RJE INTERNATIONAL, INC.

VADR/RM
VEHICLE ACOUSTIC RECEIVER with OMNI DIRECTIONAL and DIRECTIONAL HYDROPHONES
USER MANUAL
REV 2.1

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Forward

This manual is comprised of figures and text intended to provide descriptions and instructions for the deployment, operation, and maintenance of the RJE International VADR navigation system comprising the VADR Vehicle Acoustic Directional Receiver and the ATT400D Acoustic Target Transponder. The information herein is arranged into chapters and sections as follows:

Chapter 1 – An overview of the VADR receiver. General notes including brief sections describing the applications and physical characteristics of the Receiver itself.

Chapter 2 – Specifications. Section comprised of a list of specifications both general and unique-to-the-unit.

Chapter 3 – Operation and Installation Notes. Sections detail the unpacking and pre-deployment checkout procedures for the VADR.

Chapter 4 - Maintenance. Section details periodic maintenance.

Please forward comments, questions, suggestions, or problems with the text, figures, or equipment to RJE International.

PROPRIETARY MATERIAL

The descriptions, procedural information, photos, figures, drawings, and illustrations in this manual are the property of RJE International, Inc. Materials may not be reproduced or disseminated without the prior written consent of RJE International.

RJE International reserves the right to make changes in design or specifications at any time without incurring any obligation to modify previously installed units.

This manual is provided for information and reference purposes only and is subject to change without notice.

LIMITED WARRANTY

RJE International, Inc. (RJE) guarantees its products to be free from defects in materials and workmanship for a period of one year from the date of shipment. In the event a product malfunctions during this period, RJE's obligation is limited to the repair or replacement, at RJE's option, of any product returned to the RJE factory. Products found defective should be returned to the factory freight prepaid and carefully packed, as the customer will be responsible for any damage during shipment.

Repairs or replacements, parts, labor, and return shipment under this warranty will be at no cost to the customer. This warranty is void if, in RJE's opinion, the product has been damaged by accident or mishandled, altered, or repaired by the customer, where such treatment has affected its performance or reliability. In the event of such mishandling, all costs for repair and return freight will be charged to the customer. All products supplied by RJE that are designed for use under hydrostatic loading have been certified by actual pressure testing prior to shipment. Any damage that occurs as a direct result of flooding is NOT covered by this warranty.

If a product is returned for warranty repair and no defect is found, the customer will be charged a diagnostic fee plus all shipping costs. Incidental or consequential damages or costs incurred as a result of a product's malfunction are not the responsibility of RJE.

All returned products must be accompanied by a Case Number issued by RJE. Shipments without a Case Number will not be accepted.

LIABILITY

RJE shall not be liable for incidental or consequential damages, injuries, or losses as a result of the installation, testing, operation, or servicing of RJE products.

CASE RETURN PROCEDURE

Before returning any equipment to RJE, you must contact RJE and obtain a Case Number. The Case Number assists RJE in identifying the origin and tracking the location of returned items.

When returning items to RJE from outside the United States, follow the checklist presented below to prevent any delays or additional costs.

Include with all shipments two copies of your commercial invoice showing the value of the items and the reason you are returning them. Whenever possible, send copies of the original export shipping documents with the consignment.

Route via courier (FedEx or UPS).

If there is more than one item per consignment, include a packing list with the shipment. It is acceptable to combine the commercial invoice and packing list with the contents of each carton clearly numbered and identified on the commercial invoice.

If it is necessary to ship via air freight, contact RJE for specific freight forwarding instructions. You will be charged for customs clearance and inbound freight.

Insure the items for their full value.

Refer to the RJE issued Case Number on all documents and correspondence.

Prepay the freight.

TITLE

Title shall pass to buyer on delivery to carrier at Irvine, CA. Risk of damage or loss following such delivery shall be to the buyer and RJE International shall in no way be responsible for safe arrival of the shipment. Title shall so pass to buyer regardless of any provision for payment of freight or insurance by RJE International or of the form of shipping documents. If shipment is consigned to RJE International, it shall be for the purpose of securing buyer's obligations under the contract.

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Section

1

INTRODUCTION TO THE VADR/RM VEHICLE ACOUSTIC DIRECTIONAL RECEIVER with REMOTE DIRECTIONAL HYDROPHONE or REMOTE OMNI DIRECTIONAL HYDROPHONE

1.1 Overall Description

The VADR/RM Vehicle Acoustic Directional Receiver with Remotely Mounted Hydrophones is a small, but rugged passive pinger receiver system used to assist operators of ROVs and AUVs to track acoustic sound sources from 8kHz to 45kHz. In addition, the VADR receiver can function as an "acoustic transponder interrogator" and provide accurate range and bearing to targets marked with ATT-400 acoustic transponders. The receiver's transponder mode is compatible with legacy transponders with reply frequencies of 25kHz. Depending on their search requirements, operators can choose between a highly directional or an omni directional hydrophone.

FIGURE 1-1 VADR/RM with VADR-DH

1.2 VADR/RM Remote Receiver with Remote Hydrophone

The VADR/RM Receiver's small size and rugged design allows for easy mounting on a ROV or AUV. Receiver electronics and a remotely mounted hydrophone are contained in pressure housings and are interconnected with the hydrophone cable allowing the hydrophone to be mounted up to 2 meters from the receiver. The receiver is externally powered by the subsea vehicle through a 5-pin SubConn bulkhead connector. In addition, all telemetry data for controlling the VADR receiver, as well as output data, is accessed through this connector.

A RS232 data interface is used to access the directional indication, range to target, operational information, and control functions of the VADR receiver using an ASCII data string. VADR Serial Control Application software is provided to allow the operator easy access to receive and control the necessary directional information to track the acoustic sound source. To track an acoustic sound source, like a "Black Box" beacon, the operator selects the proper frequency through the VADR Serial Control Application software. Once selected, the VADR electronics begins to look for that acoustic signal through a hydrophone mounted on the front of the ROV. The signal is processed by the electronics and feedback is provided to the ROV operator. The operator can then "fly" the ROV to the target area using the feedback provided by the VADR receiver.

In addition, the ROV operator can change the mode of the VADR receiver to track and locate ATT400 series transponders. This option allows the ROV operator to mark locations or equipment underwater and relocate them within one meter. When the system is operating as a transponder interrogator, the feedback to the ROV operator is more accurate because true range and bearing data is delivered to the operator. Each ATT400 transponder can be programmed to reply on one of eight (8) different frequencies allowing the marking of multiple locations within an operational range up to 1000 meters.

Each VADR/RM Receiver comes with the receiving unit, hydrophone (omni directional or highly directional), hydrophone cable, mating connector with pigtail, test cable, VADR Serial Control Application software, RS232 to USB adapter and operations manual.

Section

2

VADR/RM VEHICLE ACOUSTIC RECEIVER with REMOTE HYDROPHONE SPECIFICATIONS

2.1 VADR Vehicle Acoustic Directional Receiver Remote

TABLE 2-1 VADR Vehicle Acoustic Directional Receiver Remote Specifications*

Pinger Receiver Mode	
Receiver Bandwidth	8 kHz to 45 kHz in 100 Hz increments
Receiver Sensitivity	-100 dB re 1μPa @ 1 meter
Transponder Interrogator Mode	
Interrogator Frequency	26 kHz
Receive Frequencies	25, 27, 28, 29, 30, 31, 32, 33, 34 kHz
Acoustic Source Level	+190 dB re 1 μPa @ 1 meter
Range Capability:	Up to 1000 meters based on model of ATT-400
Directional Hydrophone	
Beam Width	40 ± 5 degrees conical
Bearing Indication:	4 BINS: Left or right, 3, 8, 20 or > 20 degrees
Bearing Accuracy	5 degrees nominal in BINS 1 and 2
Bearing Resolution	2 degrees
Omni Bearing Hydrophone	
Beam Width	Omni Directional
Bearing Indication:	0-360 degrees in 1 degree increments
Bearing Accuracy	5 degrees nominal

Bearing Resolution	1 degree
Remote Hydrophone interface	
Connector	SubConn MCBH8F, 8-pin female bulkhead
Remote Hydrophone cable	Custom cable, Subconn MCIL8M to MCIL8F, 8-pin male to 8-pin female
Control and Power Interface	
RS232	9600 Baud, No Parity, 8 Data Bits, and 1 Stop Bit
Connector	SubConn MCBH5F, 5-pin female bulkhead
Pigtail Connector	SubConn MCIL5M, 5-pin male with locking sleeve
Power Source	8-32 VDC: 24 VDC Nominal
Current drain:	40 ma @ 24 VDC continuous
Mechanical/Environmental	
Housing	Aluminum, Hard Coat Anodized
Operational Depth	VADR/RM-6000M: 6000 meters (19850ft)
Dimensions	VADR/RM-6000M: 12.0 cm Ø x 24.5 cm L (4.7" Ø x 9.7" L)
Weight	VADR/RM-6000M: Air 4.0 Kg (8.5 lbs.). Water: 1.4Kg (3.1 lbs.) VADR-DH: Air 1.8 Kg (4.0 lbs.). Water: 0.8 Kg (1.8 lbs.) VADR-ODH: Air 2.0 Kg (4.5lbs.). Water: 0.8 Kg (1.8 lbs.)

*** Specifications are subject to change**

Section

3

OPERATIONS & INSTALLATION NOTES

3.1 Introduction

The VADR Vehicle Acoustic Directional Receiver Remote is an externally powered directional receiver and transponder interrogator with a remotely mounted directional or omni directional hydrophone, designed to be operated from the surface when fixed mounted to a subsea vehicle. The receiver can be operated in a passive mode for pinger relocation or active mode for transponder relocation and ranging. A RS232 interface provides navigation data to the operator and allows the operator to control various functions of the VADR with the VADR Serial Control Application software.

Once an acoustic sound source has been received (acoustic beacon or ATT-400 series transponder), the VADR provides accurate range and bearing to the source.

3.2 VADR System Components

The VADR System includes:
VADR-RM-6000M Vehicle Acoustic Directional Receiver Remote (FIGURE 3-1A)
Remote Hydrophone cable (FIGURE 3-1B)
Remote Directional Hydrophone VADR-DH (FIGURE 3-1C)
Remote Omni Directional Hydrophone VADR-ODH (FIGURE 3-1D)
Mating Connector Pigtail (FIGURE 3-1E)
Test Cable (FIGURE 3-1F)
VADR Serial Control Software (FIGURE 3-1G)
RS232 to USB Adapter (FIGURE 3-1H)

FIGURE 3-1A VADR-RM-6000M Receiver

FIGURE 3-1B Remote Hydrophone Cable

FIGURE 3-1C VADR-DH Remote Directional Hydrophone

FIGURE 3-1D VADR-ODH Remote Omni Directional Hydrophone

FIGURE 3-1E
Pigtail

FIGURE 3-1F
Test Cable

FIGURE 3-1G
Application Software

FIGURE 3-1H
RS232 to USB
Adapter

3.3 Unpacking

When opening the shipping carton, carefully inspect each piece of equipment as it is unpacked and report any damage to the freight carrier and to RJE International.

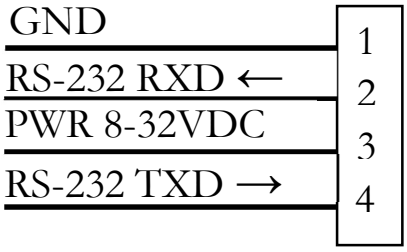
As with any sophisticated electronic equipment, RJE International products should be handled with a reasonable amount of care during unpacking, transporting, and storing. Pay particular attention to make sure that:

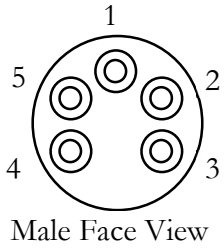
- The end caps are properly secured, and the end cap screws are tightened.
- There is no damage to the housing.
- The mating connector pigtail is in good condition.

3.4 Connector Wiring

All functions of the VADR Vehicle Acoustic Directional Receiver are accessed by the RS232 port on the end cap connector. Note wiring and connector orientation in Figure 3-2 for the SubConn connectors.

Note: Pin 5 is unused





MCIL5M Connector Cable Plug Face View

FIGURE 3-2 VADR SubConn MCIL5M Connector Wiring

3.5 Powering Up and Shutting Down the VADR

Power is supplied to the electronics of the VADR through an underwater connector at the base of the unit. Application of 8-32 VDC via the underwater connector will enable the receiver to turn on.

3.6 Installing the VADR Receiver onto the Subsea Vehicle

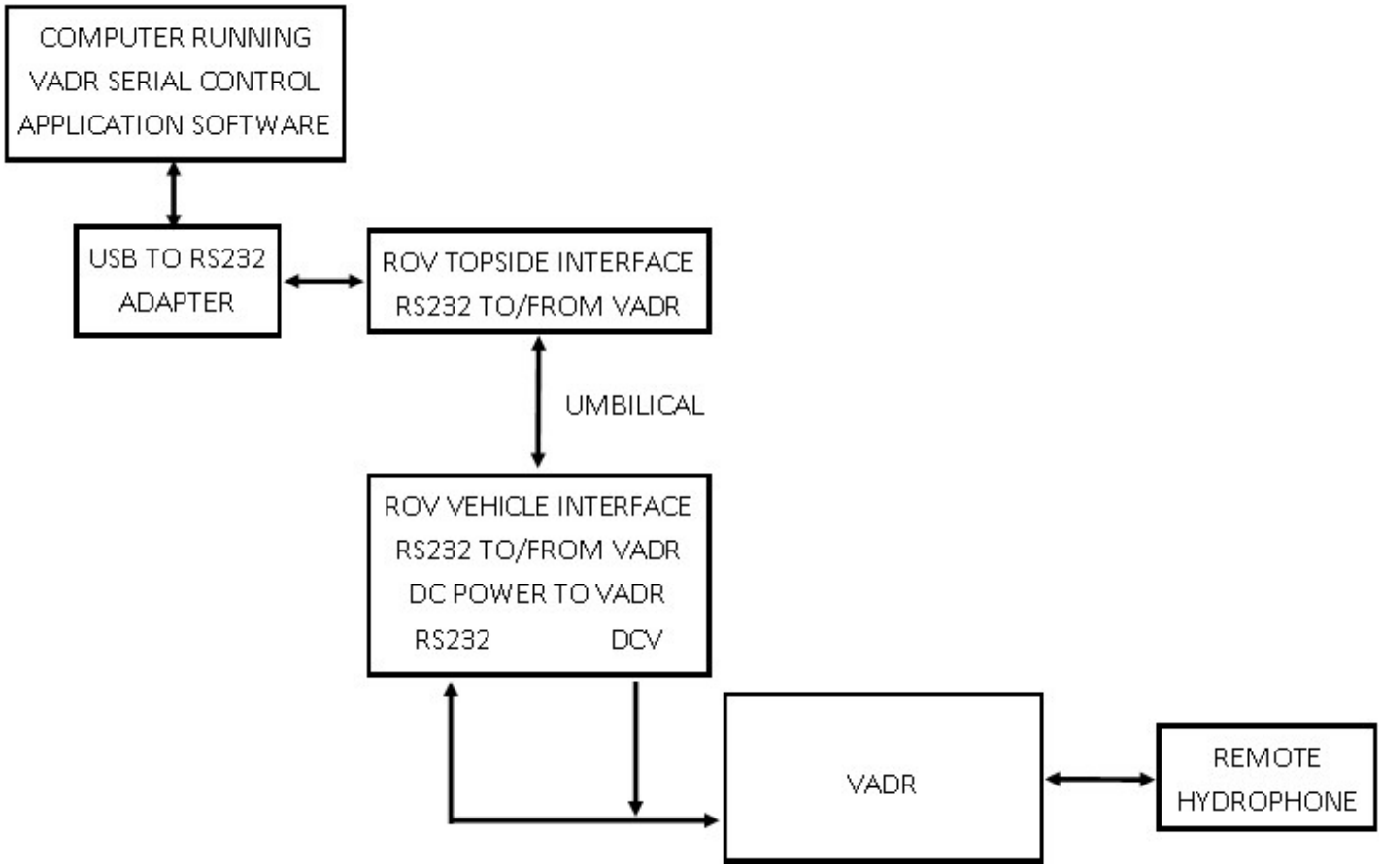


FIGURE 3-4 Block Diagram, Installation of the VADR Receiver

When mounting the receiver and its components on a subsea vehicle, ensure that:

- The receiver, hydrophone and interconnecting cable are clear of any noise generating equipment such as motors and high voltage cables.
- The mounting hardware is aluminum or plastic, eliminating any issues of dissimilar metals and corrosion.

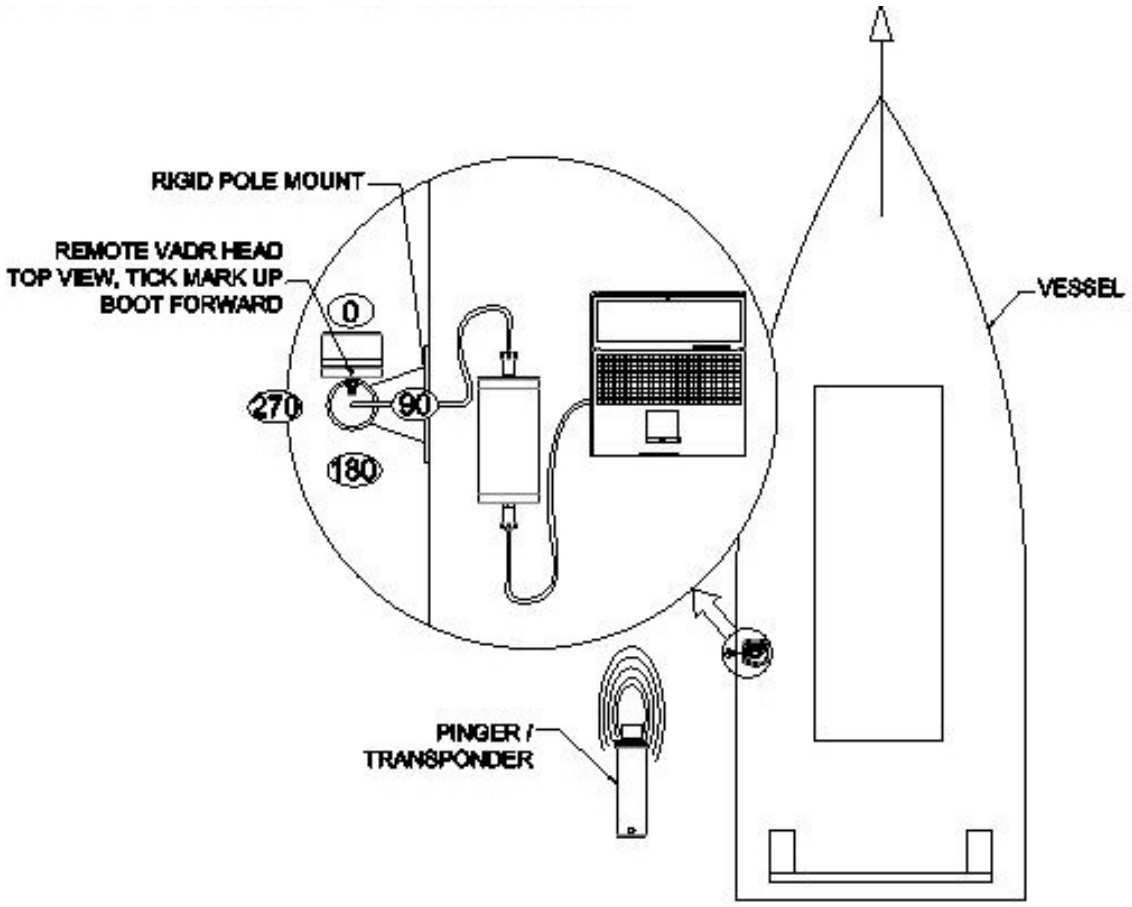
- Pay close attention to instructions for placement and orientation of the hydrophone on the vehicle. The directional hydrophone and Omni Directional Hydrophone have unique mounting requirements.
- When using the VADR remote in omni bearing mode, the omni hydrophone must be fix mounted to the vessel or vehicle with the array alignment mark oriented toward the bow as shown below.

FROWARD

FIGURE 3-5
Directional Hydrophone
Mounting Orientation

DOWN

FIGURE 3-6
Omni Directional Hydrophone
Mounting Orientation



DIRECTIONAL HYDROPHONE ORIENTATION TO VESSEL DIRECTION, SIDE VIEW.

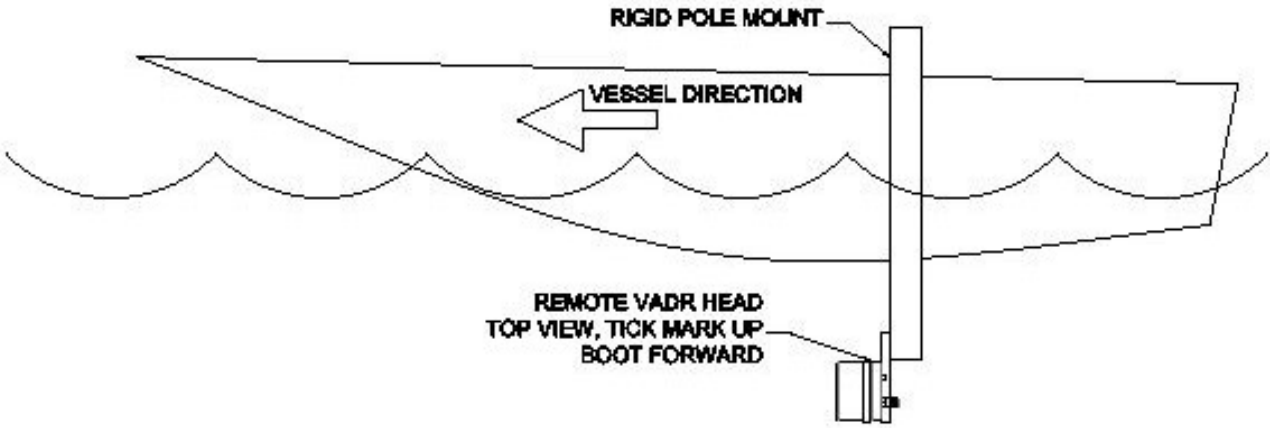
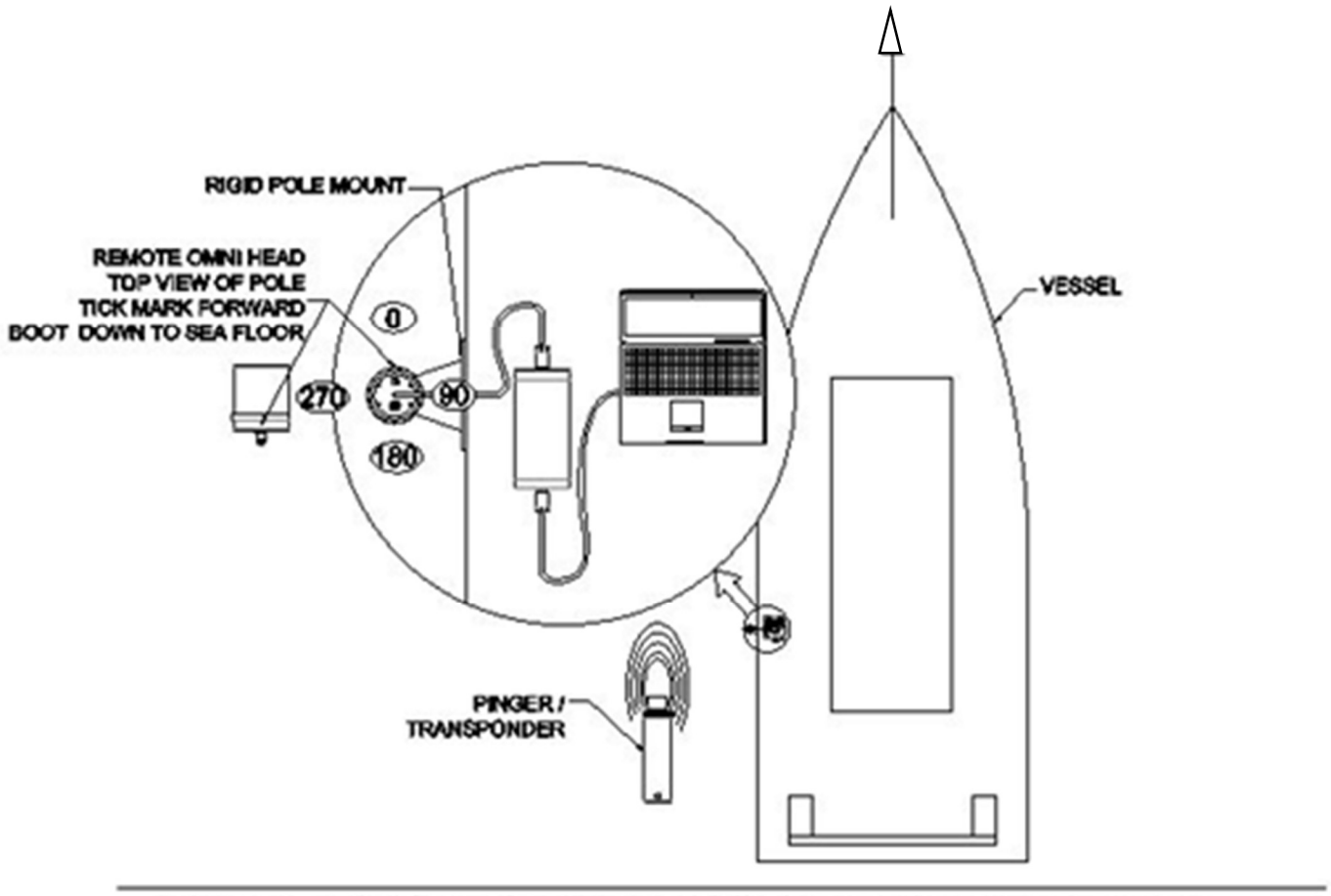


FIGURE 3-7 Directional Hydrophone Mounting and Orientation



OMNI DIRECTIONAL HYDROPHONE ORIENTATION TO VESSEL DIRECTION, SIDE VIEW.

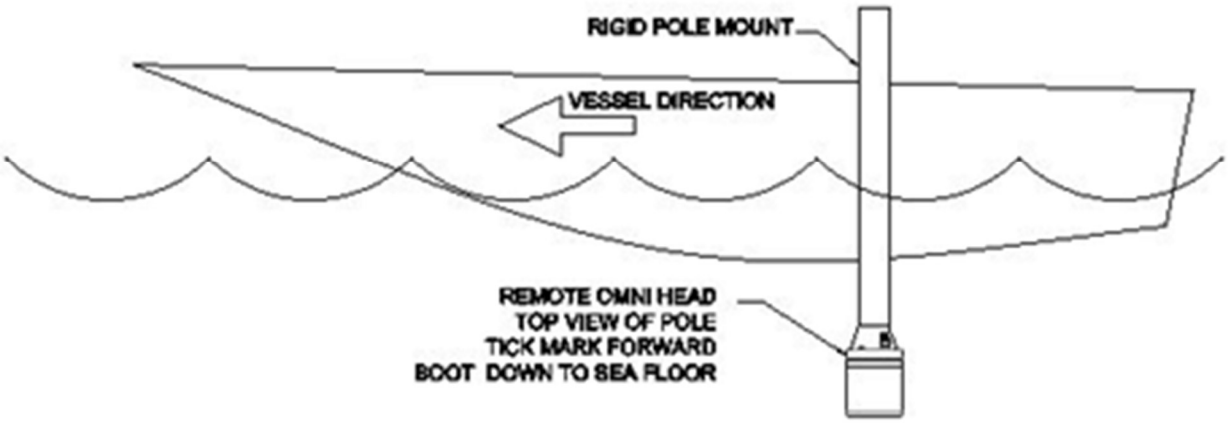


FIGURE 3.8 Omni Directional Hydrophone Mounting and Orientation

3.7 Controlling the VADR Receiver

The VADR receivers are accessed through a RS232 communications protocol that allows the operator to control the functions of the receiver and monitor the tracking data.

Control functions include adjusting the receive frequency, changing mode from active to passive, changing the hydrophone type from Directional to Omni. The VADR receiver will also provide tracking data that includes range and bearing to an ATT-400 transponder in active mode or signal strength and bearing to an acoustic sound source that is operating from 8 kHz to 45 kHz in passive mode.

The output is an ASCII data string that allows the operator to use a common terminal program to connect to the VADR receiver and to incorporate coding into the existing software package. Below is a description of the ASCII data string.

3.8 Passive Directional Mode

Passive directional mode is for use with the Directional Remote Hydrophone.

When the receiver detects a ping in "Passive Directional Data Mode", it will output an ASCII data string in the following format.

(Example String: ...$P, F27.0, R3, S07, D00, -2DB<CR><LF>)

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TABLE 3-1 Passive Data String Format Directional Hydrophone

Output String / Parameter	Corresponding Indication
$P(space)Fxx.x(space)Bn(space)Sxx(space)Dxx(space)xxdB<CR><LF>	P indicates a received ping was detected in Passive mode. Fxx.x is the selected receive frequency in kHz. Bn represents the corresponding bearing indication. Sxx is a relative measure of the received signal strength. Dxx is the AGC setting. xxdB is receiver gain.
Fxx.x = Selected receive frequency	xx.x = Receive frequency in kHz. 8.0kHz to 45.0kHz in 100Hz increments
Bn = Corresponding bearing indication	Bn = 00 (zero zero), target is dead ahead B = L for left of target. B = R for right of target. n = Numbers 1 to 4 indicating the magnitude of the bearing angle as follows: 1 – Bearing is as much as 3 degrees off target. 2 – Bearing is as much as 8 degrees off target. 3 – Bearing is as much as 20 degrees off target. 4 – Bearing is off by greater than 20 degrees.
Sxx = Relative Signal strength (like bars on a cell phone)	xx = Numbers 1 – 10 indicating the relative magnitude of the detected ping - 1 being minimum detectable and 10 being receive limit or saturated.
Dxx	AGC setting.
xxdB	Receiver Gain in dB

3.9 Active Directional Mode

Active directional mode is for use with the Directional Remote Hydrophone.

In Active Directional Mode" the VADR transmits a 26 kHz interrogate pulse to the ATT-400 once per second. Each time the system transmits it will output an ASCII string indication. The string will consist of a **'$T',** carriage return and linefeed, in the following format.

(Example String: $T<CR><LF>)

When the system detects a reply from a transponder corresponding to the selected receive channel it will output an ASCII string. The output string will consist of a **'$A'**, space, channel setting, space, bearing indication, space, signal strength level, space, range, carriage return and linefeed, in the following format.

(Example String: …$A, F27.0, R2, R0179, D00, -2DB<CR><LF>)

TABLE 3-2 Active Data Stream Format Directional Hydrophone

Output String / Parameter	Corresponding Indication
$T<CR><LF>	Each time the system transmits.
$A(space)Fxx.x(space)Bn(space)Rxxxx(space)Sxx(space)Dxx(space)xxdB<CR><LF>	$A indicates a received ping was detected in Active mode. Fxx.x is the selected receive frequency in kHz. Bn represents the corresponding bearing indication. Rxxxx Represents Range to transponder in meters. Sxx is a relative measure of the received signal strength. Dxx is the AGC setting. xxdB is receiver gain.
Fxx.x = Selected receive frequency	xx.x = Receive frequency for selected channel. Frequencies correspond to channel number as follows; 0- 25kHz Legacy, ATT-400 Channel. 1-27.0kHz; 2-28.0kHz; 3-29.0kHz; 4-30.0kHz; 5-31.0 kHz; 6-32.0 kHz; 7-33.0 kHz; 8-34.0 kHz
Bn = Corresponding bearing indication	Bn = 00 (zero zero), target is dead ahead. B = L for left of target. B = R for right of target. n = Numbers 1 to 4 indicating the magnitude of the bearing angle as follows: 1 – Bearing is as much as 3 degrees off target. 2 – Bearing is as much as 8 degrees off target. 3 – Bearing is as much as 20 degrees off target. 4 – Bearing is off by greater than 20 degrees.
Rxxxx = Range to transponder in meters	xxxx = 000 – 1000 meters
Sxx = Relative Signal strength (like bars on a cell phone)	xx = Numbers 1-10 indicating the relative magnitude of the detected ping - 1 being minimum detectable and 10 being receive limit or saturated.
Dxx	AGC setting
xxdB	Receiver Gain in dB

3.10 Passive Omni Mode

Passive omni mode is for use with the Omni bearing Remote Hydrophone.
When the receiver detects a ping in "Passive Omni Data Mode", it will output an ASCII data string in the following format.

(Example String: …$OP, F37.0, B181, S07, D00, -2DB<CR><LF>)

TABLE 3-3 Passive Data String Format Omni Hydrophone

Output String / Parameter	Corresponding Indication
$OP(space)Fxx.x(space)Bnnn(space) Smm(space)DDD(space)YYYDB<CR> <LF>	P indicates a received ping was detected. Fxx.x is the selected receive frequency. Bnnn represents the corresponding bearing Indication in degrees. Smm is a relative measure of the received signal strength DDD indicates AGC gain mode YYYDB reports current ACG gain
Fxx.x = Selected receive channel	F = Frequency Selected following corresponding frequencies. 8kHz to 45kHz in 100Hz increments
Bnnn = Corresponding bearing indication	The Bearing displayed is 0 – 360 degrees. 0 degrees indicates the pinger is straight ahead. 90 degrees indicates the pinger is to the starboard or right. 180 degrees the pinger is directly aft or behind. 270 degrees the pinger is to the port or left.
Smm = Relative Signal strength (like bars on a cell phone)	mm = Numbers 1 – 10 indicating the relative magnitude of the detected ping - 1 being minimum detectable and 10 being receive limit or saturated.
DDD = AGC gain mode	DDD =D00 for auto AGC gain control. (default) DDD =MAN for manual AGC gain control. **Factory test only**
YYYDB = Current AGC gain setting	YYYDB = AGC gain in DB. -28DB to 0dB

3.11 Active Omni Mode

Active Omni mode is for use with the Omni Bearing Remote Hydrophone.
In Active Omni Mode" the VADR transmits a 26 kHz interrogate pulse to the ATT-400 once per second. Each time the system transmits it will output an ASCII string indication. The string will consist of a **'$T',** carriage return and linefeed, in the following format.

(Example String: $T<CR><LF>)

When the system detects a reply from a transponder corresponding to the selected receive channel it will output an ASCII string. The output string will consist of a **'$A'**, space,

channel setting, space, bearing indication, space, signal strength level, space, range, carriage return and linefeed, in the following format.

(Example String: …$OA, F27.0, B181, R0179, MAN,-2DB<CR><LF>)

TABLE 3-4 Active Data Stream Format Omni Hydrophone

Output String / Parameter	**Corresponding Indication**
$T<CR><LF>	Each time the system transmits
$OA(space)Fxx.x(space)Bnnn(space)Rxxx(space)D00(space)YYYDB<CR><LF>	A indicates a received ping was detected. Fxx.x is the selected channel frequency. Bnnn represents the corresponding bearing Indication in degrees. Rxxx Represents Range to transponder in meters. DDD indicates AGC gain mode YYYDB reports current ACG gain
Fxx.x = Selected receive channel	F = Transponder frequency selected with the following corresponding frequencies. 25 kHz; 27 kHz; 28 kHz; 29 kHz; 30 kHz; 31 kHz; 32 kHz; 33 kHz; 34 kHz
Bnnn = Corresponding bearing indication	The Bearing displayed is 0 – 360 degrees. 0 degrees indicates the pinger is straight ahead. 90 degrees indicates the pinger is to the starboard or right. 180 degrees the pinger is directly aft or behind. 270 degrees the pinger is to the port or left.
Rxxxx = Range to transponder in meters	xxx = 0000 – 1000meters
DDD = AGC gain mode	DDD =D00 for auto AGC gain control. (default) DDD =MAN for manual AGC gain control. **Factory test only**
YYYDB = Current AGC gain setting	YYYDB = AGC gain in DB. -28DB to 0dB

3.12 Using the VADR Control Application Software when Operating the VADR Remote with Directional Hydrophone

THE VADR CONTROL APPLICATION IS FOR USE WITH THE DIRECTIONAL REMOTE HYDROPHONE ONLY

To support the VADR receiver, a simple user interface software application is provided to assist in controlling the receiver's functions and accessing the tracking data. This interface is Windows based and requires Mouse Clicks to access the software.

3.12.1 Installing and setting up the VADR Control Application Software

- Install memory stick into PC USB port and navigate to memory stick folder. Invoke VADRsetup.com, follow prompts to install VADR Serial Control Application.

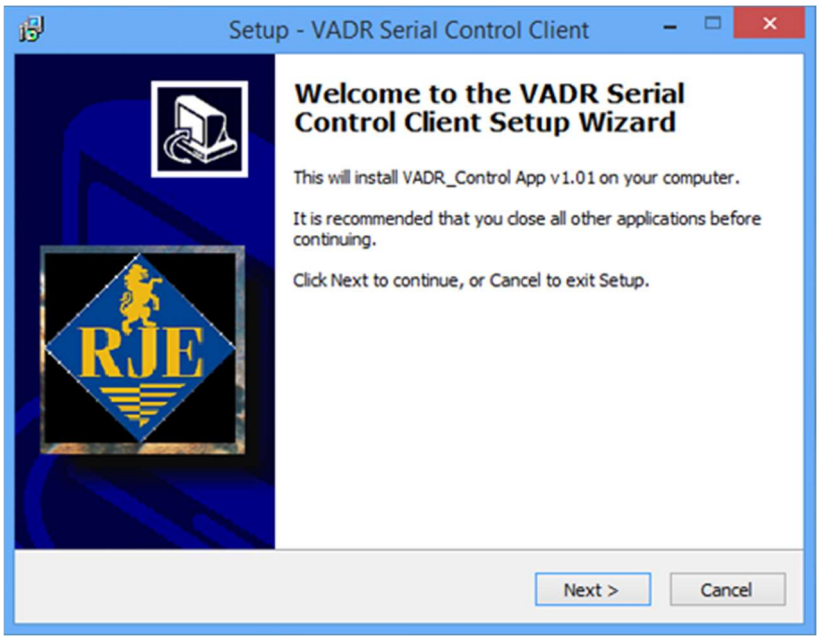

FIGURE 3.9 VADR Setup Screen

- Connect the test cable to the VADR receiver and the PCs' COM or USB port via the RS232 adapter. Ensure that the VADR Serial Control Application Software is loaded on the PC being used. Power up the test cable using the supplied AC adapter.

FIGURE 3.10 VADR/RM Test Setup

- Right click the COM PORT drop down menu and select the COM port that you will be using on your PC. Keep in mind that you may need to use the RS232 to USB adapter provided with the test cable if your PC does not have a COM Port. Right click OPEN COMMS button, observe VADR communicating with PC.

- It is highly recommended that the operator become familiar with the operation of the VADR Serial Control Application Software. Use an ATT-400, Legacy transponder or pinger on the bench in air for this training.

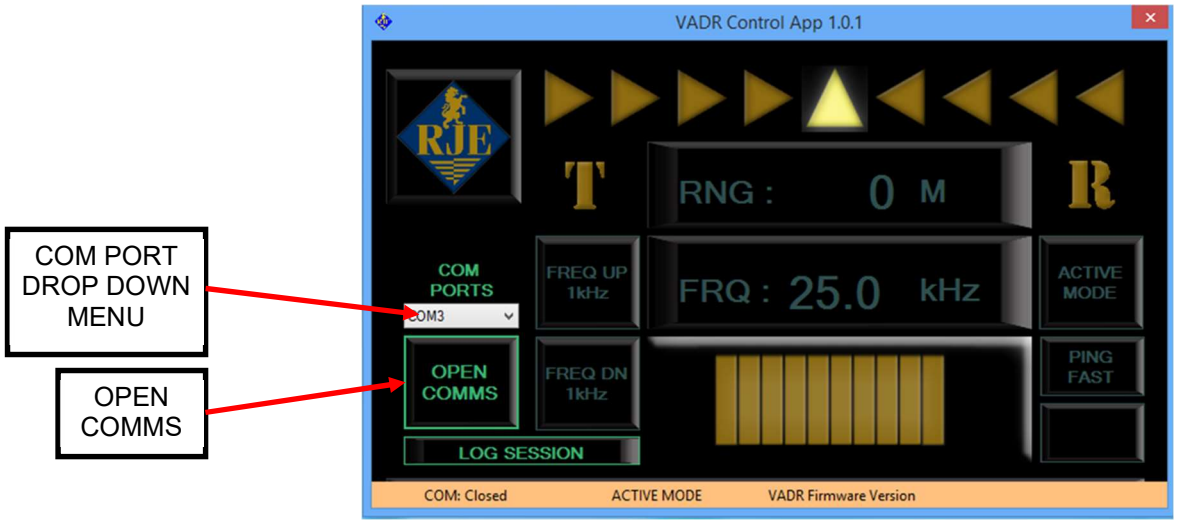

FIGURE 3.11 Connection Mode Screen

3.12.2 Controls and Display of the VADR Serial Control Software.

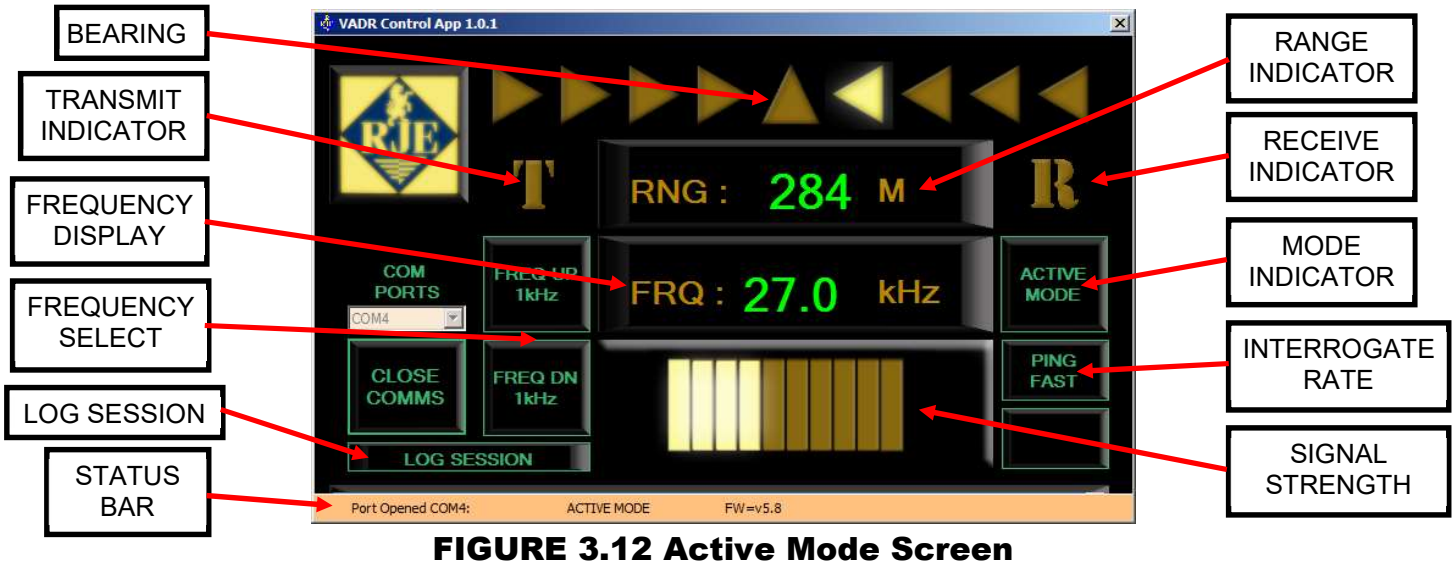

FIGURE 3.12 Active Mode Screen

TABLE 3.5 Active Mode Controls

DISPLAY	DESCRIPTION
▷▷▷▷△◁◁◁◁ **Bearing Indicator**	• Nine Arrows show the direction adjustment required to determine bearing to the target. • When the unit is pointed directly at the target, only the center arrow is illuminated. • As the direction moves off center to the left, arrows to the left of the center arrow will be illuminated. Likewise, when the direction moves off center to the right, arrows to the right of the center arrow will be illuminated. • The number of arrows displayed shows the movement required to correct the aim to the target. One arrow indicates the direction is off about 5 degrees. Two arrows indicate the direction is off as much as 10 degrees. Three arrows indicate the direction is off by as much as 20 degrees. Four arrows indicate the direction is off by more than 20 degrees.
T	Marker flashes each time the Receiver sends an interrogation signal.

FRQ:	Frequency currently selected. 25kHz Legacy transponders, ATT-400 Channel Switch setting: 0=27.0 kHz 1=28.0 kHz 2=29.0 kHz 3=30.0 kHz 4=31.0 kHz 5=32.0 kHz 6=33.0 kHz 7=34.0 kHz.
FREQUENCY SELECT	Right click to raise or lower selected frequency by 1kHz.
LOG SESSION	Right click to open “save as” window.
STATUS BAR	Shows open COM PORT, current mode and firmware revision.
RXXXX:	Displays the Range in meters to the ATT-400 set to the selected Channel.
R	Indicator illuminates each time the Receiver receives an acoustic signal at the selected frequency.
MODE INDICATOR	Indicates current mode. Right click to change modes.
INTERROGATE RATE	Increases repetition rate from 1 pulse per second to 2 pulses per second
SIGNAL STRENGTH	Relative Signal strength (like bars on a cell phone)

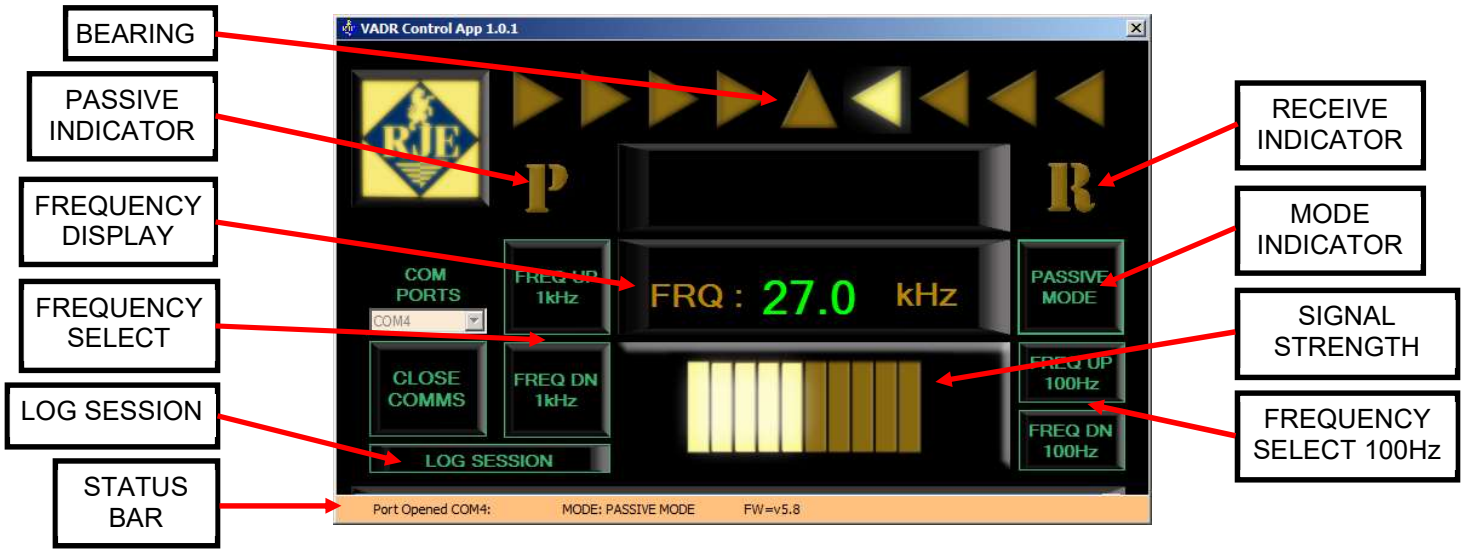

FIGURE 3.13 Passive Mode Screen

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TABLE 3.6 Passive Mode Controls

DISPLAY	DESCRIPTION
▷▷▷▷△◁◁◁◁ **Bearing Indicator**	• Nine Arrows show the direction adjustment required to determine bearing to the target. • When the unit is pointed directly at the target, only the center arrow is illuminated. • As the direction moves off center to the left, arrows to the left of the center arrow will be illuminated. Likewise, when the direction moves off center to the right, arrows to the right of the center arrow will be illuminated. • The number of arrows displayed shows the movement required to correct the aim to the target. One arrow indicates the direction is off about 5 degrees. Two arrows indicate the direction is off as much as 10 degrees. Three arrows indicate the direction is off by as much as 20 degrees. Four arrows indicate the direction is off by more than 20 degrees.
P	Indicates Passive Mode.
FRQ:	Frequency currently selected from 8 kHz to 45 kHz.
FREQUENCY SELECT 1kHz	Right click to raise or lower selected frequency by 1kHz.
LOG SESSION	Right click to open “save as” window.
STATUS BAR	Shows open COM PORT, current mode and firmware revision.
R	Indicator illuminates each time the Receiver receives an acoustic signal at the selected frequency.
MODE INDICATOR	Indicates current mode. Right click to change modes.
FREQUENCY SELECT 100Hz	Right click to raise or lower selected frequency by 100Hz.
SIGNAL STRENGTH	Relative Signal strength (like bars on a cell phone).

3.13 Session Logging

To save a text file of the data, right click the Log Session button. A "Save As" window will open. Enter name of session file and select directory or folder for data storage file. The VADR outputs data strings. See section 3.10 Output Data Strings for more information.

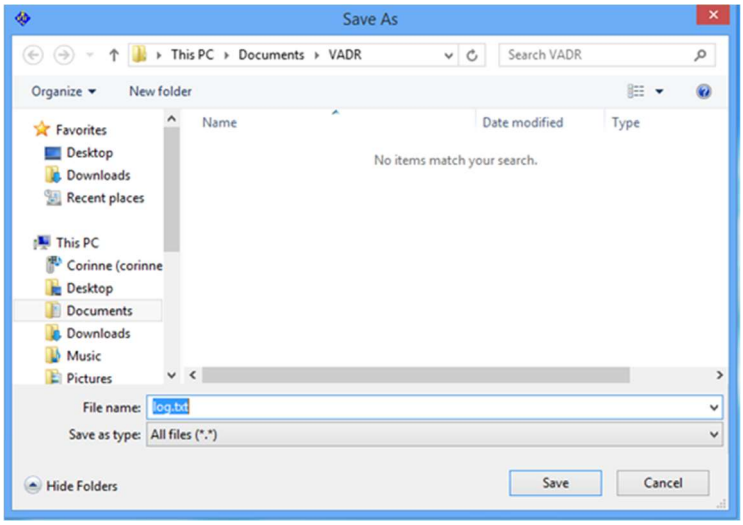

FIGURE 3.14 Session "Save As" window

3.14 Controlling The VADR Receiver with TTY Terminal

The VADR receiver is accessed through a RS232 communications protocol that allows the operator to control the functions of the receiver and monitor the tracking data.

Control functions include adjusting the receive frequency, changing mode from active to passive, and setting AGC. The VADR receiver will also provide tracking data that includes range and bearing to an ATT-400 transponder in active mode or signal strength and bearing to an acoustic sound source that is operating from 8 kHz to 45 kHz in passive mode.

The input or output is an ASCII data string that allows the operator to use PuTTY, a common terminal program, to connect to the VADR receiver and to incorporate coding into the existing software package. To operate the VADR via ASCII commands, switch to Advanced Mode.

3.15 Control Application Software Advanced Mode

Right click the RJE logo on the VADR Control App window. Enter – VADR – at the password window and click OK.

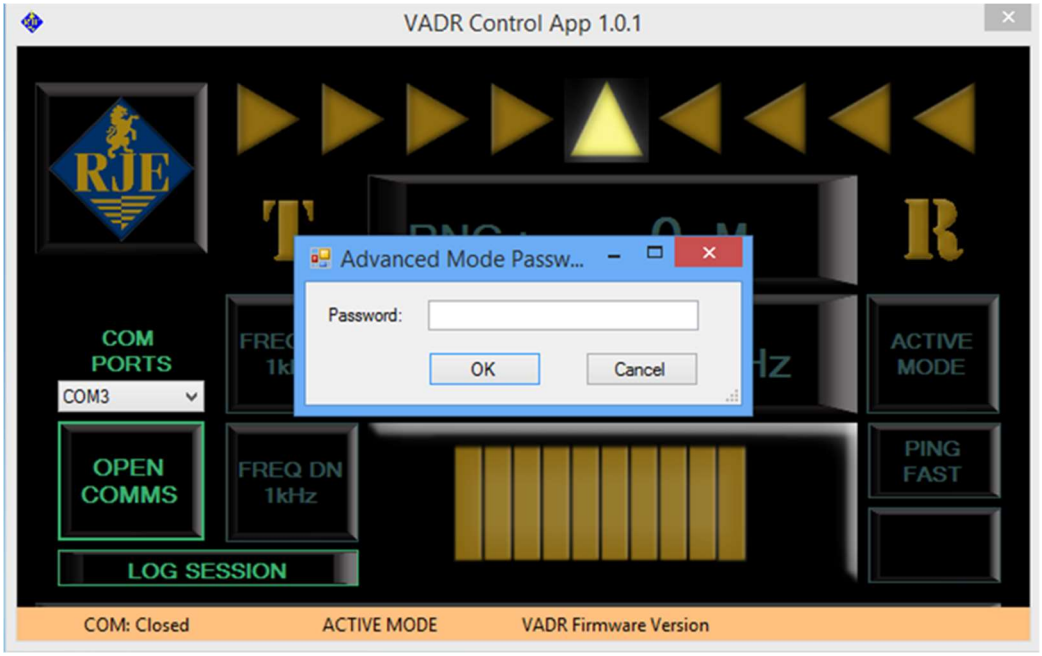

FIGURE 3.15 Password Window

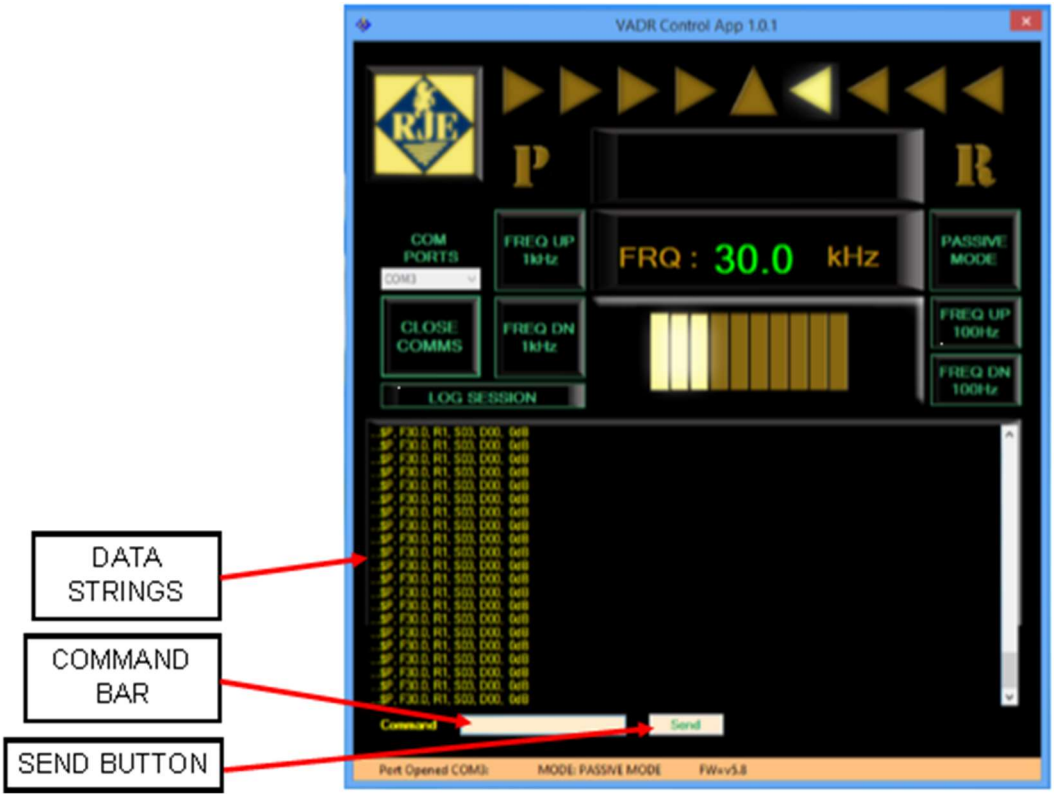

FIGURE 3.16 Advanced Mode Screen

3.16. Advanced Mode Screen

User commands are sent via the RS232 interface. The commands consist of single ASCII characters which are processed immediately. Enter ASCII characters in the command bar and click the send button. Observe data in the data strings window. See Table 3-7 User Commands.

3.17 Operating the VADR Remote with Omni Bearing Hydrophone

An RS-232 terminal program such as Procomm or Hyper terminal is used to control the VADR functions and monitor the output. This interface is not Windows based and requires keystrokes to access the software.

Switch on the VADR power and enter omni bearing mode. The "O" command toggles between omni bearing and directional modes. Use the "I" (show info) command to report which mode is currently selected along with other status data such as receive frequency selected and hydrophone orientation.

3.17.1 Active mode operation

- Use the 0-8 key to select the appropriate receive channel.
- Descend to the approximate depth of the target transponder.
- Begin a slow 360° turn, observing the output for an indication of a received signal and a bearing to the transponder.
- Bearing readings are 0 – 359 degrees referenced to the bow of the vessel/vehicle. So that 0 degrees is dead ahead, 90 degrees is to the starboard, 270 degrees is to the port and 180 degrees is to the aft.
- Observe the bearing reading and slowly adjust the vessel/vehicle heading until the bearing reading is 0 degrees. This indicates that the selected transponder is dead ahead.
- View the **Rxxx**: parameter in the output string to acquire an accurate range to the target.
- When moving towards the target, monitor the range and bearing on the VADR
- output.
- If the range suddenly begins to increase, it is possible to have passed over or under the transponder.
- Use the 0-8 keys to obtain range and bearing to target transponders operating at other frequencies.

3.17.2 Passive mode operation

- Use the "**K" "L" "."(period) and "," (comma)** keys to select the appropriate pinger receive frequency.
- Descend to the approximate depth of the target pinger.
- Begin a slow 360° turn, observing the output for an indication of a received signal and a bearing to the transponder.
- Bearing readings are 0 – 359 degrees referenced to the bow of the vessel/vehicle. So that 0 degrees is dead ahead, 90 degrees is to the starboard, 270 degrees is to the port and 180 degrees is to the aft.
- Observe the bearing reading and slowly adjust the vessel/vehicle heading until the bearing reading is 0 degrees. This indicates that the selected transponder is dead ahead.
- View the **Smm**: signal strength parameter in the output string to acquire a relative range to the target.
- When moving towards the target, monitor the signal strength and bearing on the VADR output.
- If the signal strength suddenly begins to decrease, it is possible to have passed over or under the transponder.

3.17.3 User Commands

User commands are sent via the RS232 interface. The commands consist of single ASCII characters, which are processed immediately. Command characters are not case sensitive. Available USER commands are as follows:

TABLE 3.7 User Commands

User Command	Corresponding Action
A	Set Active Mode
O	Toggles between Directional/Omni Hydrophone Mode
P	Set Passive Mode
T	Force Ping Transmission PASSIVE MODE ONLY
V	Read Input Voltage
F	Show Firmware Version
S	Save Current Mode (ACTIVE or PASSIVE) and CH to EEPROM. These parameters will be active on the next power-up

I	Show Info (MODE, CH, ORIENTATION, FIRMWARE VERSION)
U	Set Orientation UP (default)
D	Set Orientation DOWN (inverted)
PASSIVE MODE FREQUENCY SELECT COMMANDS	
K	Increase frequency in 1kHz increments
L	Decrease frequency in 1kHz increments
.	Increase frequency in 100Hz increments
,	Decrease frequency in 100Hz increments
ACTIVE MODE FREQUENCY SELECT COMMANDS	
0	Selects 25kHz transponder reply frequency
1	Selects 27kHz transponder reply frequency
2	Selects 28kHz transponder reply frequency
3	Selects 29kHz transponder reply frequency
4	Selects 30kHz transponder reply frequency
5	Selects 31kHz transponder reply frequency
6	Selects 32kHz transponder reply frequency
7	Selects 33kHz transponder reply frequency
8	Selects 34kHz transponder reply frequency

The procedures for operating the VADR receiver are quite simple when using a Terminal type program. The unit's output string parameters are designed to be clear and easy to understand while operating the system. However, optimum performance of the instrument will result from repeated and patient practice of operating techniques.

3.18 Pre-deployment Setup and Check-out

3.18.1 Testing the VADR receiver before mounting

- Each VADR receiver comes with a test cable for testing the system prior to mounting on a vehicle. When receiver is mounted on a vehicle, the test cable can be used to verify the system operation and RS232 communication.

- Connect the test cable to the VADR receiver and a PCs' COM or USB port via the RS232 Adapter. Ensure that the VADR Serial Control Application software is loaded on the PC being used.

- Turn the Test Cable on via the switch on the junction box. The receiver is powered up and the RS232 communication port is open.

- On the PC, Initialize the VADR Serial Control Application software and select the proper COM port. The VADR receiver should now be communicating with the PC.

- Select an ATT-400 or acoustic pinger operating between 25 kHz and 45 kHz for testing purposes. Activate the pinger or transponder, place it a few inches in front of the receiver hydrophone and verify the VADR Serial Control Application software is tracking the signal.

3.18.2 Testing the VADR receiver when mounted on vehicle

WARNING: REVIEW SECTION 3.4 AND VEHICLE WIRING DIAGRAM - VERIFY CONNECTOR PIGTAIL POWERING THE VADR HAS BEEN WIRED PROPERLY.

- Inspect the installation for loose or missing hardware and proper transducer orientation. Inspect pressure housing of the receiver to ensure that end caps are secure.
- Perform an in-air check of the VADR receiver by using the following sequence:
    - Turn the receiver on via the vehicles power supply.
    - Connect the VADR RS232 port to a computer with a serial terminal application set to communicate at 9600, N, 8, 1 or the VADR Serial Control Application Software, via the vehicle's umbilical.
    - Select an ATT-400 or acoustic pinger operating between 25 kHz and 45 kHz for testing purposes. Activate the pinger or transponder and place it a few inches in front of the receiver hydrophone and verify the receiver is tracking the signal.

Section

4

VADR VEHICLE ACOUSTIC DIRECTIONAL RECEIVER

Maintenance

Upon completion of each mission, take these steps to assure continued reliable performance from the VADR System components.

- Turn the equipment OFF by disabling the external power source.
- Wash the exterior of the equipment with fresh water and mild detergent. Pay particular attention to cleaning film build-up from the transducer face.
- Make sure the equipment has been thoroughly dried before storage.
- Inspect all system components for damage and wear. Order needed replacement parts if required.