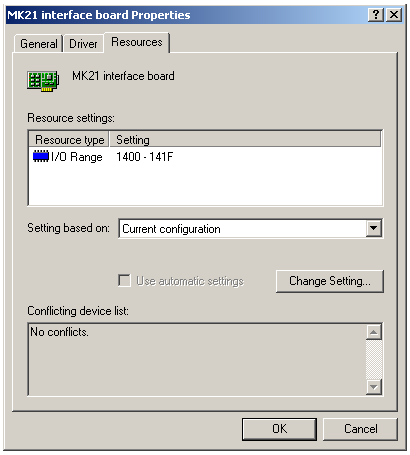
22. Click **Change Setting**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

23. Click the up or down arrow in the **Value** drop-down list box, select the required port address range, and then click **OK**.

    The selected I/O Range should now be displayed in the **Resource settings** list.

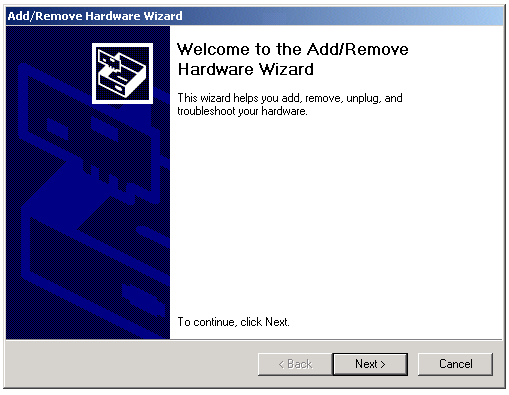


24. Click **OK**.

2.3.2 Installing the MK-21 ISA Driver for Windows 2000

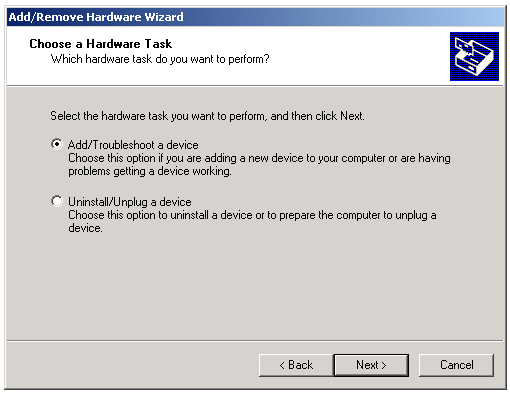
To install the MK-21 ISA driver on a computer running Windows 2000:

1. Remove the *WinMK21 for Windows* CD from your CD-ROM drive.
2. Start Windows 2000.
3. Click *Start*, select *Settings*, and then choose *Control Panel*.
4. Choose *Add/Remove Hardware Wizard*.



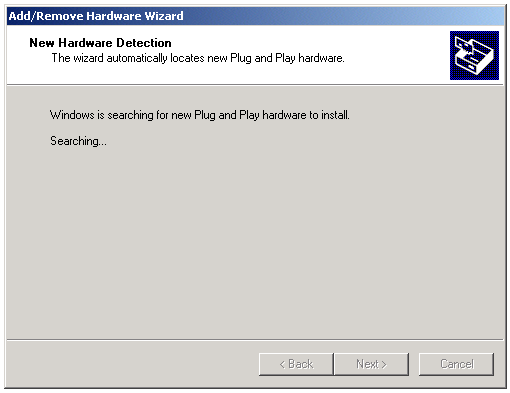
5. Click **Next**.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

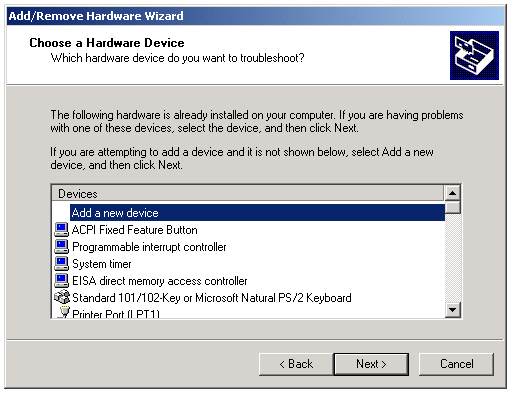


6. Select the **Add/Troubleshoot a device** option, and then click **Next**.

   Windows attempts to locate the hardware device.

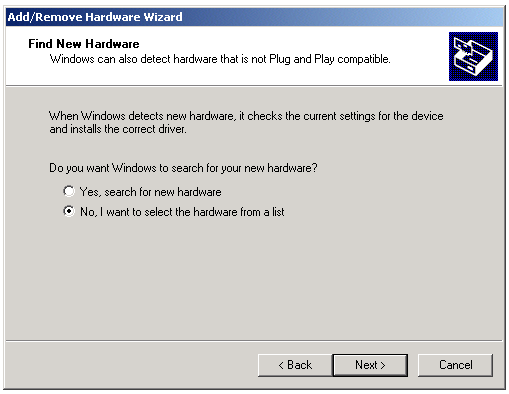


7. Click **Next** when the button is available.

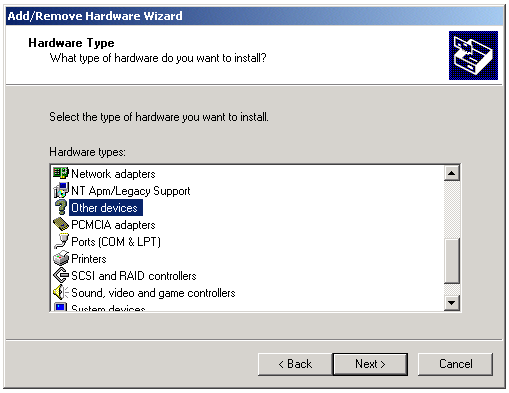


8. Select *Add a new device*, and then click **Next**.

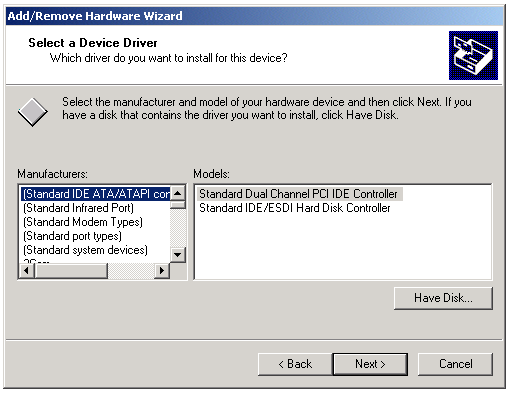
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



9. Select the **No, I want to select the hardware from a list** option, and then click **Next**.

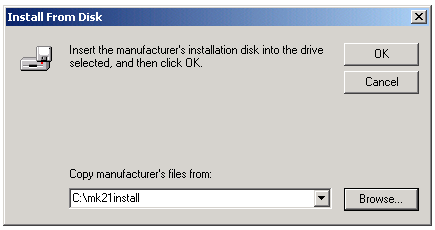


10. Select *Other devices*, and then **Next**.



11. Click **Have Disk**.

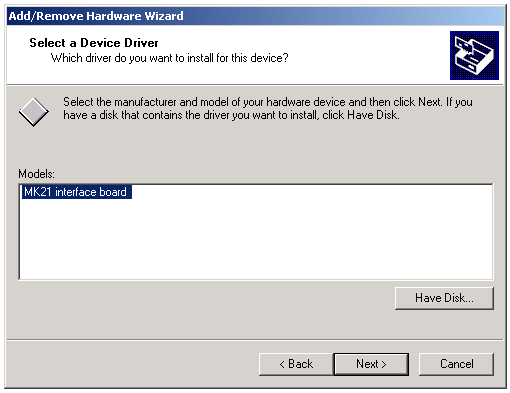
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



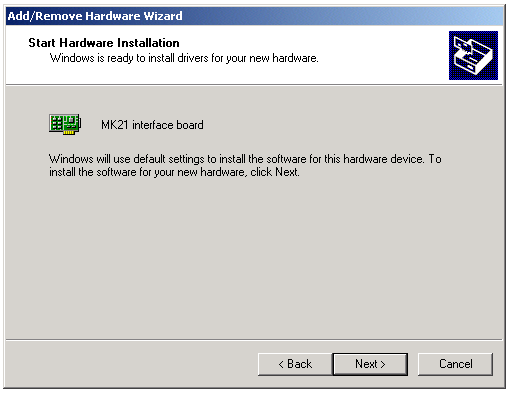
12. Click **Browse**, then select MK21WDM.INF from the C:\Program Files\Sippican\MK21WDM directory.

The **Copy manufacturer's files from** text box should now display C:\sippican\winmk21\mk21wdm.

13. **Click OK**.

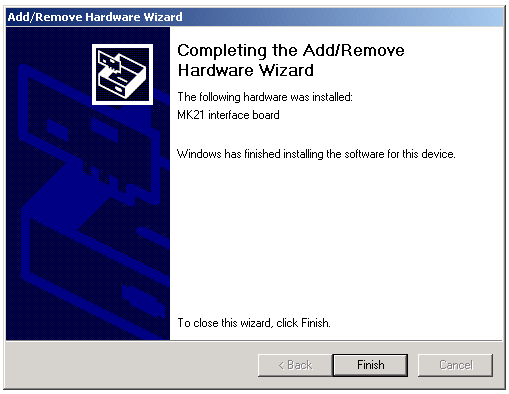


14. Select *MK21 interface board*, and then click **Next**.



15. Click **Next.**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

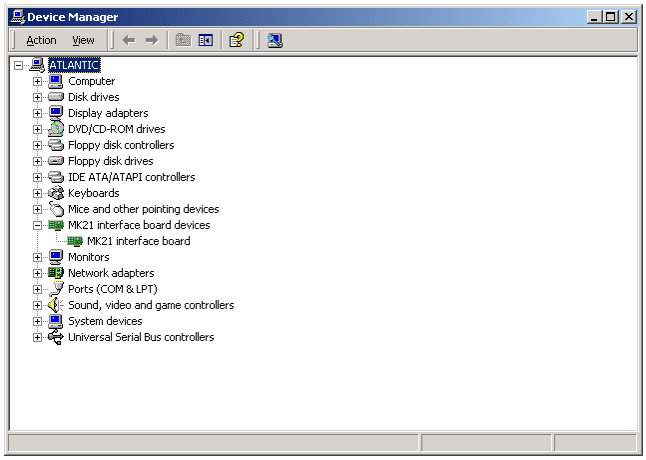


16. Click **Finish**. The MK-21 ISA driver for Windows 2000 finishes installing.

    If you are required to change the port address of the MK21 interface board, continue with the steps below. Normally you should not have to change the port address.

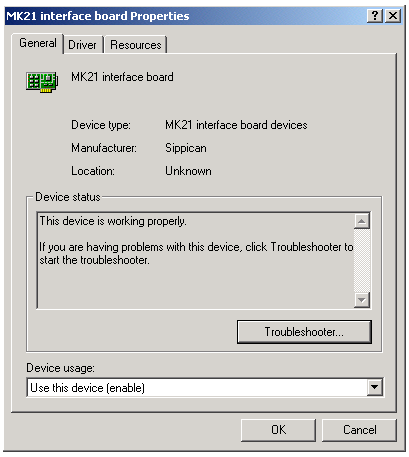
17. Click *Start*, select *Settings*, and then choose *Control Panel*.

18. Choose *System*, and then click the **Device Manager** tab in the *System Properties* dialog box.

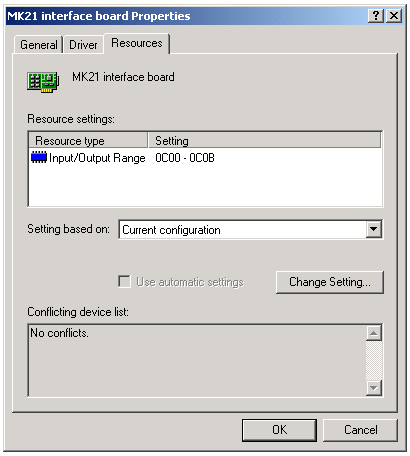


19. Double click *MK21 interface board devices*, right click *MK21 interface board*, and then choose *Properties* from the pop-up menu.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

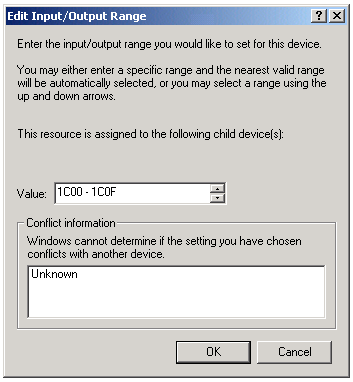


20. Click the **Resources** tab.



21. Select a new configuration, such as *Basic configuration 0000* in the **Settings based on** drop-down list box, and then select *Input/Output Range* in the **Resource settings** list.

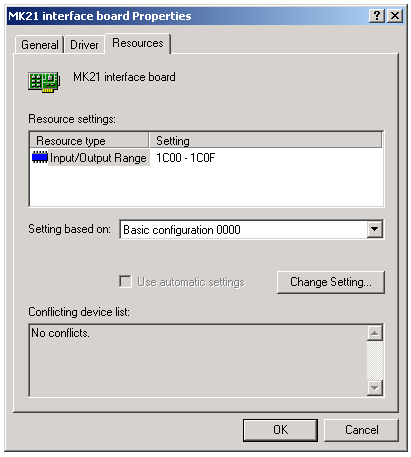
22. Click **Change Setting**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

23. Click the up or down arrow in the **Value** drop-down list box, select the required port address range, and then click **OK**.

    The selected Input/Output Range should now be displayed in the **Resource settings** list.



24. Click **OK**.

2.4 Starting WinMK21

To start WinMK21:

1. Click *Start*, select *Programs*, and then choose *Sippican - WinMK21*.
2. From the *Sippican - WinMK21* menu, choose *WinMK21*.

When you start WinMK21 for the first time, a *Message* dialog box opens. In the *Message* dialog box, click **Cancel** if you do not want to locate the default backup on the **A** drive. Otherwise click **OK**. If you click **Cancel**, a second *Message* dialog box opens indicating the default backup path has been changed. To accept the changed path, click **OK**. For more information about the backup option, see “System Parameters” on page 5-12.

WinMK21 will also ask you for a password when you start it for the first time. Either enter a password or click **Cancel**. If you enter a password, you will be asked to enter it if you attempt to access restricted features such as the System Parameters. If you click **Cancel**, you will not require a password. For more information about the password option, see “Password Protection” on page 5-48.

2.5 Exiting from WinMK21

To exit from WinMK21 choose *Exit* from the *File* menu.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2.6 Verifying Proper Operation of the MK21 Interface Board

After you have installed the MK-21 ISA driver on your computer, you should verify proper operation of the MK21 interface board.

To verify proper operation of the MK21 interface board:

1. Start WinMK21.
2. Verify that "MK21 Standby" is displayed in the Status bar at the bottom of the window.
3. Select *MK21 I/O Board* from the *Actions* menu, and then choose *Initiate*.

   The MK21 interface board is initialized. This process takes about seven seconds during which the messages "Detect MK21" and "Test MK21" are displayed. If proper operation is established, no additional messages are displayed.
4. Verify that "MK21 Ready" is displayed in the Status bar at the bottom of the window.
5. Exit from WinMK21.

If the MK21 interface board should fail to be detected, the port address of the board may be in conflict with another hardware device in the computer. Refer to “MK21 Interface Board Port Address” on page 5-54 for instructions on how to change the port address.

Contact Sippican technical support if the MK21 interface board repeatedly fails.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 3
INSTALLATION AND TEST

This section provides instructions on how to set up your computer and connect it to an isolated power source, and how to unpack, mount and ground an LM-2A, LM-3A or LM-4A launcher and connect it to the MK21 interface board in the computer. In addition, procedures are included for verifying operation of the system before launching a probe.

For instructions on how to install the MK21 interface board in your computer, install WinMK21, and install the MK-21 ISA driver for Windows 98/Me/NT/2000/XP, see SECTION 2, "Installing the MK21 Interface Board and WinMK21."

3.1 Setting up and Connecting the Computer

Setting up and connecting the computer encompasses the following:

- Finding a location
- Connecting an isolated power source
- Connecting the launcher cable

3.1.1 Finding a Location for the Computer

Set up the computer near a 100–240 VAC, 50–60 Hz power outlet. It should be located in an area that is protected from weather and spray, and where the temperatures are consistently between 0°C and 40°C (32°F to 104°F). Ensure the computer is secure and that there is room behind it for connecting the cables. In addition, ensure there is plenty of air circulation around and on top of the computer.

3.1.2 Connecting an Isolated Power Source to the Computer

If the 100–240 VAC, 50–60 Hz power source contains large amounts of line noise that might affect the performance of the MK-21/ISA, an isolation transformer should be connected between the power source and the computer. A Topaz Ultra Isolator, Model 91095-12 from EPE Technologies, Inc., Costa Mesa, California or an equivalent is recommended. In addition, an isolation plug should be used on the computer side of the isolation transformer as shown in Figure 3-1. The isolation plug ensures there is no third wire ground connection between the ship's ground and the computer, including peripherals such as a printer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

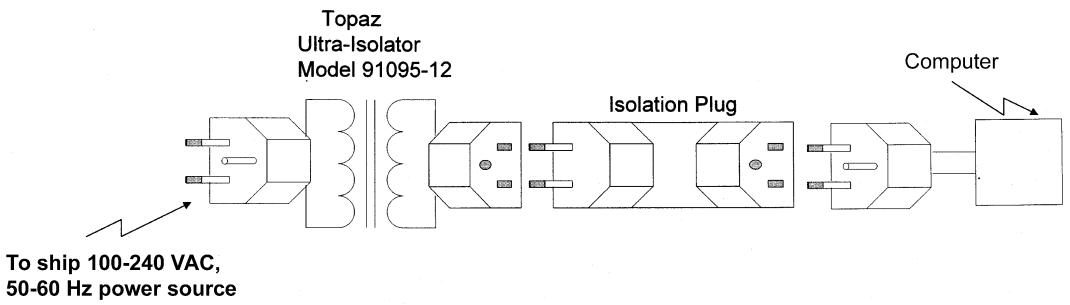


FIGURE 3-1: ***Connecting the Isolation Transformer to the Computer***

3.1.3 Connecting the Launcher Cable to the MK21 Interface Board

The LM-2A Deck-Mounted Launcher and the LM-4A Thru-Hull Launcher are supplied with 100 feet of 3/8-inch outer diameter, insulated, shielded, five-conductor cable; the LM-3A Hand-Held Launcher, 50 feet. Other lengths are available.

NOTE *The maximum launcher cable length is 600 feet, and splices should be in watertight junction boxes only.*

A connector box—available from Sippican and shown in Figure 3-2—or a similar watertight junction box must be installed between the MK21 interface board and the launcher. The connector box is prewired with an interface cable that connects to the MK21 interface board. For the connector box specifications and part numbers, see "MK21 Interface Board and Connector Box Specifications" on page 1-2. Connector boxes are available with a 3.0-meter or a 6.1-meter prewired interface cable. Mount the connector box or junction box near the computer by fastening it to a secure surface.

To connect the launcher to the MK21 interface board when using a connector box, connect the interface cable to the CONNECTOR BOX connector on the board, and after installing the launcher, wire the launcher cable to the connector box as described below. Refer to "MK21 Interface Board Connectors" on page 1-3 for the location of the CONNECTOR BOX connector.

To connect the launcher to the MK21 interface board when using a watertight junction box, wire the junction box to the board as described below, and after installing the launcher, wire the launcher cable to the junction box.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

A seawater ground connection should be made at the connector box only if an adequate ground is not possible at the launcher, or if an LM-3A Hand-Held Launcher will be used, which requires that the ground connection be made at the connector box. To make the ground connection, connect a 12 AWG wire to the ground post on the outside of the connector box and to a good seawater ground, such as the ship's plumbing. Connect the ground post to the signal ground terminal as shown in Figure 3-2. If a junction box is used instead of a connector box, it should be grounded in a similar manner.

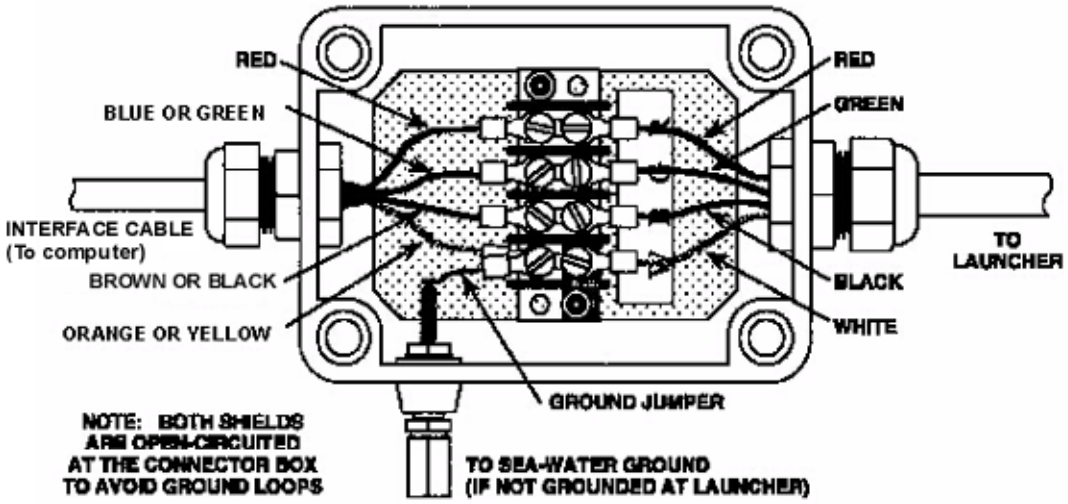


FIGURE 3-2: ***Connector Box (Sippican P/N 306146-1) with Prewired Interface Cable***

NOTE *If you make the seawater ground connection at the connector box, be sure you do not attach the ground strap of the LM-2A Deck-Mounted Launcher or the LM-4A Hull-Mounted Launcher to ground. Doing so will create an undesired ground loop.*

To wire a junction box to the MK21 interface board, connect the junction box to the CONNECTOR BOX connector on the back of the MK21 interface board using a mating DB-9P connector and a 24 AWG, 4-conductor, shielded cable. The CONNECTOR BOX connector is a DB-9S. Do not use a cable length longer than 30 feet. Wire the cable to the mating connector in accordance with Table 3-1. Do not connect the shield to the connector or to ground at any point, as doing so will create an undesired ground loop.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TABLE 3-1: ***Launcher Cable Connection Information***

DB-9P MATING CONNECTOR PIN NUMBER	LAUNCHER CABLE WIRE COLOR	FUNCTION
2	Red	A Lead
6	Green	B Lead
1	Black	C Lead
3	White	Signal Ground
—	Braid	Shield

To connect the launcher cable to the connector box:

1. Route the launcher cable from the launcher to the connector box.

   If a junction box is used instead of a connector box, it should be watertight and the parallel leakage resistances should exceed 50 megohms. It should also have a sealing nut and strain relief assembly similar to that shown in Figure 3-2.

2. Remove the connector box cover.
3. Loosen the sealing nut from the strain relief assembly.
4. If the launcher cable has spade lugs, remove them.
5. Flush-cut the end of the launcher cable.
6. Strip off about two inches of the jacket and cut off the shield as it is not to be connected.
7. Strip approximately 1/2 inch of insulation off each wire.
8. Insert the launcher cable through the sealing nut and strain relief assembly, allowing enough length to make electrical connections.
9. Connect the stripped wires to the terminals on the terminal block as shown in Figure 3-2. The use of lugs is preferred to that of bare conductors.
10. Tighten the sealing nut around the launcher cable and replace and secure the connector box cover.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.2 Unpacking and Installing the LM-2A Deck-Mounted Launcher

Unpack the LM-2A Deck-Mounted Launcher and inspect it for damage. Report any damage to Sippican. Do not install or operate the launcher if it appears damaged.

The LM-2A is intended for a semi-permanent installation by bolting it to an existing rail post on the ship, or for a permanent installation by welding it to the deck of the ship. As shown in Figure 3-3, the launcher should be mounted a minimum of six feet above the water line of the ship, on the stern or on the port or starboard quarter, and so that the launch tube protrudes beyond the edge of the deck. Avoid locations near garbage chutes or other areas where solids are discharged, and areas where equipment could interfere with the wire during launching.



NOTE *After installing the LM-2A Deck-Mounted Launcher, cover the launcher with the canvas cover provided in the accessory kit with the launcher when the launcher is not in use. Secure the cover with the bronze clip, also provided.*

Installation the LM-2A encompasses the following:

- Mounting
- Grounding
- Routing the launcher cable

3.2.1 Mounting the LM-2A

The LM-2A Deck-Mounted Launcher includes a launcher assembly, a stanchion, an accessory kit, and 100 feet of cable for connection to the MK21 interface board. The launcher assembly is composed of a breech, a breech adapter and a launch tube. (See Figure 1-6 on page 1-10.) The accessory kit includes two 3-inch U-bolts, a toggle pin with an attached lanyard, a 1/4-20 machine screw and flat washer, and a snap bolt. A canvas cover and a bronze clip to secure it is also provided to protect the launcher when not in use. The launcher assembly slips into the top of the stanchion and is retained by the toggle pin. The launcher assembly can also be rotated for stowage alongside the rail so that it will not be damaged when docking. Refer to Figure 3-4 on page 3-7 when mounting the launcher.

To Mount the LM-2A:

1. Position the launcher stanchion upright against a rail post of up to three inches in diameter such that when the launcher assembly is installed, the launch tube will extend beyond the edge of the deck.
2. Orient the launcher so that the axis of the two 9/16” diameter toggle pin holes near the top of the stanchion are 35° to 55° from the centerline of the ship toward the stern if the launcher is side mounted, or approximately 90° if stern mounted.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

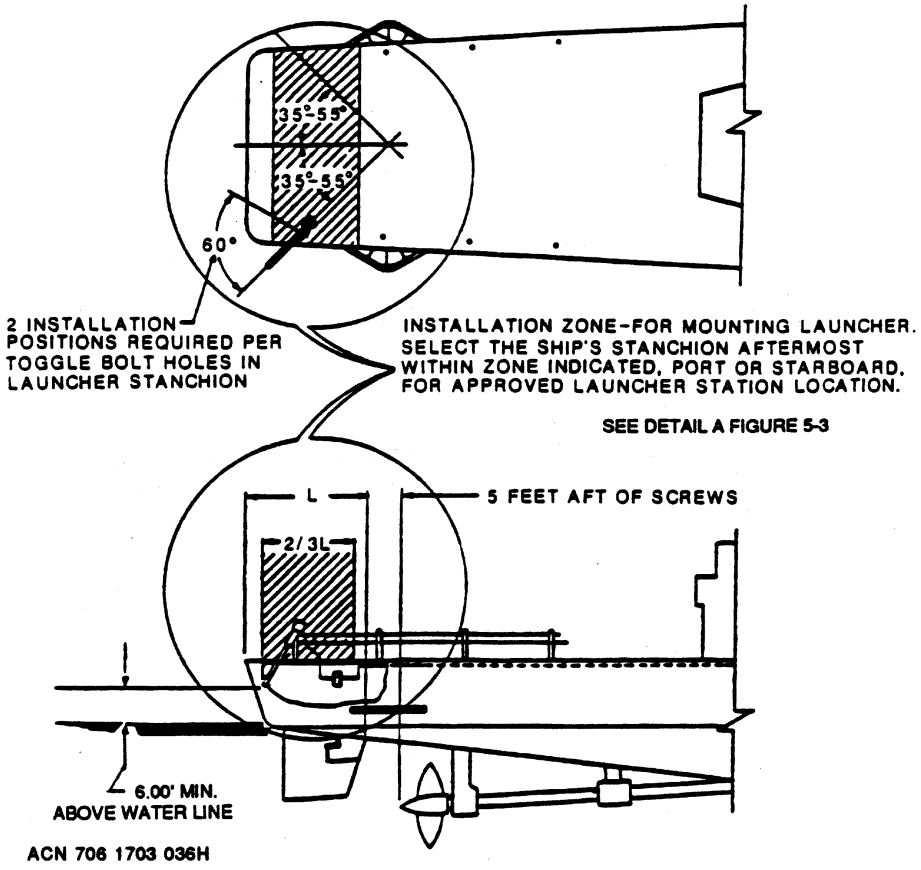


FIGURE 3-3: ***LM-2A Deck-Mounted Launcher Mounting Locations***

3. Using the U-bolts, secure the stanchion such that there will be sufficient room to insert the toggle pin, to fully open the breech and to insert canisters into the launcher.
4. Install the launcher assembly by inserting its X-shaped mounting boss into the stanchion.
5. Insert the toggle pin through the stanchion and mounting boss to prevent the launcher assembly from rotating.
6. Secure the free end of the toggle pin lanyard to the tapped hole in the stanchion with the 1/4-20 machine screw and flat washer.
7. Using the snap bolt, secure the launcher with a safety line attached from the hole on the top of the breech adaptor to the ship's structure.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

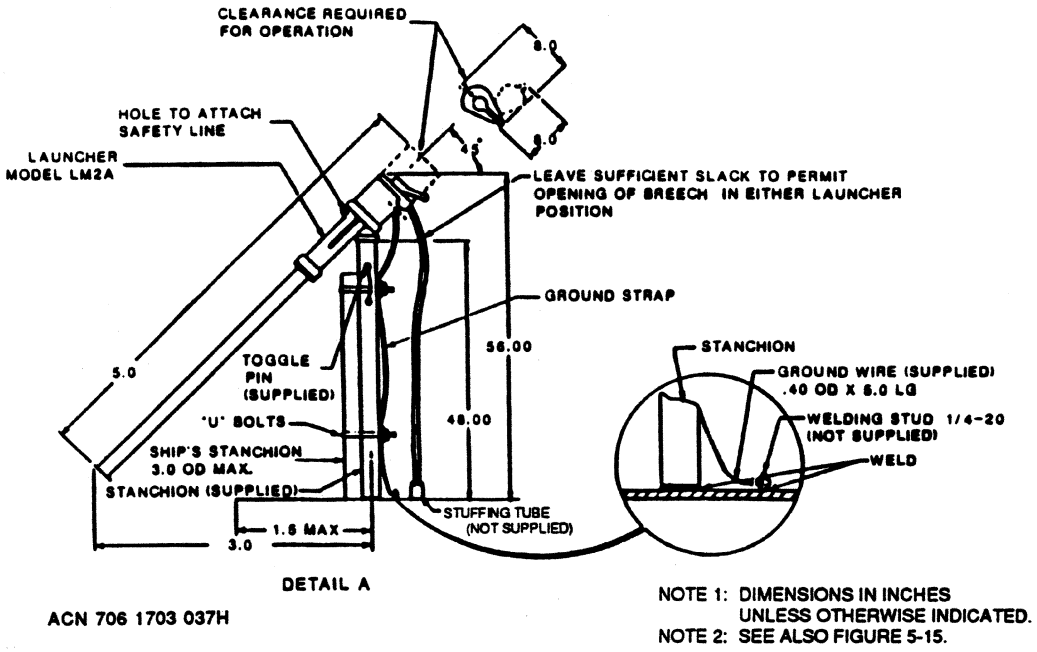


FIGURE 3-4: ***LM-2A Deck-Mounted Launcher Installation Guide***

3.2.2 Grounding the LM-2A

To ensure reliable data acquisition, the LM-2A launcher must be connected to a good seawater ground. To ground the launcher when the ship's deck is made of metal, weld a grounding lug to the deck and attach the ground strap to it as shown in Figure 3-4. For non-metal decks, use a 12 AWG or larger wire and connect it between the 1/4-20 machine screw on the breech to the ship's plumbing or to the rudder shaft.

NOTE *If an adequate seawater ground connection cannot be made at the LM-2A launcher, then make the ground connection at the connector box as described in "Connecting the Launcher Cable to the MK21 Interface Board" on page 3-2. If you make the ground connection at the connector box, be sure you do not attach the launcher ground strap to ground. Doing so will create an undesired ground loop.*

3.2.3 Routing the LM-2A Launcher Cable

Route the LM-2A launcher cable to the connector box and connect the cable to it as described in "Connecting the Launcher Cable to the MK21 Interface Board" on page 3-2. If the launcher cable will pass through bulkheads or beams, install proper sized bushings and packing to preserve watertight integrity. The cable must also be properly supported and strapped to prevent insulation damage. Allow sufficient slack at each end to permit installation or repair of connectors without installation of new cables.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.3 Unpacking and Installing the LM-3A Hand-Held Launcher

Unpack the LM-3A Deck-Mounted Launcher and inspect it for damage. Report any damage to Sippican. Do not install or operate the launcher if it appears damaged.

The LM-3A is a light weight, portable launcher that allows you to easily position it such that it does not interfere with other equipment. (See Figure 1-7 on page 1-11.) It should be used on the stern or on the port or starboard quarter, and it should be held far enough over the side of the ship to ensure the wire does not come in contact with the ship.

As the LM-3A is portable, the only installation requirements are to route and connect the launcher cable to the connector box as described in "Connecting the Launcher Cable to the MK21 Interface Board" on page 3-2.

NOTE *You must make the seawater ground connection for the LM-3A launcher at the connector box as described in "Connecting the Launcher Cable to the MK21 Interface Board" on page 3-2.*

If the launcher cable will pass through bulkheads or beams, install proper sized bushings and packing to preserve watertight integrity. The cable must also be properly supported and strapped to prevent insulation damage.

3.4 Unpacking and Installing the LM-4A Hull-Mounted Launcher

Unpack the LM-4A Hull-Mounted Launcher and inspect it for damage. Report any damage to Sippican. Disassemble the launcher by removing the 5/8" studs. Do not install or operate the launcher if it appears damaged.

The LM-4A is intended for a permanent installation, as it penetrates the ship's hull and requires that the launcher be welded to the opening in the hull. The launcher should be mounted such that the launch tube penetrates the hull a minimum of three feet above the water line of the ship on the port or starboard quarter, and in an area where it does not interfere with other equipment.

NOTE *Headphone or voice communications to the area where the computer is located is recommended to allow coordination between the operators of the computer and the launcher.*

Installation the LM-4A encompasses the following:

- Mounting
- Grounding
- Routing the launcher cable

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.4.1 Mounting the LM-4A

The LM-4A Thru-Hull Launcher includes a breech and a breech adapter that are similar to the LM-2A Deck-Mounted Launcher. (See Figure 1-8 on page 1-12.) The launch tube, which penetrates the hull, is made of urethane and is mounted to a manually operated ball valve and a ship's adapter. The adapter, which is welded to the interior plating of the ship, provides a rigid mount for the launcher. Refer to Figure 3-5 and Figure 3-6 when mounting the launcher.

NOTE *Installation of the LM-4A Thru-Hull Launcher requires penetrating the ship's hull. A shipfitter should refer to the detailed installation information available from Sippican when installing the LM-4A. The procedure below is provided as a guide.*

To Mount the LM-4A:

1. Mount the ship's adapter to the hull.
2. Install the 5/8" studs in the ship's adapter.
3. Insert the urethane launch tube into the ship's adapter.
4. Place the ring washer over the studs and seat the washer on the face of the launch tube.
5. Mount the ball valve on the 5/8" studs in such a way as to permit operation of the ball valve handle without interference from the ship's surrounding structures and framework.
6. Install the breech adapter assembly and secure it with 5/8" nuts, two per stud.

3.4.2 Grounding the LM-4A

To ensure reliable data acquisition, the LM-4A launcher must be connected to a good seawater ground. Attach the ground strap, which is attached to the 1/4-20 machine screw on the breech, to one of the 5/8" studs as shown in Figure 3-5.

NOTE *If an adequate seawater ground connection cannot be made at the LM-4A launcher, then make the ground connection at the connector box as described in "Connecting the Launcher Cable to the MK21 Interface Board" on page 3-2. If you make the ground connection at the connector box, be sure you do not attach the launcher ground strap to ground. Doing so will create an undesired ground loop.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

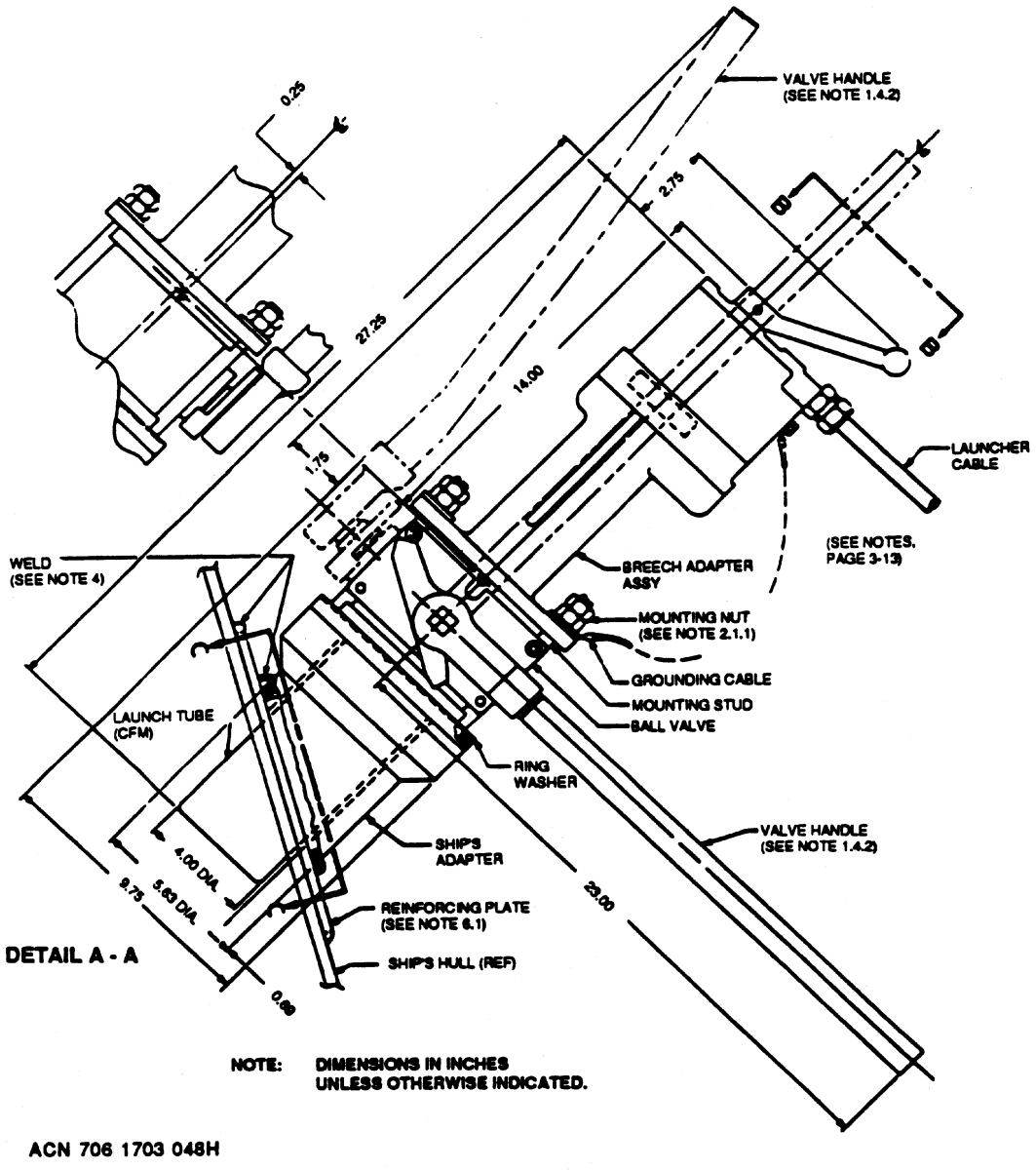


FIGURE 3-5: ***LM-4A Thru-Hull Launcher Installation Guide***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

NOTES (UNLESS OTHERWISE SPECIFIED)

1. LAUNCHER CRATE:
   - 1.1 SIZE — 36.37 X 19.25 X 13.5 IN. (9452 CU. IN.)
   - 1.2 MATERIAL — PLYWOOD
   - 1.3 WEIGHT — 105 LBS., 147 LBS. CRATED
   - 1.4 CONTENTS:
     - 1.4.1 ASSEMBLED LAUNCHER (MINUS BALL VALVE HANDLE) LM4A (ONE)
     - 1.4.2 BALL VALVE HANDLE (ONE)
2. LAUNCHER MUST BE DISASSEMBLED FOR WELDING OF SHIP'S ADAPTER TO REINFORCING PLATE.
   - 2.1 LAY LAUNCHER ON A FLAT SURFACE.
     - 2.1.1 REMOVE MOUNTING NUTS (EIGHT).
     - 2.1.2 REMOVE GROUNDING CABLE AND WASHERS (FOUR).
     - 2.1.3 LAUNCH TUBE, SHIP'S ADAPTER, RING WASHER, BALL VALVE, AND BREECH ADAPTER NOW COME APART.
   - 2.2 SHIP'S ADAPTER MAY BE WELDED TO REINFORCING PLATE.
   - 2.3 REASSEMBLE UNIT.
3. LAUNCHER MUZZLE REF LINE TO WATER LINE IS ALWAYS AT LEAST THREE FEET (SIX FEET OPTIMUM) ABOVE THE WATER.
4. PERFORM ALL WELDS IN ACCORDANCE WITH EQUIVALENT TO U.S. NAVSHIPS 900-000-1000 OR EQUIVALENT SPEC.
5. CABLE SPLICING PROHIBITED WHEN ROUTING LAUNCHER CABLE.
6. REINFORCING PLATE:
   - 6.1 MATERIAL — 15.3 LB. DBLR. PLATE
   - 6.2 SIZE — 16 IN. DIAMETER
7. LOCATE THREE LABEL PLATES IN A NOTICEABLE PLACE NEAR THE EQUIPMENT, TO READ AS FOLLOWS:
   - 7.1 IN RED LETTERING — WARNING — WHEN SYSTEM IS NOT IN USE, REMOVE CANISTER AND SHUT BALL VALVE.
   - 7.2 STANDARD DAMAGE CONTROL X.
   - 7.3 OPERATING INSTRUCTIONS:
     - (1) ESTABLISH PHONE COMMUNICATION WITH RECORDER SITE.
     - (2) WHEN DIRECTED, TURN BREECH HANDLE COMPLETELY CLOCKWISE TO OPEN LAUNCHER BREECH AND REMOVE DUMMY CANISTER.
     - (3) WHEN DIRECTED, TURN BALL VALVE HANDLE TO OPEN POSITION.
     - (4) REMOVE PLASTIC CAP FROM EXPENDABLE DEVICE CANISTER.
     - (5) INSERT EXPENDABLE DEVICE CANISTER INTO LAUNCHER BREECH.
     - (6) WHEN DIRECTED, TURN BREECH HANDLE COMPLETELY COUNTERCLOCKWISE TO SHUT LAUNCHER BREECH.
     - (7) WHEN DIRECTED, REMOVE CANISTER PIN TO RELEASE EXPENDABLE PROBE.
     - (8) WHEN DIRECTED, OPEN LAUNCHER BREECH AND REMOVE EXPENDED PROBE CANISTER AND REPLACE DUMMY CANISTER.
     - (9) SHUT LAUNCHER BREECH.
     - (10) TURN BALL VALVE HANDLE TO SHUT POSITION.
     - (11) REPORT LAUNCHER SECURED.
     - (12) BREECH SHOULD REMAIN IN SHUT POSITION, EXCEPT WHEN ATTENDED DURING EXPENDABLE DEVICE LAUNCH OR TEST OPERATIONS.
8. BALL VALVE AND HANDLE ARE SHOWN IN PREFERRED POSITION (SIDE OF LAUNCHER).

   IF SPACE LIMITATIONS PREVENT MOUNTING IN THIS POSITION, BALL VALVE MAY BE ROTATED UNTIL HANDLE PROVIDES 90 DEGREES OPERATING CLEARANCE.
9. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.

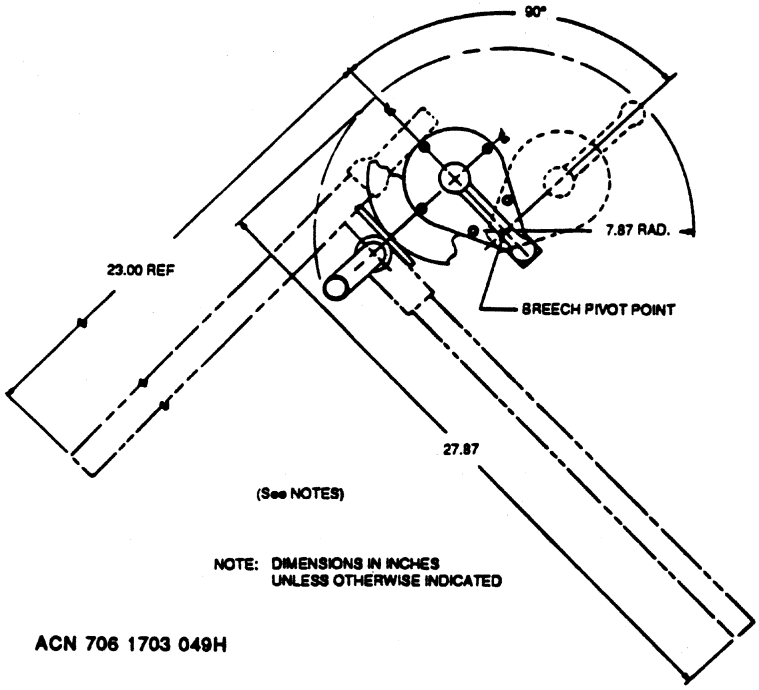


FIGURE 3-6: *LM-4A Thru-Hull Launcher Installation Notes*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.4.3 Routing the LM-4A Launcher Cable

Route the LM-2A launcher cable to the connector box and connect the cable to it as described in “Connecting the Launcher Cable to the MK21 Interface Board” on page 3-2. If the launcher cable will pass through bulkheads or beams, install proper sized bushings and packing to preserve watertight integrity. The cable must also be properly supported and strapped to prevent insulation damage. Allow sufficient slack at each end to permit installation or repair of connectors without installation of new cables.

3.5 Verifying System Operation

After installing the components of the MK-21/ISA Bathythermograph Data Acquisition System, you should verify the proper operation of the system by testing the system using an XBT or XCTD-1 Test Canister. You should perform this test before launching an actual probe. The test verifies the proper operation of the launcher, the cabling, the MK21 interface board, and the WinMK21 Data Acquisition and Post-Processing Software.

3.5.1 Verifying Operation using an XBT Test Canister

To verify operation using an XBT Test Canister:

1. Turn on the computer, start WinMK21 and wait until the WinMK21 Main window opens.
2. Choose *Probe* from the *Options* menu, and then choose *Selection*. The *Select Surface Probe Type* dialog box opens. Select an XBT probe type by clicking its option button, and then click **OK**.

   The probe type is selected and the *Select Surface Probe Type* dialog box closes.
3. Do one of the following to initiate a new probe drop:

   - Click the **New Drop** button.
   - Choose *New Drop* from the *File* menu.

   The *Realtime Data Acquisition* window opens with "Load Probe" displayed in the Acquisition State panel, and the probe type displayed in the Launch Information display.



NOTE *If "Spent Canister" is displayed in the Acquisition State panel instead of "Load Probe," a spent canister is in the launcher. Remove the canister and the display should change to "Load Probe."*

4. Insert the XBT Test Canister into the launcher.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. For an LM-3A Hand-Held Launcher, swing the contact lever down; for an LM-2A Deck-Mounted Launcher or an LM-4A Thru-Hull Launcher, close the breech.

   Immediately after the launcher pins make contact with the contacts in the canister, the display in the Acquisition State panel of the *Realtime Data Acquisition* window changes to "Testing Probe" for a few seconds, then to "Prepare for Launch" for another few seconds, and then to "Launch Probe."

6. For an LM-3A Hand-Held Launcher only, connect the release pin of the XBT Test Canister to the ship's hull or other metal ground using a clip lead.

   "Collecting MK21 Data" is displayed in the Acquisition State panel of the *Realtime Data Acquisition* window and data acquisition begins as if a real probe has been launched. Data acquisition continues until the probe's terminal depth is reached or the test is terminated. A temperature data profile appears in the Graphics display, and the data are also displayed numerically in the Launch Information display.

7. Verify that the displayed temperature value is 1.5°C (±0.1°C).

8. To terminate the test before the end of the simulated probe drop, choose *Terminate* from the *Actions* menu. "Spent Canister" is briefly displayed in the Acquisition State panel, and then WinMK21 automatically switches to Post Processing mode.

3.5.2 Verifying Operation using an XCTD-1 Test Canister

To verify operation using an XCTD-1 Test Canister:

1. Turn on the computer, start WinMK21 and wait until the WinMK21 Main window opens.

2. Choose *Probe* from the *Options* menu, and then choose *Selection*. The *Select Surface Probe Type* dialog box opens. Select the XCTD-1 probe type by clicking its option button, and then click **OK**.

   The probe type is selected and the *Select Surface Probe Type* dialog box closes.

3. Do one of the following to initiate a new probe drop:

   - Click the **New Drop** button.
   - Choose *New Drop* from the *File* menu.

   The *Realtime Data Acquisition* window opens with "Load Probe" displayed in the Acquisition State panel, and the probe type displayed in the Launch Information display.



NOTE *If "Spent Canister" is displayed in the Acquisition State panel instead of "Load Probe," a spent canister is in the launcher. Remove the canister and the display should change to "Load Probe."*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Activate the XCTD-1 Test Canister electronics by switching on the toggle switch on the end of the canister. An indicator should illuminate.
5. Insert the XCTD-1 Test Canister into the launcher.
6. For an LM-3A Hand-Held Launcher, swing the contact lever down; for an LM-2A Deck-Mounted Launcher or an LM-4A Thru-Hull Launcher, close the breech.



WARNING *While WinMK21 is testing the probe, 60 VDC is present on the contact pins of the launcher. Do not remove the test canister while WinMK21 is testing the probe.*

Immediately after the launcher pins make contact with the contacts in the canister, the display in the Acquisition State panel of the *Realtime Data Acquisition* window changes to "Testing Probe" for a few seconds, then to "Prepare for Launch" for another few seconds, and then to "Launch Probe."

7. Verify that the serial number of the XCTD-1 Test Canister is displayed in the Launch Information display. The serial number is printed on the side of the test canister.

   "Collecting MK21 Data" is displayed in the Acquisition State panel of the *Realtime Data Acquisition* window and data acquisition begins as if a real probe has been launched. Data acquisition continues until the probe's terminal depth is reached or the test is terminated. Temperature and Conductivity data profiles appear in the Graphics display, and the data are also displayed numerically in the Launch Information display.
8. Verify that the displayed temperature and conductivity values are correct to within the stated tolerances. These values are printed on the side of the test canister.
9. To terminate the test before the end of the simulated probe drop, choose *Terminate* from the *Actions* menu. "Spent Canister" is briefly displayed in the Acquisition State panel, and then WinMK21 automatically switches to Post Processing mode.

3.6 Preparing to Reship the Launcher and Probes

If reshipping the launcher or the probes is required, refer to the general procedures provided below to prepare the items for reshipment.

3.6.1 Preparing to Reship a Launcher

To reship a launcher, first disassemble it, if necessary. Then repackage it securely in a protective wooden shipping crate. Make sure all of the launcher parts are secured in the crate so they will not break free during shipment.

After removing a LM-4A Thru-Hull Launcher from the ship’s adapter, fit and secure a plate to the opening in the adapter to ensure the watertight integrity of the hull.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.6.2 Preparing to Reship Probes

Probes are usually shipped from Sippican in cases of 12. And each probe is individually packaged in a protective plastic bag or similar container. When preparing to reship probes, they should be packaged in their original containers.

3.7 Storing the Launchers and Probes

The launchers and the probes should be stored in accordance with the instructions provided below.

3.7.1 Storing the LM-2A Deck-Mounted Launcher

When the LM-2A Deck-Mounted Launcher is not in use, shut and secure the launcher breech and leave an expended probe canister in the breech to help prevent erosion and salt water contamination. Secure the launcher to the deck, and cover it with the protective canvas provided with the launcher. Secure the canvas cover to the deck with chain or heavy weather-resistant line.

3.7.2 Storing the LM-3A Hand-Held Launcher

When the LM-3A Hand-Held Launcher is not in use, store the launcher indoors in a cool, dry place. Do not leave the launcher on deck when it is not in use, and do not leave it exposed to the sun for extended periods. In addition, to prevent oxidation of the launcher contact pins, leave an expended probe canister in the launcher with the contact lever down.

3.7.3 Storing the LM-4A Thru-Hull Launcher

When the LM-4A Thru-Hull Launcher is not in use, shut and secure the breech and ball valve on the launcher. Remove the spent probe canister and any wire remaining in the launch tube. Flood the outer launch tube as directed by individual ship operating procedures.

3.7.4 Storing Probes

When storing probes on board ship or in a maintenance depot, you should leave them in their original containers. Store them in a cool, dry place away from wind, spray, and salt water contaminants. Store them at temperatures from 0°C to 50°C (32°F to 122°F); at or below 25°C (77°F) is ideal. The ideal storage temperature for XCTD probes is at or below 30°C (86°F).

On each of the probe shipping containers is a "Use Before..." date label. The date is engraved on the shipping label at the time of manufacture. For an XCTD probe there is also a recommended "Use Within..." date (e.g., "use within x number of days from date of manufacture"). Sippican cannot guarantee the performance of an XBT, XSV or XCTD probe used after the "Use Before..." or "Use Within..." date.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

This page is intentionally left blank.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 4
OPERATION

With the computer running the WinMK21 Data Acquisition and Post-Processing Software, and with the Main window of WinMK21 open, an XBT, XSV or XCTD probe can be loaded into a launcher and launched. This section provides step by step instructions on how to turn on the computer, launch a probe and use WinMK21 to view, acquire, store and post process data from the probe. This entire launch and data acquisition sequence is illustrated in the flow diagram in Figure 4-1. For detailed information and instructions on how to use all of the functions provided by WinMK21, see SECTION 5, "WinMK21 Menus and Commands." Instructions are also provided on how to exit from WinMK21 and turn off the computer.

4.1 Turning On the Computer and Starting WinMK21

Before you can launch a probe, the computer must be turned on with WinMK21 started and the Main window open. You must have also installed the MK-21 ISA driver on your computer. (See "Installing the MK-21 ISA Driver on Your Computer" on page 2-5.)

To turn on the computer and start WinMK21:

1. Turn on the computer.

   Windows 98/Me/NT/2000/XP starts.

2. Double-click the WinMK21 icon ( ) on the Windows desktop to start WinMK21.

   After WinMK21 is started, the Main window opens as shown in Figure 4.2.

With the Main window open, WinMK21 is ready to be placed into one of its two operating modes, Data Acquisition or Post Processing. To launch a probe and to acquire and view data from it, WinMK21 must be in Data Acquisition mode.

NOTE *A number of startup options are available including an option which automatically places WinMK21 in the Data Acquisition mode at startup. For more information about this option and others, see SECTION 5, "WinMK21 Menus and Commands."*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

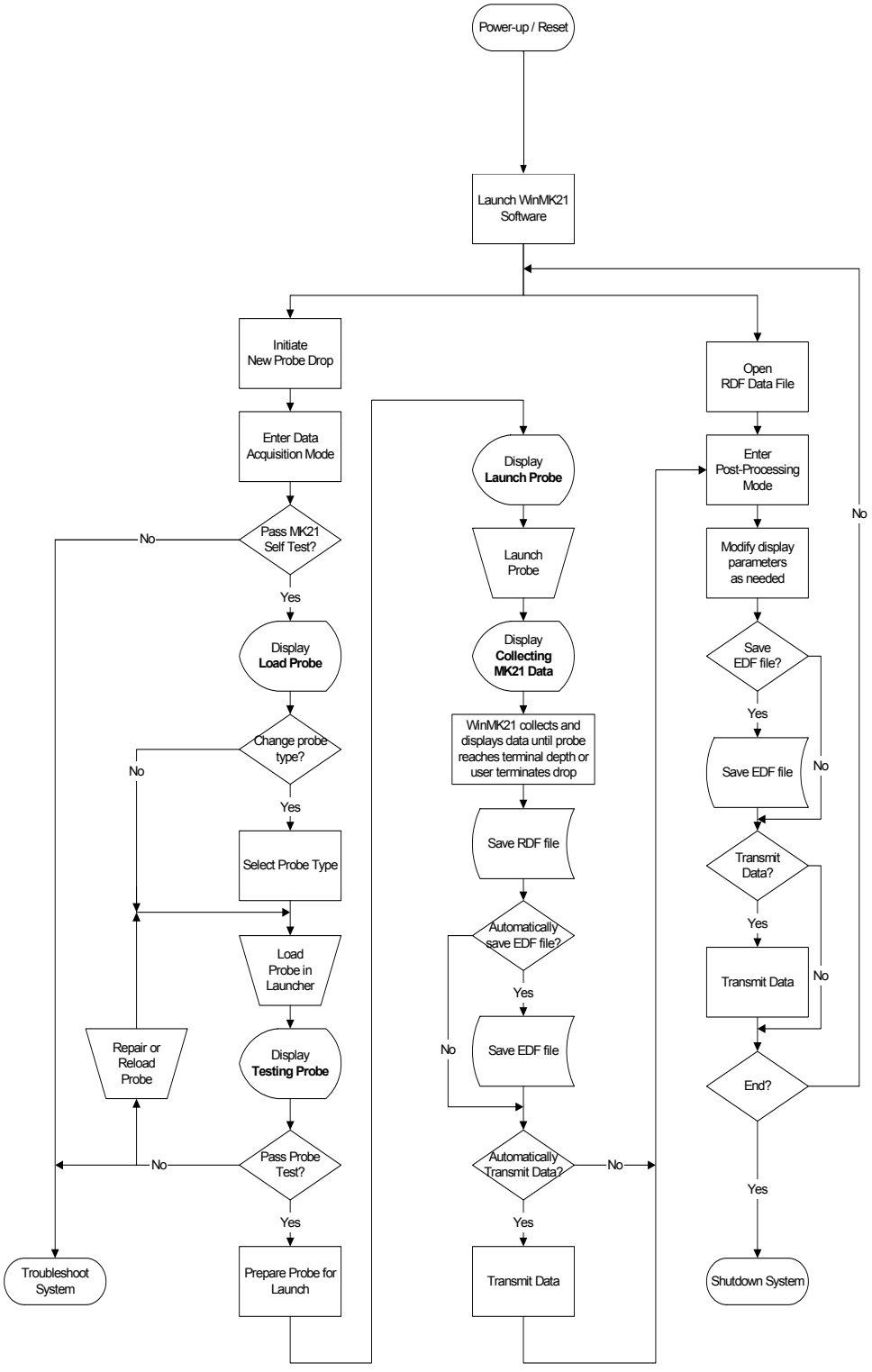


FIGURE 4-1: ***Probe Launch and Data Acquisition Sequence Flow Diagram***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

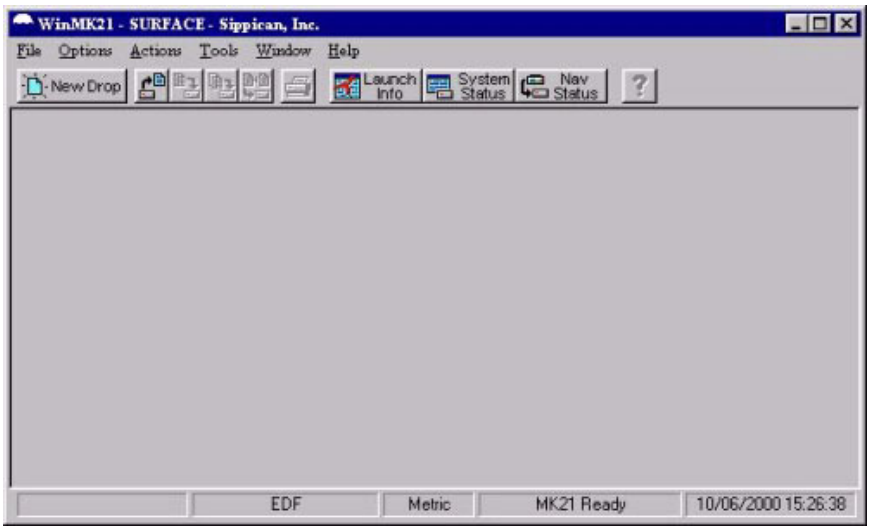


FIGURE 4-2: ***The WinMK21 Main Window***

4.2 Exiting from WinMK21 and Turning Off the Computer

To exit from WinMK21, shut down Windows, and turn off the computer:

1. Do one of the following:
   - Choose *Exit* from the *File* menu.
   - Press **Alt+F4.**
   - Click the Windows close button in the Title bar.
2. Refer to the instructions provided with Windows 98/Me/NT/2000/XP and shut down Windows.
3. Turn off the computer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.3 Launching a Probe

Before you can launch a probe, the WinMK21 Main window must be open as shown in Figure 4-2 on page 4-3. In addition, WinMK21 must be in Data Acquisition mode. This mode is entered by initiating a new probe drop. You may also have to enter the probe type and edit the launch information if these items have changed since the last probe drop. The launch sequence is a 11-step procedure as follows:

STEP 1. Initiate a new probe drop.

STEP 2. Select or verify the probe type.

STEP 3. Verify the data file name.

STEP 4. Update or verify the setup parameters.

STEP 5. Load the probe.

STEP 6. Launch the probe.

STEP 7. Wait for terminal depth or stop data acquisition.

STEP 8. Transmit the data.

STEP 9. Perform post processing of data.

STEP 10. Edit the launch information.

STEP 11. Load another probe or exit from WinMK21.

4.3.1 STEP 1—Initiate a New Probe Drop

To initiate a new probe drop, do one of the following:

- Click the **New Drop** button.
- Choose *New Drop* from the *File* menu.

WinMK21 enters Data Acquisition mode and the *Realtime Data Acquisition* window shown in Figure 4-3 opens with "Load Probe" displayed in the Acquisition State panel. The Title bar displays "Realtime Data Acquisition," and the Graphics display appears.



NOTE *If "Spent Canister" is displayed in the Acquisition State panel instead of "Load Probe," a spent canister is in the launcher. Remove the canister and the display should change to "Load Probe."*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

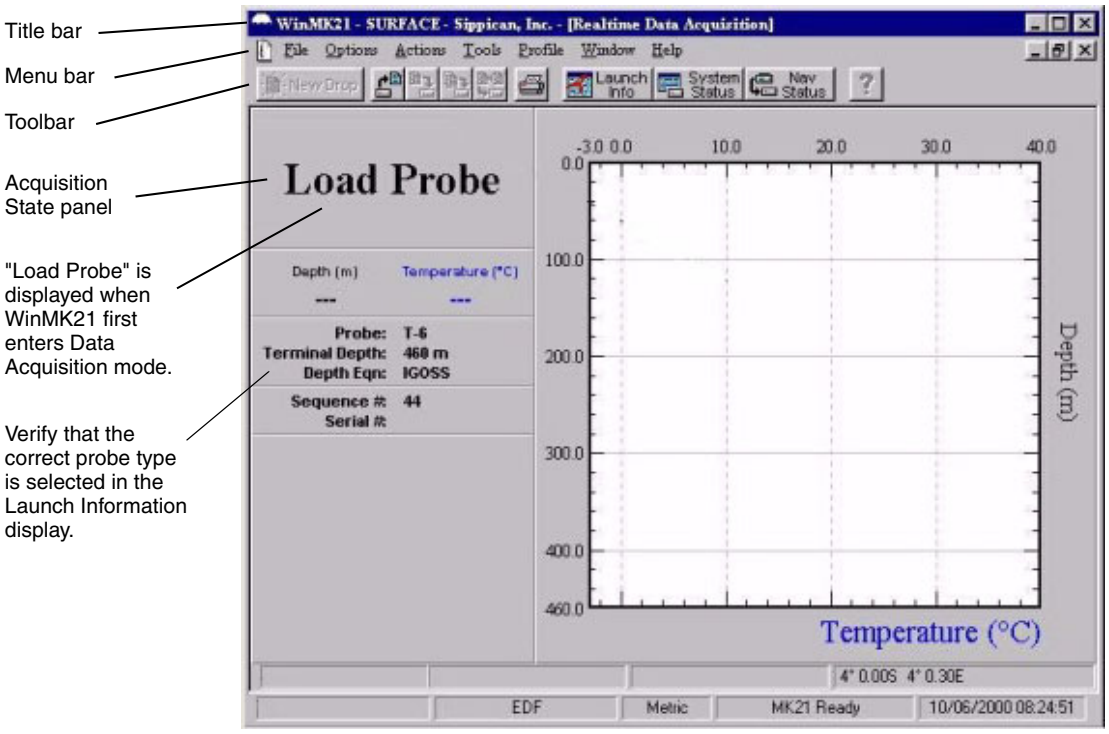


FIGURE 4-3: ***Realtime Data Acquisition Window—Load Probe***

4.3.2 STEP 2—Select or Verify the Probe Type

If the probe you are launching is different from the previous one launched, you must select the new probe type. Even if you have not changed the probe type, verify that the correct probe type, its terminal depth and its depth equation are displayed in Launch Information display.

To select the probe type, choose *Probe* from the *Options* menu, and then choose *Selection*. The *Select Surface Probe Type* dialog box shown in Figure 4-4 opens. Select the probe type by clicking its option button, and then click **OK**. The probe type is selected and the *Select Surface Probe Type* dialog box closes.

NOTE *To edit the terminal depth and drop rate coefficients for the selected probe type, click the* ***More*** *button in the Select Surface Probe Type dialog box. The Probe Attributes dialog box opens where you can make these changes. For more information, see SECTION 5, "WinMK21 Menus and Commands."*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

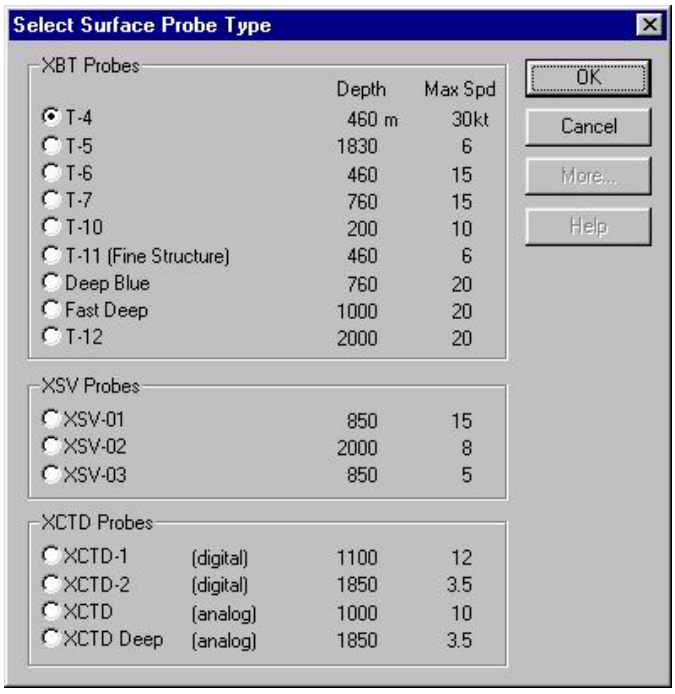
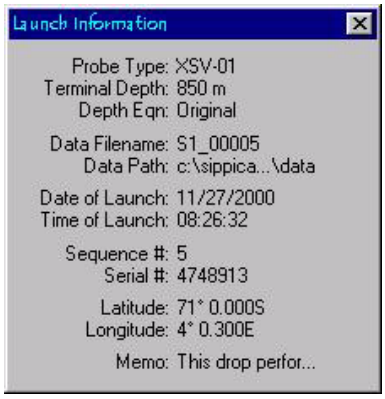


FIGURE 4-4: ***The Select Surface Probe Type Dialog Box***

4.3.3 STEP 3—Verify the Data File Name

You should verify the correct file name for the data and the folder in which the file will be stored. WinMK21 automatically names the file. The name comprises a prefix identifying the probe type, a sequence number, and the extension *.rdf*, which is for "raw data file." For example, a data file named T4_00012.RDF is a file name for a T-4 XBT probe, and the sequence number is 00012. The prefixes for each of the probe types are listed in Table 4-1.

To verify the data file name, click the **Launch Info** button. The *Launch Information* window opens:



The name of the data file and the folder in which it is stored, along with other information, are displayed. If desired, the window can remain open during the launch.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TABLE 4-1: ***Data File Name Prefixes***

TYPE	PREFIX
T-4	T4_
T-5	T5_
T-6	T6_
T-7	T7_
T-10	T0_
T-11	T1_
T-12	T2_
Fast Deep	TF_
Deep Blue	TD_
XSV-01	S1_
XSV-02	S2_
XSV-03	S3_
XCTD-1	C3_
XCTD-2	C4_

4.3.4 STEP 4—Update or Verify the Launch Information

Along with the data, the following launch information is stored in the .RDF file for each probe drop:

- Probe type and its terminal depth (entered automatically)
- Drop rate equation used (IGOSS, original or custom)
- Data file name (entered automatically)
- Data path (entered automatically)
- Date and time of launch (entered automatically)
- Sequence number (initialized manually, incremented automatically)
- Probe Serial number (entered manually for XBTs and XSVs, automatically for XCTDs)
- Latitude and longitude (entered manually or automatically updated; see SECTION 5, “WinMK21 Menus and Commands,” for more information)
- Memo of up to 15 lines of up to 68 characters each (entered manually)
- Up to eight custom parameters with assigned values

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To edit or verify the launch information, choose *Launch Information* from the *Options* menu. The *Launch Information Parameters* dialog box opens as shown in Figure 4-5.

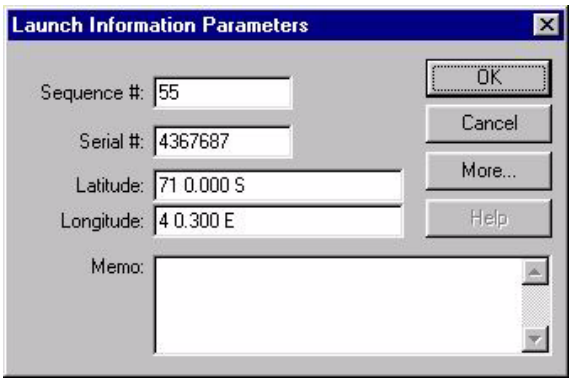


FIGURE 4-5: ***The Launch Information Parameters Dialog Box***

Verify or edit the launch information as required, and then click **OK**.

To view the updated launch information, click the **Launch Info** button, which opens the *Launch Information* window. You can also open the window by selecting *Status* from the *Window* menu, and then choosing *Launch Information.* The window can be left open during the launch. It can also be moved anywhere in the display by dragging its Title bar.

NOTE *The manually entered information in the Launch Information Parameters dialog box is stored in the .RDF files for all subsequent probe drops. Therefore, before launching the next probe, you should update or delete any manual entries that have changed.*

In addition to the launch information, you can modify a number of setup parameters, which include system, scaling, post processing, navigation input, and data transmit parameters. For information about these parameters and instructions on how to modify them, see SECTION 5, “WinMK21 Menus and Commands.”

4.3.5 STEP 5—Load the Probe

Remove the end cap from the canister containing the selected probe type and insert the canister into the launcher. For an LM-3A Hand-Held Launcher, swing the contact lever down; for an LM-2A Deck-Mounted Launcher or an LM-4A Thru-Hull Launcher, close the breech. For a description of the Sippican launchers and how they operate, see “Launchers” on page 1-10.

Immediately after the launcher pins make contact with the contacts in the canister, the display in the Acquisition State panel of the *Realtime Data Acquisition* window changes to "Testing Probe," during which the probe is tested. When testing is complete, the display changes to "Prepare for Launch" for a few seconds, and then to "Launch Probe" as shown in Figure 4-6.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

If the probe is an XCTD, the probe serial number, terminal depth and depth equation that have been read from the probe's internal memory are displayed in the *Launch Information* window.

If the probe is a T-12, the *Serial Number* dialog box opens prompting you to enter a valid 8-digit serial number. WinMK21 uses the serial number of a T-12 probe to locate the calibration coefficients and the calibrated depth for the pressure point calibration located in the .TCO and .PPT files, respectively, for the probe.

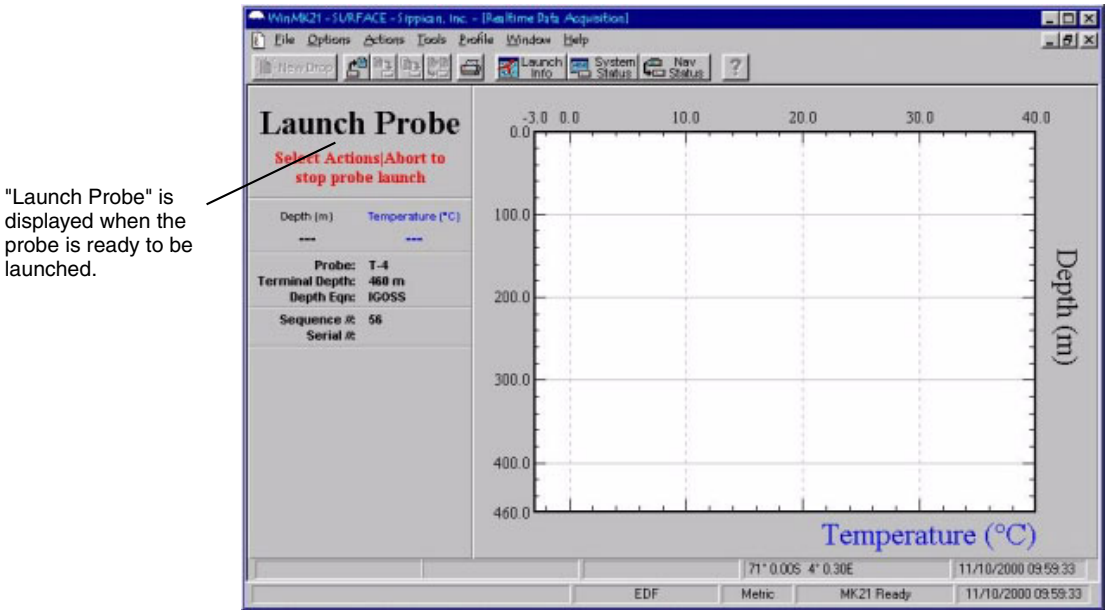


FIGURE 4-6: ***Realtime Data Acquisition Window—Launch Probe***

4.3.6 STEP 6—Launch the Probe

With "Launch Probe" displayed in the Acquisition State panel, the probe is ready to be launched.

NOTE *To terminate the launch, choose Terminate from the Actions menu.*

To launch the probe, pull the release pin out of the canister.

The following occurs:

- "Collecting MK21 Data" is displayed in the Acquisition State panel of the *Realtime Data Acquisition* window as shown in Figure 4-7.
- Data acquisition begins.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

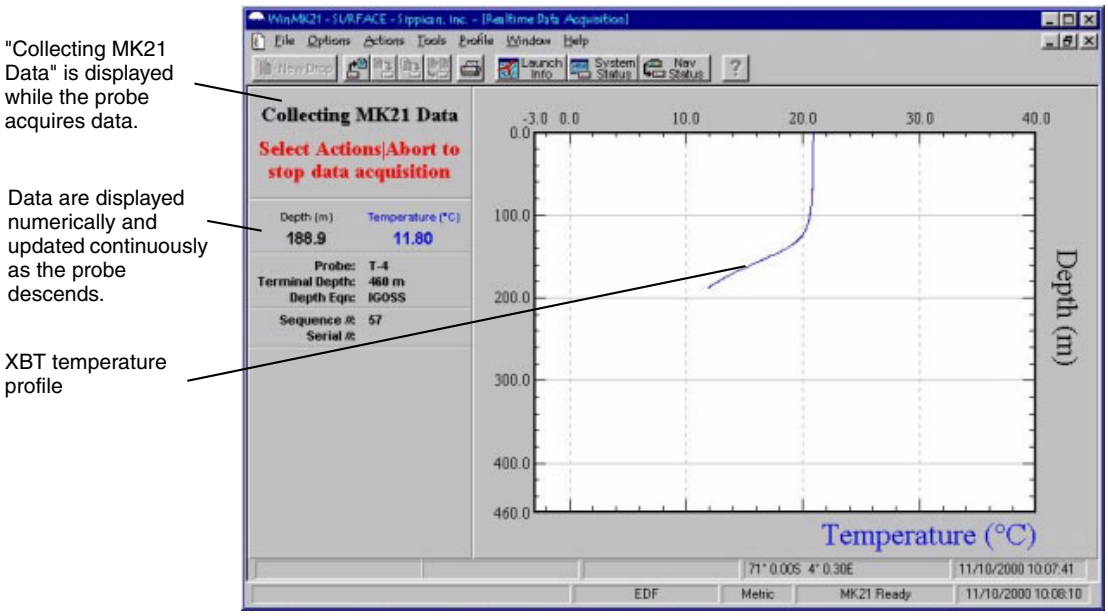


FIGURE 4-7: ***Realtime Data Acquisition Window—Collecting MK21 Data***

- A data profile begins to appear in the Graphics display as shown in Figure 4-7 where the temperature profile for an XBT probe is displayed. Two profiles are displayed, temperature and conductivity, for an XCTD probe.
- The data are displayed numerically in the Launch Information display, continuously updated as the probe descends.

4.3.7 STEP 7—Wait for Terminal Depth or Stop Data Acquisition

To acquire all the data possible from a probe drop, you must wait for the probe to complete its descent by either reaching its terminal depth or hitting the bottom. However, you can stop data acquisition and save all the acquired data before the probe completes its descent. This may be desirable, for example, when launching a probe in shallow water. To stop data acquisition, choose *Terminate* from the *Actions* menu. The profiles remain displayed in the Graphics display, the data are saved to the data file, and "Spent Canister" is briefly displayed in the Acquisition State panel. Then you are asked if you want to transmit the data and WinMK21 automatically switches to Post Processing mode as described below.

4.3.8 STEP 8—Transmit the Data

When the probe reaches its terminal depth, or if data acquisition is stopped, WinMK21 can transmit the data. If WinMK21 has been configured to transmit the data at the end of a probe drop, a dialog box opens asking you if you want to transmit the data for this probe drop. To transmit the data, click **Yes**; otherwise click **No**. For more information, see SECTION 5, “WinMK21 Menus and Commands.”

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.3.9 STEP 9—Perform Post Processing of Data

When the probe reaches its terminal depth, "Spent Canister" is briefly displayed in the Acquisition State panel and the data are saved to the data file. The profiles remain displayed in the Graphics display while WinMK21 automatically switches to Post Processing mode, and the Post Processing window shown in Figure 4-8 opens with the data file name displayed in the Title bar.

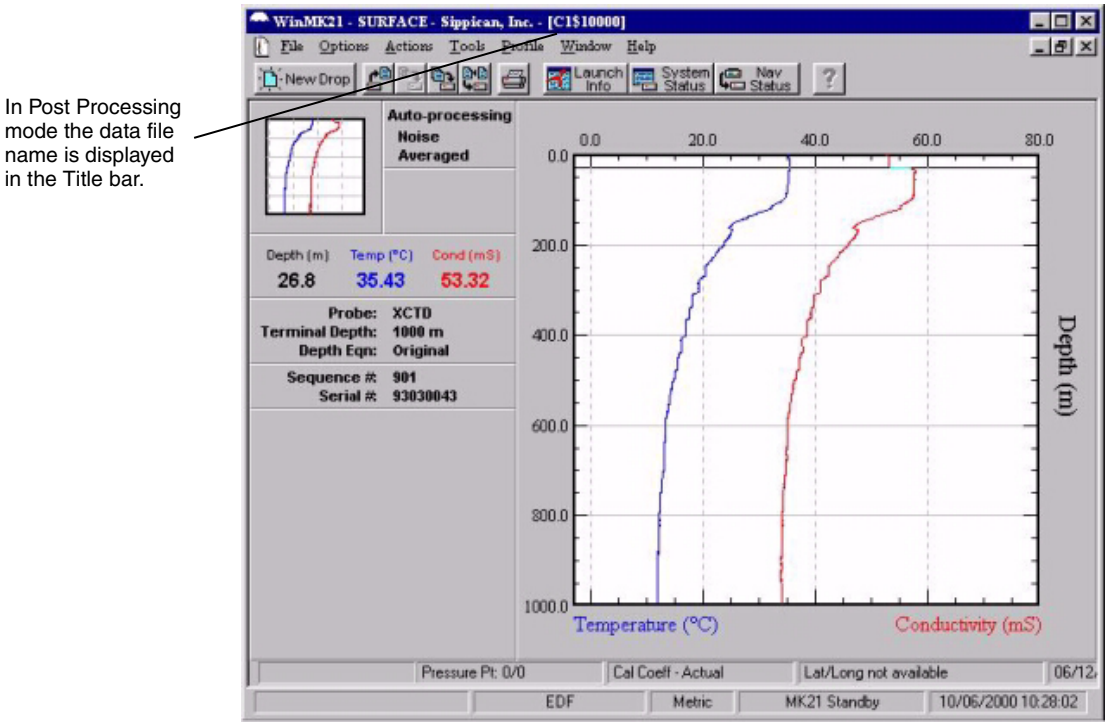


FIGURE 4-8: ***Post Processing Window***

In Post Processing mode you can have WinMK21 calculate sound velocity from XBT or XCTD data, calculate salinity and density from XCTD data, and transmit the data over the RS-232 interface of the computer. You can also print the Graphics display together with the data in the Launch Information display. For instructions on how to perform these and other tasks, see “Post Processing” on page 4-12, and for more information about all the functions that can be performed in Post Processing mode, see SECTION 5, “WinMK21 Menus and Commands.”

4.3.10 STEP 10—Edit the Launch Information

Following completion of the probe’s descent, you can edit the launch information to reflect observations made after launch. The edited data file must be saved to the original data file, overwriting the data, or saved to a new data file with a different file name.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To edit the launch information, choose *Launch Information* from the *Options* menu. The *Launch Information Parameters* dialog box shown in Figure 4-5 on page 4-8 opens.



NOTE *It is not advisable to change the sequence number displayed in the* ***Sequence #*** *text box.*

Edit the launch information as required, and then click **OK**. To view the updated launch information, click the **Launch Info** button, which opens the *Launch Information* window. To save the edited launch information, choose *Save* from the *File* menu to save the data to the original data file. Or choose *Save As* to open the *Save As* dialog box, and then create a new file name and save the data to the new data file.

4.3.11 STEP 11—Load Another Probe or Exit from WinMK21

Launch another probe, or exit from WinMK21 and turn off the computer.

To launch another probe, choose *Close* from the *File* menu, and then repeat the launch sequence for a new probe. To exit from WinMK21 and turn off the computer, see "Exiting from WinMK21 and Turning Off the Computer" on page 4-3.

4.4 Post Processing

You can enter Post Processing mode in two ways: automatically at the end of a probe drop or by opening a data file. In Post Processing mode you can perform the following major functions:

- Open a data file.
- View the data profiles and numeric displays.
- Scale and Zoom in on the Graphics display.
- Compare two data profiles.
- Display tabulated data.
- Filter the data.
- Edit the launch information.
- Print the data profiles.
- Generate an export file.
- Transmit the data file.

A number of other functions can be performed in Post Processing mode. For information about these features and how to work with them, see SECTION 5, "WinMK21 Menus and Commands."

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.4.1 Opening a Data File

To open a data file, select *Open* from the *File* menu. The *Open* dialog box opens. Select the data file, a file with extension *.rdf*, and then click **OK**.

NOTE *You can select only files with extension .rdf. In addition, the file name prefix identifies the probe type. The prefixes for each of the probe types are listed in Table 4-1 on page 4-7.*

The *Post Processing* window opens with the name of the data file displayed in the Title bar as shown in Figure 4-9. The data profiles are displayed in the Graphics display, and the Launch Information window displays information about the probe drop, including the probe type, its terminal depth, its depth equation, its sequence number, and its serial number.

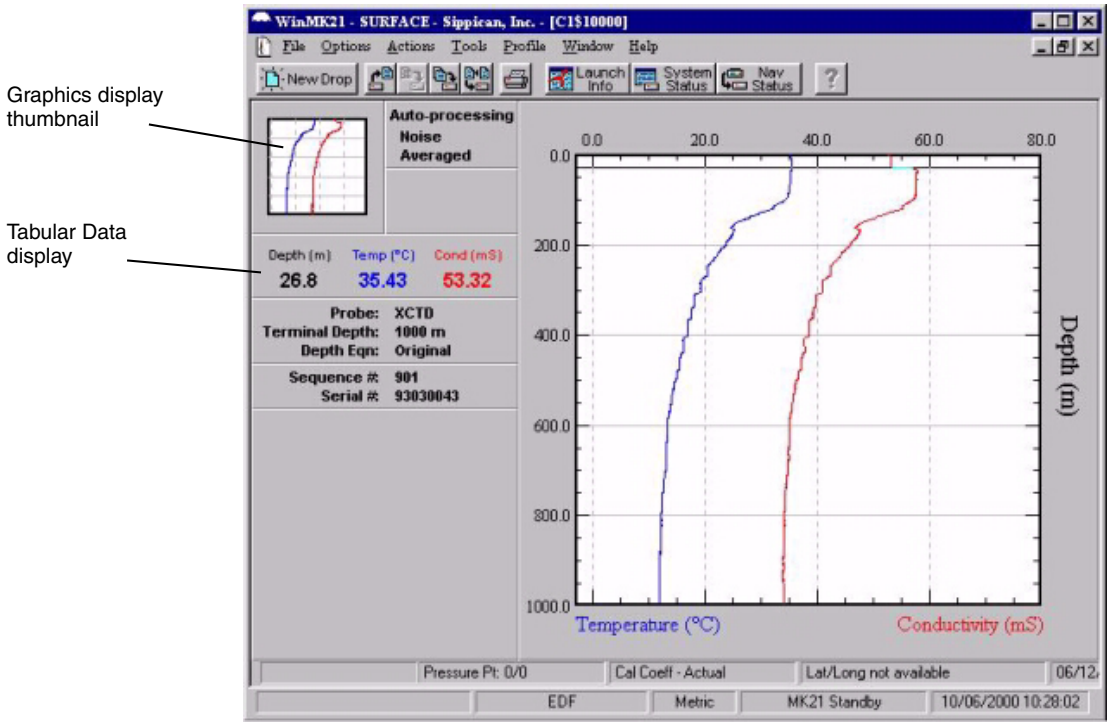


FIGURE 4-9: ***Post Processing Window***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.4.2 Viewing the Data Profiles and Numeric Displays

The data profiles are displayed in the Graphics display when you open a data file as shown in Figure 4-9. To view the numeric displays at any depth, place your pointer inside the Graphics display. A horizontal line appears. Move the pointer up and down to view the numeric data in the Tabular Data display for any depth. The horizontal line moves with the pointer and the displayed depth changes with the vertical position of the pointer. Moving the pointer off the graph, either to the left or to the right, fixes the displayed depth.

To view the derived sound velocity profile from an XBT or XCTD data file, choose *Sound Velocity* from the *Profile* menu, or right click anywhere in the Graphics display and choose *Sound Velocity*. The sound velocity data profile is displayed. To return to the original display, choose *Original* from the *Profile* menu, or right click anywhere in the Graphics display and choose *Original*.

NOTE *The sound velocity data profile for an XBT is based on an assumed salinity. To verify the correct salinity, or to change it, choose Post Processing from the Options menu. For an XCTD the temperature and conductivity data are sufficient to derive salinity, and therefore do not require that you verify or enter an assumed salinity.*

To view the derived salinity or density data profile from an XCTD data file, choose *Salinity* or *Density* from the *Profile* menu, or right click anywhere in the Graphics display and choose *Salinity* or *Density*. The salinity or density data profile is displayed. To return to the original display, choose *Original* from the *Profile* menu, or right click anywhere in the Graphics display and choose *Original*.

4.4.3 Scaling and Zooming in on the Graphics Display

The horizontal scaling of the Graphics display can be adjusted to provide greater display resolution. Scaling can be performed on any data profile, including derived data profiles. To scale the Graphics display, select *Scaling* from the *Profile* menu, and then choose *Set*. Or instead, right click the Graphics display thumbnail and choose *Scaling*. The *Graph Scaling - Defaults* dialog box opens. Enter the minimum and maximum values for the Graphics display, and then click **OK**.

Any area of the Graphics display can be selected to zoom in on. To zoom in on the Graphics display, click and hold the left pointing device button and drag the pointer to draw a box around the area of the Graphics display you want to zoom in on as shown in Figure 4-10. Then release the button. The zoomed in area is displayed in the Graphics display as shown in Figure 4-11. A view box representing the zoomed in area relative to the entire profile is also displayed in the Graphics display thumbnail. You can pan the Graphics display by dragging and dropping the view box anywhere in the Graphics Display thumbnail. To return to the original display, choose *Original* from the *Profile* menu, or right click anywhere in the Graphics display and choose *Original*.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Click and drag to draw a box around the area of the Graphics display you want to zoom in on.

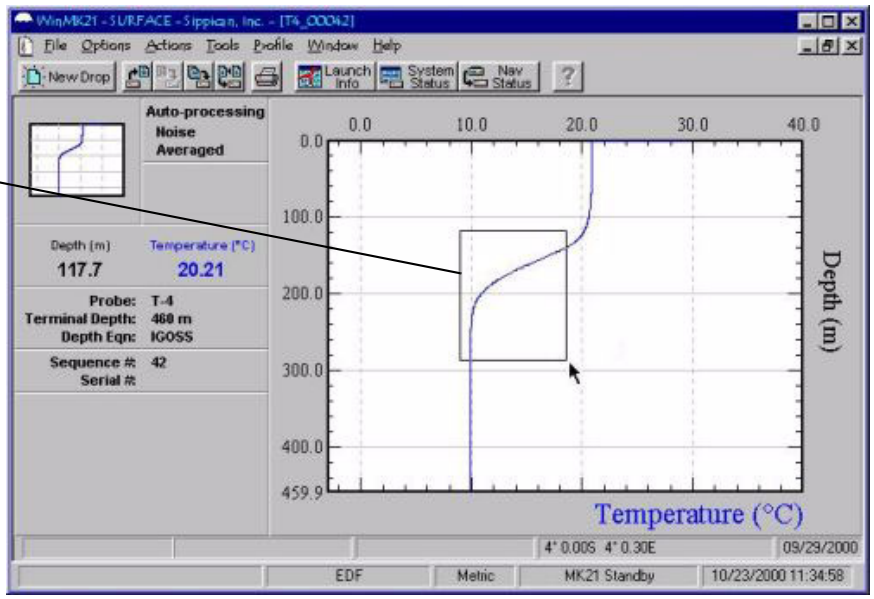


FIGURE 4-10: ***Selecting an Area of the Graphics Display to Zoom in on***

A view box representing the zoomed in area is displayed in the Graphics display thumbnail.

The zoomed in area is displayed in the Graphics display

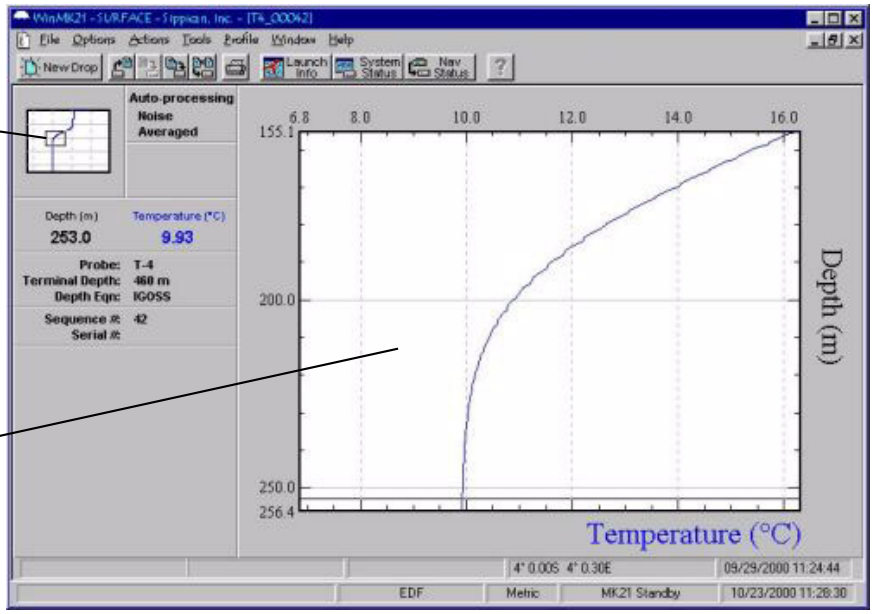


FIGURE 4-11: ***Zooming in on an Area of the Graphics Display***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.4.4 Comparing Two Data Profiles

To compare two data files, open each file, one after the other. Then choose *Tile* from the *Window* menu. The two profiles are displayed side by side in separate *Post Processing* Windows. You can perform all of the post processing functions in either window.

To overlay the two data files, select *Overlay* from the *Profile* menu, and then choose *Set*. The two profiles are overlaid with the data file that was selected last displayed in a lighter color. To remove the overlay, select *Overlay* from the *Profile* menu, and then choose *Remove*.

4.4.5 Displaying Tabulated Data

You can display both the acquired and derived data in tabular format. To display data in tabulated format, choose *Tabular Data* from the *Profile* menu. The *Tabular Data* window opens where you can scroll through the data one line at a time, either from this window or from the Graphics display. To scroll through the data from the window, drag the vertical scroll box up or down. To scroll through the data from the Graphics display, move the pointer up or down in the Graphics display. A horizontal line appears which moves with the pointer. Moving the pointer off the graph, either to the left or to the right, selects a single line of data.

4.4.6 Filtering the Data

Data files may be filtered for display and for preparation of export files. Two filter modes are available: Noise Reduction and Averaging. When noise reduction is selected, each data point whose value exceeds a selectable threshold is deleted. Averaging includes both noise reduction and averaging of the noise-reduced data. A data file must be open to filter the data, and the original data profiles must be displayed. To display the original profiles, choose *Original* from the *Profile* menu.

To apply the Noise Reduction filter, choose *Post-Processing* from the *Options* menu, enter the desired threshold value in the **Noise Threshold** text box, and then click **OK**. To display the noise-reduced data profiles, choose *Noise* from the *Profile* menu.

To apply the Averaging filter, choose *Post-Processing* from the *Options* menu, enter the desired number of points over which to average in the **Averaging Window** text box, and then click **OK**. To display the averaged data profiles, choose *Averaged* from the *Profile* menu.

4.4.7 Editing the Launch Information

The launch information in the .RDF file can be edited to reflect observations made after the launch. After editing the launch information, the edited data file must be saved to the original data file, overwriting the data, or saved to a new data file with a different file name.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To edit the launch information, first open the data file and verify that the file name in the Launch Information window is correct. Then choose *Launch Information* from the *Options* menu. The *Launch Information Parameters* dialog box shown in Figure 4-5 on page 4-8 opens.

NOTE *It is not advisable to change the sequence number displayed in the* ***Sequence*** **#** *text box.*

Edit the launch information as required, and then click **OK**. To view the updated launch information, click the **Launch Info** button, which opens the *Launch Information* window. To save the edited launch information, choose *Save* from the *File* menu to save the data to the original data file. Or choose *Save As* to open the *Save As* dialog box, and then create a new file name and save the data to the new data file.

4.4.8 Printing the Data Profiles

To print the data profiles, choose *Print* from the *File* menu. The *Print* dialog box opens. Select the printer, and then click **OK**. The Graphics display, as it is currently displayed, and the launch information is printed.

4.4.9 Generating an Export Data File

Any .RDF file can be converted into a text-format export data file compatible with external application software such as spreadsheets. The export file format has the extension *.edf* (Export Data File) instead of *.rdf* (Raw Data File). To create an export data file, open a raw data file, and then choose *Export* from the *File* menu. The *Save As* dialog box opens. Select the directory in which the export data file is to be created, and then create a file name and save the data to the file. The export data file can be opened in a word processing or spreadsheet program.

4.4.10 Transmitting the Data File

To transmit a data file, choose *Transmit* from the *File* menu. A dialog box opens asking you if you want to transmit the data for this probe drop. To transmit the data, click **Yes**; otherwise click **No**.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

This page is intentionally left blank.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 5
WinMK21 Menus and Commands

For information on the menus and commands provided by the WinMK21 Data Acquisition and Post-Processing Software, online Help is provided which is accessed directly from the Menu bar. Help has all of the Windows Help features, including hyperlinks which make navigating through the information quick and easy.

To open Help, choose *Contents* from the *Help* menu or click the **Help** button. The contents of Help are displayed and include the following hyperlinked components:

- WinMK21 System Description
- WinMK21 Data Acquisition
- WinMK21 Software Reference

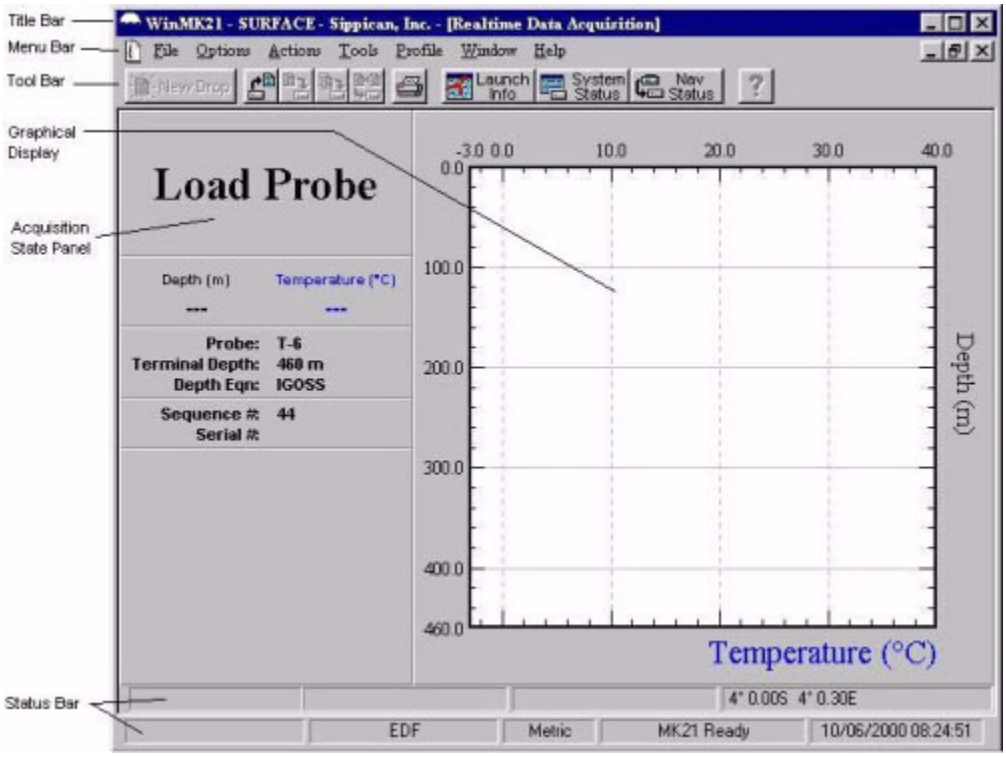
This section includes the same information provided in the WinMK21 Software Reference component of the online Help and encompasses the following main topics:

- Real-Time Data Acquisition Window
- Menu Bar
- WinMK21 Tool Bar
- Dialog Overview
- Additional Information Overview
- MK21 Interface Board Port Address

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.1 Real-Time Data Acquisition Window

The *Real-time Data Acquisition* window shows launch state, i.e. "Load Probe," "Testing Probe," "Launch Probe," "Collecting MK21 Data," and "Spent Canister," the measured parameter(s) as a function of depth, and the graphical representation of the data being collected. This window is invoked by the *File|New Drop* command. There can be only one *Real-time Data Acquisition* window for collecting data. However, other data windows can display data in Post-Acquisition mode from previous drops.



5.2 Menu Bar

This section provides a discussion of all the commands that are accessible from the menu bar, which includes the following menus:

- File
- Options
- Actions
- Tools
- Profile
- Window
- Help

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.1 File Menu

The *File* menu provides commands for displaying the *Real-time Data Acquisition* window, opening existing profiles, saving profiles, printing profiles, and exiting the application.

New Drop	Display the *Real-time Data Acquisition* window.
Open	Open an existing profile.
Close	Close the current profile.
Save	Save the current profile in the Raw Data Format (.rdf).
Save As	Save the current profile with a new name in the Raw Data Format (.rdf).
Export	Export the current profile in the Export Data Format (.edf)
Transmit	Transmit the current profile to an external device.
Print Setup	Set the default printer characteristics.
Print Preview	View a sample printout of the current profile.
Print	Print the current profile.
Exit	Exit WinMK21 application.

5.2.1.1 New Drop

The *File*|*New* command creates a new *Real-time Data Acquisition* window, and makes it the active window.

5.2.1.2 Open

The *File*|*Open* command allows the user to load a Raw Data file (.rdf). The standard Windows *Open* dialog will appear from which the user can select the file to be opened.

5.2.1.3 Close

File|*Close* closes the currently active data window.

5.2.1.4 Save

The *File*|*Save* command allows the user to save any changes made to the profile in the active data window.

NOTE *If the profile data has been modified by the operator an asterik (*) is appended to the file name in the caption bar of the profile window. The asterik indicates that the profile data, or more precisely a parameter that affects the profile display, has been modified since the data file was last saved.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.1.5 Save As

The *File|Save As* command allows the user to save the profile in the active data window in a Raw Data File (.rdf) under a new name, or in a new location on disk. The command displays the *Save File As* dialog. The new file name, including the drive and directory, can be entered. The active window containing this profile is updated with the new name. If an existing file name is chosen, the user is prompted to indicate if the existing file should be overwritten.

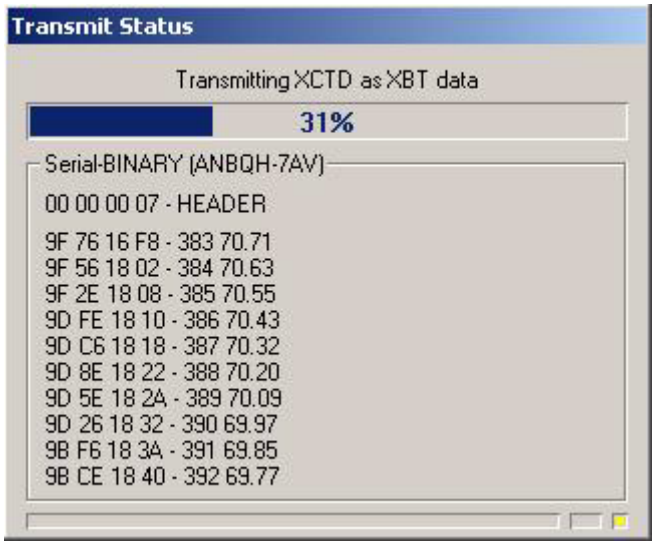
5.2.1.6 Export

The *File|Export* command allows the user to save a profile in the Export Data Format (.EDF). The command displays the *Save File As* dialog. The new file name, including the drive and directory, can be entered. If an existing file name is chosen, the user is prompted to indicate whether the existing file should be overwritten.

5.2.1.7 Transmit

The *File|Transmit* command allows the transmission of the current profile to an external device using the currently selected Data Transmit parameters. These options can be accessed by selecting *Options*, and then *Transmit* from the menu bar.

During the data transmission, the *Transmit Status* dialog is displayed. The *Transmit Status* dialog allows the operator to monitor the completion status of the transmission as well as monitor the integrity of the data transmission.



The binary values and the interpreted values of the transmitted data are displayed on the dialog.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The bottom bar indicates the number of bytes in the operating system's output buffer. Under correct operating conditions this bar will appear empty since the data bytes in the output buffer should be transmitted as soon as they are sent to the output buffer. However, if the transmission serial settings do not allow the data bytes to be transmitted as fast as the WinMK21 application sends them to the output buffer, the output buffer will fill up. The short bar to the right of the bottom bar indicates if the output buffer has overflowed. Even if the output buffer is no longer full, this indicator will remain highlighted in order to indicate the overflow situation. An overflow situation will indicate a transmission failure. In this case, the baud rate of the transmit serial settings should be increased. The bottom square to the right of the two indicators flashes when activity is detected on the operating system's output buffer.

5.2.1.8 Print Setup

The *File|Print Setup* command displays the *Printer Setup* dialog which allows the user to select and configure the current printer.

5.2.1.9 Print Preview

File|Print Preview opens a special window that shows how the profile in the active window will appear when printed. The preview window shows the data profile as it would be laid out on the printer page.

5.2.1.10 Print

The *File|Print* command prints the profile of the active window. Use *File|Print Preview* to see how the profile in the active window will appear when printed. Use *File|Print Setup* to select a printer and to set printer options.

5.2.1.11 Exit

The *File|Exit* command exits the WinMK21 program.

5.2.2 Options Menu

The *Options* menu provides commands for setting the WinMK21 options.

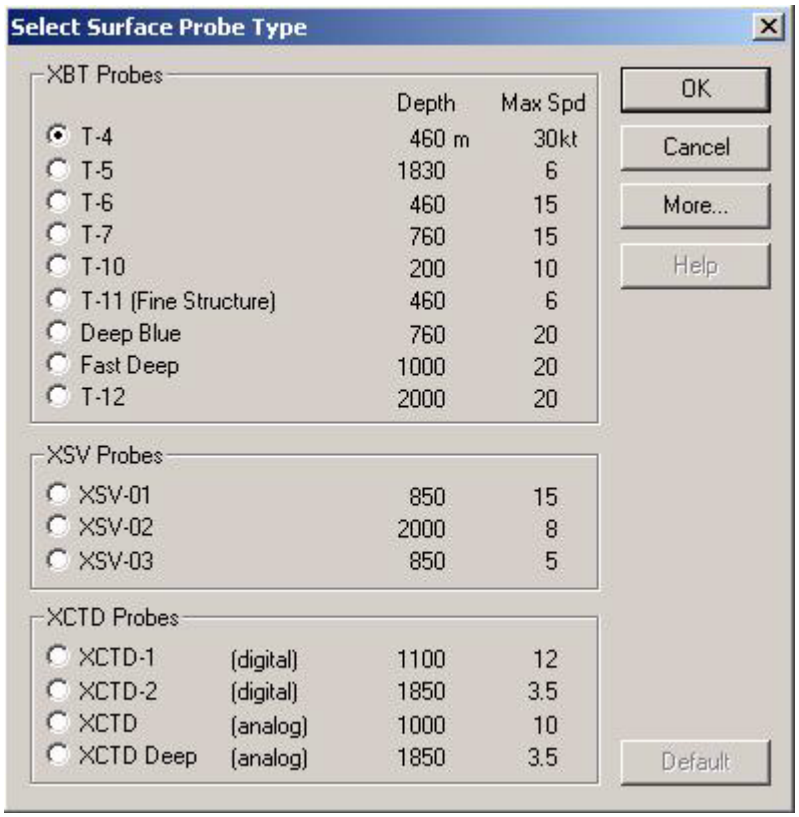
Probe	Displays pop-up menu for probe settings - selection of probe type and probe attributes.
System	Set display units, storage mode and hardware settings for the MK21 interface board.
Transmit	Set data transmission settings.
User	Set user interface settings
Scaling	Set profile scaling settings.
Post-Processing	Set profile post-processing parameters.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Launch Information	Set launch information for the active profile
Navigation Input	Set navigation input parameters

5.2.2.1 Probe - Selection

There can be only one active probe type for the Data Acquisition mode. When a new probe drop has been initiated, the system will use the currently active probe type by default. Thus, if an XSV-01 probe is the currently selected data acquisition probe type, when the user starts a new drop sequence, the system will prepare the MK21 interface board for an XSV-01 probe. Therefore, the first step in starting a new drop is to ensure the desired probe type is actually the currently selected data acquisition probe type. If a different probe is desired, click *Options*, then *Probe*, then *Selection*. The following dialog appears which allows the user to select a different probe.



Simply click on the desired probe, and then click **OK**. Clicking the **More** button displays the *Probe Attributes* dialog for the currently selected probe. Clicking the **Default** button resets the attributes of all of the probes to their corresponding default values. The **Default** button is disabled if all of the probe attributes are currently set to their default values.

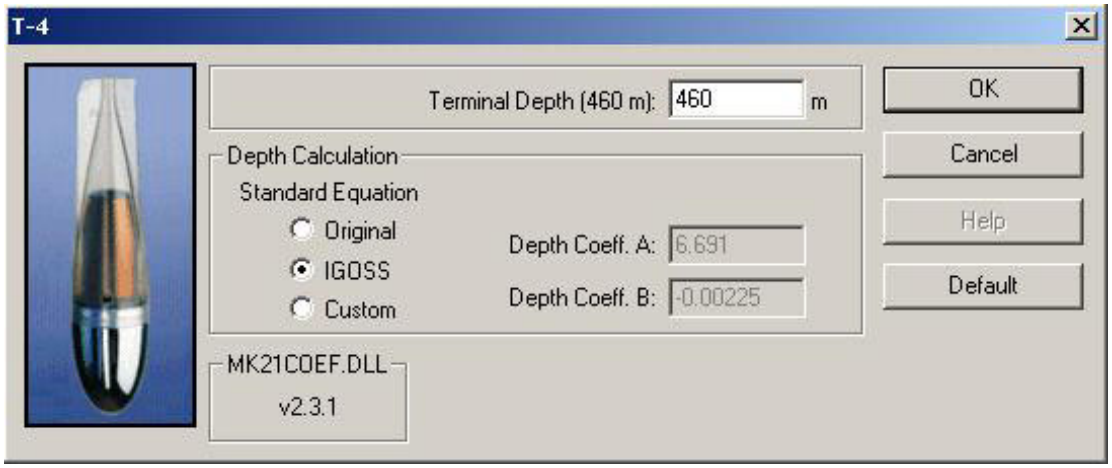
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.2 Probe - Attributes

In Data Acquisition mode, the probe attributes are displayed by clicking the **More** button in the *Probe Selection* dialog. In Data Acquisition mode, changes made to the probe attributes will affect all subsequent profiles that use the edited probe type.

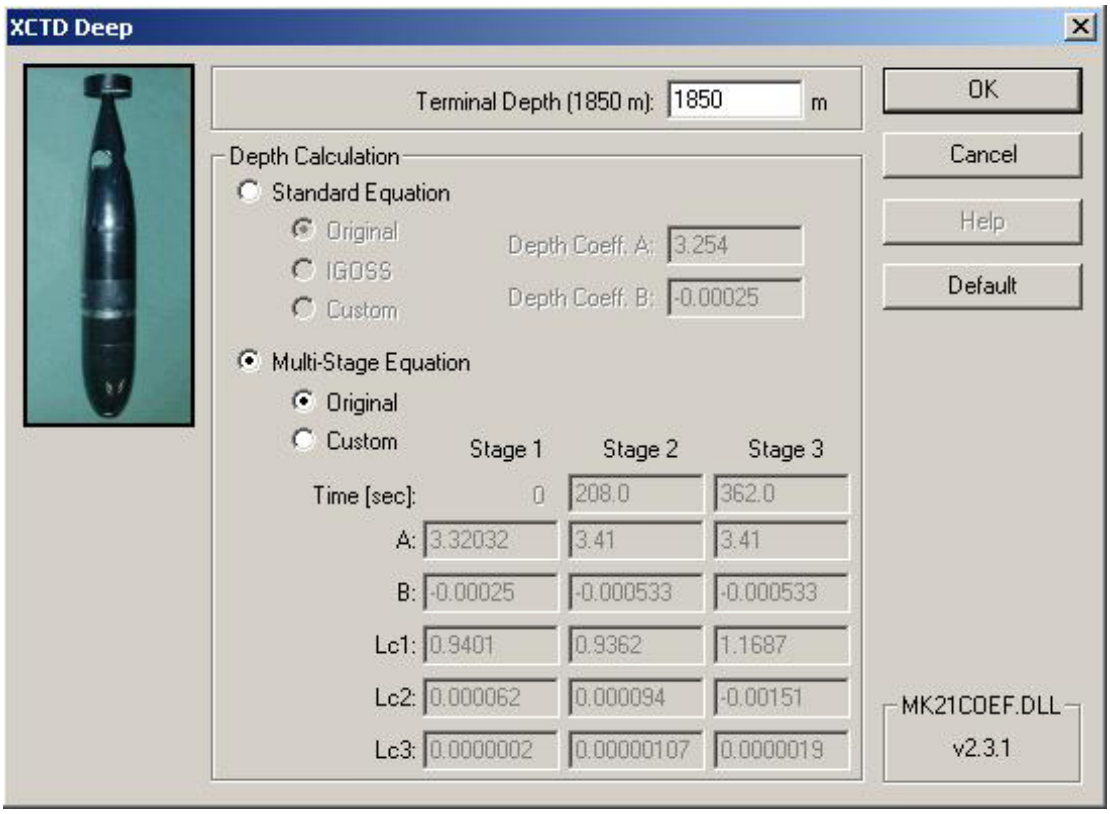
In Post Processing mode, select *Options*, *Probe*, and then *Attributes* menu items to display the attributes for the probe in the currently active profile. The *Attributes* menu item is only available in Post-Processing mode. In Post Processing mode, changes made to the probe attributes are specific to the probe in the currently active profile only.

Probe Attributes Dialog. The *Probe Attributes* dialog allows the user to edit the probe's terminal depth as well as verify or modify drop rate coefficients (Original, IGOSS, or Custom). The IGOSS drop rates are the preferred drop rates. Unless there is a special need for the use of custom coefficients it is best to use the default coefficients for all of the probe types. Furthermore, in Post Processing mode, the user will be able to define Pressure Pt and Calibration coefficients if they are available. The following dialog is displayed:



The probe type, in this case a T-4, is displayed in the caption bar of the dialog. Furthermore, a picture of the probe is displayed to avoid confusion. If the user changes any of the values in this dialog, they can be reset back to the default values by clicking the **Default** button. Note that this dialog will have a different appearance for each probe type. For example, the XCTD Deep probe can use a Multi-Stage Equation in calculating the depth. The *Probe Attributes* dialog for the XCTD Deep probe is as follows:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



For the XCTD Deep probe, the user can decide to use the standard equation like other probe types, or the Multi-Stage Equation. Unless instructed by Sippican, Inc., or if there is a special need for the use of the Multi-Stage Equation, it is best to use the Standard Equation with the default coefficients.

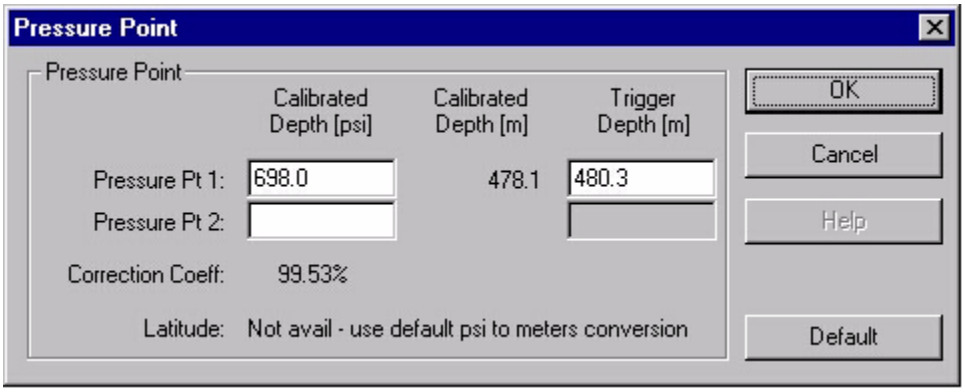
In another special case, the XCTD-1 probe transmits the terminal depth and drop rate coefficients from an EEPROM on the probe during the probe loading process. Thus, unlike all of the other probes, the user is not able to set the probe specific parameters prior to initiating an XCTD-1 probe.

Post-Processing Attributes. In Post Processing mode, the user will be able to define the calibrated depth of the pressure point and edit the data calibration coefficients. If the feature is supported by the probe, a corresponding button appears in the dialog for the *Pressure Point* and *Calibration Coefficients* dialogs. Clicking the **Pressure Pt.** button displays the *Pressure Point* dialog. Correspondingly, clicking the **Cal. Coeff.** button displays *Calibration Coefficients* dialog.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.3 Probe Attributes - Pressure Point

The *Pressure Point* dialog allows the user to define the calibrated depth of the probe's pressure sensor. Furthermore, the user can manually modify or remove the trigger depth of the pressure point.



The calibrated depth is recorded as a pressure in psi. The calibrated depth in psi is then converted to a depth in meters (or feet depending on the current units). If the latitude of the probe drop is available, the WinMK21 will automatically compensate the psi to meters conversion based on the known latitude.

The trigger depth is displayed in meters (or feet). If this value is blank, then the pressure point is considered to be “Free.” Otherwise, this value reflects the current trigger depth whether it was obtained automatically using Auto-Find or set manually by the user. To remove the trigger depth for the pressure point, simply remove the value and leave the field blank.

If the trigger depth is set, the resulting correction coefficient is displayed. The correction is indicated as a required percentage change that must be applied to the derived depth in order to force the trigger depth of the pressure point signature in the probe data to be located correctly at the calibrated depth of the pressure sensor.

Clicking the **Default** button resets the calibrated depth to the default value.

Clicking the **Update** button allows the user to update the calibrated depth from the corresponding .PPT file, in which the eight-digit serial number of the probe is used for the filename of the .PTT file. If the corresponding .PPT file cannot be located automatically by the WinMK21, the user is prompted to search for the .PPT file manually.

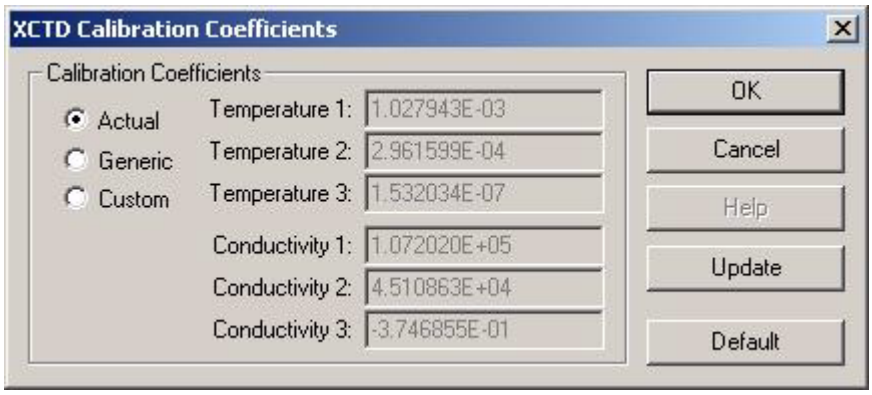
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.4 Probe Attributes - Calibration Coefficients

The *Calibration Coefficients* dialog allows the user to modify the data calibration coefficients used by WinMK21 to convert the raw data collected by the probe's sensors to engineering units. The calibration coefficients, which are only used for analog XCTD, digital XCTD and T-12 probes are determined during the probe load sequence.

5.2.2.5 Analog XCTD and XCTD Deep Calibration Coefficients

The user may select either Actual, Generic or Custom calibration coefficients for both the temperature and conductivity calibration coefficients. The Actual coefficients are defined during the probe load process either directly from the EEPROM on the probe or from the probe's corresponding .CON file. If the Actual coefficients are not available, the user can elect to use Generic coefficients for the data acquisition process. The user can also enter Custom coefficients, however, this is not recommended unless otherwise instructed by Sippican, Inc. You cannot edit either the Actual or Generic coefficients.

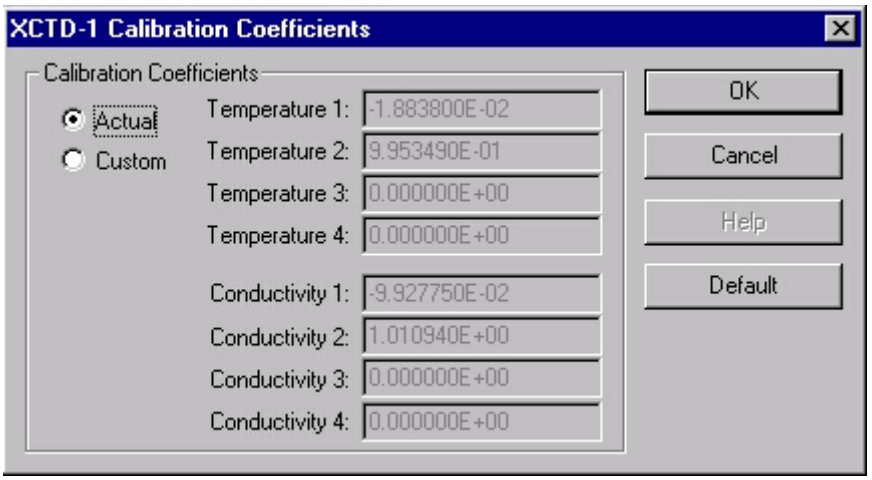


Clicking the **Update** button allows the user to update the calibration coefficients from the corresponding .CON file, in which the eight-digit serial number of the probe is used for the filename of the .CON file. If the corresponding .CON file cannot be located automatically by the WinMK21, the user is prompted to search for the .CON file manually.

5.2.2.6 Digital XCTD Calibration Coefficients

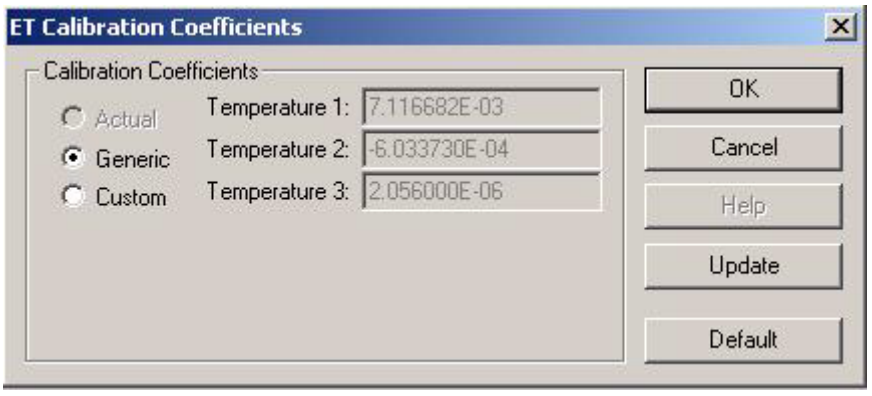
The Actual coefficients for the digital XCTD probes are defined during the probe load process directly from the EEPROM on the probe. If the Actual coefficients are not available from the EEPROM, you cannot continue with the data acquisition process. The user cannot elect to use Generic coefficients for the data acquisition process. In Post Processing mode the user can enter Custom coefficients, however, this is not recommended unless otherwise instructed by Sippican, Inc. You cannot edit the Actual coefficients.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



5.2.2.7 T-12 Calibration Coefficients

The user may select either Actual, Generic or Custom calibration coefficients for the temperature calibration coefficients. The Actual coefficients are defined during the probe load process from the probe's corresponding .TCO file. If the Actual coefficients are not available, the user can elect to use Generic coefficients for the data acquisition process. The user can also enter Custom coefficients, however, this is not recommended unless otherwise instructed by Sippican, Inc. You cannot edit either the Actual or Generic coefficients.

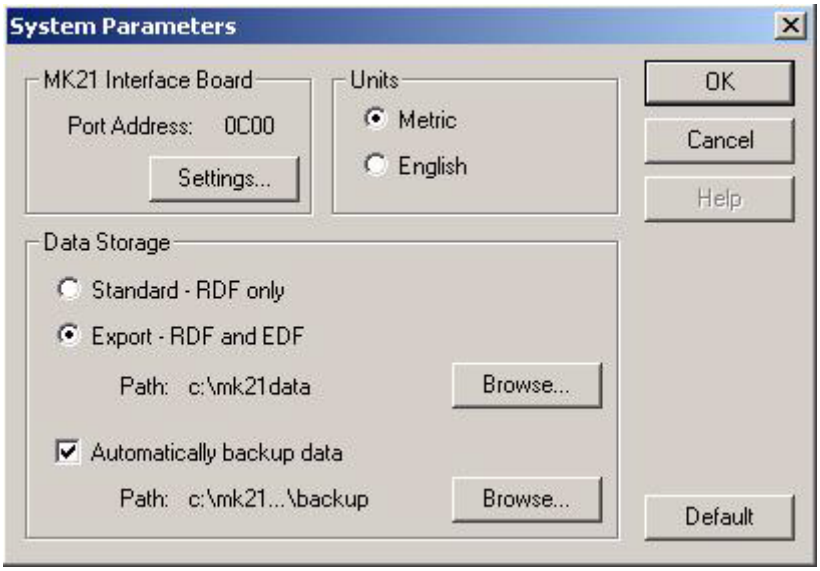


Clicking the **Update** button allows the user to update the calibration coefficients from the corresponding .TCO file, in which the eight-digit serial number of the probe is used for the filename of the .TCO file. If the corresponding .TCO file cannot be located automatically by the WinMK21, the user is prompted to search for the .TCO file manually.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.8 System Parameters

The system parameters include options to modify the MK21 interface board port address, select whether the data is to be displayed in metric units or English units, and determine how and where the collected data is to be stored. Select *Options*, and then *System* to display the dialog for these options:



MK21 Interface Board. In the MK21/USB configuration, the port address may be modified by the WinMK21 application. Click the **Settings** button to display the *MK21 Interface Board Port Address* dialog to modify the port address. The user cannot modify the port address if the MK21 interface board is in Ready mode. A properly functioning MK21 interface board in Ready mode indicates that the port address is correct and that it does not need to be modified.

In the ISA configuration, the port address is maintained by the MK21 device driver and cannot be changed by the WinMK21 application. In Windows NT a separate utility, SetMK21, is provided to modify the port address setting for the device driver. However, you can view the designated port address in this dialog. In Windows 98/Me/2000/XP, the port address is modified using the Device Manager.

Please refer “MK21 Interface Board Port Address” on page 5-54 for information on changing the port address.

Units. To select the units in which the data is to be displayed, simply click either the **Metric** or the **English** option.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

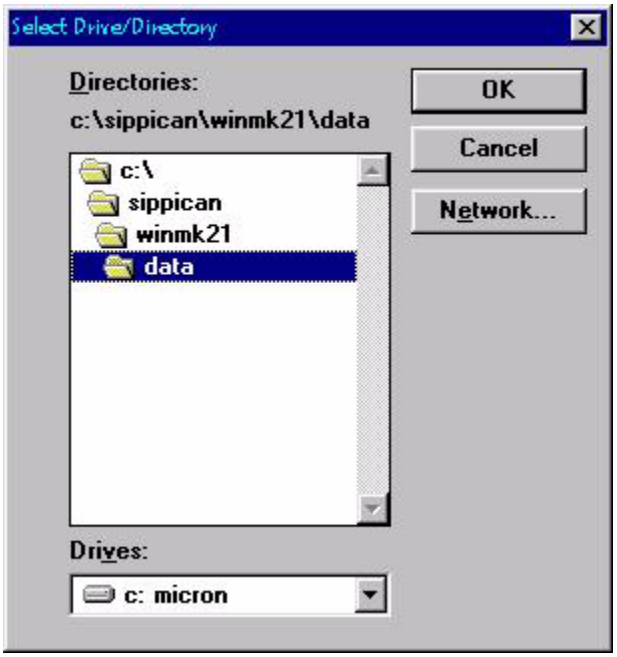
Data Storage. Click either the **Standard** button or the **Export** button to indicate the storage mode.

Standard — All unprocessed (raw) acquired data will be stored in the designated data directory. Raw data files have the extension .rdf.

Export — All unprocessed (raw) acquired data and an additional export file will be stored in the designated data directory. Export files are recorded as text files using ASCII characters for use by other applications such as spreadsheets. The export file will be stored in the same directory as the associated raw data file, and under the same name, but with the extension .edf rather than the raw data file's .rdf extension.

Select the **Automatically backup data** check box to create a second raw data file that is written to the designated backup directory automatically. If the Export mode is currently selected, a second export data file will also be written to the backup destination.

The user can select the data and backup directories by selecting the corresponding **Browse** button. The following dialog will appear:

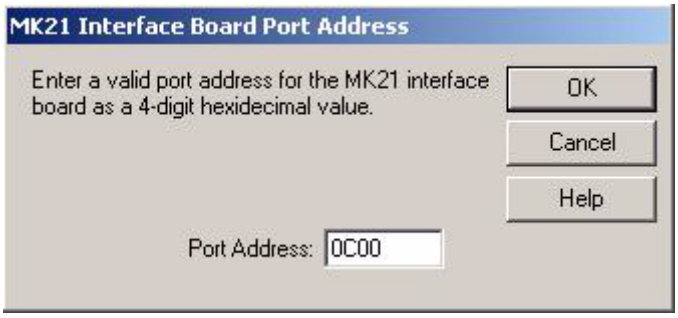


The user can select the directory by navigating through the directory structure until the desired directory has been found, and then clicking the **OK** button. The newly selected path will be displayed in the *System Parameters* dialog.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.9 System Parameters - MK21 Interface Board Port Address

It is possible to change the MK21 interface board port address if the default port address is not available. Please refer “MK21 Interface Board Port Address” on page 5-54 for information on changing the port address.



The user cannot modify the port address if the MK21 interface board is in Ready mode. A properly functioning MK21 interface board in Ready mode indicates that the port address is correct and that it does not need to be modified. Thus, in order to exercise this option, it is necessary to make sure that the MK21 interface board is in Standby mode.

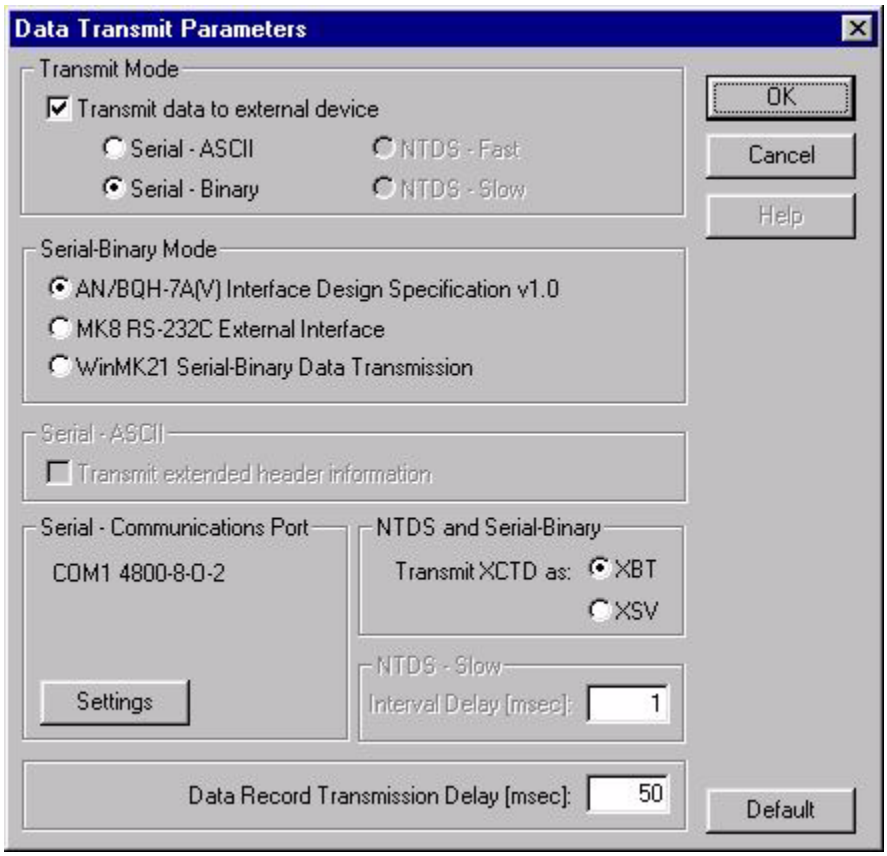
5.2.2.10 Data Transmit Parameters

The profile data may be transmitted to an external device via a serial port or an NTDS interface card. The profile data may be transmitted as follows:

Serial-ASCII:	ASCII profile data transmitted via serial port
Serial-Binary:	Proprietary binary data format based on NTDS protocol transmitted via serial port
NTDS-Fast:	NTDS protocol (proprietary binary data format) transmitted via NTDS-Fast interface card
NTDS-Slow:	NTDS protocol (proprietary binary data format) transmitted via NTDS-Slow interface card

To specify the type of external interface select *Options*, and then *Transmit*. The *Data Transmit Parameters* dialog will appear:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Enable Data Transmission. To enable data transmission, the box labeled **Transmit data to external device** must be selected. If this box is selected, the profile data from valid probes will be automatically transmitted to the selected external device at the completion of a probe drop. The user will always be prompted to confirm the data transmission. Select the transmit mode depending on the interface to the external interface. Various options may be set depending on the selected transmit mode.

All Transmit Modes. All transmit modes allow you to set the Data Record Transmission Delay. The transmission delay is used to control data flow as required. Some external readers cannot keep up with an uninterrupted data transmission either because their input buffer overflows or they are too slow. As a result, they will miss transmitted data. A variable transmission delay is a simple method to accommodate slower readers or readers with limited buffering capability. Setting the transmission delay will help control the data flow should timing between the WinMK21 and the receiver become a problem by adding a delay in milliseconds between each record that is transmitted.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Serial-ASCII Mode. The Serial-ASCII mode transmits the data via the serial port. The profile data from all probes may be transmitted in this mode. Click the **Settings** button in the **Serial - Communications Port** section to set the communications port settings. The *Communications Port Parameters* dialog will appear. The Serial-ASCII transmit mode can transmit an extended header prior to the profile data. The extended header information is similar to the header information in the Export Data Format (.edf) data file.

Serial-Binary Mode. There are three different protocols available for the Serial-Binary mode. For more information on the various protocols, see SECTION 6, "Serial-Binary Data Transmission Description." The Serial-Binary mode transmits the data via the serial port. Click the **Settings** button in the **Serial - Communications Port** section to set the communications port settings. The *Communications Port Parameters* dialog will appear.

NTDS-Slow Mode. The NTDS-Slow mode transmits the data via an NTDS-Slow interface card. In order to remain compatible with existing systems, it may be necessary to specify an Interval Delay in milliseconds. The interval delay causes the NTDS-Slow transmission to pause between each byte in a data record transmission. The delay allows older NTDS readers enough time to read the data value before the next byte in the data record is transmitted.

Valid Probes for Serial-Binary and NTDS Transmit Modes. The Serial-Binary, NTDS-Fast and NTDS-Slow modes transmit the data using a proprietary binary data format. The protocol only allows the profile data from specific probes to be transmitted as follows:

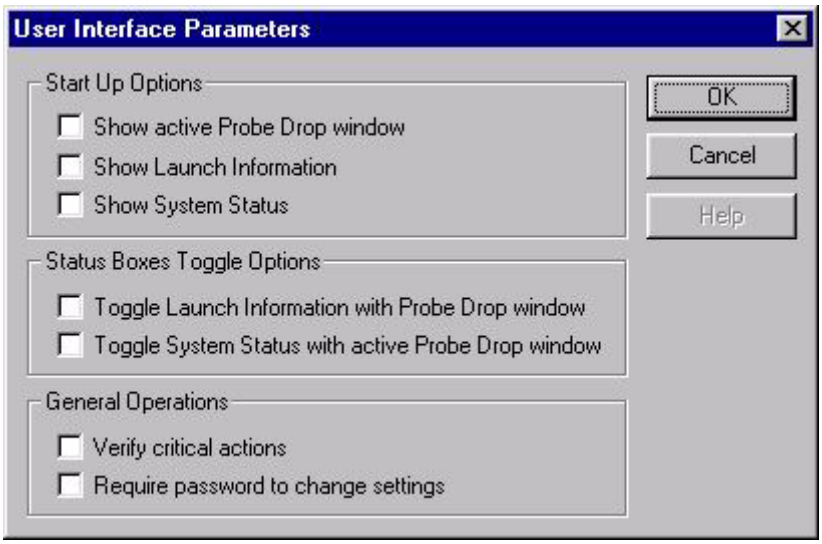
Serial-Binary:	T-4, T-5, T-6, T-7 and T-10 XBT and XSV-01 and XSV-02 XSV probes; however, not all of the listed probes are available for all Serial-Binary modes.
NTDS-Fast:	T-4, T-5 and T-7 XBT and XSV-01 probes.
NTDS-Slow:	T-7 probes only.

Since an XCTD has both temperature and sound velocity information, WinMK21 allows the profile data to be transmitted as XBT-like or XSV-like. When XCTD data is being transferred the operator will be asked to specify whether the XCTD data should be transmitted as XBT or XSV data. The operator is always prompted to specify the data format with the XCTD Transmit Format dialog; however, this setting is used to set the default selection.

5.2.2.11 User Interface Parameters

It is possible to control the display upon startup of the WinMK21 software. Click *Options*, and *User*, and the dialog shown below appears which displays the various display options at startup.

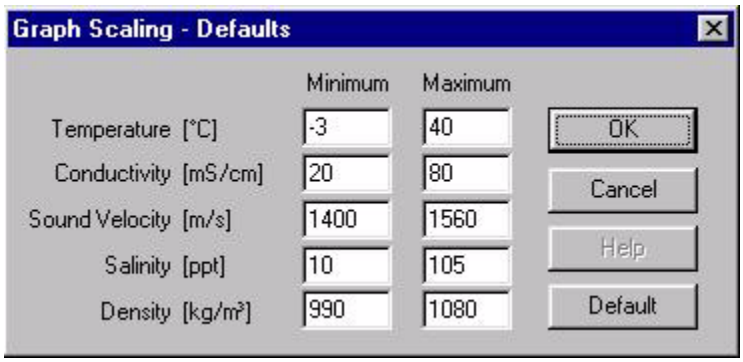
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Clicking the check boxes in the section labeled **Start Up Options** will display the *Launch Information and System Status* dialog at startup. The check box labeled **Show active Probe Drop window** will automatically start the program in Data Acquisition mode when it is enabled. The **Status Boxes Toggle Options** enable/disable the display of both the active window with the *Launch Information* window whenever an active window is launched, as well as the Real-Time Data Acquisition window with the System Status window whenever a new data acquisition is launched. **General Operations** allows the user to enable or disable verification of critical actions. The **Require password to change settings** option allows the user to protect system options with a password.

5.2.2.12 Graph Scaling - Defaults

The minimum and maximum default scaling values for the various profile displays can be modified prior to probe launch as well as after data acquisition. Click *Options*, and then *Scaling*, and the following dialog appears:



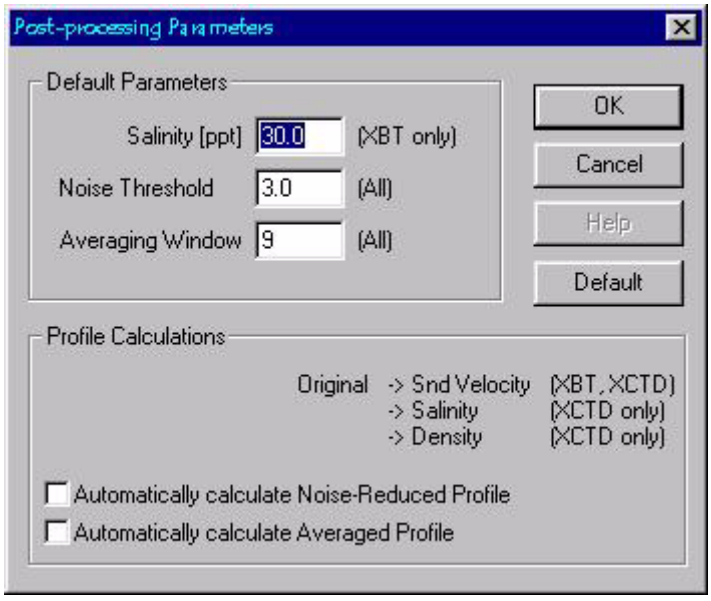
If the any of the values have been modified, clicking the **Default** button will return the values back to their associated defaults.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.13 Post-processing Parameters

Noise spike removal and a moving average can be done to profiles. The noise threshold value and the number of points in the average are user selectable. Implementation of the noise spike removal and averaging can be selected to be automatic at the end of data collection. The *Post-processing Parameters* dialog allows the user to set the post-processing settings such as the default salinity for XBT sound velocity calculations, the noise threshold and averaging window and the automatic profile calculation settings.

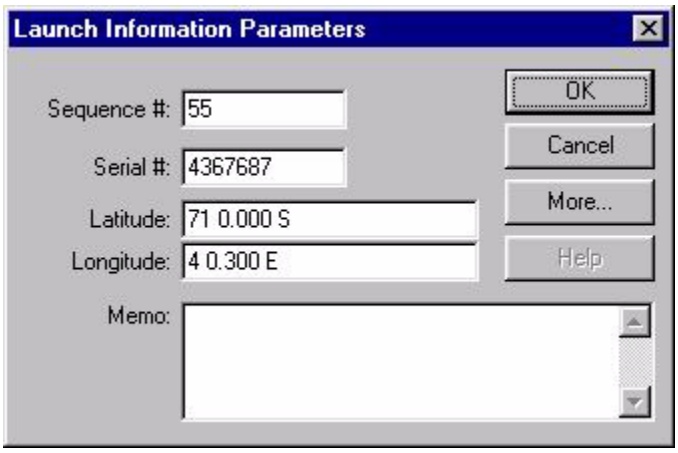
Select *Options*, and then *Post-processing*. The dialog below displays the values used to do subsequent calculations with data profiles.



5.2.2.14 Launch Information Parameters

The *Launch Information Parameters* dialog displays the information related specifically to the currently active profile. Select *Options*, and then *Launch Information*, and the dialog appears as follows:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



This dialog displays the:

Sequence #: The sequence number is initialized manually, but incremented automatically. Fill in the field labeled **Sequence #** to initialize this parameter.

Serial #: Each probe is assigned a unique serial number at the time of manufacture. The serial number must be entered manually for XBTs and XSVs. However, the serial number, which is stored on the probes' EEPROM, is entered automatically for XCTDs.

Latitude/Longitude: The latitude and longitude at which the probe is dropped can be defined by the user. The position information can be entered automatically by an external navigational device as outlined in the Navigation Input parameters.

Memo: A memo can be entered manually. Enter the desired text in the field labeled **Memo**. Note that typing the carriage return key or the enter key is similar to clicking the **OK** button. The cursor can be placed on a new line in this field by typing *<Ctrl> Return*, or *<Ctrl> Enter*.

Custom Fields: Since some users might want to store additional information with each probe drop, it is possible to define up to eight custom parameters which can then be assigned values. A labeled field will appear in the *Launch Information* window for each parameter, and a value can then be entered according to the needs of the user.

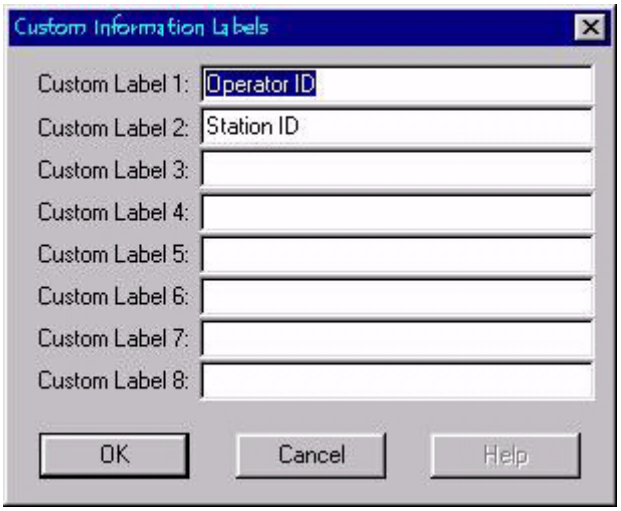
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2.15 Launch Information - Custom Information Labels

The *Custom Information Labels* dialog allows you to define additional custom labels to display user-specific information in the *Launch Information* window. Any new operator defined parameters, such as Operator ID and Station ID, appear in the *Launch Information Parameters* dialog.

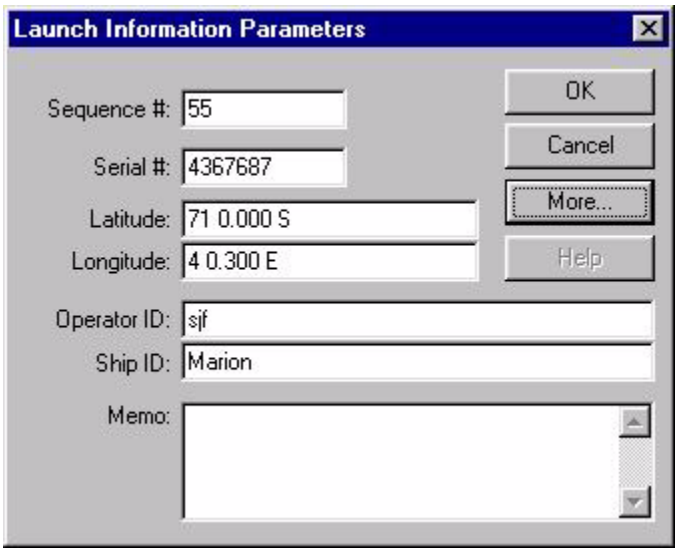
To open the *Custom Information Labels* dialog, click the **More** button in the *Launch Information Parameters* dialog.

It is possible to define up to eight custom information labels which can then be assigned values. A labeled field will appear in the *Launch Information* window for each parameter, and a value can then be entered according to the needs of the user. Furthermore, the information recorded in these custom fields is included in the exported data files.



The value entered into each of the fields will serve as the label for an operator defined parameter. It is not necessary to enter a value for each of the fields in this dialog. If a value has been entered into only three fields, then there are likewise three operator defined parameters. Once the user is finished and the **OK** button has been clicked, the new operator-defined parameters appear in the *Launch Information Parameters* dialog as shown below:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



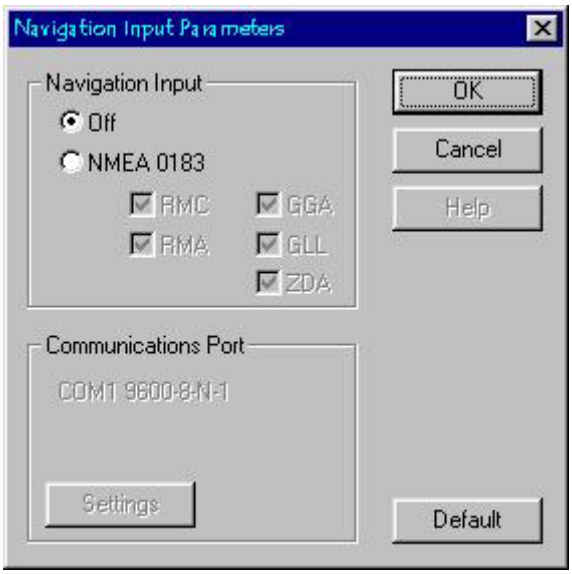
Now each parameter can be assigned a value, and that value is stored along with the data and all other information.

5.2.2.16 Navigation Input Parameters

The WinMK21 program is capable of accepting NMEA 0813 navigational information on a serial port. WinMK21 is a listener for NMEA 0813 talkers like a GPS or LORAN C, and accepts GGA, GLL, RMC, RMA and ZDA sentences. When any of the position-related NMEA 0183 sentences are received by WinMK21, the latitude and longitude information is displayed in the *Launch Information* window. The position quality is appended to the latitude (SPS Mode, Differential GPS, PPS Mode or "Fix not avail. or invalid"). Furthermore, if the time-related ZDA sentence is selected, the internal clock on the host computer is reset by the date/time of the contents of the ZDA sentence.

To enable Navigation Input, select *Options*, and then *Navigation Input*. The *Navigation Input* dialog is displayed as shown below:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

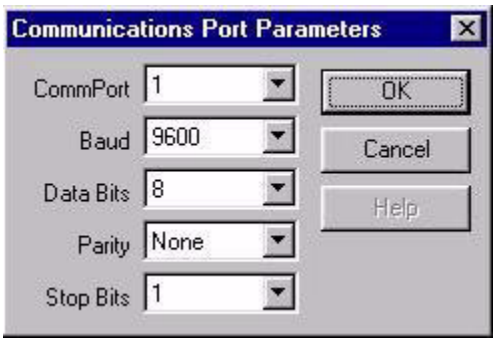


Select the **NMEA 0183** option to enable the navigation input option. Select at least one of the NMEA 0183 sentences that is output by your navigational device so the WinMK21 can look at an incoming serial transmissions for the navigational information. Select the ZDA option if you want the internal clock on the host computer to be reset by the date/ time of the contents of the ZDA sentence.

The communications port settings are displayed in the **Communications Port** section. Click the **Settings** button to modify the settings. The *Communications Port Parameters* dialog will appear.

5.2.2.17 Communications Port Parameters

This dialog allows the operator to set the communications port number, baud rate, parity, and number of data and stop bits for a serial port. All WinMK21 options that make use of the serial ports, such as Data Transmit and Navigation Input, allow the operator to define the communications port using this dialog.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.3 Actions Menu

The *Actions* menu provides commands for initiating an action related to the operation of the MK21 interface board.

Terminate	Terminate the current the operation.
MK21 I/O Board	Display pop-up menu for MK21 interface board operations.

5.2.3.1 Terminate

The *Actions*|*Terminate* command terminates the current operation. This menu item is only enabled when a Terminate operation is allowed. For example, the menu item is available during the data acquisition. Once the terminate operation is initiated, the user is informed that the data acquisition has been terminated. The program is then reset to a state in which it is simply checking for the presence of a probe in the launcher.

5.2.3.2 MK21 I/O Board

Selecting *MK21 I/O Board* from the *Actions* menu displays a popup menu that allow you to either manually initiate the MK21 interface board or set the MK21 interface board to Standby mode.

Initiate	Initiate the MK21 interface board.
Standby	Set the MK21 interface board to standby mode.

5.2.3.3 MK21 I/O Board - Initiate

After launching the software, the MK21 interface board is held in Standby mode. The MK21 interface board can be initialized automatically when the user proceeds into data acquisition, or as a separate event. After installing a MK21 interface board in a new machine, the user may want to manually initiate a MK21 interface board initialization to verify the board is functioning properly. To do this select *Actions*, then *MK21 I/O Board*, then *Initiate*. Initialization of the MK21 interface board takes about 7 seconds and is accompanied by "Detect MK21" and "Test MK21" messages. During this time the MK21 board is

- Confirmed to be detected at the address selected by the software settings, and
- Verified to pass internal diagnostic tests.

If the MK21 interface board should fail to be detected, the base address may be in conflict with some other process of the computer. Please refer “MK21 Interface Board Port Address” on page 5-54 for information on changing the port address.

Contact Sippican - Technical Support if the MK21 interface board repeatedly fails one of the internal diagnostic tests.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.3.4 MK21 I/O Board - Standby

After a successful initialization, the MK21 interface board is held in Ready mode even after a data acquisition has been completed. This is indicated by the Ready status shown in the *System Status* dialog. Select *Actions*, then *MK21 I/O Board*, then *Standby* to revert the the MK21 interface board back to Standby mode. However, it is not necessary for the MK21 interface board to revert to Standby mode. The MK21 interface board can safely remain in the Ready mode indefinitely.

5.2.4 Tools Menu

The *Tools* menu provides commands for the WinMK21 diagnostic feature, modifying fundamental profile attributes and for interacting with the hardware of the MK21 interface board and probes.

Diagnostic	Displays pop up menu for diagnostic feature.
Convert	Convert profile probe attributes
Read Probe EEPROM	Reads the contents of the EEPROMs on XCTD probes
Update Firmware	Updates the firmware of the MK21 interface board

5.2.4.1 Diagnostic

The *Tools*|*Diagnostic* command provides commands for setting the diagnostic options.

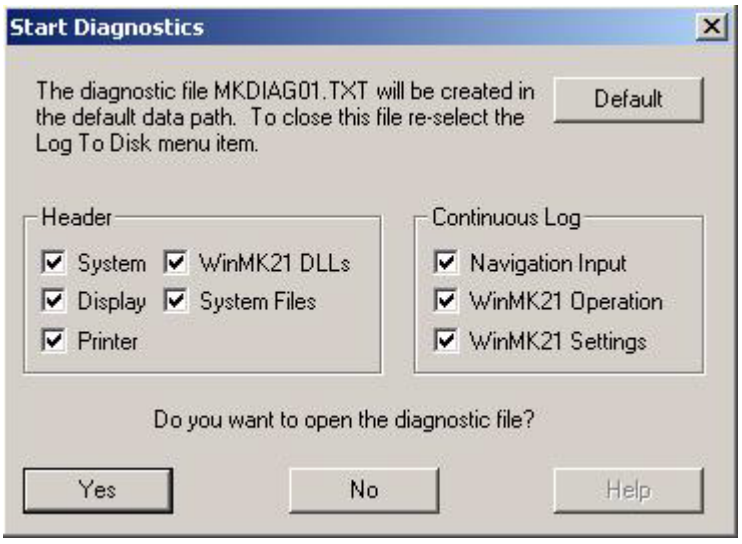
Log to Disk	Toggle diagnostic log to disk feature.
Settings	Set diagnostic settings.

5.2.4.2 Diagnostic - Log To Disk

The *Diagnostic*|*Log to Disk* command is a feature which, when enabled, saves certain selectable information to a file on disk. This information can later be viewed by Sippican technical support and assists in situations when either the MK21 interface board or the WinMK21 software does not seemed to be functioning properly. When enabled, a check mark will appear next to the menu item to indicate that the diagnostic information is currently being logged to disk. To stop writing the diagnostic information to disk, select this menu item again.

The *Start Diagnostics* dialog will appear. This dialog allows the user to select the items to be included in the diagnostic file header as well as items that are to be recorded continuously while the file is open.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



The diagnostic information written to disk includes:

Header Information

System:	The current operating system and computer configuration
Display:	Video Display Configuration
Printer:	Printer configuration
WinMK21 DLLs:	WinMK21 DLL version information
System Files:	WIN.INI and SYSTEM.INI files

Continuously Recorded Information

Navigation Input:	Serial input settings and navigational information
WinMK21 Operation:	WinMK21 internal operations
WinMK21 Settings:	WinMK21 software settings

5.2.4.3 Diagnostic Parameters

If diagnostic information is already being recorded, then a dialog can be opened which allows the user to change what is being recorded to disk.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Header Information

System:	The current operating system and computer configuration
Display:	Video Display Configuration
Printer:	Printer configuration
WinMK21 DLLs:	WinMK21 DLL version information
System Files:	WIN.INI and SYSTEM.INI files

Any Header Information item that has already been written to the file will be gray. This indicates that this item cannot be removed from the header information once it has been written to disk.

Continuous Recording

Navigation Input:	Serial input settings and navigational information
WinMK21 Operation:	WinMK21 internal operations
WinMK21 Settings:	WinMK21 software settings

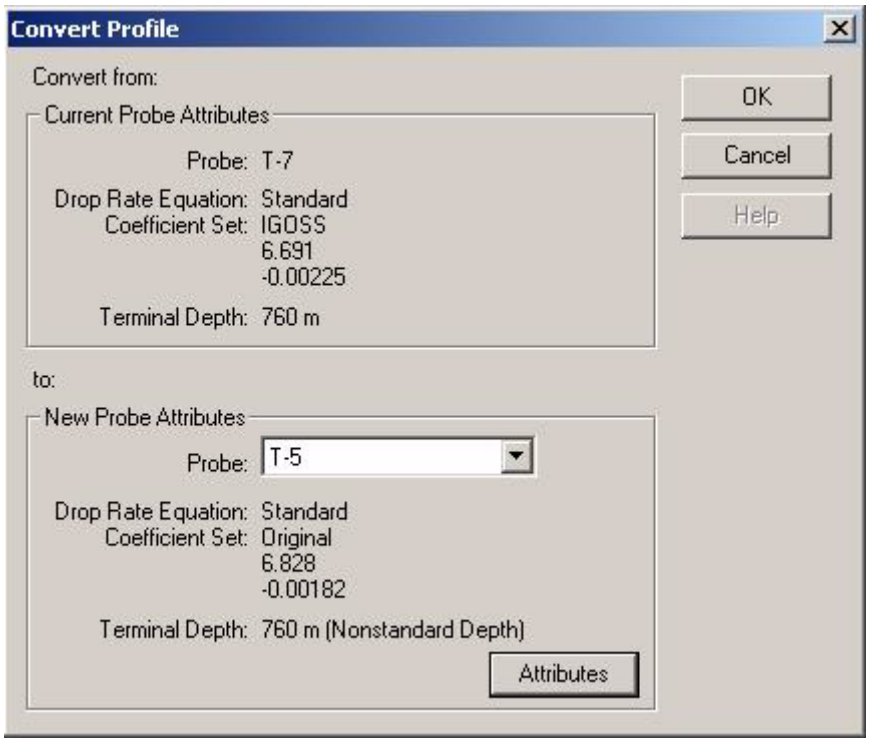
5.2.4.4 Convert

The *Convert* tool allows the operator to change the probe type of an existing data file. On occasion a probe is dropped with the incorrect probe type specified in the WinMK21 application. This can occur because all of the probes for each group share the same electrical characteristics. For example, the WinMK21 application is unable to distinguish the difference between a T-4 and a T-10. All XBT probes are treated the same by the data acquisition process in the WinMK21 application. However, it is important to specify the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

correct probe type since each probe within the probe group has unique drop rate coefficients which directly impact the depth calculation for the collected data. Furthermore, each probe has a unique terminal depth which determines the end of the data collection process.

To convert a profile, select *Tools* and then *Convert* from the menu bar. The *Convert Profile* dialog is displayed for the active profile.



The current probe attributes are listed in the top section. The new probe attributes are listed in the bottom section. Compatible probe types are listed in the **Probe** selection box. The operator can only convert to a probe type that has compatible electrical characteristics. For example, it is not possible to convert a T-10 to an XSV-01. Upon selection of a compatible probe type, the probe attributes are listed in the bottom section. The terminal depth of the current probe attributes are maintained for the new probe attributes.

Click the **Attributes** button to specify custom probe attributes for the new probe type.

Upon selecting the **OK** button, the profile is converted to the new probe type, with the specified probe attributes. The filename is also converted using the correct prefix for the new probe type. However, the operator must resave the file to disk.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.4.5 Read EEPROM (XCTD Probes only)

The Read EEPROM tool reads the contents of the EEPROM on both the analog and digital XCTD probes. If the active probe is an XCTD probe, then the Read EEPROM tool will attempt to read the contents of the currently active probe. The active probe is set using the Probe Selection dialog.

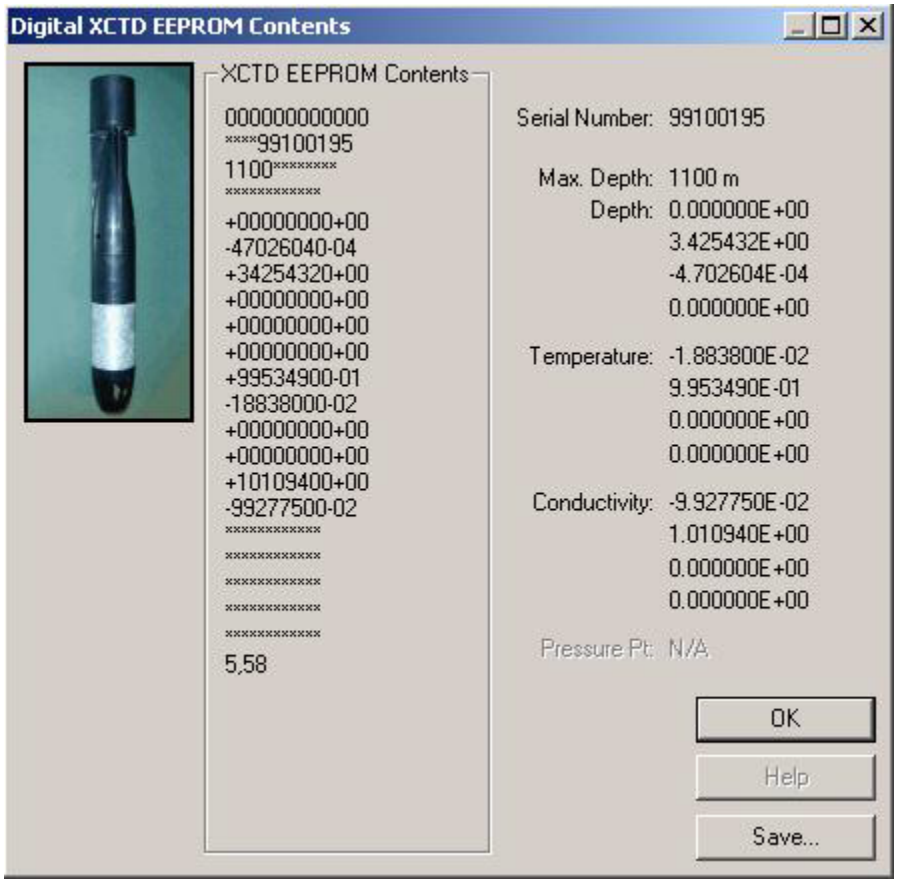
Normally the acquisition and utilization of the contents of the probe EEPROM happens at the beginning of each launch, and is completely transparent to the user. This feature can be used as a prelaunch verification check to ensure the system integrity (computer, launcher, cable connections, and probe) prior to launching the probe.

Analog XCTD Probes. The sensors on the analog XCTD probes are individually calibrated. The calibration coefficients are stored on the EEPROM of each probe and are used by the WinMK21 application to convert the sampled data into temperature and conductivity values. The analog XCTD maintains three temperature and three conductivity calibration coefficients. Furthermore, the EEPROM on the analog XCTD probes contains the serial number and may contain a Pressure Point calibration value.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital XCTD Probes. The sensors on the digital XCTD probes are individually calibrated. The calibration coefficients are stored on the EEPROM of each probe and are used by the WinMK21 application to convert the sampled data into temperature and conductivity values. The digital XCTD maintains four temperature and four conductivity calibration coefficients. Furthermore, the EEPROM on the digital XCTD probes contains the serial number, drop rate coefficients and terminal depth for the probe.



Save EEPROM Contents. Click the **Save** button to save the EEPROM contents to disk in ASCII text format. The user will be prompted to specify the filename and location for the resulting text file.

5.2.4.6 Update Firmware

The MK21 interface board firmware can be updated by the user. This should only be done when a new release of the firmware has been made available by Sippican. The process for updating the firmware is simple; however, there are several safeguards in place to prevent the possibility of inadvertently erasing the existing firmware on the MK21 interface board. This feature will be used only when new firmware has been provided by Sippican to add additional capability to the software, or fix a problem that has been identified to be repairable with a firmware change.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.4.7 Identifying the Current Firmware Version

The version of firmware resident on a MK21 interface board is identified by the date. To obtain the version date, select *Help*, then *About*, then *MK21 I/O Board*. The *About MK21 Interface Board* dialog will be displayed. The version date is specified under **Firmware Id.** If the **MK21 I/O Board** button in the *About WinMK21* dialog is grayed out, the MK21 interface board needs to be initialized. To do this, select *Actions*, then *MK21 I/O Board*, then *Initiate*. Then repeat the previous procedure to obtain the Firmware Id.

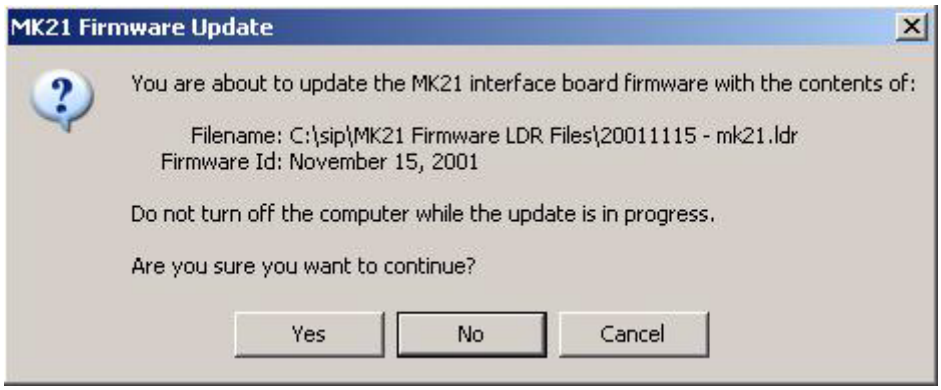
To update the firmware:

1. Obtain the MK21 firmware update file from Sippican. This is a file identified with an .LDR extension. It may be on a floppy disk, or copied to any disk space accessible by the WinMK21 program.
2. Select the *Update Firmware* menu item from the *Tools* menu. Using the browser, select the .LDR firmware update file discussed in the previous step.
3. The MK21 Firmware Update window prompts the user to set the PROGRAM/RUN switch to PROGRAM. This switch is the 2-position toggle switch on the edge connector of the MK21 interface board located above the DB-9 launcher cable connector and the red/white DIP switch. To set the PROGRAM/RUN switch to PROGRAM, toggle the switch in the direction away from the DB-9 launcher cable connector.
4. Click **OK** to proceed with the download.



5. At this point, the update procedure will require you to confirm the desire to continue with the firmware update using the specified .LDR file. The version of selected firmware update as identified by the date is displayed. This is the last chance to cancel the firmware update procedure. Answer **Yes** to proceed with the firmware update. If you select either **No** or **Cancel**, the operation will be cancelled.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



6. The firmware update will now be performed. For the ISA configuration, the update process takes only a few seconds. However, for the MK21/USB configuration, the update process takes considerably longer. A progress dialog is displayed during the update process for the MK21/USB configuration.



CAUTION *Do not try to perform any other action with the computer during the update. Do not turn off the computer while the update is in progress. Otherwise, the firmware on the MK21 interface board may become corrupted and MK21 interface board may become inoperable.*

---

7. Once the update is completed, the *MK21 Firmware Update* window prompts the user to set the PROGRAM/RUN switch back to RUN. At this time toggle the switch back to its original position, in the direction towards the DB-9 launcher cable connector. Select **OK**.

8. The update procedure now indicates that the update has been completed, and confirms that the PROGRAM/RUN switch has been set to the RUN position properly.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5 Profile Menu

The *Profile* menu provides commands for setting the profile display options. The *Profile* menu item is only available when the *Real-time Data Acquisition* window is open, or a previously acquired profile is being displayed.

Scaling	Displays pop-up menu for scaling settings.
Tabular Data	Toggle display of *Tabular Data* dialog for the current profile.
Original	Display the acquired unfiltered data.
Noise	Display the noise reduced data.
Averaged	Display the averaged data.
Salinity	Display the derived salinity data.
Sound Velocity	Display the derived sound velocity data.
Density	Display the derived water density data.
Pressure Pt	Displays pop-up menu for pressure point settings.
Overlay	Displays pop-up menu for overlay settings.

5.2.5.1 Scaling

The *Scaling* pop-up menu provides commands for setting the scaling options for the current profile.

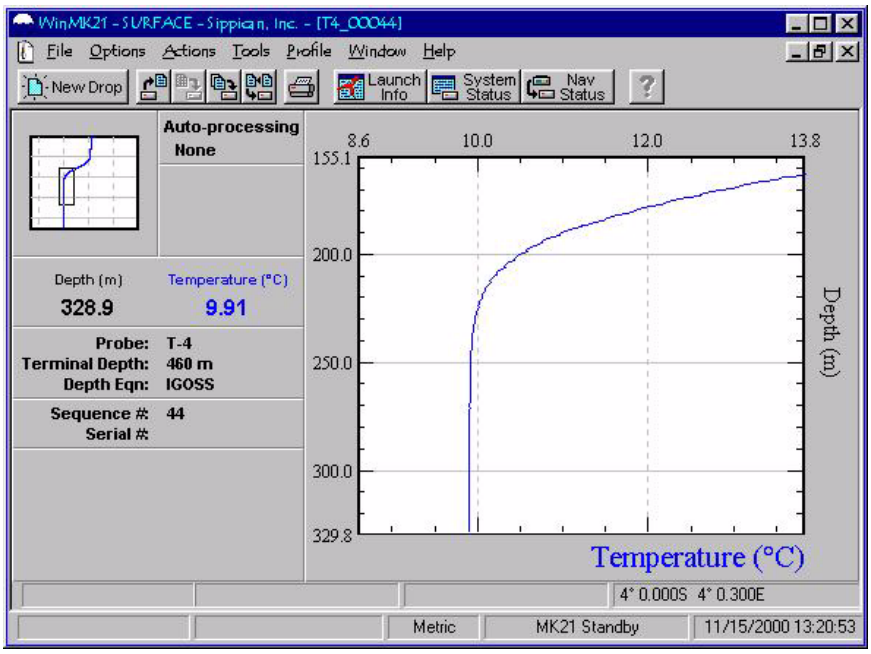
Default	Set the current profile scaling values to default values.
Auto	Set the current profile scaling values automatically.
Zoom Out	Zoom out from the current profile scaling settings.
Set	Set profile scaling settings.

5.2.5.2 Default Scaling

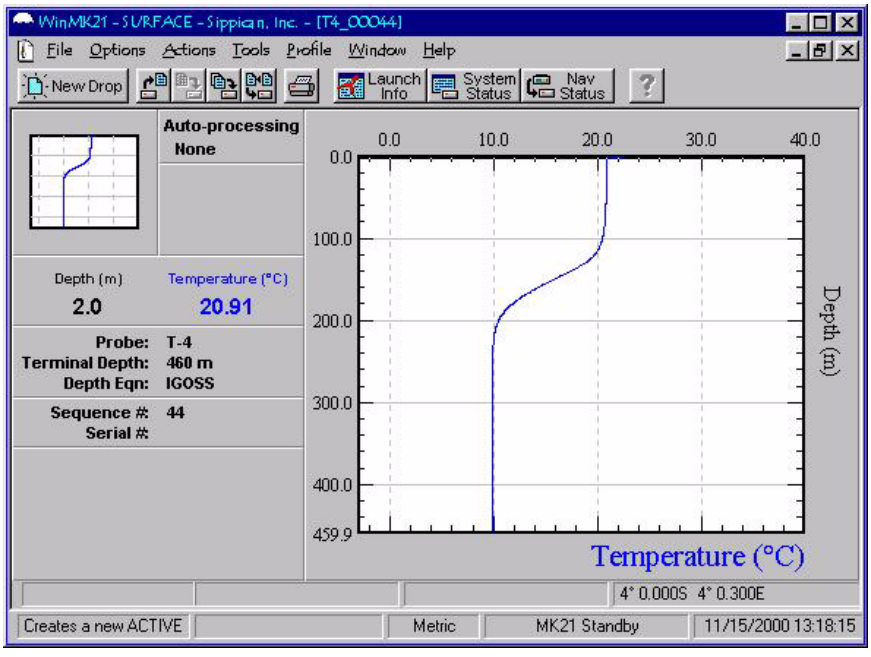
The *Scaling*|*Default* command sets the current profile scaling values to default values. The default scaling values are set by the *Scaling Parameters* dialog, accessed either by the *Options*|*Scaling* or *Scaling*|*Set* menu items.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

If the profile has been zoomed, it appears as follows:



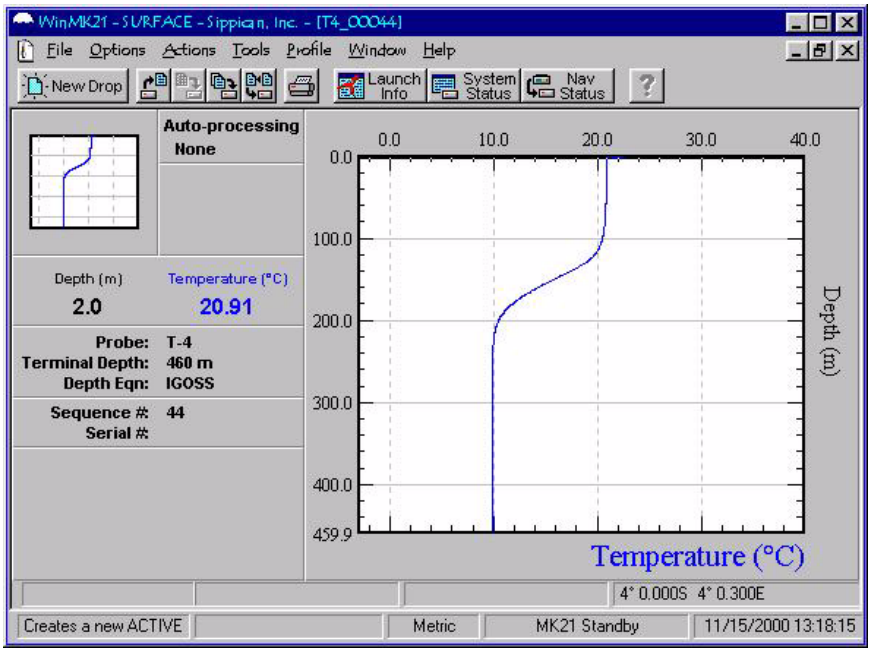
Selecting the *Default* menu item from the *Profile|Scaling* menu redraws the profile as follows:



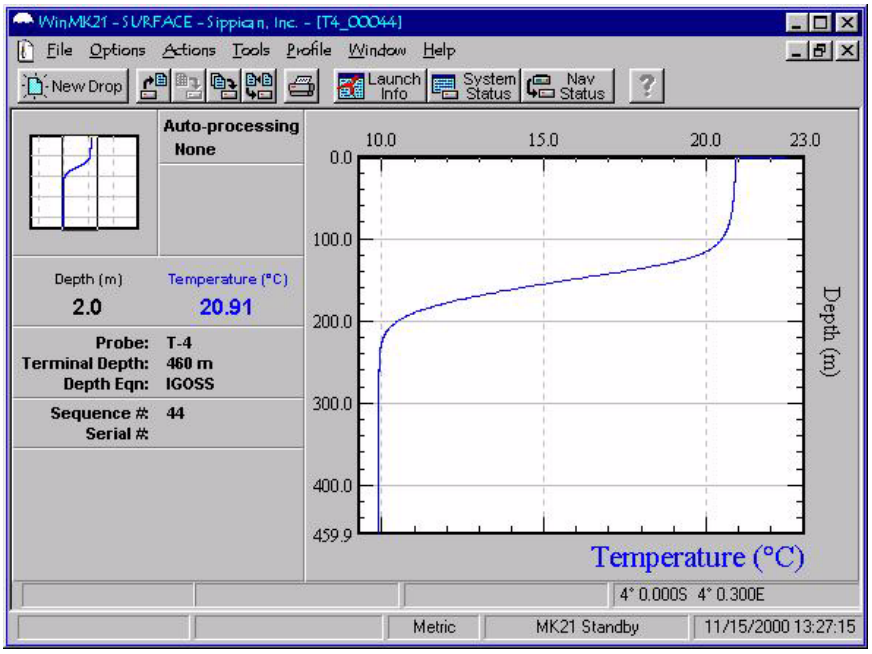
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.3 Auto Scaling

The *Scaling|Auto* command sets the current profile scaling values based on the minimum and maximum values of the profile data. A default profile appears as follows:



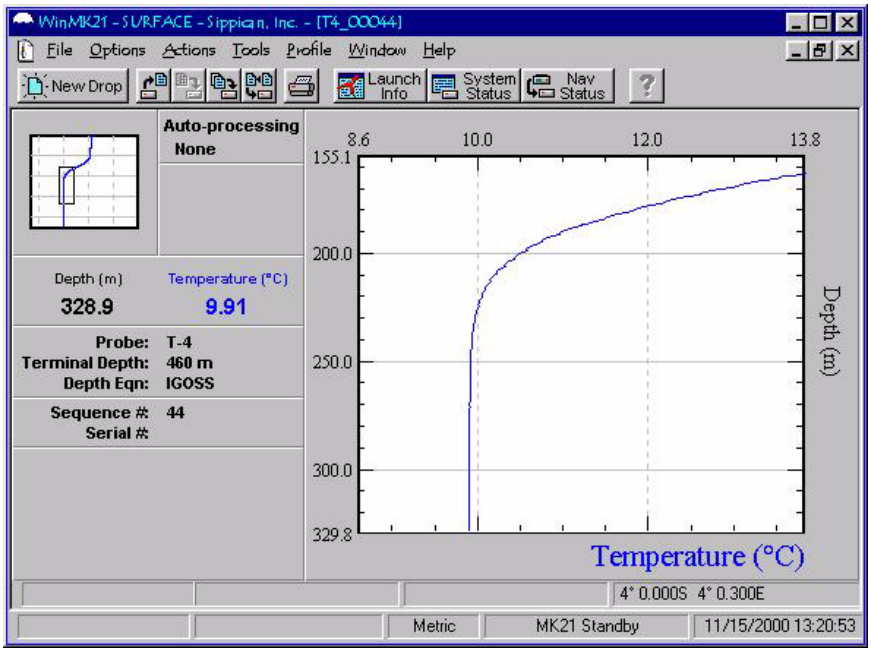
Selecting the *Auto* menu item from the *Profile|Scaling* menu redraws the profile as follows:



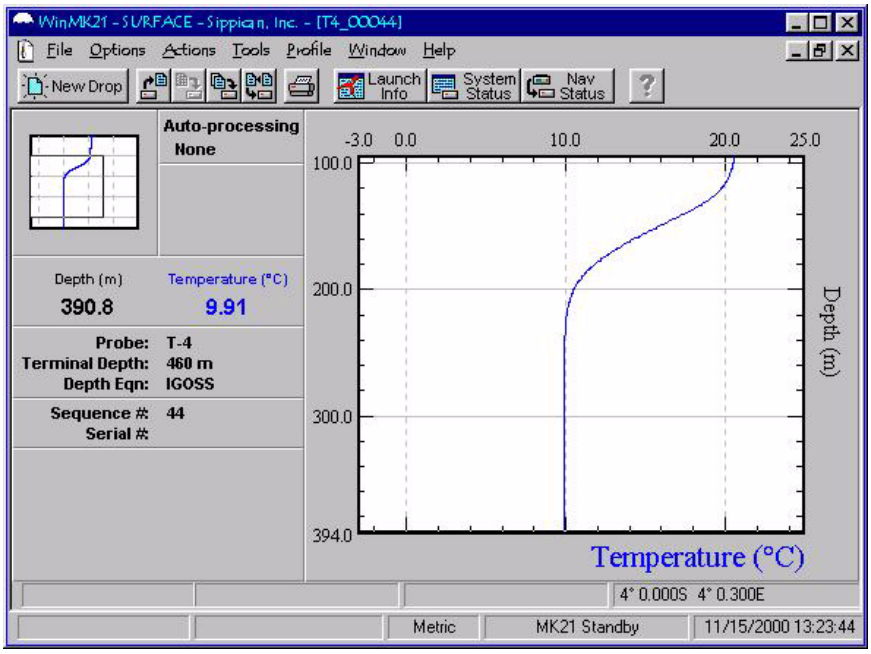
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.4 Zoom Out Scaling

The *Scaling|Zoom Out* command in the Scaling menu will expand the view of the current profile by doubling the current scaling values. A zoomed profile appears as follows:



Selecting the *Zoom Out* menu item from the *Profile|Scaling* menu redraws the profile as follows:



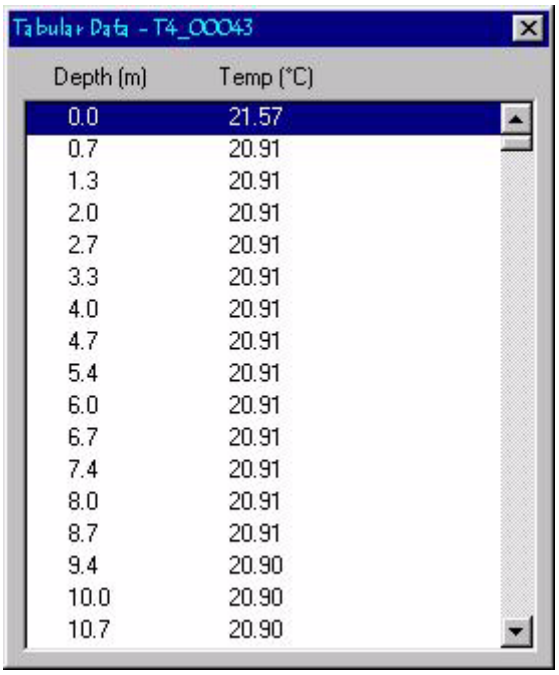
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.5 Set Scaling

The *Scaling*|*Set* command displays the *Graph Scaling - Defaults* dialog so you can set the minimum and maximum default scaling values for the various profile displays. This dialog is also accessed by the *Options*|*Scaling* menu item.

5.2.5.6 Tabular Data

The *Profile*|*Tabular Data* command toggles the display of the *Tabular Data* window. This dialog displays the profile data in a tabular format listed sequentially by depth. A check mark will appear next to the menu item to indicate the dialog for the active profile is currently visible. This dialog is shown below.



5.2.5.7 Original Profile

The original profile is a trace of the acquired and unfiltered data. To display the original profile select the *Original* menu item from the *Profile* menu. This action rewrites the original trace to the graphical display, retaining the current scaling. The acquired data is as follows for the different probes:

XBT:	Temperature
XSV:	Sound Velocity
XCTD:	Temperature and Conductivity

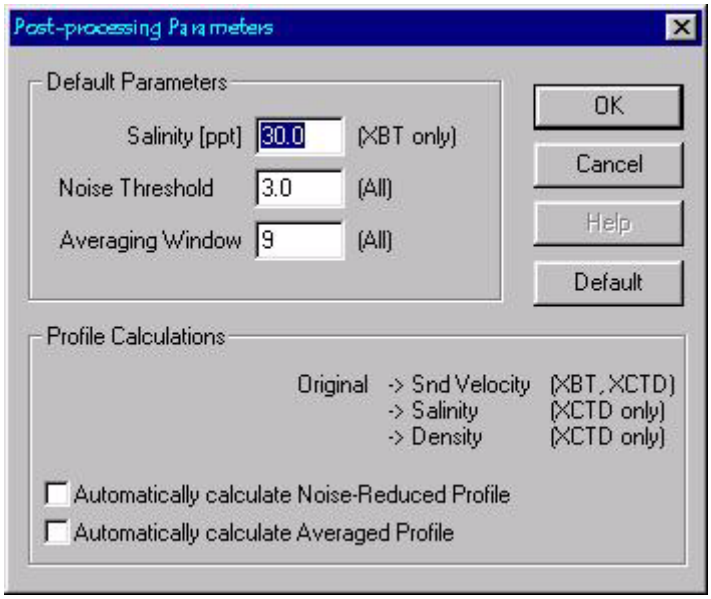
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.8 Noise Reduced Profile

The Noise Reduced profile is a trace of the data with the noise spikes removed. To display the noise reduced profile select the *Noise* menu item from the *Profile* menu. This function rewrites the trace while retaining the current scaling of the graphical display.

This function is performed by scanning each individual data point, and comparing the value of that data point with the value of the previous data point. If the difference between these two values is greater than the Noise Spike Threshold defined in the *Post-Processing Parameters* dialog, the current data point will be removed from the Noise Reduced profile. Subsequent data points are also compared to the last acceptable data point, and removed if their differences exceed the threshold. As the trace continues to be examined, the reference point is advanced when the difference drops below the threshold. After the trace is complete, there is a note in the Post-processing section of the profile window showing the percentage of points removed. For the XCTD probe, both data sets (conductivity and temperature) are processed in parallel. If either data set has a value which is suspect, then that data point is removed from both profiles.

The removal of data points can be influenced through the Noise Spike Threshold as defined in the *Post-processing Parameters* dialog. Select *Options*, and then *Post-Processing* to display the *Post-processing* dialog.



The value in the field labeled **Noise Threshold** defines the difference between data point values at which that data point will be removed. Simply enter a new value into this field to define a new threshold. Note that if the entered threshold value is too small, large voids can result in the display as groups of valid data points will be removed. Also note that this function does not modify the raw data file.

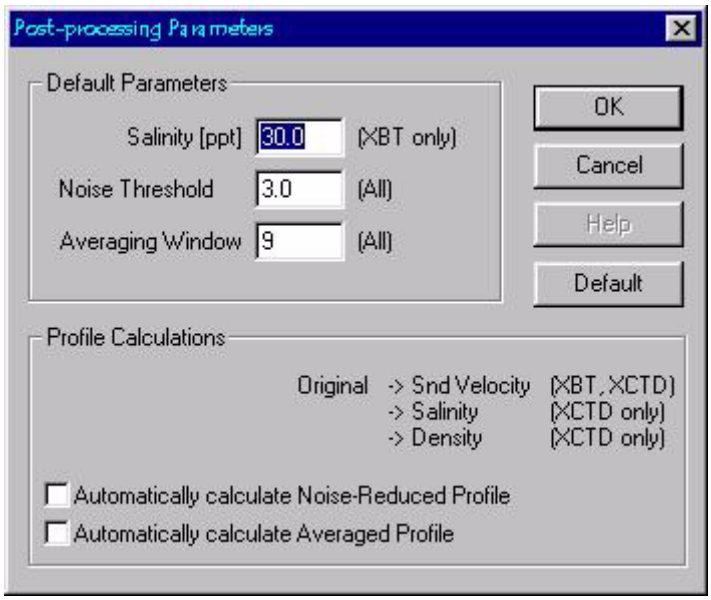
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.9 Averaged Profile

The Averaged profile is a trace of the data with the data averaged. To display the averaged profile select the *Average* menu item from the *Profile* menu. This function rewrites the trace while retaining the current scaling of the graphical display.

The WinMK21 application can optionally create a Noise Reduced profile first. Then the value of each remaining data point is averaged using a variable averaging window.

The averaging of data points can be influenced through the **Averaging Window** as defined in the *Post-processing Parameters* dialog. Select *Options*, and then *Post-Processing* to display the *Post-processing* dialog.



Enter a valid odd number in the **Averaging Window** field to change the number of values used in generating the Averaged profile. If the **Automatically calculate Noise-Reduced Profile** option has been selected in the *Post-processing Parameters* dialog, the acquired data will be automatically noise-reduced using the current settings before the data is averaged. Also note that this function does not modify the raw data file.

5.2.5.10 Salinity Profile

The Salinity profile provides computation and display of salinity. This profile display option is only available for XCTD probes. To display the salinity profile select the *Salinity* menu item from the *Profile* menu. This function rewrites the trace while retaining the current scaling of the graphical display. If the automatic post-processing options have been activated in the *Post-Processing Parameters* dialog, the acquired data will be automatically noise-reduced and/or averaged using the current settings before the salinity profile is derived.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The equation used to calculate salinity as a function of measured temperature, conductivity and depth is defined by the 1978 Practical Salinity Scale (PSS-78).[1, 2, 3]

5.2.5.11 Sound Velocity Profile

The *Profile|Sound Velocity* command computes and displays the derived sound velocity data in the graphical display. This profile display option is available for both:

XBT probes	Using the acquired temperature data and a default salinity value as set in the *Post-Processing Parameters* dialog.
XCTD probes	Using the acquired temperature and conductivity data.

If the automatic post-processing options have been activated in the *Post-Processing Parameters* dialog, the acquired data will be automatically noise-reduced and/or averaged using the current settings before the sound velocity profile is derived. The spike removal threshold, the percentage of data points that have been deleted and the size of the averaging window are displayed in the Post-processing section of the profile window.

The equation used to calculate sound velocity, often known as the UNESCO algorithm, is due to Chen and Millero.[4] For the original UNESCO paper see Fofonoff and Millard (1983).[5]

5.2.5.12 Density Profile

The *Profile|Density* command computes and displays the derived water density data in the graphical display. This profile display option is only available for XCTD probes.

If the automatic post-processing options have been activated in the *Post-processing Parameters* dialog, the acquired data will be automatically noise-reduced and/or averaged using the current settings before the water density profile is derived. The spike removal threshold, the percentage of data points that have been deleted and the size of the averaging window are displayed in the Post-processing section of the profile window.

The equation used to calculate density is defined in the UNESCO paper attributed to Fofonoff and Millard (1983).[5]

---

1. UNESCO Technical Papers in Marine Science, #36 (1981a) “The Practical Salinity Scale 1978 and the International Equation of State of Seawater 1980,” UNESCO Division of Marine Sciences (Paris), 25pp.
2. UNESCO Technical Papers in Marine Science, #37 (1981b) “Background papers and supporting data on the practical salinity scale, 1978,” UNESCO Division of Marine Science (Paris), 144pp.
3. 1978 Practical Salinity Scale Equations (January 1980) IEEE Journal of Oceanic Engineering, OE-5 No. 1, p. 14.
4. C-T Chen and F.J. Millero, Speed of sound in seawater at high pressures (1977) J. Acoust. Soc. AM. 62(5) pp. 1129-1135.
5. N.P. Fofonoff and R.C. Millard Jr., UNESCO Technical Papers in Marine Science, #44 (1983) “Algorithms for computation of fundamental properties of seawater,” UNESCO Division of Marine Science (Paris) 53pp.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.13 Pressure Point - Overview

The *Pressure Point* pop-up menu provides commands for setting the pressure point trigger depth for the current profile.

Set	Manually set the location of the pressure point signature at the current profile marker.
Remove	Manually remove the trigger depth indicating the pressure point signature.
Auto-Find	Automatically search the probe data for the pressure point signature.

5.2.5.14 Pressure Point - Set

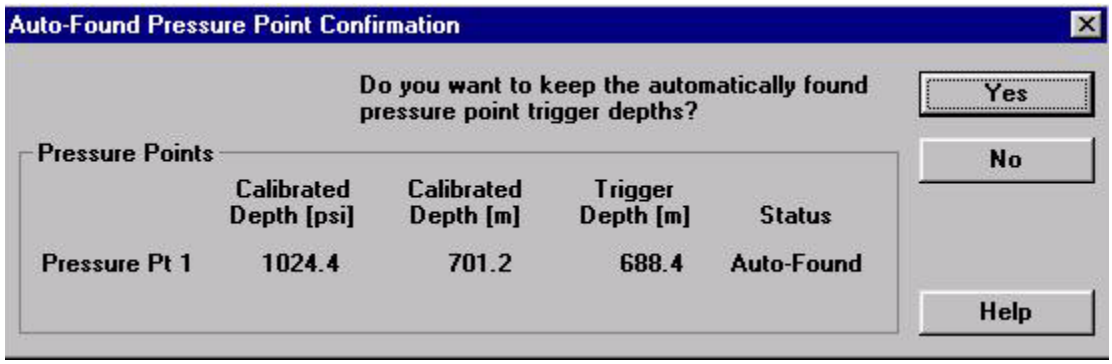
Select the *Set* menu item from the *Profile|Pressure Pt* menu to manually set the location of the pressure point signature. The trigger depth for the pressure point will be set to the current depth as indicated by the profile marker.

The *Profile*, *Pressure Point*, *Set* menu item is only available if the current probe is pressure point enabled and the calibrated depth of the pressure point has been properly defined. Only analog XCTD and T-12 probes are pressure point enabled. The calibrated depth of the pressure point is either read from an analog XCTD probe's EEPROM or from a .PPT file for both analog XCTD and T-12 probes.

To define the calibrated depth of the pressure point, select the *Attributes* menu item from the *Options|Probe* menu. The *Probe Attributes* dialog will appear. If the probe is pressure point enabled the **Pressure Pt.** button is enabled. Click the **Pressure Pt.** button to display the *Pressure Point* dialog. The user can now define the calibrated depth of the pressure point for the current probe.

5.2.5.15 Pressure Point - Auto-Find

Select *Profile*, *Pressure Pt*, and then *Auto-Find* from the menu bar to automatically set the location of the pressure point. WinMK21 will search the probe data for the pressure point signature. The results of the search are displayed in the *Auto-Found Pressure Confirmation* dialog.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

If the user confirms a successful search, the profile data is redrawn with the new corrected depths. The pressure point signature will be displayed at the calibrated depth and all the other probe depths will be adjusted accordingly.

5.2.5.16 Pressure Point - Undo

Select *Profile*, *Pressure Pt*, and then *Undo* from the menu bar to manually remove the trigger depth for the pressure point. This action effectively clears any existing pressure point correction to the depth equation.

The *Profile*, *Pressure Point*, *Undo* menu item is only available if the current probe is pressure point enabled and both the calibrated and trigger depth of the pressure point have been properly defined. Only analog XCTD and T-12 probes are pressure point enabled.

5.2.5.17 Overlay - Overview

An overlay allows you to view a profile from a previous launch on the graphical display, but does so using a lighter color than the current profile. The file name of the overlay profile is indicated in the caption bar of the profile window.

In some cases the overlay may not be able to draw a matching profile. The probe data in the selected overlay must be able to automatically calculate the matching data set in order to draw the overlay profile. For example, the data from an XSV probe drop cannot be used as an overlay for an XBT because the matching temperature profile cannot be derived automatically from the XSV data. As another example, the data from an XBT probe drop can be used as a partial overlay for an XCTD probe because at least the matching temperature profile is available in the XBT data.

The *Overlay* menu provides commands for adding and removing an overlay for the current profile.

Set	Add an overlay profile.
Remove	Remove an overlay profile.

5.2.5.18 Overlay - Set

Select *Profile*, *Overlay*, and then *Set* from the menu bar to add an overlay profile to the current profile. A dialog will appear which prompts the user to select a .rdf data file of a previous launch. Once the file is selected, the overlay profile is drawn in the graphical display using a lighter color than the current profile. Furthermore, the file name of the overlay profile is indicated in the caption bar of the profile window.

Select *Profile*, *Overlay*, and then *Set* from the menu bar to replace an existing overlay profile with a different overlay profile. You do not need to remove the existing overlay first.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.5.19 Overlay - Remove

Select *Profile*, *Overlay*, and then *Remove* from the menu bar to remove an existing overlay profile from the current profile. This menu item is only available if an overlay has been set for the current profile.

5.2.6 Window Menu

The *Window* menu provides commands to control the position and layout of the application's windows.

The *Status* pop-up menu allows you to toggle the display of the various status windows. A check mark will appear next to the name of the status window if it is currently displayed.

Launch Information	Toggle display of *Launch Information* window
System Status	Toggle display of *System Status* window
Navigation Input Status	Toggle display of *Navigation Input Status* window

The following menu items allow you organize the profile windows.

Cascade	Resize and position all profile windows, with the exception of the *Launch Information*, *System Status* and *Navigation Input Status* windows, in an overlapping pattern.
Tile	Resize and position all profile windows, with the exception of the *Launch Information*, *System Status* and *Navigation Input Status* windows, in non-overlapping pattern.
Arrange Icons	Align all iconized windows along a grid.
Close All	Close all profile windows.

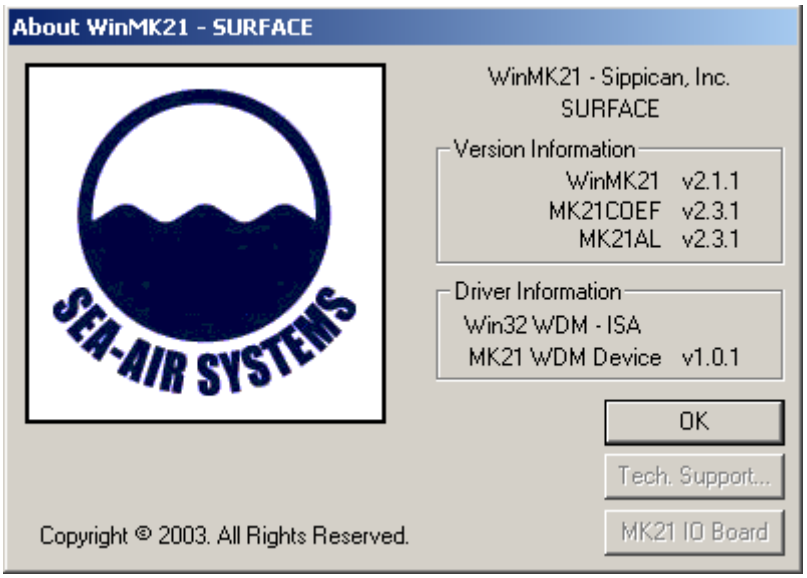
5.2.7 Help Menu

The WinMK21 application provides online help to assist users in using the WinMK21 software. If there are questions not answered by the online help, additional assistance is available by contacting Sippican.

The *About WinMK21* dialog displays the version information for the application and its support files. Additional information is listed for the device driver.

Click the **Tech. Support** button to display information on how to contact the Sippican - Technical Support. Click the **MK21 IO Board** button to display the *About MK21 IO Board* dialog that displays version information about the MK21 interface board.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



5.3 WinMK21 Tool Bar

The WinMK21 tool bar is a row of buttons at the top of the Main window which represent application commands. Clicking one of the buttons is a quick alternative to choosing a command from the menu. Buttons on the tool bar activate and deactivate according to the state of the application.

New Drop	Drop a new probe	*File|New Drop*
	Open a profile	*File|Open*
	Save the profile	*File|Save*
	Save the profile with a new name	*File|Save As*
	Export the profile in the active window	*File|Export*
	Print the profile in the active window	*File|Print*
Launch Info	Toggle Launch Information display	*Window|Status|Launch Information*
System Status	Toggle System Status display	*Window|Status|System Status*
Nav Status	Toggle Navigation Input Status display	*Window|Status|Navigation Input Status*
	Display help file contents	*Help|Contents*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.4 Dialog Overview

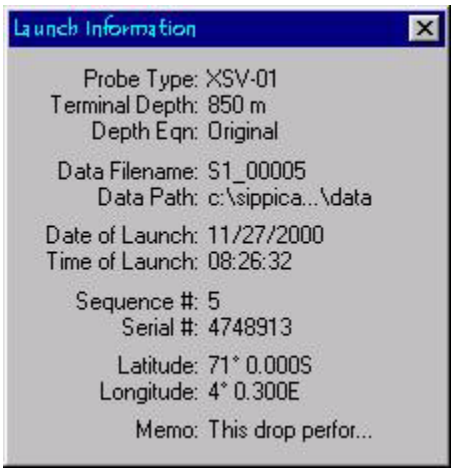
This section provides information on a few selected dialogs. These dialogs include:

- *Launch Information* window
- *System Status* dialog
- *Navigation Input Status* dialog

5.4.1 Launch Information

The *Launch Information* window displays the information related specifically to the currently active profile. This dialog displays the:

Probe Parameters:	Probe, Terminal Depth, Drop Rate Equation, Serial number.
Storage Parameters:	Data Filename, Data Path.
Launch Parameters:	Date and Time, Sequence Number, Latitude and Longitude position.
Custom Parameters:	Custom label and contents if available.



5.4.2 System Status

The *System Status* window displays the current system status parameters. This dialog displays the:

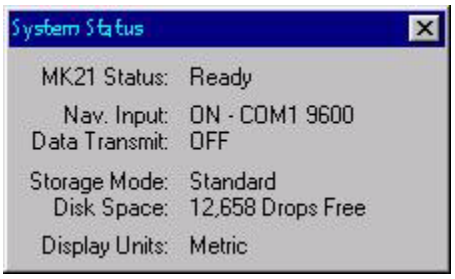
MK21 Status:	Indicates MK21 interface board state (Ready or Standby).
Nav. Input:	Indicates communications port state and settings.
Data Transmit:	Indicates if the collected data is to be transmitted to an external device.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Storage Mode: Indicates automatic export storage mode (.rdf and .edf) or standard storage mode (.rdf only).

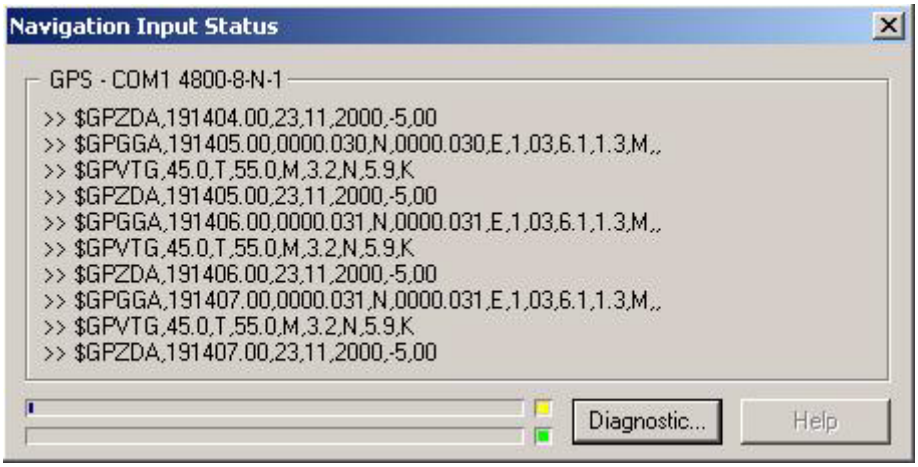
Disk Space: Indicates amount of free space available in the current default data path as the number of drops for the currently selected probe.

Display Units: Indicates universal system units (metric or English).



5.4.3 Navigation Input Status

The *Navigation Input Status* dialog displays diagnostic information related to the navigational input parameters and a scrolling display of the incoming serial data on the active communications port.



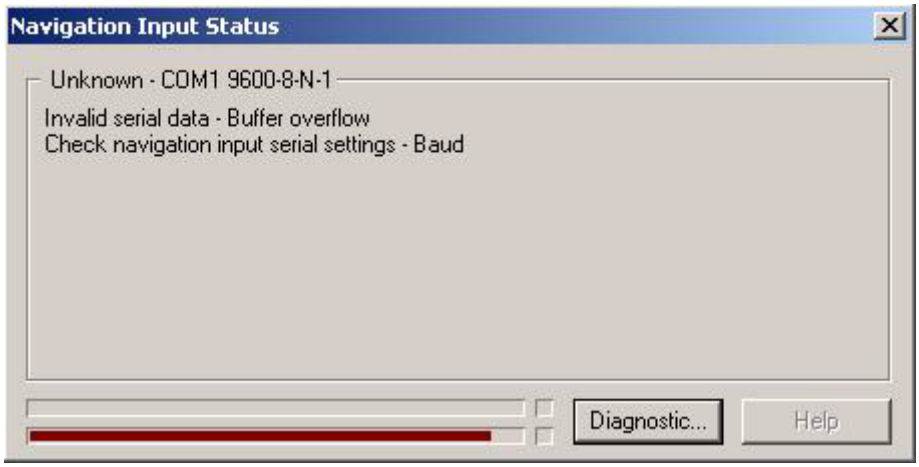
The horizontal bars at the bottom of the dialog indicate the status and activity of the two serial input buffers as follows:

Operating System Input Buffer Status. The top bar indicates the amount of bytes in the operating system's input buffer. Under normal operating conditions this bar will appear empty unless an internal process has temporarily delayed the WinMK21 application's ability to retrieve the serial information from the operating system's input buffer. The top square to the right of the indicator flashes when activity is detected on the operating system's input buffer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Internal WinMK21 Input Buffer Status. The bottom bar indicates the number of bytes in the internal WinMK21 input buffer. Under normal operating conditions this bar will appear empty. However, it is possible for the internal WinMK21 input buffer to begin to fill up if a lengthy internal process has temporarily delayed the WinMK21 application's ability to process the data in this input buffer. Once the WinMK21 is able to process the data in the internal input buffer, the indicator will revert to empty. The bottom square to the right of the indicator flashes when activity is detected on the internal WinMK21 input buffer.

The WinMK21 input buffer will fill up if the WinMK21 application is unable to process the data in the input buffer. This typically occurs if the navigation input serial settings, such as the baud rate, are not specified correctly for the incoming data stream.



In this example, the navigation input serial settings have been set to a baud rate of 9600. The incoming data stream from the external navigation device is set to a baud rate of 4800. The WinMK21 application is still able to read the data from the serial port, however, it is unable to process the data since it doesn't make any sense because of the incorrect serial settings. As a result, the internal WinMK21 input buffer simply fills up with the unprocessed serial data until an overflow is detected. Upon detecting an overflow, the WinMK21 application clears the internal input buffer and warns the operator of the possible problem.

Diagnostics. The **Diagnostic** button activates the diagnostics feature. If not already active, a diagnostics file is automatically named and created in the default data directory. This file will contain diagnostic system information related to the serial communications and records all incoming serial data and changes to the communications settings. Selecting the **Diagnostic** button a second time will stop recording the navigation input information to the current diagnostics file.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.5 Additional Information Overview

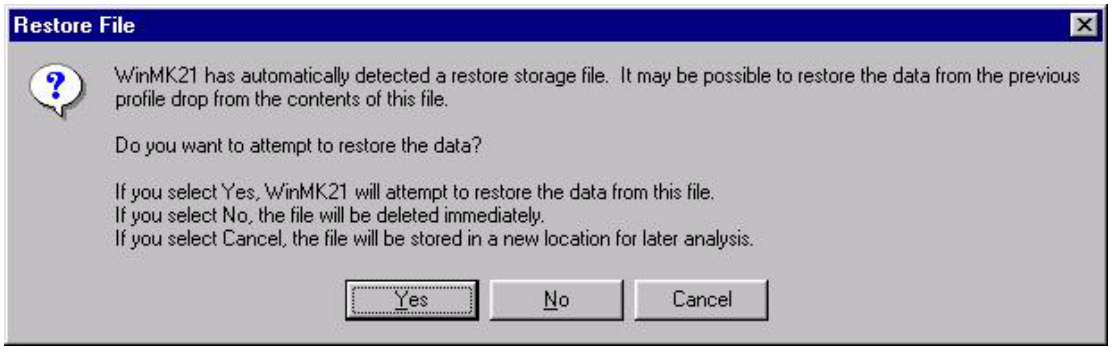
This section briefly explains some issues not related to other topics in this help file.

- Restore Storage File
- Configuration Log File
- Password Protection Overview
- Probe Filenames
- Raw Data Format
- Export Data Format
- Depth Equation
- Terminal Depth
- Navigation Input Reference - NMEA 0183

5.5.1 Restore Storage File

WinMK21 automatically creates a temporary restore storage file, MK21RSTR.SIP, in the default data folder for every probe drop. If the probe drop is completed successfully and the data is recorded to a valid RDF data file, the temporary restore storage file is automatically removed. However, if an unexpected error occurs that results in an incomplete probe drop or an unsuccessful storage of the data in a valid RDF file, the restore file remains available in the default data folder.

Upon restarting WinMK21, the restore file is automatically detected. The operator is presented with a list of options as follows:



Upon selecting **Yes**, WinMK21 will attempt to restore the data from the restore storage file. If the data recovery is successful, the data profile is displayed in a Data Window. The operator must manually save the profile to an RDF file. If the data recovery is unsuccessful, the operator is prompted to store the invalid restore storage file in a new

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

location and send the file to the Sippican - Technical Support for further analysis. If the restore storage file is not moved to a new location, it will be overwritten automatically at the beginning of the next probe drop.

Upon selecting **No**, the restore storage file will be deleted immediately.

Upon selecting **Cancel** the operator is prompted to move the restore storage file to a new location with an optional new name. This option allows the operator to record multiple restore storage files.

5.5.2 Configuration Log File

WinMK21 maintains a configuration log file, MK21CFG.LOG, in the Windows directory of the computer. The configuration log file records the original configuration settings and any subsequent changes to the WinMK21 settings. The configuration log file should never be deleted unless specifically requested by the Sippican - Technical Support. Furthermore, the configuration log file should not be maintained or viewed by the operator. The sole purpose of the file is to aid the Sippican - Technical Support in determining the original configuration of the WinMK21 settings and subsequent changes for technical support situations.

5.5.3 Password Protection

The Password Protection option allows the supervisor to restrict access to specific system options. The user can only access the restricted options if a valid password is entered. The password can contain up to 32 context sensitive alphanumeric characters, including spaces.

The Password Protection option is enabled by selecting the **Require password to change settings** option in the *User Parameters* dialog. The *New Password* dialog will appear and the supervisor is prompted to enter a new password. Once a new password has been activated, a user will be required to enter the password in the *Password Protection* dialog to access specific parameters.

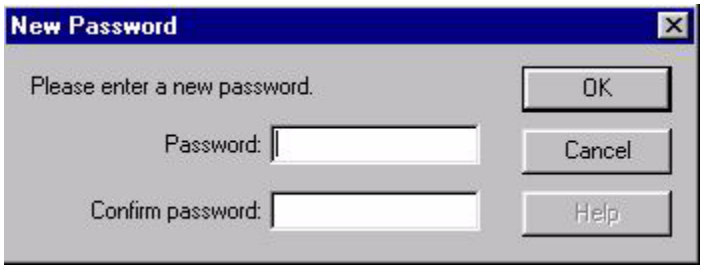
If you have lost or forgotten the supervisor password, contact Technical Support for assistance.

Password Protection Dialog. This dialog is presented when you are attempting to perform an action that is protected by a password. The dialog prompts you to enter the current supervisor password. If the password is entered correctly, you are allowed to proceed. If the password is entered incorrectly, you are not allowed to proceed.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

New Password Dialog. This dialog allows you to set a new password. The new password must be entered twice to verify the correct spelling. The password can contain up to 32 context sensitive alphanumeric characters, including spaces.



5.5.4 Probe Filenames

The data filename is constructed automatically from the probe type and sequence number. The first two characters of each data filename identify the probe type. The table below shows the prefixes for each probe type:

TYPE	PREFIX
T-4	T4_
T-5	T5_
T-6	T6_
T-7	T7_
T-10	T0_
T-11	T1_
T-12	T2_
Fast Deep	TF_
Deep Blue	TD_
XSV-01	S1_
XSV-02	S2_
XSV-03	S3_
XCTD-1	C3_
XCTD-2	C4_

The numeric portion of the data filename is taken from the sequence number.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.5.5 Raw Data Format

The Raw Data Format is a proprietary binary file format of the profile data. This file is the standard storage format for WinMK21, WinMK12 and the DOS-based MK12 applications. Although WinMK21 is able to convert files generated by the WinMK12 and DOS-based MK12 applications, the WinMK21 RDF data files are not compatible with the earlier WinMK12 and DOS-based MK12 applications. As such, the earlier WinMK12 and DOS-based MK12 applications can not read RDF files generated by WinMK21.

5.5.6 Export Data Format

The Export Data Format is an ASCII output file of the profile data. The file contains launch and probe information in the header. The complete profile data is then listed in tab-delimited format with a single data sample set on each line. A single data sample set consists of the calculated depth and the measured and derived data for each probe, i.e. temperature, sound velocity, conductivity, etc. An example of such a file is displayed below.

```
// This is a MK21 EXPORT DATA FILE  (EDF)
//
Date of Launch:  10/10/2000
Time of Launch:  08:49:38
Sequence #     :  49
Latitude       :  4 0.000S
Longitude      :  4 0.300E
Serial #       :  0
//
// Here are the contents of the memo fields.
//
//
// Here is some probe information for this drop.
//
Probe Type        :  T-4
Terminal Depth    :  460 m
Depth Equation    :  Standard
Depth Coeff. 1    :  0.0
Depth Coeff. 2    :  6.691
Depth Coeff. 3    :  -0.00225
Depth Coeff. 4    :  0.0
Pressure Pt Correction:  100.0%
//
Raw Data Filename:  C:\SIPPICAN\WINMK21\DATA\T4_00049.RDF
//
Display Units     :  Metric
//
// This XBT export file has been noise reduced and averaged.
```


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

```
Noise Threshold :  10.0 (0.0% spikes)
Averaging Window:  7
//
// Sound velocity derived with assumed salinity: 30.00 ppt
//
Depth (m) - Temperature (°C) - Sound Velocity (m/s)
4.7      20.91 1575.30
5.4      20.91 1575.31
6.0      20.91 1575.32
6.7      20.91 1575.33
7.4      20.90 1575.34
8.0      20.90 1575.35
8.7      20.90 1575.36
...
454.8    9.91  1552.97
455.4    9.91  1552.98
456.1    9.91  1552.99
456.7    9.91  1553.00
457.3    9.91  1553.01
458.0    9.91  1553.02
458.6    9.91  1553.03
```

5.5.7 Depth Equation

Probe depth is determined as a function of elapsed time after detection of seawater entry. The general expression for probe depth is a quadratic equation as follows:

Depth= A * time + B * time * time

The linear term is terminal velocity and the second-order term accounts for the slight reduction in probe mass as its wire dereels, reducing its descent speed as depth increases. Because probe types vary in geometry and mass, the equation coefficients also vary from type to type.

WinMK21 maintains a set of drop rate coefficients for each probe. The drop rate coefficients for all probe types were originally determined by Sippican. In 1995, The *Integrated Global Ocean Services System (IGOSS) Task Team on Quality Control Procedures for Automated Systems.*[1] published an extensive study refining the drop rate coefficients for the T-4, T-6 and T-7 XBTs. For these probes the IGOSS coefficients have been implemented as the default values. Where there are no IGOSS coefficients available, the original Sippican values are used as defaults (IGOSS option is not selectable). Note that the coefficients can also be modified by the user to custom values. Use of the custom coefficients is extremely rare and is not recommended without consulting with Sippican - Technical Support first.

1. K. Hanawa, P. Rual, R. Bailey, A. Sy, and M. Szabados, *A New Depth-Time Equation for Sippican or TSK T-7, T-6 and T-4 Expendable Bathythermographs (XBT)* published in IOC Technical Series No. 42.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The current selection for drop rate is displayed in the *Launch Information* window as Depth Equation. Any selection other than the default selection for a given probe type will be displayed in red to alert the operator that non-default values are being used. In Data Acquisition mode, to view or change the drop rate coefficients click on *Options*|*Probe*|*Selection*|*More*. In Post Processing mode, click on *Options*|*Probe*|*Attributes*. In either case the *Probe Attributes* dialog is displayed for the active probe.

XCTD-Deep Depth Equation. The XCTD-Deep analog probe allows a multi-stage depth equation. This is a customized depth equation for use with the XCTD-Deep probe that divides the probe descent into multiple stages based on time. Each stage has a unique set of drop rate coefficients and three additional correction factors. The Multi-Stage equation was designed to model the empirically measured descent of the XCTD-Deep probe. If required, please contact Sippican - Technical Support for more information on the XCTD-Deep depth equation.

Digital XCTD Depth Equation. The digital XCTD probes do not allow the operator to modify the drop rate coefficients. The drop rate coefficients are stored on the EEPROM and are determined at the time the probe is loaded in the launcher. The digital XCTD EEPROM format has allocated space for four drop rate coefficients for use with the depth equation. However, it is only using two terms, the linear and second-order terms, at this time. If a non-standard set of drop rate coefficients are read from a probe's EEPROM and subsequently used in the depth equation, this non-standard state is indicated in red in the *Launch Information* window.

5.5.8 Terminal Depth

Sippican probes are rated for specific depths. This rated depth will appear as the default value in the *Probe Selection* dialog.

Some users may be interested in modifying this depth. To modify the terminal depth for a specific probe type, click the **More** button in the *Probe Selection* dialog to display the *Probe Attributes* dialog for the selected probe.

The terminal depth can be decreased for purposes of saving time in the case of shallow depth profiles. Alternatively, the terminal depth can be increased to maximize the amount of data collected in the case of monitoring the probe beyond it's rated depth, until data transmission is terminated by a wire break. In the event of monitoring the probe beyond the rated depth, Sippican does not recommend increasing the terminal depth by more than 20%. Also, Sippican cautions that data collected when the wire is being stretched prior to breaking is often suspect. Furthermore, termination of the data transmission by breaking of the wire can cause the data collection program to appear to be hung up, particularly if the terminal depth has been reset to be very deep relative to the rated depth. In this event, terminate the data collection by selecting the *Terminate* menu item from the *Actions* menu. All data collected until that time will be written to disk.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.5.9 Navigation Input Reference - NMEA 0183

The *NMEA 0183 Standard for Interfacing Marine Electronic Navigational Devices* was adopted by the National Marine Electronics Association (NMEA) to allow marine instruments to transmit and receive information via a serial cable. This communication between a single talker and multiple listeners is based on a block transmission. Blocks, or groups of NMEA 0183 sentences, are transmitted over the serial cable. Each sentence has a header that uniquely identifies the talker and the information contained in the sentence. An external navigational device that supports the NMEA 0183 protocol continuously transmits at least the minimum implementation of sentences. A serial cable connects the external navigational device (talker) to a serial port of the WinMK21 control computer (listener).

The WinMK21 application will accept NMEA 0183 navigational information on a serial port. The WinMK21 application looks for the navigational information in the following sentences:

RMC:	Recommended Minimum Specific GPS/TRANSIT Data
RMA:	Recommended Minimum Specific Loran-C Data
GGA:	Global Positioning System Fix Data
GLL:	Geographic Position - Latitude/Longitude

When any of the position-related NMEA sentences are received by WinMK21 application, the latitude and longitude information is displayed in the *Launch Information* window. The position quality is appended to the latitude (SPS Mode, Differential GPS, PPS Mode or "Fix not avail. or invalid").

Furthermore, the WinMK21 application allows you to reset the computer system clock based on the external navigational device time provided by the ZDA, Time & Date sentence. The time-related ZDA sentence must be selected in the *Navigation Input Parameters* dialog.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.6 MK21 Interface Board Port Address

The factory default port address of the MK21 interface board is 0C00. The MK21 interface board communicates with the WinMK21 software by using up to 32 consecutive I/O locations starting at the designated port address.

It is recommended to initially use the factory default settings on the MK21 interface board. The MK21 interface board is designed to not interfere with other operations of your computer, and in most cases the default settings will be the preferred settings.

NOTE *The WinMK21 application and MK21 device drivers do not automatically detect the port address of the MK21 interface board. The port address settings for the WinMK21 application and MK21 device drivers must be set to match the physical address as indicated by the DIP switch on the MK21 interface board. Thus, if it is necessary to change the port address of the MK21 interface board it is very important to change both the physical address as indicated by the DIP switch on MK21 interface board and the port address settings used by either the WinMK21 application or MK21 device driver to locate the MK21 interface board.*

5.6.1 Determine Available Port Address for Use by MK21 Interface Board

The Device Manager system tool will allow you to determine which I/O port address locations are available on the PC for use by the MK21 interface board. An I/O port base address is indicated by a 4-digit hexadecimal number, such as 0C00. The MK21 interface board has a number of requirements when selecting a valid port address as follows:

For the 4-digit hexadecimal port address **WXYZ**:

1. **W** may be any value from 0 to F
2. **X** must be either 4 or C.

   For example, 1400 and 0C00 are valid; however, 1200 and 0D00 are invalid.
3. **Y** must be even.

   For example, 1480 and 0C20 are valid; however, 1410 and 0CD0 are invalid.
4. **Z** must be zero.

   For example, 1480 and 0C20 are valid; however, 1482 and 0C2C are invalid.

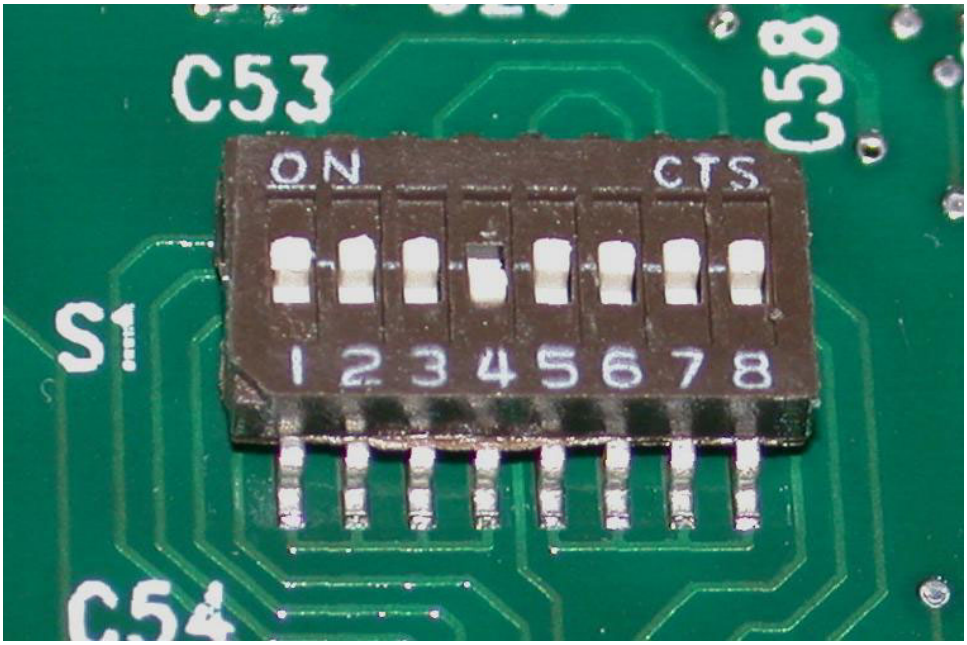
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.6.2 Changing the Port Address Settings in the WinMK21 Application or MK21 Device Driver

For the MK-21/USB configuration, the port address is modified from the System Parameters dialog. However, for the ISA configuration, the port address is maintained by the MK21 device driver. In Windows NT a separate utility, SetMK21, is provided to modify the port address setting for the device driver. In Windows 98/Me/2000/XP, the port address is modified using the Device Manager.

5.6.3 Changing the Port Address Settings on the MK21 Interface Board

The port address on the MK21 interface board is set using the 8-position DIP switch (S1) on the MK21 interface board. The 8-position DIP switch is located in the middle lower section of the MK21 interface board. Each individual switch, as indicated by the number along the bottom, is a toggle switch which can be either On or Off. A switch is considered On when the tab is in the position closest to the On label. The switch is considered Off when the tab is in the position away from the On label. In the figure below, switch 4 is in the Off position. All of the other switches are in the On position.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Setting the 8-position DIP switch using the 4-digit port address, **WXYZ**, is a three part process as follows:

1. Set the DIP positions 1 - 3 based on the **Y** value of the port address as follows:

Y	1	2	3	
0	On	On	On	***** Default - 0C00 (Y = 0)**
2	Off	On	On	
4	On	Off	On	
6	Off	Off	On	
8	On	On	Off	
A	Off	On	Off	
C	On	Off	Off	
E	Off	Off	Off	

2. Set the DIP position 4 based on the **X** value of the port address as follows:

X	4	
4	On	***** Default - 0C00 (X = C)**
C	Off	

3. Set the DIP positions 5 - 8 based on the **W** value of the port address as follows:

W	5	6	7	8	
0	On	On	On	On	***** Default - 0C00 (W = 0)**
1	Off	On	On	On	
2	On	Off	On	On	
3	Off	Off	On	On	
4	On	On	Off	On	
5	Off	On	Off	On	
6	On	Off	Off	On	
7	Off	Off	Off	On	
8	On	On	On	Off	
9	Off	On	On	Off	
A	On	Off	On	Off	
B	Off	Off	On	Off	
C	On	On	Off	Off	
D	Off	On	Off	Off	
E	On	Off	Off	Off	
F	Off	Off	Off	Off	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.6.4 Sample Port Address Settings

The following samples illustrate the conversion from the 4-digit hexadecimal port address to the 8-position DIP switch.

Port Address	1	2	3	4	5	6	7	8	
0400	On	On	On	On	On	On	On	On	
0C00	**On**	**On**	**On**	**Off**	**On**	**On**	**On**	**On**	*****Default**
0C60	Off	Off	On	Off	On	On	On	On	
1400	On	On	On	On	Off	On	On	On	
4CE0	Off	Off	Off	Off	On	On	Off	On	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

This page is intentionally left blank.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 6
SERIAL-BINARY DATA TRANSMISSION DESCRIPTION

The WinMK21 Data Acquisition and Post-Processing Software can transmit temperature and sound velocity data either in Data Acquisition mode at the end of a probe's descent or in Post Processing mode using the serial-binary data transmission interface. This section specifies the interface requirements for WinMK21 and an external serial device to achieve the serial-binary data transmission between them.

6.1 Physical Requirements

WinMK21 provides a transmit-only serial channel that conforms to either the TIA/EIA-232 or the TIA/EIA-422 standard. WinMK21 does not support any software or hardware flow control mechanism. In relation to WinMK21, the serial interface acts as an asynchronous, simplex (TRANSMIT only) interface.

The serial channel configuration parameters are as follows:

Parameter	Setting
Baud Rate	2400
Character Bits	8
Stop Bits	2
Parity	Odd

6.2 Protocol Requirements

WinMK21 transmits a four-byte header message to inform the host system of the probe type selected by the operator. From this information, the host system can allocate the proper amount of buffer space receiving the data as well as select the appropriate data processing algorithm. The first data message is sent approximately two seconds after the header message. WinMK21 sends a precise number of data messages for each of the probe types as follows:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Probe Type	Total Number of Data Messages
T-4, T-6	750
T-5	3000
T-7	1250
T-10	330
XSV-01	1395
XSV-02	3281

A data message is sent for every two-foot depth interval. WinMK21 samples the probe data at a constant 100 millisecond interval for the duration of the probe drop. Thus, the time-based data is interpolated to generate the two-foot interval data.

6.3 Message Requirements

6.3.1 XBT Header Message Format

The four-byte header message transmitted for the XBT probes contains three bytes of all zeroes and a fourth byte of five zeroes and a three bit probe type code. The header message is transmitted only once and cannot be re-transmitted. The four-byte header message, listed from MSB to LSB, is formatted as follows:

	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
Byte 1	0	0	0	0	0	0	0	0	
Byte 2	0	0	0	0	0	0	0	0	
Byte 3	0	0	0	0	0	0	0	0	
Byte 4	0	0	0	0	0	P2	P1	P0	
						1	0	0	T-4, T-6
						1	0	1	T-5
						1	1	1	T-7
						0	1	0	T-10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.2 XSV Header Message Format

The four-byte header message transmitted for the XSV probes contains three bytes of all ones and a fourth byte of five zeroes and a three bit probe type code. The header message is transmitted only once and cannot be re-transmitted. The four-byte header message, listed from MSB to LSB, is formatted as follows:

	7	6	5	4	3	2	1	0	
Byte 1	1	1	1	1	1	1	1	1	
Byte 2	1	1	1	1	1	1	1	1	
Byte 3	1	1	1	1	1	1	1	1	
Byte 4	0	0	0	0	0	P2	P1	P0	
						0	1	1	XSV-01
						1	1	0	XSV-02

6.3.3 Data Message Format

The bit format of the data message is not standard and requires the receiving computer to do bit manipulation and scaling to generate useful values. The data message consists of four bytes containing a twelve-bit temperature/sound velocity word and a twelve-bit depth word. The four-byte data message, from MSB to LSB, is formatted as follows:

	7	6	5	4	3	2	1	0
Byte 1	X11	X10	X9	X8	X7	X6	X5	1
Byte 2	X4	X3	X2	X1	X0	1	1	0
Byte 3	Y11	Y10	Y9	Y8	Y7	Y6	Y5	0
Byte 4	Y4	Y3	Y2	Y1	Y0	0	P	0

The bits X11–X0 contain the temperature/sound velocity word. The bits Y11–Y0 contain the depth word. Bit 0 (LSB) of byte 1 is always set to a one while bit 0 of bytes 2–4 are always set to zero. This feature can be used to properly frame a data message should individual bytes be lost. Bit 1 of byte 4 (P) provides an odd parity check of the entire data message.

6.3.4 Data Out-of-Range Messages

When the input stimulus to WinMK21 exceeds the expected range, it loads default values into the data message. The temperature/sound velocity portion of the data message (X11–X0) is set to all zeroes if the data is less than the lowest expected value. The temperature/sound velocity portion of the data message (X11–X0) is set to all ones if the data is greater than the highest expected value. In all cases, the depth data reflects the actual depth of the measurement.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.5 Temperature Range

The valid temperature range of WinMK21 is 26°F to 98°F. If the input stimulus measures less than 26°F, the temperature bits are set to all zeroes in the data message. If the input stimulus measures greater than 98°F, the temperature bits are set to all ones in the data message.

6.3.6 Sound Velocity Range

The valid sound velocity range of WinMK21 is 4610 ft/sec to 5118 ft/sec. If the input stimulus measures less than 4610 ft/sec, the sound velocity bits are set to all zeroes in the data message. If the input stimulus measures greater than 5118 ft/sec, the sound velocity bits are set to all ones in the data message.

6.3.7 Processing Algorithm

When the host receives an XBT header message, bits X11–X0 of the data message contain temperature data. The host converts this twelve-bit word to temperature in degrees Fahrenheit with the following equation:

$$\text{Temperature [°F]} = X / 4095 * 72 + 26$$

When the host receives an XSV header message, bits X11–X0 of the data message contain sound velocity data. The host converts this twelve-bit word to sound velocity in feet/second with the following equation:

$$\text{Sound Velocity [ft/sec]} = X / 4095 * 508 + 4610$$

Irrespective of the header message, bits Y11–Y0 of the data message contain depth data. The host converts this twelve-bit word to depth in feet with the following equation:

$$\text{Depth [ft]} = Y * 2$$

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP