

Aquacom®




BELL-200

Bell Back-Up System

Installation & Operation Guide

FUSE


SPARE MAIN




Ocean Technology Systems
OTS
TECHNOLOGY IN DEPTH

VOL

ON XMIT OFF



PTT



BELL-200

AQUACOM®
EMERGENCY COMMUNICATIONS
BACK-UP SYSTEM

Manufactured by: Ocean Technology Systems

MADE IN USA

“Technology in Depth”

- NOTICE -

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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 the product, the user shall determine the suitability of the product for intended use and 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 from the use of or the inability to use the product. No statement or recommendation not contained herein shall have any force or effect unless it is 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 operators are properly trained and equipped and fully understand this user's manual before attempting to use the Aquacom® BELL-200.

Refer to the Library page of our Web site, www.oceantechnologysystems.com, for a list of any changes made to this manual since its publication.

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SECTION 1: INTRODUCTION

Congratulations! You have just purchased the finest, state-of-the-art bell back-up system in the world. The BELL-200 is a single-sideband through-water acoustic telephone, designed as an emergency communications system for the diving bell or hardwire communications failure.

The system consists of a transceiver module and an acoustic transducer. The transceiver is mounted internally on a suitable bracket. The transducer is mounted on the outside of the bell on top. The cable is routed through an approved hull connector (not supplied) or customer-furnished penetrator.

The method of transmission is state-of-the-art suppressed carrier single sideband using the upper sideband.

This manual is a comprehensive handbook for the BELL-200, providing specifications, installation instructions, operating instructions, special considerations, a troubleshooting guide, and warranty information.

SECTION 2: SPECIFICATIONS

Power output:	70 watts PEP (peak envelope power)
Frequency:	25 kHz (although other frequencies are available)
Housing material:	Diecast aluminum AlSi 12, powder coated per Fed. STD 26357 semi gloss gray
Size:	Height 3.54 inches, width 4.72 inches, depth 8.66 inches

SECTION 3: INSTALLATION INSTRUCTIONS

The installation of the BELL-200 is fairly simple. A drawing (Figure 1) is provided to assist the installation technician.

As shown in Figure 1, the unit is installed using the four holes provided in the lower portion of the enclosure. Care must be exercised to ensure that cable damage does not occur. **Do not separate the housing halves more than 4 inches.** Installation of the housing is achieved by passing the mounting bolt through the lower housing enclosure. These bolts are then attached to a mounting plate that is secured to the diving bell. The installation technician is at liberty to use any suitable method to install the electronics package.

The unit comes with a transducer cable assembly with an MS-type connector. A transducer with cable and no termination (bare wires) is provided to allow the technician the option of molding or splicing the cable to a bulkhead penetrator or connector. **A proper connection is critical.** Therefore, the following information is provided to assist the technician.

3.1 TRANSDUCER CONNECTION

See Figure 2 for an illustration of the wiring for connecting the transducer.

The cable connections are as follows:

- a. The white leads are connected together.
- b. The black leads and shields are connected together at the splice between the transducer cable and the transducer cable with the MS connector.
- c. For the MS connections, pins A and B are shorted together and are connected to the black and shield of the transducer cable. The other white cable lead is connected to pins E and F. Pins E and F also are shorted together.

3.2 ELECTRICAL POWER

The power required for the BELL-200 is 24 volts direct current at 10 amperes. The unit will draw approximately 8 amperes peak during transmissions.

See Figure 3 for an illustration of the wire connections for power input. The power input connections are as follows:

- a. 24-volt positive input on MS: Connector on pin A
- b. 24-volt negative input on MS: Connector on pin B

3.3 HEADSET INSTALLATION

For enhanced quality of communications with the BELL-200, Ocean Technology Systems offers as an accessory a dual-earphone headset with a boom microphone.

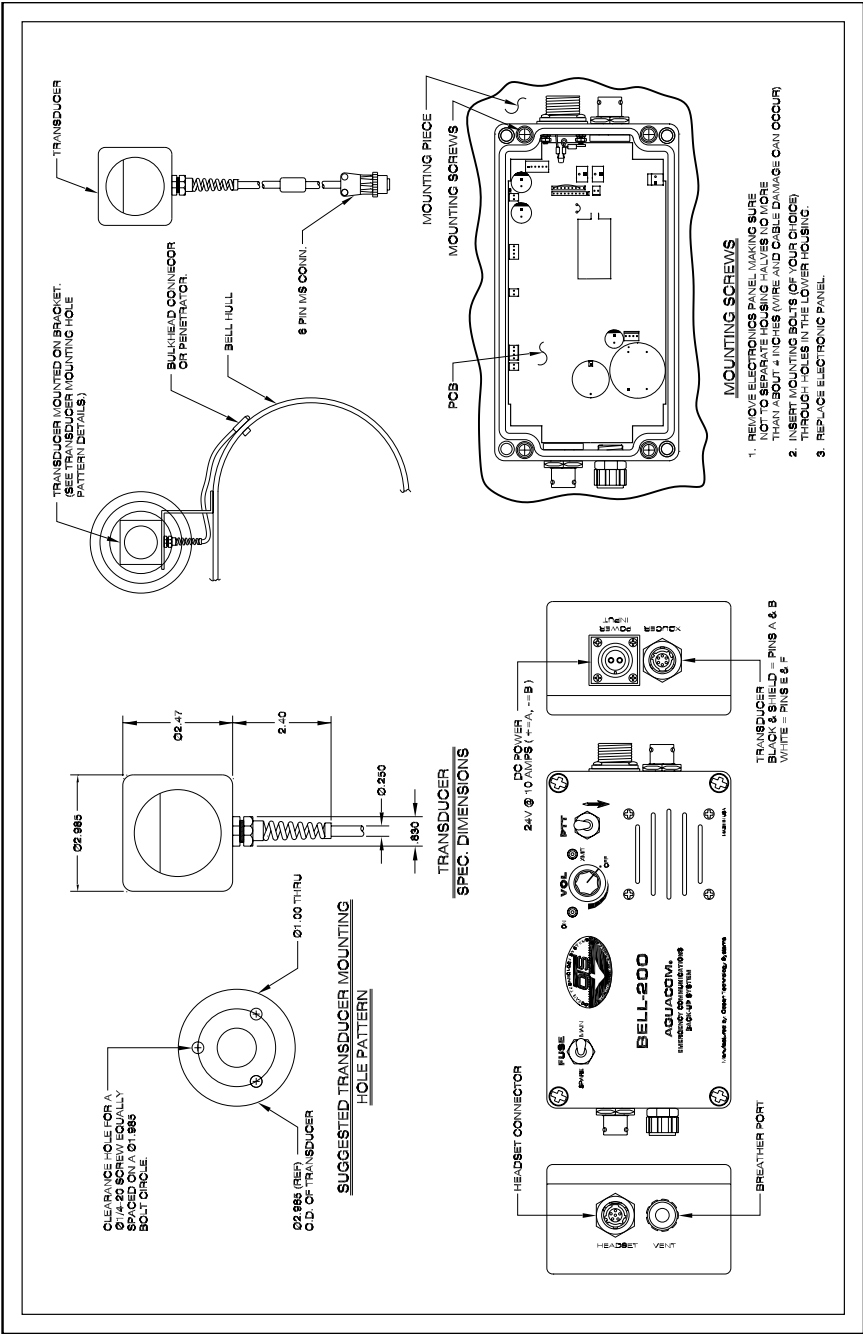
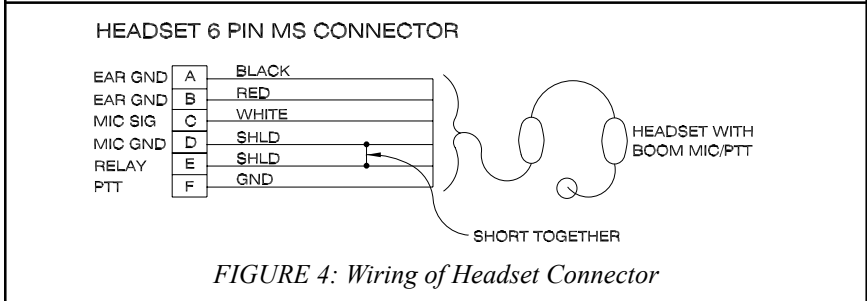
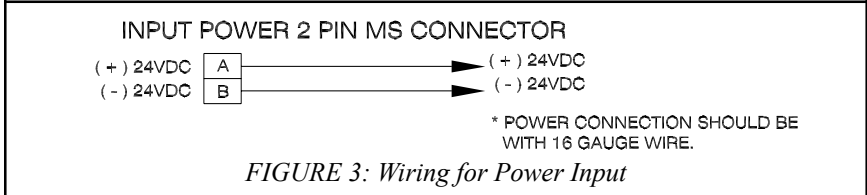
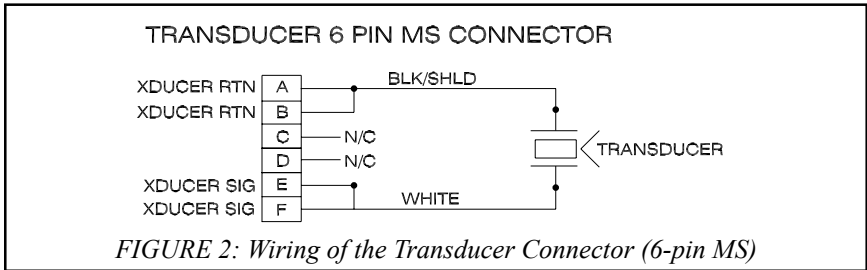


FIGURE 1: Installation of the BELL-200

The **THB-BELL** headset conveniently connects to the BELL-200 through the external headset jack (see Fig. 5, #9, in Section 4). Its specifications, including special impedances, are matched to the requirements of the BELL-200.

A wiring diagram showing the factory-configured headset connections of the THB-BELL headset is provided in Figure 4.



SECTION 4: COMPONENTS & CONTROLS

Refer to Figure 5 for an illustration of the components and controls of the BELL-200.

- | | |
|---|------------------------|
| 1. Fuse select switch for main and spare fuses | 6. Speaker |
| 2. On/off indicator LED | 7. Power input jack |
| 3. On/off switch and volume control | 8. Transducer jack |
| 4. Transmit indicator LED | 9. Headset output jack |
| 5. Momentary toggle switch for push-to-talk transmit function | 10. Vent |
| | 11. Front-panel screws |

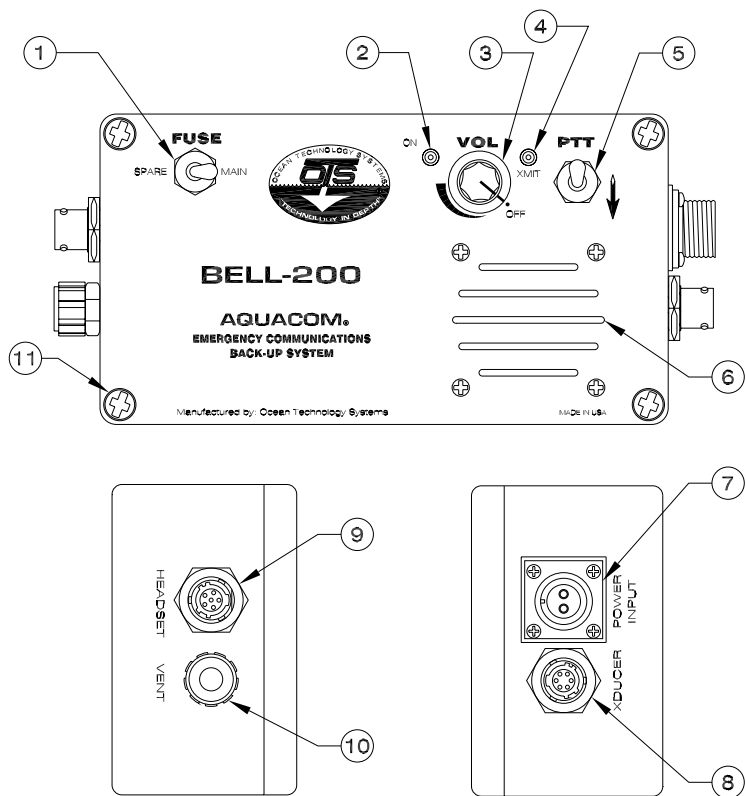


FIGURE 5: Components and Controls of the BELL-200

SECTION 5: OPERATING INSTRUCTIONS

The operation of the BELL-200 through-water communication transceiver is rather simple. The following steps are all that is required to operate the system. We will assume that the unit has been installed, the power connector is connected to the unit and to an adequate 24-volt power source, and the transducer is properly installed and connected to the unit.

Refer to Figure 5 throughout these instructions for identification of the components and controls of the BELL-200 system.

1. Ensure that the transducer is clean (free of grease or debris) and submerged. ***Never operate the system without the transducer submerged. Damage to the transducer and/or transceiver may occur.***

Note: The transducer may be cleaned with denatured alcohol. Do not use solvent-type cleaners!

2. Rotate the on/off volume control (#3) clockwise. Verify that the red LED (#2) illuminates and that you hear static or hash noise from the speaker (#6).
3. Have the surface transceiver operator transmit to the BELL-200. Verify that this transmission has been received.
4. Depress the push-to-talk switch (#5) and communicate with the surface station. Speak directly into the panel speaker (#6), within about 6 to 12 inches. When operating at deeper depths, it is important that the operator speak loudly, close to the panel speaker, because helium-derived speech does not have as much amplitude (volume) as speech generated in a normal air environment. The BELL-200 transmit power level is directly proportional to the amplitude of the operator's speech, to a maximum output of 50 watts.
5. All users involved should verify receipt and transmission of the communications.

5.1 OPERATION OF THB-BELL HEADSET

Refer to Figure 6 for an illustration of the headset components and controls mentioned in these instructions.

The THB-BELL headset, as illustrated in Figure 6, is an accessory item for the BELL-200 bell back-up system. Its use enhances communications by helping to isolate both transmission and reception from external interference.

The headset plugs into the BELL-200 unit (see Section 3.3, Headset Installation) via the 6-pin MS connector (Fig. 6, #2). Once the headset is plugged in, all communication is through the headset (the speaker on the BELL-200 will no longer function for reception and transmission).

The THB-BELL headset features a noise-canceling boom microphone (#1) and dual earphones (#3) for clear communications. To transmit, simply press the push-to-talk (PTT) switch (#4) and speak clearly into the microphone. *Note: The microphone is noise canceling, so it should be positioned as close to your lips as possible without hindering speech.*

Contact OTS or your local OTS dealer to inquire about the THB-BELL headset.

5.2 OPERATION OF HSM-10 HAND-HELD MICROPHONE

For users that do not need the full functionality of a headset but still prefer to use an external microphone with the BELL-200, OTS offers the HSM-10 hand-held microphone. The HSM-10 plugs into the headset jack of the BELL-200, disabling the microphone function of the speaker (minimizing environmental noise) to allow clearer transmission. Simply press the PTT button on the HSM-10 to transmit.

Contact OTS or your local OTS dealer to inquire about the HSM-10 microphone.

- Key
1. Microphone
 2. 6-pin MS connector
 3. Earcup
 4. PTT button

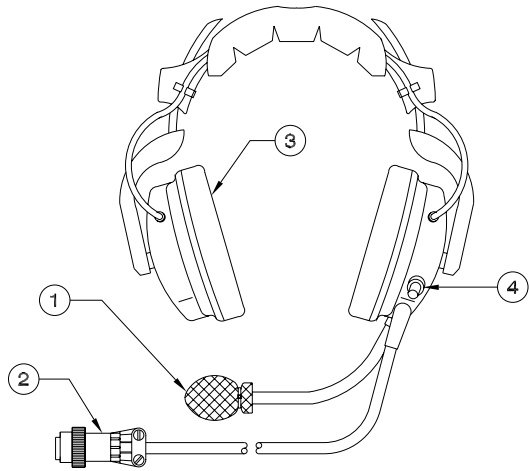


FIGURE 6: THB-BELL Headset Configuration

SECTION 6: SPECIAL CONSIDERATIONS

The environment in which the BELL-200 transceiver is operated poses some special needs if deep helium speech communications are to be successful. The special STX-101SB surface unit employs a means to record the diver. This facility can be used to connect a helium unscrambler. Normally, the helium unscrambler is connected to the bell intercom system. This connection provides a more “ideal” signal for the unscrambler. Unfortunately, although the BELL-200 is capable of transmitting helium speech, and the modified STX-101SB is capable of receiving this speech, there can be some problems. These problems are the result of some “pitch pulse” unscramblers that cannot tolerate noise pulses within the speech signal. These unscramblers treat these noise pulses like speech pitch pulses, and therefore the unscrambler is “fooled” into processing this noise.

Some of the more modern unscramblers that use *Digital Signal Processing (DSP)* techniques are more likely to provide acceptable results in a noisy acoustic environment.

Usually, the emergency Bell Communication System is operated in an ocean environment that is away from areas producing high levels of biological acoustic noise. Most acoustic noise will probably be generated near the surface.

Because of this possibility of near-surface noise, as well as acoustical problems presented by thermoclines, we recommend that the surface unit transducer be lowered as deep as possible. This practice places the transducer farther away from surface noise and closer to or below some of the “near-surface” thermal gradients.

Refer to the STX-101SB manual for more information on the theory of operation.

Problem	Probable Cause	Remedy
<i>(cont.)</i>	Board connectors not making contact	Clean pins or replace defective connector.
	Bad trace on board	Repair trace or replace board.
	PTT logic circuits defective	Repair trace or replace board.
	Low battery voltage	Charge or replace bell battery (the BELL-200 has no internal battery).
	Microphone pre-amp circuit defective	Trace signal to find fault and replace defective part.
	Defective CPU chip	Repair or replace board.
Power OK but cannot transmit or receive	Defective CPU	Replace CPU or board.
	Transducer or cable defective	Replace.
	Defective PLL synthesizer	Replace part or circuit board.
	Defective components in modulator signal path	Trace problem and replace part of circuit board.
Weak transmission	Transducer ceramic cylinder fractured	Replace transducer.
	Transducer cable or connections faulty	Repair bad connections or cable.
	Microphone weak (applies only to custom models with external microphone option)	Replace microphone.
	Transducer not clean	Clean transducer with denatured alcohol.
	Transducer above thermoclines	Operate transducer below thermoclines.
Distorted, unintelligible speech	Transmitting or receiving on the wrong channel	Check channel jumpers on circuit board for weak or cold connection.

Undersea Systems International
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LIMITED WARRANTY

The Aquacom[®] BELL-200 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 replacement 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 the time of purchase. The complete unit and/or part must be returned to our factory, transportation charged 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.

3133 W. Harvard Street, Santa Ana, CA 92704 USA

Toll-free (800) 550-1984 • Tel. (714) 754-7848 • Fax (714) 966-1639

E-mail ots@oceantechnologysystems.com

Web www.oceantechnologysystems.com

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