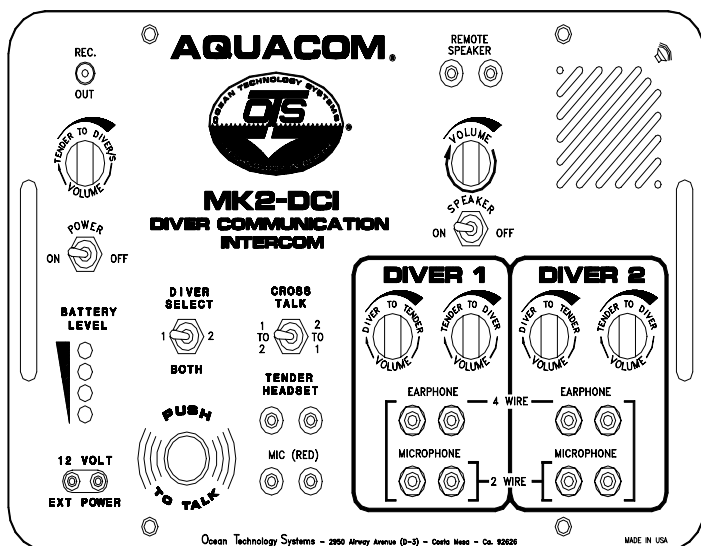


AQUACOM® MK2-DCI

Two- or One-Diver Intercom

User Guide



“Technology in Depth”

- Notice -

This manual and the information contained herein are provided for the use as a maintenance and operation guide. No license or rights to manufacture, preproduce, and/or sell either the manual or articles described herein are given. Undersea Systems International, Inc., *dba* Ocean Technology Systems, reserves the right to change specifications without notice. It is recommended that all users read and fully understand this manual before using MK2-DCI.

All statements, technical information, and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed; and the following is made in lieu of all warranties, expressed or implied, including the implied warranties of merchantability and fitness for purpose: Seller's and Manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for intended use, and user assumes all risk and liability whatsoever in connection therewith. Neither Seller nor Manufacturer shall be liable either in tort or in contract for any loss or damage, direct, incidental, or consequential, arising out of the use of or the inability to use the product. No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by officers of the Seller and Manufacturer.

- IMPORTANT SAFETY NOTICE -
(Please read before using product.)

IT IS ABSOLUTELY ESSENTIAL THAT ALL DIVERS ARE PROPERLY TRAINED AND EQUIPPED AND FULLY UNDERSTAND THE OWNER'S MANUAL BEFORE ATTEMPTING TO USE THE AQUACOM® MK2-DCI.

WHILE AQUACOM® MK2-DCI PROVIDES DIVERS WITH GOOD UNDERWATER COMMUNICATIONS, IT DOES NOT CHANGE OR ELIMINATE THE POTENTIAL HAZARDS OF DIVING!

DO NOT ATTEMPT TO CHARGE BATTERIES BEFORE READING PAGE 9, NUMBER 2, THE RB-6V SIX-VOLT OPTIONAL RECHARGEABLE BATTERY SECTION. WITHOUT FOLLOWING PROPER PROCEDURES, DAMAGE TO THE MK2-DCI, AN EXPLOSION, AND/OR INJURY MAY OCCUR.

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SECTION 1

INTRODUCTION:

Congratulations! You have just purchased the finest, state-of-the-art hard-wire intercom in the world. Your new MK2-DCI Two- or One-Diver Air Intercom represents state-of-the-art technology and innovation—the choice of discriminating divers throughout the world. Please take the time to read this owner’s manual. With proper care and use, your Ocean Technology Systems product will provide you with the ultimate in high-quality communications and reliability.

The MK2-DCI is a compact, self-contained Two- or One-Diver Air Intercom providing clear communications between the operator and diver(s). The MK2-DCI offers two- or four-wire communications.

This manual will cover Specifications, Operating Instructions, Two-Wire or Four-Wire Communications, Batteries, Helpful Hints, and Warranty Information.

These guidelines and illustrations are presented to assist you. If you need additional information, do not hesitate to confer with your local OTS dealer or representative. If you require service, contact Ocean Technology Systems, 3133 West Harvard Street, Santa Ana, California 92704, Telephone (714) 754-7848, Toll-Free (800) 550-1984, Fax (714) 966-1639, www.oceantechnologiesystems.com.

SECTION 2

MK2-DCI SPECIFICATIONS:

| | |
|---------------------|---|
| Battery Life: | 20 hours continuous use |
| Battery Type: | (2) 6-volt lantern batteries, recommended batteries (Eveready Heavy Duty Alkaline #528 or Duracell Heavy Duty Alkaline ID #9150) or an external 12-volt source; optional 6-volt rechargeable batteries. |
| Power Output: | 20 watts |
| Frequency Response: | 600 to 12,000 Hz |
| Cabinet Material: | ABS plastic |
| Front Panel: | 1/8" aluminum, chemically treated and coated with a tough, durable, urethane finish to withstand the marine environment. |
| Size: | Height: 6 5/8" (16.8 cm) Width: 16 3/8" (41.6 cm) Depth: 8 3/8" (21.3 cm) |
| Weight: | 14.0 lbs. |

SECTION 3

MK2-DCI OPERATING INSTRUCTIONS (see page 5):

- 1) Record Out: Permits tender to record diving operations (Line level).
- 2) Volume: Tender-to-diver(s) volume control.
- 3) Power ON: Turns the power ON or OFF.
- 4) Battery Level: Color LEDs illuminate to alert tender to conditions of batteries.
- 5) Ext. Power: A 12-volt, DC power source can be used.
- 6) Push-to-talk: Push button used in two-wire mode by tender to talk to divers.
- 7) Tender Headset: Tender-worn earphones connect via banana plug connectors.
- 8) Mic. (RED): Used for hand-held or boom mic. via banana plug connector.
- 9) Volume: Diver #1: diver-to-tender volume control.
- 10) Earphone: Diver #1: earphone connection (banana or bare-wire style).
- 11) Microphone: Diver #1: microphone connection (banana or bare-wire style).
- 12) Volume: Diver #1: tender-to-diver volume control.
- 13) Microphone: Diver #2: microphone connection (banana or bare-wire style).

- 14) Earphone: Diver #2: microphone connection (banana or bare-wire style).
- 15) Handle: Front panel handle (right & left side).
- 16) Volume: Diver #2: tender-to-diver volume control.
- 17) Volume: Diver #2: diver-to-tender volume control.
- 18) Speaker: Front panel speaker.
- 19) Thumb Screw: One of four front panel screws (captive).
- 20) Speaker: Remote speaker output (speaker level).
- 21) Volume: Volume control for front panel speaker.
- 22) Speaker: Switch to turn the front panel speaker ON or OFF.
- 23) Cross Talk: Switch used to cross-talk Diver 1 to Diver 2 or vice versa. Tender must hold the switch in the direction of the cross talk. This is a momentary switch.
- 24) Diver Select: Switch used to select Diver 1, Diver 2, or Both-Divers communications.
- 25) REM: This connector is used if a headset/boom microphone with a PTT switch is used.

(Note: See page 5, Figure 1 for a panel description.)

MK2-DCI TWO-DIVER AIR INTERCOM

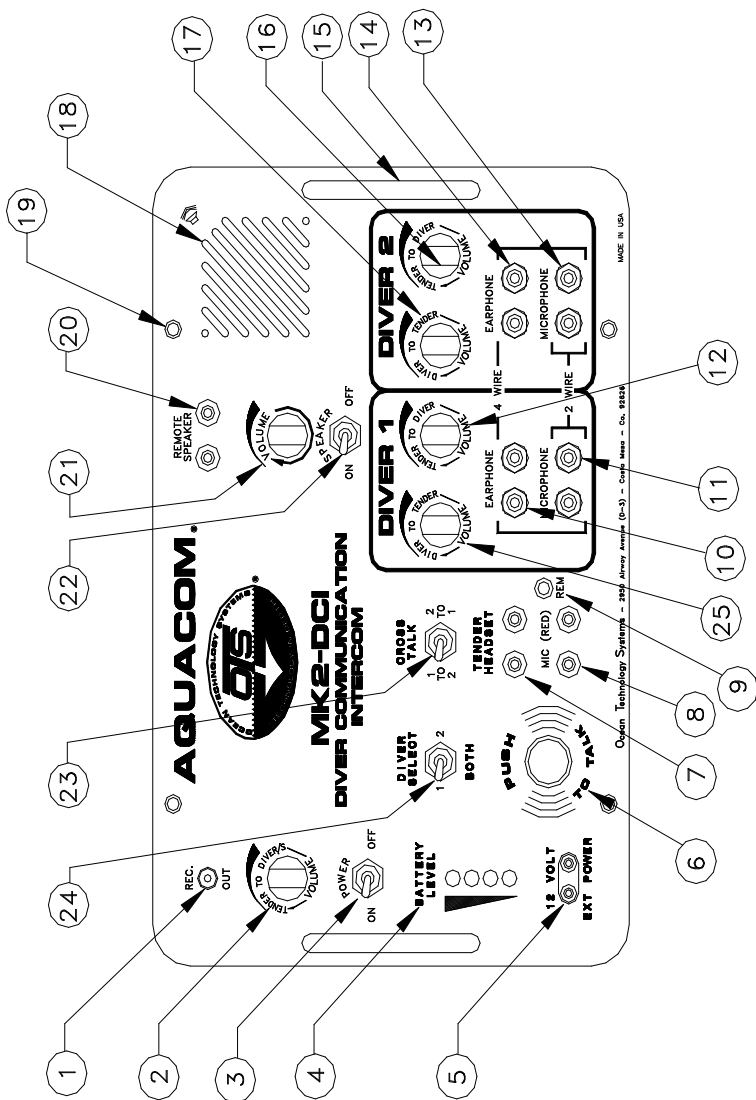


Figure 1

SECTION 4

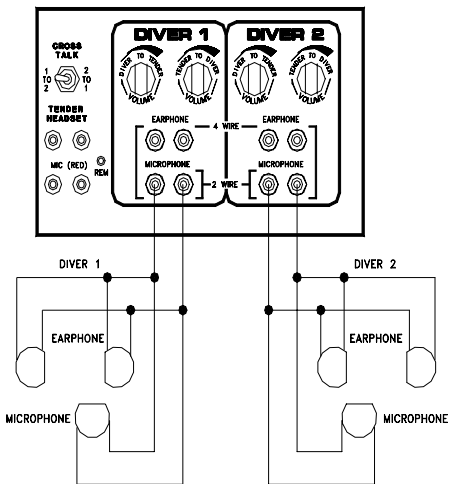
TWO-WIRE MODE:

In normal two-wire operations, the two wires within the diver communication cable are connected to the corresponding binding post (Divers #1 and #2) on the surface unit (see Figure 2). If a four-wire cable is used, two wires are normally twisted together for one side of the microphone binding post, and the remaining two wires twisted together for the other microphone binding post.

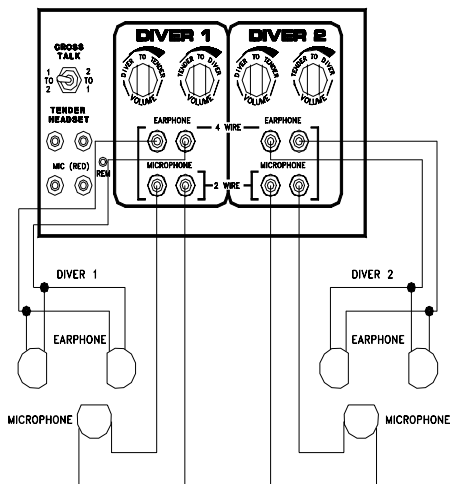
This configuration allows the tender to talk to the divers individually or both divers simultaneously. The diver(s) may also communicate with each other when the tender engages the cross-talk switch. The divers' speaker and the surface unit speaker both function as speaker and microphone. If required, a separate microphone and earphone can be used with the divers' masks or helmets. If a speaker is located in a diving bell or recompression chamber, the MK2-DCI can be used as the communications link between the divers and the outside. When the system is used where conditions are noisy, the tender can switch off the speaker and use a headset and boom microphone. However, when using a headset with a boom microphone, the tender must use a push-to-talk (PTT) button to communicate. Our headset with a boom microphone has a PTT button located on one side of the headset. The MK2-DCI also has a PTT. The divers' communication is the primary signal. When the tender uses the PTT button, his signal becomes the primary signal. If the diver is trying to say something while the tender is talking, the tender will not hear the diver until he releases the PTT button.

The divers' helmets and/or full face masks are typically wired with the earphones and microphones tied together. When wired like this, the divers' earphone and microphones are functioning together. Bubbles passing by the earphones while the diver is talking will be picked up via the earphones. This will cause the communications to be noisy. When the tender is talking to the diver, his voice is heard not only from the diver's earphone, but also from the microphone!

TWO-WIRE MODE (Figure 2)



FOUR-WIRE MODE (Figure 3)



SECTION 5

FOUR-WIRE MODE:

The four-wire mode provides continuous open-line communications between the tender and up to five divers, or any combination of recompression chambers or diving bells. The four-wire mode will give you optimum performance and intelligibility by the MK2-DCI. Using this method, everyone hears each other simultaneously. Therefore, the earphones, speakers, and microphones must be isolated to prevent feedback. All earphones are connected in parallel. A four-wire cable is required for all stations. Two of the wires are used for the microphone and two for the headset(s) and earphone(s) (see Figure 3). The diver earphones should be connected to the “EARPHONE” binding post on the surface unit (via the black banana plug located in the 1 or 2 Diver sections). The banana plug on the tender’s OTS headset should be connected to the “EARPHONE” banana plug (black; Tender section). The remote plug on the headset should be connected to the “REM” receptacle located in the Tender section. The tender’s microphone should be connected to the red banana plug labeled “MICROPHONE” (Tender’s section). The diver’s microphone should be connected to the “MICROPHONE” banana plug (red) in the Diver’s section of the MK2-DCI. When in the four-wire mode, everyone is on-line together. It is similar to a telephone conference call.

Note

The “Diver Select” must be in the “BOTH” position for four-wire communications in order to hear everyone. A headset with a boom microphone has to be used by the tender when using the MK2-DCI in the four-wire mode. If you experience feedback from the headset’s microphone, turn off the front panel speaker.

SECTION 6

BATTERIES:

The MK2-DCI Two-Diver Air Intercom can be powered by two 6-volt heavy duty Alkaline batteries, rechargeable 6-volt batteries (RB-6), or a 12-volt alternate source.

The following are options for the desired power source:

- 1) LANTERN BATTERIES: The MK2-DCI is designed to use two 6-volt spring connector type batteries. To achieve optimum performance, we recommend the use of 6-volt Alkaline batteries only! Eveready or Duracell Alkaline batteries will provide the best results for most diving operations. You can use standard 6-volt lantern batteries with spring connectors as well. However, battery life will be greatly reduced, and you will notice a substantial power drop when transmitting.

INSTALLATION OF 6-VOLT BATTERIES: Locate and loosen the four screws located on the front panel (see Figure 1, #19). These screws are captive and will not come off the front panel. Remove front panel from housing. Remove cotter pin from battery strap (see Figure 4, #3). Remove battery strap from battery housing (see Figure 4, #2). Insert both 6-volt, spring-type lantern batteries, springs facing toward battery PC board (see Figure 4, #4). Verify that the batteries are secure on the bottom of the housing and the backs are being held by the back plate. You will notice the batteries can be installed with springs in any direction on the PC board (see Figure 5). After batteries are installed, replace the battery strap and cotter pin, dress the wires so they are not pinched when you put the front panel back in place, replace the panel, and tighten the four screws (do not overtighten).

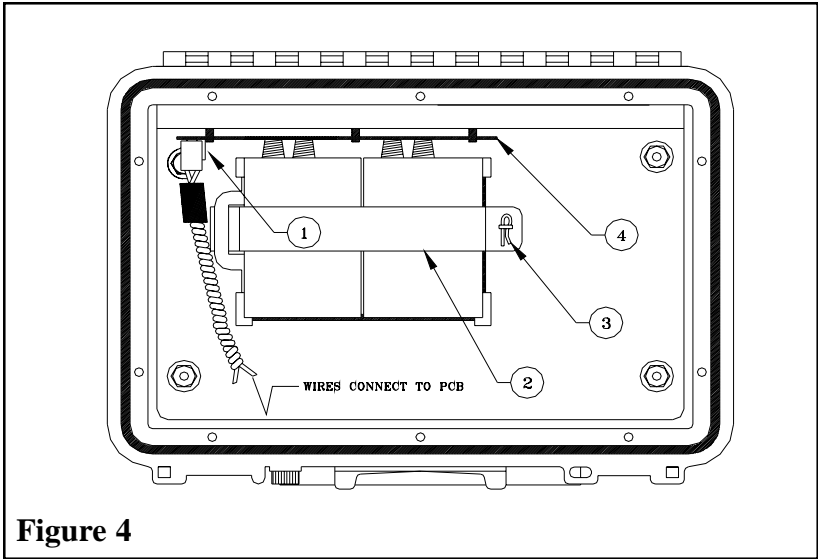


Figure 4

- 2) 6-VOLT RECHARGEABLE BATTERY (RB-6V): When utilizing the optional RB-6V sealed lead acid battery, you will attain the maximum performance of a self-contained battery (two are required). Install the batteries as per instructions found on page 9, “INSTALLATION OF 6-VOLT BATTERIES.” To recharge the optional rechargeable batteries, you do not

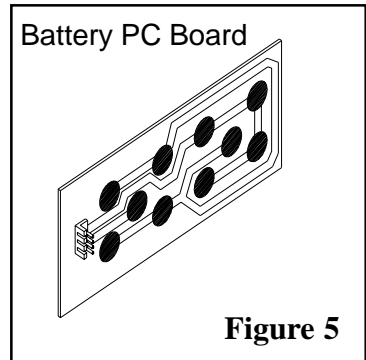


Figure 5

need to remove them from the MK2-DCI. Just connect the RC-13 battery charger to the front panel 12-volt external power jack. Then connect the charger’s power plug to any 110-volt, 60-cycle power outlet and let the battery charge for no more than 14 hours.

Note: For operation outside the U.S., the optional RC-13I charger should be used instead of the RC-13.

IMPORTANT SAFETY NOTE:

VERIFY BEFORE YOU CONNECT THE RC-13 BATTERY CHARGER TO THE EXTERNAL POWER JACK THAT THE BATTERIES INSTALLED ARE RECHARGEABLE BATTERIES. IT IS RECOMMENDED THAT RECHARGEABLE BATTERIES BE USED WHEN EXTERNAL POWER IS SUPPLIED. THE EXTERNAL SOURCE SHOULD PROVIDE A VOLTAGE GREATER THAN 12 BUT LESS THAN 15 VOLTS. IT WILL RECHARGE THE BATTERIES WHILE THE SYSTEM IS OPERATING.

ALWAYS WAIT A MINIMUM OF 20 MINUTES FOR ANY GASSES EXPELLED DURING CHARGING TO DISSIPATE BEFORE POWERING UP THE MK2-DCI. AVOID SMOKING, OPEN FLAMES, OR STRIKING A MATCH WHILE CHARGING BATTERIES.

3) **ALTERNATE POWER SOURCE:** The external receptacle (see Figure 1, #5) provides an easy terminal for a marine or automotive 12-volt DC source. The power source should provide 12 volts and a minimum of 3 amps capacity. The alternate power source connection is also used for charging the battery.

4) **LOW BATTERY LEDs:** The four LEDs illuminate one at a time, starting with the upper LED. Green represents fresh or fully charged batteries. As long as the power is 11 volts or higher, the top green LED will illuminate. As the power decreases to approximately 10 volts, the second green LED will illuminate. The top green LED shuts off. When power falls to approximately 9 volts, the yellow LED will illuminate and the green LED will shut down. When power reaches approximately 8 volts, the red LED will illuminate and the yellow LED will shut down.

At this point the MK2-DCI will audibly start warning you of lower power with a beeping sound every 30 seconds. When the voltage falls to about 7 volts, the red LED will start blinking and the warning beeps will come every 30 seconds. When the voltage falls below 7 volts, the beep occurs every 15 seconds. Below 6 volts the LED blinks quickly for a few seconds, after which the unit shuts off to save the battery from damage. The warning mode continues until the user installs fresh batteries, charges the batteries, or connects a 12-volt power source, or until the power drops enough to shut down the MK2-DCI (see chart below).

| <u>LED CHART</u> | | | |
|-------------------------|------------------------|-----------|------------------|
| COLOR | VOLTAGE | ON | BEEPING |
| ● Green | 11 volts DC or above | Solid | None |
| ● Green | Approximately 10 volts | Solid | None |
| ● Yellow | Approximately 9 volts | Solid | None |
| ● Red | Approximately 8 volts | Solid | Every 30 seconds |
| | Approximately 7 volts | Blinking | Every 30 seconds |
| | Below 7 volts | Blinking | Every 15 seconds |

SECTION 7

HELPFUL HINTS:

- 1) Before diving operations begin, check to be sure the microphone, earphones, and wire connections are secure and operating properly. Ninety percent of all problems in communications turn out to be a problem with one of the above.
- 2) When in the four-wire mode, you must use a headset with a boom microphone, and the Diver Select switch must be in the “BOTH” position. If feedback is present, switch off the front panel speaker (see Figure 1, #24).
- 3) Avoid excessive tender-to-diver volume. Most of the time, when there is too much volume, the diver will hear distortion and ask for more volume!
- 4) Before diving operations, always check the battery power level, and replace or recharge the batteries if necessary.
- 5) Make certain the headphone and remote PTT plugs are securely inserted into the proper receptacle.
- 6) When in the four-wire mode and a wire breaks, try setting the system up in the two-wire communication mode (see Figure 2), and continue diving operations.
- 7) Secure the MK2-DCI if using the unit on a vessel that is rolling about. Also strain-relief the umbilical(s) so they will not pull on the MK2-DCI.
- 8) Ensure the umbilicals are dressed out so as not to trip anyone.

TROUBLESHOOTING FOR MK2-DCI

| PROBLEM | PROBABLE CAUSE | REMEDY |
|--|---|-------------------------------------|
| No Power | Battery exhausted | Replace battery |
| | Battery leads loose | Check battery connectors |
| | Defective ON/OFF switch | Change switch |
| | Board connector not making contact | Clean pins |
| | Open circuit on board | Repair or replace board |
| Power only for a short time when power switch is turned on | Defective boot circuit | Repair or replace board |
| | Defective CPU chip | Replace CPU or replace board |
| No diver voice | Loose connection at ribbon lead connector | Check connector; clean or reconnect |
| | Board connectors loose | Clean pins and reconnect |
| | Defective PCB | Replace board |
| | Defective speaker ON/OFF switch | Replace switch |
| | Defective volume controls | Replace control |
| | Defective panel speaker | Replace speaker |
| | Defective pre-amp chip | Replace |
| | Defective relay | Replace |
| | PTT logic circuits defective | Repair or replace board |
| No tender voice | Defective board | Replace |
| | Defective relay | Replace |

| PROBLEM | PROBABLE CAUSE | REMEDY |
|---|--|--|
| | Defective pre-amp chip | Replace |
| | Open trace on board | Repair trace or replace board |
| | PTT logic circuits defective | Repair or replace board |
| | Weak battery | Charge (if rechargeable) or replace |
| | Microphone pre-amp circuit defective | Trace signal to find fault and replace defective part |
| No record-out function | Board connector not making contact | Clean pins or replace defective connector |
| | Defective record amp | Trace fault around record op-amp and replace faulty part |
| | | Replace board |
| Weak output to divers and tender | Power amplifier defective | Replace power amplifier chip |
| | Defective component that supports the power amplifier is defective | Trace part and replace |
| Distorted unintelligible speech | Bias supply faulty | Check supply and replace defective part |
| Cannot cross-talk divers | Defective cross-talk switch | Replace cross-talk switch |
| | Defective relays | Replace relays |
| | CPU defective | Replace CPU |
| Tender-to-diver faulty in two-wire mode | Defective PTT switch | Replace PTT switch |
| | Defective relays | Replace relays |
| | Defective CPU | Replace CPU |

Undersea Systems International
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Ocean Technology Systems

LIMITED WARRANTY

The MK2-DCI is fully warranted against defects in materials and workmanship for a period of 1 year from the time of purchase. Our obligation under this warranty is limited to the replacing of any part or parts that prove to our satisfaction to have been defective and that have not been misused or carelessly handled. Labor is warranted for 1 year from time of purchase. The complete unit and/or part must be returned to our factory, transportation charges prepaid. We reserve the right to decline responsibility where repairs have been made or attempted by other than an Ocean Technology Systems factory-trained service center or properly trained personnel. In no event shall Ocean Technology Systems be liable for consequential damages.

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