System 3

(Version 4.00)

User's Manual

Order No. 4200-036-400

Revision A

Preface

About This Manual

The System 3 (Version 4.3) Manual is divided into seven sections.

Section I, Introduction, is a brief overview of the hardware components and software programs that comprise System 3.

Section II, Setup and Operation, is a “How-To” section which describes, in a step-by-step sequence, how use the System 3 software programs to setup a configuration file and how to put the configured file into operation.

Section III, Diagnostics, describes diagnostic, monitoring, optimization, and troubleshooting checks and utilities.

Section IV, Hardware, describes the specifications, installation, and deployment of System 3 hardware and associated DigiCOURSE wet-end equipment.

Section V, Setup Program, describes the setup configuration software.

Section VI, Operator Interface Program, describes the operational software.

Section VII, Analysis Program, describes the analysis utility software.

If you find errors or omissions in this manual, please fax your comments to the Input/Output Marine Systems Engineering Department at 504 734-8627.

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System 3 (Version 4.0) User's Manual

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Section I Introduction

SYSTEM OVERVIEW

System 3 is a hardware and software package that controls and collects data from a network of acoustic sensors and streamer positioning devices. System 3 has on-line command, diagnostic, and performance-monitoring capabilities. See Figure 1.1, for a diagram of the System 3 Architecture.

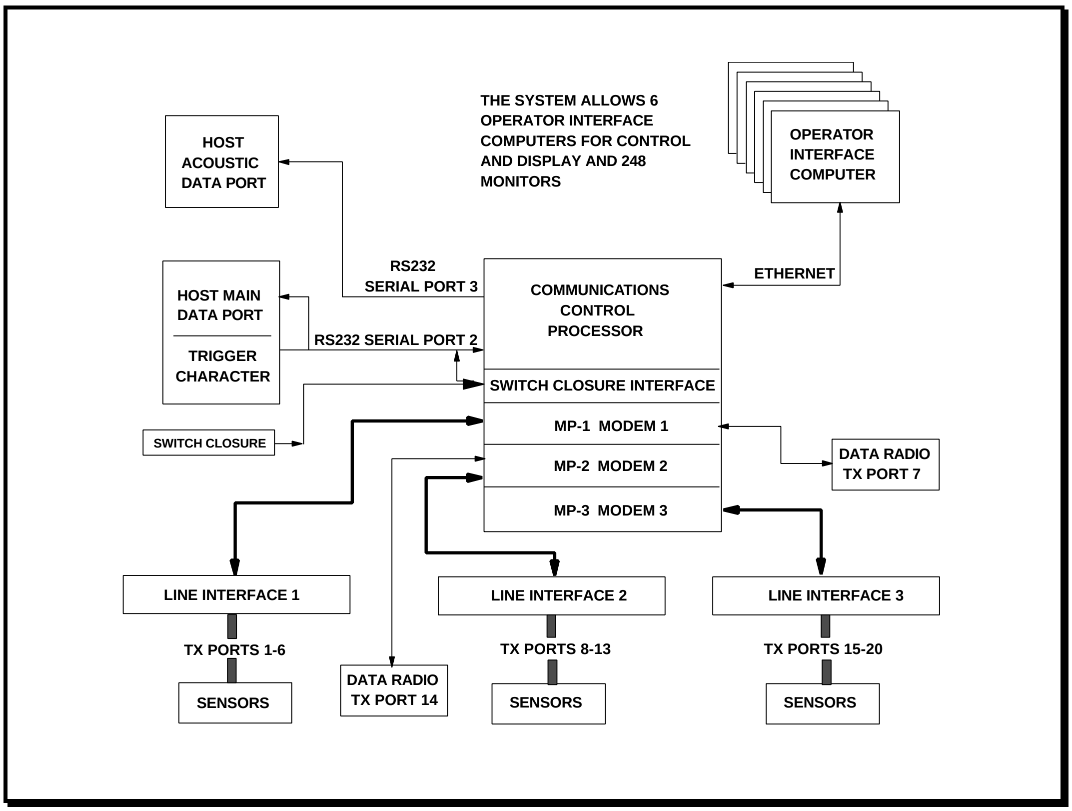


Figure 1.1 System 3 Architecture (three-Modem)

Hardware Overview

System 3 hardware is composed of three main components: a Data Management Unit, an Operator Interface computer, and one, two, or three Line Interface Units.

Data Management Unit

The Data Management Unit (DMU) is the interface between the shipboard computers and the sensors on the cables. It serves as a centralized data switch for data collected from the sensors, and distributes data to the shipboard computers. All functions relating to communications with the sensors and external computers are implemented within this unit.

Operator Interface Computer

The Operator Interface computer is the system command console. It handles all operator control and monitoring functions by implementing the three System 3 software programs: Setup, Operator Interface (OI), and Analysis. From the Operator Interface computer you can enter commands and configuration data to set up the system, execute sensor control, diagnostic, and test functions, and display current information on streamer position and sensor performance in both tabular and graphic formats.

The system can be set up to use multiple Operator Interface computers. In System 3 Versions 2.0 and later, up to six Operator Interface computers can be set up to provide full command and control functions. An additional 248 Operator Interface computers can be set up in monitor mode only.

The DMU and the Operator Interface computer(s) communicate over an Ethernet connection.

Line Interface Unit

The Line Interface Unit (LIU) provides the physical interface between the DMU and the transmission lines. Each LIU has six transmission line connectors. In System 3 versions 3.0 and later, up to three LIUs are provided for 18-streamer capabilities: each LIU supports 6 streamers, with ports 7 (Modem #1) and 14 (Modem #2) reserved for data radio ports.

Optional Dry-End Components

An expanded System 3 may include optional hardware, such as a Line Power Unit (LPU), additional Operator Interface computers, additional Line Interface Units, and other on-board electronics, such as a Rack-mount CMX.

The DMU, Operator Interface computer, LIU, and other on-board components collectively comprise what is called "the dry end."

Wet-End Components

Other components (which are not intrinsically System 3 components, but are used in conjunction with the System 3 hardware) comprise what is called "the wet end."

These “wet end” components include the acoustic units (CMX and CTX units), birds, velocimeters, and any in-streamer compasses and in-streamer depth sensors. In System 3 versions 3.0 and later, the system can include up to 500 sensors (a maximum of 180 can be acoustic units; the remainder, non-acoustic units) with up to 600 ranges.

Additional Information

For expanded information on the System 3 hardware components, including the wet end components that are used with System 3, see Section IV, Hardware.

Software Overview

System 3 is operated through the Operator Interface computer using three software programs: the Setup Program, the Operator Interface Program, and the Analysis Program.

Setup Program

The Setup program allows you to set up the parameters needed for operation of the system.

The Setup Program is the system configuration program. Setup allows you to set the parameters needed for operation of the system. The Setup program supports the definition, editing, and transferring of system level parameters, lines, sensor equipment, and acoustic ranges. All configuration data is first entered and stored on disk; then an option is presented for transferring the configuration data to the DMU. Configuration of the system can be done either entirely in one session or in several separate sessions. To put a new Setup parameter file into service, it must be transferred to the DMU. Any number of setup files can be stored in the Operator Interface computer with file name identification.

Unlike the Operator Interface computer, which can store many setup files, the DMU can run only one. When a Setup file is transferred to the DMU, it remains in effect until it is replaced by another setup file.

How to use the Setup Program is discussed in Section II, Setup and Operation. The entire Setup Program is described Section V.

Operator Interface Program

The Operator Interface Program allows you to monitor and control the system; it provides a real-time interface that allows you to interact with the system while acquiring seismic data.

How to use the Operator Interface Program is discussed in Section II, Setup and Operation. The entire Operator Interface Program is described in Section VI.

Analysis Program

The Analysis allows you to analyze acoustic data that has been acquired.

Installation of the Analysis program is optional; it can not be executed unless the software has been installed on the Operator Interface computer. The Analysis files should be installed in the same directory as the System 3 files.

The Analysis Program is described in Section VII.

Section II Setup and Operation

This is a “How-To” section that describes, in a step-by-step sequence, how to use the System 3 software programs to setup a configuration file and how to put the configured file into operation. Follow the instructions in each step carefully.

For a complete description of the individual System 3 software programs, see Section V, Setup Program; Section VI, Operator Interface Program; and Section VII, Analysis Program.

SETUP FUNCTIONS

Step 1 Prerequisites

Before starting the Setup Program, you must assemble the following prerequisite information. A rough sketch of the system layout will also make the configuration process easier, faster, and more accurate.

1. Lateral offsets for all platforms
2. Cable offsets for all sensors (Acoustic and Bird units)
3. Unit numbers (for both Acoustic and Bird units)
4. Unit serial numbers (for both Acoustic and Bird units)
5. Target depth settings for all streamers

Step 2 Enter the Setup Program

To initialize the system, first apply power to the Data Management Unit, then to the Operator Interface computer. The power switch for the Data Management Unit (DMU) is at the lower right corner of the front panel.

The entire boot process takes approximately 40 seconds. When the DMU is powered, the green LEDs labeled RUN and SCON will illuminate.

On the Operator Interface computer, start the Setup program by double-clicking on the program icon.

From the Setup program's Main Window, you must either open an existing Setup file, create a new Setup file, or import a Setup file from a Spectra navigation system (see the Spectra File Exchange topic in Step 16):

How to Create a New File

You can create a new file by any of the following methods:

Click on **File** / **New.**

Press **Ctrl** + N.

Click on the "New" button .

How to Open an Existing File

You can access an existing file by any of the following methods:

Click on **File / Open**.

Click on **File**, then select from the list of existing files at the bottom of the menu.

Press **Ctrl** + O.

Click on the "Open" button .

Step 3 Set Global Parameters

The **System / Global** command accesses the **Global Parameters Dialog Box**, which allows you to define system-wide parameters that are not associated with any subsystem. The parameters that can be defined or edited are Vessel Number, Number of Transmission Ports, Units for Depth Measurement, and Emergency Dive Depth. The Emergency Dive Depth must be set before the creation of a Setup configuration.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array, it will not access the Global Parameters Dialog Box.

Section II   Setup and Operation

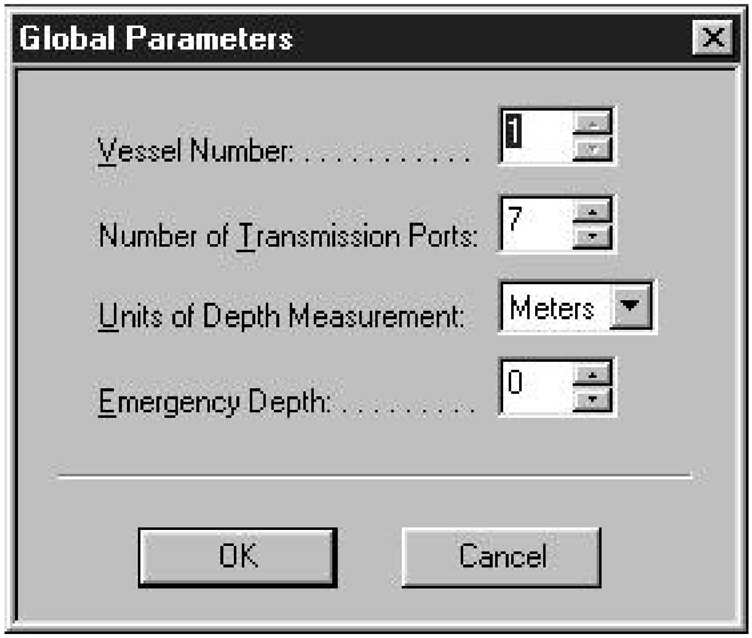


Figure 2.1 Global Parameters Dialog Box

Vessel Number

The range of entries is 1 to 4. The default is 1. This data field is used primarily in multi-boat configurations.

Number of Transmission Ports

This parameter is the number of transmission lines used in a given installation. Each DMU modem supports up to seven transmission lines (including the radio port). The range is 1 to 20.

Ports 7 and 14 are used for radio data telemetry only.

Units of Depth Measurement

The depth can be displayed in either feet or meters. This selection also effects the unit of depth measurement that is sent to the Host computer.

Emergency Depth

The range is between 0 to 125 meters. The default is 0. The emergency dive depth specifies the target depth for all lines when an emergency dive command is executed. The Emergency Dive Depth must be set before the creation of a Setup configuration.

When using Model 5010E or 5011E birds, do not enter depths greater than 31 meters (103 feet).

Step 4 Set Host Parameters

The **System / Host** command accesses the **Host Parameters Dialog Box**, which allows you to define the configuration of the communications ports. These ports are used to transfer data to the Host computer and to select the data formats for acoustic and non-acoustic data. The parameters that can be defined (or edited) include the selection of the Logging Mode, Non-acoustic data format, Non-acoustic data sort direction, Acoustic data port, Acoustic data protocol, and Acoustic port characteristics.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array, it will not access the Host Parameters Dialog Box.

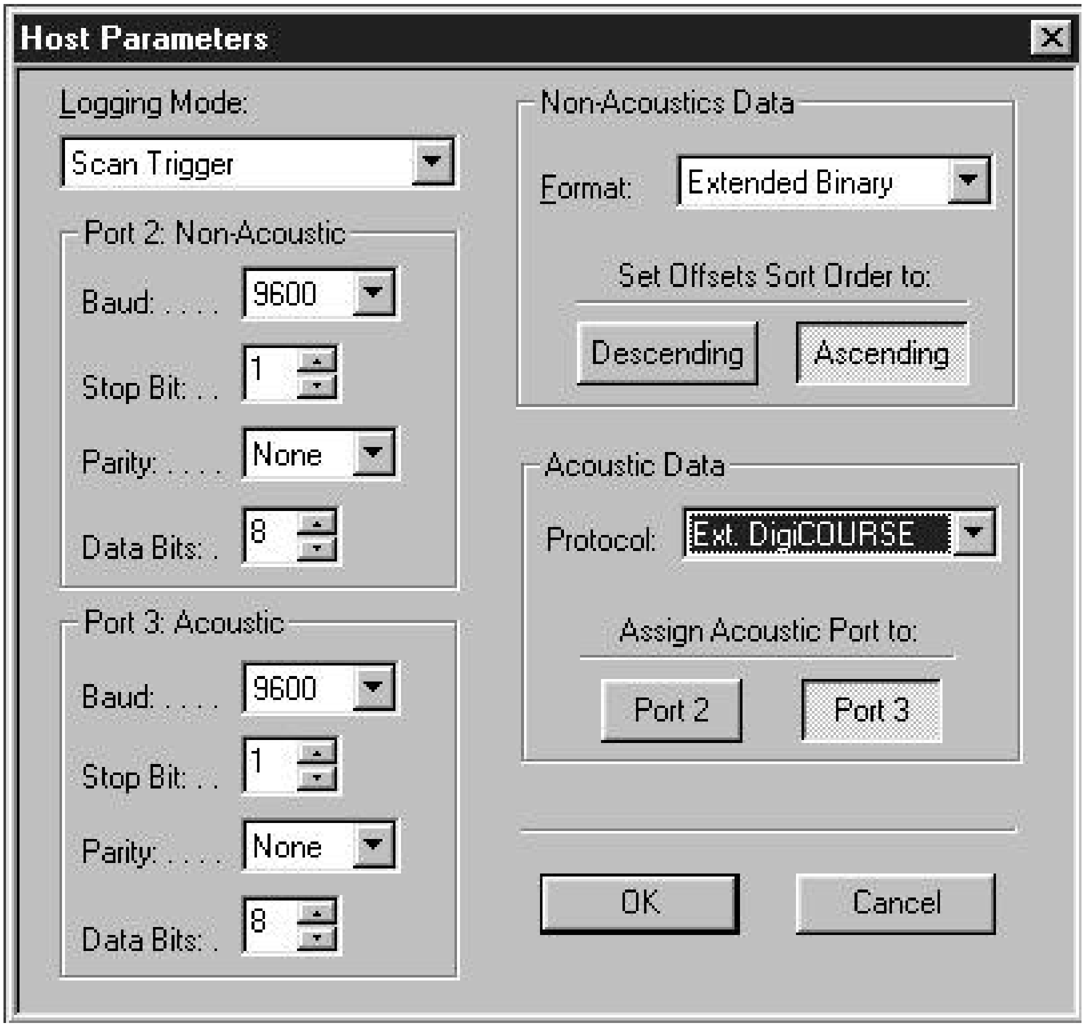


Figure 2.2 Host Parameters Dialog Box

Logging Mode

The Logging Mode determines when sensor data is sent to the Host. Select one of the four modes:

Disable Logging: When Data Logging is turned off; no data is sent to the Host on trigger.

Data Request: Non-acoustic data (depth, heading, fin) is sent to the Host when a specific code (separate from the trigger character) is requested by the Host. Request code 1 is for heading data; request code 2 is for depth data; and request code 3 is for fin angle data. The request codes are binary numbers, and the non-acoustic sensor data is returned in binary format. No request code exists for acoustic data. Acoustic data is logged automatically on receipt of the scan trigger if Port 3 is selected as the acoustic data port. If Port 2 is selected as the acoustic data port (and Data Request is selected as the Logging Mode), acoustic data will not be sent to the Host.

Scan Trigger: Data is sent to the Host on the receipt of every external scan trigger. The external trigger may be a character received from the Host or from an electronic closure supplied to the Contact Closure Unit. The format of the sensor data returned is determined by the selections made for the Non-acoustic Data Format and the Acoustic Data Protocol.

Scan or Internal Timer: Data is sent to the Host on the receipt of every external or internal trigger. Internal triggering occurs in the absence of external triggering. The format of the sensor data returned is determined by the selections made for Non-Acoustic Data Format and the Acoustic Data Protocol.

Port 2 Acoustic/Non-Acoustic

The primary Host port (Port 2) is a bi-directional serial link between your Host computer and the System 3 Data Management Unit. The Data Management Unit responds to commands from the Host computer to perform various functions related to data acquisition and output, including timing control for data acquisition triggering.

If the Port 2 is selected for the output of acoustic range data, an acoustic range message is transmitted every time a Host log event is scheduled. The range message follows the non-acoustic data message. Port 2 shows Acoustic, Port 3 shows Not In Use.

Port 2 Baud

This parameter is determined by your Host computer. The selection options are 1200, 2400, 4800, 9600, and 19200.

Port 2 Stop Bit

This parameter is determined by your Host computer. The selection options are 1 and 2.

Port 2 Parity

This parameter is determined by your Host computer. The selection options are None, Even, and Odd.

Port 2 Data Bits

This parameter is determined by your Host computer. The selection options are 5, 6, 7, and 8.

Port 3 Acoustic/Not In Use

If the acoustic data port (Port 3) is selected, an acoustic data message is output at the beginning of each scan cycle. The type of message to be output is specified as a configuration parameter. Port 3 shows Acoustic, Port 2 shows Non-Acoustic.

Port 3 Baud

This parameter is determined by your Host computer. The selection options are 1200, 2400, 4800, 9600, and 19200.

Port 3 Stop Bit

This parameter is determined by your Host computer. The selection options are 1 and 2.

Port 3 Parity

This parameter is determined by your Host computer. The selection options are None, Even, and Odd.

Port 3 Data Bits

This parameter is determined by your Host computer. The selection options are 5, 6, 7, and 8.

Non-Acoustic Data Format

This parameter is determined by your Host computer. Five types of data formats are supported for the transfer of non-acoustic sensor data via the primary Host data port:

- Binary
- ASCII
- Western
- Extended Binary
- Gbird

Both solicited and unsolicited output of sensor data are supported. For solicited output, a data request must be received from the Host. Unsolicited output occurs automatically once each shot interval, with its timing controlled by the internal scan trigger.

Set Offset Sort Order

This parameter determines whether non-acoustic unit data is output in ascending or descending order by streamer cable offset. The selection options are Descending and Ascending.

Acoustic Data Protocol

This selection defines which data protocol is used to output acoustic range data to the Host. This parameter is determined by your Host computer. The available protocols are:

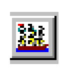
- DigiCOURSE (P/N 1000-132)
- CLS
- GLS
- HGS (P/N 1000-388)
- Extended DigiCOURSE (P/N 1000-361)
- GECO Binary
- Standard Ethernet
- PGS Ethernet

Assign Acoustic Port

This option determines which serial port (Port 2 or Port 3) is used to send acoustic data to the Host. Port 3 is the default. If Port 2 is selected as the acoustic port, Port 3 is inactive and its parameters cannot be set. Port 2, which is the primary Host port, can be used for either acoustic or non-acoustic data.

Step 5 Set Data Acquisition Parameters

The **System / Data Acquisition** command accesses the **Data Acquisition Parameters Dialog Box**, which allows you to define how often data is requested by and from the Data Management Unit. The parameters that can be defined (or edited) are Self Trigger Interval, Number of Poll Retries, and Scan Start Delay.

Do not click on the "Add Vessel" button  on the Setup Toolbar; that button will add another vessel to the array, it will not access the Data Acquisition Parameters Dialog Box.

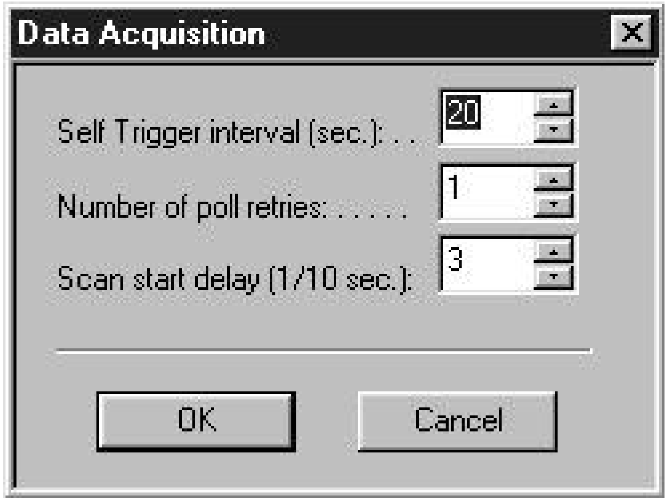


Figure 2.3 Data Acquisition Parameters Dialog Box

Self Trigger Interval

This parameter specifies the interval (from 1 to 255 seconds) between consecutive system-generated internal scan triggers in the absence of an external trigger from the Host. If the Host stops triggering, the system initiates internal triggering after expiration of a two-minute timer unless another external trigger is received. Internal triggering terminates when external triggering resumes.

Number of Poll Retries

This parameter specifies the number of times (from 0 to 3) the modem will issue a communication retry to a sensor failing to respond to the initial data acquisition poll. The default value is 1.

Scan Start Delay

This parameter specifies the length of time (in tenths of seconds, from .3 second to 25.5 seconds) between the external trigger and the primary acoustic sync sent out by the Data Management Unit. This parameter can be used to change the delay time between trigger and primary acoustic ranging to move the acoustic ranging time away from the gun blast.

Increasing the value of the scan start delay extends the acquisition cycle time.

Step 6 Set Acoustic Parameters

The **System / Acoustics** command accesses the **Acoustic Parameters Dialog Box**, which allows you to define system level acoustic parameters. The parameters that can be defined (or edited) are Secondary Acoustic Sync, Speed of Sound, Same Channel Aperture Separation, Aperture Size for Same Line, Aperture Size Transmission, Distance to Bottom Minimum/Maximum, Different Line Aperture Sizes, Pulse Size Number, and Default Threshold.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array, it will not access the Acoustic Parameters Dialog Box.

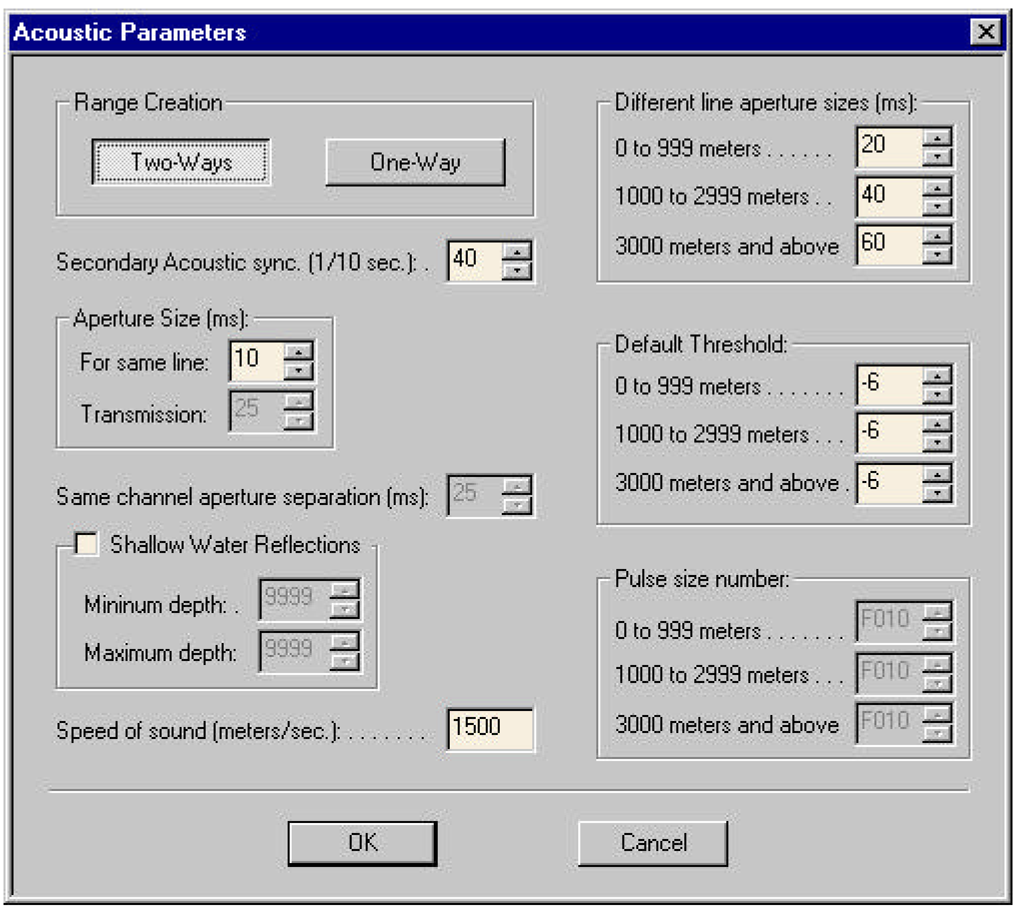


Figure 2.4 Acoustics Parameters Dialog Box

Range Creation

This option specifies the mode of operation for range data acquisition: one-way ranging or two-way ranging (default). When one-way ranging is selected, a range consists of a single path time measurement, with one unit receiving the acoustic signal transmitted by the other unit. Range acquisition time is generally shorter when one-way ranging is in use. When two-way ranging is selected, a range consists of two path time measurements combined to make a range value, with each of the two units both transmitting to and receiving from the other unit.

Secondary Acoustic Sync

This parameter specifies the length of time (in tenths of seconds, from 0 to 10 seconds) desired between the trigger and the secondary sync sent out. The purpose of the secondary sync is to initiate a retry for ranges that failed in the primary acquisition. The value entered must be greater than Primary offset and less than 100 (10 seconds). The default value is 40 (4 seconds). A setting of 0 disables secondary acquisition.

Speed of Sound

This parameter is a fixed nominal sound speed used internally to convert distances to transit times and vice versa. The accuracy of this value determines the accuracy of the ranges displayed during run time. The entered value must be from 1400 to 1600 meters/second. The default is 1500 meters/second. (NOTE: This value does **not** affect the accuracy of range data transferred to the Host computer.)

Same Channel Aperture Separation

This parameter specifies the minimum delay time (in milliseconds) between two receiver apertures on the same channel. The entry must be from 0 to 999 milliseconds. The default value is 25 milliseconds.

Aperture Size for Same Line

This parameter specifies the size of the apertures (in milliseconds) for ranges between two CMXs attached to the same line. The entered value must be from 1 to 999 milliseconds. The default value is 10 milliseconds.

Aperture Size Transmission

This parameter specifies the amount of time (in milliseconds) to be taken for a CMX to transmit an acoustic pulse. The valid value must be from 0 to 10,000 milliseconds. The default value is 25 milliseconds and should not be changed.

Shallow Water Reflections: Minimum/Maximum Depth

These parameters are used by the acoustic compiler to eliminate reflections between different range pairs. An acoustic pod’s self generated reflection is also eliminated. Survey water depth minimum and maximum values (in meters) should be entered at the start of the survey. The default value for both parameters is 9999m. Typically, the default values can be used for water depths of greater than 85m.

Different Line Aperture Sizes

These parameters specify the sizes of the apertures (in milliseconds) for ranges between two CMXs attached to different lines.

0 to 999 meters: Enter the different line aperture size for ranges in which the offsets of both CMXs are less than 1000 meters. The default value is 20 milliseconds.

1000 to 2999 meters: Enter the different line aperture size for ranges in which the offsets of one or both CMXs are from 1000 to 2999 meters. The default value is 40 milliseconds.

3000 meters and above: Enter the different line aperture size for ranges in which the offsets of one or both CMXs are from 3000 meters and above. The default value is 60 milliseconds.

Pulse Size Number

This parameter affects the acoustic transmit waveform parameters. The pulse size number is set to its default value of F010 Hex and cannot be changed by you.

Default Threshold

This parameter specifies a threshold value that will be used as the default value when ranges are created. To change the default threshold value for ranges that have already been created, the ranges must be deleted and re-created after the new default threshold value has been entered in the default threshold field.

0 to 999 meters: Enter the default threshold desired for paths in which the offsets of both CMXs in the range are less than 1000 meters. The default is -6.

1000 to 2999 meters: Enter the default threshold desired of both CMXs in the range are from 1000 to 2999 meters. The default is -6.

3000 meters and above: Enter the default threshold desired for paths in which the offsets of both CMXs in the range are above 3000 meters. The default is -6.

Step 7 Set Radio Configuration Parameters (if Radios are used)

If radios are not used, skip this step.

The **System / Radio Configuration** command accesses the **Radio Parameters Dialog Box,** which allows you to define radio timing parameters. The parameters that can be defined (or edited) are Baud Rate, Radio Transmission Delay, Response Time-out, RTS to Transmission Delay, and Transmission to Reception Turnaround Delay.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array, it will not access the Radio Configuration Parameters Dialog Box.

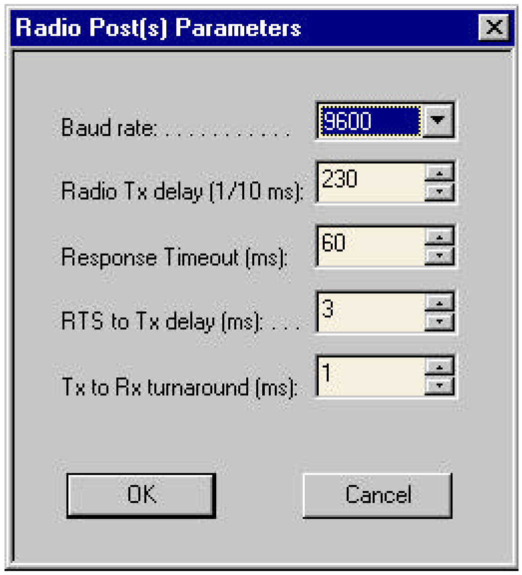


Figure 2.5 Radio Parameters Dialog Box

Baud Rate

This parameter is determined by the radio you are using. Ensure that the baud rate selected matches the baud rate of the radio. The selection options are 1200, 2400, 4800, 9600, and 19200.

The parameters shown in the example are the default values for the TSI 9600 Radio Modem operating at 9600 baud rate. Contact DigiCOURSE before altering the default settings.

Radio TX Delay (tb)

This parameter is determined by the radio you are using, since the delay is introduced by the radio's buffer. The radio transmission delay is the delay from the time that the sending device starts transmitting until data is actually received.

The selection options are from 0 to 1000 (in 1/10 ms). For TTI radios, tb = 0 ms; for TSI radios, tb = 23 ms.

To measure tb, first use the radio manual to determine a close estimate, then compare the sync bit from the radio CTX to the FSK CMX to fine tune this number. Attempt to get a zero mean spread on the sync bits deviation. An alternate method of measuring tb is to compare the line 1 start of sync transmit to the radio line 7 (or radio line 14). For a six-streamer system, compare (TXD) MP 1, connector 1, pin 5 to (TXD MP 1, connector 7, pin 5. For a twelve-streamer system, compare (TXD) MP 1, connector1, pin 5 to (TXD) MP 2, connector 7, pin 5.

Response Time-out (te)

This parameter specifies the time-out period in the radio multiplex port from the end of the TX to RX Turnaround period to the first bit in the response message. The default is 60 ms. The selection options are from 0 to 255 (in ms); however, never use 0.

RTS to TX Delay (ta)

This parameter specifies the delay required from the activation of RTS to the start of transmission from the sending device to the radio modem. The selection options are from 0 to 255 (in ms); however, never use 0. For TTI radios, ta = 25 ms; for TSI radios, ta = 3 ms.

TX to RX Turnaround (tc)

This parameter specifies the delay required as dead time between the end of transmission and the start of reception. This delay is necessary in some radios due to the transmitter decay time. The selection options are from 0 to 255 (in ms); however, never use 0. For TTI radios, tc = 30 ms; for TSI radios, tc = 1 ms.

Parameters td and tf are embedded in the CTX and, therefore, are not adjustable in the Radio Configuration Parameters Dialog Box.

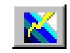
Baud Rate Compensation Delay in the CTX (td)

This parameter is the delay that is embedded in the CTX to compensate for the differences in baud rates between the radio and FSK ports. This is only relevant when timing accuracy is required. Only the sync message needs this delay. The value embedded in the CTX takes into account the actural baud rates of the MP and the CTX units.

Message Time-out in the CTX (tf)

This parameter is the time-out period in the CTX from the start of the Data Carrier Detect to the start of the first bit in the incoming message. The tf = 32 ms.

Step 8 Create Platforms/Lines (Steamers only)

The **Edit / Platform Line / Create** command (or button ) allows you to add a new line to the array of a vessel (that is, to create or define a new line to which sensors can be attached, such as streamer cables, gun arrays, tail buoys, etc.) by accessing a new **Platform/Line Information Dialog Box** and completing the information fields in the box. Platform/Line parameters that can be defined are Line ID, Vessel, Name, Type, Cable, Port, Line Length, Lateral Offset, Cable Depth and Disable Cable Screen Display.

Line ID

The line identifier is a letter or a digit-letter combination that serves as a reference for a line. The identifiers are A to Z for lines 1-26, 1A to 1Z for lines 27-52, and 2A to 2K for lines 53-63 (63 total lines). No two lines can have the same identifier.

Vessel

The vessel number allows System 3 to associate a line to a vessel. This feature also allows a multi-vessel system to be treated as a single system. The limits for vessel number are 1 to 4, and the default is 1.

Name

The line name is used only for display purposes. The name can be any character string up to 20 characters long, and can include blanks. There is no default for line name.

Type

The type identifies the type of platform line, and is used both for display purposes and for identification of streamer cables in the bird data sent to the Host. The selections available are Streamer Cable, Vessel, Gun Array, Tail Buoy, Paravane, Tow Fish, Nav Sled, and Test Cable. **Select "Streamer Cable**."

Cable

The cable number is used for identification of streamer cables in the bird data sent to the Host. This field is locked out unless the "Line Type" is "Streamer". Cable numbers must be sequential with no numbers skipped.

Port

The port corresponds to the line number on the Line Interface Unit to which the communications link for the defined line is connected. Line Interface Unit numbers are 1 to 6, 8 to 13, and 15 to 20. Port numbers 7 and 14 are for radio telemetry only and are not to be used as streamer cables.

Line Length (m)

The line length is the total length of the platform line (in meters), and is used for display purposes. The line length must be greater than the largest unit offset.

Lateral Offset (m)

The lateral offset is the lateral offset distance (in meters) from a system-wide reference line to the line being entered. Normally, all lines are referenced from the vessel center line. Lines to port of the reference have a negative lateral offset and lines to starboard have a positive offset. The limits are -9999 to +9999; and the default is 0. For multi-vessel systems, all lines must be referenced from the same reference line (which is normally the centerline of Vessel 1).

Cable Depth (m)

The depth is the desired target depth for the line. The limits for depth are from 0 to 115 meters (0 to 378 feet), and the default is 0.

An emergency dive depth, which specifies the target depth for all cables when an emergency dive command is executed, is input during the Setup program by selecting System menu, Global submenu, Emergency Depth command.

When using Model 5010E or 5011E birds, DO NOT ENTER VALUES GREATER THAN 31 METERS (103 feet).

Step 9 Add Acoustic Units and Bird Units to Streamer(s)

Adding (or creating, or attaching) acoustic sensors and birds to a line is most easily accomplished using a combination of mouse clicks and key strokes, then tabbing from field to field in the dialog boxes. The instructions in this section is just one way to accomplish the task. Make sure that you build one complete streamer (both acoustics and birds) before beginning another one.

The Edit / Platform Line / Copy command allows you to copy a selected line that has previously been defined. If the line sensors have been defined, this command will also copy all sensor information (except the serial numbers) to the new line.

The Edit / Platform Line / Populate command accesses the Populate Line Dialog Box, which allows you to add birds or acoustic units to a

selected streamer at regularly-spaced offsets.

For details on how to use either of these convenient and time-saving commands, see Section V, Setup Program, Edit menu.

Unit Names

Unit names are unique alphanumeric identifiers for external devices. The names are initially defined in the Setup program when a new device is added to the configuration, and are subsequently used in both the Setup program and the Operator Interface for identifying the devices.

Two forms of unit names are supported: standard Input/Ouput unit names, and free-form unit names. The type of unit names to be used is selected during software installation, and remains in effect until the software is re-installed. When standard Input/Ouput unit names are in use, the Setup program automatically generates the names based on a device’s location on a platform, the device type, and a user-defined unit number. For example, in the name FB03, ‘F’ represents the platform line, ‘B’ designates a bird, and ‘03’ is the device’s unit number.

When free-form unit names are in use, you enter a unit name consisting of up to six characters when you define a new device in the Setup program. The program ensures that the name you enter is not a duplicate of an existing name. These names can also be imported from a Spectra Navigation system, eliminating the need to re-enter them in System 3 Setup.

Acoustic Units

Acoustic sensors must be uniquely identified to all system components. For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Ouput unit names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character (or two characters for lines 27-63) of the identifier is a letter or digit-letter pair designating the line (platform) to which the sensor is attached. The next character is the letter A (designating an acoustic sensor), and the last two characters are digits designating the unit number.

The **Edit / Unit Sensor / Create / Acoustic** command accesses a new **Acoustic Sensor Information Dialog Box**. Complete the information in the box.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (BA01), and is used to construct a unique address for communications with the sensor. The limits for CMX unit number are 1 to 31. The CMXs are stored in alphanumeric order, and, for existing setup files, the first CMX initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label of each CMX, and must be entered here. Duplication of serial numbers is not allowed.

Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the CMX. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). CMXs in front of this point have a negative offset and CMXs behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

Group Number

The group number associates the CMX with an acoustic group, such as front, middle or tail. It is used primarily for display purposes. The limits for group number are 1 to 9.

If the TAGS protocol is in use, this field is locked out. The TAGS ID determines the group number (F=1, T=2, M=3, N=4, O=5, P=6, Q=7, R=8, S=9).

Geco/CLS/GLS ID

The protocol identifier selects the Host protocol in use. If the CLS or GLS Host protocol is in use, this entry identifies the CMX unit in the nomenclature defined in that protocol. If the HGS (TAGS) Host protocol is in use, this entry identifies the CMX unit in the nomenclature defined in that protocol.

Transmit Channels 1, 2, 3, 4, and 5

These entries allow you to limit the freedom of the compiler by disallowing certain transmit channels. This causes the transmit channel of the CMX to be limited to the allowed channels. If a particular channel is causing interference to another system, that channel can be disallowed here. Check (or un-check) the appropriate check box to allow (or disallow) the use of a channel. There must be at least one transmit channel allowed. The default is all channels allowed. If any of these entries are changed, the acoustic data must be compiled.

Receive Channels 1, 2, 3, 4, and 5

These entries allow you to limit the freedom of the compiler by disallowing certain receive channels. This causes all ranges associated with the CMX to be limited to the allowed channels. If background noise levels are too high for a particular channel, that channel can be disallowed here. Check (or un-check) the appropriate check box to allow (or disallow) the use of a channel. There must be at least one receive channel allowed. The default is all channels allowed. If any of these entries are changed, the acoustic data must be compiled.

Bird Units

Bird sensors must be uniquely identified to all system components. For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Ouput unit names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character (or two characters for lines 27-63) of the identifier is a letter or digit-letter pair designating the line (platform) to which the sensor is attached. The next character is the letter B (designating a bird), and the last two characters are digits designating the unit number.

The **Edit / Unit Sensor Create / Bird** command accesses a new **Bird Sensor Information Dialog Box.** Complete the information in the box.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (BB01), and is used to construct a unique address for communications with the sensor. The limits for bird unit number are 1 to 63. The birds are stored in alphanumeric order, and, for existing setup files, the first bird initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label of each DigiBIRD, and must be entered here. Duplication of serial numbers is not allowed.

Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the bird. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). Birds in front of this point have a negative offset and birds behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

Subtype

It is vital to streamer depth control that the model defined by the subtype entry agrees with the type of bird installed on the streamer. Model types may be mixed on the streamer providing they are correctly identified.

Depth

The depth defines the assigned target depth (in meters) of the bird. The default value is the depth of the line to which the bird is attached. The limits are 0 to 115 meters (0 to 378 feet).

When using Model 5010E or 5011E birds, DO NOT ENTER VALUES GREATER THAN 31 METERS (103 feet).

Include data to Host Yes/No

If the Host protocol you are using limits the number of sensors that can send data to the Host, you may select which sensors are allowed to send data.

Step 10 Create Platforms/Lines (Gun-mounts)

Repeat Step 8. In the **Type** selection, select "**Gun Array**."

Step 11 Create Platforms/Lines (Radio CTX, if needed)

Repeat Step 8 if radio CTX units are used; otherwise, skip this step.

Step 12 Create Ranges

For a detailed description of the range creation procedure, see the *Create Ranges* section in the Setup program description in Section V.

The **Edit / Create Ranges** command is the first step in creating and editing ranges. After selecting the **Edit / Create Ranges** command, click on an acoustic unit in the Graphic side to display all existing ranges for that unit; the icon for the selected unit will turn white. To define a new range for that sensor, hold the Control key (Ctrl) down and right-click (right mouse button) on the second acoustic unit of the range pair. A line connecting the two units representing the range will appear, and the icon for the second unit will turn green. Use this method to create up to eight ranges for the selected unit. When all ranges are defined for the current unit, left-click on that unit to de-select it, then right-click on the next unit whose ranges you wish to define or edit.

To edit an existing range, left-click on one unit of the range pair, then double-click on the second acoustic unit (which is ranged to the first unit) to access the **Edit Range Dialog Box**. Range Name is used to identify a range in the Operator Interface program when viewing Signal Strength or Path Time displays. The range name can be any character string up to 20 characters long and can include blank spaces and upper or lower case letters.

Path thresholds are entered as a scale factor index. Path 1 is the signal received by the first CMX in the range pair, and Path 2 is the signal received by the second CMX. The value entered is an index that corresponds to the threshold setting in dB above RMS noise level. The index also determines CMX operational mode: reflection or normal. All DigiRANGE acoustic units with serial number 7000 and higher have new firmware with Enhanced CFAR. This feature is an improvement over the previous CFAR settings in that it is self-adjusting to changing noise conditions. Also the system is more immune to false noise trips. The new default setting for deep water mode is -3, and for dual tracking mode is -14. The default value of -3 should be used for units 1000 meters or more behind the vessel. For units less than 1000 meters, the default values of -5 seem to work best.

The minimum and maximum range distances are entered in meters. The “Retry” option (Yes/No) determines whether this range should be retried if secondary acquisition is enabled and the primary range data was absent or unqualified. The “Range Data Mode” field selects the type of range data qualification: two-way, one-way (Unit 1 receive), or one-way (Unit 2 receive). Two-way range qualification generally results in a more accurate measurement, but one-way qualification may be appropriate if one CMX of the pair is in a high noise environment.

Step 13 Compile

The **File / Compile** command compiles an acoustic system configuration file. The **Compile** function uses system, line, acoustic sensor (CMX), and range information, combined with rules and algorithms, to calculate and optimize all aspects of the acoustic transmit and receive signals. This acoustic system configuration file must be compiled prior to downloading individual unit configuration information to the CMX’s in the Operator Interface (OI) program. Whenever acoustic parameters are changed, a new compilation may be required; the Setup program will indicate when this is necessary.

Step 14 Check Cycle Estimates

The **File / Cycle Estimate** command accesses (after the acoustic system configuration file has been compiled) the Cycle Estimates window. The Bird

Communications Rate and Acoustic Range Completion Rate can be changed to generate an acquisition cycle time estimate based on current observations.

When using a system with multiple DMU modem processors or in multi-boat acoustic operations, the secondary acoustic sync must be after the primary cycle time. The total cycle time must be less than the fastest switch closure or trigger to the system.

The total cycle time can be used to determine if all data acquisition is complete prior to the next trigger (shot). The primary cycle time can be used to determine the time to set the second acoustic sync time. Calculate the secondary acoustic sync time by using the primary cycle time, adding 750 ms, and rounding the number to the next highest 1/10 second.

Example:

Primary Cycle time = 4495

4495 + 750 = 5245

5245 rounded to next highest 1/10 second = 5300

Set the secondary acoustic sync to 53 and run Cycle Estimate again to check that the total cycle time is less than switch closure or trigger time.

Compile the acoustic system configuration file prior to using the Cycle Estimates function.

Step 15 Save File

The **File / Save As** command saves changes made to the open System 3 file. Changes can be saved under a new file name and/or a new folder.

Step 16 Transfer File to DMU

The **File / Transfer to DMU** command downloads a System 3 Setup configuration file from the Operator Interface computer and transfers that file to the DMU. Before System 3 can use a Setup file created with the Setup program, the file must be transferred to the DMU. Following the entry of all setup data, an acoustic compile is performed (if required) and the Setup file is stored on disk using one of the Save commands under a file name of your choice. This file can be opened later for updates, and the modified setup can be stored on disk under the same name or under a new name. In any case, the Setup file does not become active until it is transferred to the DMU.

The Operator Interface computer first sends an Initialize Link message to the DMU and waits for an acknowledgment. If no acknowledgment is received, an error is reported. If the DMU is prepared to accept the Setup program file, it sends the acknowledgment to the Operator Interface, and the Setup data is formatted into the required messages and is transmitted to the DMU.

Following the transfer of the Setup file information to the DMU, the acoustic configuration must still be downloaded to each CMX from the Operator Interface runtime program.

Spectra File Exchange

This feature is available only if it is enabled during installation. If Spectra has not been enabled during installation, you must re-run installation.

Purpose

The purpose of the configuration file exchange is to increase productivity by minimizing the number of times you must input system configuration data. Previously you had to enter the system configuration, i.e., vessels, platforms, birds, acoustic nodes, and range observations, once in Spectra and then again in System 3. This new feature of exchanging configuration files requires you to enter the system configuration only once.

In addition, once the exchange cycle is completed, both systems will have the same configuration. Previously, when errors were made the two systems did not have the same configuration.

Initial System Configuration

See Figure 2.6, File Exchange: Initial System Configuration

1. Completely define the system setup on the Spectra system. Input vessel information, platforms, birds, and acoustic nodes. Ranges can be defined in either system.

The Spectra system platform screen will include a field for the System 3 transmission port number. The Spectra system will accept System 3 unit numbers on the bird and acoustic node screens, and will enforce the System 3 rules that require unique unit numbers for sensor types on any given transmission port. It is suggested that you input the serial numbers for sensors when they are defined in the Spectra system.

2. Once finished entering data on the Spectra system, select the Export selection from the File menu on the Spectra SNN Program. This creates an exchange file based on the current configuration.

3. Go to the System 3 operator interface terminal and from the Setup program select **File /Spectra Interface (Read)**. If there is no file open in Setup, the file read from Spectra into System 3 will result in a new configuration being created, including all platforms and sensors.

If ranges exist in the exchange file they will be created with default aperture and threshold settings. If ranges do not exist, then create the range observations for the current system in the System 3 Setup program.

4. Compile the acoustic system, and transfer the configuration to the System 3 DMU. The Setup program will put the configuration on the Spectra system automatically. Then select the Import selection from the File menu on the Spectra SNN Program. This updates the Spectra system based on the current exchange file. The exchange is now complete with both systems having the same configuration.

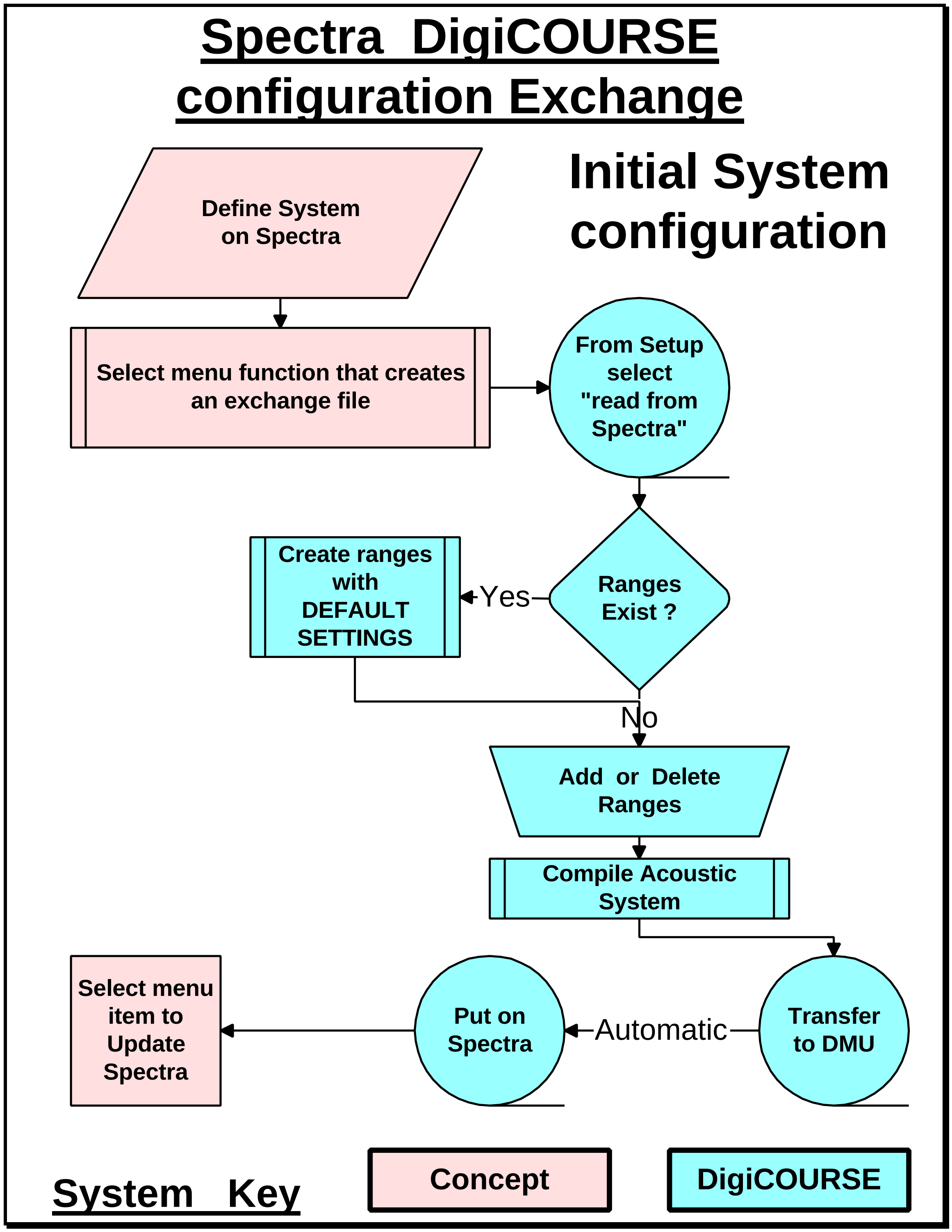


Figure 2.6 File Exchange: Initial System Configuration

Changes After Initial Configuration

See Figure 2.7, File Exchange: Changes to System Configuration.

If changes need to be made in either system the following procedure should be followed.

1. If Spectra system changes are needed, such as, offset changes, adding a node, or deleting a node, do these changes first.
2. Once finished changing data on the Spectra system, select the Export selection from the File menu on the Spectra SNN Program. This creates an exchange file based on the current configuration.
3. From the Setup program, select **File / Receive from DMU**.
4. From the Setup program select **File / Spectra Interface (Sync)**. The Setup program will ask which system's serial numbers to preserve: DigiCOURSE or Spectra. It will then ask if the system should keep the acoustic aperture settings or reset the apertures to the default settings. The Spectra configuration will be merged with the System 3 configuration. This will preserve the System 3 specific parameters.
5. Add or delete ranges if needed.
6. Compile acoustics. This must be done any time a configuration is received from Spectra.
7. Transfer the configuration to the System 3 DMU. The Setup program will put the configuration on the Spectra system automatically. Then select the Import selection from the File menu on the Spectra SNN Program. This updates the Spectra system based on the current exchange file. The exchange is now complete with both systems having the same configuration.

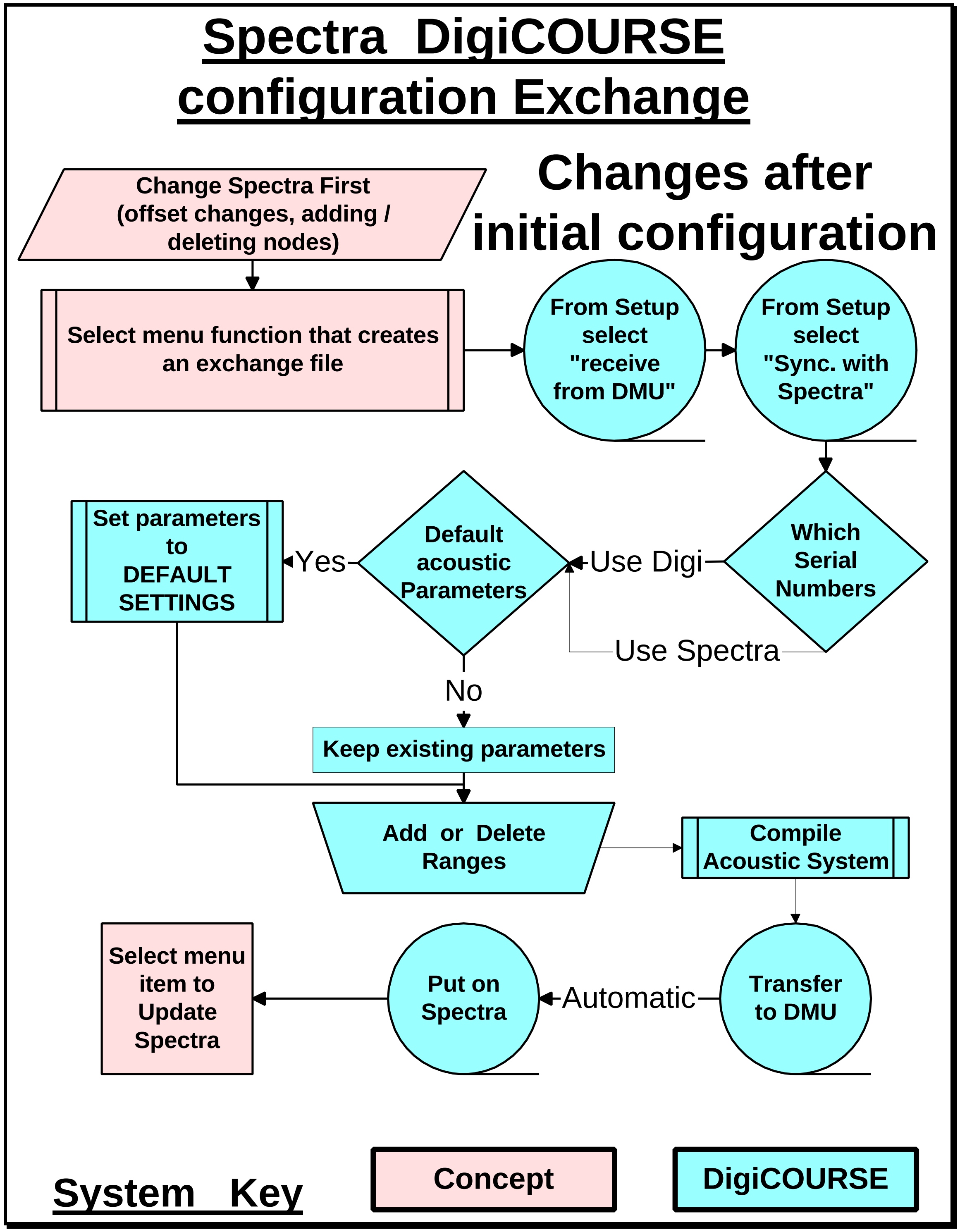


Figure 2.7 File Exchange: Changes to System Configuration

Limits

At this time, no mechanism exists to automatically keep the two systems synchronized. You must follow the above procedures to manually keep the System 3 and Spectra systems in sync.

Section II Setup and Operation

OPERATOR INTERFACE FUNCTIONS

The following steps describe the basic functions necessary to operate System 3. For a complete description of the Operator Interface Program, see Section VI.

Step 1 Open the Operator Interface (OI) Program

Step 2 Connect to the DMU

The **File / Connect** command connects the Operator Interface computer to the DMU. The Depth graphic screen is the default. Select the display that you want to view.

Step 3 Set Target Depth Color Values

The **File / Preferences** command allows you to make color adjustments to the display. The **File / Preferences** command initially accesses the **System Preferences Dialog Box** (which is tabbed into two sections: the **System Preferences for Depth Displays Dialog Box** and **the System Preferences for Ranges/Paths/Acoustics Dialog Box**. The dialog box allows you to select the default colors used in the Graphic Display for bird and acoustic settings. The only settings required at this time is for the Target Depth values; the other color preferences can be set now or at another time. Double-click on a color to call up the color palette, and select you colors you want to use, or use the default colors. These colors, once set, are displayed in the Color Bar. Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.

Step 4 Deploy Bird Units

The **Sensor / Deploy a Bird Unit** command accesses the **Bird Deployment Dialog Box**. The dialog box allows you to enter a Unit ID and select from the following options: Assign Unit Number, Read Serial Number, Read Battery Voltage, Read AGC, Assign Target Depth, Wing Reset, Set Fin +15, Set Fin -15, and Set Fin 0.

Assign the bird a Unit ID.

Set Wing Reset to ensure the wing operates through its full range of motion.

Select the options you want to check.

Press the "Execute" button to read the depth and response from the selected options.

Press the "Info Page" button to access the **Bird Information Dialog Box**. (The dialog box is also accessible by using the **Diagnostic / Bird / Info Page** command.)

Read the **Bird Information Dialog Box.** The dialog box allows you to enter a Unit ID (if necessary) and view a quick summary of the key parameters that define the status of that bird. The dialog box combines diagnostic and control information from several of the individual commands into a single display. The display updates continually until it is exited.

Deploy all bird units before continuing.

Step 6 Turn On Acoustics Mode

The **DMU / Set Acoustics Mode** command is a switch that allows you to turn the acoustics on or off. Turning the acoustics off when they are not in use saves battery life; however, under most circumstances, the acoustics should be turned ON. The Acoustic Mode must be ON to check the battery voltage of acoustic units.

Step 7 Deploy Acoustic Units

The **Sensor / Deploy an Acoustic Unit** command accesses the **Acoustic Deployment Dialog Box**. The dialog box allows you to enter a Unit ID and select from the following options: Assign Unit Number, Read Serial Number, Read Battery Voltage, Read AGC, and Download CMX Configuration.

Assign the acoustic a Unit ID.

Select the options you want to check.

Press the "Execute" button to read the response from the selected options.

Press the "Info Page" button to access the **CMX Information Dialog Box**. (The dialog box is also accessible by using the **Acoustic / Diagnostic Page** command.

Read the **CMX Information Dialog Box**. The dialog box contains more detailed information on a specific CMX unit. When this option is executed off-line, an option is available for downloading a special test configuration to the selected CMX unit. This is most useful during initial deployment, when the CMX may not have a valid configuration. After the **Diagnostic Page** option is selected in off-line mode and the desired Unit ID is entered, you can download the special configuration by pressing the Download Diagnostic button. If the special configuration is downloaded, the previous configuration must be re-downloaded after completing the diagnostics procedure.

Download the acoustic's runtime configuration. The **Sensor / Download CMXs Configuration** command loads any required configuration data to a sensor. (Currently this applies only to acoustic CMXs, and is used to download acoustic aperture and threshold settings). Valid runtime acoustic configurations (originally generated by the Setup program) must be downloaded to all CMXs prior to initiating operation of the acoustic system to ensure that valid range data is produced. It is also important to avoid making any individual range aperture/threshold adjustments unless the affected CMXs contain valid runtime configuration data. To download configurations to all CMXs at once, enter the "@" wildcard at the unit ID prompt.

Deploy all acoustic units before continuing.

If, at any time, you need to substitute one CMX for another, use Read/ Swap Serial Number function to change the serial number in the database to match what is actually being put on the line.

Step 8 Checkout Birds and Acoustics

The **Performance / Sensor Comm. Graphic** command displays a graphical representation of inbound signal strength and noise data by transmission line. The display plots inbound received signal strength (in dB volts) as a function of linear offset (in meters) for the selected transmission line. All sensors that communicate over the selected line are displayed. The vertical axis represents signal strength, and the horizontal axis represents offset distance from the towpoint. The background noise level in dBV is shown as a horizontal line across the graph. The display updates automatically at every shot cycle after the initial read.

Normally the received signal strength should decrease linearly with distance down the line. If any significant sharp drops appear at specific points along the line, this may a indicate leakage problem or some other condition causing attenuation. Also, communications may be unreliable with any sensor whose signal strength is near the background noise level.

Use the **Performance / Sensor Comm.Graphics** command for <u>EACH</u> bird and acoustic unit.

Step 9 Enable Path Reflections

The **DMU / Path Reflections** command is a switch that allows you to enable or disable the reflection QC function. When the reflection QC function is enabled, the DMU will analyze the acoustic data trend and attempt to detect when reflections are present. When reflections are detected, the data quality flag bit will be set in the message to the host computer signifying bad (reflected) data. This function serves as an additional layer of acoustic data QC before data is handed to the host computer. When the function is disabled acoustic data is not checked for the presence of reflections.

Step 10 Enable Path Prediction

The **DMU /Path Prediction** command is a switch that allows you to enable or disable the path prediction feature. The acoustic pod will send the predicted value of the path time if it does not detect a path time. When a path prediction is sent from a pod, a +6 is placed in the signal strength field to notify the dry end that the path is a predicted value. If path prediction is off, the DMU will ignore the prediction from the acoustic pod. If path prediction is enabled, and the range is configured as a two-way range, the DMU will combine a predicted value with an actual received path from the other pod in the range pair to form a range. A predicted value will not be used for a configured one-way range even if path prediction is enabled since no received path time is available to qualify the prediction. Refer to the table for a description of the operation of the acoustic path prediction feature and its effect on the data quality flag (0 / Good Range; 1 / Bad Range) in the host message and its effect on acoustic secondaries.

	ACOUSTIC DATA		**DATA QUAL. FLAG (0 / GOOD; 1 / BAD)**		**PERFORM SECONDARY?**	
	PATH 1	**PATH 2**	**PRED. ON**	**PRED. OFF**	**EST. ON**	**EST. OFF**
PASSED	DATA	DATA	0	0	N	N
RANGE	DATA	PREDICTION	0	1	N	Y
PROC.	PREDICTION	DATA	0	1	N	Y
CHECKS	PREDICTION	PREDICTION	1	1	Y	Y
FAILED	DATA	DATA	1	1	Y	Y
RANGE	DATA	PREDICTION	1	1	Y	Y
PROC.	PREDICTION	DATA	1	1	Y	Y
CHECKS	PREDICTION	PREDICTION	1	1	Y	Y

Step 11 Check the DMU Status on Status Bar

The “RPQA” DMU status codes should be present on the status bar.

The DMU status codes are as follows:

R = Run Mode (R alone is for bird data, but no acoustic scan. A and R together are needed for acoustic data)

B = Background Noise Mode

P = Range Prediction On

Q = Path QC On

A = Acoustics On

- = Position of option turned off

Step 12 Choose a Type of Display from the View Menu

Open the View menu and choose the type of display in which you want to view the data.

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Section III Diagnostics

DMU COMMUNICATIONS PROCESSOR

The DMU Communications Processor (CP) (P/N 8000-766) resides in slot 1 of the DMU chassis. During normal operation the LEDs on the front panel of the CP should be in the following states:

Fail LED	OFF
Status LED	ON (Yellow)
Run LED	ON (Green)
Scon LED	ON (Green)

The ON state of the FAIL LED (Red) indicates a CP board failure. The "bad" CP board can be replaced with a new CP (part of spares kit - P/N 6500-057A) by following the procedure in Section IV, Hardware, DMU Communications Processor Replacement.

DMU MODEM PROCESSOR COMMUNICATIONS

The DMU Modem Processor (MP) (P/N 8000-772) resides in slot 3 of the DMU chassis. The front panel connectors on the MP allow for convenient monitoring of signals for troubleshooting problems. The pinout for the front panel connectors is shown in Figure 3.1.

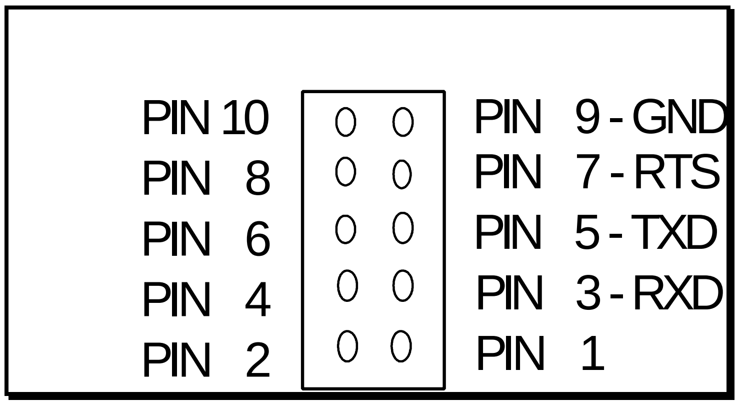


Figure 3.1 Modem Processor Front Panel Connector Pinout

The RTS (pin 7) signal is used to enable the FSK transmitter. The voltage level of the RTS signal is +12V when data is transmitted to "in-water" sensors and -12V when no data is transmitted.

The TXD (pin 5) signal is the asynchronous data that will be FSK and put on the streamer twisted pair. When not transmitting, the level is -12V.

The RXD (pin 3) signal is the demodulated data returned from the "in-water" sensors. RXD signals are valid only after a request for data (poll cycle, diagnostics, etc.). When not receiving data from "in-water" sensors, noise will cause random changes of level on the RXD line, this is a normal situation.

If an MP failure is suspected, observing the above signals should help in diagnosing the problem.

Good modem communication is required in order for a system perform properly. Even if the system is deployed properly and no acoustic problems exist, bad modem communications causes the system to have low range completion rates.

Section III Diagnostics

Causes for Poor Modem Communications

- Interference from another system
- Saltwater intrusion in the streamer
- Improper wiring between the LIU and the streamer communication lines
- Misaligned coils
- Damaged equipment

How to Monitor Modem Communications

Sensor Communications Text

The **Performance / Sensor Comm. Text** command accesses the **Sensors Communications Charts Dialog Box**. The dialog box allows you to select the transmission ports that you want information from. Data available in the dialog box includes the inbound and outbound signal strength and outbound noise level for all sensors on the selected line. Under Communications, data includes the total number of polls issued, the number of response time-outs, and the number of checksum errors. Under Performance, data includes the inbound noise, the transmit voltage, the transmit current, the dc voltage (if Line Power Unit is installed), and the dc current (if Line Power Unit is installed). The dialog box updates automatically at every shot cycle after the initial read.

Sensor Communications Graphic

The **Performance / Sensor Comm. Graphic** command displays a graphical representation of inbound signal strength and noise data by transmission line. The display plots inbound received signal strength (in dB volts) as a function of linear offset (in meters) for the selected transmission line. All sensors which communicate over the selected line are displayed. The vertical axis represents signal strength, and the horizontal axis represents offset distance from the towpoint. The background noise level in dBV is shown as a horizontal line across the graph. The display updates automatically at every shot cycle after the initial read.

Normally the received signal strength should decrease linearly with distance down the line. If any significant sharp drops appear at specific points along the line, this may a indicate leakage problem or some other condition causing attenuation. Also, communications may be unreliable with any sensor whose signal strength is near the background noise level.

Reset Counter Statistics

The **Performance / Reset Counter Statistics** command accesses the **Reset Line(s) Counter Statistics Dialog Box**. Select the line or lines that you want to reset, and press the “Reset” button; this causes the Operator Interface processor to send a command to the DMU to clear all sensor communications counters.

Reset Communication Statistics

The **Performance / Reset Comm. Statistics** accesses the **Reset Line (s) Communication Statistics Dialog Box**. Select the line or lines that you want to reset, and press the “Reset” button; this causes the Operator Interface processor to send a command to the DMU to clear and reset the filtered signal strength, background noise, and line power statistics.

DigiRange Diagnostics

Several tools are available for monitoring performance and diagnosing problems with the DigiRange system. These include the Operator Interface options Acoustic Disk Logging, Reset Range Statistics, and Check Background Noise. The main tool for diagnosing problems with specific ranges is the Analysis program (see Section VII).

Range Completion Rate

A useful and obvious indicator of acoustic system performance is the range completion rate. A range that has problems for any reason will indicate a low completion rate. Range completion rates can be viewed on the Operator Interface Range/Path Data display.

If the system is set up correctly, the recommended deployment methods are used, and the system is operating correctly, the expected Range Completion Rates are as follows:

Front network: > 80%

Mid network: > 95%

Tail network: > 95%

Causes of Low Completion Rates

- Improper deployment
- Damaged equipment
- Poor modem communications

- Poor or inconsistent acoustic path
- High ambient noise
- Improper aperture or threshold settings

Acoustics Disk Logging

The **Performance / Acoustic Disk Logging** command accesses the **Disk Logging Dialog Box**. The dialog box allows you to cause the next N shot points worth of acoustic data to be logged to a file on the hard disk of the Operator Interface system, where N is a user-entered value (default=250). Logging terminates automatically after the specified number of shot points, or you can choose to terminate logging early. The logged acoustic data can be analyzed by the Analysis program. The log file name is constructed from the current date and time, and has the extension ".DEP".

The Acoustic Logging Counter (ALog) on the Status Bar counts the number of shots logged.

The Skipping Nth Shots option is not active here; it is active only in the Disk Logging: Depth & Fin Dialog Box.

Reset Range Statistics

The **Performance / Reset Range Statistics** accesses a question box asking whether or not you wish to proceed. A "Yes" response causes the Operator Interface processor to send a command to the DMU to reset the range percent completion values to zero.

Check Background Noise

The **Sensor / Check Background Noise** command measures the background acoustic noise while off-line (not in the Run Mode). A special configuration is downloaded to the CMXs, which turns off the transmitters in the CMX units. The receive apertures are still active and viewing the ambient background noise. The save acoustic .DEP file option can be used to record the background noise and then view this information using the Analysis program.

Before returning to normal operation, the runtime configurations must be downloaded to all CMXs using **Download CMXs Configuration**.

Range Status

Range status can be monitored to help diagnose many acoustic related problems. When a range seems to have a high occurrence of a status other than "normal", the cause of the problem should be diagnosed and solved. Range statuses can be viewed on the Operator Interface Range/Path Data display as color-coded text.

Range statuses are as follows:

- Secondary Ranges
- Aperture Edge
- Discrepancy
- One-Way Ranges
- No Range

Secondary Ranges

"Secondary" ranges, if enabled, indicate that the primary range was determined to be bad and the secondary range was sent to the host. A high percentage of secondary ranges indicates an interference problem with acquiring the primary range. The interference could be affecting primary modem communications or acoustic paths. If modem communications interference is suspected, refer to the Modem Communications section for possible causes. If acoustic path interference is suspected, identify and disable, one at a time, all possible causes. Some possible causes are other acoustic systems, gun wake or other communication systems in the streamer.

Aperture Edge

"Aperture edge" is caused by having the aperture improperly set for the existing dynamics of the system. Refer to the Aperture Size section for an explanation of how to set apertures. It is normal to have this condition just after starting a turn or just before the streamers are become straight after a turn.

Discrepancy

"Discrepancy" is an indication that two paths failed the range processing verification test (which suggests that the sensor is in a noisy environment). This test requires ranges of 600 meters or less to have path times that are within 2 ms of each other. Ranges greater than 600 meters use a test criteria of 4 ms. Failure of this test indicates that the paths are not the same. The Analysis Program should be used to help determine which path is correct.

One-Way Ranges

"One-way" ranges are usually caused by localized acoustic path blockage or noise sources. For ranges that consistently provide only one way data, there may be a problem with one path. This is sometimes seen in ranges from Remote Hull-mount Transducers to Remote Transducers attached to energy sources. If this is the case, access the Setup Program to label that range as a "one-way" path only. This causes one-way ranges to be flagged as good data.

No Range

"No range" indicates that no path, primary or secondary, has been detected. If this happens a very high percentage of the time, a setup or deployment problem probably exists.

Signal Strength

Signal strength is an indication of the physical acoustic path quality. Problems in the acoustic path will show up as a lower than expected signal strength.

If the system is setup correctly, the recommended deployment methods are used, and the system is operating correctly, the expected Average Signal Strengths are as follows.

The signal strength for a given shot point will vary from the average by as much as 6 dB.

Average Signal Strengths

10m to 19m	-6 dB
20m to 39m	-12 dB
40m to 79m	-18 dB
80m to 159m	-24 dB
160m to 319m	-36 dB
320m to 640m	-42 dB
641m to 1200m	-48 dB

Aperture Size

Aperture size should be set according to the dynamics of the range measurement being made. If the apertures are too small for a given range, when currents or skew are present, the range will not be received. When the apertures are larger than needed for a given range, acoustic noise will have a greater chance of causing a false signal detection.

Recommended Aperture Sizes

Range between two Cable-mount CMX's on the same line: ±10ms

Range between two Remote Transducers (energy source): ±10ms

Range between Remote Hull-mount Transducer and any other sensor: ±20ms

Range between Cable-mount CMXs on different lines (gun system): ±20ms

Range between Cable-mount CMXs on different lines (mid cable): ±40ms

Range between Cable-mount CMXs on different lines (tail system): ±60ms

Deployments in weak ocean currents or with short streamers can operate with smaller apertures. Deployments in strong ocean currents or with very long cables may need larger apertures. Circle shoot deployments will require much larger apertures for all cross brace ranges in the mid and tail network due to the changing dimensions of the system on progressively smaller radius circles. In any situation, the aperture must be big enough so that the maximum deviation from the nominal setup will not cause the range to quit coming in. Larger apertures will cause the total cycle time to increase.

When to Alter an Aperture

Using the Operator Interface Program, the range screen will indicate when a range is approaching the edge of the aperture by changing the color of the range measurement. Using the Analysis Program, view the plot of the range in question. An aperture set too small will show up as a clipped wave form. Apertures can be adjusted online through the Operator Interface Program or by using the Setup Program.

Section III Diagnostics

Reflections in Range Data

Problems involving reflected signals are sometimes difficult to detect. The turbulence caused by the guns causes the direct acoustic signal between the sensors to be severely attenuated. When the sensors do not detect the attenuated direct signal, they may detect a stronger indirect signal and assume that it is a valid range.

For a reflected signal to be reported as a good two-way range, both sensors must receive the indirect signal. If one sensor receives the direct signal and the other receives the indirect signal, the range may be reported as bad because of the discrepancy.

Identifying Reflections

Using the Analysis Program, view the plot of the range in question along with its associated paths. Reflections will appear as a well-defined band of data with an upper edge that tracks the lower edge.

Reflection Mode Dual Tracking Option

DigiRANGE CMXs are equipped with a "Reflection Mode" option. This option may be used when you have identified a reflection problem with a particular range. Reflection problems are usually revealed by a "double band" of data in the graphical range display of the Analysis Program.

In most cases, reflections can be eliminated by adjusting thresholds or by closing the stop aperture. The Reflection Mode should only be used if threshold and aperture adjustments fail to eliminate the reflection.

CAUTION: Never use the Reflection Mode Dual Tracking Option in mid or tail nets.

Shallow water prospects increase the probability of reflection problems in ranges. The reflection problem is normally more prevalent in the front section network, (guns, hull mounts, cross streamer ranges).

In dual signal tracking, two signals are tracked instead of one. The first trackable signal is reported as the path time by the CMX.

To activate the dual signal tracking feature, use a threshold index from -11 to -20. (For example, if an original setting is -6, its dual tracking setting is -16.)

Rack-Mount CMX Diagnostics

Error Indicators While in Run Mode

Rack-mount CMX errors will usually be indicated by the following display conditions while in Run Mode:

COMM ERR (RED COLOR CODE) Communication Error

This condition is updated and displayed every shot point. COMM ERR can indicate that any of the following problems exist:

- Failed modem if all CMXs on one modem line (streamer) are exhibiting this condition
- Failed DMU if no communication on all modem boards
- Failed CMX electronics
- Failed LIU Interconnecting cable (P/N 8000-044)

INTDIAG ERR (YELLOW COLOR CODE) Internal Diagnostic Error

This is a summary fault indication that is updated and displayed every shot point. If any Error condition exists in a CMX other than “Depth Module,” it will be colored yellow.

Diagnostics While Not in Run Mode

Test the Rack-mount CMX using the procedures described in Section IV, Hardware, Dual Rack-Mount CMX. Use a known good Remote Transducer and the special Short Test Cable. Use the Polarity Checker as well.

If all appears well with the Rack-mount CMX itself, the problem may be due to a damaged Remote Transducer (energy source or hull mount) or by a damaged interconnecting cable.

Check the interconnecting cables for the Remote (energy source) Transducers. Use the Pre-Deployment Checkout procedure; again use a known good Remote Transducer. Use the Polarity Checker as well. The firing line cable may have water intrusion.

Check the interconnecting cables for the Remote Hull Mount Transducers. Use the Pre-Deployment Checkout procedure; again use a known good Remote Transducer. Use the Polarity Checker as well. The waterproof interconnecting cable may have been damaged and have water intrusion.

If both the Rack-mount CMX and the Remote Transducer (energy source or hull mount) interconnecting cables check out. Then replace the Remote Transducer.

Remote Transducer Diagnostics

Perform Pre-deployment Checkout

Perform pre-deployment checkouts by following the procedures in Section IV, Hardware, Remote Transducer.

Pulse Monitor Test

The intent of this reading is to determine gross status of the transmitter circuitry and the transducer and cabling. The Pulse Monitor count is a number from 0 to 255 that represents the relative current flowing into the transducer.

Normal readings are in the range of 155 to 210. A low value, near 0, means that no pulse was transmitted. Check to see if a valid Transmit Channel is selected.

If the transducer is suspected of being bad, replace with a new one from the spares kit.

Cable-Mount CMX Diagnostics

Error Indicators While in Run Mode

Cable-mount CMX errors will usually be indicated by the following display conditions while in run mode:

COMM ERR (RED COLOR CODE) Communication Error

This condition is updated and displayed every shot point. COMM ERR can indicate any of the following problems:

- CMX not on streamer
- Water intrusion into streamer (leakage)
- Dead batteries or no batteries installed
- Communication Coil (collar) misalignment
- Failed System 3 modem if all CMXs on one modem line (one streamer) are exhibiting this condition
- Failed DMU if no communication on all modem boards
- Water in CMX
- Failed CMX electronics
- Damaged communication coil in CMX nose assembly.
- Loose, unplugged, or damaged coil interconnecting cable in CMX
- High communication background noise; usually due to the streamer AC power supply. The OFF (V) in CMX Diagnostics Page will usually read 1.0 or less if this is the problem.

INTDIAG ERR (YELLOW COLOR CODE) Internal Diagnostic Error

This is a summary fault indication that is updated and displayed every shot point. For a more complete description of error conditions, causes, and possible solutions, refer to the section Off-line Diagnostics.

CONFIG ERR (CYAN COLOR CODE) Configuration Error

This condition is updated every time the CMX Configuration is changed, either at run-time or at Setup time. This error indicates that the CMX Configuration does not match the configuration in the DMU's memory. Configuration error is caused by:

- Communication failure during " Download to CMX" at setup time
- Failure during run-time Configuration changes (aperture adjustments, threshold modifications) for a selected range The failure could occur due to: Communication problems on the Tx line or with a CMX or CMX having the correct unit number (CMX ID) but having the incorrect serial number entered. To clear this condition, you must download the CMX. If the problem still exists, then the communications may be bad or the CMX may have a have an internal problem.

Diagnosing Problems While in Run Mode

The CMX run-time status information code is displayed for each CMX in the run-time CMX display screen. The code is a 16-bit integer displayed in hexadecimal format. Leading zeros are not displayed.

CMX Run-time Status Information Code: Most Significant Byte

The Most Significant Byte (MSB) of the integer code indicates *communication errors* with the CMX.

Bit Position	Condition if Bit Is On
0	CMX timeout error
1	Virtual address error
2	Checksum error
3	CMX missing sync error
4 - 7	not defined

CMX Run-time Status Information Code: Least Significant Byte

The Least Significant Byte (LSB) indicates *internal diagnostic errors* for the CMX.

Bit Position	Condition if Bit Is On
0	DSP host interface failed
1	DSP reset failed
2	High voltage status failed
3	Acquisition buffer overflow
4	DSP unstop failed
5	DSPRVOK line failed
6	Conf Data Setup failed
7	DSPTVOK line failed

Examples

The following examples of codes and the corresponding conditions show typical run-time observations:

Code	Condition(s)
0	No problems
800	Missing sync error (communication)
200	Checksum error (communication)
20	DSPRVOK line failed (internal diagnostic error)
80	DSPTVOK line failed (internal diagnostic error)
84	DSPTVOK failed; High Voltage Status failed

Section III Diagnostics

Diagnostics After Retrieving Problem Equipment

If it is determined that the error flag is due to a fatal equipment condition or a dead battery pack, the CMX must be retrieved and replaced, or serviced with a new battery pack. Once retrieved, the CMX can be further diagnosed by following the pre-deployment procedures in Section IV, Hardware.

Communication problems due to a damaged communication coil in the CMX nose assembly or a loose, unplugged, or damaged coil interconnect cable can be repaired with new parts from the spares kit or from another nose assembly.

The intent of this reading is to determine gross status of the transmitter circuitry and the transducer and cabling. The Pulse Monitor count is a number from 0 to 255 that represents the relative current flowing into the transducer.

Normal readings are in the range of 155 to 210. A low value, near 0, means that no pulse was transmitted. Check to see if a valid Transmit Channel is selected.

If the transducer is suspected of being bad, replace with an assembly from the spares kit.

OFF-LINE DIAGNOSTICS

Further diagnostics can be performed with the Operator Interface Program while the DMU is out of the run mode. To do this, click on the **Diagnostic / Acoustic / Diagnostic Page** command, which accesses the **CMX Information Dialog Box**. The dialog box contains more detailed information on a specific CMX unit. When this option is executed off-line, an option is available for downloading a special test configuration to the selected CMX unit. This is most useful during initial deployment, when the CMX may not have a valid configuration. After the **Diagnostic Page** option is selected in off-line mode and the desired Unit ID is entered, you can download the special configuration by pressing the Download Diagnostic button. If the special configuration is downloaded, the previous configuration must be re-downloaded after completing the diagnostics procedure.

Unit Number

This is the identifier (that you assign) which System 3 uses to communicate with an individual CMX. Never use the same unit number on two CMXs connected to the same System 3 Line Interface Unit port. This causes operator and system confusion because both CMXs will try to communicate at the same time, resulting in at best one of them getting through sporadically, and at worst no communication to either unit.

Serial Number

This is the factory assigned serial number stored in the CMX Control Module EPROM, and is used to assign Unit Numbers as well as unambiguously identify a particular CMX. You can not change this number. DigiRANGE CMXs are assigned serial numbers of 3000 and above.

Transmit Channel

This is the number of the active transmit channel being used in this diagnostic. In this mode, if the diagnostic configuration has been downloaded to the CMX, transmit channels 1 to 5 can be selected one at a time by changing the value in the Transmit Channel field. Channel 0 disables the transmitter and is used to observe background noise levels reported from each of the available 8 apertures in the SIGSTR display; the receivers are still active in this case.

This transmit channel indicator only appears if the Diagnostic Configuration has been downloaded.

Section III Diagnostics

SIGSTR

SIGSTR (dB) refers to the DSP (Digital Signal Processor) processed received signal strength for apertures 1 through 8. This is NOT a raw amplitude signal strength. Readings of between -72 dB and -84 dB are typical during instrument room checkout. A reading of -10dB indicates a stronger signal than does -40dB. The SIGSTR range is +6 to -84 dB. A signal strength of +6 indicates a path estimate.

Signal

Volt (V) = 0.0 0.0

This is an indication of the relative levels of the FSK signals received by the selected CMX from the LIU. A reading of 0.0 indicates that the CMX FSK receiver is saturated and therefore receiving adequate signal levels from the LIU. Numbers greater than 0.0 indicate that the signal from the 272 LIU modem is weaker and is not saturating the CMX FSK receiver. Levels greater than about 1.0 are likely to result in intermittent or no communication. This data is useful in finding proper coil alignment, or in detecting improper alignment when deploying CMXs.

Off (V) = X.X

This is an indication of the level of the consistent, long term background noise present on the communication twisted pair in the streamer cable. The number presented here is inversely proportional to this noise level. A value of 2.5 or 2.4 indicates a noise free condition. Intermittent communication will more than likely exhibit a reading of about 1.0 or less. This noise on the streamer cable is due to interference from AC streamer power supplies. In the instrument room there are many sources of interference; high resolution CRT monitors are among the worst offenders. Because of this, it is sometimes necessary to take a CMX out of the instrument room (long test coil cable) to perform pre-deployment checks. A better alternative is to use a µ metal or steel enclosure as a shield for the test coil and CMX coil.

Depth / Temperature

If the Data Acquisition Module is installed on the Control Module of the CMX, the readings for depth and temperature are displayed here.

Alkaline Battery Pack

New alkaline battery packs start at approximately 63 volts. Battery packs should be replaced when the voltage drops below 42 volts.

Lithium Battery Pack

Acoustic Transmit Pulse Monitor

The intent of this reading is to determine gross status of the transmitter circuitry and the transducer and cabling. The Pulse Monitor count is a number from 0 to 255 that represents the relative current flowing into the transducer.

Normal readings are in the range of 155 to 210. A low value, near 0, means that no pulse was transmitted. Check to see if a valid Transmit Channel is selected.

Status Fields

A white status indicator indicates normal operations. A red status indicator indicates a failure. The following is a list of the status indicators and possible causes of red (failure) condition status.

Host Interface

This is a run time status check of the communication between the Control Module and the Host Interface of the DSP Module.

Failure Causes

- The DSP program did not download properly from the Control Module.
- The DSP did not reset properly.
- The DSP RAM contains an erroneous configuration or a corrupted program.

CMX Action Taken If Failure Condition Exists

Aborts further acoustic activity, fatal error.

Corrective Action

Failure is likely to be the DSP Module if communication is proper. Try resetting the DSP to clear this condition by pressing the Reset DSP button.

Section III Diagnostics

DSP Reset Status

This is a check performed only at power up or reset time to verify proper operation of the DSP power up sequence.

Failure Causes

- The DSP failed to get out of the low power mode (STOP).
- The DSP Module 20 MHz oscillator failed to power up in the required time.
- The DSP still failed its communication check after the previous two events successfully occurred.

CMX Action Taken If Failure Condition Exists

System retries 5 times then aborts subsequent acoustic actions, fatal error.

Corrective Action

Failure is likely to be the DSP Module if communication is working. Try resetting the DSP to clear this condition by pressing the Reset DSP button.

High Volt Status

This is a run time check performed before and during every pulse transmit event to determine the condition of the high voltage power supplies (HVPS) and the power amp.

Failure Causes

- The + or - HVPS is not at the correct voltage level before transmitting the pulse.
- The + or - HVPS has dropped too far in voltage level while transmitting the pulse.

CMX Action Taken If Failure Condition Exists

Further transmit action is not attempted. Probable fatal equipment error. Symptom is no ranges will be received by other CMXs from this CMX.

Corrective Action

Low or faulty battery packs can cause this error status to be set. Check wiring and/or change transducer. Failure is likely to be on the Power Module in the HVPS section.

Invalid Setup

An invalid configuration has been downloaded to the CMX.

CMX Action Taken If Failure Condition Exists

CMX aborts all acoustic activity.

Corrective Action

Check the unit's acoustic configuration in the Setup Program, to see if it has any invalid parameters.

DSP Unstop

RESERVED.

DSP Receive Voltage OK (VOK) line

This is a run time check performed before receiver apertures are opened to determine that the levels of the receive circuit's power supply voltages have stabilized to their proper values.

Failure Cause

- + or -RVSW is not at the correct voltage level before opening receive apertures.
- + or -5RVSW is not at the correct voltage level before opening receive apertures.

CMX Action Taken If Failure Condition Exists

Aborts all acoustic activity. DSP reset attempted. Probable fatal equipment error. Symptom is no ranges will be received by this CMX.

Corrective Action

The most likely cause of this problem is a spent battery pack. A failure is likely to be on the DSP Module in the ±RVSW or ±5RVSW section. Replace the batteries.

Configuration Data Setup

This is a check performed every time a configuration parameter is downloaded to the CMX. A minimal amount of error checking is done here since most of the configuration checks are done by System 3.

Failure Cause

Configuration value is not within bounds.

CMX Action Taken If Failure Condition Exists

CMX will not respond to the System 3 "SYNC", no acoustic ranging will take place.

Corrective Action

The most likely cause of this problem is an error in the Setup configuration file

DSP Transmit Voltage OK (TVOK) line

This is a run time check performed before every pulse transmit event to determine that the levels of the transmit circuitry's low voltage power supplies have stabilized to their proper values.

Failure Cause

+ or -TVSW is not at the correct voltage level before transmitting the pulse.

CMX Action Taken If Failure Condition Exists

Transmit action is not attempted. Probable fatal equipment error. Symptom is no ranges will be received by other CMXs. Receiver action will continue anyway.

Corrective Action

The most likely cause of this problem is a spent battery pack. A failure is likely to be on the DSP Module in the ±TVSW section. Replace the batteries.

The equipment for this status does not exist on the 9000-4010 and 9000-4010/3 CMXs. The status is permanently set to "check" by the CMX firmware.

Electrically Erasable PROM (EEPROM) Test

This is a test performed only at power up time in which the contents of the non-volatile EEPROM are summed and compared against the checksum also stored in EEPROM. This test is to ensure the integrity of important configuration data, i.e. Unit Number.

CMX Action Taken If Failure Condition Exists

EEPROM checksum fails during RESET check.

Failure Cause

Failure is likely to be on the Control Module; in particular the MC68HC11 micro-controller itself.

Data Acquisition Module

This Failure condition status is used and set for two purposes: Checked at power up to determine if a Data Acquisition Module is installed on the Control Module and, if it is installed, to determine proper operation for depth and temperature data acquisition.

CMX Action Taken If Failure Condition Exists

If "F" is set upon power up (no DAQ module present); no further attempts are made to access this function. If it is determined that DAQ Module is installed then several retries are made during run mode before setting this error status.

Failure Cause

Failure is likely to be on the Data Acquisition Module installed on the Control Module.

The Data Acquisition Module is not normally installed in the CMX and therefore its normal status is in the failure condition.

External RAM Test

This check is performed only at power up time only and consists of a multi pattern test on each cell of the 8K byte RAM on the Control Module.

Failure Cause

Any cell fails to read back any of the patterns written to it.

CMX Action Taken If Failure Condition Exists

All cells are zeroed out and further action is attempted. Possible software error. Also possible that the failed cell is not used by the program. If symptom persists, it is a probable fatal equipment failure.

Erasable PROM (EPROM) Checksum

This is a checksum test on the program section of the EPROM on the Control Module that is performed at every power up.

Failure Cause

EPROM checksum fails.

CMX Action Taken If Failure Condition Exists

Further action is attempted. This is a probable fatal equipment failure.

X-memory in DSP

This is the status of a RAM pattern test performed on the external RAM X-data-memory on the DSP Module.

Corrective Action

Failure is on the DSP module.

Y-memory in DSP

This is the status of a RAM pattern test performed on the external RAM Y-data-memory on the DSP Module.

Corrective Action

Failure is on the DSP module.

P-memory in DSP

This is the status of a RAM pattern test performed on the external RAM P-program-memory on the DSP Module.

Corrective Action

Failure is on the DSP module.

Analog to Digital (A/D) Converter Condition

This status check is performed every time the A/D converter internal to the MC68HC11 micro-controller on the Control Module is used, i.e. communication background noise checks (2.5V), ± Battery Voltage Reads.

Failure Cause

Any time that the A/D converter times out during a conversion process.

CMX Action Taken If Failure Condition Exists

A/D conversion is aborted and tried again next time. This is a probable fatal equipment failure. May not necessarily stop CMX operation but will result in no communication background noise checks (2.5V), or ± Battery Voltage Reads.

Section III Diagnostics

TROUBLESHOOTING UTILITIES

Geometry Verification

Set Geometry Parameter

The **Sensor / Set Geometry Parameters** command accesses the **Geometry Test Settings Dialog Box**, which allows you to select an acoustic group and enter the two reference CMXs (origin and baseline). The origin CMX defines the center of a local coordinate system for the group, and the baseline CMX determines the orientation of the local coordinate system. Following your selection of the two reference CMXs, select the **Sensor / Request a Geometry Test** command.

Request a Geometry Test

The **Sensor / Request a Geometry Test** command initiates the geometry verification process. When the process is started, the CMX Serial numbers are read and compared with the configured Serial numbers.

At this point, it is assumed that all CMXs are deployed and their acoustic configurations downloaded, and the reference CMXs (origin and baseline) are specified.

For units with mismatches, both the configured Serial number and the true Serial number (read from the sensor) are displayed next to the Unit ID. Mismatches must be resolved in order to proceed further (communications failures are ignored).

If all Serial numbers match, the verification will proceed. During the next phase, the DMU collects range samples over 10 shot intervals and then computes the estimated positions of the CMXs. The DMU must be in Run Mode for the sampling process to proceed. Other operations can be performed at the Operator Interface while this sampling is in progress. A message appears when the verification is complete (allow at least 10 shot intervals), indicating that the results are available for display.

Any of the following error conditions can prevent the verification process from determining the CMX locations:

- invalid reference CMXs specified
- insufficient range data for reference CMXs
- insufficient range data for the group
- no convergence

- RMS exceeds threshold.

If the 'invalid reference CMXs specified' message appears, re-enter two reference CMXs, ensuring that they are on the same line. If any of the other error messages appear, verify that all CMX configurations have been downloaded and that the CMXs are communicating. Then go to the Range display and check the status of the ranges in that group. If a fault is discovered, restart the verification after it is corrected.

During the acquisition of the geometry verification data, the lines should be straight and no turns made.

Retrieve Geometry Results

The **Sensor / Retrieve Geometry Results** command accesses the **Select Group Dialog Box**. The dialog box allows you to select the number of the acoustic group that you want to view in order to obtain the results of the last geometry verification. A dialog box appears briefly and informs you that the verification results are being compiled. Following the compilation of the geometry verification results, they are displayed in a tabbed window. The window is divided into two groups: **Lines and Units** and **Acoustic Ranges**.

The **Lines and Units Geometry Test Results Display** allows you to view the configured lateral offset and the calculated lateral offset for each line and sensor unit found in the selected group. All offsets are in meters. The calculated offset for the line is the average of the calculated lateral offsets of all CMXs on that line. Any calculated lateral offset that differs from the corresponding configured offset by more than 10 meters is displayed in a pre-selected color. Any unit with insufficient valid range data to participate in the verification is displayed in another pre-selected color.

To select the colors used in the displays, use the tabbed System Preferences Dialog Box, which is accessed by clicking on File / Preferences. Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.

The **Acoustic Ranges Geometry Test Results Display** allows you to view the configured, calculated and measured range distances (in meters) for each range in the selected group. The measured range is based on an average of the observed range values collected over the 10 shot intervals, with all unqualified range measurements excluded. If an insufficient number of valid measurements were obtained over this 10-shot sample interval for a range, that range is displayed in a pre-selected color. Any calculated range that falls outside the center half of its configured aperture is displayed in another pre-selected color.

Section III Diagnostics

CMX Verification Test

The **Sensor / CMX Verification Test** command verifies the acoustic ranging operation of a pair of CMXs by measuring a single range between two CMXs whose transducers are in close contact. The range value reported between the CMX pair is an indication of the accuracy of the two CMXs. This is essentially a zero-range verification test. To pass the test, the reported range time should be 0.0 +/- 0.1 millisecond.

A special Setup file named ZERO.CFG is used for the verification test. This file contains only two CMXs, both on transmission port 1 (AA01 and AA02), with a single range between them.

The following steps are required to perform this test:

1. Position two cable-mounted CMXs so that their transducers are barely in contact. Minimal contact is recommended. Place a suitable impeding medium (the recommended medium is the bubble pack wrapping used to ship the battery packs) between the transducers.
2. The CMXs must communicate over a line connected to modem transmission port 1. If the default test configuration (ZERO.CFG) is modified, be sure that the two CMXs are connected to the appropriate modem port and have different unit numbers.
3. Enter the Setup program, open the ZERO.CFG Setup file and enter the serial numbers of the two CMXs being used. Then, transfer this file to the DMU (**File / Transfer to DMU** command). After a successful transfer, exit Setup.
4. Enter the Operator Interface (OI) program and select the **DMU / Exit Run Mode** command.
5. Select the **Sensor / Deploy an Acoustic Unit** command. Enter the first CMX ID (AA01) in the Unit ID field, and select ‘Assign Unit Number’ from the list of Command options. If an error message appears, repeat the operation until it succeeds. Return to the Unit ID and repeat the same procedure for the second CMX (AA02).
6. Select the **Sensor / CMX Verification** command. The CMX configurations will be downloaded to each of the two pods. A message will appear confirming each download.
7. Select the **DMU / Enter Run Mode** command. This activates data acquisition and acoustic ranging.
8. Observe the acoustic signal strengths for path 1 and path 2 for the range “AA01-AA02”. They should fall within the range of -35 dB to -1 dB. If

they do not, make small adjustments to the position of the CMX transducers or the impeding medium to change the contact pressure.

9. Select the **DMU / Path Reflections** command to ensure that both CMXs are communicating properly (CMX Unit IDs are both the correct pre-selected color).
10. Observe the range time for range "AA01-AA02" over several shot intervals. The reported range should be 0.0 +/- 0.1 millisecond.
11. When the test is complete, return to the Setup program and transfer the desired Setup file to the DMU (**File / Transfer to DMU** command). Then go through normal deployment procedures.

Before returning to normal operation, the runtime configurations must be downloaded to all CMXs using the Download CMXs Configuration command.

Test Coil Diagnostics

If you have a free (unused) Transmission port on the Line Interface Unit (LIU), you can designate that port as a Transmission line, create a platform/line, type is Test Cable, label the Test Port "T", and click on the **Diagnostics / Acoustic Diagnostics** command.

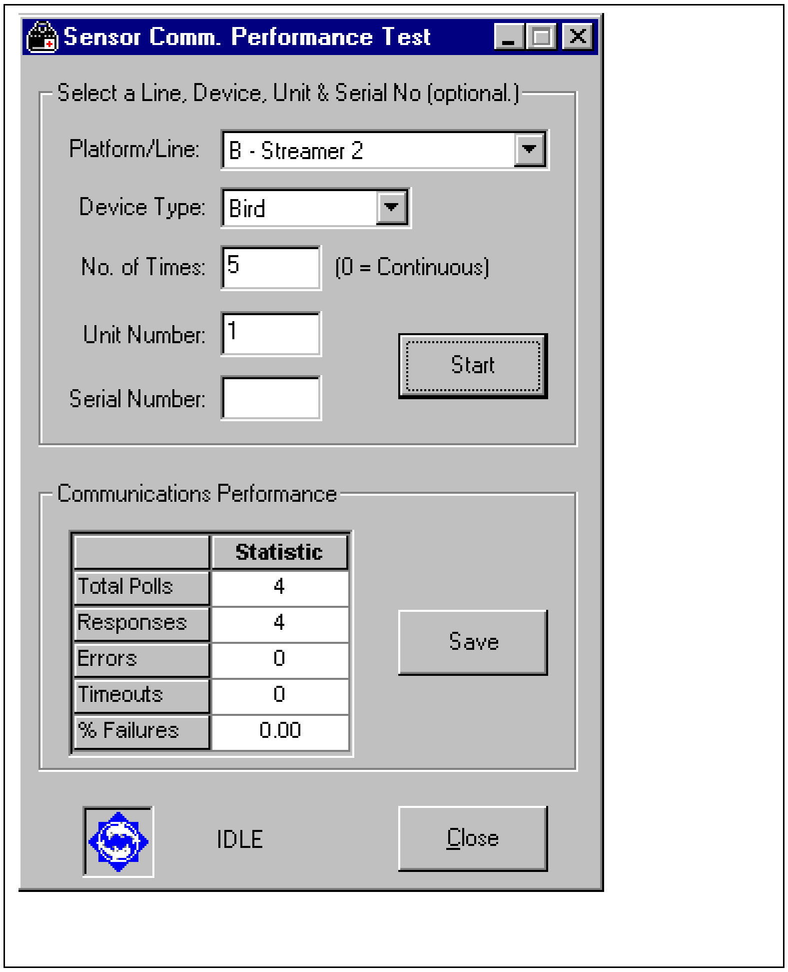
Read AGC

1. Click on the **Diagnostic / Read AGC** command.
2. Use @ as a wildcard to read all AGC's.

Sensor Communication Test

The **Performance / Sensor Comm. Test** option performs a communications test on a sensor. This test allows you to send a number of polls to a selected sensor, and to display the results in a table of statistics. When this option is selected, the **Sensor Comm. Performance Test Dialog** is displayed. From here you select the platform line and the device type, and enter the sensor's unit number (or serial number) and the number of times to poll the unit. To poll continuously without stopping until the window is closed, enter zero for the number of times to poll. Click "Start" to begin the test.

The results displayed include the total number of polls issued, the number of responses, errors, and timeouts, and the percentage of failures. This data can be saved to a file by clicking the "Save" button.



DATA MANAGEMENT UNIT

Overview

The Data Management Unit (DMU) is the interface between the shipboard computers and the sensors on the cables. It serves as a centralized data switch for data collected from the sensors, and distributes data to the shipboard computers. All functions relating to communications with the sensors and external computers are implemented within this unit.

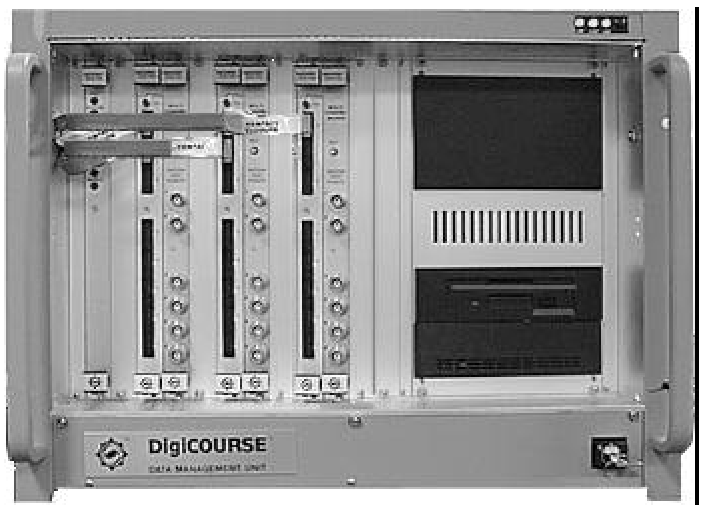


Figure 4.1 Data Management Unit (front view)

Communications Processor

The Communications Processor (CP**)** handles all high-level communications and data management functions, which includes the acquisition cycle timing and the interfaces to the shipboard computers.

Modem Unit

The Modem Unit (which consists of a Modem Processor and a Modem I/O) is an intelligent communications controller that implements the data link interface and physical layer interface to the transmission lines.

Section IV Hardware

Modem Processor

The Modem Processor (MP) is an eight-port RS-232 board. It provides the interface between the CP and the Contact Closure Board, the radio link, and the Modem I/O. Ports 1 to 6 interface with the Modem I/O via the backplane. Port 7 interfaces with the radio link via a ribbon cable. And Port 8 interfaces with the Contact Closure Board via a ribbon cable. Therefore, one Modem Unit is capable of handling up to seven transmission lines (one is a data radio link; two Modem Units are capable of handling up to 14 transmission lines (two are data radio links; and three Modem Units can handle up to 20 transmission lines (two are data radio links). The actual number of lines used in a given installation is specified during system setup.

Modem I/O

The Modem I/O converts RS-232 to FSK (and vice versa) for communication to and from the birds and the acoustic units. It also provides transmission signal quality monitoring. Each of the 6 BNC connectors on the front panel are connected to one of the six FSK transmission lines for external signal verification.

Communications between the Modem Units and the sensors on the streamer cable uses the communications protocol described in the document System 3 Transmission Line Communications Protocol, (P/N 1000-191). The Modem Unit handles the low-level functions related to the acquisition of data from individual sensors on each transmission line, including polling of individual sensors, framing of received responses, error detection, and re-polling of non-responding sensors.

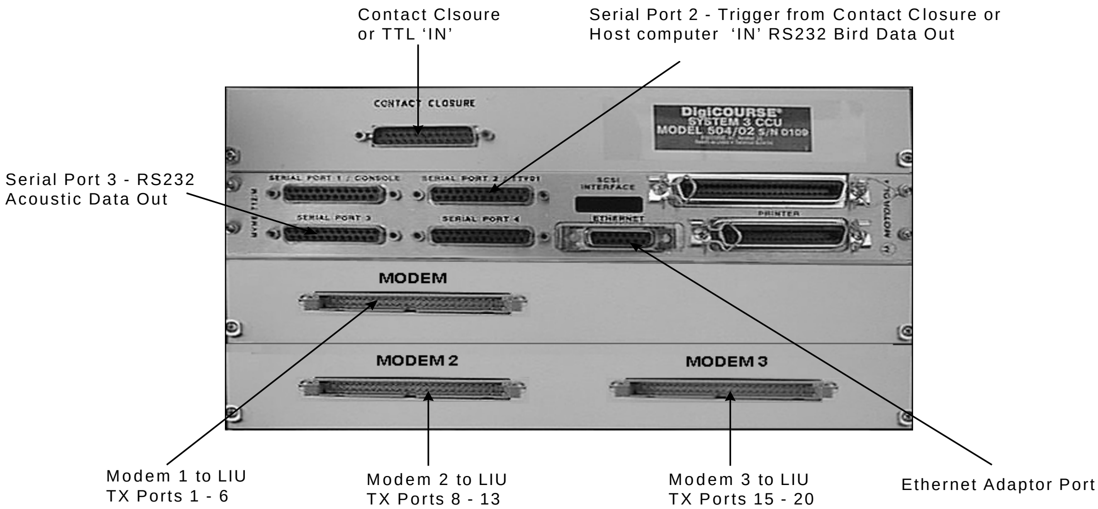


Figure 4.2 Data Management Unit (rear view)

Serial Ports 1 through 4

The four interface ports (which are located on the rear panel on the DMU chassis) are used for data links for communications between the DMU and the other system components.

Serial Port 1

Serial Port 1 is the Console port, which is used to troubleshoot system problems or to perform software upgrades.

Serial Port 2

Serial Port 2 is the main communications port between the shipboard (Host) computer and the DMU. The Host computer and the DMU Serial Port 2 communicate through a bi-directional serial link (RS-232 link).

The DMU responds to commands from the Host computer to perform various functions related to data acquisition and output, including timing control for data acquisition triggering.

Host Data Transfer

Two basic types of data formats, binary and ASCII, are supported for the transfer of non-acoustic sensor data from Serial Port 2 to the Host computer. Several protocols are supported for the transfer of data in binary format, and one protocol is supported for ASCII format. These protocols are specified in the DigiSCAN Operator's Manual, 293-A Edition, (P/N 6301-293A).

Both solicited and unsolicited output of sensor data are supported. For solicited output, a data request must be received from the Host. Unsolicited output occurs automatically once each shot interval, with its timing controlled by the internal scan trigger.

Host Data Logging Modes

In the Setup program, the **System / Host** command will open the **Host Parameters Dialog Box**. Select one of the logging modes from the table below:

Host Logging Mode	Result	Explanation
Disable Logging	Logging is disabled.	
Data Request	Receipt of a trigger event (character “d” followed by either a 1, 2, or 3) from the Host.	The cycle begins as soon as the Host trigger is received.
Scan Trigger	Auto log on external scan trigger.	Data sent every external scan trigger.
Scan on Internal Timer	Auto log (auto-triggering) on external or internal trigger.	Data sent every external or internal trigger. See the note below concerning the DigiCOURSE Contact Closure Board.

When the DigiCOURSE Contact Closure Board (P/N 9000-504/02) is used for triggering, the Host Logging Mode (Scan Trigger OR Scan on Internal Timer) and data format are specified in the Setup program.

Triggering occurs regardless of which selection is made. If logging is not disabled, the type of data output during logging depends on which Host command is chosen.

Host Data Triggering

The Host computer issues commands to the DMU to initiate a single data acquisition cycle. In a data acquisition cycle, data is collected from the sensors and is logged (stored); the DMU also transmits to the Host computer the data logged from the previous data acquisition cycle.

The type of data logged and transmitted depends on which Host character(s)/command(s) is issued. The Host commands which are supported are as follows:

Character	Command
P	trigger data acquisition and transmit data (ASCII)
Q	(same as P)
T	transmit data (log data to Host computer; ASCII)
d	trigger data acquisition and transmit data (binary)
p	trigger data acquisition and transmit data (extended binary)
w	trigger data acquisition and transmit compass data
c	contact closure trigger (mode set internally)
d followed by g	trigger data acquisition and transmit data when "g" is issued (Geco Tribird data format). The Logging mode must be set to Data Request for this function.
d followed by 1	trigger data acquisition and transmit **compass** data when 1 is issued. The Logging mode must be set to Data Request for this function.
d followed by 2	trigger data acquisition and transmit **depth** data when 2 is issued. The Logging mode must be set to Data Request for this function.
d followed by 3	trigger data acquisition and transmit **fin angle** data when 3 is issued. The Logging mode must be set to Data Request for this function.

Acoustic Data Option

Optionally, Serial Port 2 can be selected for the output of acoustic range data. If Serial Port 2 is selected for acoustic data, an acoustic range message is transmitted every time a Host log event is scheduled. The range message follows the non-acoustic data message.

Acoustic Data Protocol

The protocols used in the transfer of acoustic data are specified in the following documents:

DigiCOURSE ECHO Standard Host Protocol (P/N 1000-132)

DigiCOURSE ECHO Extended Host Protocol P/N 1000-133)

DigiCOURSE Extended Acoustic Protocol (P/N 1000-361)

Acoustic data output by the System 3 DMU to the Host computer employs the selected protocol regardless of whether Serial Port 2 or Serial Port 3 is used. (Refer to the Host Parameters Dialog Box, Acoustic Data Protocol selection.)

Serial Port 3

Serial Port 3 is the primary acoustic port between the shipboard (Host) computer and the DMU. The Host computer and the DMU Serial Port 3 communicate through a bi-directional serial link (RS-232 link).

If this port is used, an acoustic data message is output at the beginning of each scan cycle. The type of message to be output is specified as a configuration parameter.

Serial Port 4

Serial Port 4 is not used.

Specifications

Physical Characteristics

Width:	48.26 cm (19.00 in)
Depth:	47.75 cm (18.80 in)
Height:	35.28 cm (13.89 in)

Section IV Hardware

Electrical Characteristics

Input Voltage:	90 - 132 / 180 - 264 Vac
Input Frequency:	47 to 63 Hz
Input Power:	575 VA (max)
Output Voltages:	+5 Vdc @ 70A
	+12 Vdc @ 10A
	-12 Vdc @ 6A

Maintenance

The System 3 DMU chassis has a forced air ventilation system that draws air from the bottom of the chassis, through an air filter, and routes the air over the circuit boards and out the top of the chassis. Leave adequate space above and below the DMU chassis for proper ventilation. Inspect and clean the air filter as often as environmental conditions dictate. The air filter is accessible by removing the three captive screws on the bottom front panel.

Installation

Before Installation

The Data Management Unit (DMU) and inter-connecting cables have been fabricated in accordance with standard DigiCOURSE manufacturing procedures. Visually inspect each piece for any possible damage due to shipping. Ensure that all items have been shipped as per the packing list.

Installation Equipment Required

The following equipment is required to install the DMU:

1. DMU (P/N 9000-501A)
2. Line Interface unit (P/N 9000-505)
3. Power cable, supplied by DigiCOURSE (P/N 6000-026).
4. DMU to LIU inter-connection cable (P/N 8000-775); supplied by DigiCOURSE
5. Rack slide rail and extension kit for the DMU; supplied by DigiCOURSE.

6. Rack mounting screws; user supplied..
7. Screwdriver.

Installation Procedure

1. Mount the rack side rails in the rack with the hardware provided. The DMU is shipped with the rack slides attached.
2. Install unit in rack and secure with the four front panel rack screws (user supplied).
3. Leave sufficient space above and below the DMU for unrestricted airflow.

Failure to allow for sufficient airflow may cause overheating and failure of the DMU.

4. Install the power cable but leave the unit power switch off.
5. The DMU power supply automatically configures itself for use with either 115Vac or 230Vac line voltage.

DMU Hard Drive Replacement

The hard drive used in the DMU is a 240 Mbyte SCSI drive. A SCSI hard drive is included in the spares kit (Note: any SCSI hard drive may be used as a temporary replacement drive if a hard drive failure occurs). In the event of a hard drive failure, the DMU will not boot up properly during a power up. To replace the hard drive, follow the procedure outlined below:

1. Remove the power cord from the DMU.
2. Remove the four screws on the front panel of the drive bay on the DMU and slide the drive bay out the front of the DMU. If the drive bay does not slide out, there may be two additional screws holding the drive bay in place. The two screws are accessible through the top cover of the DMU (note: before sliding DMU out on rails, remove modem cable connector on rear of DMU).
3. Remove the power cable connector and SCSI cable connector from the rear of the hard drive. Remove the hard drive from the drive bay by removing the four screws that secure the hard drive to the bay frame.
4. Install the replacement hard drive in the drive bay and secure it with the four screws.
5. Connect the power plug and SCSI connector to the hard drive.
6. Insert the drive bay into the DMU chassis and secure it with the four front panel screws.

7. Plug in the DMU power cord and reconnect the modem cable.
8. Power up the DMU.

DMU Communications Processor Replacement

The DMU Communications Processor (CP) (P/N 8000-766) resides in slot 1 of the DMU chassis. During normal operation the LEDs on the front panel of the CP should be in the following states:

Fail LED	OFF
Status LED	ON (Yellow)
Run LED	ON (Green)
Scon LED	ON (Green)

The ON state of the FAIL LED (Red) indicates a CP board failure. The "bad" CP board can be replaced with a new CP (part of spares kit - P/N 6500-057A) by following this procedure:

1. Power off DMU.
2. Remove the ribbon cable connector from port 8 on the front panel of the Modem Processor (P/N 8000-760) located in slot 3 of the DMU chassis.
3. Remove the 2 retaining screws on the front panel of the CP (P/N 8000-766). Remove the failed CP (P/N 8000-766) from the DMU chassis.
4. Insert the new CP into the DMU chassis, making sure the board is properly seated in the backplane.
5. Tighten the 2 retaining screws on the CP front panel.
6. Insert the ribbon cable connector into port 8 on the front of the MP.
7. Power on DMU.

Contact Closure Board

The Contact Closure Board is used when the host does not generate an ASCII character for the System 3 shot point trigger, but a switch closure (either relay closure or logic signal level change) is available as the trigger for the System 3 DMU.

This board is designed to convert a switch closure into an ASCII character ("c" or 63h). The character is then forwarded to the System 3 DMU Serial Port 2 where it serves as the System 3 shot point trigger character. See Figure 4.2 for the location of the Contact Closure Unit on the DMU. Remove the two panel screws to gain access to the DIP switch on the Contact Closure Board for configuration.

The option switches on the closure board are defined as follows:

Switch	Definition
5. 6. 7	Baud Rate Selection
4	Active High/Low Selection
2, 3	Parity Selection
1	Not Used

Baud Rate Codes

The baud rate codes are listed below where a "1" equals an open switch, and a "0" equals a closed switch.

	Switch		
5	**6**	**7**	**Baud Rate**
0	**0**	**0**	**300 bits per second**
0	**0**	**1**	**600 bits per second**
0	**1**	**0**	**1200 bits per second**
0	**1**	**1**	**2400 bits per second**
1	**0**	**0**	**4800 bits per second**
1	**0**	**1**	**9600 bits per second**
1	**1**	**0**	**1200 bits per second**
1	**1**	**1**	**1200 bits per second**

Section IV Hardware

Parity Codes

Parity codes are:

Switch 2	Switch 3	Parity Selection
0	**0**	**Odd**
0	**1**	**Even**
1	**0**	**Off**
1	**1**	**Off**

Signal Active High/Low

Signal Active High/Low selection is as follows:

Switch 4		Signal Polarity
1	**Low**	**Open**
0	**High**	**Closed**

In two-boat operations, set the switch to “High” to ensure closure synchronization.

The communication configuration of the contact closure board must match the Host Port configuration as configured by the Setup program.

Refer to Figure 4.3 for contact closure unit cable installation connections.

Refer to Figure 4.4 for the contact closure cable pin out.

The contact Closure Board also connects to Modem Processor Port 8 on the front panel of the DMU chassis via a ten pin ribbon cable connector.

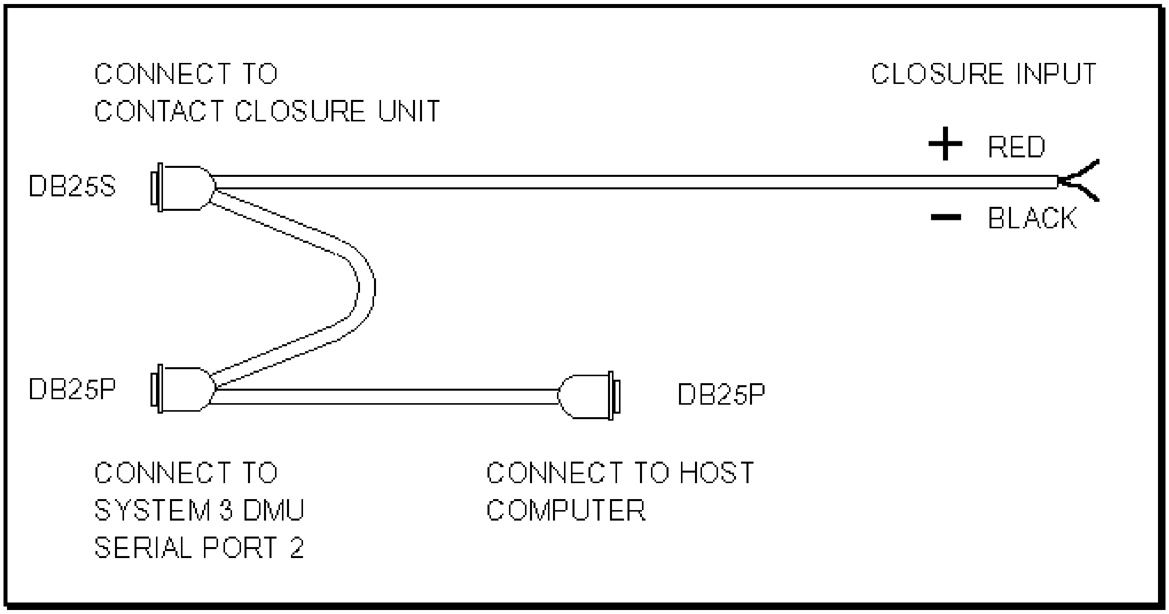


Figure 4.3 Contact Closure Unit Cable Connections

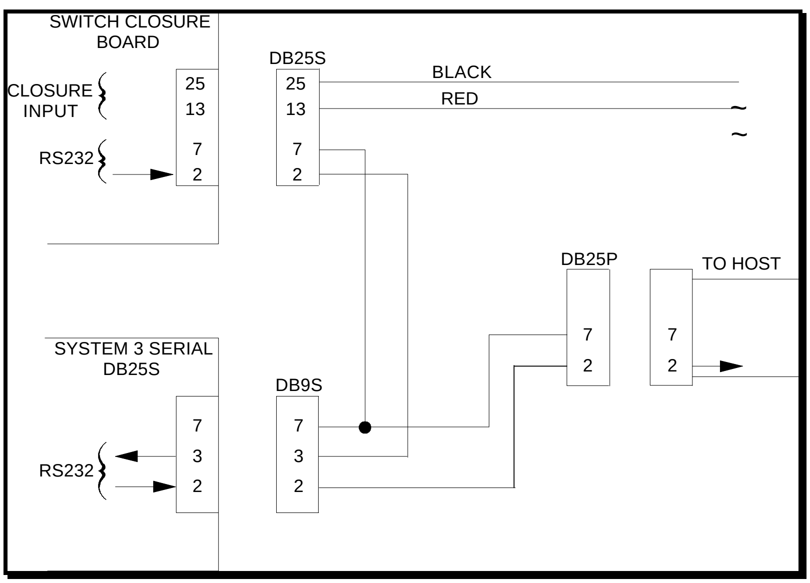


Figure 4.4 Contact Closure Pin Out

Section IV Hardware

Host Interface Installation

The host interface is the physical data link between the DMU and the host computer. It allows the transfer of sensor data to the host computer. Physically, the host interface consists of a serial RS-232 cable, host computer serial ports and DMU Serial Port 2 and Serial Port 3.

On the DMU, two serial ports, Serial Port 2 and Serial Port 3, are available for the host interface link.

Normally, Serial Port 2 is used as the dedicated compass/depth data link to the host. Acoustic data transfer is normally done through Serial Port 3.

Serial Port 2 port on the DMU is a 25 pin female port used for logging compass/depth data and receiving the System 3 shot point trigger. The pin functions are :

1. pin 2: TX from the DMU to the host
2. pin 3: RX (trigger character from the host or CCU)
3. pin 7: GND

Serial Port 3 port on the DMU is a 25-pin female port used for logging acoustic range data. The pin functions are :

1. pin 2: TX from the DMU to the host
2. pin 3: No function
3. pin 7: GND

Figure 4.5, Data Management Unit Connector Location, shows the location of Serial Port 2 and Serial Port 3.

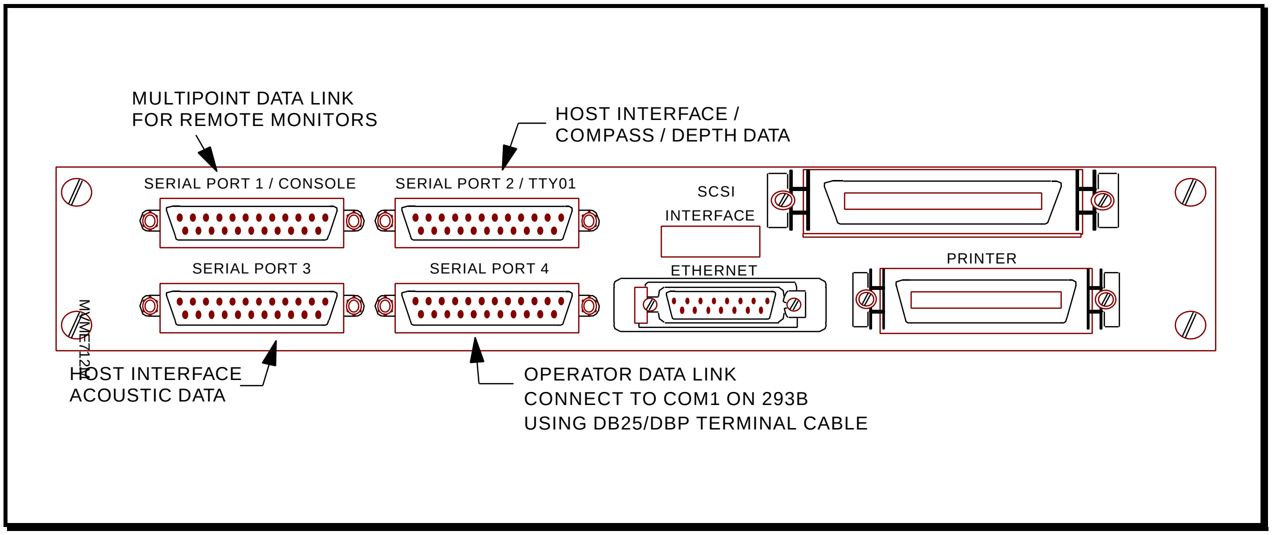


Figure 4.5 Data Management Unit Connector Location

:

Section IV Hardware

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Operator Interface Computer

Overview

The Operator Interface computer is the system command console. It handles all operator control and monitoring functions by implementing the three System 3 software programs: Setup, Operator Interface (OI), and Analysis. From the Operator Interface computer you can enter commands and configuration data to set up the system, execute sensor control, diagnostic, and test functions, and display current information on streamer position and sensor performance in both tabular and graphic formats.

The system can be set up to use multiple Operator Interface computers. Up to six Operator Interface computers can be set up to provide full command and control functions. An additional 248 Operator Interface computers can be set up in monitor mode only.

The Operator Interface computer(s) communicates with the DMU over an Ethernet connection.

For information on the software run by the Operator Interface computer, see Section V, Setup Program; Section VI, Operator Interface Program; and Section VII, Analysis Program.

Section IV   Hardware

Figure 4.6 Operator Interface Computer (typical)

Specifications

The specifications below are the minimum recommended for use as a System 3 Operator Interface computer.

90 MHz processor (minimum)

3.5-inch floppy disk

CD ROM drive

540 MB hard disk (minimum)

Windows NT or Windows 98 Operating Systems

Color, 17-inch, multi-sync resolution monitor

LINE INTERFACE UNIT

Overview

The Line Interface Unit (LIU) provides the physical interface between the DMU and the transmission lines. Each LIU has six transmission line connectors. Three LIU’s are provided for 18 streamer capabilities: one LIU for streamers 1 through 6, a second LIU for streamers 8 through 13, and a third LIU for streamers 15 through 20.

LIU units do not have connectors for Line 7 and Line 14. Lines 7 and 14 (on the DMU) are used as Data Radio Telemetry links and cannot be used for streamers.

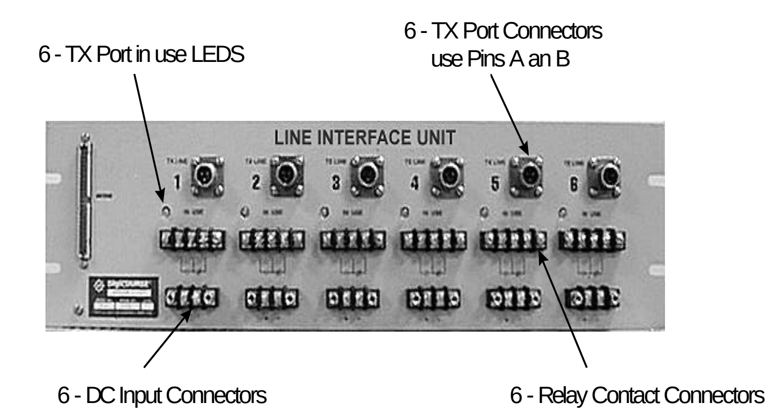


Figure 4.7 Line Interface Unit

The LIU has output relays and a “Line-in-Use” indicator LED for each line, which are active when the DMU Modem Unit is accessing the transmission lines. The LIU has terminal connections for supplying dc power to the transmission lines. The dc power supply monitoring is available as an option (P/N 9000-505/02).

Section IV Hardware

Specifications

Physical Characteristics

Width:	48.26 cm (19.00 in)
Depth:	6.4 cm (2.520 in)
Height:	13.26 cm (5.219 in)

Electrical Characteristics

Input Voltage:	90 - 132 / 180 - 264 Vac
Input Frequency:	47 to 63 Hz
Input Power:	575 VA (max)
Output Voltages:	+5 Vdc @ 70A
	+12 Vdc @ 10A
	-12 Vdc @ 6A

Part Numbers

P/N 9000-505/01:	No dc power supply monitoring.
P/N 9000-505/02:	Includes dc power supply monitoring. Use with in-streamer sensors and Line Power Unit.

Installation

1. Mount the LIU on the back side of the rack with the transmission connectors facing outward. Secure the unit with four rack screws (user supplied).
2. Using the 8000-775 ribbon cable, connect the DMU rear panel Modem connector (see Figure 4.8) to the Modem connector on the LIU.

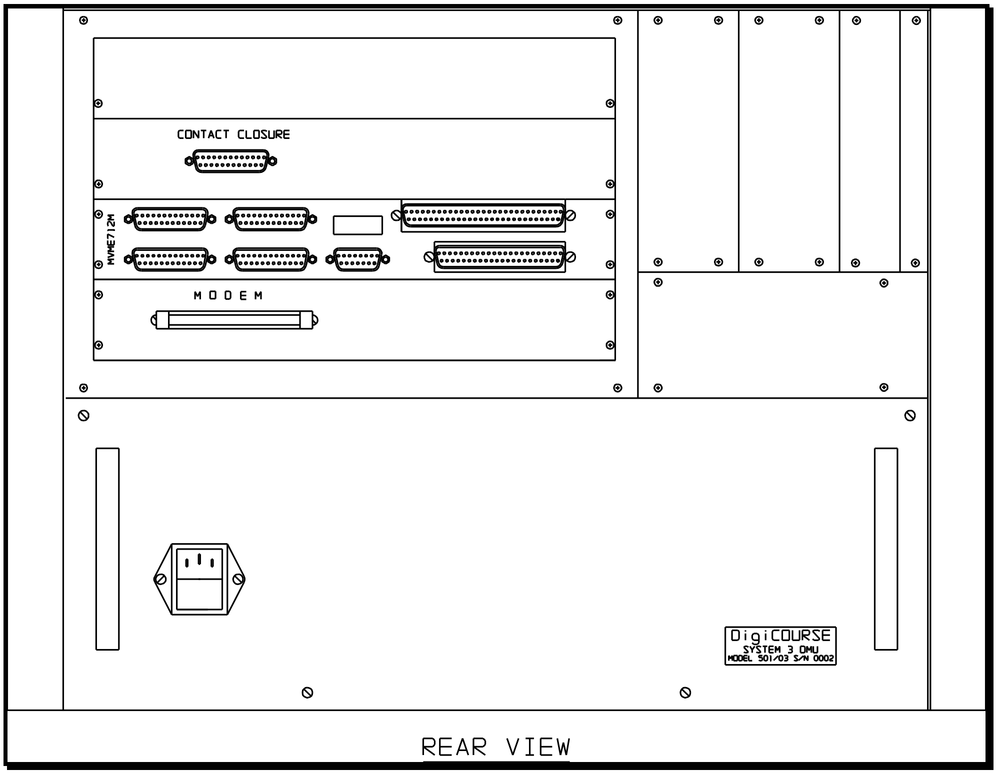


Figure 4.8 DMU and LIU Interconnections.

Section IV   Hardware

LINE POWER UNIT

Overview

When in-streamer sensors requiring dc power are used, the optional Line Power Unit (P/N 9000-503) is required to power the devices. The /02 version of the Line Interface Unit is used with in-streamer sensors and provides dc voltage and current monitoring through the operator interface terminal for up to six transmission lines. The "+" and "-" terminal blocks on the Line Power Unit are wired to the "+" and "-" terminals in the Line Interface Unit (P/N 9000-505) to route dc power to each transmission line.

Figure 4.9 Line Power Unit

Installation

The Line Power Unit is needed <u>only</u> if dc voltage for powering in-streamer sensors is required.

1. Mount the Line Power Unit on the back side of the rack underneath the Line Interface Unit.
2. Configure the ac voltage input module for the proper line voltage (115/230Vac).
3. Wire the "+" terminal of the Line Power Unit terminal block to the corresponding "+" terminal on the Line Interface Unit terminal block.
4. Wire the "-" terminal of the Line Power Unit terminal block to the corresponding "-" terminal on the Line Interface Unit terminal block.
5. Install the Line Power Unit power cable but do not power on the unit at this time.

MODEL 5010 DIGIBIRD

Overview

The DigiCOURSE series 5000 components are advanced, microprocessor-based cable control devices that are mounted externally on a marine seismic streamer cable. The Model 5010 DigiBird provides adjustable depth control, depth measurement, and ballast information. The DigiBird has a modular construction that allows you to change mechanical and electronic subassemblies for different cable control applications.

Externally, the Model 5010 DigiBIRD and the Model 5011 Compass Bird are identical except for the color of the end-cap. The Model 5010 has a white end-cap, and the Model 5011 has a black end-cap.

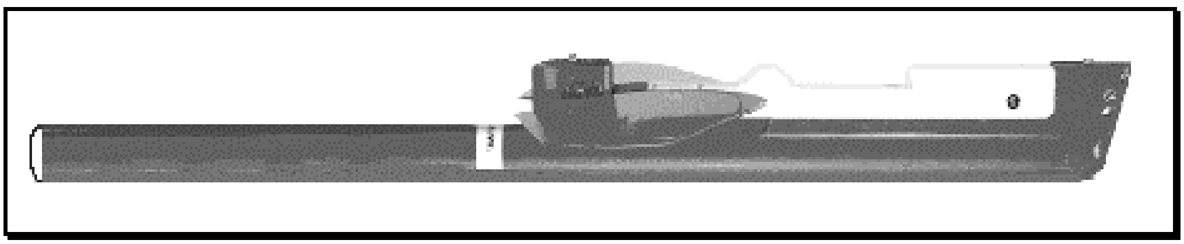


Figure 4.10 Model 5010 DigiBird

Specifications

Physical Characteristics

Length: 1.2 m (48.2 in)

Weight: 8.32 kg (18.3 lb) in air

2.78 kg (6.1 lb) in sea water with batteries

Mounting: Industry standard collars on 0.57 m (22.5 in) centers

Communications

Type: Serial FSK

Frequency: 26 kHz or 28 kHz

Data Rate: 2400 bits/s

Section IV Hardware

Depth Measurement

Operating Range:	122 m (0 to 400 ft)
Resolution:	.05 ft (0.15 m)

Diving Plane

Lift:	15.9 kg (35 lb) at 5 knots and 125° wing angle
Airfoil:	NACA 651-012 Airfoil section
Wing Span:	48.3 cm (19 in)

Battery

Cells:	4 D-cell Lithium
Life:	90 days typical operation

MODEL 5011 COMPASS BIRD

Overview

The DigiCOURSE series 5000 components are advanced, microprocessor-based cable control devices that are mounted externally on a marine seismic streamer cable. The Model 5011 Compass Bird provides adjustable depth control, depth measurement, ballast information, and compass heading data. The Compass Bird has a modular construction that allows you to change mechanical and electronic subassemblies for different cable control applications.

Externally, the Model 5010 DigiBIRD and the Model 5011 Compass Bird are identical except for the color of the end-cap. The Model 5010 has a white end-cap, and the Model 5011 has a black end-cap.

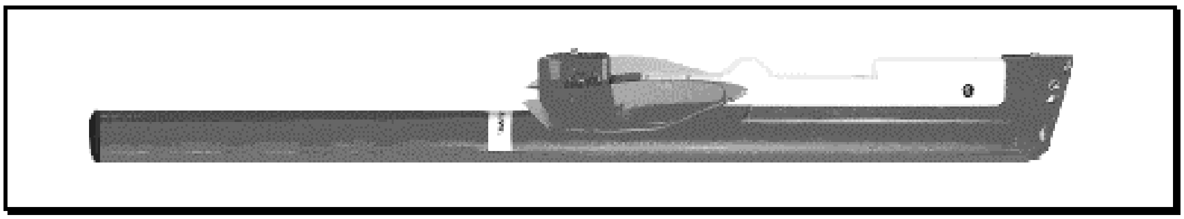


Figure 4.11 Model 5011 Compass Bird

Specifications

Physical Characteristics

Length: 1.2 m (48.2 in)

Weight: 8.32 kg (18.3 lb) in air

2.78 kg (6.1 lb) in sea water with batteries

Mounting: Industry standard collars on 0.57 m (22.5 in) centers

Section IV   Hardware

Communications

Type:	Serial FSK
Frequency:	26 kHz or 28 kHz
Data Rate:	2400 bits/s

Depth Measurement

Operating Range:	122 m (0 to 400 ft)
Resolution:	.05 ft (0.15 m)

Heading Measurement

Accuracy:	Better than +/-0.5°
Resolution:	12 bits

Diving Plane

Lift:	15.9 kg (35 lb) at 5 knots and 125° wing angle
Airfoil:	NACA 651-012 Airfoil section
Wing Span:	48.3 cm (19 in)

Battery

Cells:	4 D-cell Lithium
Life:	60 days typical operation

MODEL 315 HEADING SENSOR

Overview

The Model 315 Heading Sensor is a compass designed for in-streamer installation. A 9-bit digital number (indicative of orientation relative to magnetic North) is latched and converted to a serial pulse train output. This sensor has a maximum operating pressure of up to 5,000 psi. The two-wire interface provides both power and data.

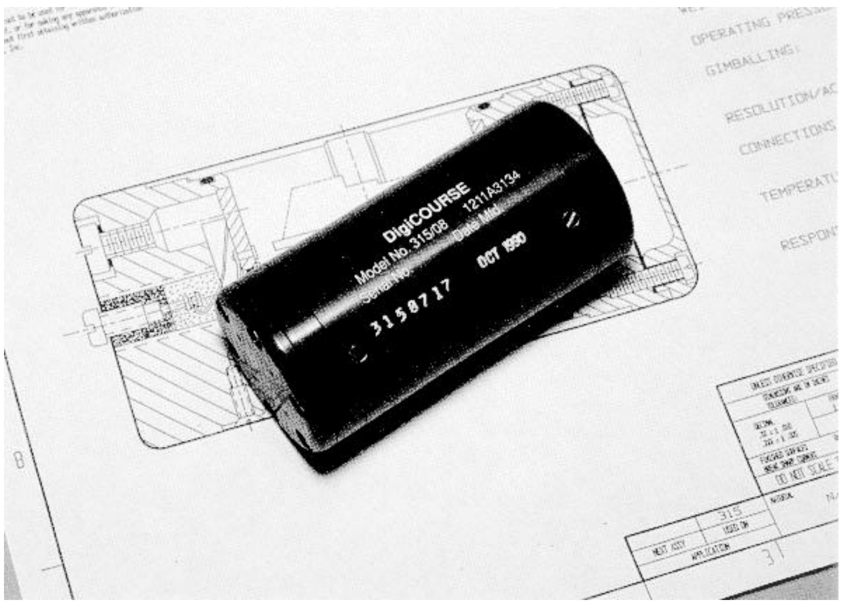


Figure 4.12 Model 315 Heading Sensor

Section IV Hardware

Specifications

Physical Characteristics

Length: 92.837 mm (3.66 in)

Diameter: 44.45 mm (1.75 in)

Weight: 341 g (12 oz)

Housing: Anodized Aluminum (tied electrically to "common" return connection)

Electrical Characteristics

Output Data Frequency: 5.44 kHz (nominal)

Power Consumption: 20 milliamperes constant current. Compass will clamp at 6.5 volts.

Output Format: n + 1 serial pulse train

Environmental Characteristics

Pressure Rating: 5000 psi maximum

Operating Temperature: -5°C to +55°C

Storage Temperature: -55°C to +85°C

Performance Characteristics

Accuracy: 1°

Roll: 360° continuous

Pitch: 47.5° +/- 2.5°

MODEL 321 HEADING SENSOR

Overview

The Model 321 Heading Sensor is a compass designed for in-streamer installation. A 10-bit digital number (indicative of orientation relative to magnetic North) is latched and shifted out serially in a 10-bit binary Gray word format. This sensor has a maximum operating pressure of up to 10,000 psi, and can be used in military towed arrays. The two-wire interface provides both power and data.

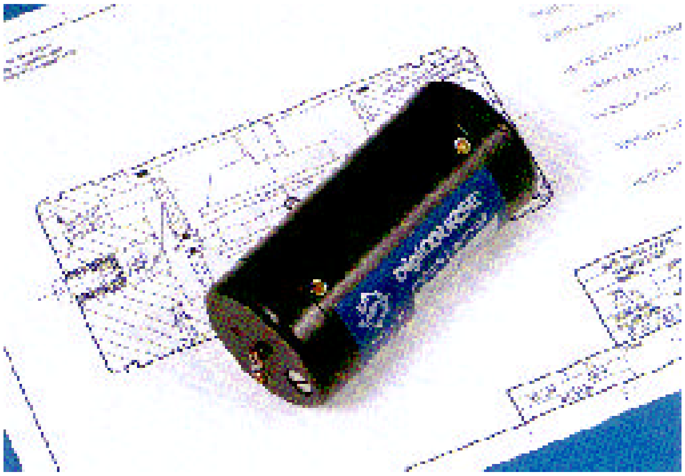


Figure 4.13 Model 321 Heading Sensor

Specifications

Physical Characteristics

Length: 92.837 mm (3.66 in)

Diameter: 44.45 mm (1.75 in)

Weight: 341 g (12 oz)

Housing: Anodized Aluminum (tied electrically to "common" return connection)

Section IV Hardware

Electrical Characteristics

Output Data Frequency:	1 kHz (nominal)
Power Consumption:	96 mW at 20 Hz / 9.6 mW at 2 Hz (sample rate dependent)
Output Format:	PWM 10-bit binary Gray word

Environmental Characteristics

Pressure Rating:	10,000 psi maximum
Operating Temperature:	-20°C to +55°C
Storage Temperature:	-55°C to +85°C

Performance Characteristics

Accuracy:	0.5°
Roll:	360° continuous
Pitch:	47.5° +/- 2.5°

MODEL 452 COMPASS INTERFACE

Overview

The Model 452 Compass Interface is designed for in-streamer installation and is the interface for the Model 321 Heading Sensor. The Model 452 Compass Interface consists of a modem and data acquisition circuitry which receives heading data from a single Model 321 Heading Sensor, monitors node voltage, monitors the signal-to-noise ratio, performs operator controllable data storage and manipulation (Parameters that the operator can control are the averaging time, the sampling interval, and the offset correction factor.), and transmits the conditioned data over the twisted pair communications line to the Operator Interface Computer.

Figure 4.14 Model 452 Compass Interface

Section IV Hardware

Specifications

Physical Characteristics

Length:	6.48 inches +/- 0.02 in
Diameter:	1.50 inches +/- 0.01 in
Weight:	17.5 oz +/- 1 oz
Housing:	Stainless Steel
Transmission Line Connection:	2-wire feed through labeled “T”
Compass Connection:	2-wire feed through labeled “C”

Electrical Characteristics

Diagnostics:	Node Strength and Signal-to-Noise ratio
Circuit Protection:	Reverse polarity and overvoltage conditions
Power Consumption:	120 mW typical
Data Interface:	DigiSCAN protocol 2400 baud FSK
Maximum Number of 452’s per Streamer:	35 for 22 awg twisted pair
	25 for 24 awg twisted pair
(see Note below)	20 for 26 awg twisted pair

This maximum number assumes 200 meters of lead in cable and one 452 unit per 100 meters, powered by DigiCOURSE Sensor Interface Unit. DigiCOURSE recommends using a dedicated twisted pair for the 452 units in the streamer.

Environmental Characteristics

Pressure Rating:	1000 psi
Operating Temperature:	-5°C to +35°C
Storage Temperature:	-30°C to +65°C

Installation

Each 452 Compass Interface unit should be installed in the streamer at least three feet from the nearest compass to prevent any possible magnetic distortion of heading readings..

MODEL 483 DEPTH SENSOR

Overview

The Model 483 Depth Sensor is designed for in-streamer installation. The 1.5-inch diameter allows the sensor to be used in nearly all types of seismic streamers. Five models of the sensor are available, each with a different depth operating range (100, 200, 500, 1000, and 2000 feet). The two-wire interface provides both power and data transfer.

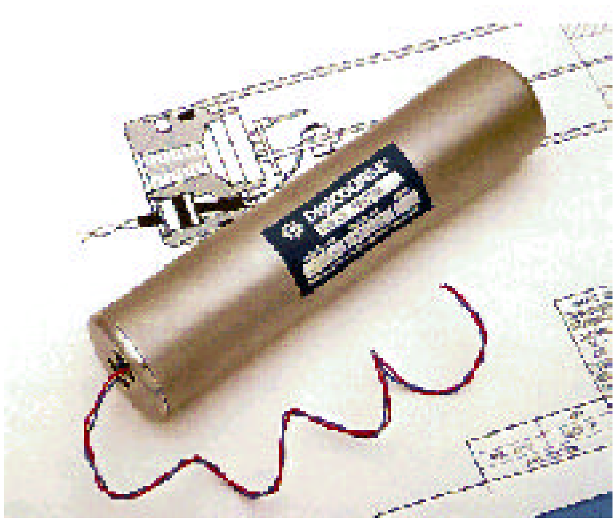


Figure 4.15 Model 483 Depth Sensor

Specifications

Physical Characteristics

Length:	164.6 mm (6.48 in)
Diameter:	38.1 mm (1.50 in)
Weight:	510.3 g (18 oz)
Housing:	Stainless Steel
Electrical Connection:	2-wire pass-through
Pressure Interface:	1/8-inch NPT female
(see Note below)	

To order 1/8 -inch NPT male hose for use with 3/16-inch I.D. hose, order P/N 2800-518.

Electrical Characteristics

Circuit Protection:	Reverse polarity and overvoltage conditions
Power Consumption:	75 mW typical
Data Interface:	DigiSCAN protocol 2400 baud FSK
Maximum Number of 483's per Streamer:	50 for 22 awg twisted pair
	40 for 24 awg twisted pair
(see Note below)	30 for 26 awg twisted pair

This maximum number assumes 200 meters of lead in cable and one 483 sensor per 100 meters, powered by DigiCOURSE serial interface unit. DigiCOURSE recommends using a dedicated twisted pair for the 483 sensors in the streamer.

Environmental Characteristics

Operating Pressure Rating:	2x operating depth
Crush Pressure Rating:	1000 psi
Operating Temperature:	-5°C to +35°C
Storage Temperature:	-30°C to +65°C

Section IV Hardware

Performance Characteristics

Depth Resolution:	11-bit
Depth Accuracy:	+/- 1 percent of full scale
Temperature Accuracy:	+/- 1°C

Depth Operating Ranges / Models

100 feet:	Model 483/02
200 feet:	Model 483/01
500 feet:	Model 483/03
1,000 feet:	Model 483/04
2,000 feet:	Model 483/05

MODEL 487 COMMUNICATION COIL

Overview

The Model 487 Communication Coil is designed for in-streamer installation. The Model 487 Communication Coil performs two functions: First, it is one-half of a transformer that inductively couples bi-directional signals with in-water sensors and controllers. Second, it optimally loads a 22 AWG twisted pair transmission line. This optimum loading maximizes the data signal with respect to the streamer power system interference while holding the data signal waveform distortion to a negligible level.

Using Model 487 Communication Coils in accordance with the instructions in DigiCOURSE Procedure 1000-243, Recommended Practice for Twisted Pair Communication with Seismic Streamers, will provide reliable data communication to 6000 meters.

Figure 4.16 Model 487 Communication Coil

Section IV Hardware

Specifications

Physical Characteristics

Length:	5.25 +/- 0.01 inches
Diameter:	0.875 +/- 0.01 inch
Wire Length:	20 inches

Electrical Characteristics

Maximum DC Voltage:	100 V
Maximum AC Voltage:	70.7 V rms

DIGIRANGE ACOUSTIC SYSTEM INTRODUCTION

This section provides the user with a general overview of the DigiRANGE and its individual product components. Subsequent sections provide instructions for installation, troubleshooting and maintenance of the DigiRANGE product components.

System Description

The DigiRANGE acoustic system is a collection of measurement devices arranged in a network to provide information that is used, along with other navigation data, to determine the geodetic position of hydrophone groups and energy sources. The system provides observations of acoustic transit time measurements between nodes (locations) of the network, with a range time resolution of 50µs for two-way ranges. The measurements are made by the instruments located at each node, and the measurement data are transmitted via System 3 to the on-board host computer. Multiple streamer configurations and multiple boat configurations are supported.

The system does not use conventional transponder, responder or pinger acoustic techniques to determine transit times. The technique used is similar in some ways to radio positioning.

Acoustic Ranging Network

The acoustic ranging network comprises a collection of nodes that represent the specific parts of the streamers/energy sources configuration requiring point-to-point linear measurements to complete the geodetic traverse. At each node a Concurrent Multichannel Transceiver (CMX) is placed to perform the actual measurement process to and from other nodes in the network. The ranges correspond to branches. Each node can acquire range measurements for up to eight branches connected to that node. Each node may initiate an acoustic signal that is used to perform the measurement at other nodes. The nodes are assigned transmit time schedules established by the System 3 configuration program (Setup Program). These time schedules are used to define which nodes are to detect the transmitted signals required to complete the network of branches. The arrival times are stored in the CMXs and transmitted to the shipboard system at each recording point using System 3.

Section IV Hardware

Modes of Operation

The acoustic system supports two modes of operation for range data acquisition: one-way ranging or two-way ranging (default). When one-way ranging is selected, a range consists of a single path time measurement, with one unit receiving the acoustic signal transmitted by the other unit. Range acquisition time is generally shorter when one-way ranging is in use. When two-way ranging is selected, a range consists of two path time measurements combined to make a range value, with each of the two units both transmitting to and receiving from the other unit. These modes are described in more detail below.

Two-Way Ranging

Two-way ranging offers a greater degree of measurement reliability at the expense of a longer range acquisition time, and is the default mode of operation. When operating in two-way ranging mode, the DigiCOURSE acoustic system provides derived ranges from two-way paths. The ranges are determined by combining the local values of the arrival time of acoustic pulses traveling along opposite path pairs between two nodes in the network. These arrival times along paths are observed within milliseconds of each other. The dry end system converts the arrival times into transit times (time of flight), and the combination of the two transit times removes errors due to CMX local time offsets (SYNC skew), most system errors, and the difficult-to-determine velocity error due to the non-static nature of the network being measured. In addition, the two path observations provide a degree of redundant measurement to help provide more reliable observations. Two criteria must be met for a valid two-way range:

1. Both components of the two-way ranges must be present to form a valid measurement
2. Both one-way measurements must be within 2ms (3 meters) of each other for ranges less than 600 meters, and within 4 ms (6 meters) of each other for ranges greater than 600 meters.

This technique further exploits the advantages of the two-way range strategy. The inherent redundancy provides an immediate means to eliminate certain errors. Criterion number 2 significantly reduces the corruption of valid data by reflection paths.

One-Way Ranging

One-way ranging offers a shorter range acquisition time at the expense of the error reduction techniques available in two-way ranging mode. This mode would normally be used when cycle time is at a premium. When operating in one-way ranging mode, the DigiCOURSE acoustic system provides a single path time-of-flight measurement for each range. Since SYNC skew is not eliminated by combining two path times, it is minimized by tight control of the transmission of the SYNC signal from the dry end Modem. Velocity error is not removed from ranges acquired in one-way mode.

CMX Units

Located at nodes in the network are pods containing the telemetry system interface, control logic, and the CMX. An identical CMX is used at each node. Each CMX can transmit on one of five assigned channels (frequencies) and can receive eight different transmitted signals from other nodes on any single channel or combination of channels. The transmit and receive processes are determined by the system network geometry. The transmission of signals from each node does not depend upon receipt of an acoustic signal or an external electronic trigger. Transmission time is determined by the precision local clock in the CMX, the network schedule defined by the Setup Program, and the system synchronization signal (SYNCH). The arrival times are measured in local time with a resolution of 100 µs. When the arrival times between two nodes constituting a branch are combined, an accurate measurement of the acoustic transit time for that branch is obtained.

The CMX units are available in two configurations to facilitate their installation at the physical location of the nodes. One is self-contained and externally mounted on the cable. These cable-mounted CMX units (pods) mount on standard collars and communicate via the conventional coil communication system of System 3.

The other is located shipboard and operates with remotely located transducers. To provide economical and reliable measurements to locate energy sources relative to the head of the streamers, Rack-mounted CMX units are used with a remotely located, ruggedized transducer unit. The rack-mounted dual CMX is located in the instrument room on board the vessel. The transducers are typically located at the end of the gun string(s) and electrically connected to the rack-mounted CMX by a shielded wire pair. The remote transducer contains the T/R switching and preamplifier functions. The rack-mounted CMXs communicate via the conventional coil communication system of System 3. Logically the devices appear to be another type of bird. Remote transducers connected to rack-mounted CMXs are also used for hull-located nodes.

The precision of the acoustic system is possible because of the power and versatility of the VLSI Digital Signal Processor (DSP). The DSP generates the acoustic signal in the 50kHz to 100kHz band, amplitude modulates the signal and presents in digital form a time series of digital words to the D/A converter to effect the amplitude modulated signal. The acoustic pulse is amplified and coupled into the water by the acoustic transducer.

During the receive mode, the A/D converter samples the output of the acoustic transducer after amplification. The digitized samples are operated on by the DSP to detect incoming acoustic signals. This provides a reliable, repeatable signal detection scheme with inherent noise immunity. It is through the use of this technology that high performance acoustic measurements are achieved.

Once a pulse is detected, the reception time is latched in the appropriate timer counter. After the acoustic measurement cycle ends, System 3 polls the CMX and retrieves the contents of the timer counters and other data on board the vessel.

Acoustic System Operation

The acoustic measurement cycle begins with the issuance of the SYNCH synchronization signal through System 3. Each CMX contains a transmit / receive schedule assigned by the System 3 Setup Program. After SYNCH, each CMX, at its scheduled time, transmits a signal on its designated channel. The acoustic energy travels through the water and is detected at locations where other CMXs are expecting to receive the signals. Internally, the CMX stores the arrival times of detected signals for retrieval later in the cycle. The time required to make all these measurements is optimized by the Setup Program, and depends on the size and geometry of the acoustic network.

The CMXs may detect up to eight path measurements at each location. This allows for a robust network with significant redundancy. For example, a front-end system with four cable- mounted CMXs and four gun array transducers can easily measure all 28 two-way range combinations. With a hull-mounted transducer, 36 possible ranges (72 one-way ranges) can be obtained. The cycle time to make the acoustic observations is still under a second.

The data collected in each CMX is time relative to scheduled transmission at that CMX. The time numbers are combined and scaled to represent an integer multiple of 50 μ sec. When operating in two-way mode, this patented technique eliminates time skew errors caused by the data communication system and eliminates the offset caused by the velocity of the entire network while measurements are being made.

DUAL RACK-MOUNT CMX UNITS AND REMOTE TRANSDUCERS

Overview

The Dual Rack-mount Concurrent Multichannel Transceiver (CMX) **(**P/N 9000-4032) is a device containing two sets of telemetry system interfaces, control logic, and transceiver circuitry for use with remote transducers (either towed or hull-mounted).

Each CMX transducer can transmit on one of five channels in the 50 kHz to 100 kHz acoustic band. Up to eight different range measurements may be acquired by each CMX on each measurement cycle. The system is designed to support acoustic transit time measurements accurate to 0.1 ms.

Included with each unit are two shielded cables for connecting the Dual Rack-mount CMX to the user's patch panel.

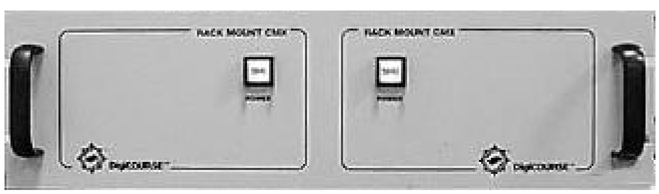


Figure 4.17 Rack-Mount CMX (ship-board electronics)

Dual Rack-Mount Pre-Installation Checkout

- <u>WARNING</u> - High voltages present. Voltages up to ±230 volts DC (and AC) exist on the transducer connectors on the rear panel of the Dual Rack-mount CMX. HANDLE WITH CARE.

The Dual Rack-mount CMX (P/N 9000-4032/03), with all cables, has been fabricated in accordance with standard DigiCOURSE manufacturing procedures. Visually inspect each piece for any possible damage due to shipping. Ensure that all items have been shipped as per the packing list.

Section IV   Hardware

Installation Equipment Required

The following equipment is required to install the Dual Rack-mount CMX, the Remote Transducer (energy source), and the Remote Hull-mount Transducer.

1. Sufficient number of Dual Rack-mount CMX units (1 unit handles two Remote Transducers [energy source or hull-mount]).
2. Power cable, supplied by DigiCOURSE.
3. Dual Rack-mount CMX to modem processor interconnection cable (P/N 8000-044); one required and supplied by DigiCOURSE for each Dual Rack-mount CMX.
4. Dual Rack-mount CMX to instrument room patch panel 100 ft. interconnecting cable (P/N 8000-312-100); one required for each Remote Transducer (energy source); two supplied with each Dual Rack-mount CMX.
5. Rack slide rail and extension kit for the Dual Rack-mount CMX; one required and supplied for each Dual Rack-mount CMX.
6. Dual Rack-mount CMX to Remote Hull Mount Transducer 200 ft. interconnecting cable (P/N 8000-312-200); one required for each Remote Hull-mount Transducer; one supplied with each Hull-mount Remote Transducer.
7. Remote Hull-mount Transducer 10 m waterproof interconnecting cable (P/N 3300-008); one required for each Remote Hull-mount Transducer; one supplied with each Hull-mount Remote Transducer.
8. Remote Transducer Cable Tester (P/N 3300-011 from test kit 6500-059); optional.
9. Energy source firing line cables with Reed 6400-201 connectors; supplied by user.

Dual Rack-Mount CMX Installation

Installation Procedure

1. Mount the rack side rails in the rack with the equipment provided. The Dual Rack-mount CMX is shipped with the rack slides attached.
2. Install unit in rack and secure with the four front panel rack screws (user supplied).
3. Install the power cable but leave the unit power off.

4. Using the 8000-044 cable, connect the Dual Rack-mount CMX rear panel COMM IN connector to the appropriate LINE X connector on the Line Interface Unit (LIU). Refer to Figure 4.18.
5. Typically, one line in the LIU is used for communication with all of the Dual Rack-mount CMXs. If more than one Dual Rack-mount CMX is being used, it should be "daisy chained" by connecting the rear panel COMM OUT connector of one unit to the COMM IN connector of another unit with another 8000-044 cable. Refer to Figure 4.18.
6. The COMM IN and COMM OUT connectors are wired in parallel so in reality there is no "IN" or "OUT"; they are both the same.

Power Up

The Dual Rack-mount CMX actually contains two independently controlled sets of CMX electronics; each has its own front panel power switch. The unused halves of these units do not need to be powered up and are to be used as spares.

1. Make sure that the 1 Amp, slow blow fuse is installed in the rear panel fuse holder.
2. Apply power to the units as needed and proceed with the complete installation and checkout of the remaining system components. Do not have the power on when connecting the Remote Transducers.

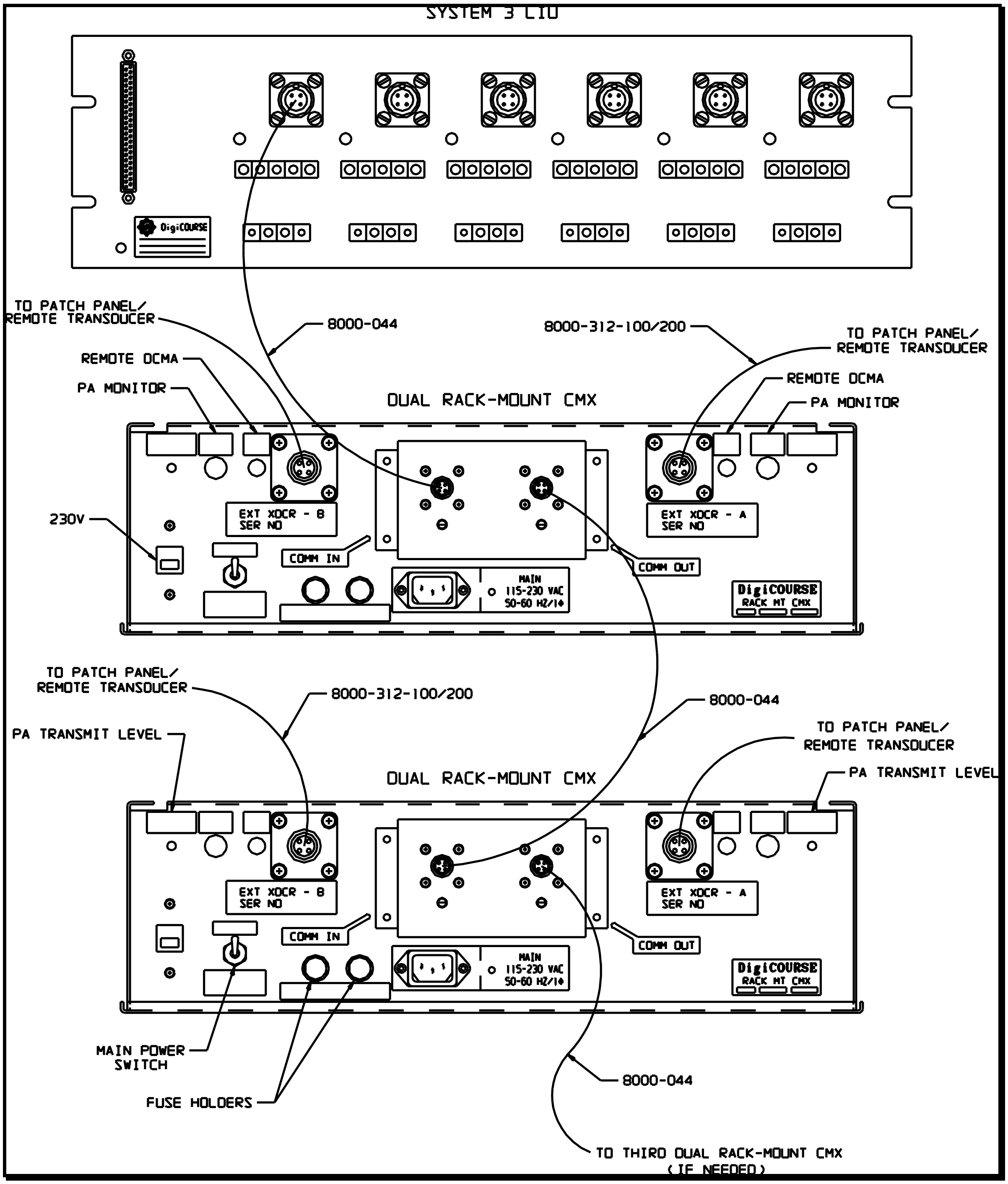


Figure 4.18 Rack-mount CMX and LIU Interconnections (rear view)

Remote Transducers (Energy Source/Nav Sled) Installation

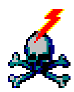
This section describes the installation procedures for the DigiRANGE Remote Transducer.

A Remote Transducer is designed to be mounted to an energy source or to a positioning sled towed directly behind the energy source. In both cases, a three meter (minimum required length) wire rope should be used to tow the remote transducer. This tow cable (supplied by user) should be attached to the bridle (supplied with Remote Transducer) of the transducer and to a convenient and stable point on the sled or energy source (usually the last gun in a string. The connecting equipment (shackles, nuts and bolts) to be used in assembly is supplied by the user.

A waterproof, 4-conductor cable with a 4-pin gun connector must be run out from the boat to the energy source or sled, and then down to the Remote Transducer to provide an electrical connection. The cable should be bound to the nearest stable structure along its path to the transducer, with enough slack to compensate for physical movement of the tow system when deployed. Inadequate slack can cause broken electrical cables.

Section IV Hardware

Dual Rack-Mount CMX to Remote Transducer (Energy Source) Wiring Interconnections



- WARNING - High voltages present. Voltages up to ±230 volts DC (and AC) exist on this assembly when it is connected to the Dual Rack-mount CMX. HANDLE WITH CARE. Disconnect from the Dual Rack-mount CMX before handling.

1. Connect the 8000-312-100 cable assembly from the Remote Transducer connector located on the rear of the Dual Rack-mount CMX to an available pair of the instrument room patch panel used for energy source firing line cables (as per Figure 4.19) for each Remote Transducer (energy source) to be deployed. This cable should be kept as short as possible; cut as necessary. Unshielded twisted pair firing line cable is recommended for connection between the Remote Transducer and the patch panel. The firing line cable must also be checked for leakage and replaced if any problems are found.
2. Verify the wiring of the energy source firing line cable with the Remote Transducer Cable Tester (P/N 3300-011 from kit no. 6500-059) attached to the connector at the end of the firing line. Turn on the power to the Dual Rack-mount CMX. If the green LED is lit, the wiring is correct. If the red LED is lit, the wiring is reversed. If neither is lit, check the wiring..
3. If a remote transducer cable tester is not available, use a DVM and measure DC voltage between pins 1 and 2 of the connector on the end of the firing line (+ on pin 1, and - on pin 2 of the gun connector).

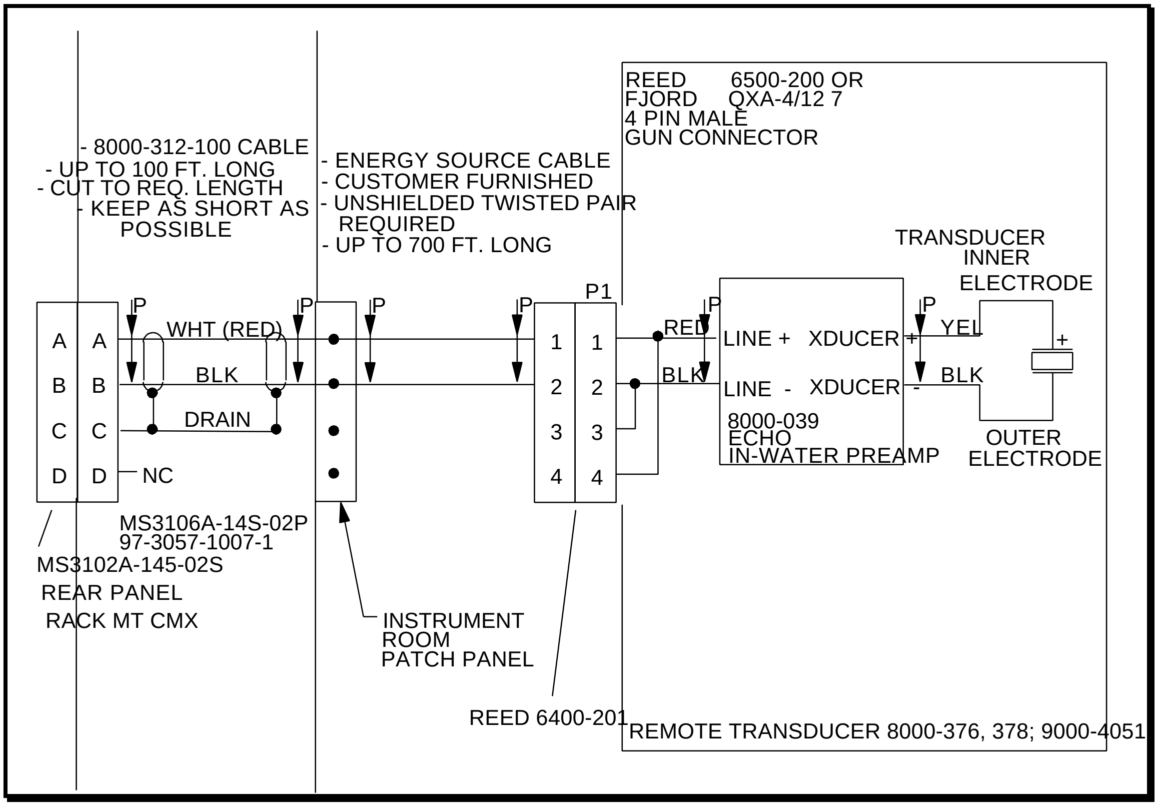


Figure 4.19 Dual Rack-Mount CMX to Remote Transducer Wiring Interconnections

Section IV   Hardware

Remote Hull-Mount Transducer Installation

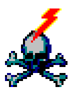
This section describes the installation procedures for the DigiRANGE Remote Hull-mount Transducer.

A remote hull-mount transducer, enclosed in a specialized housing, is designed to be mounted to a retractable stem that can be lowered below the hull of the vessel.

The following are the basic steps required to install a Remote Hull-mount Transducer.

1. Feed the 4-pin gun connector end of the 10m waterproof cable (supplied with the Remote Hull-mount Transducer) into the top of the stem. Pull the connector end out of the bottom of the stem.
2. Connect the 4-pin connector of waterproof cable to the 4-pin connector of the transducer.
3. Attach the Remote Hull-mount Transducer to the end of the stem using the provided equipment (user supplies waterproofing method and materials).
4. Splice the end of the waterproof cable to a shielded cable running from the instrument room down to the stem location (waterproof splice should be made).

Dual Rack-Mount CMX to Remote Hull-Mount Transducer Wiring Interconnections



- <u>WARNING</u> - High voltages present. Voltages up to ±230 volts DC (and AC) exist on this assembly when it is connected to the Dual Rack-mount CMX. HANDLE WITH CARE. Disconnect from the Dual Rack-mount CMX before handling.

1. Route the 8000-312-200 cable assembly from the Remote Transducer connector located on the rear of the Dual Rack-mount CMX through the standard cable trays to the area where the Remote Hull-mount Transducer is installed.
2. Splice the 8000-312-200 cable to the 3300-008 cable connected to the Remote Hull-mount Transducer as per Figure 4.20. This cable should be kept as short as possible; cut as necessary.
3. Before the 3300-008 cable is connected to the Hull-mount Transducer, verify wiring with the Remote Transducer Cable Tester connected to the 3300-008 cable. Turn on the power to the Dual Rack-mount CMX. If the green LED is lit, the wiring is correct. If the red LED is lit, the wiring is reversed. If neither is lit, check the wiring.
4. If a Remote Transducer Cable Tester is not available, use a DVM and measure DC voltage between pins 1 and 2 of the connector on the end of the 3300-008 cable (+ on pin 1 and - on pin 2 of the gun connector). With the Dual Rack-mount CMX powered up, the voltage should be approximately +24vdc if the wiring has been done correctly.

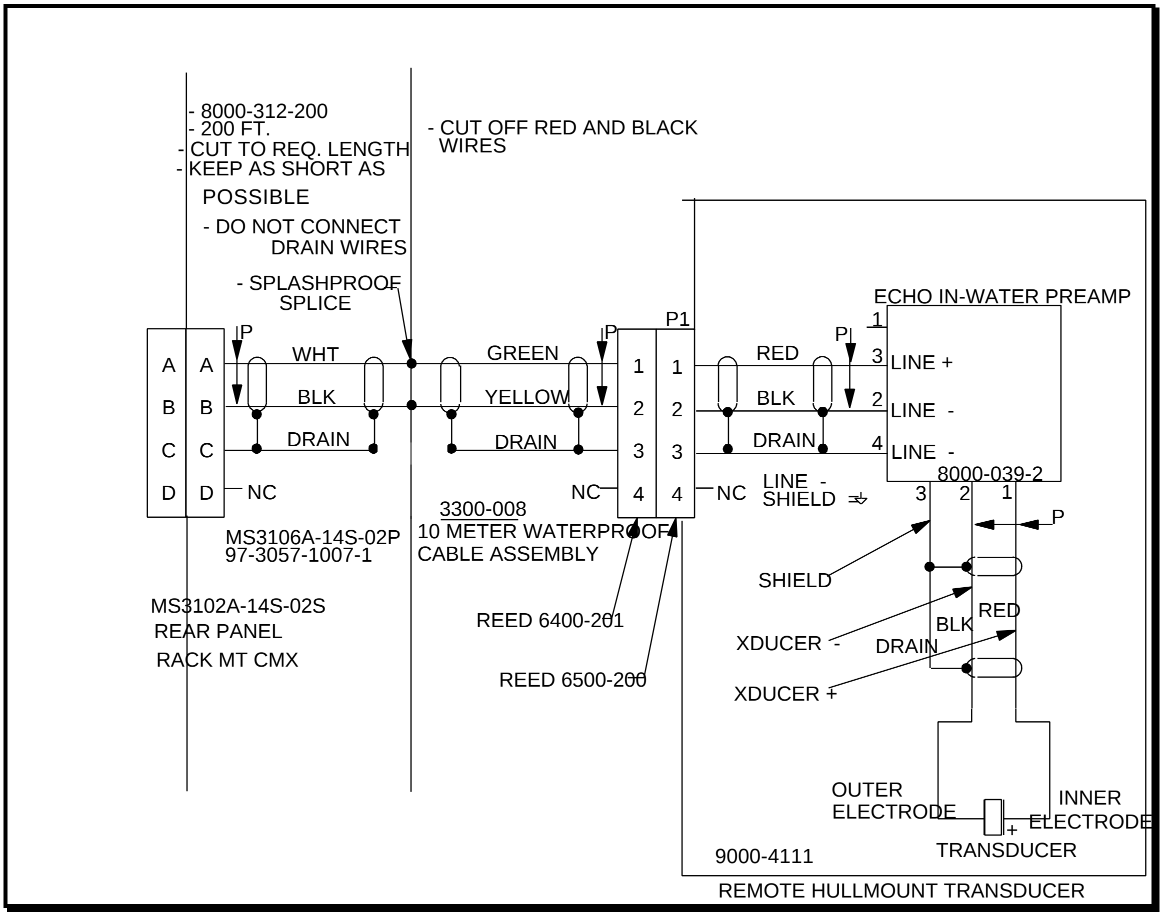


Figure 4.20 Remote Hull-mount Transducer to Rack-mount CMX Interconnections

Remote Transducer and Hull-Mount DC Current Check

To verify that the remote transducer (hull or energy source) is drawing the correct DC current, perform the following check while NOT transmitting.

1. Plug the remote transducer DC current monitor cable phone plug (Figure 4.21) into the rear panel jack labeled "Remote DC mA". Connect the other end of the special cable to a DVM set to measure DC current on a 100 mA or 200 mA scale.

   The following table can be used to determine the DC conditions of the Remote transducer and its wiring.

	CONDITION	PROPER CURRENT METER READING	INDICATION
1	Nothing connected to rear panel connector. EXT.XDCR A or B	≈ 20 mA	If greater than ≈ 20 mA, internal failure.
2	Cable connected without remote transducer.	≈ 20 mA	If condition 1 OK, greater than ≈ 20 mA indicates wiring problem.
3	Cable and remote transducer connected.	≈ 50 mA	If 1 and 2 OK, greater than ≈ 50 mA but less than 65 mA indicates backward wiring.
4	Cable and remote transducer connected.	≈ 70 mA	Slight leakage to full short circuit.

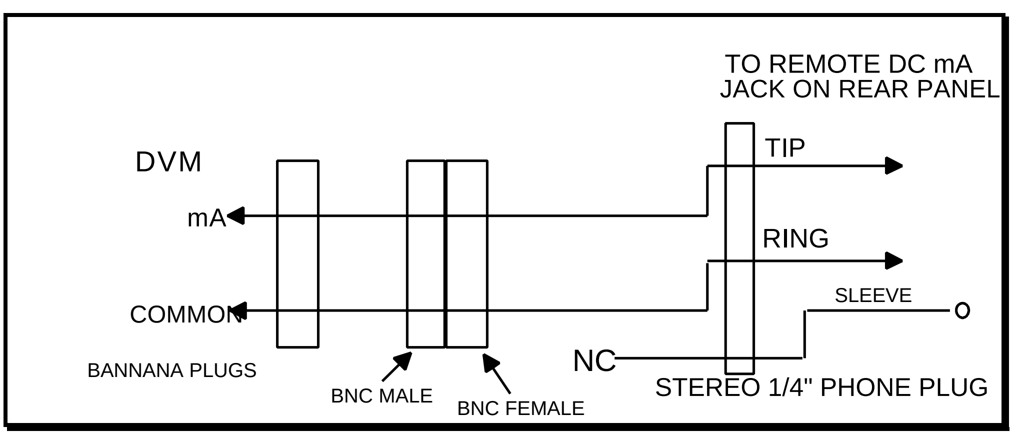


Figure 4.21 Remote Transducer DC Current Monitor Cable

Section IV Hardware

The Remote Transducer DC Current Monitor Cable is contained in the Remote Transducer Test Kit (P/N 6500-059).

Rear Panel Power Amplifier Transmit Level Control Adjustment

The Power Amplifier (PA) Transmit Level control is used in conjunction with the PA Monitor BNC connector to set the output level of the Rack-mount CMX PA. More importantly, it **must** be used to prevent PA clipping and distortion from causing interference with adjacent channels. This is typically a problem on energy source mounted Remote Transducer installations with cable lengths exceeding about 500 ft. where line capacitance is excessive.

This procedure must be done with the Rack Mount CMX in actual deployed conditions, i.e. full length energy source Remote Transducer cables (including Hull-Mount), and Remote Transducers in the water.

1. Take the DMU out of the Run mode.
2. From the Operator Interface Program, select the **Diagnostic / Acoustics / Diagnostic Page** command, and answer "Yes" to the "download diagnostic configuration" prompt.
3. Enter the Unit ID of the CMX and verify successful download. The Transmit Channel = 0 (transmitter disabled) at this point.
4. Change the transmit channel to 1 by entering a "1" is the Transmit channel field on the Diagnostic page.
5. Connect the rear panel PA MONITOR BNC connector to a Digital Storage Oscilloscope (DSO).

Initial Oscilloscope setup:

Horizontal: sweep 5 ms/div.

Vertical CH1: DC coupling, 5 V/div.

Trigger: Internal CH1, normal, positive edge, +2 VDC, DC coupling

This will cause the DSO to trigger on the transient » 20 ms before the center of the pulse as shown on Figure 4.22 (not clipped).

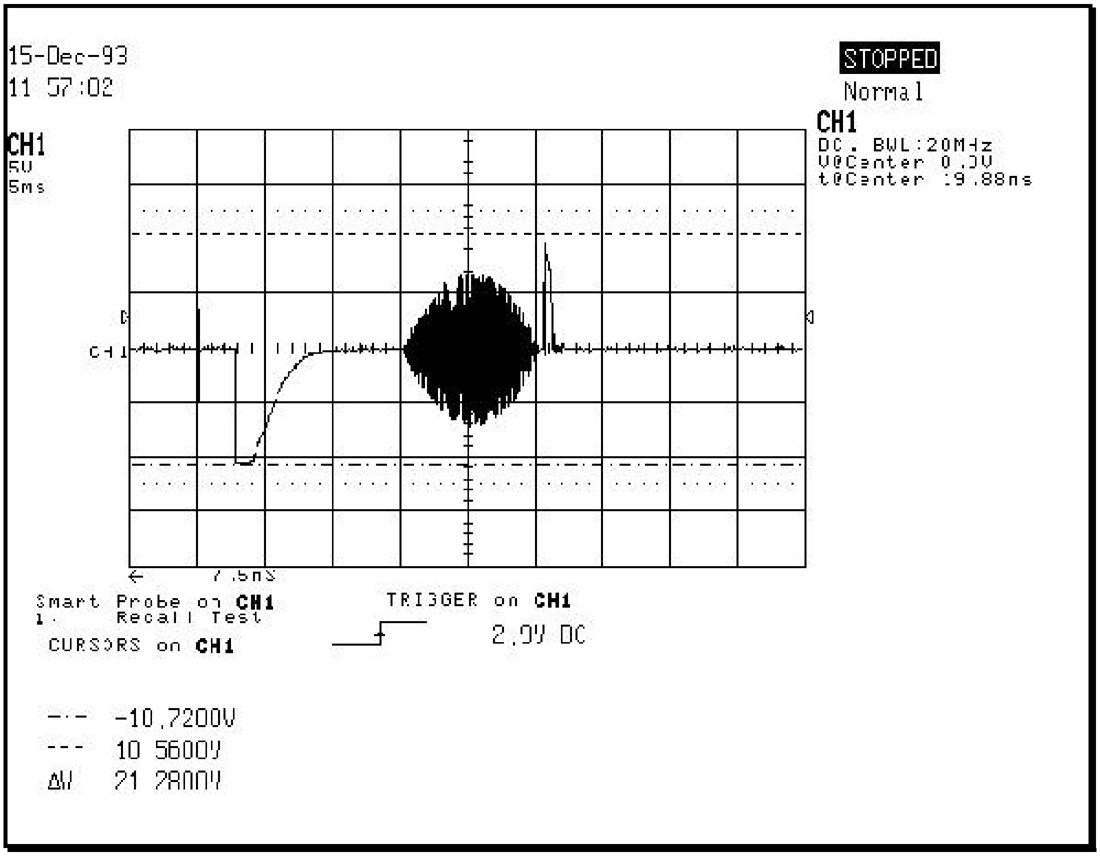


Figure 4.22 Not Clipped

6. Observe the waveform at its center, » 5.12 milliseconds from its beginning. To do this it will be necessary to delay from the waveform beginning and use a horizontal sweep time of 5 or 10 ms. See Figure 4.23 (clipped)

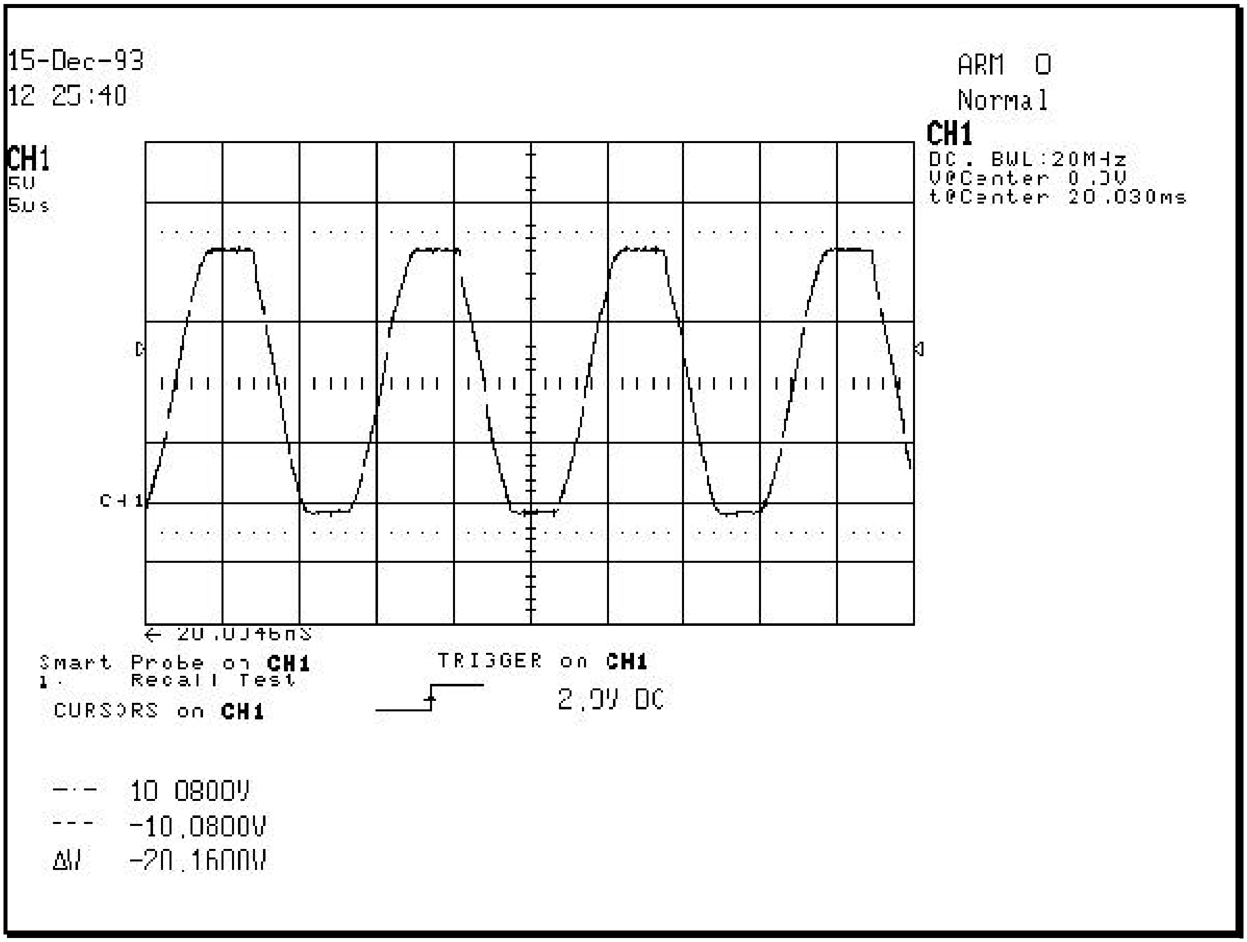


Figure 4.23 Clipped

The waveform envelope and the individual sinusoids must not be clipped, "flat-topped," or distorted. See Figure 4.24 (clipped envelope).

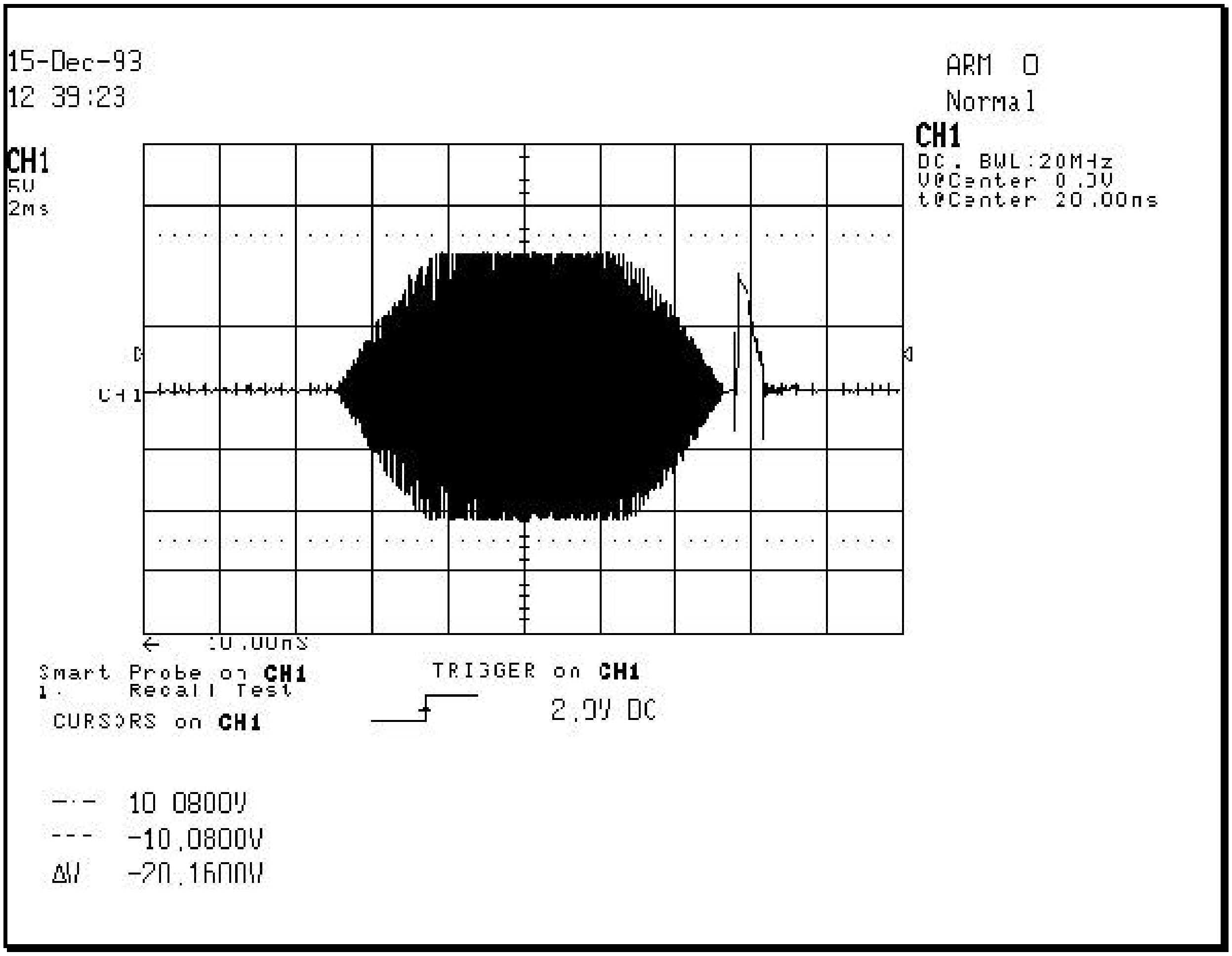


Figure 4.24 Clipped Envelope

7. If clipping or distortion is evident, use a very small flat blade screwdriver and adjust the PA Transmit Level control counterclockwise (CCW) until the waveform is not clipping. This will not only reduce the output level of the Power Amplifier, but it will reduce the clipping and/or distortion. Leave the control set for the maximum amplitude without clipping. Clipping is defined as any voltage >22.0 Volts peak to peak. The absolute amplitude of the signal will vary somewhat from channel to channel and is dependent on load conditions. <u>A non-clipping waveform is more important than the absolute level.</u>

8. Perform these checks on all 5 channels and adjust for the channel with the most clipping. Once the control has been adjusted CCW to eliminate clipping on one channel, never turn the control back CW because another channel is not clipping as much.

Dual Rack-mount CMX / Remote Transducer Post-Deployment Checkout

The purpose of this procedure is to verify the functionality of the Dual Rack-mount CMX unit in the instrument room equipment rack after installation and/or to verify the functionality of the Dual Rack-mount CMX / Remote Transducer combination after deployment.

The procedure must be performed twice to check both halves of the Dual Rack-mount CMX.

Setup

Turn power on to both CMX units.

Communication Check

1. In the Operator Interface Program, click on the **Diagnostics / Acoustics** command.
2. Select the Read Unit ID function to interrogate the CMX by Serial number and verify the previously assigned Unit ID. It is assumed that at this stage the correct Unit ID has been assigned before deployment.
3. Verify interrogation by the Unit ID by clicking on Read/Swap Serial No.

Status Checks

1. Take the DMU out of the Run Mode.
2. In the Operator Interface Program, click on the **Diagnostic / Acoustic** command. Select the Diagnostic Page and answer “Yes” to the question..
3. Enter the Unit ID of the CMX and verify successful download. Transmit channel = 0 (transmitter disabled) at this point.

Signal

Volt (V) = 0.0 0.0

Off (V) = 2.5

If the "Off" (V) does not equal 2.4 or 2.5 it is probably due to interference from electronic equipment in the instrument room.

Depth/Temperature

Depth = 0.00 PSI 0.0 M

Temperature (C) = -24.0

These fields are reserved for the Depth and Temperature measurement option on Cable-mount CMXs and will not be used on Dual Rack-mount CMXs.

Pulse Monitor

Count = 0.0 0.0

At this point the acoustic pulse transmitter is OFF as indicated by Transmit Channel : 0.

Status Display

Depth Acq module should have a red status color (failure). This is normal.

All others items should read "check."

The CMX Diagnostic Page may also be used to diagnose problem CMXs.

See the Off-Line Diagnostics section for more information on Status.

Transmitter Functional Check (Pulse Monitor)

Select Tx channel 1 by entering "1" in the TX channel field of the Diagnostic Page; observe PULSE MONITOR. Counts should be within the following limits:

Remote Transducer (Energy Source) or Remote Hull-mount Transducer

- CH 1 (both + and - counts) = 100 (approximately)
- CH 1 (both + and - counts) = 40 ± 10 (only when using Remote Transducer Test Cable).

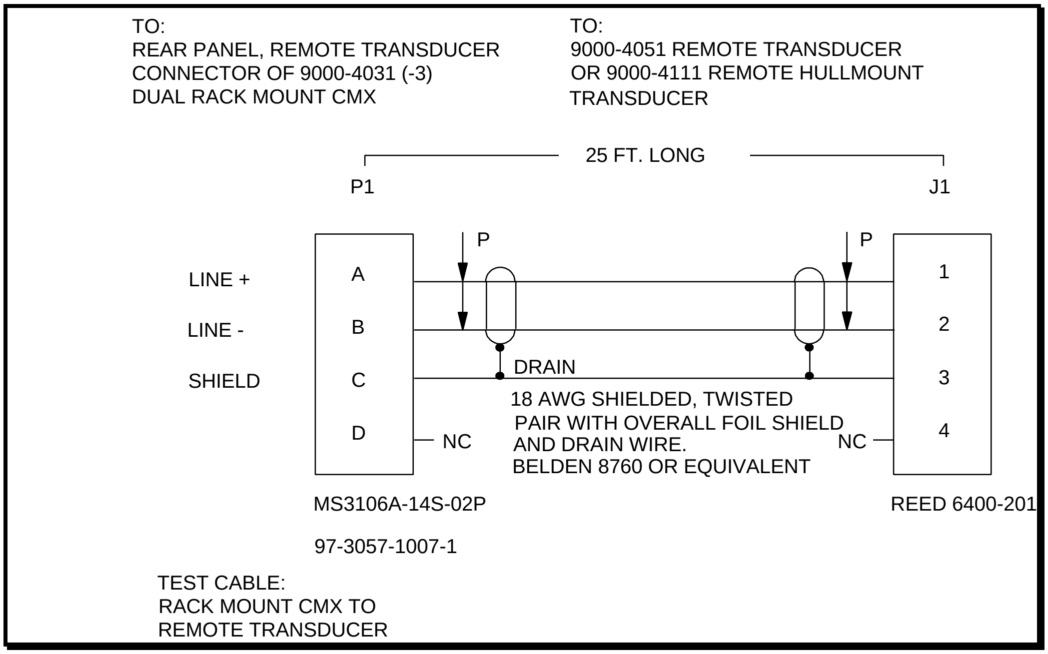


Figure 4.25 Remote Transducer Test Cable (P/N 3300-009)

Receiver Functional Check

Background Signal Check

Select Tx channel 0 by entering "0" in the TX channel field on the Acoustic Diagnostic Page. With a known good Remote Transducer (P/N 9000-4051) connected to the remote transducer connector on the rear of the Dual Rack-mount CMX, perform the following:

Background Signal Check

With Tx channel 0 selected, observe the background SIGSTRengths for apertures 1 - 5; all shall be within the limits of -72 to -84 dB.

Transducer Functional Check

Using fingernails, keychain, or other suitable object, scratch or tap the Remote Transducer briskly while observing SIGSTR for apertures 1 - 5. Readings for all 5 apertures should change to about 20 dB more (less negative) than those observed above in the "Background Signal Check" section.

This is a qualitative check only and is intended to determine that the transducer is actually connected to the receiver. Readings are very

much dependent on how hard or how fast the Transducer is scratched.

Dual Rack-mount CMX 2nd Half Checkout

From the CMX Diagnostics menu, select CMX INFO and then enter the serial number of the second side of the Dual Rack-mount CMX. The serial number is shown on the power switch key cap. Then repeat the checks described above.

Range Accuracy Verification (refer to Section 11.2.6)

This test involves acquiring a range between a pair of Remote Transducers (energy source or hull-mount) arranged transducer to transducer (0 distance), maintaining contact with each other through a "bubble pack" or any other suitable non-metallic impeding medium.

The range value reported between the transducer pair is an indication of the accuracy of the pair. This is essentially a zero-range verification test. To pass this test, the pair must consistently provide a range time limited to 0 +/- 0.1 ms. This test can also be run using a Cable-mount CMX together with a Remote Transducer / Dual Rack-mount CMX (provide they are on the same modem transmission line).

The following steps are required to perform this test:

1. Position the two Remote Transducers so that the transducers are barely in contact. Minimal contact is recommended. Place a suitable impeding medium (the recommended medium is the bubble pack wrapping used to ship the battery packs) between the transducers.

2. Connect the two transducers to a Dual Rack-mount CMX unit (or to two separate Dual Rack-mount CMX units) and power up.

3. If using two separate Dual Rack-mount CMX units, make sure that they are connected to the same modem transmission line. The two CMXs must have different unit number assignments.

4. Follow the steps for CMX Verification Test in the Section III Diagnostics, Troubleshooting Utilities.

Remote Transducer (Energy Source/Hull-Mount) Pre-Deployment Checkout

The purpose of this procedure is to verify the functionality of the 9000-4051 DigiRANGE Remote Transducer (energy source) or the 9000-4111 Remote Hull-mount Transducer in the instrument room before deployment. This procedure can also be used for the older 8000-376 and 8000-378 Remote Transducers.

Remote Transducer Setup

Connect the Remote Transducer under test to a known good Dual Rack-mount CMX configured in System 3. The only exception to this is that the Remote Transducer Test Cable is needed to make the connection between the Remote Transducer and the Dual Rack-mount CMX.

Transmitter Functional Check (Pulse Monitor)

Select Tx channel 1 by entering "1" in the TX channel field of the Diagnostic Page; observe PULSE MONITOR. Counts should be within the following limits:

Remote Transducer (Energy Source) or Remote Hull-mount Transducer

- CH 1 (both + and - counts) = 100 (approximately)
- CH 1 (both + and - counts) = 40 ± 10 (only when using Remote Transducer Test Cable).

Receiver Functional Check

Background Signal Check

Select Tx channel 0 by entering "0" in the TX channel field of the Diagnostic Page.. Observe the background SIGSTRengths for apertures 1 - 5; all SIGSTRs should typically be within the limits of -72 to -78 dB. These readings may get as high as -54 dB in rough weather.

Remote Transducers on the energy sources may experience high noise conditions because of flow noise from the energy sources themselves, energy source air leaks, etc. SIGSTR readings greater than -54 dB can keep the CMX/Remote Transducer from being able to successfully receive the longer ranges. High SIGSTR readings indicate a possible deployment problem and deserve attention.

Remote Hull-mount Transducers may experience high noise conditions because of ships mechanical noise transferred through the water to the Transducer. This noise may emanate from the propellers (intensity and frequency will change with both rpm and pitch), high pressure compressors, engines, etc.

SIGSTR readings greater than -45 dB can keep the CMX/Remote Hull-mount Transducer from being able to successfully receive the longer ranges. SIGSTR readings higher than about -45 dB indicate a possible deployment or stem location problem and deserve attention.

High noise readings on Remote Transducers may also indicate a wiring or grounding problem or be caused by electrical (or acoustic) interference from another system. Thoroughly check all wiring and interconnections. If electrical or acoustic interference is suspected, shut off the system suspected of creating the noise to isolate the cause. Elimination of the noise source may not be that easy.

Transducer Functional Check

Using fingernails, keychain, or other suitable object, scratch or tap the Remote Transducer briskly while observing SIGSTR for apertures 1 - 5. Readings for all 5 apertures should change to about 20 dB more (less negative) than those observed above in the "Background Signal Check" section.

This is a qualitative check only and is intended to determine that the transducer is actually connected to the receiver. Readings are very much dependent on how hard or how fast the Transducer is scratched.

CABLE-MOUNT CMX UNITS

The terms "Cable-mount CMX" and "Streamer-mount CMX" are used interchangeably.

Overview

The Cable-mount Concurrent Multichannel Transceiver (CMX) **(**P/N 9000-4012) is a measurement device that makes up a node in the DigiRANGE acoustic system. The device contains a telemetry system interface, control logic, and transceiver circuitry. The cable-mount CMX has an integral transducer designed to be mounted on a cable or tailbuoy.

Each CMX can transmit on one of five channels in the 50 kHz to 100 kHz acoustic band. Up to eight different range measurements may be acquired by each CMX on each measurement cycle. The system is designed to support acoustic transit time measurements accurate to 0.1 ms.

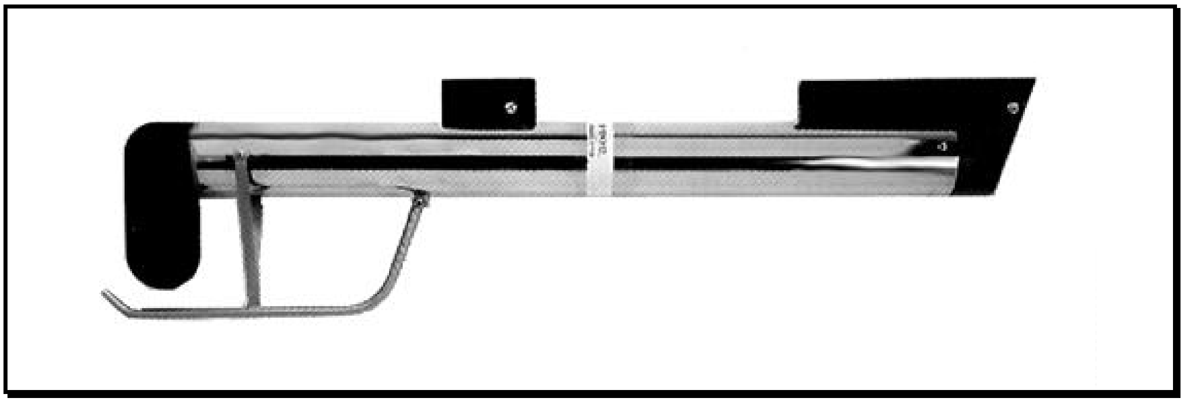


Figure 4.26 CMX Unit (cable-mounted)

Specifications

Physical Characteristics

Length:	106.7 cm (42 in)
Diameter:	12.1 cm (3.5 in)
Weight:	approx. 4.3 kg (9.6 lbs in water)

Section IV Hardware

Performance Characteristics

Number of Channels	5
Acoustic Band	50 kHz - 100 kHz
Ranges per Node	8
Battery Life	65 days

Cable-Mount CMX Pre-Deployment Checkout

The purpose of this procedure is to verify the functionality of the Cable-mount CMX in the instrument room before deployment on the streamer cable. This procedure is to be performed with a load tested battery pack and nose assembly installed in the CMX. A Test Coil (P/N 9000-388/01) will be used for communicating with the Cable-mount CMXs during checkout.

Test Coil Installation

Connect the 9000-388/01 Test Coil to a Line on the LIU panel. Place the coil section of the Test Coil as near to the Cable-mount CMX coil (see coil indicator line on nose assembly) as possible for the following tests. Avoid high electrical noise environments caused by monitors and other equipment.

Communication Check

1. In the Operator Interface Program, click on the **Diagnostics / Acoustics** command.
2. Select the Read Unit ID function to interrogate the CMX by Serial number and verify the previously assigned Unit ID. It is assumed that at this stage the correct Unit ID has been assigned before deployment.
3. Verify interrogation by the Unit ID by clicking on Read/Swap Serial No.

Status Checks

1. Take the DMU out of the Run Mode.
2. In the Operator Interface Program, click on the **Diagnostic / Acoustic** command. Select the Diagnostic Page and answer "Yes" to the question..
3. Enter the Unit ID of the CMX and verify successful download. Transmit channel = 0 (transmitter disabled) at this point.

Signal

Volt (V) = 0.0 0.0

Off (V) = 2.5

If the "Off" (V) does not equal 2.4 or 2.5 it is probably due to interference from electronic equipment in the instrument room.

Depth/Temperature

Depth = 0.00 PSI 0.0 M

Temperature (C) = -24.0

These fields are reserved for the Depth and Temperature measurement option on Cable-mount CMXs and will not be used on Dual Rack-mount CMXs.

Pulse Monitor

Count = 0.0 0.0

At this point the acoustic pulse transmitter is OFF as indicated by Transmit Channel : 0.

Status Display

Depth Acq module should have a red status color (failure). This is normal.

All others items should read "check."

The CMX Diagnostic Page may also be used to diagnose problem CMXs.

See the Off-Line Diagnostics section for more information on Status.

Transmitter Functional Check (Pulse Monitor)

Select Tx channel 1 by entering "1" in the TX channel field of the Diagnostic Page; observe PULSE MONITOR. Counts should be within the following limits:

Remote Transducer (Energy Source) or Remote Hull-mount Transducer

- CH 1 (both + and - counts) = 100 (approximately)
- CH 1 (both + and - counts) = 40 ± 10 (only when using Remote Transducer Test Cable).

Receiver Functional Check

Background Signal Check

Select Tx channel 0 by entering "0" in the TX channel field of the Diagnostic Page.. Observe the background SIGSTRengths for apertures 1 - 5; all SIGSTRs should typically be within the limits of -72 to -78 dB. These readings may get as high as -54 dB in rough weather.

Cable-mount CMXs on sleds or tail buoys may experience high noise conditions because of generator noise or flow noise from the buoy itself. Cable-mount CMXs on the first or second active streamer sections may experience high noise conditions because of flow noise from the paravanes, doors, energy sources, energy source air leaks, etc.

In any case, SIGSTR readings greater than -54 dB can keep the CMX from being able to successfully receive the longer ranges. High SIGSTR readings indicate a possible deployment problem and deserve attention.

Transducer Functional Check

Using fingernails, keychain, or other suitable object, scratch or tap the Remote Transducer briskly while observing SIGSTR for apertures 1 - 5. Readings for all 5 apertures should change to about 20 dB more (less negative) than those observed above in the "Background Signal Check" section.

This is a qualitative check only and is intended to determine that the transducer is actually connected to the receiver. Readings are very much dependent on how hard or how fast the Transducer is scratched.

CMX Verification Test

See the instructions for conducting the CMX Verification Test in Section III Diagnostics, Troubleshooting Utilities.

Latch Mechanism Physical Inspection

Since it is not always obvious that the latch is properly engaged when installing a Cable-mount CMX on a streamer, it is imperative that the latch mechanisms be checked from time to time to ensure proper operation, and that CMX to collar fit be checked during streamer deployment.

Prior to streamer deployment, all Cable-mount CMX latch assemblies should be checked for proper operation (as described below) and , if necessary, cleaned and lubricated.

Check that the dovetail pin on top of each pylon extends and retracts fully as the eccentric_pin (slotted hex on either side of the pylon) is rotated. There should be no tendency for the dovetail pin to stick or bind. The locking link (in front of the dovetail pin) should extend as the pin retracts. Use a collar outer ring to check latch operation. When retracted, the dovetail pin should retain the test collar tightly against the pylon with the locking link (in front of pin) fully extended.

Buildups of fine grained mud and sea salts can eventually impair proper operation of the latch mechanism. After streamer retrieval and before storage of the Cable-mounted CMXs, latch mechanisms should be flushed with a light oil or silicone lubricant to ensure continued reliable operation. Use of CMXs with malfunctioning latches can result in loss of, or damage to the CMX.

Cable-Mount CMX Deployment

Perform pre-deployment checks prior to installing a CMX unit to a cable.

Collar to Streamer Orientation

Cable-mount CMXs are mounted to the streamer cable utilizing the industry standard of rotating keyhole collars spaced at 22.5 inches between keyholes. The collars must be attached along the streamer in locations that allow the communication coil of the CMX to be positioned below the coil in the streamer. The center of the streamer's coil should be lined up with the center of the CMX's coil (marked on the top of the front latch). The collars should be mounted with the hole of the keyhole slot facing the head of the streamer as shown in Figure 4.27.

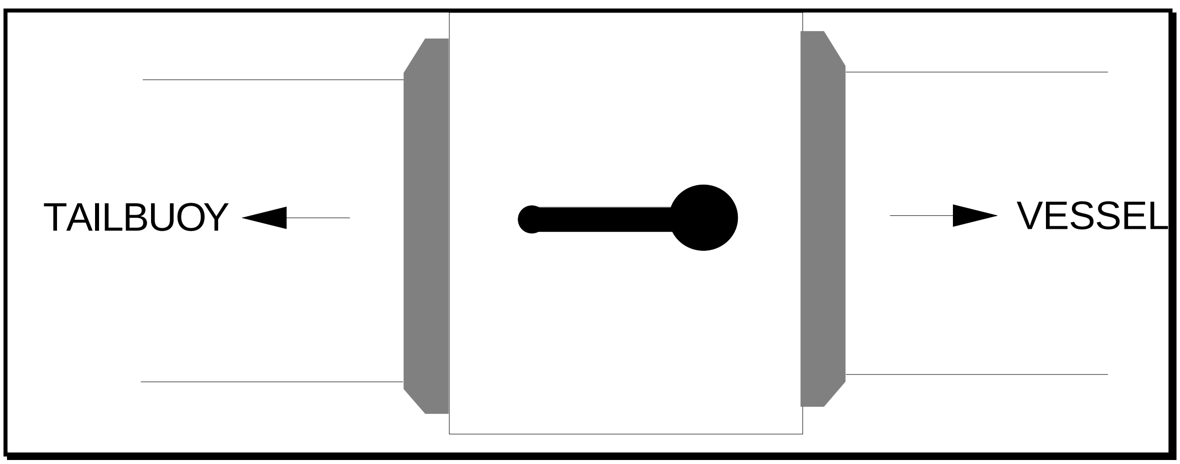


Figure 4.27 Collar Orientation

Cable-Mount CMX to Collars Attachment

When attaching a Cable-mount CMX to the streamer, start with both dovetail pins in the extended (unlatched) position with the locking links more or less flush with the top of the pylon. Note that, when the small hole to one side of the screwdriver slot is up (toward the top of the pylon), the dovetail pin is in the fully extended position. See Figure 4.28.

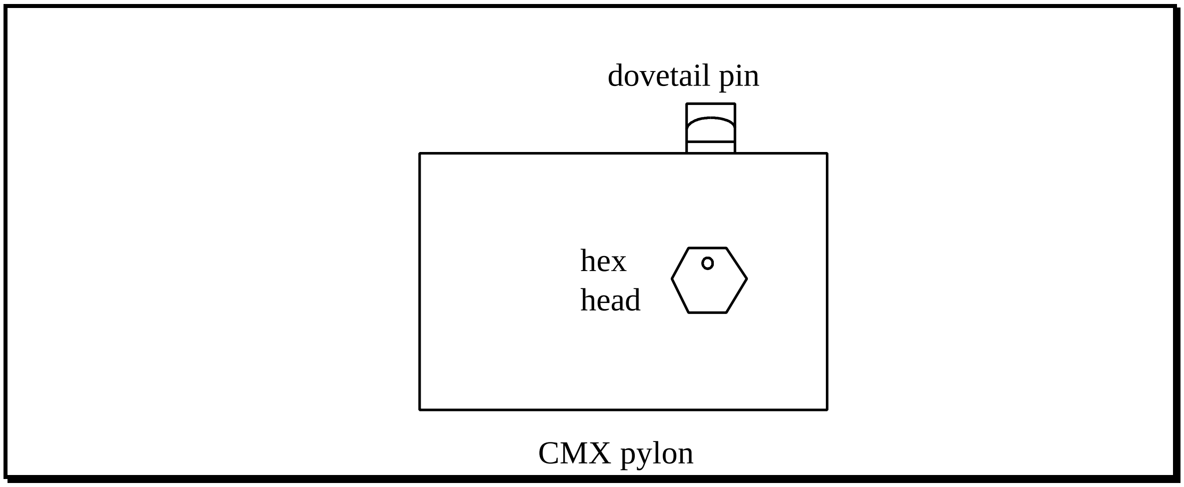


Figure 4.28 Latch in Extended Position

As each Cable-mount CMX is installed on the collars, be sure that front and rear pins fit into the hole on the collar rings at the same time. **If it is necessary to insert one pin onto a collar and then slide the Cable-mount CMX on that collar to engage the other collar, then collar spacing is incorrect and both latches may not be able to fully engage.** The CMX should be oriented such that the transducer and cage are pointing toward the tailbuoy end of the streamer.

Next, slide the Cable-mount CMX back on the collars so that the front of both pylons is behind the front edge of the aluminum collar ring. Lock the CMX to the collar rings by rotating the hex heads on the front and rear eccentric pins so that the small holes are down (away from the top of the pylons). The hex heads should rotate freely ¼ turn either side of this position. Shake the CMX forward and backward along the streamer to ensure it is locked in place. Wrap the supplied safety cable around streamer and clip to the loop on the side of the latch.

CAUTION: If the front of either pylon is ahead of the front edge of the aluminum collar ring, both latches may not be fully engaged. CHECK COLLAR SPACING BEFORE DEPLOYING. Collar spacing is maintained by properly latched CMXs; the rear collar will move.

Cable-Mount CMX to Float Tube Orientation

A Float Tube (P/N 9000-303/01) must be mounted directly to the same collars as a Cable-mount CMX (collars come with opposing keyhole slots). See Figure 4.29

for Float Tube orientation. Float Tubes must be used to ensure proper orientation of Cable-mount CMXs.

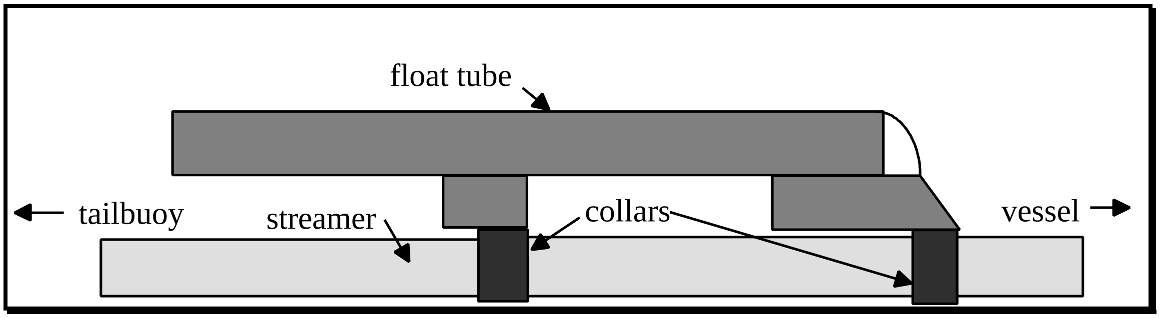


Figure 4.29 Float Tube Orientation

Cable-Mounted CMX to Tailbuoy Installation

A Cable-mounted CMX can be mounted to the tailbuoy to several ways. Four possible methods are described in the following sections.

Tailbuoy Hard-Mount

A Cable-mount CMX can be hard mounted to a tailbuoy provided the tow depth is greater than two meters. The CMX can be mounted in any orientation (horizontal, vertical, or at an angle), as long as the transducer has an unobstructed path forward and down to the CMXs mounted on the streamers. The CMX should be mounted so that the transducer is directly beneath the geodetic reference on the tailbuoy. The Cable-mount CMX can be mounted using standard collars modified to fit the buoy structure, or it can be bound to the buoy structure with banding or similar material. See Figure 4.30 .

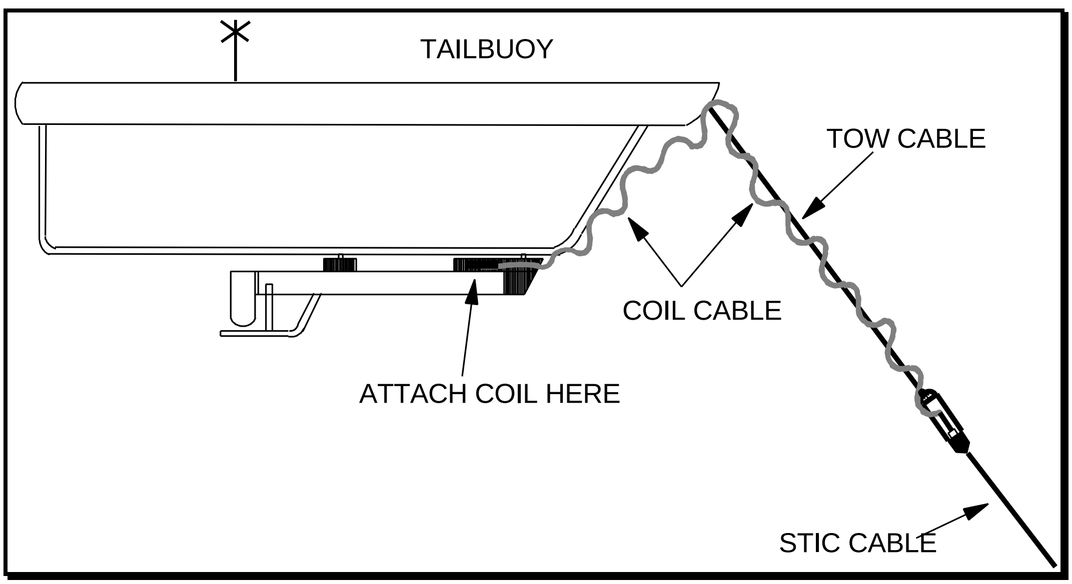


Figure 4.30 Tailbuoy Hard-Mount

Tailbuoy Hard-Mount with DigiCOURSE Tail Tow Tube (TTT)

A DigiCOURSE TTT can be mounted to a section of the buoy structure providing a convenient attachment point for a Cable-mount CMX. Tow depth must exceed two meters for this deployment. The TTT has two standard collars to which the Cable-mount CMX can be attached. The bail of the TTT can be shackled to the tailbuoy. The TTT should be shackled at a position in which the CMX's transducer is directly beneath the geodetic reference on the tailbuoy. The coil end of the Coil Cable should be secured in the interior of the TTT using the coil retaining fixture included with the TTT. See Figure 4.31.

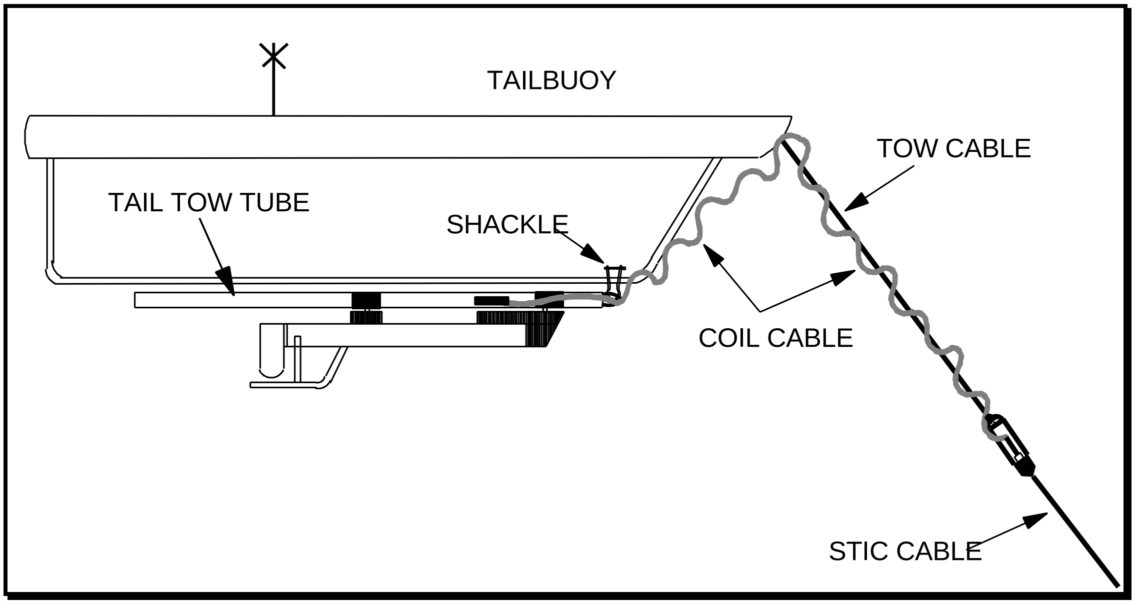


Figure 4.31 Tailbuoy Hard-Mount with DigiCOURSE Tail Tow Tube

Tethered DigiCOURSE Tail Tow Tube (TTT)

A DigiCOURSE TTT can also be towed from a tow rope attached to the end of the STIC cable, or other suitable underwater tow point. The tow depth should be a minimum of two meters, and the CMX's transducer should be positioned directly beneath the geodetic reference on the tailbuoy. A Cable-mount CMX can be collar mounted to the TTT, with the coil from the Coil Cable secured in the interior of the TTT. See Figure 4.32.

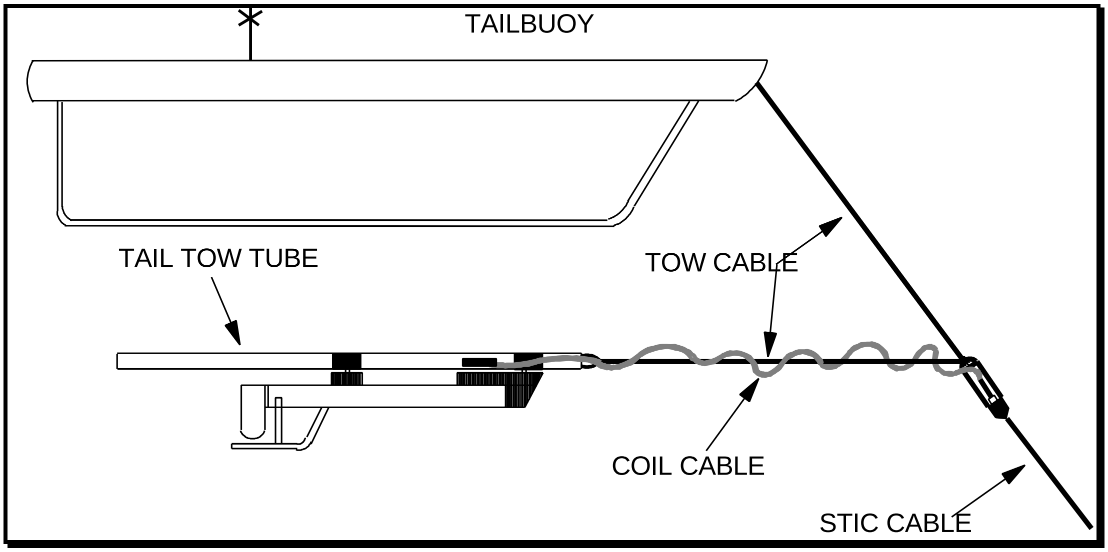


Figure 4.32 Tethered DigiCOURSE Tail Tow Tube.

Tethered Short Streamer Section

A Cable-mount CMX can also be attached at a coil position on a short streamer section using standard collars. This streamer section can then be attached to the tailbuoy or STIC in a way that is similar to the methods shown in Figures 4.31 and 4.32 but with the streamer section substituted for the DigiCOURSE TTT. The CMX's transducer should be positioned directly beneath the geodetic reference on the tailbuoy.

Cable-Mount CMX Post-Deployment Checkout

Once all equipment has been deployed, a few basic tests should be performed to ensure all components of the deployed system are operating properly. The following tests are performed while in the Acoustic Diagnostics section of Operator Interface.

The purpose of this procedure is to verify the functionality of the Cable-mount CMX both during and after deployment on the streamer. These checks should be performed for each Cable-mount CMX once they are deployed in the water.

Communication Check

1. In the Operator Interface Program, click on the **Diagnostics / Acoustics** command.
2. Select the Read Unit ID function to interrogate the CMX by Serial number and verify the previously assigned Unit ID. It is assumed that at this stage the correct Unit ID has been assigned before deployment.
3. Verify interrogation by the Unit ID by clicking on Read/Swap Serial No.

Status Checks

1. Take the DMU out of the Run Mode.
2. In the Operator Interface Program, click on the **Diagnostic / Acoustic** command. Select the Diagnostic Page and answer "Yes" to the question..
3. Enter the Unit ID of the CMX and verify successful download. Transmit channel = 0 (transmitter disabled) at this point.

Signal

Volt (V) = 0.0 0.0

Off (V) = 2.5

If the "Off" (V) does not equal 2.4 or 2.5 it is probably due to interference from electronic equipment in the instrument room.

Depth/Temperature

Depth = 0.00 PSI 0.0 M

Temperature (C) = -24.0

These fields are reserved for the Depth and Temperature measurement option on Cable-mount CMXs and will not be used on Dual Rack-mount CMXs.

Pulse Monitor

Count = 0.0 0.0

At this point the acoustic pulse transmitter is OFF as indicated by Transmit Channel : 0.

Status Display

Depth Acq module should have a red status color (failure). This is normal.

All others items should read "check."

The CMX Diagnostic Page may also be used to diagnose problem CMXs.

See the Off-Line Diagnostics section for more information on Status.

Transmitter Functional Check (Pulse Monitor)

Select Tx channel 1 by entering "1" in the TX channel field of the Diagnostic Page; observe PULSE MONITOR. Counts should be within the following limits:

Remote Transducer (Energy Source) or Remote Hull-mount Transducer

- CH 1 (both + and - counts) = 100 (approximately)
- CH 1 (both + and - counts) = 40 ± 10 (only when using Remote Transducer Test Cable).

Receiver Functional Check

Background Signal Check

Select Tx channel 0 by entering "0" in the TX channel field of the Diagnostic Page.. Observe the background SIGSTRengths for apertures 1 - 5; all SIGSTRs should typically be within the limits of -72 to -78 dB. These readings may get as high as -54 dB in rough weather.

Remote Transducers on the energy sources may experience high noise conditions because of flow noise from the energy sources themselves, energy source air leaks, etc. SIGSTR readings greater than -54 dB can keep the CMX/Remote Transducer from being able to successfully receive the longer ranges. High SIGSTR readings indicate a possible deployment problem and deserve attention.

Remote Hull-mount Transducers may experience high noise conditions because of ships   mechanical noise transferred through the water to the Transducer. This noise may emanate from the propellers (intensity and frequency will change with both rpm and pitch), high pressure compressors, engines, etc.

SIGSTR readings greater than -45 dB can keep the CMX/Remote Hull-mount Transducer   from being able to successfully receive the longer ranges. SIGSTR readings higher than about -45 dB indicate a possible deployment or stem location problem and deserve attention.

High noise readings on Remote Transducers may also indicate a wiring or grounding problem or be caused by electrical (or acoustic) interference from another system. Thoroughly check all wiring and interconnections. If electrical or acoustic interference is suspected, shut off the system suspected of creating the noise to isolate the cause. Elimination of the noise source may not be that easy.

Section IV Hardware

Cable-Mount CMX Battery Pack Installation/Replacement

Alkaline battery packs are HIGH VOLTAGE with 60 to 63 volts. Use DigiCOURSE P/N 9000-4122 to test Alkaline batteries. Pack shall measure a minimum ± 63 VDC under “no load” condition, and a minimum ± 60 VDC under “load” condition.

Battery packs must be installed when deploying Cable-mount CMXs for the first time (units are not shipped with battery packs). Weak battery packs must be replaced with fresh packs when required. When a Cable-mount CMX does not operate properly or has intermittent communication, its battery pack should be replaced with a fresh one as an initial test before unit is disassembled further.

Battery Pack Replacement Procedure

1. Remove the three screws (2800-507) that hold the nose (8000-384) in place. Tilt the front of the CMX down to prevent water trapped around the O-rings from dripping into the housing of the CMX. Gently slide the nose out the front of the housing (2500-318) and unplug it from the CMX. Wipe out any water that may have entered the housing. If necessary, remove the electronics module (see section tilted "Removing Electronics Module of Cable-mount CMX") to ensure complete removal of water.
2. If the unit has a white foam spacer (3100-064) and gray PVC battery pack spacer (2501-352) inside the CMX, remove them.

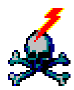
   If the CMX has not previously been deployed, it may contain a shipping spacer (2501-367) in place of the battery pack. Remove the shipping spacer. If replacing a battery pack, unplug the pack currently in the CMX and remove from CMX.
3. Insert the fresh battery pack (4000-036) into the front end of the CMX, with the connector side facing out. Plug the pack in to the three pin connector of the wire harness coming from the CMX electronics.
4. Reinstall the gray plastic spacer and the foam spacer, in that order, into the CMX.
5. Replace the two o-rings (2701-068) on nose with a fresh pair and lube with Dow Corning #4 electrical insulating compound (1600-019).
6. Mate the two pin connector of the electronics wire harness with that of the nose.

7. Using the Pre-Deployment Checkout procedures, check to see that CMX is working properly before reassembling.
8. Push the wire harness down into the CMX and install the nose. Retain the nose with the three screws removed in step 1.

Section IV Hardware

Cable-Mount CMX Transducer Removal/Replacement

The acoustic transducer must be removed to extract the electronics module from the housing or to replace a bad transducer. Proper grounding techniques must be utilized while performing the following procedure in order to prevent damaging the CMX electronics with electrostatic discharge.



-WARNING - **High voltages present. Voltages up to ±230 volts DC for a total of 460 volts DC may be present on the CMX electronics assembly. HANDLE WITH CARE.**

1. Disconnect the battery pack from the CMX electronics by following the procedures described in Cable-Mount CMX Battery Pack Installation/Replacement.
2. Remove the four screws (2800-507) retaining the transducer assembly (8000-386). Tilt the rear of the CMX down to prevent water flowing into the housing. Gently slide the transducer off the rear of the housing (rotate the transducer to avoid hitting the protective cage). Wipe out any water that may have entered the housing. If necessary, remove the electronics module (see section tilted "Removing Electronics Module of Cable-mount CMX") to ensure complete removal of water.
3. The electronics module (8000-573) is mechanically connected the transducer by a wire strain relief cable (2850-024). Use this cable to pull the electronics module out far enough to get a hold of it. Then pull the electronics out by hand until the transducer plug on PC board is visible.
4. Unplug the transducer from the PC board and unscrew the strain relief from the rear support of the electronics module.
5. If replacing the current transducer with one from a spares kit, attach a #8 cable tie (6000-019) from the spares kit to the wire of the transducer approximately one inch past the end of the wire strain relief.
6. Put screw (2800-507) removed in step 2 through the wire strain relief and the cable tie and screw it into the rear support of the electronics. Feed the electrical wire through the slot in the support and plug the connector into the mating connector on the PC board.
7. Make sure the o-rings (two 2701-072 and one 2701-074) on the electronics module are sufficiently lubricated with #4 insulating compound (1600-019), and slide the electronics back into the rear of the housing, about one inch.

8. Twist the transducer two times to coil the wires and insert the transducer into the rear of the housing. Retain the transducer with the four screws removed in step 1.

Section IV Hardware

Cable-Mount CMX Electronics Module Removal

The electronics module may need to be removed to replace a bad electronics module or a bad CMX housing. The electronics are meant to remain as a module and should not be disassembled into its component parts.

<u>-WARNING -</u> High voltages present. Voltages up to ±230 volts DC for a total of 460 volts DC may be present on the CMX electronics assembly. HANDLE WITH CARE. The two high voltage capacitors, C33 and C50, on the power module must be discharged with a 160 ohm, 2 watt resistor before handling. The resistor must be insulated where it is touched.

Components on this assembly are electrostatic sensitive. Use proper grounding techniques to prevent static damage when handling.

1. Perform disassembly operations outlined Cable-Mount CMX Battery Pack Installation/Replacement.
2. Perform disassembly operations outlined Cable-Mount CMX Transducer Removal/Replacement.
3. Slide the electronics module (8000-573) out of the rear of the housing (2500-318). See above warning.
4. Perform any necessary work on the electronics.
5. Make sure the initial seven to eight inches of the rear inner diameter of the housing is well lubricated with #4 insulating compound (1600-019). Lube o-rings (two 2701-072 and one 2701-074) of electronics module with #4 insulating compound.
6. Slide the electronics into the rear of the housing, wire harness end first. Insert the electronics module with the small modem board facing the latch side. The tube and electronics must be well lubricated to ease installation.
7. Install the transducer as stated in Cable-Mount CMX Transducer Removal/Replacement.
8. Install battery pack as stated in Cable-Mount CMX Battery Pack Installation/Replacement.

EPROM Replacement

There may be situations where the EPROM in a CMX has to be replaced. The EPROM is the component in the CMX electronics that stores the software required to operate a given CMX. This situation would occur if the software within the CMX has been updated at DigiCOURSE and then has to be installed in the CMXs in the field. Do not replace EPROMs as a troubleshooting procedure. EPROMS should only be replaced on instructions from DigiCOURSE.

<u>-WARNING -</u> High voltages present. Voltages up to ±230 volts DC for a total of 460 volts DC may be present on the CMX electronics assembly. HANDLE WITH CARE. The two high voltage capacitors, C33 and C50, on the power module must be discharged with a 160 ohm, 2 watt resistor before handling. The resistor must be insulated where it is touched.

Components on this assembly are electrostatic sensitive. Use proper grounding techniques to prevent static damage when handling.

1. Perform the disassembly procedures shown Cable-Mount CMX Electronics Module Removal. Observe the warning shown above.
2. The EPROM is located on the solder side of the 8000-570 board at the nose end of the assembly. It is fully accessible <u>without</u> taking the electronics assembly apart. Remove the old EPROM by pushing the socket locking tabs outward. The EPROM should pop up.
3. Install the new EPROM with the <u>same</u> <u>serial</u> <u>number</u> as the one that was removed (EXAMPLE: V1.9 s/n 1234 changes to V2.0 s/n 1234). Observe that pin 1 of the EPROM is facing the small modem board. Push the socket locking tabs inward, after the pins are aligned with holes, to seat the EPROM.
4. Reassemble the CMX as show in the section Cable-Mount CMX Electronics Module Removal.

Cable-Mount CMX Latch Pin and Locking Link Replacement

The entire locking link and/or its retaining pin (latch pin) may need to be replaced if the latch pin or locking link becomes bent from minor physical damage. If major physical damage has occurred, then the entire latch assembly should be replaced.

1. Use 1/8-inch (or smaller) diameter punch to push out latch pin (2800-245) retaining the locking link (2500-434).
2. Remove locking link.
3. Install a new locking link, with ball shaped portion of the link in the hole in the side of the dovetail pin assembly (8000-890), and retain with a new latch pin.

Cable-Mount CMX Rear Latch Assembly Replacement

The entire rear latch assembly may need to be replaced in the event that a housing or rear latch has been damaged in service. If a dovetail pin is not operating correctly, replace the entire latch assembly. Only the locking link and its retaining pin are field replaceable as individual components of the overall latch assembly.

1. Use a heat gun to soften the gray epoxy that fills the holes on top of the latch. While heating, use a small screw driver to dig out the softened epoxy to expose the heads of the socket head cap screws (2800-470) and washers (2800-240).
2. Use a 3/16 hex key to remove the screws and remove the latch assembly (8000-385).
3. Clean the area of the housing where the latch assembly was seated. Press the sealant (supplied with the latch assembly replacement kit) around the threaded bosses per the diagram supplied with the kit.
4. Place the new latch assembly on the housing (2500-318) of the CMX with the dovetail pin end facing toward the front of the CMX. Retain the latch assembly with the two socket head cap screws (2800-470) and two flat washers (2800-240). Use 277 or 271 red Loctite on the threads of the screws. Tighten the screws to a torque of 140 - 150 in-lbs. Refill the holes with epoxy if available.

Section IV   Hardware

Cable-Mount CMX Protective Cage Replacement

The protective cage on a Cable-mount CMX may have to be replaced if it is bent or damaged beyond repair. Also, cage installation is required for new housings being readied for use.

1. Remove the truss head screws, washers, and nut that retain the cage (2500-323).
2. Remove the cage.
3. Inspect the condition of the housing (2500-318) around the cage attachment points for any damage that may require the housing to be replaced in addition to the cage.
4. Attach the front of the new cage to the housing first, with the 3/4 inch truss head screw (2800-512), two washers (2800-240), and a nut (2800-241)(use new equipment if needed). Apply 277 or 271 red Loctite to the threads of the screw. Do not completely tighten nut.
5. Apply 277 or 271 red Loctite to the threads of the two 3/8 inch truss head screws (2800-511), and use them with two washers (2800-240)(one for each "leg") to retain the "legs" of the cage to the sides of the housing. Tighten all three bolts completely.

Cable-Mount CMX Nose Assembly Replacement

The nose may have to be replaced in the event of a bad communications coil, damaged sealing areas, faulty latch mechanism, or damaged wires. Replace the entire nose if the dovetail pin is not working properly. Only the locking link and its retaining pin components of the latch mechanism are field replaceable.

1. Remove the three screws (2800-507) that hold the nose (8000-384) in place. Tilt the front of the CMX down to prevent water trapped around the O-rings from dripping into the housing of the CMX. Gently slide the nose out the front of the housing (2500-318) and unplug it from the CMX. Wipe away any water that may have entered the housing. If necessary, remove the electronics module (see section tilted Cable-Mount CMX Electronics Module Removal) to ensure complete removal of water.
2. Lubricate the two o-rings (2701-068) with #4 insulating compound (1600-019) and install them on a new nose assembly.
3. Plug the new nose into the wire harness of the CMX.
4. Using the Pre-Deployment Checkout procedures, check to see if the CMX is working properly before reassembling.
5. Push the wire harness down into the CMX and install the nose. Retain the nose with the three screws removed in step 1.

Section IV Hardware

Cleaning Deployed Equipment

All equipment that has been deployed in saltwater should be rinsed with fresh water when retrieved. All latch mechanisms should be lubricated with a light oil or silicone lubricant when the equipment is retrieved.

When CMXs are to be opened to perform internal repairs or change batteries, they should be rinsed thoroughly with fresh water and dried completely before opening. A mild detergent may be used to remove material that cannot be washed off by rinsing alone. Again be sure to lubricate the latch mechanisms with a light oil or silicone lubricant when cleaning is completed.

The black polyurethane transducers should be cleaned with a mild abrasive agent, i.e. Comet Cleanser. They should always be free of grease, oil or any type of marine growth for optimum acoustic performance.

CTX UNITS

Overview

CTX Units are modular forms of the CMX with equivalent performance specifications, each consisting of a CTX electronics module and a separately-housed transducer (pinger).

BUOY-MOUNTED CTX ELECTRONICS MODULE

Overview

The Buoy-mounted CTX Electronics Module (P/N 9000-4022) is designed for deployment on tail buoys, Nav buoys, energy sources, and hull-mounts.

Deployment at the energy source requires special installation instructions. These instructions are outlined in the CTX Energy Source Application Mounting section below.

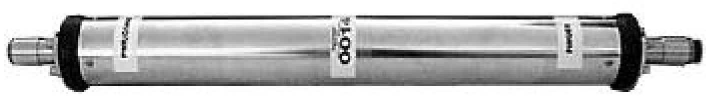


Figure 4.33 Buoy-Mounted CTX Electronics Module (Pod)

CTX Electronics cannot be swapped for the DigiRANGE CMX electronics.

Specifications

Physical Characteristics

Length:	83.8 cm (33 in)
Diameter:	8.3 cm (3.25 in)
Weight:	5 kg (11 lbs) in air

CTX ENERGY SOURCE APPLICATION MOUNTING

CAUTION: Any variation to this deployment scheme requires review and approval by DigiCOURSE Engineering.

For energy source applications, the CTX must be placed inside a protective housing. DigiCOURSE supplies this housing and hardware in the CTX Source Application Kit (P/N 8200-037).

1. Position the housing. When determining the location of the housing, position it to minimize impacts during gun retrieval and deployment, and place it no more than 30 meters from the pinger. (A maximum of 30 meters of cable between the CTX and the pinger is allowed.)

The 10-meter cable supplied by DigiCOURSE does not have a grounded shield. The CTX may experience interference from other electrical sources on the cable, and the CTX may in turn interfere with other non-shielded equipment.

2. Secure the housing either to a gun rack or to a gun plate. If you are attaching the housing to a gun rack, proceed to Step 3; however, if you are attaching the housing to a gun plate, skip to Step 4.

CAUTION: Do not mount the CTX any closer than one meter to a gun; mounting further away from the guns is preferred.

3. If you are attaching the housing to a gun rack, weld the housing to the top of the rack from which the guns are suspended as described in Figure 4.34, Weld Installation Detail. Weld all metals, which are 316L stainless steel, with appropriate electrodes, then proceed to Step 5.

CAUTION: If you weld the housing to a gun rack, do not place the CTX module and rubber spacers inside the housing until the welding is completed.

4. If you are attaching the housing to a gun plate, bolt the housing to the gun plate as described in Figure 4.35, Bolt On Installation Detail. Place a customer-supplied Nitrile rubber (BUNA-N) spacer between the u-bolts and the housing as well as between the housing and the gun plate, then proceed to Step 5.
5. After securing the housing, insert the CTX module and spacers as detailed in Steps 6 through 9. See Figure 4.36, Assembly of Housing, for the order of assembly.
6. Insert an end spacer (the spacer material is nitrile) into the housing, then insert the housing spacer. Roll up the housing spacer lengthwise to facilitate insertion into the housing.
7. Insert the CTX module. Ensure this module is firmly pushed all the way into the housing.
8. Place another end spacer inside the housing, and bolt the end flange in place. Use the 5/16-18x1-1/2 316L screws and locknuts supplied.
9. Secure the cables extending from the CTX to within 25 cm of the end connectors to prevent whipping.

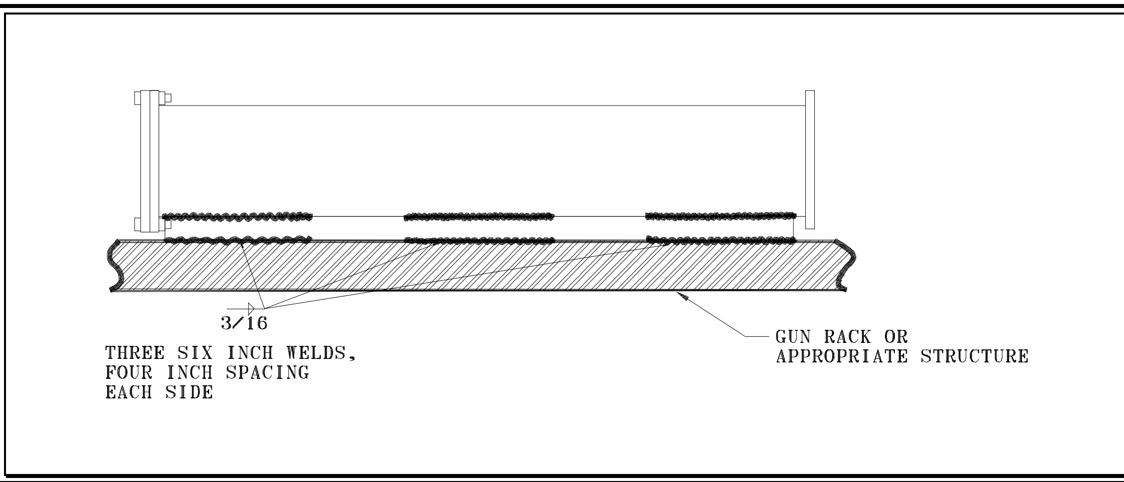


Figure 4.34 Weld Installation Detail

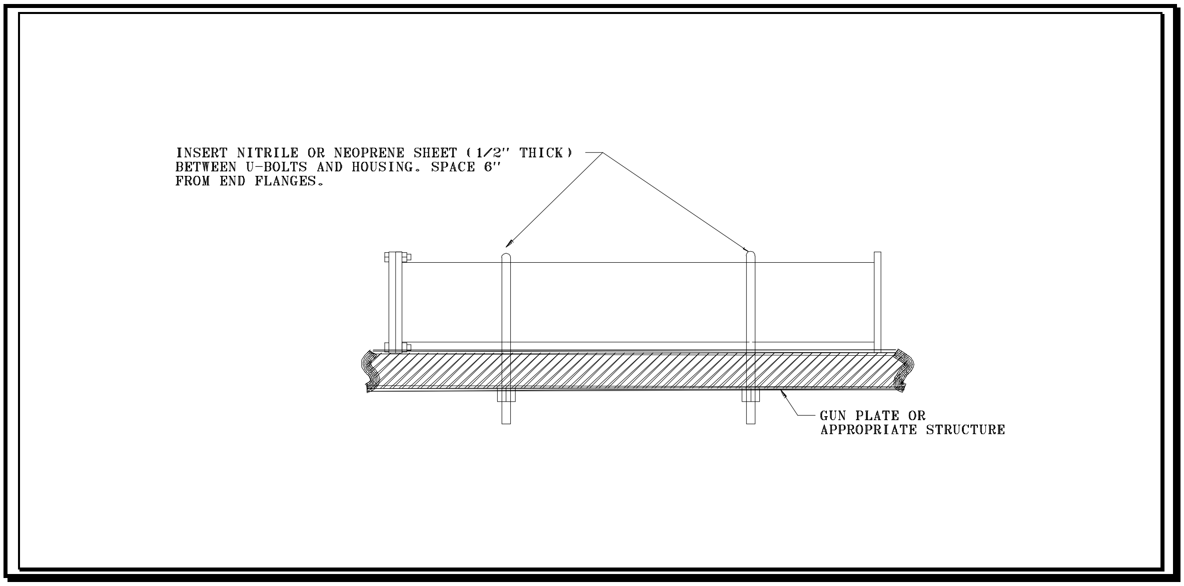


Figure 4.35 Bolt On Installation Detail

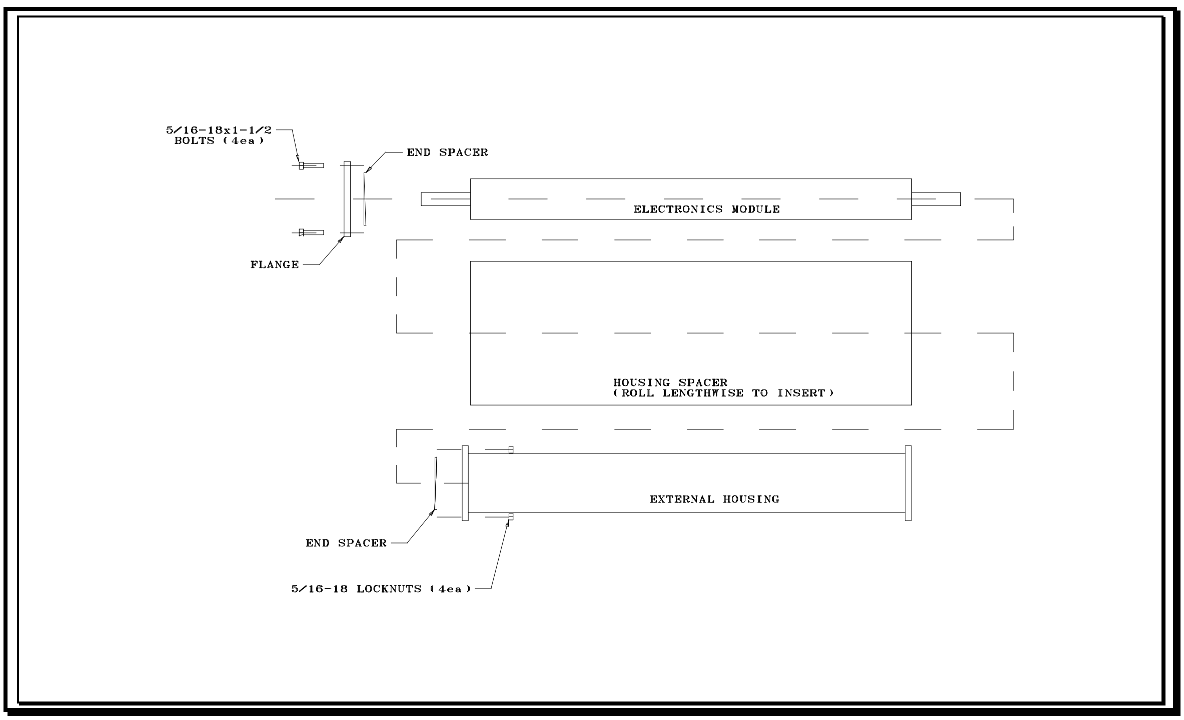


Figure 4.36 Assembly of Housing

RADIO CTX

Overview

A radio telemetry option is provided with the Radio CTX (P/N 9000-4022/10) in conjunction with the CTX Remote Radio (P/N 9000-4027) and CTX Vessel Radio (P/N 9000-4028). This option allows the DigiRANGE shipboard equipment to communicate with CTX units located at nodes not conducive to hardwired connections.

Specifications

Radio CTX Physical Characteristics

Length:	92.7 cm (36.5 in)
Diameter:	8.9 cm (3.5 in)
Weight:	3.6 kg (8 lbs) in water
	3.7 5.4 kg (12 lbs) in air

CTX Remote Radio Physical Characteristics

Length:	61.0 cm (24 in)
Diameter:	11.4 kg (4.5 in)

CTX BATTERY MODULE

Overview

The CTX Battery Module (P/N 9000-4023/01) is provided for applications with no available power. This module uses two 42C-cell alkaline battery packs and can power a Buoy CTX for 120 days. Power consumption by the Radio CTX and CTX radio is high enough to limit this module to a backup role for these style units (7 days maximum life). Several battery modules may be deployed in series using the Multiple Battery Module Adapter Kit (P/N 8200-023).

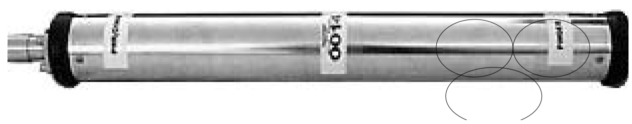


Figure 4.37 CTX Battery Module

Specifications

Physical Characteristics

Length:	104 cm (41 in)
Diameter:	8.3 cm (3.25 in)
Weight:	11.6 kg (25.5 lbs) in air

FLANGED PINGER

Overview

The Flanged Pinger (P/N 9000-4112/01) is similar in design to hull-mounted remote transducers (though NOT interchangeable because Flanged Pingers work only with CTX electronics) and is designed for hull-mount deployment. However, the flanged design readily adapts to a variety of customer-designed mounts for tailbuoy, Nav buoy, or energy source deployment.

Figure 4.38 Flanged Pinger

Specifications

Physical Characteristics

Length:	31.1 cm (12.25 in)
Diameter:	15.2 cm (6 in)
Weight:	4.1 kg (9 lbs) in <u>water</u>
	5.9 kg (13 lbs) in <u>air</u>

Section IV Hardware

TOWED PINGER

Overview

The Towed Pinger (P/N 9000-4112/02) is similar in design to the Remote Transducer used with the Rack-mounted CMX (though NOT interchangeable because Towed Pingers work only with CTX electronics). It may be deployed where a rugged, free-flying housing is required.

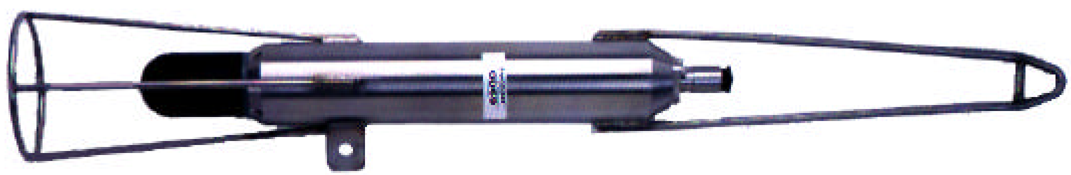


Figure 4.39 Towed Pinger

Specifications

Physical Characteristics

Length:	98.4 cm (38.75 in)
Diameter:	16.2 cm (6 3/8 in) maximum
Weight:	26.3 kg (58 lbs) in water
	26.4 33.6 kg (74 lbs) in air

RIGHT ANGLE PINGER

Overview

The Right Angle Pinger (P/N 9000-4112/03) is another rugged design, but requires hard-mounting.

Figure 4.40 Right Angle Pinger

Specifications

Physical Characteristics

Length:	74.7 cm (29.4 in)
Diameter:	8.9 cm (3.5 in)
Height:	28.6 cm (11.25 in)
Weight:	9.6 kg (21 lbs) in water
	15.9 kg (35 lbs) in air

Section IV Hardware

THREADED PINGER

Overview

The Threaded Pinger (P/N 9000-4112/04) is a reduced-sized transducer that must be mounted into a properly threaded pipe. (The mating threads in the pipe are 2 ¼ x 8 UN Class 2B.)

Specifications

Physical Characteristics

Length:	18.4 cm (7.25 in)
Diameter:	6.0 cm (2 3/8 in)
Weight:	.25 kg (.5 lb) in <u>water</u>
	1.4 kg (3 lbs) in <u>air</u> (with cable)

This section describes in detail each function of the Setup Program. If you want to create a System 3 Setup file, see Section II, Setup and Operation, which describes the functions in a step-by-step sequence.

SYSTEM 3 SETUP WINDOW

When the System 3 Setup program is run, the main System 3 Setup window is automatically displayed. The main System 3 Setup window is segmented into two views: an Equipment Tree (on the left), which in this manual will be called the "Text side," and an Equipment Graphic Display (on the right), which will be called the "Graphic side." Additionally, the main window is composed of a title (caption) bar, a menu bar, two toolbars (the Main Toolbar and the Setup Toolbar), and a status bar.

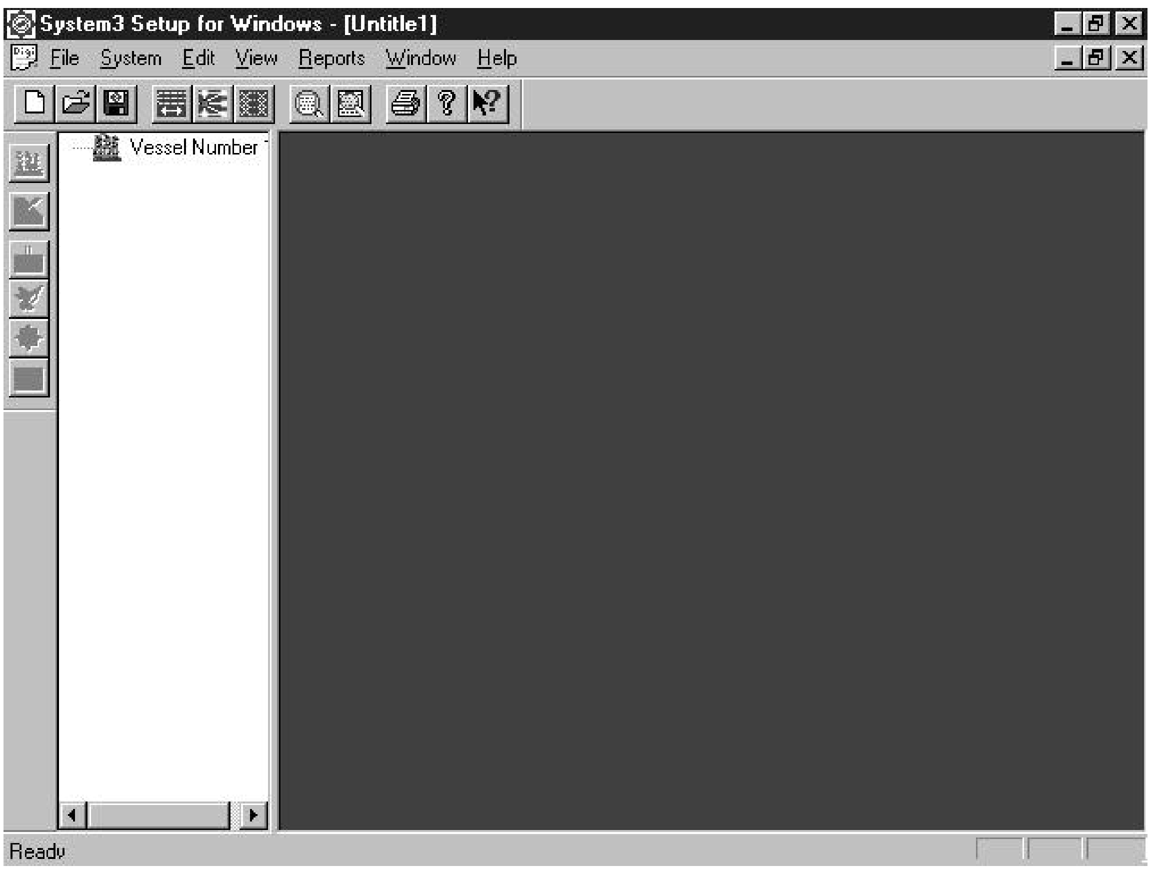


Figure 5.1 Setup Window

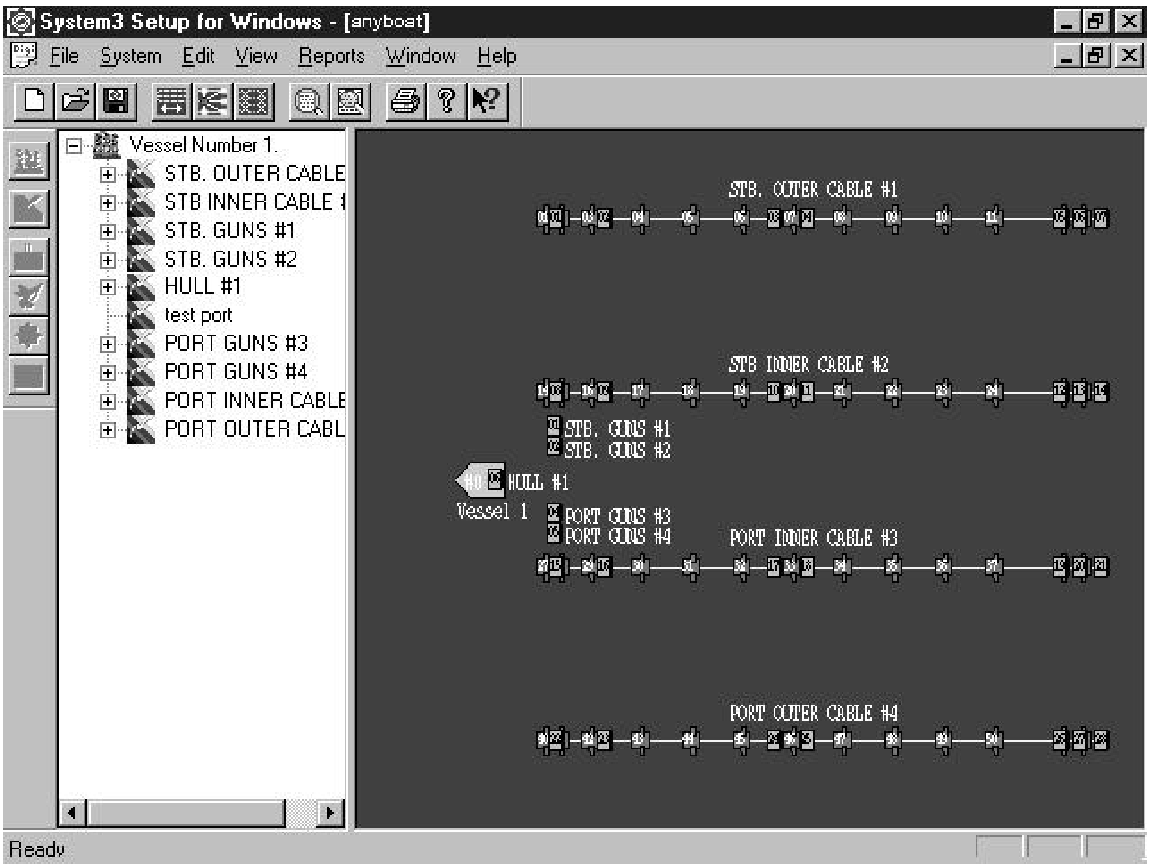
Section V Setup Program

The Text Side

The text side of the System 3 Setup window displays, in a hierarchical format, all vessels, lines, and sensors that have been created for the System 3 file.

When a System 3 file is opened, a Vessel is displayed: Vessel Number 1.

Click on the plus symbol or double-click on the vessel icon (in the Text side; not in the Setup Toolbar) to reveal the lines that have been created for this System 3 file. An example of a typical line tree follows:



To reveal the sensor components that reside on each line, either click on the plus symbol next to the line or double-click on the line icon. All hardware components on the line are displayed. Each component, represented by an icon, is followed by a character string which describes the component type, the unit number, and the offset from the towpoint. Examples of each follow:

BA18 @ 500

BB14 @ 1050

BC30 @ 100

BD22 @ 10

Double-click on a component to open that component's sensor information dialog box. For example, by double-clicking on a bird: BB12 @ 450 , the following dialog box is opened.

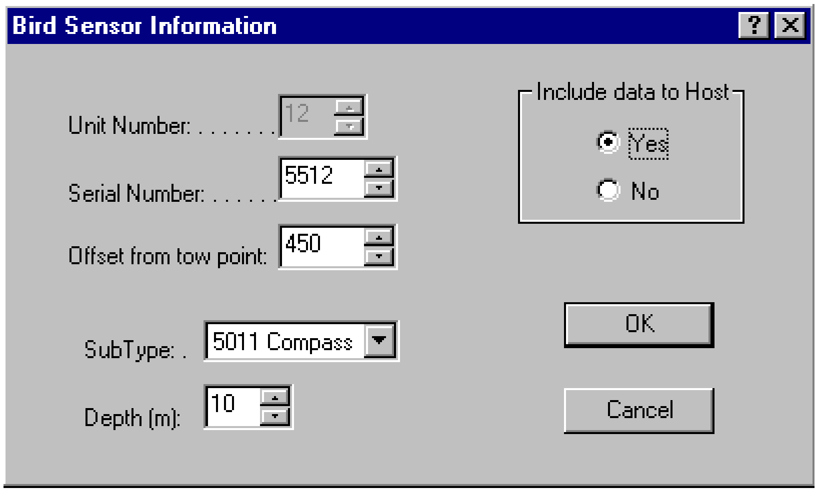


Figure 5.2 Bird Sensor Information Dialog Box

The information fields in the dialog box can be changed as needed.

The Graphic Side

The Graphic side displays all vessels, lines, and sensors that have been created for the System 3 file in an overhead, or "bird's-eye" view.

Double-click on a component to open that component's information dialog box. The information fields in the dialog boxes can be changed as needed.

Position you cursor on a component in the Graphic side (but do not click the mouse button) to view a pop-up summary field, or a "tool tip" for the selected component.

The tool tip for an acoustic unit includes a character string which describes the component type, the unit number, the offset from the towpoint, the number of ranges assigned to that acoustic unit, and the line number. An example follows:

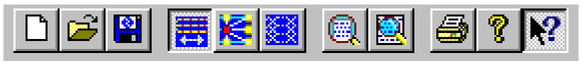
WA01 @ 335, Ranges: 5 on Stbd cable

The tool tip for a birdunit includes a character string which describes the component type, the unit number, the offset from the towpoint, the serial number, and the line number. An example follows:

WB01 @ 258, S.N.: 9694 on Stbd cable

Section V   Setup Program

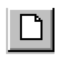
The Main Toolbar



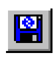
The Main Toolbar, in conjunction with the Setup Toolbar, provides you with shortcut methods to configure, view, and control System 3 Setup operations.

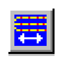
The "New," "Open," "Save," "About," and "Help" buttons are always active. The other buttons on the Main Toolbar are active only when the Equipment Graphic Display is selected.

Use the Main Toolbar buttons as follows:

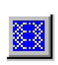
The "New" button  creates a new System 3 file.

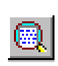
The "Open" button  opens an existing System 3 file.

The "Save" button  saves the open or active System 3 file using the same file name.

Click on the "Move Sensors" button  and, using the cursor, draw a box around (rubberband) the sensors that you want to offset. When the sensors are selected, the Move Sensor(s) Dialog Box is displayed. Enter the offset in meters and click on the "OK" button to move/offset the sensors.

Click on the "Create Ranges" button  to access a list of all defined groups (the Group list), which is used to select the group of sensors whose ranges are to be defined. Then click on an acoustic sensor in the Equipment Graphic Display; all ranges for that acoustic sensor will be displayed. Double-click on a second acoustic sensor (which is ranged to the first sensor) to access the **Edit Ranges Dialog Box**. (You may instead, right click on an acoustic sensor in the Equipment Graphic Display, and select **Summary / Ranges**. Select from Group 1 through 9, and click the "OK" button; the **Ranges Summary Dialog Box** for the selected group will be displayed. Double-click on the sensor line to access the **Edit Ranges Dialog Box**.)

The "Display Ranges" button  shows or hides all system ranges in the Equipment Graphic Display.

The "Display Full Scale" button  shows the entire system network in the Equipment Graphic Display.

The "Zoom Area" button enlarges a specified area in the Equipment Graphic Display.

The "Print Setup" button selects a printer and define printer properties.

The "About" button accesses the **Sys3w Information Box**, which lists software version and copyright information.

The "Help" button accesses a help icon. Move the icon to any item in the Main Window (including all buttons, graphics, and menu items), and click a second time to access the Help topic.

The **View** / **Toolbar** command is an on/off switch for the Main Toolbar. Deselect the item to hide the toolbar.

The Setup Toolbar

The Setup Toolbar, in conjunction with the Main Toolbar, provides you with shortcut methods to configure, view, and control System 3 Setup operations.

The Setup Toolbar is active only when the Text side is selected. Initially, only the Vessel and Platform/Line tools are active. When a line is accessed in the Text side, the Acoustic, Bird, Compass, and Depth tools are then made active.

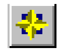
Use the Setup Toolbar buttons as follows:

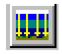
The "Add Vessel" button adds a vessel to the array.

The "Add Platform/Line" button accesses the **Platform/Line Information Dialog Box**. Complete the information in the box to add any type of platform/line to the array of a given vessel. The types are: Streamer Cable, Vessel, Gun Array, Tail Buoy, Paravane, Tow Fish, Nav Sled, and Test Cable.

The "Add Acoustic" button accesses the **Acoustic Sensor Information Dialog Box**. Complete the information in the box to add an acoustic sensor to an existing line (cable, gun line, radio, etc).

The "Add Bird" button accesses the **Bird Sensor Information Dialog Box**. Complete the information in the box to add a bird sensor to a line.

The “Add Compass” button  accesses the **Compass Sensor Information Dialog Box**. Complete the information in the box to add an in-streamer compass sensor to a line.

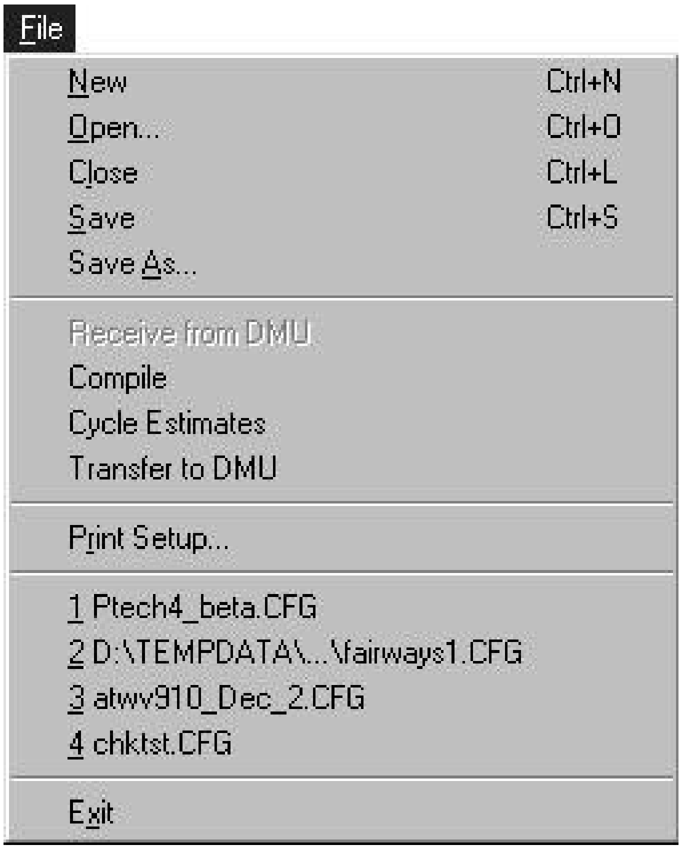
The “Add Depth” button  accesses the **Depth Sensor Information Dialog Box**. Complete the information in the box to add an in-streamer depth sensor to a line.

The “Add Velocimeter” button  accesses the **Velocimeter Sensor Information Dialog Box**. Complete the information in the box to add a velocimeter to a line.

The **View / Sys3 Toolbar** command is an on/off switch for the Setup Toolbar. Deselect the item to hide the toolbar.

SETUP MENUS

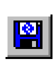
The File Menu



Save As

The **File / Save As** command saves changes made to the open System 3 file. Changes can be saved under a new file name and/or a new folder.

You can also save changes made to a file by any of the following methods:

- Click on the **File** menu, **Save** command.
- Press Ctrl + S.
- Click on 

Section V Setup Program

Receive from DMU

The **File / Receive from DMU** command uploads information from the Data Management Unit to the Operator Interface computer. The active Setup file data is retrieved from the DMU and is loaded into the Operator Interface's Setup program workspace, where it can be edited or saved.

Compile

The **File / Compile** command compiles an acoustic system configuration file. The **Compile** function uses system, line, acoustic sensor (CMX), and range information, combined with rules and algorithms, to calculate and optimize all aspects of the acoustic transmit and receive signals. This acoustic system configuration file must be compiled prior to downloading individual unit configuration information to the CMXs in the Operator Interface (OI) program. Whenever acoustic parameters are changed, a new compilation may be required; the Setup program will indicate when this is necessary.

Cycle Estimate

The **File / Cycle Estimate** command accesses (after the acoustic system configuration file has been compiled) the Cycle Estimates window. The Bird Communications Rate and Acoustic Range Completion Rate can be changed to generate an acquisition cycle time estimate based on current observations.

When using a system with multiple DMU modem processors or in multi-boat acoustic operations, the secondary acoustic sync must be after the primary cycle time. The total cycle time must be less than the fastest switch closure or trigger to the system.

The total cycle time can be used to determine if all data acquisition is complete prior to the next trigger (shot). The primary cycle time can be used to determine the time to set the second acoustic sync time. Calculate the secondary acoustic sync time by using the primary cycle time, adding 750 ms, and rounding the number to the next highest 1/10 second.

Example:

Primary Cycle time = 4495

4495 + 750 = 5245

5245 rounded to next highest 1/10 second = 5300

Set the secondary acoustic sync to 53 and run Cycle Estimate again to check that the total cycle time is less than switch closure or trigger time.

Compile the acoustic system configuration file prior to using the Cycle Estimates function.

Transfer to DMU

The **File / Transfer to DMU** command downloads a System 3 Setup configuration file from the Operator Interface computer and transfers that file to the DMU. Before System 3 can use a Setup file created with the Setup program, the file must be transferred to the DMU. Following the entry of all setup data, an acoustic compile is performed (if required) and the Setup file is stored on disk using one of the Save commands under a file name of your choice. This file can be opened later for updates, and the modified setup can be stored on disk under the same name or under a new name. In any case, the Setup file does not become active until it is transferred to the DMU.

The Operator Interface computer first sends an Initialize Link message to the DMU and waits for an acknowledgment. If no acknowledgment is received, an error is reported. If the DMU is prepared to accept the Setup file, it sends an acknowledgment to the Operator Interface, and the Setup data is transmitted to the DMU.

Following the transfer of the Setup file information to the DMU, the acoustic configuration must still be downloaded to each CMX from the Operator Interface runtime program.

Spectra File Exchange

This feature is available only if it is enabled during installation. If Spectra has not been enabled during installation, you must re-run installation.

Purpose

The purpose of the configuration file exchange is to increase productivity by minimizing the number of times you must input system configuration data. Previously you had to input the system configuration, i.e., vessels, platforms, birds, acoustic nodes, and range observations, once in Spectra and then again in System 3. This new feature of exchanging configuration files requires you to enter the system configuration only once.

In addition, once the exchange cycle is completed, both systems will have the same configuration. Previously, when errors were made the two systems did not have the same configuration.

Initial System Configuration

See Figure 5.3, File Exchange: Initial System Configuration.

1. Completely define the system setup on the Spectra system. Input vessel information, platforms, birds, and acoustic nodes. Ranges can be defined in either system.

The Spectra system platform screen will include a field for the System 3 transmission port number. The Spectra system will accept System 3 unit numbers on the bird and acoustic node screens, and will enforce the System 3 rules that require unique unit numbers for sensor types on any given transmission port. It is suggested that you input the serial numbers for sensors when they are defined in the Spectra system.

2. Once finished entering data on the Spectra system, select the Export selection from the File menu on the Spectra SNN Program. This creates an exchange file based on the current configuration.
3. Go to the System 3 operator interface terminal, and from the Setup program select **File / Spectra Interface (Read)**. If there is no file open in Setup, the file read from Spectra into System 3 will result in a new configuration being created, including all platforms and sensors.

If ranges exist in the exchange file, they will be created with default aperture and threshold settings. If ranges do not exist, then create the range observations for the current system in the System 3 Setup program.

4. Compile the acoustic system, and transfer the configuration to the System 3 DMU. The Setup program will put the configuration on the Spectra system automatically. Then select the Import selection from the File menu on the Spectra SNN Program. This updates the Spectra system based on the current exchange file. The exchange is now complete with both systems having the same configuration.

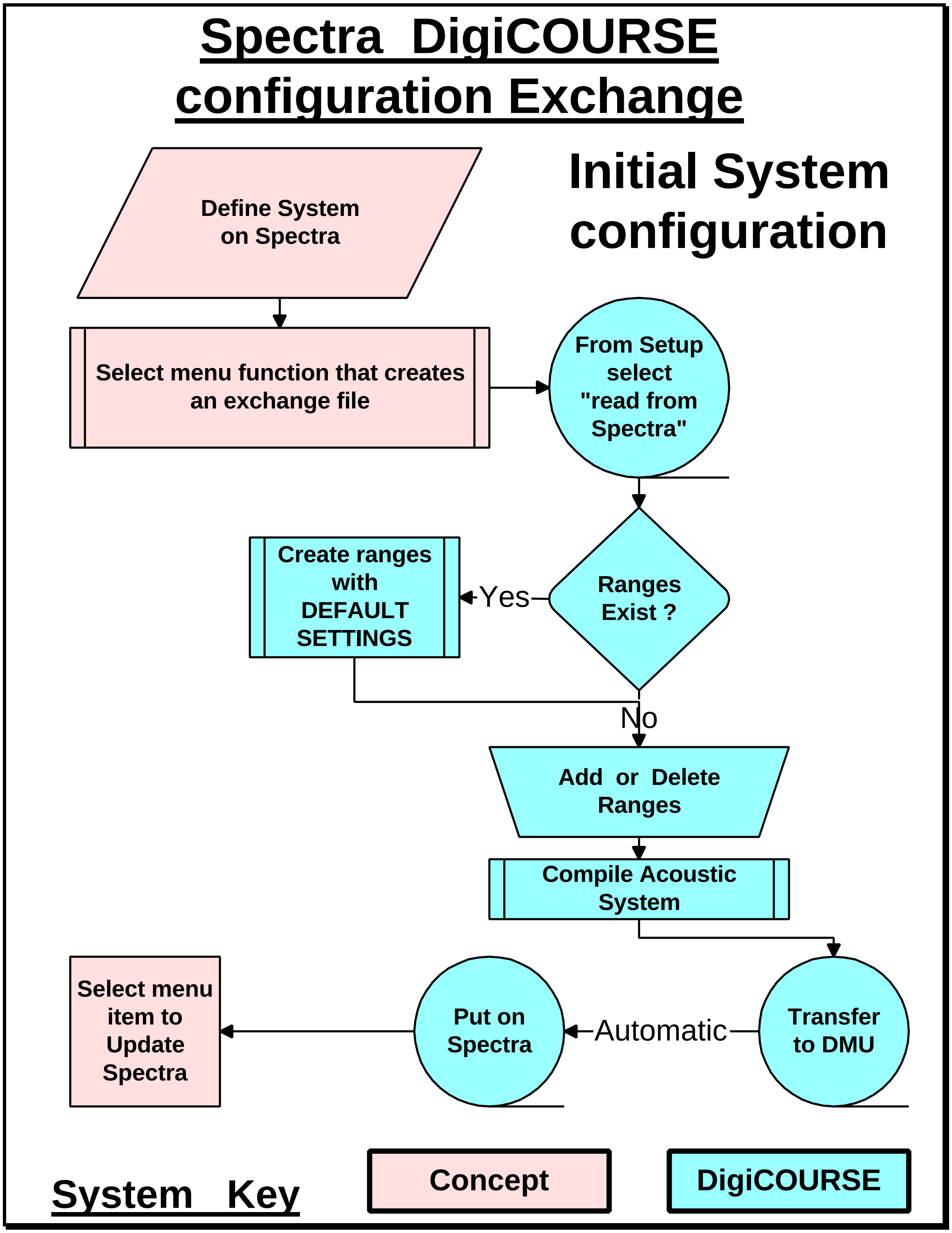


Figure 5.3 File Exchange: Initial System Configuration

Changes After Initial Configuration

See Figure 5.4, File Exchange: Changes to System Configuration.

If changes need to be made in either system the following procedure should be followed.

1. If Spectra system changes are needed, such as, offset changes, adding a node, or deleting a node, do these changes first.
2. Once finished changing data on the Spectra system, select the Export selection from the File menu on the Spectra SNN Program. This creates an exchange file based on the current configuration.
3. From the Setup program, select **File / Receive from DMU**.
4. From the Setup program select **File / Spectra Interface (Sync)**. The Setup program will ask which system's serial numbers to preserve: DigiCOURSE or Spectra. It will then ask if the system should keep the acoustic aperture settings or reset the apertures to the default settings. The Spectra configuration will be merged with the System 3 configuration. This will preserve the System 3 specific parameters.
5. Add or delete ranges if needed.
6. Compile acoustics. This must be done any time a configuration is received from Spectra.
7. Transfer the configuration to the System 3 DMU. The Setup program will put the configuration on the Spectra system automatically. Then select the Import selection from the File menu on the Spectra SNN Program. This updates the Spectra system based on the current exchange file. The exchange is now complete with both systems having the same configuration.

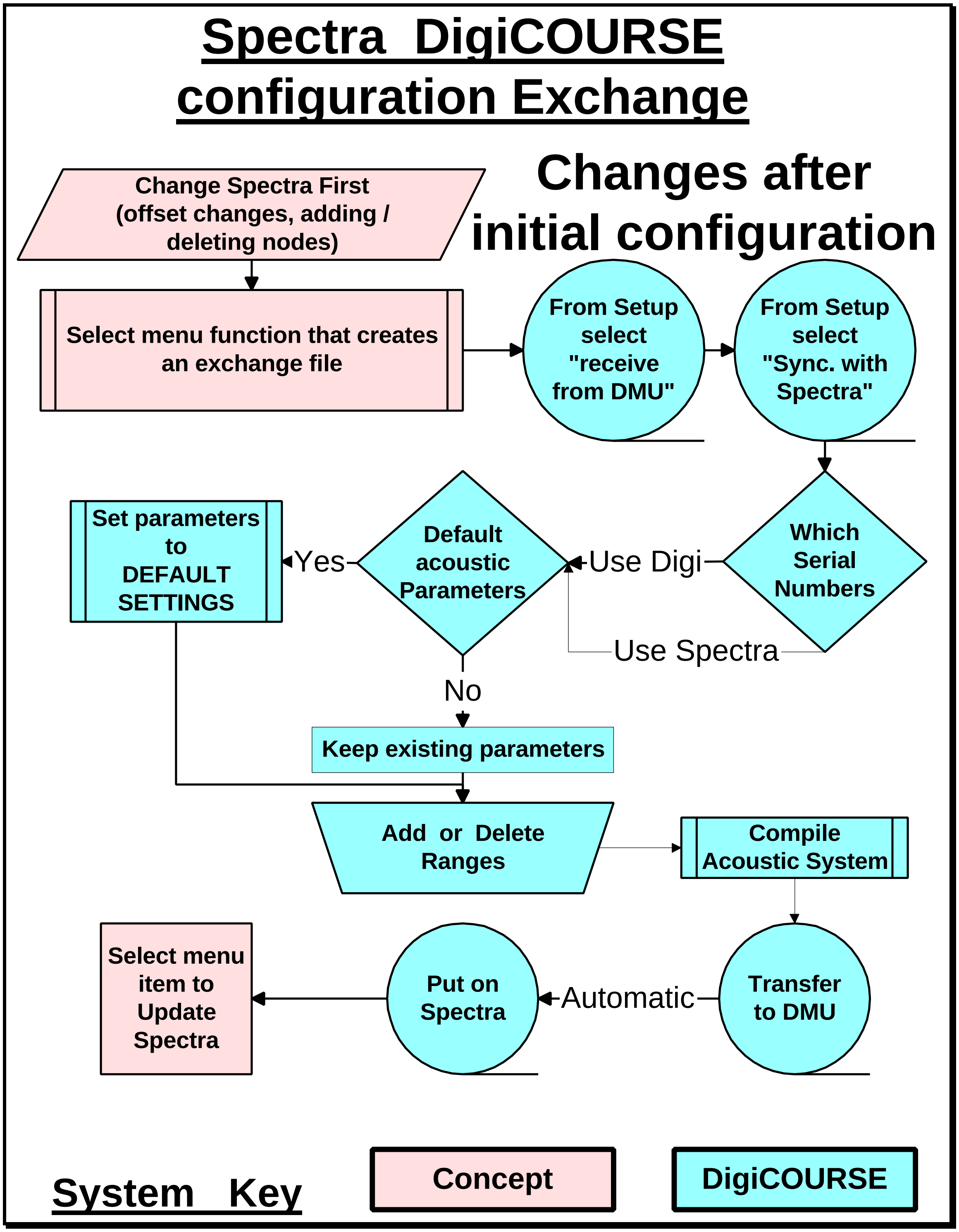


Figure 5.4 File Exchange: Changes to System Configuration

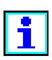
Limits

At this time, no mechanism exists to automatically keep the two systems synchronized. You must follow the above procedures to manually keep the System 3 and Spectra systems in sync.

The System Menu

Global Parameters

The **System / Global** command accesses the **Global Parameters Dialog Box**, which allows you to define system-wide parameters that are not associated with any subsystem. The parameters are Vessel Number, Number of Transmission Ports, Units for Depth Measurement, and Emergency Dive Depth. The Emergency Dive Depth must be set before the creation of a Setup configuration.



Do not click on the "Add Vessel" button  **on the Setup Toolbar; that button will add another vessel to the array; it will not access the**

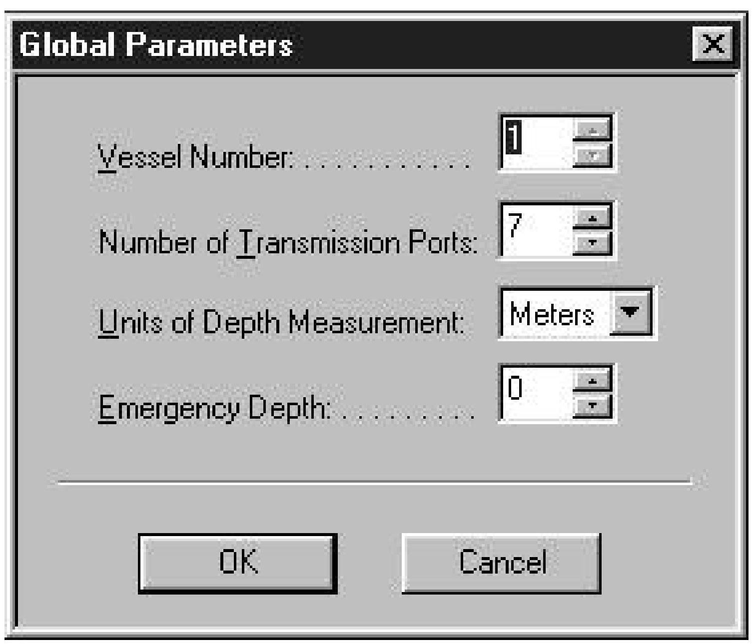


Figure 5.5 Global Parameters Dialog Box

Vessel Number

The range of entries is 1 to 4. The default is 1. This data field is used primarily in multi-boat configurations.

Number of Transmission Ports

This parameter is the number of transmission lines used in a given installation. Each DMU modem supports up to seven transmission lines (including the radio port). The range is 1 to 20.

Ports 7 and 14 are used for radio data telemetry only.

Units of Depth Measurement

The depth can be displayed in either feet or meters. This selection also effects the unit of depth measurement that is sent to the Host computer.

Emergency Depth

The range is between 0 to 125 meters. The default is 0. The emergency dive depth specifies the target depth for all lines when an emergency dive command is executed. The Emergency Dive Depth must be set before the creation of a Setup configuration.

When using Model 5010E or 5011E birds, do not enter depths greater than 31 meters (103 feet).

Host Parameters

The **System / Host** command accesses the **Host Parameters Dialog Box**, which allows you to define the configuration of the communications ports. These ports are used to transfer data to the Host computer and to select the data formats for acoustic and non-acoustic data. The parameters that can be defined (or edited) include the selection of the Logging Mode, Non-acoustic data format, Non-acoustic data sort direction, Acoustic data port, Acoustic data protocol, and Acoustic port characteristics.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array; it will not access the Host Parameters Dialog Box.

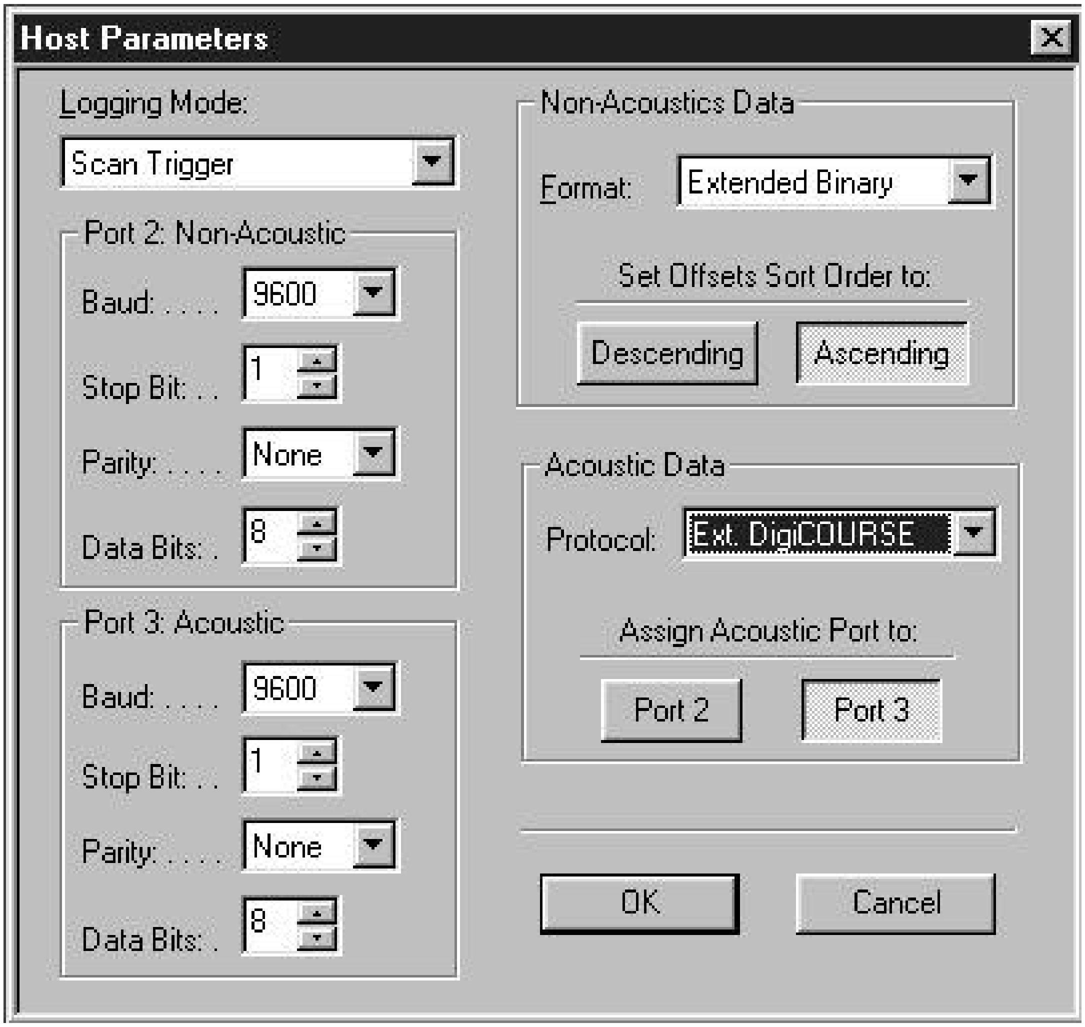


Figure 5.6 Host Parameters Dialog Box

Logging Mode

The Logging Mode determines when sensor data is sent to the Host. Select one of the four modes:

Disable Logging: When Data Logging is turned off; no data is sent to the Host on trigger.

Data Request: Non-acoustic data (depth, heading, fin) is sent to the Host when a specific code (separate from the trigger character) is requested by the Host. Request code 1 is for heading data; request code 2 is for depth data; and request code 3 is for fin angle data. The request codes are binary numbers, and the non-acoustic sensor data is returned in binary format. No request code exists for acoustic data. Acoustic data is logged automatically on receipt of the scan trigger if Port 3 is selected as the acoustic data port. If Port 2 is selected as the acoustic data port (and Data Request is selected as the Logging Mode), acoustic data will not be sent to the Host.

Scan Trigger: Data is sent to the Host on the receipt of every external scan trigger. The external trigger may be a character received from the Host or from an electronic closure supplied to the Contact Closure Unit. The format of the sensor data returned is determined by the selections made for the Non-acoustic Data Format and the Acoustic Data Protocol.

Scan or Internal Timer: Data is sent to the Host on the receipt of every external or internal trigger. Internal triggering occurs in the absence of external triggering. The format of the sensor data returned is determined by the selections made for Non-Acoustic Data Format and the Acoustic Data Protocol.

Port 2 Acoustic/Non-Acoustic

The primary Host port (Port 2) is a bi-directional serial link between your Host computer and the System 3 Data Management Unit. The Data Management Unit responds to commands from the Host computer to perform various functions related to data acquisition and output, including timing control for data acquisition triggering.

If the Port 2 is selected for the output of acoustic range data, an acoustic range message is transmitted every time a Host log event is scheduled. The range message follows the non-acoustic data message. Port 2 shows Acoustic, Port 3 shows Not In Use.

Port 2 Baud

This parameter is determined by your Host computer. The selection options are 1200, 2400, 4800, 9600, and 19200.

Port 2 Stop Bit

This parameter is determined by your Host computer. The selection options are 1 and 2.

Port 2 Parity

This parameter is determined by your Host computer. The selection options are None, Even, and Odd.

Port 2 Data Bits

This parameter is determined by your Host computer. The selection options are 5, 6, 7, and 8.

Port 3 Acoustic/Not In Use

If the acoustic data port (Port 3) is selected, an acoustic data message is output at the beginning of each scan cycle. The type of message to be output is specified as a configuration parameter. Port 3 shows Acoustic, Port 2 shows Non-Acoustic.

Port 3 Baud

This parameter is determined by your Host computer. The selection options are 1200, 2400, 4800, 9600, and 19200.

Port 3 Stop Bit

This parameter is determined by your Host computer. The selection options are 1 and 2.

Port 3 Parity

This parameter is determined by your Host computer. The selection options are None, Even, and Odd.

Port 3 Data Bits

This parameter is determined by your Host computer. The selection options are 5, 6, 7, and 8.

Non-Acoustic Data Format

This parameter is determined by your Host computer. Five types of data formats are supported for the transfer of non-acoustic sensor data via the primary Host data port:

- Binary
- ASCII
- Western
- Extended Binary
- Gbird

Both solicited and unsolicited output of sensor data are supported. For solicited output, a data request must be received from the Host. Unsolicited output occurs automatically once each shot interval, with its timing controlled by the internal scan trigger.

Set Offset Sort Order

This parameter determines whether non-acoustic unit data is output in ascending or descending order by streamer cable offset. The selection options are Descending and Ascending.

Acoustic Data Protocol

This selection defines which data protocol is used to output acoustic range data to the Host. This parameter is determined by your Host computer. The available protocols are:

- DigiCOURSE (P/N 1000-132)
- CLS
- GLS
- HGS (P/N 1000-388)
- Extended DigiCOURSE (P/N 1000-361)
- GECO Binary
- Standard Ethernet
- PGS Ethernet

Assign Acoustic Port

This option determines which serial port (Port 2 or Port 3) is used to send acoustic data to the Host. Port 3 is the default. If Port 2 is selected as the acoustic port, Port 3 is inactive and its parameters cannot be set. Port 2, which is the primary Host port, can be used for either acoustic or non-acoustic data.

Data Acquisition Parameters

The **System / Data Acquisition** command accesses the **Data Acquisition Parameters Dialog Box**, which allows you to define how often data is requested by and from the Data Management Unit. The parameters that can be defined (or edited) are Self Trigger Interval, Number of Poll Retries, and Scan Start Delay.

Do not click on the “Add Vessel” button on the Setup Toolbar; that button will add another vessel to the array; it will not access the Data Acquisition Parameters Dialog Box.

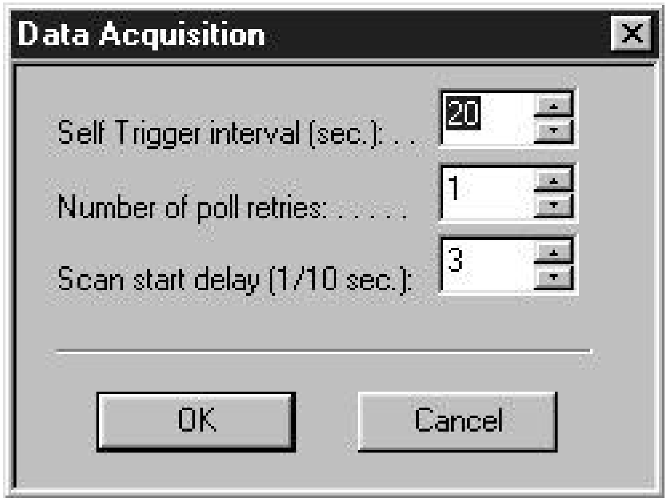


Figure 5.7 Data Acquisition Parameters Dialog Box

Self Trigger Interval

This parameter specifies the interval (from 1 to 255 seconds) between consecutive system-generated internal scan triggers in the absence of an external trigger from the Host. If the Host stops triggering, the system initiates internal triggering after expiration of a two-minute timer unless another external trigger is received. Internal triggering terminates when external triggering resumes.

Number of Poll Retries

This parameter specifies the number of times (from 0 to 3) the modem will issue a communication retry to a sensor failing to respond to the initial data acquisition poll. The default value is 1.

Scan Start Delay

This parameter specifies the length of time (in tenths of seconds, from .3 second to 25.5 seconds) between the external trigger and the primary acoustic sync sent out by the Data Management Unit. This parameter can be used to change the delay time between trigger and primary acoustic ranging to move the acoustic ranging time away from the gun blast.

Increasing the value of the scan start delay extends the acquisition cycle time.

Acoustics Parameters

The **System / Acoustics** command accesses the **Acoustic Parameters Dialog Box**, which allows you to define system level acoustic parameters. The parameters that can be defined (or edited) are Secondary Acoustic Sync, Speed of Sound, Same Channel Aperture Separation, Aperture Size for Same Line, Aperture Size Transmission, Distance to Bottom Minimum/Maximum, Different Line Aperture Sizes, Pulse Size Number, and Default Threshold.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array; it will not access the Acoustic Parameters Dialog Box.

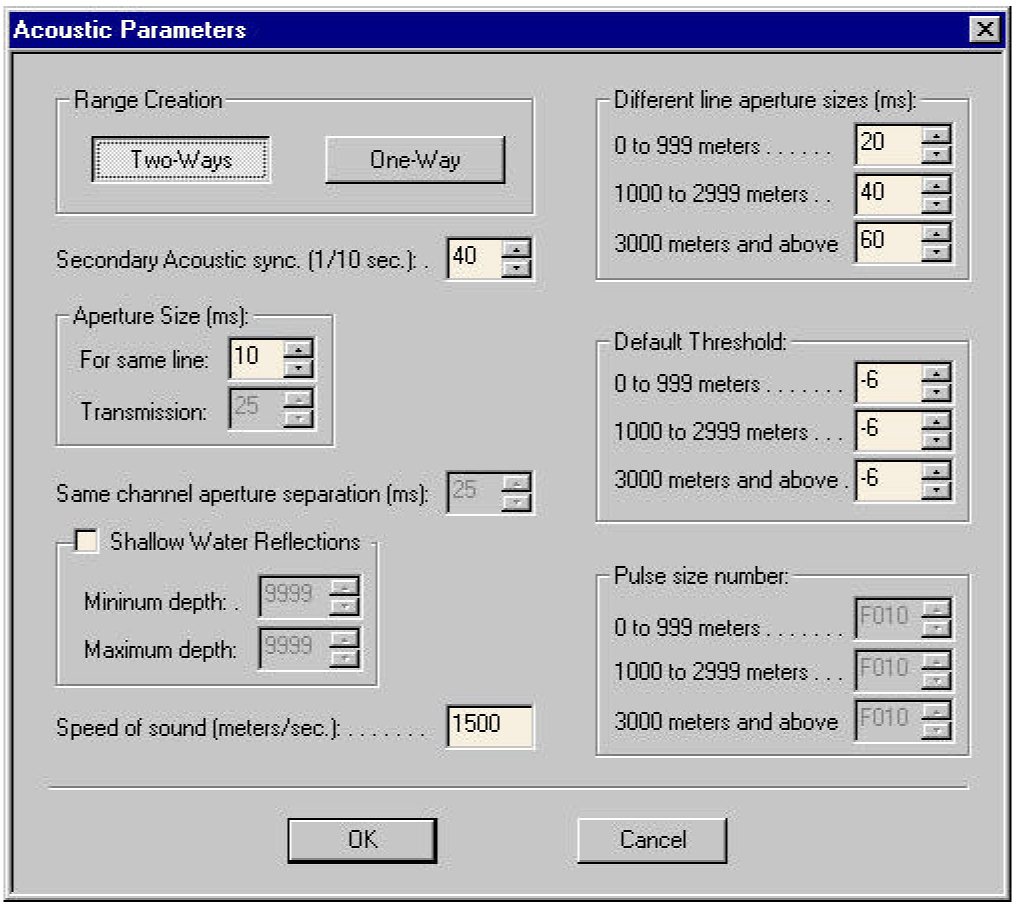


Figure 5.8 Acoustics Parameters Dialog Box

Range Creation

This option specifies the mode of operation for range data acquisition: one-way ranging or two-way ranging (default). When one-way ranging is selected, a range consists of a single path time measurement, with one unit receiving the acoustic signal transmitted by the other unit. Range acquisition time is generally shorter when one-way ranging is in use. When two-way ranging is selected, a range consists of two path time measurements combined to make a range value, with each of the two units both transmitting to and receiving from the other unit.

Secondary Acoustic Sync

This parameter specifies the length of time (in tenths of seconds, from 0 to 10 seconds) desired between the trigger and the secondary sync sent out. The purpose of the secondary sync is to initiate a retry for ranges that failed in the primary acquisition. The value entered must be greater than Primary offset and less than 100 (10 seconds). The default value is 40 (4 seconds). A setting of 0 disables secondary acquisition.

Speed of Sound

This parameter is a fixed nominal sound speed used internally to convert distances to transit times and vice versa. The accuracy of this value determines the accuracy of the ranges displayed during run time. The entered value must be from 1400 to 1600 meters/second. The default is 1500 meters/second. (NOTE: This value does **not** affect the accuracy of range data transferred to the Host computer.)

Same Channel Aperture Separation

This parameter specifies the minimum delay time (in milliseconds) between two receiver apertures on the same channel. The entry must be from 0 to 999 milliseconds. The default value is 25 milliseconds.

Aperture Size for Same Line

This parameter specifies the size of the apertures (in milliseconds) for ranges between two CMXs attached to the same line. The entered value must be from 1 to 999 milliseconds. The default value is 10 milliseconds.

Aperture Size Transmission

This parameter specifies the amount of time (in milliseconds) to be taken for a CMX to transmit an acoustic pulse. The valid value must be from 0 to 10,000 milliseconds. The default value is 25 milliseconds and should not be changed.

Shallow Water Reflections: Minimum/Maximum Depth

These parameters are used by the acoustic compiler to eliminate reflections between different range pairs. An acoustic pod's self generated reflection is also eliminated. Survey water depth minimum and maximum values (in meters) should be entered at the start of the survey. The default values for both parameters is 9999m. Typically, the default values can be used for water depths of greater than 85m.

Different Line Aperture Sizes

These parameters specify the sizes of the apertures (in milliseconds) for ranges between two CMXs attached to different lines.

0 to 999 meters: Enter the different line aperture size for ranges in which the offsets of both CMXs are less than 1000 meters. The default value is 20 milliseconds.

1000 to 2999 meters: Enter the different line aperture size for ranges in which the offsets of one or both CMXs are from 1000 to 2999 meters. The default value is 40 milliseconds.

3000 meters and above: Enter the different line aperture size for ranges in which the offsets of one or both CMXs are from 3000 meters and above. The default value is 60 milliseconds.

Pulse Size Number

This parameter affects the acoustic transmit waveform parameters. The pulse size number is set to its default value of F010 Hex and cannot be changed by you.

Default Threshold

This parameter specifies a threshold value that will be used as the default value when ranges are created. To change the default threshold value for ranges that have already been created, the ranges must be deleted and re-created after the new default threshold value has been entered in the default threshold field.

0 to 999 meters: Enter the default threshold desired for paths in which the offsets of both CMXs in the range are less than 1000 meters. The default is -6.

1000 to 2999 meters: Enter the default threshold desired of both CMXs in the range are from 1000 to 2999 meters. The default is -6.

3000 meters and above: Enter the default threshold desired for paths in which the offsets of both CMXs in the range are above 3000 meters. The default is -6.

Radio Configuration Parameters

The **System / Radio Configuration** command accesses the **Radio Parameters Dialog Box,** which allows you to define radio timing parameters. The parameters that can be defined (or edited) are Baud Rate, Radio Transmission Delay, Response Time-out, RTS to Transmission Delay, and Transmission to Reception Turnaround Delay.

Do not click on the "Add Vessel" button on the Setup Toolbar; that button will add another vessel to the array; it will not access the Radio Configuration Parameters Dialog Box.

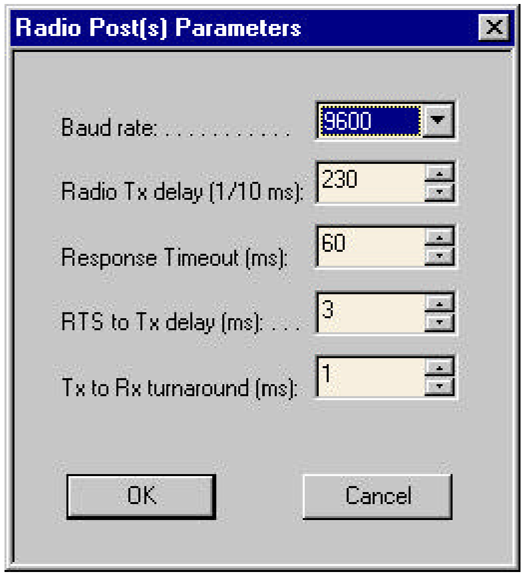


Figure 5.9 Radio Parameters Dialog Box

Baud Rate

This parameter is determined by the radio you are using. Ensure that the baud rate selected matches the baud rate of the radio. The selection options are 1200, 2400, 4800, 9600, and 19200.

The parameters shown in the example are the default values for the TSI 9600 Radio Modem operating at 9600 baud rate. Contact DigiCOURSE before altering the default settings.

Radio TX Delay (tb)

This parameter is determined by the radio you are using, since the delay is introduced by the radio's buffer. The radio transmission delay is the delay from the time that the sending device starts transmitting until data is actually received. The selection options are from 0 to 1000 (in 1/10 ms). For TTI radios, tb = 0 ms; for TSI radios, tb = 23 ms.

To measure tb, first use the radio manual to determine a close estimate, then compare the sync bit from the radio CMX to the FSK CMX to fine tune this number. Attempt to get a zero mean spread on the sync bits deviation. An alternate method of measuring tb is to compare the line 1 start of sync transmit to the radio line 7 (or radio line 14). For a six streamer system, compare (TXD) MP 1, connector 1, pin 5 to (TXD) MP 1, connector 7, pin 5. For a twelve streamer system, compare (TXD) MP 1, connector1, pin 5 to (TXD) MP 2, connector 7, pin 5.

Response Time-out (te)

This parameter specifies the time-out period in the radio multiplex port from the end of the TX to RX Turnaround period to the first bit in the response message. The default is 60 ms. The selection options are from 0 to 255 (in ms); however, never use 0.

RTS to TX Delay (ta)

This parameter specifies the delay required from the activation of RTS to the start of transmission from the sending device to the radio modem. The selection options are from 0 to 255 (in ms); however, never use 0. For TTI radios, ta = 25 ms; for TSI radios, ta = 3 ms.

TX to RX Turnaround (tc)

This parameter specifies the delay required as dead time between the end of transmission and the start of reception. This delay is necessary in some radios due to the transmitter decay time. The selection options are from 0 to 255 (in ms); however, never use 0. For TTI radios, tc = 30 ms; for TSI radios, tc = 1 ms.

Parameters td and tf are embedded in the CTX and, therefore, are not adjustable in the Radio Configuration Parameters Dialog Box.

Baud Rate Compensation Delay in the CTX (td)

This parameter is the delay that is embedded in the CTX to compensate for the differences in baud rates between the radio and FSK ports. This is only relevant when timing accuracy is required. Only the sync message needs this delay. The value embedded in the CTX take into account the actural baud rates of the MP and the CTX units.

Message Time-out in the CTX (tf)

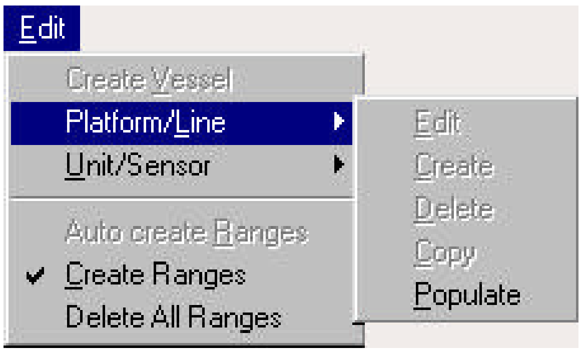
This parameter is the time-out period in the CTX from the start of the Data Carrier Detect to the start of the first bit in the incoming message. The tf = 32 ms.

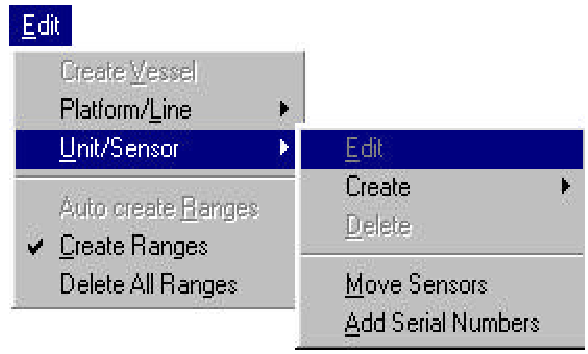
Host Test

The **System / Host Test** command tests the interface between the DMU and the Host computer. When this option is selected, the DMU is taken off-line and a fixed pattern of sensor depth, heading, and range data is generated and output to the Host at each external trigger. The data patterns are generated by starting with an initial value for the first sensor or range defined, and incrementing (or decrementing) the value by one unit for each subsequent sensor or range.

Section V   Setup Program

The Edit Menu





Create Vessel

The **Edit / Create Vessel** command adds a vessel to the array.

Edit Line

The **Edit / Platform Line / Edit** command allows you to edit an existing line. To edit a line, first select (highlight) a line in either the Text side or the Graphic side, then click on the **Edit** command. Change the necessary fields in the **Platform/Line Information Dialog Box**. You may redefine any of the following Platform/Line parameters: Line ID, Vessel, Name, Type, Cable, Port, Line Length, Lateral Offset, Cable Depth and Disable Cable Screen Display.

Line ID

The line identifier is a letter or a digit-letter combination that serves as a reference for a line. The identifiers are A to Z for lines 1-26, 1A to 1Z for lines 27-52, and 2A to 2K for lines 53-63 (63 total lines). No two lines can have the same identifier.

Vessel

The vessel number allows System 3 to associate a line to a vessel. This feature also allows a multi-vessel system to be treated as a single system. The limits for vessel number are 1 to 4, and the default is 1.

Name

The line name is used only for display purposes. The name can be any character string up to 20 characters long, and can include blanks. There is no default for line name.

Type

The type identifies the type of platform line, and is used both for display purposes and for identification of streamer cables in the bird data sent to the Host. The selections available are Streamer Cable, Vessel, Gun Array, Tail Buoy, Paravane, Tow Fish, Nav Sled, and Test Cable.

Cable

The cable number is used for identification of streamer cables in the bird data sent to the Host. This field is locked out unless the “Line Type” is “Streamer”. Cable numbers must be sequential with no numbers skipped.

Port

The port corresponds to the line number on the Line Interface Unit to which the communications link for the defined line is connected. Line Interface Unit numbers are 1 to 6, 8 to 13, and 15 to 20. Port numbers 7 and 14 are for radio telemetry only and are not to be used as streamer cables.

Line Length (m)

The line length is the total length of the platform line (in meters), and is used for display purposes. The line length must be greater than the largest unit offset.

Lateral Offset (m)

The lateral offset is the lateral offset distance (in meters) from a system-wide reference line to the line being entered. Normally, all lines are referenced from the vessel center line. Lines to port of the reference have a negative lateral offset and lines to starboard have a positive offset. The limits are -9999 to +9999; and the default is 0. For multi-vessel systems, all lines must be referenced from the same reference line (which is normally the centerline of Vessel 1).

Cable Depth (m)

The depth is the desired target depth for the line. The limits for depth are from 0 to 115 meters (0 to 378 feet), and the default is 0.

An emergency dive depth, which specifies the target depth for all cables when an emergency dive command is executed, is input during the Setup program by selecting System menu, Global submenu, Emergency Depth command.

When using Model 5010E or 5011E birds, DO NOT ENTER VALUES GREATER THAN 31 METERS (103 feet).

Create Line

The **Edit / Platform Line / Create** command allows you to add a new line to the array of a vessel (that is, to create or define a new line to which sensors can be attached, such as streamer cables, gun arrays, tail buoys, etc.) by accessing a new **Platform/Line Information Dialog Box** and completing the information fields in the box. Platform/Line parameters that can be defined are Line ID, Vessel, Name, Type, Cable, Port, Line Length, Lateral Offset, Cable Depth and Disable Cable Screen Display.

Delete Line

The **Edit / Platform Line / Delete** command deletes the selected line (and associated sensors).

Copy Line

The **Edit / Platform Line / Copy** command allows you to copy a selected line that has previously been defined. If the line sensors have been defined, this command will also copy all sensor information (except the serial numbers) to the new line. To copy a line, first select an existing line from the Graphic side, then click on the **Copy** command**.** Once the line has been copied it is necessary to set the line parameters for the new line and enter the sensor serial numbers.

Populate Line

The **Edit / Platform Line / Populate** command accesses the **Populate Line Dialog Box**, which allows you to add Model 5011 birds (or acoustic units) to a selected streamer at regularly-spaced offsets.

The Populate command is more useful for adding birds than for adding acoustic units because birds are normally spaced at regular intervals along the entire length of a streamer cable.

For a shortcut to the Populate command, right mouse click on the desired Line on the Text side, which will display the following submenu:

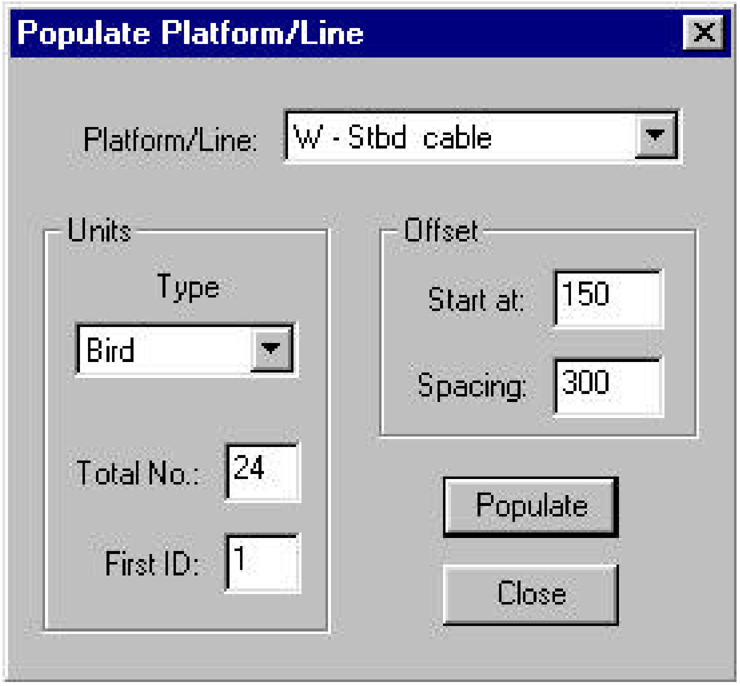


Figure 5.10 Populate Dialog Box

Total Number of Units

Enter the number of units (from 1 to 63) that you desire to add to the line.

The populate action terminates when the offset of the next unit to be added exceeds the platform line length.

First ID

Enter the unit number (from 1 to 63) for the first unit you are adding to the line.

Starting Offset

The offset from tow-point is the linear offset distance (in meters) from a system-wide reference point to the bird. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). Units in front of this point have a negative offset and birds behind this point have a positive offset. The limits are -600 to +10000 meters.

Spacing

Enter the spacing (in meters) between the birds. The spacing must be from 10 to 1000 meters.

Section V Setup Program

After populating a line with birds (or acoustic units), you must enter the serial numbers for each unit. Use the **Edit / Unit Sensor / Add Serial Numbers** command to open the **Set Sensor Serial Number Dialog Box** (which lists only the sensor that do not already have serial numbers) and assign serial numbers to each unit on the list.

Edit Unit/Sensor

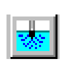
The **Edit / Unit Sensor / Edit** command accesses a **Sensor Information Dialog Box**. To edit an existing sensor, select (highlight) a sensor in either the Text side or the Graphic side, then click on the **Edit** menu, **Unit/Sensor** submenu, (**Bird, Acoustic, Compass, Depth, or Velocimeter)** command. Change the necessary fields in the **Sensor Information Dialog Box**.

When using free-form unit names, the Dialog Box contains a field for the entry of Unit Name. Enter any alphanumeric character string up to six characters long.

Create Acoustic Unit

The **Edit / Unit Sensor / Create / Acoustic** command accesses the **Acoustic Sensor Information Dialog Box**. You can add an acoustic sensor to a line by completing the information fields in the box.

Access a new **Acoustic Sensor Information Dialog Box** by any of the following methods:

- Click on the **Edit** menu, **Unit/Sensor** submenu, **Create** submenu, **Acoustic** command.
- Click on 
- Click the right mouse button on the platform/line icon 

in the Text side to reveal a submenu, then click on the **Create** submenu, **Acoustic** command.
- Click the right mouse button on any sensor icon in the Text side to reveal a submenu, then click on the **Create** submenu, **Acoustic** command.

To edit an existing acoustic sensor, select (highlight) an acoustic sensor, then click on **Edit** menu, **Unit/Sensor** submenu, **Edit** command. Alternatively, you can double-click on the sensor in the Graphic side.

Acoustic Sensor Information Dialog Box

Acoustic sensors must be uniquely identified to all system components For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Output names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character (or two characters for lines 27-63) of the identifier is a letter or digit-letter pair designating the line (platform) to which the sensor is attached. The next character is the letter A (designating an acoustic sensor), and the last two characters are digits designating the unit number.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (BA01, 1CA03), and is used to construct a unique address for communications with the sensor. The limits for CMX unit number are 1 to 31. The CMXs are stored in alphanumeric order, and, for existing setup files, the first CMX initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label of each CMX, and must be entered here. Duplication of serial numbers is not allowed.

Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the CMX. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). CMXs in front of this point have a negative offset and CMXs behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

Group Number

The group number associates the CMX with an acoustic group, such as front, middle or tail. It is used primarily for display purposes. The limits for group number are 1 to 9.

If the TAGS protocol is in use, this field is locked out. The TAGS ID determines the group number (F=1, T=2, M=3, N=4, O=5, P=6, Q=7, R=8, S=9).

Geco/CLS/GLS ID

The protocol identifier selects the Host protocol in use. If the CLS or GLS Host protocol is in use, this entry identifies the CMX unit in the nomenclature defined in that protocol. If the HGS (TAGS) Host protocol is in use, this entry identifies the CMX unit in the nomenclature defined in that protocol.

Transmit Channels 1, 2, 3, 4, and 5

These entries allow you to limit the freedom of the compiler by disallowing certain transmit channels. This causes the transmit channel of the CMX to be limited to the allowed channels. If a particular channel is causing interference to another system, that channel can be disallowed here. Check (or un-check) the appropriate check box to allow (or disallow) the use of a channel. There must be at least one transmit channel allowed. The default is all channels allowed. If any of these entries are changed, the acoustic data must be compiled.

Receive Channels 1, 2, 3, 4, and 5

These entries allow you to limit the freedom of the compiler by disallowing certain receive channels. This causes all ranges associated with the CMX to be limited to the allowed channels. If background noise levels are too high for a particular channel, that channel can be disallowed here. Check (or un-check) the appropriate check box to allow (or disallow) the use of a channel. There must be at least one receive channel allowed. The default is all channels allowed. If any of these entries are changed, the acoustic data must be compiled.

Create Bird Unit

The **Edit / Unit Sensor / Create / Bird** command accesses a new **Bird Sensor Information Dialog Box.** You can add a new bird sensor to a line by completing the information fields in the box.

Access a new **Bird Sensor Information Dialog Box** by any of the following methods:

- Click on the **Edit** menu, **Unit/Sensor** submenu, **Create** submenu, **Bird** command.
- Click on 
- Click the right mouse button on the line icon  in the Text side to reveal a submenu, then click on the **Create** submenu, **Bird** command.
- Click the right mouse button on any sensor icon in the Text side to reveal a submenu, then click on the **Create** submenu, **Bird** command.

To edit an existing bird sensor, select (highlight) a bird in either the Text side or the Graphic side, then click on the **Edit** menu, **Unit/Sensor** submenu, **Edit** command. Alternatively, you can double-click on the sensor in the Graphic side.

Bird Sensor Information Dialog Box

Bird sensors must be uniquely identified to all system components. For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Output names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character (or two characters for lines 27-63) of the identifier is a letter or digit-letter pair designating the line (platform) to which the sensor is attached. The next character is the letter B (designating a bird), and the last two characters are digits designating the unit number.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (AB01), and is used to construct a unique address for communications with the sensor. The limits for bird unit number are 1 to 63. The birds are stored in alphanumeric order, and, for existing setup files, the first bird initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label of each DigiBIRD, and must be entered here. Duplication of serial numbers is not allowed.

Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the bird. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). Birds in front of this point have a negative offset and birds behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

Subtype

It is vital to streamer depth control that the model defined by the subtype entry agrees with the type of bird installed on the streamer. Model types may be mixed on the streamer providing they are correctly identified.

Depth

The depth defines the assigned target depth (in meters) of the bird. The default value is the depth of the line to which the bird is attached. The limits are 0 to 115 meters (0 to 378 feet).

When using Model 5010E or 5011E birds, DO NOT ENTER VALUES GREATER THAN 31 METERS (103 feet).

Include data to Host Yes/No

If the Host protocol you are using limits the number of sensors that can send data to the Host, you may select which sensors are allowed to send data.

Create Velocimeter Unit

The **Edit / Unit Sensor / Create / Velocimeter** command accesses a new **Velocimeter Sensor Information Dialog Box.** You can add a new velocimeter sensor to a line by completing the information fields in the box.

Access a new **Velocimeter Sensor Information Dialog Box** by any of the following methods:

- Click on the **Edit** menu, **Unit/Sensor** submenu, **Create** submenu, **Velocimeter** command.
- Click on 
- Click the right mouse button on the line icon  in the Text side to reveal a submenu, then click on the **Create** submenu, **Velocimeter** command.
- Click the right mouse button on any sensor icon in the Text side to reveal a submenu, then click on the **Create** submenu, **Velocimeter** command.

To edit an existing sensor, select (highlight) a velocimeter in either the Text side or the Graphic side, then click on the **Edit** menu, **Unit/Sensor** submenu, **Edit** command. Alternatively, you can double-click on the sensor in the Graphic side.

Velocimeter Sensor Information Dialog Box

Velocimeter sensors must be uniquely identified to all system components. For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Output names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character (or two) of the identifier designates the line (platform) to which the sensor is attached. The next character is the letter V (designating a velocimeter sensor), and the last two characters are digits designating the unit number.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (BV01), and is used to construct a unique address for communications with the sensor. The limits for velocimeter unit number are 1 to 10. The units are stored in alphanumeric order, and, for existing setup files, the first unit initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label of each velocimeter, and must be entered here. Duplication of serial numbers is not allowed.

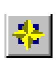
Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the velocimeter. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). Units in front of this point have a negative offset and units behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

Create In-Streamer Compass Sensor

The **Edit / Unit Sensor Create / Compass** command accesses a **Compass Sensor Information Dialog Box**. You can add an in-streamer compass to a line by completing the information fields in the box.

Access a new **Compass Sensor Information Dialog Box** by any of the following methods:

- Click on the **Edit** menu, **Unit/Sensor** submenu, **Create** submenu, **Compass** command.
- Click on 
- Click the right mouse button on the line icon 

 in the Text side to reveal a submenu, then click on the **Create** submenu, **Compass** command.
- Click the right mouse button on any sensor icon in the Text side to reveal a submenu, then click on the **Create** submenu, **Compass** command.

To edit an existing in-streamer compass sensor, select (highlight) in either the Text side or the Graphic side, then click on the **Edit** menu, **Unit/Sensor** submenu,

Compass command. Change the necessary fields in the **Compass Sensor Information Dialog Box**.

Compass Sensor Information Dialog Box

Compass sensors must be uniquely identified to all system components For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Output names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character of the identifier is a letter designating the line (platform) to which the sensor is attached. The next character is the letter C (designating compass), and the last two characters are digits designating the unit number.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (BC01), and is used to construct a unique address for communications with the sensor. The limits for unit number are 1 to 63. The compass sensors are stored in alphanumeric order, and, for existing setup files, the first unit initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label and must be entered here. Duplication of serial numbers is not allowed.

Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the compass sensor. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). Compass sensors in front of this point have a negative offset and compass sensors behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

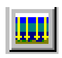
Include data to Host Yes/No

If the Host protocol you are using limits the number of sensors that can send data to the Host, you may select which sensors are allowed to send data.

Create In-Streamer Depth Sensor

The **Edit / Unit Sensor Create / Depth** command a new **Depth Sensor Information Dialog Box**. You can add an in-streamer depth sensor to a line by completing the information fields in the box.

Access a new **Depth Sensor Information Dialog Box** by any of the following methods:

- Click on the **Edit** menu, **Unit/Sensor** submenu, **Create** submenu, **Depth** command.
- Click on 
- Click the right mouse button on the line icon 

 in the Text side to reveal a submenu, then click on the **Create** submenu, **Depth** command.
- Click the right mouse button on any sensor icon in the Text side to reveal a submenu, then click on the **Create** submenu, **Depth** command.

To edit an existing in-streamer depth sensor, select (highlight) a depth sensor in either the Text side or the Graphic side, then click on the **Edit** menu, **Unit/Sensor** submenu, **Depth** command. Change the necessary fields in the **Depth Sensor Information Dialog Box**.

Depth Sensor Information Dialog Box

In-streamer depth sensors must be uniquely identified to all system components For system-wide identification, a unique global identifier is assigned to each sensor by using the Setup program.

When standard Input/Output names are in use, a 4- or 5-character alphanumeric identifier is assigned to each sensor during Setup. This identifier is guaranteed to be unique by the Setup program, and is stored in the sensor equipment table of the configuration file. The first character (or two) of the identifier designates the line (platform) to which the sensor is attached. The next character is the letter D (designating an in-streamer depth sensor), and the last two characters are digits designating the unit number.

Unit Number

The unit number determines the last two characters of the unique sensor identifier (BD01), and is used to construct a unique address for communications with the sensor. The limits for unit number are 1 to 63. The in-streamer depth sensors are stored in alphanumeric order, and, for existing setup files, the first unit initially displayed is the one with the lowest unit number on the first line.

Serial Number

The serial number is the unique number assigned to each DigiCOURSE product when it is manufactured. The serial number is printed on the label and must be entered here. Duplication of serial numbers is not allowed.

Offset from Towpoint

The offset from towpoint is the linear offset distance (in meters) from a system-wide reference point to the in-streamer depth sensor. Normally, all units are referenced from the center stern of the vessel (or navigation reference point). In-streamer depth sensors in front of this point have a negative offset and depth sensors behind this point have a positive offset. The limits are -9999 to the defined line length, and the default is 0.

Include data to Host Yes/No

If the Host protocol you are using limits the number of sensors that can send data to the Host, you may select which sensors are allowed to send data.

Delete Unit/Sensor

The **Edit / Unit Sensor / Delete** command deletes the selected sensor from the array.

Move Sensors

The **Edit / Unit Sensor / Move Sensors** command allows you to move or offset a sensor or group of sensors.

You can move any sensor by either of the following methods:

- Click on the **Edi**t menu, **Unit/Sensor** submenu, **Move Sensor** command, and, using the cursor, draw a box around (rubberband) the sensors that you want to offset. When the sensors are selected, the **Move Sensor(s) Dialog Box** is displayed. Enter the offset in meters and click on the "OK" button to move/offset the sensors.
- Click on  , and, using the cursor, draw a box around (rubberband) the sensors that you want to offset. When the sensors are selected, the **Move Sensor(s) Dialog Box** is displayed. Enter the offset in meters and click on the "OK" button to move/offset the sensors.

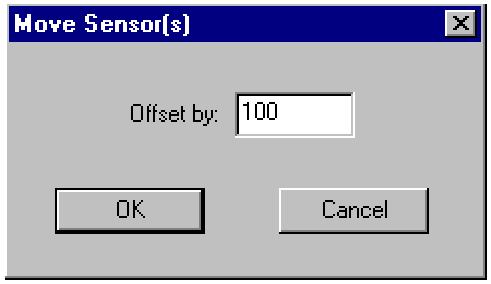


Figure 5.11 Move Sensor Dialog Box

Add Serial Numbers

The **Edit / Unit Sensor / Add Serial Number** command accesses the **Set Sensor Serial No. Dialog Box**. This dialog box shows the list of units that have no serial numbers. Enter the serial numbers for these units.

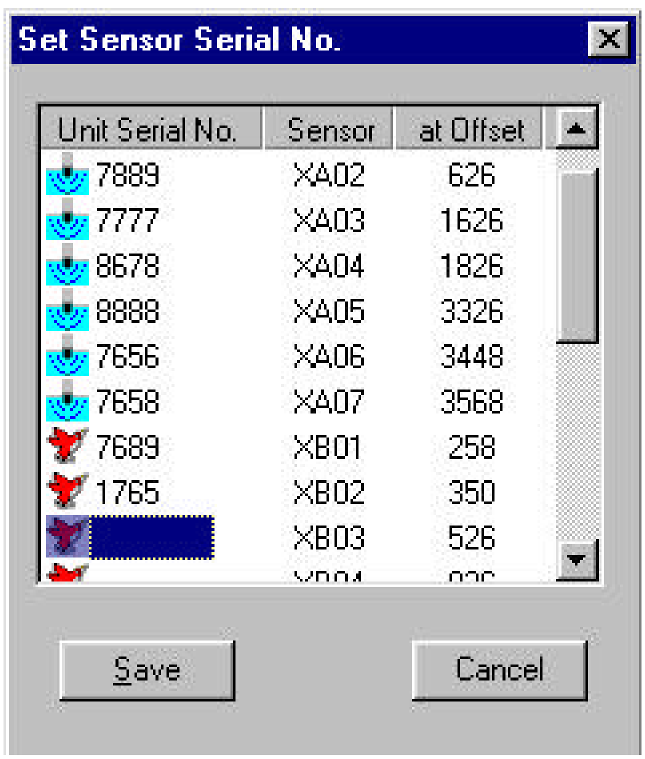


Figure 5.12 Set Sensor Serial Number Dialog Box

The **Set Sensor Serial No. Dialog Box** shows the list of units that have no serial numbers. Enter the serial numbers for these units.

This dialog box is accessed by clicking on **Edit / Unit/Sensor / Add Serial Number**.

You must press the Save button; otherwise, nothing is stored.

Auto Create Ranges

The **Edit / Auto Create Ranges** command creates a set of ranges automatically. Acoustic ranges can be manually created one at a time by following the standard range creation procedure, or a set of ranges meeting user-defined criteria can be created automatically by using the Auto Create Ranges option. Significant time can be saved for large networks by using this option. First let the program automatically generate the most commonly configured ranges, then use the manual range creation and deletion procedures to remove unwanted ranges and add other desirable ranges.

You can create all ranges that meet specified criteria by following these steps.

1. Select the **Display All Ranges** option from the main toolbar. This will permit you to view the results immediately.
2. Select **Auto Create Ranges** from the **Edit** menu.
3. The Auto Create Ranges dialog box will appear. Enter the desired maximum range distance, the maximum number of ranges per acoustic node, and use the "create intergroup ranges" checkbox to indicate whether ranges are to be created between groups.
4. Click OK to automatically create ranges meeting the defined criteria.
5. If the ranges created are not satisfactory, use the **Delete All Ranges** option under the **Edit** menu to delete these ranges, then repeat the steps.
6. Use the standard manual range creation and deletion procedures to refine the network.

Maximum Ranges per Node

This entry limits the number of ranges that can be connected to any CMX node during the automatic range creation procedure. Enter a number from 1 to 8.

Maximum Range Distances

The three entries for maximum distance define the longest ranges that are to be automatically created for each category. Distance is entered in meters. The three categories are:

In-line ranges between nodes on the same streamer

Adjacent ranges between nodes on different streamers but at the same streamer offset

Cross-line ranges between nodes on different streamers with different offsets

Create Intergroup Ranges

This checkbox indicates whether intergroup ranges (ranges between nodes in different groups) are to be created. They will not be created by default.

Create Intervessel Ranges

This checkbox indicates whether intervessel ranges (ranges between nodes on different vessels) are to be created. They will not be created by default.

Create Ranges

The **Edit / Create Ranges** command accesses the **Edit Ranges** view, which is the first step in creating new ranges or editing existing ranges.

You can access the **Edit Ranges** view in either of two ways:

- Click on the **Edit** menu, **Create Ranges** command OR
- Click on 

Click on an acoustic unit in the Graphic side to display all existing ranges for that unit; the icon for the selected unit will turn white. To define a new range for that sensor, hold the Control key (Ctrl) down and right-click (right mouse button) on the second acoustic unit of the range pair. A green (two-way mode) or yellow (one-way mode) line connecting the two units representing the range will appear, and the icon for the second unit will turn green (or yellow). Use this method to create up to eight ranges for the selected unit. When all ranges are defined for the current unit, left-click on that unit to de-select it, then right-click on the next unit whose ranges you wish to define or edit.

When in one-way ranging mode, the first unit selected is the transmitter and the second unit selected is the receiver. A unit can be on the receiving end of no more than eight ranges; however, a transmitting unit can transmit to an unlimited number of receiving units. So when connecting to secondary units in one-way mode, you may select more than eight secondary units. When creating ranges in one-way mode, the secondary unit is displayed in yellow if it is receiving from the selected unit, in gray if it is transmitting to the selected unit, and in green if it is both transmitting to and receiving from the selected unit.

To delete an existing range, left-click to select the first unit of the range pair, then hold the Control (Ctrl) key down and right-click on the second acoustic unit. The second unit's icon will turn gray, and the line connecting the two units will disappear.

Edit Range Dialog Box

The **Edit Range** dialog box is used to modify parameters that affect the way the acoustic signal for the selected range is acquired and processed in the CMX. To edit an existing range, left-click on one unit of the range pair, then double-click on the second acoustic unit (which is ranged to the first unit) to access the **Edit Range Dialog Box**. (You may instead, right click on an acoustic sensor in the tree view on the Text side, and select **Ranges**; the **Ranges Summary Dialog Box** listing all ranges for that unit will be displayed. Double-click on the desired range to access the **Edit Range Dialog Box**.)

Range Name is used to identify a range in the Operator Interface program when viewing Signal Strength and Path Time displays. The range name can be any character string up to 20 characters long and can include blank spaces and upper or lower case letters.

Path thresholds are entered as a scale factor index. Path 1 is the signal received by the first CMX in the CMX pair, and Path 2 is the signal received by the second CMX. The value entered is an index that corresponds to the threshold setting in dB above RMS noise level. The DigiRANGE index also determines CMX operational mode: reflection or normal. The following table shows the valid indexes and their corresponding dB levels for DigiRANGE systems without enhanced CFAR.

Normal Mode	Reflection Mode	dB Above Noise
-1.00	-11.00	21.5
-2.00	-12.00	19.0
-3.00	-13.00	17.5
-4.00	-14 **	15.5
-5.00	-15.00	13.0
-6 **	-16.00	9.5
-7.00	-17.00	5.5
-8.00	-18.00	3.5
-9.00	-19.00	1.0
-10.00	-20.00	-2.5

All DigiCOURSE acoustic units with serial number 7000 and higher have new firmware with Enhanced CFARs. This feature is an improvement over the previous CFAR settings in that it is self-adjusting to changing noise conditions. Also the system is more immune to false noise trips. The new default setting for deep water mode is -3, and for dual tracking mode -14. The default value of -3 should be used for units 1000 meters or more behind the vessel. For units less than 1000 meters, the default value of -5 seems to work best.

Adjustments should only be needed in the case of weak signals or interference from adjacent acoustic devices. If a signal is weak then try lowering the CFAR setting one CFAR index at a time and observe the range for some time before using a lower CFAR setting.

If you are receiving interference from an adjacent acoustic device try changing the setting to -1, and then adjusting down if needed.

The following table gives the expected threshold settings for minimum and maximum noise for a given CFAR index setting.

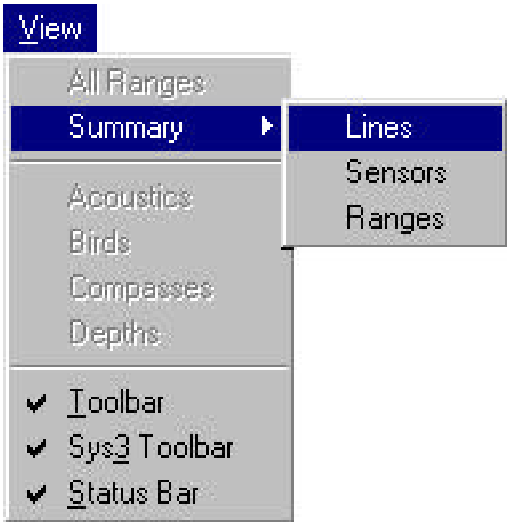
	Normal	Dual Tracking	dB Above Noise
	-1	-11	34.5 - 16
	-2	-12	31 - 14
Default for offsets >1000m	-3	-13	28 - 13
	-4	-14	24 - 12
Default for offsets <1000m	-5	-15	22 - 11
	-6	-16	19 - 9
	-7	-17	16 - 7.5
	-8	-18	12 - 6
	-9	-19	8 - 4.5
	-10	-20	6 - 2.5

The minimum and maximum range distances are entered in meters. The “Retry” option (Yes/No) determines whether this range should be retried if secondary acquisition is enabled and the primary range data was absent or unqualified. The “Range Data Mode” field selects the type of range data qualification: two-way, one-way (Unit 1 receive), or one-way (Unit 2 receive). Two-way range qualification generally results in a more accurate measurement, but one-way qualification may be appropriate if one CMX of the pair is in a high noise environment. This selection is applicable only when the system is operating in two-way ranging mode, and is not to be confused with the two operational modes.

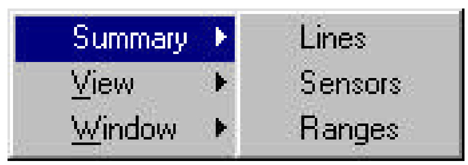
Delete All Ranges

The **Edit / Delete All Ranges** command deletes or clears all ranges.

The View Menu



A shortcut to the Summary Information boxes can be accessed by a right mouse click on the Graphic side. The following set of submenus will be displayed.



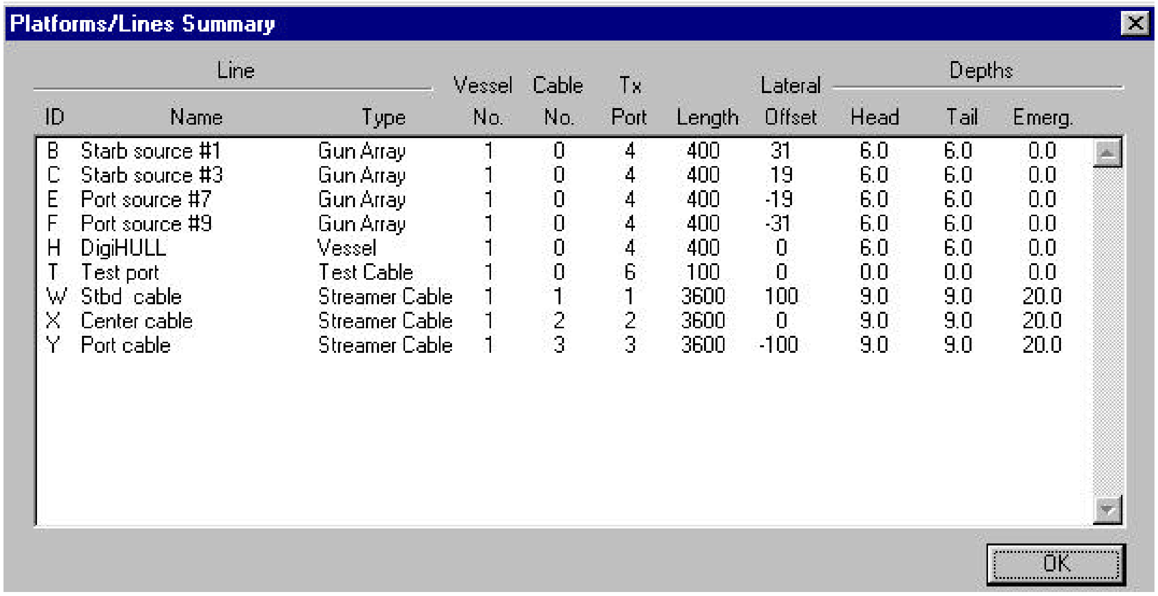
View All Ranges

The **View / All Ranges** command is an on/off switch to display the ranges in the Graphic side. The "Display All Ranges" button duplicates the command.

Selecting All Ranges will deselect Acoustics.

View Lines Summary

The **View / Summary / Lines** command accesses the **Platforms/Lines Summary Information Box**. This summary box lists all available information on every line in the system.



Line ID	Line Name	Line Type	Vessel No.	Cable No.	Tx Port	Length	Lateral Offset	Depths Head	Depths Tail	Depths Emerg.
B	Starb source #1	Gun Array	1	0	4	400	31	6.0	6.0	0.0
C	Starb source #3	Gun Array	1	0	4	400	19	6.0	6.0	0.0
E	Port source #7	Gun Array	1	0	4	400	-19	6.0	6.0	0.0
F	Port source #9	Gun Array	1	0	4	400	-31	6.0	6.0	0.0
H	DigiHULL	Vessel	1	0	4	400	0	6.0	6.0	0.0
T	Test port	Test Cable	1	0	6	100	0	0.0	0.0	0.0
W	Stbd cable	Streamer Cable	1	1	1	3600	100	9.0	9.0	20.0
X	Center cable	Streamer Cable	1	2	2	3600	0	9.0	9.0	20.0
Y	Port cable	Streamer Cable	1	3	3	3600	-100	9.0	9.0	20.0

Figure 5.13 Lines Summary

View Sensors Summary

The **View / Summary / Sensors** command opens the **Sensor Type Selection** window. Select the type of sensor summary information that you want to view, and press the OK button.

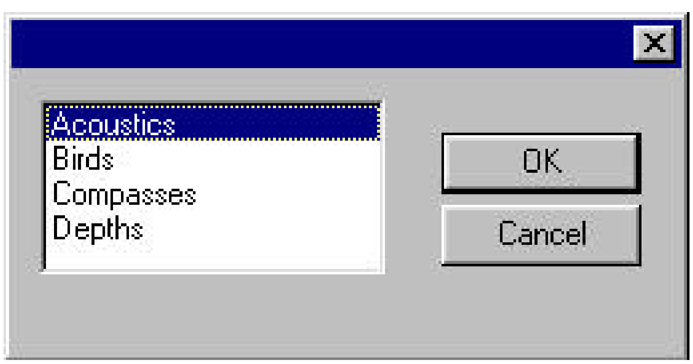


Figure 5.14 Sensor Type Selection

If you select **Acoustics**, the **Acoustic Sensor Summary Information Box** will appear. This summary box lists all available information on every acoustic unit in the system.

Acoustic Sensors Summary

Unit ID	Serial No.	Offset	Group	Host ID	Allowable Receive	Allowable Transmit	Tx Ch	Tx Offset	Ranges
BA01	3900	200	1	BA01	12345	12345	4	172	7
CA02	3901	200	1	CA02	12345	12345	1	60	7
EA04	3920	200	1	EA04	12345	12345	1	418	7
FA05	3925	200	1	FA05	12345	12345	2	354	7
HA06	3919	-28	1	HA06	12345	12345	1	60	6
WA01	6210	335	1	WA01	12345	12345	2	60	5
WA02	6207	626	1	WA02	12345	12345	5	60	5
WA03	6230	1626	2	WA03	12345	12345	2	60	1
WA04	6203	1826	2	WA04	12345	12345	1	60	0
WA05	6204	3326	3	WA05	12345	12345	1	60	4
WA06	6222	3448	3	WA06	12345	12345	5	60	4
WA07	6220	3568	3	WA07	12345	12345	2	60	0
XA01	6201	335	1	XA01	12345	12345	4	330	6
XA02	6300	626	1	XA02	12345	12345	3	442	9
XA03	6078	1626	2	XA03	12345	12345	2	314	1
XA04	6777	1826	2	XA04	12345	12345	1	314	2
XA05	6555	3326	3	XA05	12345	12345	1	379	3
XA06	6646	3448	3	XA06	12345	12345	5	369	3
XA07	6895	3568	3	XA07	12345	12345	2	379	3
YA01	6687	335	1	YA01	12345	12345	3	60	5
YA02	6087	626	1	YA02	12345	12345	3	60	5

OK

Figure 5.15 Acoustic Sensor Summary Information Box

If you select **Bird**, the **Bird Sensor Summary Information Box** will appear. This summary box lists all available information on every bird unit in the system.

Birds Sensors Summary

Unit ID	Serial No.	Offset	SubType	Depth	Inlude to Host
WB01	9694	258	5011 Compass	9.0	Yes
WB02	9507	350	5011 Compass	9.0	Yes
WB03	8607	526	5011 Compass	9.0	Yes
WB04	9595	826	5011 Compass	9.0	Yes
WB05	9514	1126	5011 Compass	9.0	Yes
WB06	8871	1426	5011 Compass	9.0	Yes
WB07	9626	1726	5011 Compass	9.0	Yes
WB08	8753	2026	5011 Compass	9.0	Yes
WB09	9618	2326	5011 Compass	9.0	Yes
WB10	8940	2626	5011 Compass	9.0	Yes
WB11	9539	2926	5011 Compass	9.0	Yes
WB12	9671	3376	5011 Compass	9.0	Yes
WB13	9644	3498	5011 Compass	9.0	Yes
XB01	6001	258	5011 Compass	9.0	Yes
XB02	6202	350	5011 Compass	9.0	Yes
XB03	6600	526	5011 Compass	9.0	Yes
XB04	6400	826	5011 Compass	9.0	Yes
XB05	6005	1126	5011 Compass	9.0	Yes
XB06	6066	1426	5011 Compass	9.0	Yes
XB07	6789	1726	5011 Compass	9.0	Yes
XB08	10790	2026	5011 Compass	9.0	Yes

OK

Figure 5.16 Bird Sensors Summary Information Box

View Ranges Summary

The **View / Summary / Ranges** command opens the **Acoustic Sensor Group Option** window. Select the group of acoustic sensors whose summary information you want to view, and press the OK button.

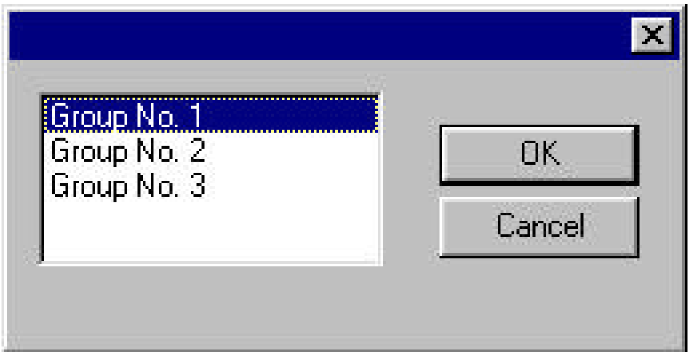
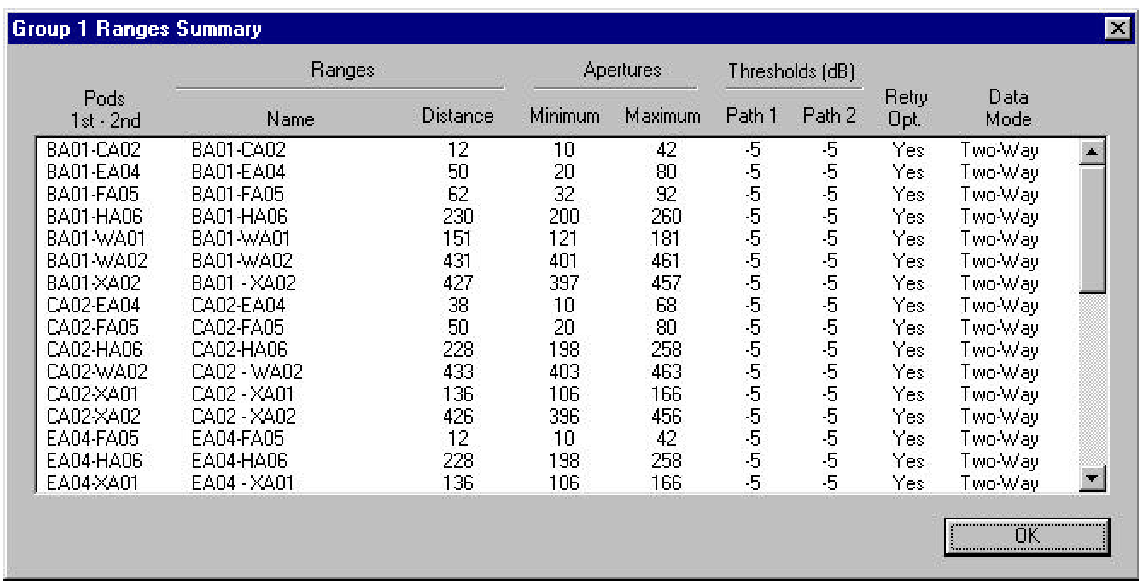


Figure 5.17 Acoustic Sensor Group Option

When you select a group and press the OK button, the Ranges Summary Information Box will appear. This summary box lists all available information on every acoustic unit in that group.



Pods 1st - 2nd	Ranges Name	Ranges Distance	Apertures Minimum	Apertures Maximum	Thresholds (dB) Path 1	Thresholds (dB) Path 2	Retry Opt.	Data Mode
BA01-CA02	BA01-CA02	12	10	42	-5	-5	Yes	Two-Way
BA01-EA04	BA01-EA04	50	20	80	-5	-5	Yes	Two-Way
BA01-FA05	BA01-FA05	62	32	92	-5	-5	Yes	Two-Way
BA01-HA06	BA01-HA06	230	200	260	-5	-5	Yes	Two-Way
BA01-WA01	BA01-WA01	151	121	181	-5	-5	Yes	Two-Way
BA01-WA02	BA01-WA02	431	401	461	-5	-5	Yes	Two-Way
BA01-XA02	BA01 - XA02	427	397	457	-5	-5	Yes	Two-Way
CA02-EA04	CA02-EA04	38	10	68	-5	-5	Yes	Two-Way
CA02-FA05	CA02-FA05	50	20	80	-5	-5	Yes	Two-Way
CA02-HA06	CA02-HA06	228	198	258	-5	-5	Yes	Two-Way
CA02-WA02	CA02 - WA02	433	403	463	-5	-5	Yes	Two-Way
CA02-XA01	CA02 - XA01	136	106	166	-5	-5	Yes	Two-Way
CA02-XA02	CA02 - XA02	426	396	456	-5	-5	Yes	Two-Way
EA04-FA05	EA04-FA05	12	10	42	-5	-5	Yes	Two-Way
EA04-HA06	EA04-HA06	228	198	258	-5	-5	Yes	Two-Way
EA04-XA01	EA04 - XA01	136	106	166	-5	-5	Yes	Two-Way

Figure 5.18 Acoustic Ranges Summary Information Box

You can make changes to any of the ranges by double-clicking on the range to access the **Range Adjustment Dialog Box**.

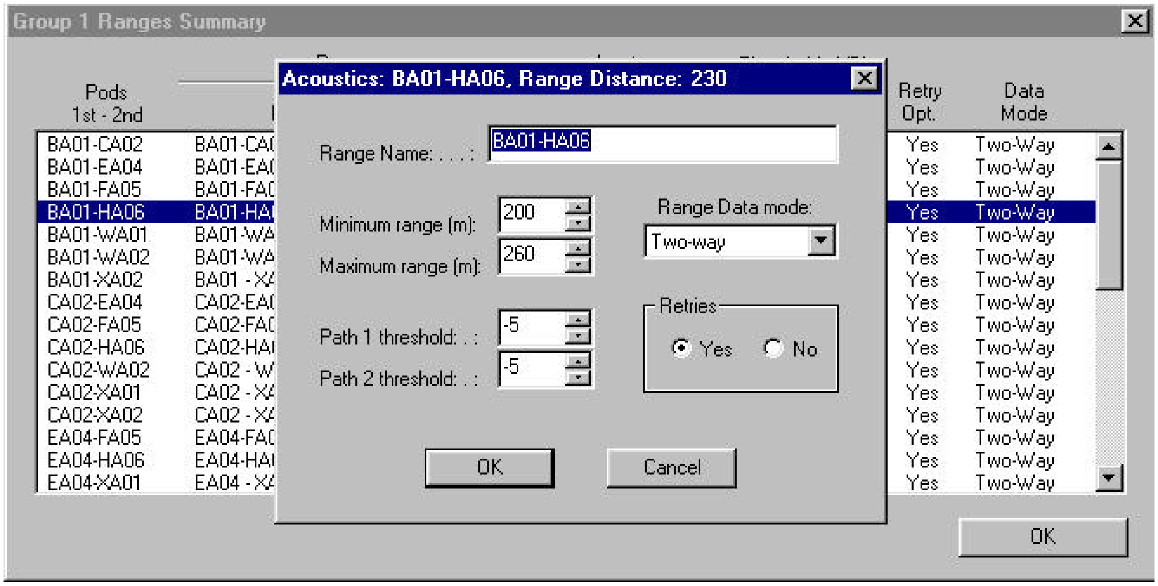


Figure 5.19 Range Adjustment Dialog Box

View Acoustics

The **View / Acoustics** command is an on/off switch to display the Acoustic sensors in the Graphic side. Deselect the item to hide the acoustic sensors.

Selecting Acoustics will deselect All Ranges.

View Birds

The **View / Birds** command is an on/off switch to display the Bird sensors in the Graphic side. Deselect the item to hide the birds.

View In-Streamer Compasses

The **View / Compasses** command is an on/off switch to display the Compass sensors in the Graphic side. Deselect the item to hide the in-streamer compasses.

View In-Streamer Depth Sensors

The **View / Depths** command is an on/off switch to display the Depth sensors in the Graphic side. Deselect the item to hide the in-streamer depth sensors.

View Main Toolbar

The **View / Toolbar** command is an on/off switch to display the Main Toolbar. Deselect the item to hide the toolbar.

View Setup Toolbar

The **View / Sys3 Toolbar** command is an on/off switch to display the Setup Toolbar. Deselect the item to hide the toolbar.

View Status Bar

The **View / Status Bar** command is an on/off switch to display the Status Bar. Deselect the item to hide the bar.

Section V   Setup Program

The Reports Menu

Print All Data

The **All Data Report** contains all data of the system being configured, including the information in the System Setup, Line Data, Unit Data, and Range Data Reports. The **Reports / All Data** command accesses a print dialog box, which will allow you to select the printer, print range, and number of copies when printing this report.

Print System Setup

The **Reports / System Setup** command accesses a print dialog box, which will allow you to select the printer, print range, and number of copies when printing this report.

Print Line Data

The **Reports / Line Data** command accesses a print dialog box, which will allow you to select the printer, print range, and number of copies when printing this report.

Print Unit Data

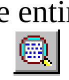
The **Reports / Unit Data** command accesses a print dialog box, which will allow you to select the printer, print range, and number of copies when printing this report.

Print Range Data

The **Reports / Range Data** command accesses a print dialog box, which will allow you to select the printer, print range, and number of copies when printing this report.

The Window Menu

Full Scale

The **Window / Full Scale** command shows the entire system network in the Graphic side. The “Display Full Scale” button  duplicates the command.

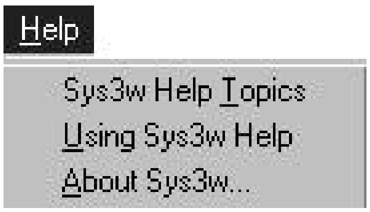
Redraw

The **Window / Redraw** command redraws or refreshes the screen.

Zoom Area

The **Window / Zoom Area** command enlarges a selected area in the Graphic side. Following the initial command, use the cursor to draw a box around the area you want to enlarge. The “Zoom Area” button  duplicates the command.

The Help Menu



System 3 Help Topics

The **Help / Sys3w Help Topics** command accesses the Help file.

Using System 3 Help

The **Help / Using Sys3w Help** command accesses a section that explains how to use the help file. The main Help window contains Contents and Index tabs. From the Contents window, double-click on a book to open it and display a list of topics, then double-click on the desired topic. From the Index window, either double-click on the desired topic, or type the first few letters of the topic in the window under the Index tab to find the topic, then click the Display button (or press Enter).

About Box

The **Help / About Sys3w** command opens a box that displays the software program version number and copyright information.

Section VI Operator Interface Program

This section describes in detail each function of the Operator Interface Program. If you want to operate System 3, see Section II, Setup and Operation, which describes the functions in a step-by-step sequence.

SYSTEM 3 OPERATOR INTERFACE WINDOW

When a Setup file is opened in the System 3 Operator Interface Program, the main window is automatically displayed. The main System 3 Operator Interface window is composed of a title (caption) bar, a color bar, a menu bar, a toolbar, a graphic display window, and a status bar.

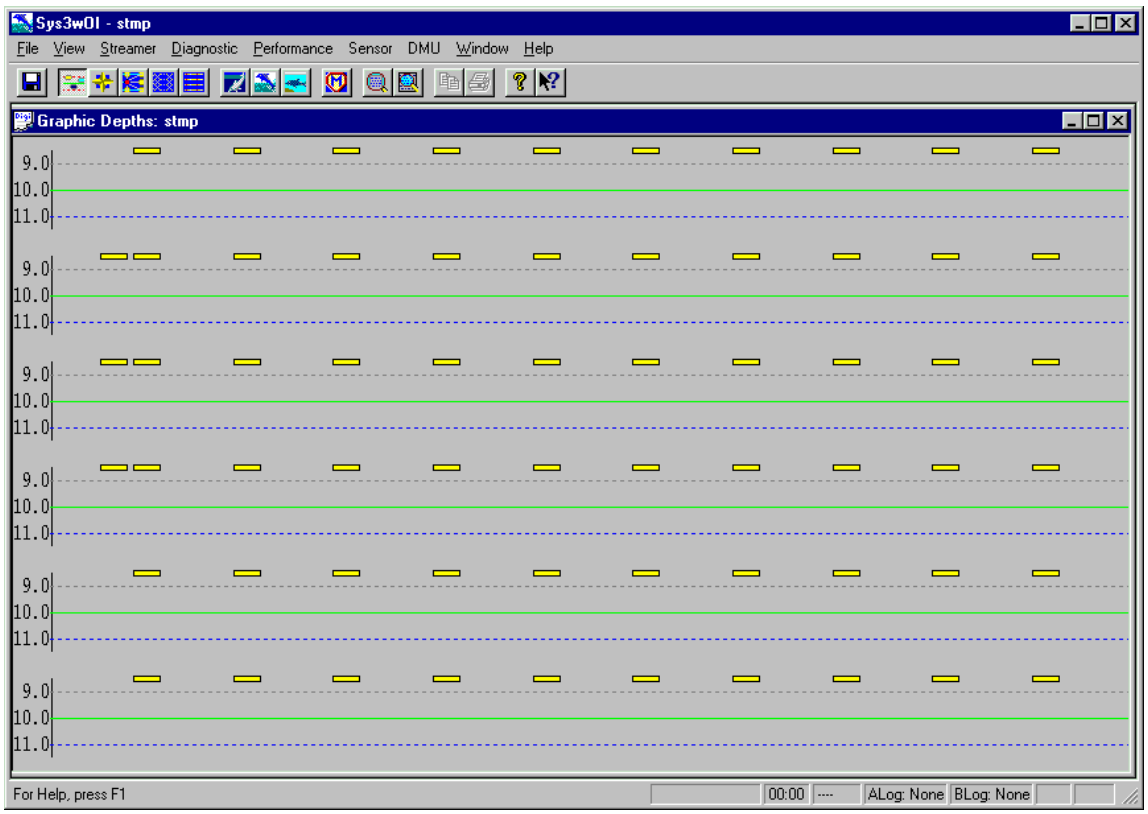


Figure 6.1 Operator Interface Window

Title Bar

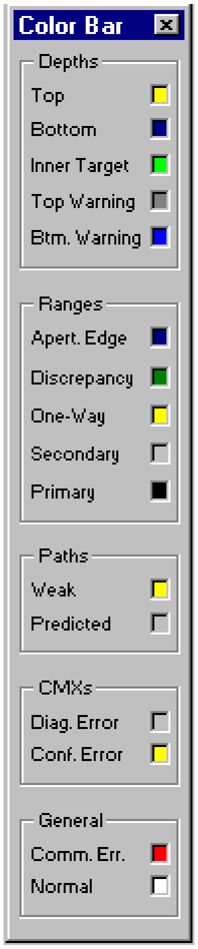
The Title Bar is displayed at the top of the main window. In addition to the name and view of the open file (when accessed) and a pull-down menu, the title bar contains the following three buttons:

Click on the "Minimize" button: to reduce the System 3 graphic display window to an icon, without closing the file.

Click on the "Maximize" button: to enlarge the System 3 graphic display window to full screen.

Click on the "Close" button: to close the active or open System 3 file.

Color Bar



The Color Bar is a color legend for all pre-set display parameters. The Color Bar can be activated by selecting the **View / Color Bar** command, or by right-clicking on the graphic display and selecting the Color Bar option.

The colors are defined in the **System Preferences Dialog Box**. (Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.). To access the **System Preferences Dialog Box**, click on the **File / Preferences** command. The **System Preferences Dialog Box** is tabbed into two sections: the **System Preferences for Depth Displays Dialog Box** and the **System Preferences for Ranges/Paths/Acoustics Dialog Box**.

Note that on the Color Bar, the Primary Range color is black, the Comm. Error is red, and the Normal condition is white. These three colors cannot be altered.

The Color Bar can be repositioned anywhere on the screen by clicking and dragging it to the desired location.

Status Bar

Title Status

Title Status: 

The Title status is activated when you click on a menu item or press a toolbar button. A description of the action that is about to be executed appears. If you do not wish to execute the command displayed on the status bar, abort the operation.

The above example: “For Help, press F1” is the default message.

Shot Status

Shot Status: 

The Shot status codes are as follows:

I = Internal Trigger

E = External Trigger

* = Waiting for Trigger

The number following the Trigger code (which in this example is 31) is the configuration sequence number. This number changes automatically each time there is a change to the system configuration (for example, changes to serial numbers, depths, and ranges).

The number following the configuration sequence number is the time of the last shot. The time is in hours, minutes, and seconds: 14:50:59.

Shot Clock

Shot Clock: 

The shot clock is the approximate time (in seconds) until the next shot. The shot interval can be set or changed by clicking on **DMU / Change Scan Interval** (which accesses the **Internal Scan Interval Dialog Box**) and assigning a number (between 0 and 255) in the Trigger field.

DMU Status

DMU Status: 

The DMU status codes are as follows:

R = Run Mode (R alone is for bird data, but no acoustic scan. A and R together are needed for acoustic data)

B = Background Noise Mode

P = Path Prediction On

Q = Path Reflection QC On

A = Acoustics On

- = Position of option turned off

ALog Status

Acoustic Logging Counter: 

The acoustic logging counter counts the number of shots logged and is used for acquiring acoustic analysis data. The total number of shots to be logged can be set by clicking on **Performance / Acoustic Disk Logging** (which accesses the **Disk Logging: Acoustics Dialog Box**) and assigning a number (between 1 and 2000) in the Total No. of Shots field.

BLog Status

Bird Logging Counter: 

The bird logging counter counts the number of shots logged and is used for bird ballast data. The total number of shots to be logged can be set by clicking on **Performance / Bird Disk Logging** (which accesses the **Disk Logging: Depth & Fin Dialog Box**) and assigning a number (between 1 and 250) in the Total No. of Shots field.

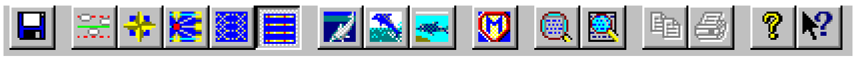
Keyboard Latch State

Keyboard Latch State: 

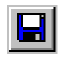
On the right side of the status bar, the keyboard latch state is displayed for the CAP (all capital letters) lock key and the NUM (numbers) lock key.

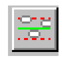
Section VI Operator Interface Program

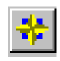
Toolbar



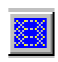
The Toolbar provides you with shortcut methods to configure, view, and control System 3 operations. Use the Toolbar buttons as follows:

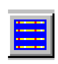
Click on the “Save As” button  to save the changes to either the same file or to a new file and/or folder.

Click on the “Display Depths” button  to view all sensors with depth information on selected cables in the O Graphic Display.

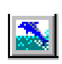
Click on the “Display Headings” button  to view all sensors with heading information on selected cables in the Graphic Display.

Click on the “Sensor Ranges” button  to view the ranges for a single sensor in the Graphic Display. Click on any acoustic to display all ranges for that sensor. Click on the selected sensor a second time to turn off the range display for that sensor. Sensor ranges can be viewed one at a time. Double-clicking on an acoustic sensor will access that sensor’s dialog box.

Click on the “Show All Ranges” button  to view all range information in the Graphic Display. Press **F5** to toggle to exceptions only.

Click on the “Show All Sensors” button  to view a static display of all sensors in the Graphic Display.

Click on the “Dive Cables” button  to initiate the three-step command process required to dive all streamer cables to an emergency depth. After you issue the **Emergency Dive** command, a question box appears asking whether or not you wish to proceed. A “Yes” response causes the **Streamer Depth: Dive Dialog Box** to be displayed, which allows you to select the depth (if desired). Press the “Assign” button to complete the process. Immediately following the assigning of an emergency depth, a **Multi Sensor Command: Dive the Cables Dialog Box** appears with a list of all birds affected by the command. The word “PASS” or “FAIL” is displayed next to each bird ID as the individual bird commands are issued. If any birds indicated “FAIL”, the streamer command can be repeated.

Click on the “Surface Cables” button  to initiate the surfacing of all streamer cables. After you issue the **Surface Cables** command, a question box appears asking whether or not you wish to proceed. A "Yes" response completes the command and causes a **Multi Sensor Command: Surface the Cables Dialog Box** to appear with a list of all birds affected by the command. The word "PASS" or "FAIL" is displayed next to each bird ID as the individual bird commands are issued. If any birds indicated "FAIL", the streamer command can be repeated.

Click on the "Return to Target" button to initiate the returning of all birds to their assigned depths (which are stored at the DMU). This command is normally used after an **Emergency Dive** or **Surface Cables** command when the threat is clear. After you issue the **Return to Target** command, a question box appears asking whether or not you wish to proceed. A "Yes" response completes the command and causes a **Multi Sensor Command: Return to Target Depth Dialog Box** to appear with a list of all birds affected by the command. The word "PASS" or "FAIL" is displayed next to each bird ID as the individual bird commands are issued. If any birds indicated "FAIL", the streamer command can be repeated.

Click on the "Multi Sensor Command" button to activate a tool which allows you to draw a box around (rubberband) a group of sensors. When the sensors are grouped, a **Multi Command Dialog Box** appears. The dialog box allows you to select from and execute the following commands: Set Bird Depth, Set Birds Fin Angle, Set Sea State Parameters, Read Birds Voltages, Read Acoustic Voltages, Read Serial Numbers, and Read Sensors AGCs.

Click on the "Display Full Scale" button to show the entire system network in the Graphic Display.

Click on the "Zoom Area" button to enlarge a specified area in the Graphic Display. Click and drag the cursor to draw a box around the area to be enlarged.

Click on the "Copy" button to make a copy of the text selected.

The "Print" button is not available in this version of System 3.

Click on the "About" button to access the **System 3 OI Information Box**.

Click on the "Help" button to activate the Help cursor. Position the cursor on any item and click in order to open a popup window containing a brief description of the item. To access the Help file for an open window or dialog box, press **F1**. To access the main Help file, click on the **Help / Help Topics**.

Section VI   Operator Interface Program

Graphic Display

The Graphic Display displays all vessels, platforms/lines, and sensors (acoustics, birds, compasses, and depths) that have been created for the System 3 file in a "bird's-eye" view and multiple side views. Most features of the Graphic Display are hidden and are brought to view only by clicking with your mouse on the screen hotspots. The features of the Graphic Display are explained (each under the action required to activate the feature) in the following sections:

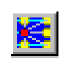
View Tool Tip

To view a tool tip, position your cursor on a component in the Graphic Display (but do not click the mouse button). The summary field includes the component's Unit ID, Serial number, the offset from the towpoint, the target depth and actual depth, the fin angle, and the line number.

View Streamer Cable

To view a single cable depth display, double-click on a line in the Graphic Display (or by clicking on **Streamer / Display Depth,** then double-clicking on one of the line choices in the **Select Streamer Line Dialog Box**). The various depths are color-coded according to the choices made in **System Preferences Depth Display Dialog Box** (which is accessed when you click on **File / Preferences**). Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.

Edit Ranges

This dialog box is accessed by clicking the "Sensor Ranges" button  on the Toolbar, then clicking on an acoustic sensor in the Graphic Display; all ranges for that acoustic sensor will be displayed. Double-click on a second acoustic sensor (which is ranged to the first sensor) to access the **Edit Ranges Dialog Box**. The **Edit Ranges Dialog Box** can also be accessed by double-clicking on the Range name while on the Range text page.

Range Name is used to identify a range in the Operator Interface program when viewing Signal Strength of Path Time displays. The range name can be any character string up to 20 characters long and can include blank spaces and upper or lower case letters.

Path thresholds are entered as a scale factor index. Path 1 is the signal received by the first CMX in the CMX pair, and Path 2 is the signal received by the second CMX. The value entered is an index that corresponds to the threshold setting in dB above RMS noise level. The DigiRANGE index also determines CMX operational mode: shallow water (reflections expected) or deep water. The following table shows the valid indexes and their corresponding dB levels for DigiRANGE systems.

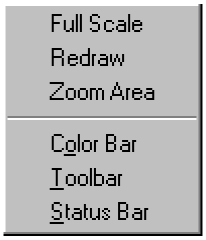
All units with serial numbers 7000 or greater have enhanced CFAR. Instead of being a fixed dB value over noise, enhanced CFAR adapts to changing noise. The following table gives the expected threshold settings for minimum and maximum noise for a given CFAR index setting.

	Normal	Dual Tracking	dB Above Noise
	-1	-11	34.5 - 16
	-2	-12	31 - 14
Default for offsets >1000m	-3	-13	28 - 13
	-4	-14	24 - 12
Default for offsets <1000m	-5	-15	22 - 11
	-6	-16	19 - 9
	-7	-17	16 - 7.5
	-8	-18	12 - 6
	-9	-19	8 - 4.5
	-10	-20	6 - 2.5

The minimum and maximum range distances are entered in meters. The "Retry" option (Yes/No) determines whether this range should be retried if secondary acquisition is enabled and the primary range data was absent or unqualified. The "Range Data Mode" field selects the type of range data qualification: two-way, one-way (Unit 1 receive), or one-way (Unit 2 receive). Two-way range qualification generally results in a more accurate measurement, but one-way qualification may be appropriate if one CMX of the pair is in a high noise environment.

Graphic Aids Menu

Click on the right mouse button when your cursor is positioned anywhere in the Graphic Display (either overhead view or side view), **except directly on a cable or sensor**, to view the following menu:



Click on **Full Scale** to show the entire system network in the Graphic Display.

Click on **Redraw** to refresh the screen

Click on **Zoom Area** to enlarge a selected area in the Graphic Display.

Click on **Color Bar** to show or hide the Color Bar.

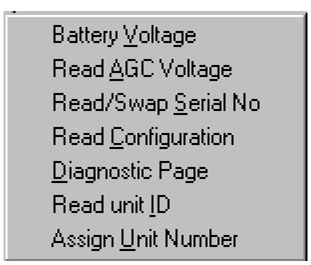
Click on **Toolbar** to show or hide the Toolbar in the Main OI Window.

Click on **Status Bar** to show or hide the Status Bar in the Main OI Window.

Click on the right mouse button when you position your cursor directly on a sensor to display a menu. The menu, which varies according to the type of sensor selected, is identical to the menu accessed by clicking on the **Diagnostic** menu, and either the **Acoustic, Bird, Compass,** or **Depth** submenu.

Acoustic Sensor Submenu

Right clicking on an Acoustic sensor accesses the following menu:



Click on **Acoustic / Battery Voltage** to access the **Acoustic Battery Voltage Dialog Box**. The dialog box allows you to enter the Unit ID, and read the voltage for the specified acoustic sensor.

Click on **Acoustic / Read AGC Voltage** to access the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

Click on **Acoustic / Read/Swap Serial Number** to access the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number in the DMU database. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number.**

Click on **Acoustic / Read Configuration** to access the **CMX Configuration Dialog Box**, which displays the CMXs internal acoustic configuration, including transmit channel, transmit offset, receive aperture open and close times, and aperture thresholds. The dialog box also displays the firmware version numbers of the control processor and the digital signal processor.

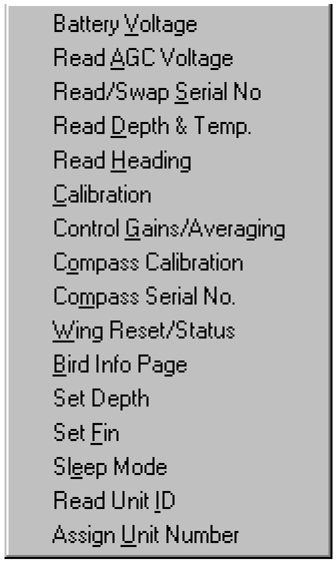
Click on **Acoustic / Diagnostic Page** to access the **CMX Information Dialog Box**. The dialog box contains more detailed information on a specific CMX unit. When this option is executed off-line, an option is available for downloading a special test configuration to the selected CMX unit. This is most useful during initial deployment, when the CMX may not have a valid configuration. After the **Diagnostic Page** option is selected in off-line mode and the desired Unit ID is entered, you can download the special configuration by pressing the Download Diagnostic button. If the special configuration is downloaded, the previous configuration must be re-downloaded after completing the diagnostics procedure.

Click on **Acoustic / Read Unit ID** to access the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

Click on **Acoustic / Assign Unit Number** to access the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number. Or, use Swap to match the unit number to the serial number in the DMU database.

Bird Sensor Submenu

Right clicking on a Bird sensor accesses the following menu:



Click on **Bird / Battery Voltage** to access the **Bird Battery Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the current battery voltage levels (A BANK and B BANK). When a multisensor command is used to read all bird battery voltages ("@" for Unit ID), a prompt appears asking if the battery voltages should be logged to a disk file. Selecting "Yes" causes a new file to be created; the filename is constructed from the current date and time, and has the extension ".BIR". When the battery voltages are read, the Serial Number, Unit ID, A and B BANK voltages, and BANK in use for each unit are written to this file.

Click on **Bird / Read AGC Voltage** to access the **Sensor AGC Voltage Dialog Box.** The dialog box allows you to enter a Unit ID and read the AGC voltages measured by the bird for the high and low frequency carriers and the background noise.

Click on **Bird / Read/Swap Serial Number** to access the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number in the DMU database. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number.**

Click on **Bird / Read Depth & Temperature** to access the **Read Depth and Temperature Dialog Box**. The dialog box allows you to enter a Unit ID and read depth, pressure, and temperature.

Click on **Bird / Read Heading** to access the **Read Heading Dialog Box**. The dialog box allows you to enter a Unit ID and read the heading for that bird.

Click on **Bird / Calibration** to access the **Bird Calibration Dialog Box**. The dialog box allows you to perform a field depth calibration procedure.

Click on **Bird / Control Gains/Averaging** to access the **Bird Control Gains Dialog Box**. The dialog box allows you enter a Unit ID and read or assign any of the following parameters to that bird: Depth Sample Rate, Depth Time Constant, Heading Time Constant, Fin Angle Dead Band, Proportional Gain, Integral Gain, Rate Gain, Control Update Rate

Click on **Bird / Compass Calibration** to access the **Read Compass Calibration Dialog Box**. The dialog box allows you to enter a Unit ID and review the A, B, and C calibration coefficients of the bird's compass.

Click on **Bird / Compass Serial Number** to access the **Bird Compass Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the Serial Number for the compass installed in the bird.

Click on **Bird / Wing Reset/Status** access the **Bird Wing Status Dialog Box**. The dialog box allows you to enter a Unit ID and read the status and type of the bird. Pressing the "Wing Reset" button causes the wings of the bird to move to a full up position, and then return to zero degrees (level). After the wing returns to zero, the bird will return to its previous mode of operation. In addition, a status word is returned by the bird; this word contains the pass/fail results of several internal diagnostic checks performed by the bird. These results are displayed in the diagnostic window as a list of error condition messages. Refer to the Model 5000 Operation and Maintenance Manual (P/N 4200-016) for the actions to be taken if one or more errors are indicated.

Click on **Bird / Info Page** to access the **Bird Information Dialog Box**. The dialog box allows you to enter a Unit ID and view a quick summary of the key parameters that define the status of that bird. The dialog box combines diagnostic and control information from several of the individual commands into a single display. The display updates continually until it is exited.

Click on **Bird / Set Depth** to access the **Set Depth Dialog Box**. The dialog box allows you to enter a Unit ID and read the current depth of that bird. The dialog box also allows you to assign a new depth, which updates the assigned depth value stored in the DMU and in the bird. The assigned depth value is the depth that a bird will go to when a **Return to Target** command is issued.

Click on **Bird / Set Fin** to access the **Set Fin Dialog Box**. The dialog box allows you to enter a Unit ID and read the current fin angle of that bird. The dialog box also allows you to assign another fixed fin angle (-15° to +15°). This command will take the bird out of the Depth-Keeping Mode and place it in Manual Fin Mode. This can be seen on birds displays as a line through the bird.

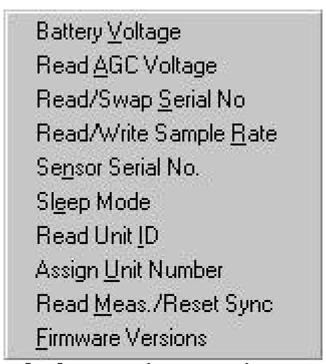
Click on **Bird / Sleep Mode** to access the **Set Sleep Mode Dialog Box**. The dialog box allows you to enter a Unit ID. Pressing the “Sleep Mode” button will de-activate the bird and preserve battery power until the next communication to the unit.

Click on **Bird / Read Unit ID** to access the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor’s Unit ID will be displayed.

Click on **Bird / Assign Unit Number** to access the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number. Or use Swap to match units in the DMU database.

Velocimeter Sensor Submenu

Right clicking on a Velocimeter sensor accesses the following menu:



Click on **Diagnostic / Velocimeter / Battery Voltage** to access the Velocimeter **Read Battery Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the current battery voltage levels (A BANK and B BANK). When a multisensor command is used to read all velocimeter battery voltages (“@” for Unit ID), a prompt appears asking if the battery voltages should be logged to a disk file. Selecting “Yes” causes a new file to be created; the filename is constructed from the current date and time, and has the extension “.BIR”. When the battery voltages are read, the Serial Number, Unit ID, A and B BANK voltages, and BANK in use for each unit are written to this file.

Click on **Diagnostic / Velocimeter / Read AGC Voltage** to access the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

Click on **Diagnostic / Velocimeter / Read/Swap Serial Number** to access the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number.

Click on **Diagnostic / Velocimeter / Read/Write Sample Rate** to access the **Read/Write Sample Rate Dialog Box**. The dialog box allows you to enter a Unit ID and read the currently selected sample rate. The dialog box also allows you to assign a new sample rate. Sample rate is entered in shot cycle increments.

Click on **Diagnostic / Velocimeter / Sensor Serial Number** to access the Velocimeter's **Internal Sensor Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the Serial Number and status information for the sensor installed in that velocimeter.

Click on **Diagnostic / Velocimeter / Sleep Mode** to access the **Set Sleep Mode Dialog Box**. The dialog box allows you to enter a Unit ID. Pressing the "Sleep Mode" button will de-activate the velocimeter and preserve battery power until the next communication to the unit.

Click on **Diagnostic / Velocimeter / Read Unit ID** to access the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). After the sensor is polled, the designated sensor's Unit ID will be displayed.

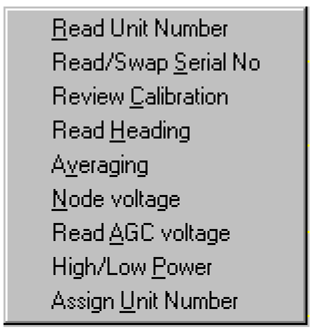
Click on **Diagnostic / Velocimeter / Assign Unit Number** to access the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, Depth, or Velocimeter), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

Click on **Diagnostic / Velocimeter / Read Meas./Reset Sync** to access the **Read Measured Data/Reset Sync Dialog Box**. The dialog box allows you to enter a Unit ID and read the currently measured speed-of-sound. The dialog box also allows you to activate a Reset Sync Counter by checking the box. When activated, the velocimeter will reset its sync counter at the same time as other velocimeters in the system (assuming the command is a multisensor command addressed to all units). This feature ensures that the velocimeters in the system are acquiring speed-of-sound measurements simultaneously.

Click on **Diagnostic / Velocimeter / Firmware Versions** to access the **Firmware Versions Dialog Box**. The dialog box allows you to read the version of the firmware in the internal sensor unit and in the velocimeter control unit.

Compass Sensor Submenu

Right clicking on a Compass sensor accesses the following menu:



Click on **Compass / Read Unit Number** to access the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

Click on **Compass / Read/Swap Serial Number** to access the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number.**

Click on **Compass / Review Calibration** to access the **Read Compass Calibration Dialog Box**. The dialog box allows you to enter a Unit ID and review the A, B, and C calibration coefficients of the bird's compass.

Click on **Compass / Read Heading** to access the **Read Heading Dialog Box**. The dialog box allows you to enter a Unit ID and read the heading for that bird.

Click on **Compass / Averaging** to access the **Heading Control Gains Dialog Box**. The dialog box allows you to enter a Unit ID and read or modify the heading sample rate and averaging time constant for that compass.

Click on **Compass / Node Voltage** to access the **Read Node Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the node voltage for that compass.

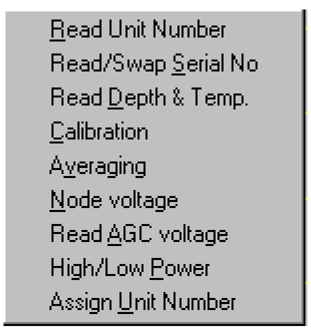
Click on **Compass / Read AGC Voltage** to access the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

Click on **Compass / High/Low Power** to access the **Set Power Mode Dialog Box**. The dialog box allows you to enter a Unit ID and place the sensor in low power mode, which permits more in-streamer devices to be served by the Line Power Unit.

Click on **Compass / Assign Unit Number** to access the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

Depth Sensor Submenu

Right clicking on a Depth sensor accesses the following menu:



Click on **Depth / Read Unit Number** to access the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

Click on **Depth / Read/Swap Serial Number** to access the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number.**

Click on **Depth / Read Depth & Temperature** to access the **Read Depth and Temperature Dialog Box**. The dialog box allows you to enter a Unit ID and read or set the depth, pressure, and temperature calibration coefficients for that depth sensor.

Click on **Depth / Calibration** to access the **Depth Calibration Dialog Box**. The dialog box allows you to enter a Unit ID and read or modify the depth slope, depth offset, and temperature offset for that depth sensor.

Click on **Depth / Averaging** to access the **Depth Control Gains Dialog Box**. The dialog box allows you to enter a Unit ID and read or modify the sample rate and averaging time constant for that depth sensor.

Click on **Depth / Node Voltage** to access the **Read Node Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the node voltage for that depth sensor.

Click on **Depth / Read AGC Voltage** to access the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

Click on **Depth / High/Low Power** to access the **Set Power Mode Dialog Box**. The dialog box allows you to enter a Unit ID and place the sensor in low power mode, which permits more in-streamer devices to be served by the Line Power Unit.

Click on **Depth / Assign Unit Number** to access the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

OPERATOR INTERFACE MENUS

The File Menu

Connect Operator Interface Computer to DMU

The **File / Connect** command connects the Operator Interface computer with the Data Management Unit and receive the current configuration of the DMU.

Open Existing Setup File

The **File / Open** command opens an existing System 3 Setup configuration file.

The **File / 1, 2, 3, or 4 File Name** command allows you to reopen one of the last four previously opened files.

Close File

The **File / Close** command closes the active or open System 3 file.

Save File

The **File / Save** command saves changes made to the open System 3 file. Changes are saved to the OI hard drive under the same file name that appears in the Main Title Bar.

The **File / Save As** command saves changes made to the open System 3 file. Changes can be saved to the OI hard drive under a new file name and/or a new folder.

Print File

The **File / Print** command is not available in this release of System 3. However, you can print Help topics from the Contents window in the Help file.

The **Print Preview** command displays the file on the screen as it would appear printed.

The **Print Setup** command selects a printer and printer connection.

Section VI   Operator Interface Program

Preferences

The **File / Preferences** command accesses the **System Preferences Dialog Box** (which is tabbed into two sections: the **System Preferences for Depth Displays Dialog Box** and **the System Preferences for Ranges/Paths/Acoustics Dialog Box**. The dialog box allows you to select the default colors used in the Graphic Display for bird and acoustic settings. These colors, once set, are displayed in the Color Bar. Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.

Sea States

The Sea States are bird control gains settings which affect the response of the birds. Select the Sea State that corresponds to your current operating environment. You can set up to five Sea States. By setting the Sea States in advance, you can instantly change how the birds are responding as you encounter different operating conditions.

The **File / Sea States** command accesses the **Sea States Listing Dialog Box**, which (with the **Enter New Sea State Name Dialog Box** and **Edit Sea State Dialog Box**) allows you to add, edit, or remove up to five sets of sea state parameters.

Sea States Listing Dialog Box

This dialog box lists all designated sea states and allows you to add, edit, and remove sea states. Up to five sea states can be specified.

When you select the "Add" button, the **Enter the New Sea State Name Dialog Box** appears. Enter the name of the new sea state and press the OK button. When you press "OK," you are returned to the **Sea States Listing Dialog Box.**

To define the parameters of a sea state, highlight the name of the sea state in the **Sea States Listing Dialog Box**, and press the 'Edit" button. When you press the "Edit" button, the **Edit Sea States Dialog Box** appears. Complete the fields and press the "OK" button. When you press "OK," you are returned to the **Sea States Listing Dialog Box.**

To remove a sea state from the listing, highlight the name and press the "Remove" button.

The "Remove" button is present only when a sea state has been specified.

Enter New Sea State Name Dialog Box

This dialog box is accessed by clicking on the “Add” button in the **Sea States Listing Dialog Box**. The dialog box allows you to name a new sea states listing.

Edit Sea States Dialog Box

This dialog box is accessed by highlighting a sea state and clicking on the “Edit” button in the **Sea States Listing Dialog Box**. The dialog box allows you to set the gain parameters of the selected sea state.

Send File

The **File / Send** command sends the active file through electronic mail.

Exit Operator Interface Program

The **File / Exit** command exits the System 3 Operator Interface Program.

Section VI Operator Interface Program

The View Menu

View Acoustic Data

The **View / Acoustics Data** command accesses a table which lists acoustic units text data.

View Depth Data

The **View / Depth Data** command accesses a table which lists the unit number, depth, and fin angle for all birds on each line.

View Graphic Data

The **View / Graphic Data** command accesses a submenu which contains the commands **Create View, Lines Display,** and **Display Type**.

The **View / Graphic Data / Create View** command creates a new default graphic view.

The **View / Graphic Data / Lines Display** command accesses the **Select Lines for Display Dialog Box**. Select the lines that you want to be displayed in the currently selected Graphic Display by using the cursor to check or un-check each line option.

The **View / Graphic Data / Display Type** command accesses another submenu which contains the commands **Sensor Headings, Sensor Depths, Sensor Ranges, All Ranges,** and **All Sensors**.

The **View / Graphic Data / Display Type / Sensor Headings** command shows all sensors with heading information in the Graphic Display.

The **View / Graphic Data / Display Type / Sensor Depths** command shows all sensors with depth information in the Graphic Display.

The **View / Graphic Data / Display Type / Sensor Ranges** command displays a view containing all acoustic units, which is used to show the ranges for a single sensor in the Graphic Display. Click on any acoustic to display all ranges for that sensor. Click on the selected sensor a second time to turn off the range display for that sensor. Sensor ranges can be viewed one at a time. Double-clicking on an acoustic sensor will access that sensor's dialog box.

The **View / Graphic Data / Display Type / All Ranges** command shows all range information in the Graphic Display.

The **View / Graphic Data / Display Type / All Sensors** command shows a static display of all sensors in the Graphic Display.

View Heading Data

The **View / Heading Data** command shows a table which lists the unit number and heading for all birds on each line.

View Velocimeter Data

The **View / Velocimeter Data** command shows a table which lists the unit number and sound speed for all velocimeters on each line.

View Range/Path Data

The **View / Range/Path Data** command accesses a submenu which displays the commands **Create View** and **Sort by Completion.**

The **View / Range/Path Data / Create View** command shows a table which lists ranges and paths text data.

The **View / Range/Path Data / Sort by Completion** command sorts the ranges and paths text data in the order of completion.

View Lines

The **View / Show All Singles** command displays all single lines in the Graphic Display.

View Sensors

The **View / Acoustics** command is a switch that allows you to show or hide the acoustics in the Graphic Display.

The **View / Birds** command is a switch that allows you to show or hide the birds in the Graphic Display.

The **View / Compasses** command is a switch that allows you to show or hide the compasses in the Graphic Display.

The **View / Depths** command is a switch that allows you to show or hide the depths in the Graphic Display.

Section VI Operator Interface Program

View Bars

The **View / Color Bar** command is a switch that allows you to show or hide the Color Bar in the main window. The Color Bar is a color legend for all pre-set display parameters. The colors are defined in the **System Preferences Dialog Box**. (Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.).To access **the System Preferences Dialog Box**, click on the **File / Preferences** command. For more information on the Color Bar, see the Color Bar explanation under the System 3 Operator Interface Window heading in this Section.

The **View / Toolbar** command is a switch that allows you to show or hide the Toolbar in the main window. For detailed information on the toolbar, see the Toolbar explanation under the System 3 Operator Interface Window heading in this Section.

The **View / Status Bar** command is a switch that allows you to show or hide the Status Bar in the main window. For detailed information on the status bar, see the Status Bar explanation under the System 3 Operator Interface Window heading in this Section.

Make Copy

The **View / Copy** command makes a copy of the text selected.

The Streamer Menu

The **Streamer** menu allows you to control the depth of the streamer cables. Selection of any one of these options causes the program to send the appropriate command to the DMU where it is translated into a series of sensor commands for transmission to the birds.

None of the streamer control commands alter the active assigned target depth of a bird in the DMU database. This assigned depth is defined initially in The Setup program and is stored at the DMU.

Emergency Dive Streamer Cables

The **Streamer / Emergency Dive** command initiates the three-step command process required to dive all streamer cables to an emergency depth. After you issue the **Emergency Dive** command, a question box appears asking whether or not you wish to proceed. A "Yes" response causes the **Streamer Depth: Dive Dialog Box** to be displayed, which allows you to select the depth (if desired). Press the "Assign" button to complete the process. Immediately following the assigning of an emergency depth, a **Multi Sensor Command: Dive the Cables Dialog Box** appears with a list of all birds affected by the command. The word "PASS" or "FAIL" is displayed next to each bird ID as the individual bird commands are issued. If any birds indicated "FAIL", the streamer command can be repeated.

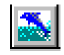
This command is accessed in either of two ways:

- Click on the "Dive Cables" button .
- Click on **Streamer / Emergency Dive**.

Surface Streamer Cables

The **Streamer / Surface Cables** command initiates the surfacing of all streamer cables. After you issue the **Surface Cables** command, a question box appears asking whether or not you wish to proceed. A "Yes" response completes the command and causes a **Multi Sensor Command: Surface the Cables Dialog Box** to appear with a list of all birds affected by the command. The word "PASS" or "FAIL" is displayed next to each bird ID as the individual bird commands are issued. If any birds indicated "FAIL", the streamer command can be repeated.

This command is accessed in either of two ways:

- Click on the "Surface Cables" button  .
- Click on **Streamer / Surface Cables**.

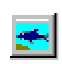
Maintain Streamer Cables Depth

The **Streamer / Maintain Depth** command assigns the specified depth to all birds on the selected streamer line(s) without altering the assigned target depths stored at the DMU. A **Streamer Depth: Maintain Dialog Box** appears, which allows you select a line (or all streamer lines) and assign a depth.

Return Streamer Cables to Target

The **Streamer / Return to Target** command initiates the returning of all birds to their assigned depths (which are stored at the DMU). This command is normally used after an **Emergency Dive** or **Surface Cables** command when the threat is clear. After you issue the **Return to Target** command, a question box appears asking whether or not you wish to proceed. A "Yes" response completes the command and causes a **Multi Sensor Command: Return to Target Depth Dialog Box** to appear with a list of all birds affected by the command. The word "PASS" or "FAIL" is displayed next to each bird ID as the individual bird commands are issued. If any birds indicated "FAIL", the streamer command can be repeated.

This command is accessed in either of two ways:

- Click on the "Back to Target" button  .
- Click on **Streamer / Return to Target**.

View Compass Birds Log

The **Streamer / Compass Birds Log** command accesses the **Multi Sensor Diagnostic: Compass Birds Log Command Dialog Box**, which includes the compass birds' Serial numbers, headings, sample rates, time constants, and A, B, and C calibration coefficients (for the compasses).

View Streamer Cable Depth

The **Streamer / Depth Display** command accesses the **Select Streamer Line Dialog Box**. Double-click on the Line which you want to view as a single sensor depth in the Graphic Display.

Section VI Operator Interface Program

The Diagnostic Menu

The **Diagnostic** menu options allow you to execute a variety of sensor diagnostic commands. Some of these commands can be executed either during normal data acquisition (on-line) or with data acquisition suspended (off-line). Other commands can be executed off-line only, due to their potential adverse effect on the data collection process.

Commands above the separator bar are commands that are common to all sensor types.

Read AGC Voltage

The **Diagnostic / Read AGC Voltage** command accesses the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present for any type unit.

Read/Swap Serial Number

The **Diagnostic / Read/Swap Serial Number** command accesses the **Read Serial Number Dialog Box**.

Read Serial Number Dialog Box

The **Read Serial Number Dialog Box** allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit’s Serial Number, which updates the Setup database file with the new serial number (the serial number in the external device cannot be changed).

Swap Serial Number Dialog Box

This dialog is accessed by clicking on the “Swap” button in the **Read Serial Number Dialog Box**. The dialog box reports the assigned Serial number (from the Setup file) and the reported Serial number (read from the device) for the device selected, and allows you to update (swap) the currently assigned serial number with the one reported by the device.

Assign Unit Number

The **Diagnostic / Assign Unit Number** command accesses the **Assign Unit Number Dialog Box.** The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. Unit ID assignments made with this option do not update the Setup database file; they simply load a new unit address into the sensor for use in subsequent communications with that sensor. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number. Or use Swap to match units in the DMU database.

Read Unit Number

The **Diagnostic / Read Unit ID** command accesses the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor’s Unit ID will be displayed.

Acoustic Diagnostics

The **Diagnostic / Acoustic / Battery Voltage** command accesses the **Acoustic Battery Voltage Dialog Box**. The dialog box allows you to enter the Unit ID, and read the voltage for the specified acoustic sensor. The Acoustic Mode must be ON for this command to function.

The **Diagnostic / Acoustic / Read AGC Voltage** command accesses the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

The **Diagnostic / Acoustic / Read/Swap Serial Number** command accesses the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit’s Serial Number. Make sure the Unit ID for this Serial Number is correct by using the **Assign Unit Number** command.

The **Diagnostic / Acoustic / Read Configuration** command accesses the **CMX Configuration Dialog Box**, which displays the CMXs internal acoustic configuration, including transmit channel, transmit offset, receive aperture open and close times, and aperture thresholds. The dialog box also displays the firmware version numbers of the control processor and the digital signal processor.

The **Diagnostic / Acoustic / Diagnostic Page** command accesses the **CMX Information Dialog Box**. The dialog box contains more detailed information on a specific CMX unit. When this option is executed off-line, an option is available for downloading a special test configuration to the selected CMX unit. This is most useful during initial deployment, when the CMX may not have a valid configuration. After the **Diagnostic Page** option is selected in off-line mode and the desired Unit ID is entered, you can download the special configuration by pressing the Download Diagnostic button. If the special configuration is downloaded, the previous configuration must be re-downloaded after completing the diagnostics procedure.

The **Diagnostic / Acoustic / Read Unit ID** command accesses the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

The **Diagnostic / Acoustic / Assign Unit Number** command accesses the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

Bird Diagnostics

The **Diagnostic / Bird / Battery Voltage** command accesses the **Bird Battery Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the current battery voltage levels (A BANK and B BANK). When a multisensor command is used to read all bird battery voltages ("@" for Unit ID), a prompt appears asking if the battery voltages should be logged to a disk file. Selecting "Yes" causes a new file to be created; the filename is constructed from the current date and time, and has the extension ".BIR". When the battery voltages are read, the Serial Number, Unit ID, A and B BANK voltages, and BANK in use for each unit are written to this file.

The **Diagnostic / Bird / Read AGC Voltage** command accesses the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the AGC voltages measured by the bird for the high and low frequency carriers and the background noise.

The **Diagnostic / Bird / Read/Swap Serial Number** command accesses the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number**.

The **Diagnostic / Bird / Read Depth & Temperature** command accesses the **Read Depth and Temperature Dialog Box**. The dialog box allows you to enter a Unit ID and read or set the depth, pressure, and temperature calibration coefficients for that bird.

The **Diagnostic / Bird / Read Heading** command accesses the **Read Heading Dialog Box**. The dialog box allows you to enter a Unit ID and read the heading for that bird.

The **Diagnostic / Bird / Calibration** command accesses the **Bird Calibration Dialog Box**. The dialog box allows you to perform a field depth calibration procedure.

Bird Calibration Dialog Box

The dialog box allows you to perform a field depth calibration procedure.

A regulated air source capable of at least 75 psi is required. Use of a precision manometer (to allow measurement of absolute pressure) is recommended. A depth calibration kit which includes a manometer can be ordered from DigiCOURSE. An analog gauge may be used instead, but it does not provide the same degree of accuracy as a factory calibration. Refer to the Model 5000 Operation and Maintenance Manual for complete instructions on connection of all equipment.

To perform the calibration, follow the steps below:

1. Select the Measuring Device (either the Manometer or Analog Gauge). Ensure that your choice corresponds to the measurement device in use. Note the maximum pressure limit.

2. Enter the Unit ID.

3. Select the “Full Calibration” button.

4. Select the 5000 type of bird.

5. The Operator Interface will read the current values, store them, then zero them.

6. Press the “Read” button in the Atmospheric values section. The display shows the ambient temperature in degrees Celsius, the (low) pressure, and the sensor count, which is the bird’s current uncalibrated depth in meters. The Atmospheric values are continuously updated.

7. If a precision manometer is in use, vent the manometer to the atmosphere, wait for the depth reading to stabilize, and then enter the displayed atmospheric pressure value. If an analog gauge is being used,

vent the bird transducer to atmosphere and wait for the depth reading to stabilize.

8. Press the “Read” button in the Apply pressure section. The display shows the bird transducer (high) pressure.

9. Pressurize the transducer as close as possible to this value, then enter the displayed value for the applied pressure.

10. View the current calibration coefficients in the Calculations section again for the Depth Slope, Depth Offset, and Temperature Offset. The New column displays the calibration coefficients just computed; the Current column displays the coefficients in effect prior to starting the calibration procedure; and the Input column displays the coefficients currently stored in the bird.

11. When you close the Window, all values not affected by the re-calibration will be restored.

If the newly computed coefficients fall outside acceptable bounds, the system will not allow the erroneous coefficients to be downloaded. If this occurs, either restore the original coefficients or abort and repeat the calibration procedure.

The **Diagnostic / Bird / Control Gains/Averaging** command accesses the **Bird Control Gains Dialog Box**. The dialog box allows you enter a Unit ID and read or assign any of the following parameters to that bird:

- Depth Sample Rate
- Depth Time Constant
- Heading Time Constant
- Fin Angle Dead Band
- Proportional Gain
- Integral Gain
- Rate Gain
- Control Update Rate

The **Diagnostic / Bird / Compass Calibration** command accesses the **Read Compass Calibration Dialog Box**. The dialog box allows you to enter a Unit ID and review the A, B, and C calibration coefficients of the bird’s compass.

The **Diagnostic / Bird / Compass Serial Number** command accesses the **Bird Compass Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the Serial Number for the compass installed in the bird.

The **Diagnostic / Bird / Wing Reset/Status** command accesses the **Bird Wing Status Dialog Box**. The dialog box allows you to enter a Unit ID and read the status and type of the bird. Pressing the "Wing Reset" button causes the wings of the bird to move to a full up position, and then return to zero degrees (level). After the wing returns to zero, the bird will return to its previous mode of operation. In addition, a status word is returned by the bird; this word contains the pass/fail results of several internal diagnostic checks performed by the bird. These results are displayed in the diagnostic window as a list of error condition messages. Refer to the Model 5000 Operation and Maintenance Manual (P/N 4200-016) for the actions to be taken if one or more errors are indicated.

The **Diagnostic / Bird / Info Page** command accesses the **Bird Information Dialog Box**. The dialog box allows you to enter a Unit ID and view a quick summary of the key parameters that define the status of that bird. The dialog box combines diagnostic and control information from several of the individual commands into a single display. The display updates continually until it is exited.

The **Diagnostic / Bird / Set Depth** command accesses the **Set Depth Dialog Box**. The dialog box allows you to enter a Unit ID and read the current depth of that bird. The dialog box also allows you to assign a new depth, which updates the assigned depth value stored in the DMU. The assigned depth value is the depth that a bird will go to when a **Return to Target** command is issued.

The **Diagnostic / Bird / Set Fin** command accesses the **Set Fin Dialog Box**. The dialog box allows you to enter a Unit ID and read the current fin angle of that bird. The dialog box also allows you to assign another fixed fin angle (-15° to +15°). This command will take the bird out of the Depth-Keeping Mode.

The **Diagnostic / Bird / Sleep Mode** command accesses the **Set Sleep Mode Dialog Box**. The dialog box allows you to enter a Unit ID and read the current status of that bird. Pressing the "Sleep Mode" button will de-activate the bird and preserve battery power.

The **Diagnostic / Bird / Read Unit ID** command accesses the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

The **Diagnostic / Bird / Assign Unit Number** command accesses the **Assign Unit Number dialog box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

Velocimeter Diagnostics

The **Diagnostic / Velocimeter / Battery Voltage** command accesses the Velocimeter **Read Battery Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the current battery voltage levels (A BANK and B BANK). When a multisensor command is used to read all velocimeter battery voltages ("@" for Unit ID), a prompt appears asking if the battery voltages should be logged to a disk file. Selecting "Yes" causes a new file to be created; the filename is constructed from the current date and time, and has the extension ".BIR". When the battery voltages are read, the Serial Number, Unit ID, A and B BANK voltages, and BANK in use for each unit are written to this file.

The **Diagnostic / Velocimeter / Read AGC Voltage** command accesses the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

The **Diagnostic / Velocimeter / Read/Swap Serial Number** command accesses the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number.

The **Diagnostic / Velocimeter / Read/Write Sample Rate** command accesses the **Read/Write Sample Rate Dialog Box**. The dialog box allows you to enter a Unit ID and read the currently selected sample rate. The dialog box also allows you to assign a new sample rate. Sample rate is entered in shot cycle increments (e.g., a value of 6 means take a new sample every 6^{th} shot cycle).

The **Diagnostic / Velocimeter / Serial Number** command accesses the Velocimeter's **Internal Sensor Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the Serial Number and status information for the sensor installed in that velocimeter.

The **Diagnostic / Velocimeter / Sleep Mode** command accesses the **Set Sleep Mode Dialog Box**. The dialog box allows you to enter a Unit ID. Pressing the "Sleep Mode" button will de-activate the velocimeter and preserve battery power until the next communication to the unit.

The **Diagnostic / Velocimeter / Read Meas./Reset Sync** command accesses the Read Measured Data/Reset Sync Dialog Box. The dialog box allows you to enter a Unit ID and read the currently measured speed-of-sound. The dialog box also allows you to activate a Reset Sync Counter by checking the box. When activated, the velocimeter will reset its sync counter at the same time as other velocimeters in the system (assuming the command is a multisensor command addressed to all units). This feature ensures that the velocimeters in the system are acquiring speed-of-sound measurements simultaneously.

The **Diagnostic / Velocimeter / Firmware Versions** command accesses the Firmware Version Dialog Box. This dialog box allows you to enter a Unit ID and read the version number for the firmware installed in the measurement sensor and in the velocimeter's control unit.

The **Diagnostic / Velocimeter / Read Unit ID** command accesses the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

The **Diagnostic / Velocimeter / Assign Unit Number** command accesses the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, Depth, or Velocimeter), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

In-Streamer Compass Diagnostics

The **Diagnostic / Compass / Read Unit Number** command accesses the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor's Unit ID will be displayed.

The **Diagnostic / Compass / Read/Swap Serial Number** command accesses the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit's Serial Number. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number**.

The **Diagnostic / Compass / Review Calibration** command accesses the **Read Compass Calibration Dialog Box**. The dialog box allows you to enter a Unit ID and review the A, B, and C calibration coefficients of the bird's compass.

The **Diagnostic / Compass / Read Heading** command accesses the **Read Heading Dialog Box**. The dialog box allows you to enter a Unit ID and read the heading for that bird.

The **Diagnostic / Compass / Averaging** command accesses the **Heading Control Gains Dialog Box**. The dialog box allows you to enter a Unit ID and read or modify the heading sample rate and averaging time constant for that compass.

The **Diagnostic / Compass / Node Voltage** command accesses the **Read Node Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the node voltage for that compass.

The **Diagnostic / Compass / Read AGC Voltage** command accesses the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

The **Diagnostic / Compass / High/Low Power** command accesses the **Set Power Mode Dialog Box**. The dialog box allows you to enter a Unit ID and place the sensor in low power mode, which permits more in-streamer devices to be served by the Line Power Unit.

The **Diagnostic / Compass / Assign Unit Number** command accesses the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

In-Streamer Depth Sensor Diagnostics

The **Diagnostic / Depth / Read Unit Number** command accesses the **Read Global ID Dialog Box**. The dialog box allows you to designate a sensor by Sensor Type, Serial Number, and location (Platform/Line). When located, the designated sensor’s Unit ID will be displayed.

The **Diagnostic / Depth / Read/Swap Serial Number** command accesses the **Read Serial Number Dialog Box**. The dialog box allows you to enter a Unit ID and read the corresponding Serial Number. The dialog box also allows you to Swap a unit’s Serial Number. Make sure the Unit ID for this Serial Number is correct by using **Assign Unit Number**.

The **Diagnostic / Depth / Read Depth & Temperature** command accesses the **Read Depth and Temperature Dialog Box**. The dialog box allows you to enter a Unit ID and read or set the depth, pressure, and temperature calibration coefficients for that depth sensor.

The **Diagnostic / Depth / Calibration** command accesses the **Depth Calibration Dialog Box**. The dialog box allows you to enter a Unit ID and read or modify the depth slope, depth offset, and temperature offset for that depth sensor.

The **Diagnostic / Depth / Averaging** command accesses the **Depth Control Gains Dialog Box**. The dialog box allows you to enter a Unit ID and read or modify the sample rate and averaging time constant for that depth sensor.

The **Diagnostic / Depth / Node Voltage** command accesses the **Read Node Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the node voltage for that depth sensor.

The **Diagnostic / Depth / Read AGC Voltage** command accesses the **Sensor AGC Voltage Dialog Box**. The dialog box allows you to enter a Unit ID and read the voltage present.

The **Diagnostic / Depth / High/Low Power** command accesses the **Set Power Mode Dialog Box**. The dialog box allows you to enter a Unit ID and place the sensor in low power mode, which permits more in-streamer devices to be served by the Line Power Unit.

The **Diagnostic / Depth / Assign Unit Number** command accesses the **Assign Unit Number Dialog Box**. The dialog box allows you to assign a Unit ID to a sensor (either Acoustic, Bird, Compass, or Depth), and assign the sensor to a specific location (Platform/Line). The **Assign Unit Number** command is normally used for a sensor not defined in the Setup file in use. This option should only be used for sensors communicating over a dedicated test line that is defined in the Setup file. Unit ID assignments made with this option do not update the Setup file. In order to change the Unit ID of a sensor defined in the Setup file, use the **Edit** menu in the Setup program. Enter the serial number of the sensor whose unit number is to be assigned, followed by the platform line to which the sensor is attached, then enter the desired unit number.

Section VI Operator Interface Program

The Performance Menu

The **Performance** menu options allow you to obtain information on system performance and integrity monitoring.

Acoustic Disk Logging

The **Performance / Acoustic Disk Logging** command accesses the **Disk Logging Dialog Box**. The dialog box allows you to cause the next N shot points worth of acoustic data to be logged to a file on the hard disk of the Operator Interface system, where N is a user-entered value (default=250). Logging terminates automatically after the specified number of shot points, or you can choose to terminate logging early. The logged acoustic data can be analyzed by the Analysis program. The log file name is constructed from the current date and time, and has the extension ".DEP".

The Acoustic Logging Counter (ALog) on the Status Bar counts the number of shots logged.

The Skipping Nth Shots option is not active here; it is active only in the Disk Logging: Depth & Fin Dialog Box.

Birds Disk Logging

The **Performance / Birds Disk Logging** command accesses the **Disk Logging Dialog Box**. The dialog box allows you to cause the next N shot points worth of bird depth and wing angle data to be logged to a file on the hard disk of the Operator Interface system, where N is a user-entered value (default=250). In addition, you can select the number of shots to be skipped between each log (0-100), with 0 meaning no shots skipped. Logging terminates automatically after the specified number of shot points. The depth is logged in units of 0.1 meters and the wing angle in units of 0.1 degrees. The filename is constructed from the current date and time, and has the extension ".FIN". The number of shots logged appears on the status bar.

The Bird Logging Counter (BLog) on the Status Bar counts the number of shots logged, and is used for bird ballast data..

Sensor Communications Text

The **Performance / Sensor Comm. Text** command accesses the **Sensors Communications Charts Dialog Box**. The dialog box allows you to select the transmission ports that you want information from. Data available in the dialog box includes the inbound and outbound signal strength and outbound noise level for all sensors on the selected line. Under Communications, data includes the total number of polls issued, the number of response time-outs, and the number of checksum errors. Under Performance, data includes the inbound noise, the transmit voltage, the transmit current, the dc voltage (if Line Power Unit is installed), and the dc current (if Line Power Unit is installed). The dialog box updates automatically at every shot cycle after the initial read.

Sensor Communications Graphic

The **Performance / Sensor Comm. Graphic** command displays a graphical representation of inbound signal strength and noise data by transmission line. The display plots inbound received signal strength (in dB volts) as a function of linear offset (in meters) for the selected transmission line. All sensors that communicate over the selected line are displayed. The vertical axis represents signal strength, and the horizontal axis represents offset distance from the towpoint. The background noise level in dBV is shown as a horizontal line across the graph. The display updates automatically at every shot cycle after the initial read.

Normally the received signal strength should decrease linearly with distance down the line. If any significant sharp drops appear at specific points along the line, this may a indicate leakage problem or some other condition causing attenuation. Also, communications may be unreliable with any sensor whose signal strength is near the background noise level.

Sensor Communication Test

The **Performance / Sensor Comm. Test** option performs a communications test on a sensor. This test allows you to send a number of polls to a selected sensor, and to display the results in a table of statistics. When this option is selected, the **Sensor Comm. Performance Test Dialog** is displayed. From here you select the platform line and the device type, and enter the sensor's unit number (or serial number) and the number of times to poll the unit. To poll continuously without stopping until the window is closed, enter zero for the number of times to poll. Click "Start" to begin the test.

Reset Counter Statistics

The **Performance / Reset Counter Statistics** command accesses the **Reset Line(s) Counter Statistics Dialog Box**. Select the line or lines that you want to reset, and press the "Reset" button; this causes the Operator Interface processor to send a command to the DMU to clear all sensor communications counters.

Reset Communication Statistics

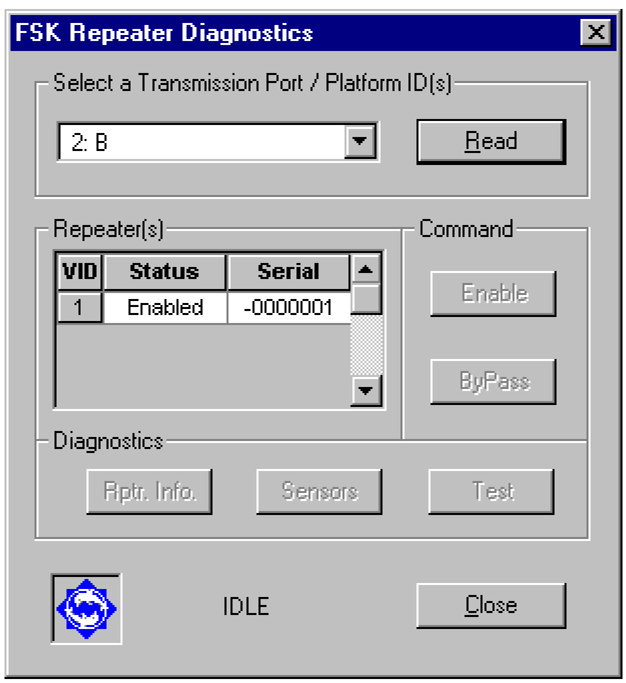
The **Performance / Reset Comm. Statistics** accesses the **Reset Line (s) Communication Statistics Dialog Box**. Select the line or lines that you want to reset, and press the "Reset" button; this causes the Operator Interface processor to send a command to the DMU to clear and reset the filtered signal strength, background noise, and line power statistics.

Reset Range Statistics

The **Performance / Reset Range Statistics** accesses a question box asking whether or not you wish to proceed. A "Yes" response causes the Operator Interface processor to send a command to the DMU to reset the range percent completion values to zero.

Repeater Diagnostics

Click on **Performance/Repeater Diagnostics** to access the **FSK Repeater Diagnostics Dialog** box. Select the transmission port you wish to view, and press the "Read" button. The ID, status, and serial number of each Repeater on that line will be displayed in the "Repeater(s)" list.



To change a repeater's status or obtain more detailed information, click on the desired Repeater ID in the "Repeater(s)" list. This will enable the following buttons:

ENABLE – take the repeater out of Bypass mode and activate the repeat function

BYPASS – place the repeater in Bypass mode, disabling the repeat function

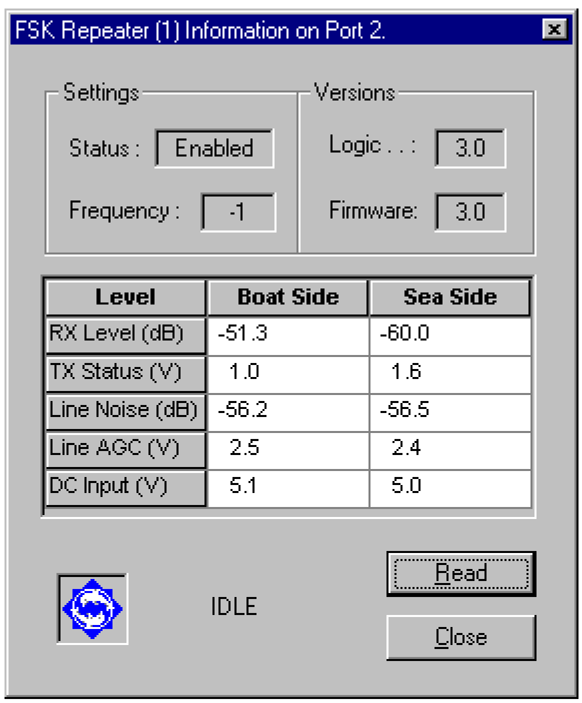
RPTR INFO – display the **Repeater Information Dialog,** containing repeater configuration and line signal levels

TEST – display the **Repeater Test Dialog** for the selected repeater

SENSORS – display the **Repeater Sensor Statistics Dialog,** with plots of signal levels measured by the repeater for all sensors on that line.

The **Repeater Information Dialog** contains repeater configuration settings, transmission status, voltage level and current signal levels for the last transmitted sensor message. Following is a short description of the measured values:

Measurement	Description
Rx Level	Decibels: receive signal strength
Tx Status	Voltage: Transmitter health: ˜ 1.5
Line Noise	Decibels: background noise
Line AGC	Voltage: induced receiver noise
DC Input	Voltage: module power supply voltage



The **Repeater Test Dialog** contains test diagnostics commands. The repeater can be commanded to output a test pattern for a specific duration. This signal can be used to measure the output level of the transmitters, which should be a square wave of 6.8Vpp minimum. Assuming a line attenuation of 4.26 dB/km, a module placed 4 km away would show a 0.96Vpp on the shipboard (see equation below).

$$V_{pp} = 6.8 \times 10^{\frac{(-4.26 \times D)}{20}}$$

Also, you can measure the output frequency of the boat and tail transmitters for both /01 and /03 frequencies. See the following table for frequency specification.

	Pattern	/01 kHz	/03 kHz
Boat	**Space**	25.80	28.98
	Mark	24.54	27.39
Tail	**Space**	27.39	28.98
	Mark	24.54	27.39

The **Repeater Sensor Statistics Dialog** displays plots of signal levels measured by the repeater for all sensors on that line. Following is a short description of the measured values:

	Measurement Description
Rx Level	receive signal strength in Decibels
Line Noise	background noise in Decibels

The **Repeater Sensor Statistics Dialog** has three tabs:

Boat Side – This window displays a plot of signal levels for each sensor measured on the repeater's boat side versus streamer offset.

Tail Side – This window displays a plot of signal levels for each sensor measured on the repeater's tail side versus streamer offset.

Sensor Table – This window displays signal and noise levels measured by the Repeater for all sensors on that line in a tabular format.

No Database Diagnostic Option

The 'No Database' diagnostic option allows you to perform diagnostics on sensors that have not been put in the configuration through the Setup program.

The 'No Database' option is entered indirectly, since there is no button or menu command to invoke the option. When performing diagnostic commands from the

Diagnostic menu, you may enter a sensor Unit ID that is not in the Setup configuration. A box will appear asking whether or not you wish to send the message. If you select 'Yes,' a second box appears with a blank Serial number field. Enter the Serial number of the sensor to perform the selected diagnostic.

The Sensor Menu

Deploy Acoustic Unit

The **Sensor / Deploy an Acoustic Unit** command accesses the **Acoustic Deployment Dialog Box**. The dialog box allows you to enter a Unit ID and select from the following options: Assign Unit Number, Read Serial Number, Read Battery Voltage, Read AGC, and Download CMX Configuration. Press the "Execute" button to read the response from the selected options. Press the "Info Page" button to access the **CMX Information Dialog Box**.

Deploy Bird Unit

The **Sensor / Deploy a Bird Unit** command accesses the **Bird Deployment Dialog Box**. The dialog box allows you to enter a Unit ID and select from the following options: Assign Unit Number, Read Serial Number, Read Battery Voltage, Read AGC, Assign Target Depth, Wing Reset, Set Fin +15, Set Fin -15, and Set Fin 0. Press the "Execute" button to read the responses from the selected options. Press the "Info Page" button to access the **Bird Information Dialog Box**.

Deploy Velocimeter Unit

The **Sensor / Deploy a Velocimeter Unit** command accesses the **Velocimeter Deployment Dialog Box**. The dialog box allows you to enter a Unit ID and select from the following options: Assign Unit Number, Read Serial Number, Read Battery Voltage, Read AGC.

Enable/Disable Polling

The **Sensor / Enable/Disable Polling** command accesses the **Enable/Disable Polling Dialog Box**. Enter a Unit ID and select Enable to activate or Disable to deactivate a sensor for periodic polling by the modem subsystem.

Section VI   Operator Interface Program

CMX Verification Test

The **Sensor / CMX Verification Test** command verifies the acoustic ranging operation of a pair of CMXs by measuring a single range between two CMXs whose transducers are in close contact. The range value reported between the CMX pair is an indication of the accuracy of the two CMXs. This is essentially a zero-range verification test. To pass the test, the reported range time should be 0.0 +/- 0.1 millisecond.

A special Setup file named ZERO.CFG is used for the verification test. This file contains only two CMXs, both on transmission port 1 (AA01 and AA02), with a single range between them.

The following steps are required to perform this test:

1. Position two cable-mounted CMXs so that their transducers are barely in contact. Minimal contact is recommended. Place a suitable impeding medium (the recommended medium is the bubble pack wrapping used to ship the battery packs) between the transducers.

2. The CMXs must communicate over a line connected to modem transmission port 1. If the default test configuration (ZERO.CFG) is modified, be sure that the two CMXs are connected to the appropriate modem port and have different unit numbers.

3. Enter the Setup program, open the ZERO.CFG Setup file and enter the serial numbers of the two CMXs being used. Then, transfer this file to the DMU (**File / Transfer to DMU** command). After a successful transfer, exit Setup.

4. Enter the Operator Interface (OI) program and select **DMU / Run Mode / Exit Run Mode**.

5. Select **Sensor / Deploy an Acoustic Unit**. Enter the first CMX ID (AA01) in the Unit ID field, and select ‘Assign Unit Number’ from the list of Command options. If an error message appears, repeat the operation until it succeeds. Return to the Unit ID and repeat the same procedure for the second CMX (AA02).

6. Select **Sensor / CMX Verification**. The CMX configurations will be downloaded to each of the two pods. A message will appear confirming each download.

7. Select **DMU / Run Mode / Enter Run Mode**. This activates data acquisition and acoustic ranging.

8. Observe the acoustic signal strengths for path 1 and path 2 for the range “AA01-AA02”. They should fall within the range of -35 dB to -1 dB. If

they do not, make small adjustments to the position of the CMX transducers or the impeding medium to change the contact pressure.

9. Select the **DMU / Path Reflections** command to ensure that both CMXs are communicating properly (CMX Unit IDs are both the correct pre-selected color).

10. Observe the range time for range "AA01-AA02" over several shot intervals. The reported range should be 0.0 +/- 0.1 millisecond.

11. When the test is complete, return to the Setup program and transfer the desired Setup file to the DMU (**File / Transfer to DMU** command). Then go through normal deployment procedures.

Before returning to normal operation, the runtime configurations must be downloaded to all CMXs using the Download CMXs Configuration command.

CMX Manual Range Test

The Manual Range Test between deployed acoustic units adds a higher level of deployment and field test diagnostics for acoustic units. This feature allows you to test the ranging operation of any pair of acoustic units as soon as they are in the water at an appropriate depth. The two units do not have to be at their final deployment location, and they do not need to have a range between them configured in the Setup file.

Manual Range Setup

The manual range test is designed to be used when the system is not performing normal range acquisition; for example, during deployment or on line change. When performing this operation it is very important that only the two units being tested are functioning in normal acoustic mode. This is achieved by placing all other units in Background Noise mode, which is in effect a 'listening only' mode. The following steps prepare the system for manual ranging:

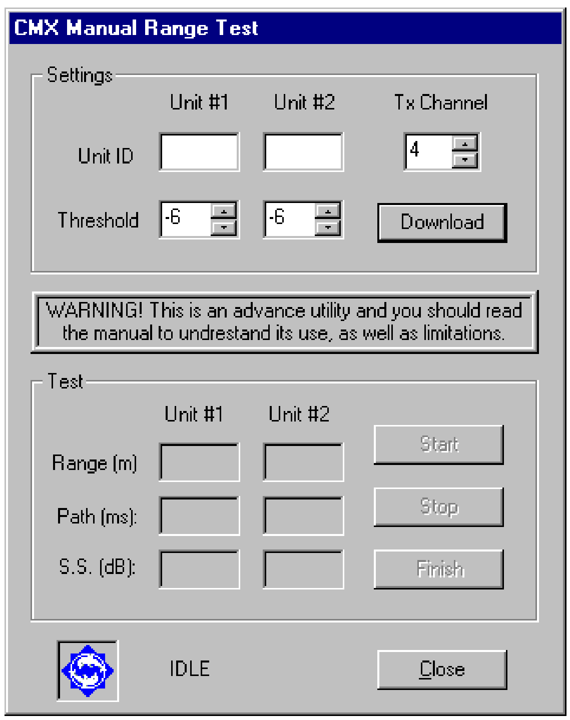
1. Select **Exit RUN mode** from the Operator Interface DMU menu. Wait until the DMU run mode 'R' indication on the Status Bar goes away.
2. Set all Acoustic units to Background Noise mode by selecting the main menu option **Sensor / Check Background Noise**, and wait for the response of all the units. It is essential to have all of the deployed units in Background Noise mode.
3. Place the DMU back in RUN mode.

4. Activate the Manual Range Diagnostic window by selecting the **CMX Verification Test** from the **Sensor** main menu option.

When employing the Manual Ranging feature during system deployment, be sure to deploy any new units in Background Noise mode. To facilitate this, a new command has been added to the Acoustic Deployment window.

Manual Range Operation

After successfully setting up the System for manual range operation, select **Sensor / CMX Verification Test** from the main menu to display the Manual Range Diagnostic window. The following diagnostic window will appear:



While in this diagnostic window you will be able to download a special configuration that will allow the ranging of any two deployed units*. The steps to perform the manual range test are as follows:

1. Enter the Unit ID of each of the two units to be tested. These units must be part of the current configuration.
2. Press the **Download** button and wait for 'PASS' acknowledgements from both units. If any one unit fails, a FAIL <UnitID> message will be displayed, at

* The units to be range tested must be with in 1000 meters of each other.

which time this step should be repeated. This step also disables the 'Unit ID' boxes; you will be able to change these units only after pressing the **Finish** button.

3. After a successful download, the **Start** button will be enabled; press it when ready to start the ranging process. At this time, the units will be queried every shot cycle and their reported range/path values will be displayed. If the units can not range, stop the test, enter new threshold settings, and return to step 2 to retry.
4. After starting the test, you will be able to halt it by pressing the **Stop** button. This will be done once you are satisfied with the range values received, or when attempting to change the threshold setting or transmit channel in order to deal with units that might have path obstructions.
5. When ready to perform a manual range test with a different pair of units, press the **Finish** button. This action will attempt to set the two selected units back to Background Noise mode. If successful, you will be able to again enter new unit IDs and restart the manual ranging process. If unsuccessful, retry by pressing the **Finish** button again.
6. At any time you will be able to exit the window by pressing the **Close** button. The system will attempt to restore the units back to Background Noise mode, but it is left to you to ensure their state by carefully following the **Start, Stop,** and **Finish** steps described above.
7. Finally, after closing this window, you will be reminded that the system is in Background Noise mode. To return the system to normal operation, first re-download the acoustic configurations by performing a **Download CMXs Conf.** command, then place the DMU in RUN mode

Download CMXs Configuration

The **Sensor / Download CMXs Configuration** command loads any required configuration data to an acoustic sensor. (Currently this consists of acoustic aperture and threshold settings). Valid runtime acoustic configurations (originally generated by the Setup program) must be downloaded to all CMXs prior to initiating operation of the acoustic system to ensure that valid range data is produced. It is also important to avoid making any individual range aperture/threshold adjustments unless the affected CMXs contain valid runtime configuration data.

Check Background Noise

The **Sensor / Check Background Noise** command measures the background acoustic noise while off-line (<u>not</u> in the Run Mode). A special configuration is downloaded to the CMXs, which turns off the transmitters in the CMX units. The receive apertures are still active and viewing the ambient background noise. The save acoustic .DEP file option can be used to record the background noise and then view this information using the Analysis program.

Before returning to normal operation, the runtime configurations must be downloaded to all CMXs using **Download CMXs Configuration**.

Set Geometry Parameters

The **Sensor / Set Geometry Parameters** command accesses the **Geometry Test Settings Dialog Box**, which allows you to select an acoustic group and enter the two reference CMXs (origin and baseline). The origin CMX defines the center of a local coordinate system for the group, and the baseline CMX determines the orientation of the local coordinate system. Following your selection of the two reference CMXs, select the **Sensor / Request a Geometry Test** command.

Request a Geometry Test

The **Sensor / Request a Geometry Test** command initiates the geometry verification process. When the process is started, the CMX Serial numbers are read and compared with the configured Serial numbers.

At this point, it is assumed that all CMXs are deployed and their acoustic configurations downloaded, and the reference CMXs (origin and baseline) are specified.

For units with mismatches, both the configured Serial number and the true Serial number (read from the sensor) are displayed next to the Unit ID. Mismatches must be resolved in order to proceed further (communications failures are ignored).

If all Serial numbers match, the verification will proceed. During the next phase, the DMU collects range samples over 10 shot intervals and then computes the estimated positions of the CMXs. The DMU must be in Run Mode for the sampling process to proceed. Other operations can be performed at the Operator Interface while this sampling is in progress. A message appears when the verification is complete (allow at least 10 shot intervals), indicating that the results are available for display.

Any of the following error conditions can prevent the verification process from determining the CMX locations:

- invalid reference CMXs specified
- insufficient range data for reference CMXs
- insufficient range data for the group

- no convergence
- RMS exceeds threshold.

If the 'invalid reference CMXs specified' message appears, re-enter two reference CMXs, ensuring that they are on the same line. If any of the other error messages appear, verify that all CMX configurations have been downloaded and that the CMXs are communicating. Then go to the Range display and check the status of the ranges in that group. If a fault is discovered, restart the verification after it is corrected.

During the acquisition of the geometry verification data, the lines should be straight and no turns made.

Retrieve Geometry Results

The **Sensor / Retrieve Geometry Results** command accesses the **Select Group Dialog Box**. The dialog box allows you to select the number of the acoustic group that you want to view in order to obtain the results of the last geometry verification. A dialog box appears briefly and informs you that the verification results are being compiled. Following the compilation of the geometry verification results, they are displayed in a tabbed window. The window is divided into two groups: **Lines and Units** and **Acoustic Ranges**.

The **Lines and Units Geometry Test Results Display** allows you to view the configured lateral offset and the calculated lateral offset for each line and sensor unit found in the selected group. All offsets are in meters. The calculated offset for the line is the average of the calculated lateral offsets of all CMXs on that line. Any calculated lateral offset that differs from the corresponding configured offset by more than 10 meters is displayed in a pre-selected color. Any unit with insufficient valid range data to participate in the verification is displayed in another pre-selected color.

To select the colors used in the displays, use the tabbed System Preferences Dialog Box, which is accessed by clicking on File / Preferences. Note that if your monitor is not using True or High Color, the colors you select may appear differently in the displays.

The **Acoustic Ranges Geometry Test Results Display** allows you to view the configured, calculated and measured range distances (in meters) for each range in the selected group. The measured range is based on an average of the observed range values collected over the 10 shot intervals, with all unqualified range measurements excluded. If an insufficient number of valid measurements were obtained over this 10-shot sample interval for a range, that range is displayed in a pre-selected color. Any calculated range that falls outside the center half of its configured aperture is displayed in another pre-selected color.

The DMU Menu

The **DMU** menu allows you to modify certain system configuration parameters within the DMU Communications Control processor without interrupting normal data acquisition.

Enter Run Mode

The **DMU / Enter Run Mode** command activates the operational state of the DMU. The DMU initiates periodic data acquisition and data distribution by internal or external trigger.

Exit Run Mode

The **DMU / Exit Run Mode** command deactivates the operational state of the DMU. When not in Run Mode, the DMU stops all periodic data acquisition and data distribution, and is available full time for special sensor diagnostics.

Scan Interval

The **DMU / Change Scan Interval** command accesses the **Internal Scan Interval Dialog Box**. The dialog box allows you to change the interval at which the DMU generates internal scan triggers in the absence of external triggers.

Set Acoustics Mode

The **DMU / Set Acoustics Mode** command is a switch that allows you to turn the acoustics on or off. Turning the acoustics off when they are not in use saves battery life.

Path Reflections

The **DMU / Path Reflections** command is a switch that allows you to enable or disable the reflection QC function. When the reflection QC function is enabled, the DMU will analyze the acoustic data trend and detect when reflections are present. When reflections are detected, the data quality flag bit will be set in the message to the host computer signifying bad (reflected) data. This function serves as an additional layer of acoustic data QC before data is handed to the host computer. When the function is disabled acoustic data is not checked for the presence of reflections.

Path Prediction

The **DMU /Path Prediction** command is a switch that allows you to enable or disable the path prediction feature. The acoustic pod will send the predicted value of the path time if it does not detect a path time. When a path prediction is sent from a pod, a +6 is placed in the signal strength field to notify the dry end that the path is a predicted value. If path prediction is off, the DMU will ignore the prediction from the acoustic pod. If path prediction is enabled, and the range is configured as a two-way range, the DMU will combine a predicted value with an actual received path from the other pod in the range pair to form a range. A predicted value will not be used for a configured one-way range even if path prediction is enabled since no received path time is available to qualify the prediction. Refer to the table for a description of the operation of the acoustic path prediction feature and its effect on the data quality flag (0 / Good Range; 1 / Bad Range) in the host message and its effect on acoustic secondaries.

	ACOUSTIC DATA		DATA QUAL. FLAG (0 / GOOD; 1 / BAD)		PERFORM SECONDARY?	
	PATH 1	**PATH 2**	**PRED. ON**	**PRED. OFF**	**EST. ON**	**EST. OFF**
PASSED	DATA	DATA	0	0	N	N
RANGE	DATA	PREDICTION	0	1	N	Y
PROC.	PREDICTION	DATA	0	1	N	Y
CHECKS	PREDICTION	PREDICTION	1	1	Y	Y
FAILED	DATA	DATA	1	1	Y	Y
RANGE	DATA	PREDICTION	1	1	Y	Y
PROC.	PREDICTION	DATA	1	1	Y	Y
CHECKS	PREDICTION	PREDICTION	1	1	Y	Y

Initialize Diagnostic Link

The **DMU / Initialize Diagnostic Link** command checks the communications link between the DMU and the Operator Interface computer. Up to six Operator Interfaces can be linked to the DMU at one time. All other computers are connected as Remote monitors. The **Initialize Diagnostic Link** command can be re-attempted at any time.

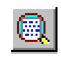
Section VI   Operator Interface Program

The Window Menu

Full Scale

The **Window /Full Scale** command shows the entire system network in the Graphic Display.

This command is accessed in any of three ways:

- Click on the “Display Full Scale” button  .
- Click on **Window / Full Scale**.
- Click on the right mouse button (but not directly on a sensor) when in the Graphic Display and select **Full Scale** from the menu that appears.

Zoom Area

The **Window / Zoom Area** command enlarges a selected area in the Graphic Display.

This command is accessed in any of three ways:

- Click on the “Zoom Area” button  .
- Click on **Window / Zoom Area**.
- Click on the right mouse button (but not directly on a sensor) when in the Graphic Display and select **Zoom Area** from the menu that appears.

Open Window

The **Window / New Window** command creates a new window that views the same file.

The **Window / 1**, **2**, **3**, or **4** (or other number) command brings the screen of an opened file to the front.

Change Window Position

The **Window / Cascade** command positions multiple opened windows in an overlapped arrangement.

The **Window / Tile Horizontally** command positions multiple opened windows in a non-overlapped horizontal arrangement.

The **Window / Tile Vertically** command positions multiple opened windows in a non-overlapped vertical arrangement.

Refresh Window

The **Window / Redraw** command refreshed the window.

The **Window / Update All** command refreshes all system views.

Arrange Icons

The **Window / Arrange Icons** command arranges icons of closed or minimized windows.

Section VI   Operator Interface Program

The Help Menu

Help Topics

The **Help / Help Topics** command accesses the main Help topics window with the Contents, Index, and Find tabs. All OI Help topics are available through this command. From the Contents window, double-click on a book to open it and display a list of topics, then double-click on the desired topic. From the Index window, either double-click on the desired topic, or type the first few letters of the topic in the window under the Index tab to find the topic, then click the Display button (or press Enter).

About System3 OI

The **Help / System 3 OI** command accesses the System 3 OI information box, which displays the copyright notice and version of your System 3 application.

You can also access the System 3 OI information box by clicking on  .

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Section VII Analysis Program

SYSTEM 3 ANALYSIS PROGRAM

The Analysis allows you to analyze acoustic data that has been acquired.

The Analysis program is optional and can not be executed unless the software has been installed on the Operator Interface computer.

Analysis Program Prerequisites

To use the Analysis Program, you must first have a .DEP file. All .DEP files are created in the Operator Interface Program. You can create a .DEP file by following the steps below:

1. In the Operator Interface Program, click on the **Performance / Acoustic Disk Logging** command.
2. The **Disk Logging Acoustic Dialog Box** will be displayed. Type the number of shots into the box provided (or leave at the 250-shot default), and press the OK button.
3. A .DEP file will be created. Save the .DEP file in a folder. The Analysis files should be installed in the same directory as the System 3 files.

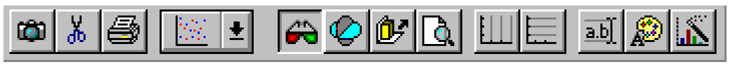
Start Analysis Program

Once you have at least one .DEP file, you can start the Analysis Program by following the steps below:

1. Open the Analysis Program, and click on **File / Open a .DEP**.
2. Select a DEP file and press **Open**.
3. To change the default configuration for range and path data selection for the graphs, click on **Range – Settings.** The **Range/Chart Settings Dialog Box** will appear. The **Range/Chart Settings Dialog Box** allows you to setup the Analysis graphic display.
4. Make the desired selections on the **Range/Chart Settings Dialog Box**. It will be useful to leave this dialog box open to conveniently modify the Application graphic display.
5. Select a range using the range selector, which is a window immediately below the pulldown menus (**File, Range, Summary,** and **Help**) and to the left of the Toolbar.
6. When a range is selected, the graphic for that range will be displayed. The graphic can be modified using the **Range/Chart Setting Dialog Box**.

The following paragraphs describe the individual toolbar and menu commands of the Analysis Program.

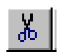
ANALYSIS TOOLBAR



Copy as Graphic

The "Copy as Graphic" button  copies the selection to the clipboard as a bitmap.

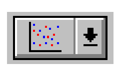
Copy as Text

The "Copy as Text" button  copies the selection to the clipboard as text.

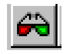
Print

The "Print" button  prints the displayed chart (or graph).

Change the Gallery Type

The "Change the Gallery Type" button  changes the <u>type</u> of graph that is displayed (for example: Linear, Scatter, etc.). Currently only Scatter graphs are supported.

3D/2D View

The "3D/2D View" button  is a switch that allows you to display the same Analysis data in either a 3D or a 2D view. Note that the 3D view shown below is shown with the Z-Clustered Series button selected.

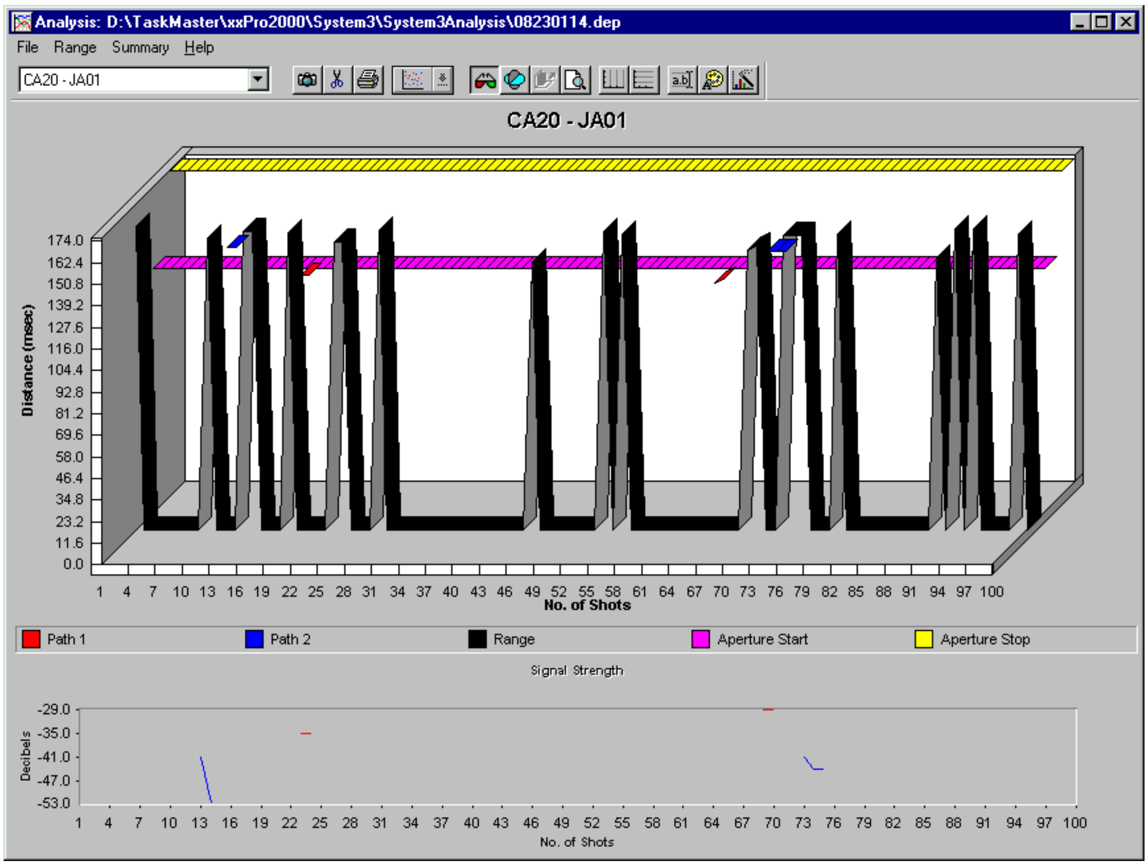


Figure 7.1 3D View

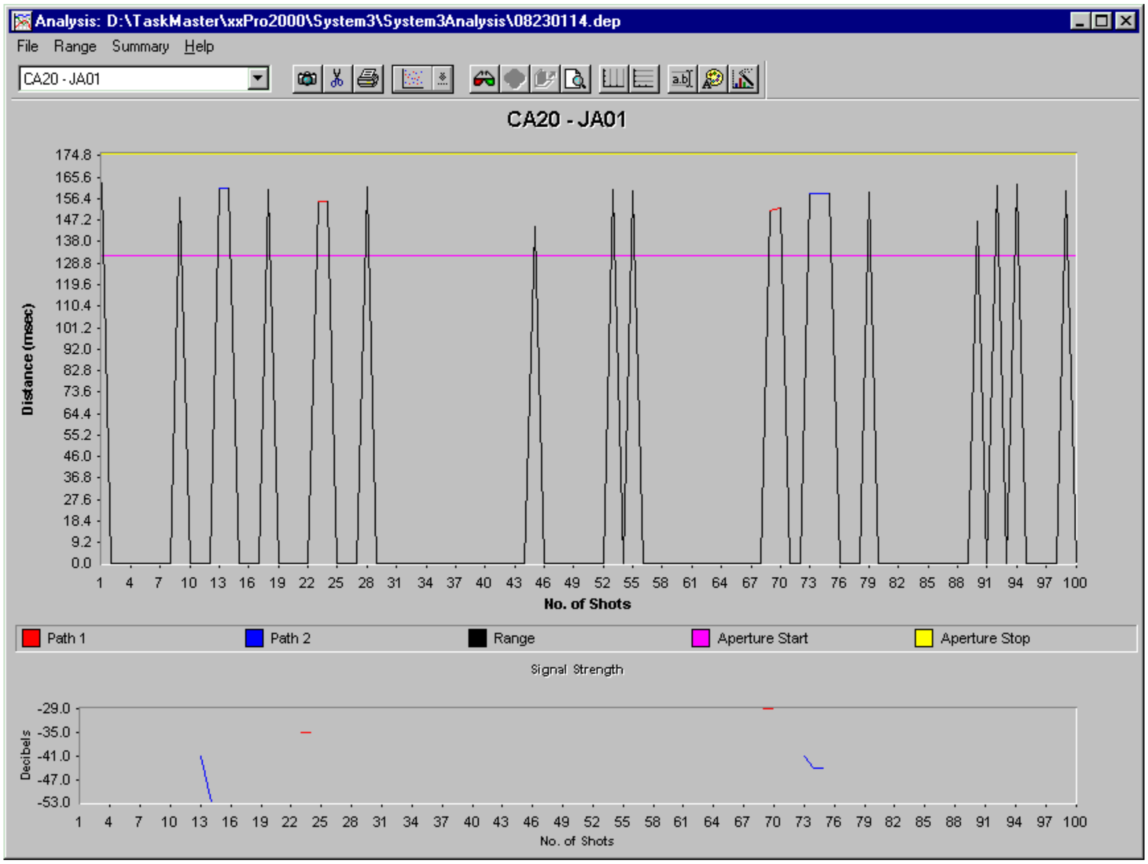


Figure 7.2 2D View

Rotate the Chart (3D)

The “Rotate the Chart (3D)” button  accesses the **3D View Properties Dialog Box**. This dialog box allows you to view the Analysis graphic data from any angle. This dialog box is also accessible through the Chart properties button, and selecting the **3D View** tab on **the Chart Properties Dialog Box**.

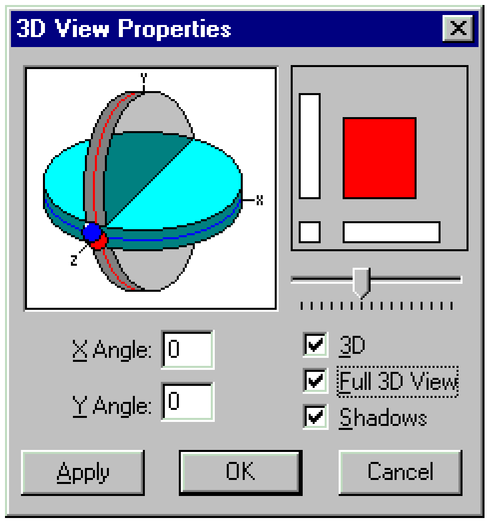


Figure 7.3 3D View Properties Dialog Box

Z-Clustered Series (3D)

The "Z-Clustered Series (3D)" button  allows you to switch between two types of 3D views. In each view, the Z-axis data is depicted (displayed) differently. The first example shows the view with the button de-selected; the second example shows the view with the button selected.

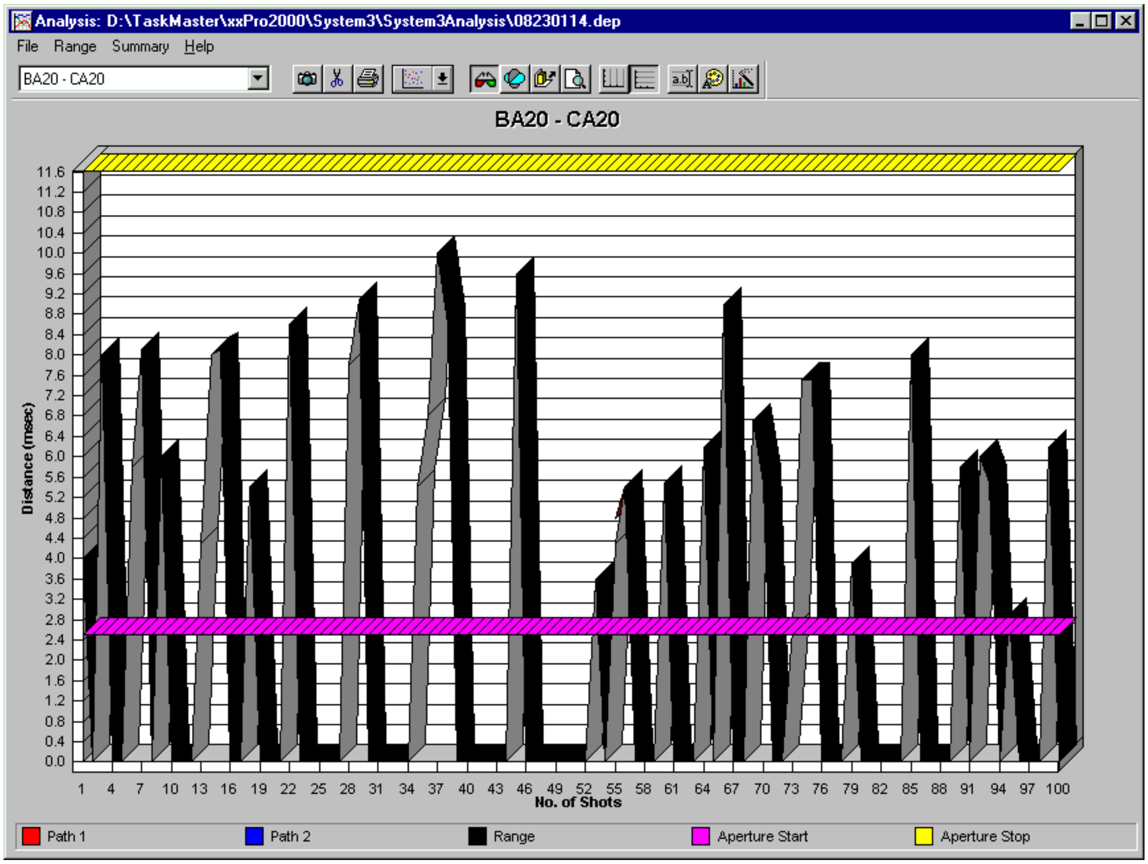


Figure 7.4 Z-Clustered Series De-selected

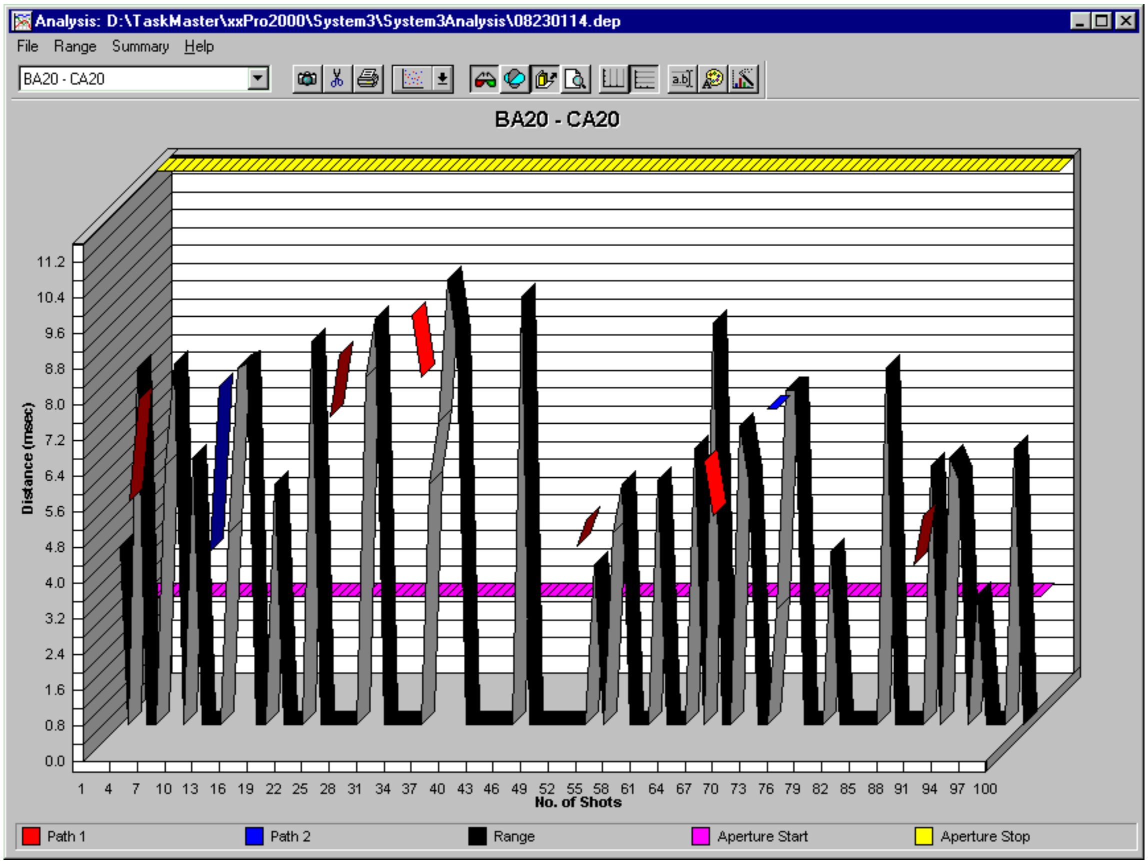
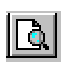
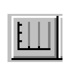


Figure 7.5 Z-Clustered Series Selected

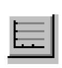
Zoom

The "Zoom" button  enlarges a selected area.

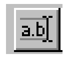
Vertical Grid

The "Vertical Grid" button  adds vertical grid lines to the graph.

Horizontal Grid

The "Horizontal Grid" button  adds horizontal grid lines to the graph.

Titles

The "Titles" button  accesses the **Titles Dialog Box**. This dialog box allows you to change the information titles on the main Applications program graphic. This dialog box is also accessible through the Chart properties button, and selecting the **Titles** tab on **the Chart Properties Dialog Box**.

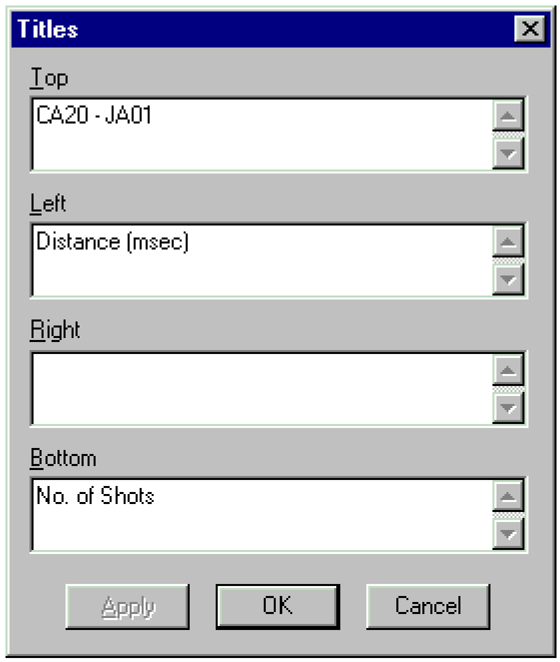


Figure 7.6 Titles Dialog Box

Fonts

The “Fonts” button  accesses the **Font Dialog Box**. This dialog box allows you to set the type, style, size, and color of the fonts used in the Analysis program.

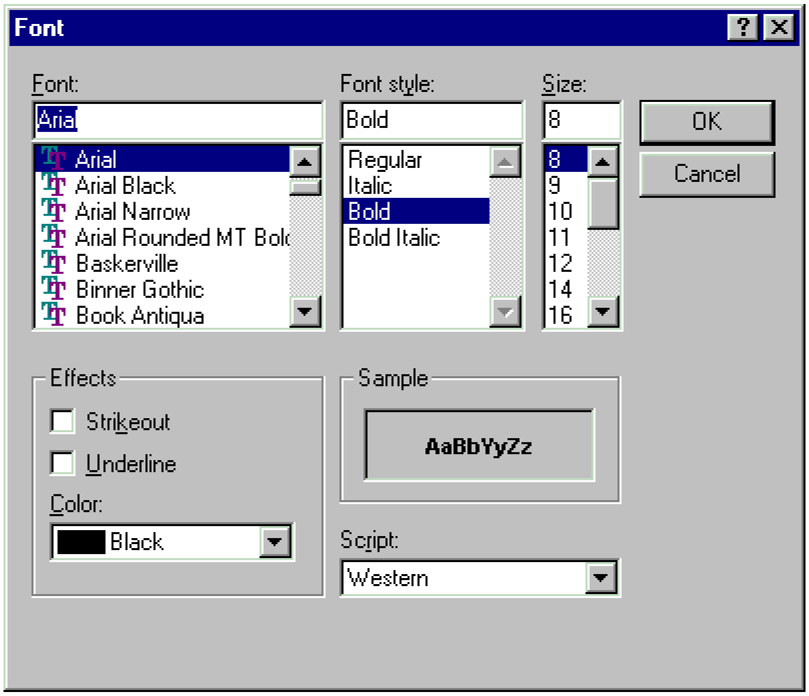
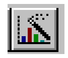


Figure 7.7 Font Dialog Box

Chart Properties

The "Chart Properties" button  accesses the **Chart Properties Dialog Box**. The Chart Properties Dialog Boxes allow you to tailor the appearance of each dialog box and graphic display. This dialog box is tabbed **General, Series, Scale, 3D View, and Titles**. An example of each dialog box appears below.

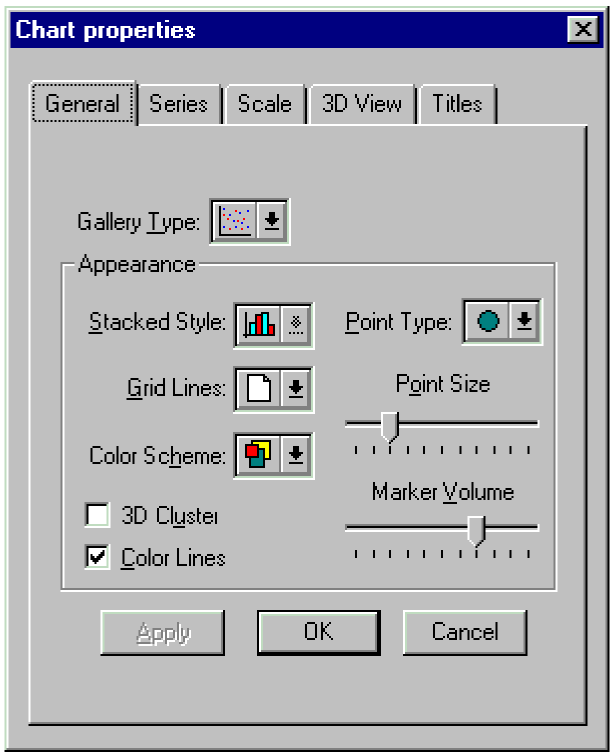


Figure 7.8 General Chart Properties Dialog Box

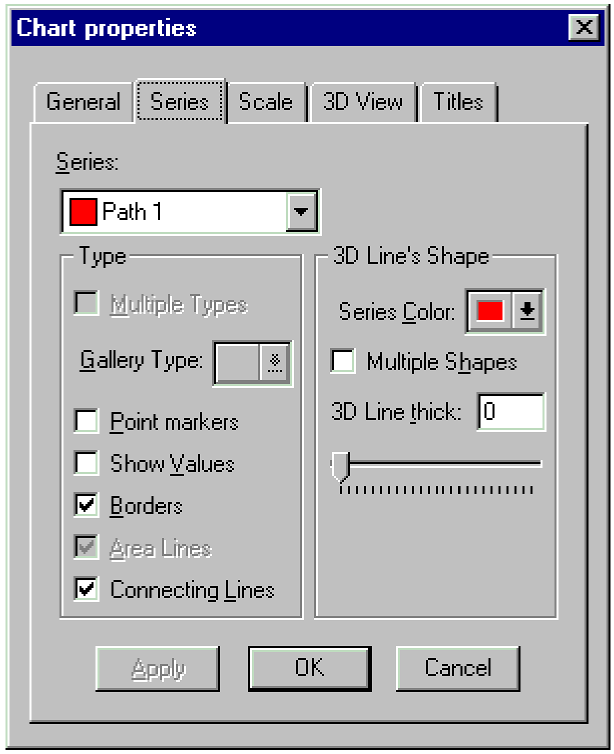


Figure 7.9 Series Chart Properties Dialog Box

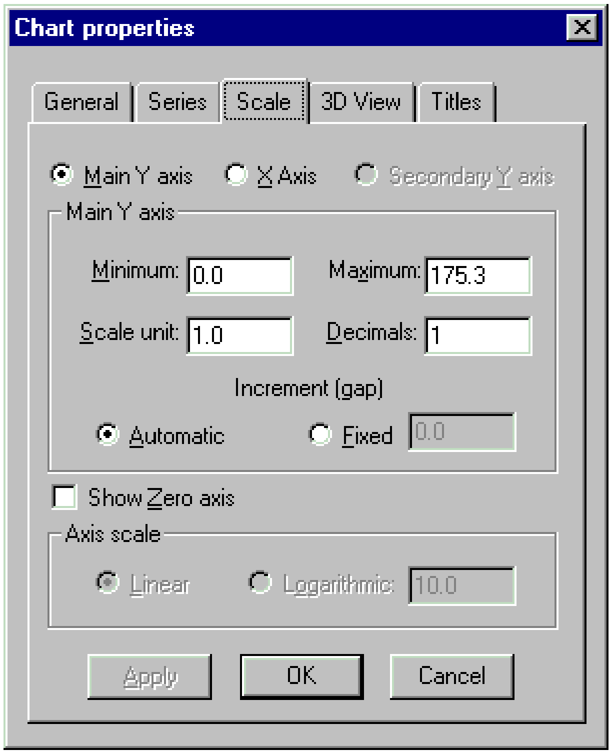


Figure 7.10 Scale Chart Properties Dialog Box

This dialog box allows you to view the Analysis graphic data from any angle. Select (check) the **Full 3D View** to make this feature operable.

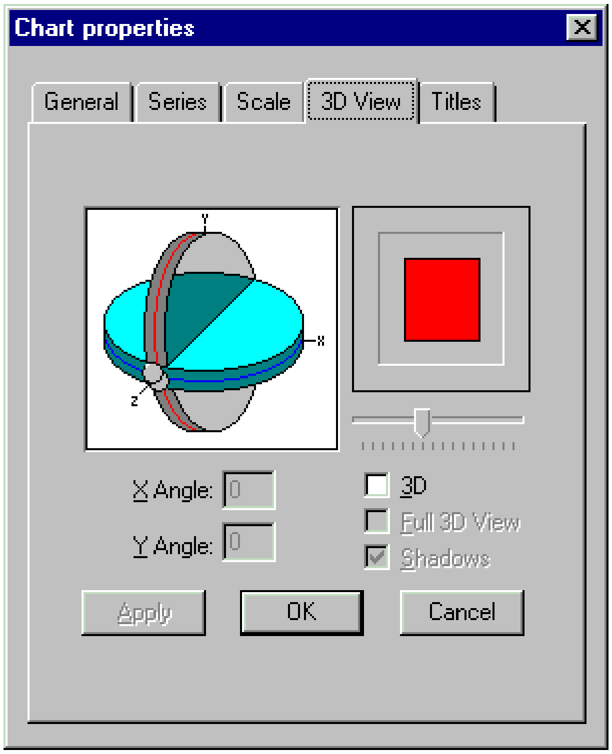


Figure 7.11 3D View Chart Properties Dialog Box

This dialog box allows you to change the information titles on the main Applications program graphic.

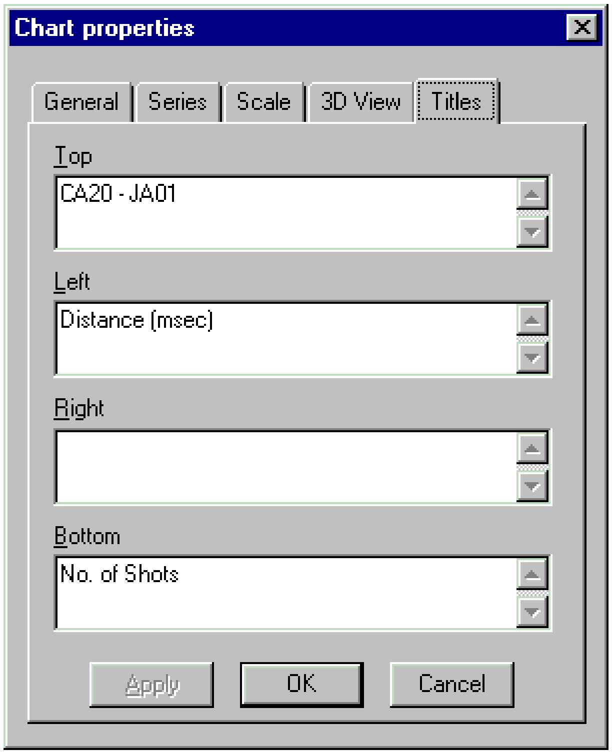


Figure 7.12 Titles Chart Properties Dialog Box

Section VII Analysis Program

FILE MENU

Open a .DEP

The **File / Open a .DEP** command opens a .DEP file from the selected folder.

Save as .TXT

The **File / Save as .TXT** command saves an Analysis Program file (a .DEP) in an ASCII format. This feature is unavailable at this time.

Exit

The **File / Exit** command exits the Analysis Program.

RANGE MENU

Range Parsing

The **Range / Parsing** command accesses the **Range Parsing Dialog Box**. This dialog box allows you to select a subset of the data collected based on shot sequence and/or completion rate. You can specify the starting and ending shot sequence numbers and the maximum completion rate.

Range Settings

The **Range / Settings** command accesses the **Range/Chart Settings Dialog Box**. This dialog box allows you to select the type of information that will be displayed for a selected range.

The Display options allow you to select which path and range data will be displayed.

The Show/Include options allow you to select whether signal strength, threshold, or secondary acoustic data will be displayed.

The Plot Type option allows you to choose between showing the range distance or the deviation in distance shot-to-shot (the rate of change).

The ranges can be viewed in Units of either meters or milliseconds.

When Signal Strength is shown, you can simplify the graphic display by choosing not to show any prediction (see Note below) graphics or to show only completed shot data.

Signal strength predictions are path-time estimates generated by the CMX and are represented by a +6 value in the signal strength graphic. The +6 signal strength prediction value is not a real value.

Range Statistics

The **Range / Statistics** command accesses the **Range Statistics Dialog Box**.

On the right side of the dialog box, general acoustic range data is shown. On the left side of the dialog box, statistics for a specified range is shown. . You select ranges by using the range selector, which is a window immediately below the pulldown menus (File, Range, Summary, and Help).

The **Range Statistics Dialog Box** is tabbed into five windows: Rate, Distance, ∂Distance, Signal, and Unit.

The Range Statistics <u>Rate</u> window shows the statistical percentage rates of shot completions.

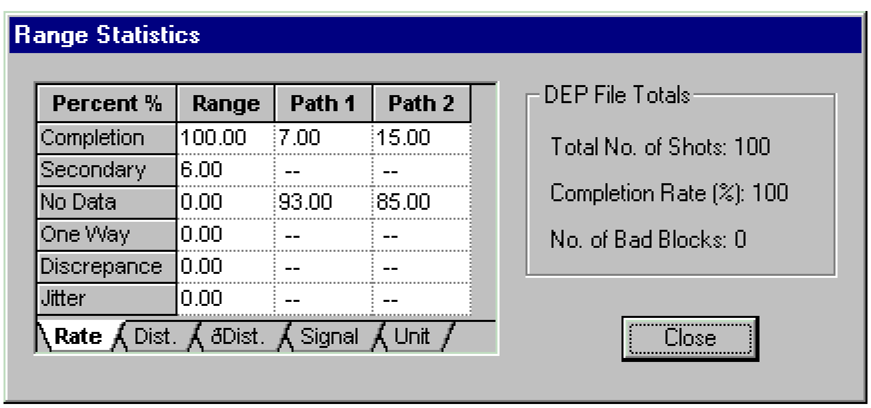


Figure 7.14 Range Statistic Rate Dialog Box

The Range Statistics Distance window shows the range distances for the selected range.

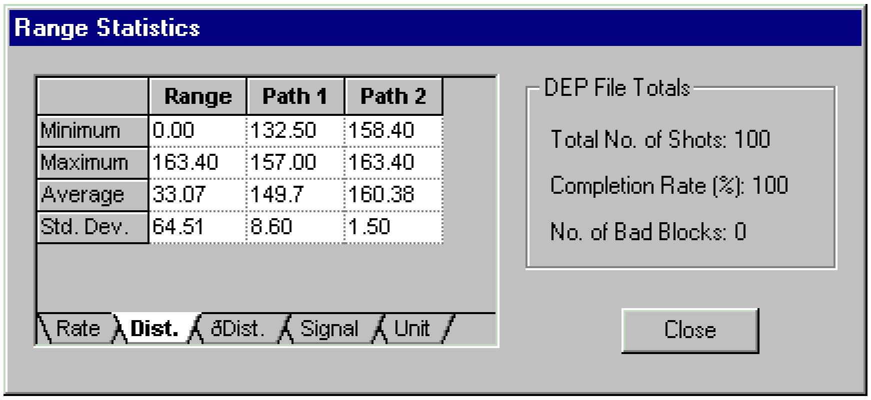


Figure 7.15 Range Statistics Distance Dialog Box

The Range Statistics ∂Distance window shows the distance deviation, or rate or change, shot-to-shot for the selected range.

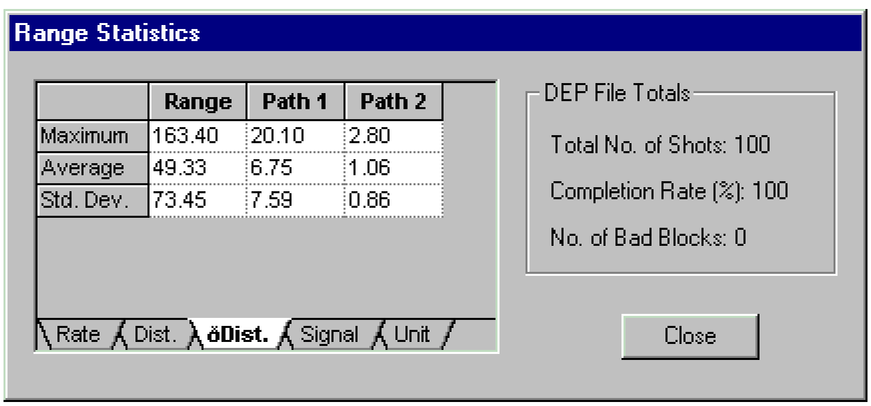


Figure 7.16 Range Statistics ¶Distance Dialog Box

The Range Statistics Signal window shows signal strength information in the selected range.

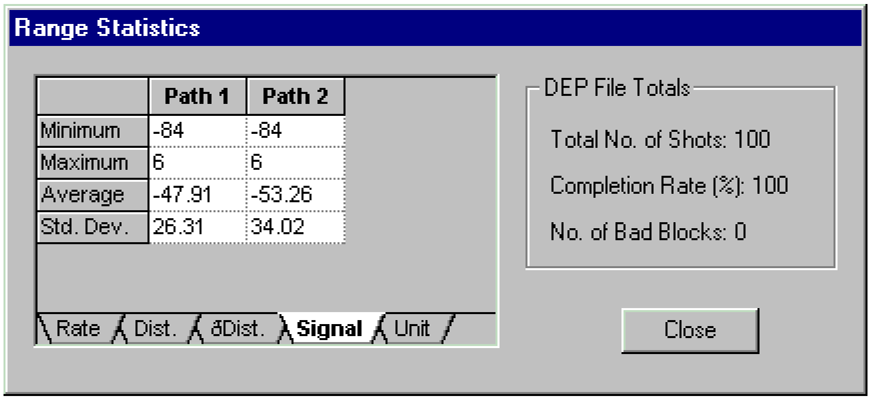


Figure 7.17 Range Statistics Signal Strength Dialog Box

The Range Statistics Unit window shows unit information for the two CMX units in the selected range.

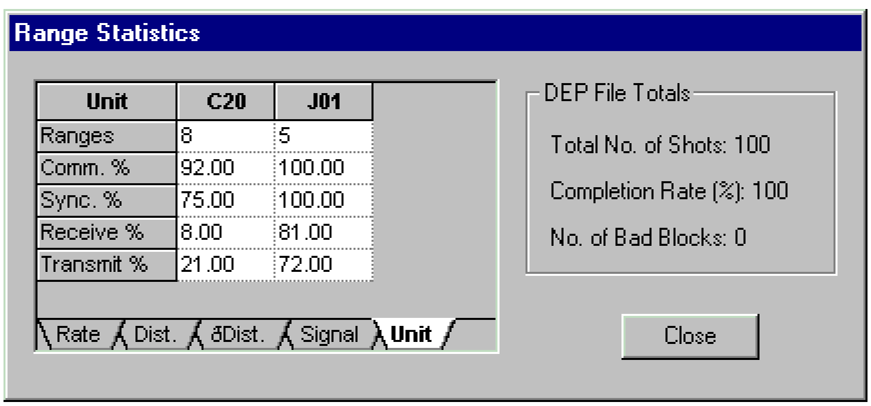


Figure 7.18 Range Statistics CMX Unit Dialog Box

Signal strength predictions are path-time estimates generated by the CMX and are represented by a +6 value in the signal strength graphic. The +6 signal strength prediction value is not a real value.

Print All Ranges

The **Range / Print / All** command prints both a copy of the displayed graphic and a copy of the Analysis Range Statistics for the specified range.

Print Range Plot (Chart)

The **Range / Print / Chart** command prints a copy of the displayed graphic.

Print Range Statistics

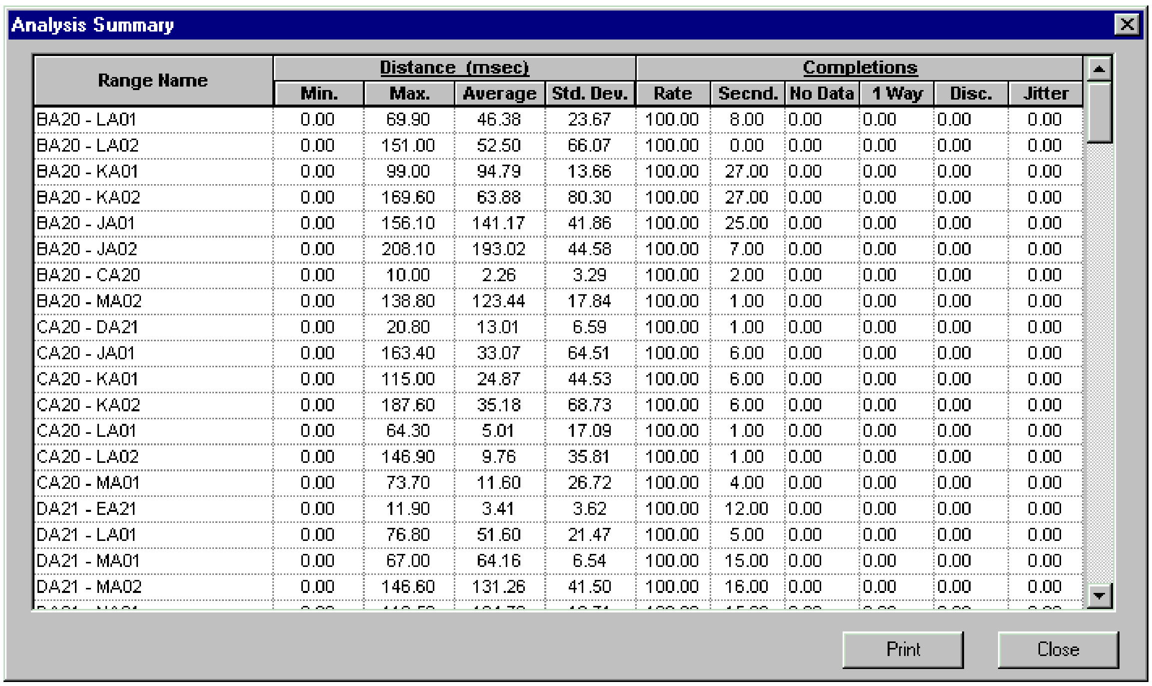
The **Range / Print / Statistics** command prints a copy of the Analysis Range Statistics for the specified range.

SUMMARY MENU

Ranges Summary

The **Summary / Ranges** command accesses the **Ranges Analysis Summary Information Box**.

This information box summarizes range distance and completion information for all ranges in the system.



Analysis Summary

Range Name	Distance (msec)				Completions					
	Min.	Max.	Average	Std. Dev.	Rate	Secnd.	No Data	1 Way	Disc.	Jitter
BA20 - LA01	0.00	69.90	46.38	23.67	100.00	8.00	0.00	0.00	0.00	0.00
BA20 - LA02	0.00	151.00	52.50	66.07	100.00	0.00	0.00	0.00	0.00	0.00
BA20 - KA01	0.00	99.00	94.79	13.66	100.00	27.00	0.00	0.00	0.00	0.00
BA20 - KA02	0.00	169.60	63.88	80.30	100.00	27.00	0.00	0.00	0.00	0.00
BA20 - JA01	0.00	156.10	141.17	41.86	100.00	25.00	0.00	0.00	0.00	0.00
BA20 - JA02	0.00	208.10	193.02	44.58	100.00	7.00	0.00	0.00	0.00	0.00
BA20 - CA20	0.00	10.00	2.26	3.29	100.00	2.00	0.00	0.00	0.00	0.00
BA20 - MA02	0.00	138.80	123.44	17.84	100.00	1.00	0.00	0.00	0.00	0.00
CA20 - DA21	0.00	20.80	13.01	6.59	100.00	1.00	0.00	0.00	0.00	0.00
CA20 - JA01	0.00	163.40	33.07	64.51	100.00	6.00	0.00	0.00	0.00	0.00
CA20 - KA01	0.00	115.00	24.87	44.53	100.00	6.00	0.00	0.00	0.00	0.00
CA20 - KA02	0.00	187.60	35.18	68.73	100.00	6.00	0.00	0.00	0.00	0.00
CA20 - LA01	0.00	64.30	5.01	17.09	100.00	1.00	0.00	0.00	0.00	0.00
CA20 - LA02	0.00	146.90	9.76	35.81	100.00	1.00	0.00	0.00	0.00	0.00
CA20 - MA01	0.00	73.70	11.60	26.72	100.00	4.00	0.00	0.00	0.00	0.00
DA21 - EA21	0.00	11.90	3.41	3.62	100.00	12.00	0.00	0.00	0.00	0.00
DA21 - LA01	0.00	76.80	51.60	21.47	100.00	5.00	0.00	0.00	0.00	0.00
DA21 - MA01	0.00	67.00	64.16	6.54	100.00	15.00	0.00	0.00	0.00	0.00
DA21 - MA02	0.00	146.60	131.26	41.50	100.00	16.00	0.00	0.00	0.00	0.00

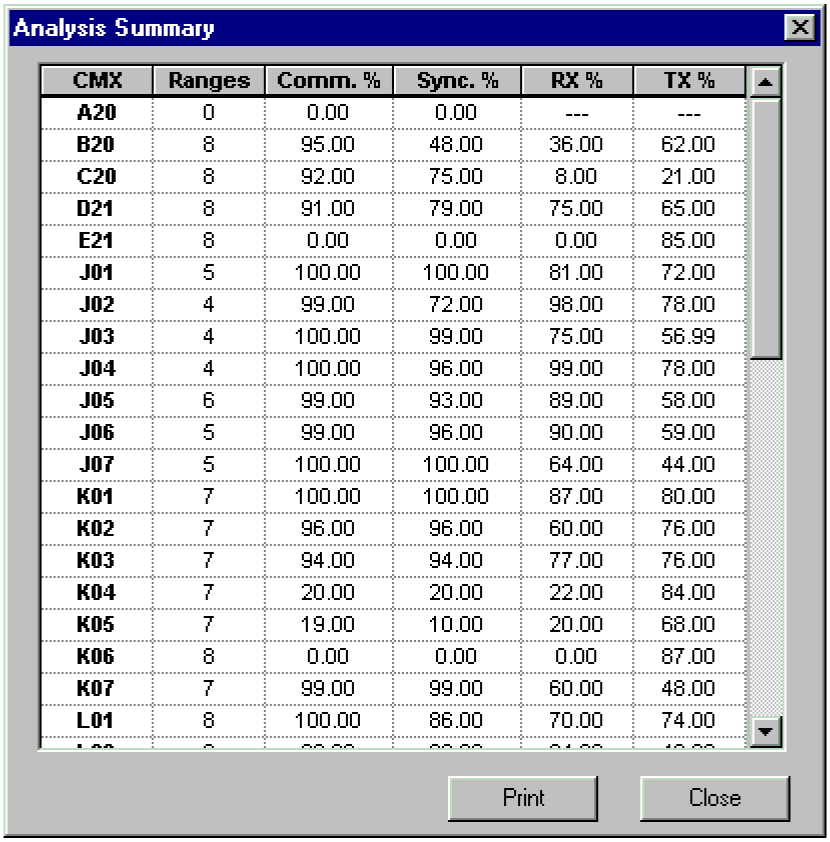
Print Close

Figure 7.19 Ranges Analysis Summary Information Box

Units Summary

The **Summary / CMX Units** command accesses the **Unit Analysis Summary Information Box**.

This information box summarizes the number of ranges, communications success rate, and the transmit and receive percentages for all CMX units in the system.



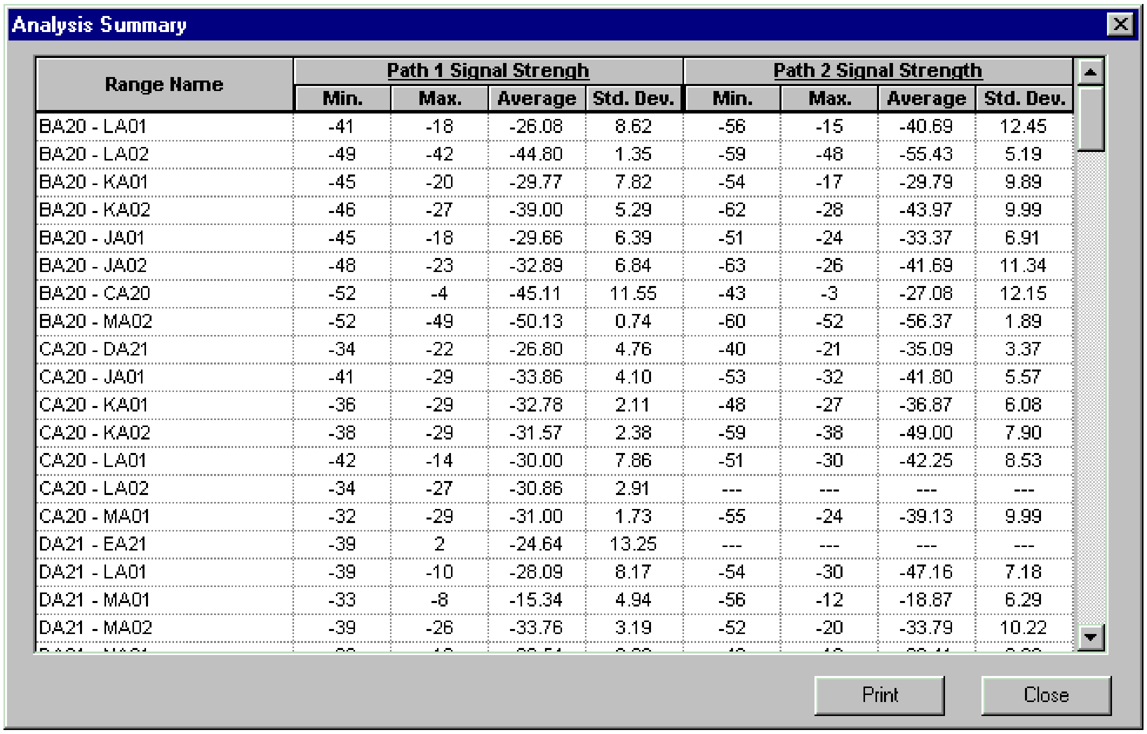
CMX	Ranges	Comm. %	Sync. %	RX %	TX %
A20	0	0.00	0.00	---	---
B20	8	95.00	48.00	36.00	62.00
C20	8	92.00	75.00	8.00	21.00
D21	8	91.00	79.00	75.00	65.00
E21	8	0.00	0.00	0.00	85.00
J01	5	100.00	100.00	81.00	72.00
J02	4	99.00	72.00	98.00	78.00
J03	4	100.00	99.00	75.00	56.99
J04	4	100.00	96.00	99.00	78.00
J05	6	99.00	93.00	89.00	58.00
J06	5	99.00	96.00	90.00	59.00
J07	5	100.00	100.00	64.00	44.00
K01	7	100.00	100.00	87.00	80.00
K02	7	96.00	96.00	60.00	76.00
K03	7	94.00	94.00	77.00	76.00
K04	7	20.00	20.00	22.00	84.00
K05	7	19.00	10.00	20.00	68.00
K06	8	0.00	0.00	0.00	87.00
K07	7	99.00	99.00	60.00	48.00
L01	8	100.00	86.00	70.00	74.00

Figure 7.20 Unit Analysis Summary Information Box

Signals Summary

The **Summary / Path S.S.** command accesses the **Signal Strength Analysis Summary Information Box**.

This information box summarizes Path 1 and Path 2 signal strength information for all ranges in the system.



Range Name	Path 1 Signal Strengh				Path 2 Signal Strength			
	Min.	Max.	Average	Std. Dev.	Min.	Max.	Average	Std. Dev.
BA20 - LA01	-41	-18	-26.08	8.62	-56	-15	-40.69	12.45
BA20 - LA02	-49	-42	-44.80	1.35	-59	-48	-55.43	5.19
BA20 - KA01	-45	-20	-29.77	7.82	-54	-17	-29.79	9.89
BA20 - KA02	-46	-27	-39.00	5.29	-62	-28	-43.97	9.99
BA20 - JA01	-45	-18	-29.66	6.39	-51	-24	-33.37	6.91
BA20 - JA02	-48	-23	-32.89	6.84	-63	-26	-41.69	11.34
BA20 - CA20	-52	-4	-45.11	11.55	-43	-3	-27.08	12.15
BA20 - MA02	-52	-49	-50.13	0.74	-60	-52	-56.37	1.89
CA20 - DA21	-34	-22	-26.80	4.76	-40	-21	-35.09	3.37
CA20 - JA01	-41	-29	-33.86	4.10	-53	-32	-41.80	5.57
CA20 - KA01	-36	-29	-32.78	2.11	-48	-27	-36.87	6.08
CA20 - KA02	-38	-29	-31.57	2.38	-59	-38	-49.00	7.90
CA20 - LA01	-42	-14	-30.00	7.86	-51	-30	-42.25	8.53
CA20 - LA02	-34	-27	-30.86	2.91	---	---	---	---
CA20 - MA01	-32	-29	-31.00	1.73	-55	-24	-39.13	9.99
DA21 - EA21	-39	2	-24.64	13.25	---	---	---	---
DA21 - LA01	-39	-10	-28.09	8.17	-54	-30	-47.16	7.18
DA21 - MA01	-33	-8	-15.34	4.94	-56	-12	-18.87	6.29
DA21 - MA02	-39	-26	-33.76	3.19	-52	-20	-33.79	10.22

Figure 7.21 Signal Strength Analysis Summary Information Box

HELP MENU

Analysis Help Topics

The **Analysis Help Topics** command accesses the Help file.

About Analysis

The **About Analysis** command displays the Analysis software version and copyright information.