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Model HC4330
HYDROLINX Three Diver Rack Mount Intercom with Helium Speech Unscrambler

USER MANUAL

Applications: Diving and Chamber

User Manual HC4330_rev.A3

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2 Introduction

HYDROLINX Diving Communication, Inc. manufactures superior diving intercoms with Noise Reduction features for the highest possible diver speech intelligibility and clarity. HYDROLINX Intercoms are recognized by their unique use of advanced functions that include **Inhalation Noise Reduction** (INR), **Background Noise Reduction** (BNR) and **Helium Speech Unscrambling** (HSU). HYDROLINX noise reduction technology is the new standard for diving intercoms. HYDROLINX intercom provides the following advanced functions:

Inhalation Noise Reduction (INR): HYDROLINX intercoms detect and mute inhalation noise without affecting the diver's speech. An LED for each diver indicates when inhalation noise is being muted. The tender optimizes inhalation noise detection by setting the INR control for best performance. The INR function is critical for superior performance in diving intercoms. This function addresses three issues in diving communication:

- It increases diver speech intelligibility and clarity. Removing the loud inhalation noise from diver microphones clarifies the diver voice presented to the tender.
- It permits any diver may speak while others are inhaling. This enables the tender to hear each diver's speech clearly when other divers are inhaling.
- It provides an LED for each diver that indicates when inhalation noise is being detected. Therefore, the tender knows when each diver inhales and has confirmation that all divers are breathing.

Background Noise Reduction (BNR): The intercom analyzes and reduces background noise from exhalation bubbles, gas flow, chamber fans, etc. The tender adjusts the reduction level for the best speech quality. Each diver's microphone signal is filtered independently.

Helium Speech Unscrambler (HSU): The helium speech unscrambler function corrects the effect of Helium gas on diver speech. The tender selects a MODE and adjusts the DEPTH value for the most intelligible speech. The HSU function works for any depth from surface to 600 meters. Seven modes optimize performance over the widest possible range of gas mixture, pressure, microphone type, and language.

Audio Line Input / Output: These audio connections expand the capabilities of HYDROLINX intercoms by allowing dual intercom operation, wireless tender operation, audio recording, telephone communication or audio playback.

HYDROLINX rack mount intercoms provide the following functions:

- The tender may adjust BNR, INR and HSU settings for individual divers or for all divers together.
- The tender may save the current settings as defaults that will be assumed when the intercom is powered up.
- Chamber divers may initiate emergency calls from a HS702 Comm. Speaker.

The INR, BNR and HSU functions may be enabled or disabled. Setting their value to 0 disables their function. Increasing their value above 0 activates advanced processing.

HYDROLINX Diving Intercoms are as easy to operate as basic analog diving radios.

3 Items Included

- One HC4330, HYDROLINX 3 Diver Intercom with HSU:
  - Rack Mount Panel and Chassis
  - Internal 12V rechargeable battery
  - Internal 100-240 V AC battery charger
- One HS504 Handheld Microphone.
- One 3-pin circular connector (part no. 1013) for 12V DC power supply.
- Three 6-pin circular connectors (part no. 1016) for diver connection.

4 Intercom Functions

4.1 Front Panel Functions

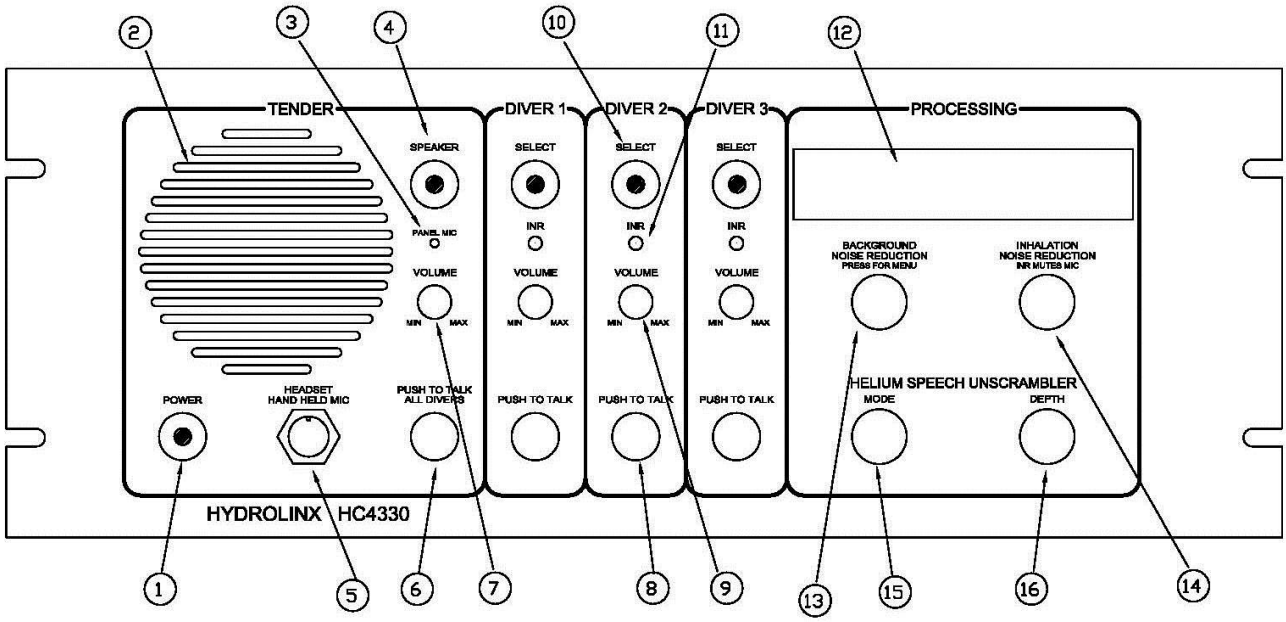

Figure 1. Front Panel Layout

1. **Power Switch:** A push button switch for turning power ON or OFF. A green LED indicates power status as follows:

   a. Steady = Battery is good.
   b. Slow Blinking = Battery is low. Charge the battery.
   c. Fast Blinking = Battery is very low. Stop communications.

2. **Panel Speaker:** A built-in speaker that operates only when the Panel Speaker Switch is ON. It allows the tender to hear the divers without using a headset. To eliminate acoustic feedback, the Panel Speaker mutes when pressing any PTT switch or the Handheld Microphone button.

3. **Panel Microphone:** A built-in microphone that allows the tender to talk to the divers without a headset or handheld microphone. The Panel Microphone works only when the Panel Speaker Switch is ON and any PTT Switch is pressed.

4. **Speaker Switch:** A push button switch that turns the Panel Speaker ON or OFF. A blue LED indicates when the Panel Speaker is turned ON.

5. **Headset / Hand Held Mic**: A circular connector that is used to connect the tender's Headset (model HS804) or Handheld Microphone (model HS504). Table 1 below shows the pin assignments are as follows:

Table 1. Headset / Hand Held Mic pin-out

Pins	Signal
1 & 2	Microphone
3 & 4	Earphone
5	Ground
6	Put-To-Talk

Normally the Handheld Microphone is used with the Panel Speaker ON. The Handheld PTT Button mutes the Panel Speaker. The tender presses the Handheld Microphone button to speak to all divers.

6. **Push-To-Talk All-Divers Switch (PTT-ALL):** A momentary push button switch that allows the tender to speak to all divers. When the Panel Speaker Switch is ON, this switch activates the Panel Microphone and mutes the Panel Speaker.

7. **Tender Volume Control:** A control for adjusting the audio output level of the Panel Speaker and tender earphone.

8. **Diver Push-To-Talk Switch (PTT-Diver):** Each diver has a Push-To-Talk (PTT) momentary push button switch. Pressing a diver's PTT switch, changes the operation of the diver's Red Binding Posts from microphone (input) to earphone (output). In 2-Wire mode, it allows the diver to hear the tender and other divers. In 4-Wire mode, it mutes the other divers' earphones for private message from tender to the selected diver.

9. **Diver Volume Control:** For each diver, there is a volume control for adjusting the diver's hearing level. It adjusts the audio output level at the diver's earphone.

10. **Diver SELECT Switch:** Each diver has a SELECT switch for enabling or disabling the diver's microphone and earphone. A blue LED indicates when the diver's SELECT Switch is ON or OFF (enabled or disabled).

11. **Diver INR-LED:** Each diver has a yellow LED that indicates when inhalation noise is detected and is being muted. Starting from 0, the tender should increase the INR setting while observing the diver's INR-LED and listening to the diver for the best muting of inhalation noise such that diver speech is not affected.

12. **LCD Display:** An LCD panel that displays the BNR, INR, and HSU settings, and provides a menu for controlling intercom functions. The tender presses the BNR knob to access the menu. Rotating the BNR knob changes menu options. Pressing the BNR knob on a selected menu option changes its setting.

13. **Background Noise Reduction (BNR):** A rotary knob for adjusting the reduction level of background noise from bubbles, air flow, chamber fans, etc. The BNR value ranges from 0 to 99. This function reduces the background noise that is mixed with diver speech. Use the BNR function only when background noise present. Avoid oversetting the BNR value. Setting BNR value to 0 disables its function. Increasing its value above 0 activates advanced BNR processing. This knob also accesses the LCD menu. For details, see **LCD Display** above.

14. **Inhalation Noise Reduction (INR):** A rotary knob for adjusting the detection level for diver inhalation noise. INR levels range from 0 to 99. When inhalation noise is detected, it is muted and diver's INR LED (yellow) is illuminated. INR operates for each diver individually. The tender should avoid oversetting the INR level. Starting from 0, tender increase the INR level while listening to the diver and observing the INR LED for the best muting of diver inhalation noise that does not affect diver speech. Setting INR value to 0 disables its function. Increasing its value above 0 activates advanced INR processing.

15. **HSU-MODE:** A control knob for selecting one of seven HSU operation modes. Each mode uses a different method to correct the effect of Helium gas and pressure on diver speech. Mode 0 (default) bypasses HSU processing. Mode 1 is for shallow depths and mode 7 is for the greatest depths. This multi-mode capability uniquely suits HYDROLINX intercoms for optimum performance at all diving depths.

16. **HSU-DEPTH:** A control knob for adjusting the HSU correction ratio to the diver voice, when breathing Helium gas. In modes 1-7, the tender adjusts the HSU-DEPTH for the clearest and most intelligible sounding speech. Starting at 3, the tender should adjust the HSU-DEPTH for the best value while a diver is speaking. Further improvement may often be achieved by switching the MODE and making slight adjustments to the DEPTH.

4.2 Rear Panel Functions

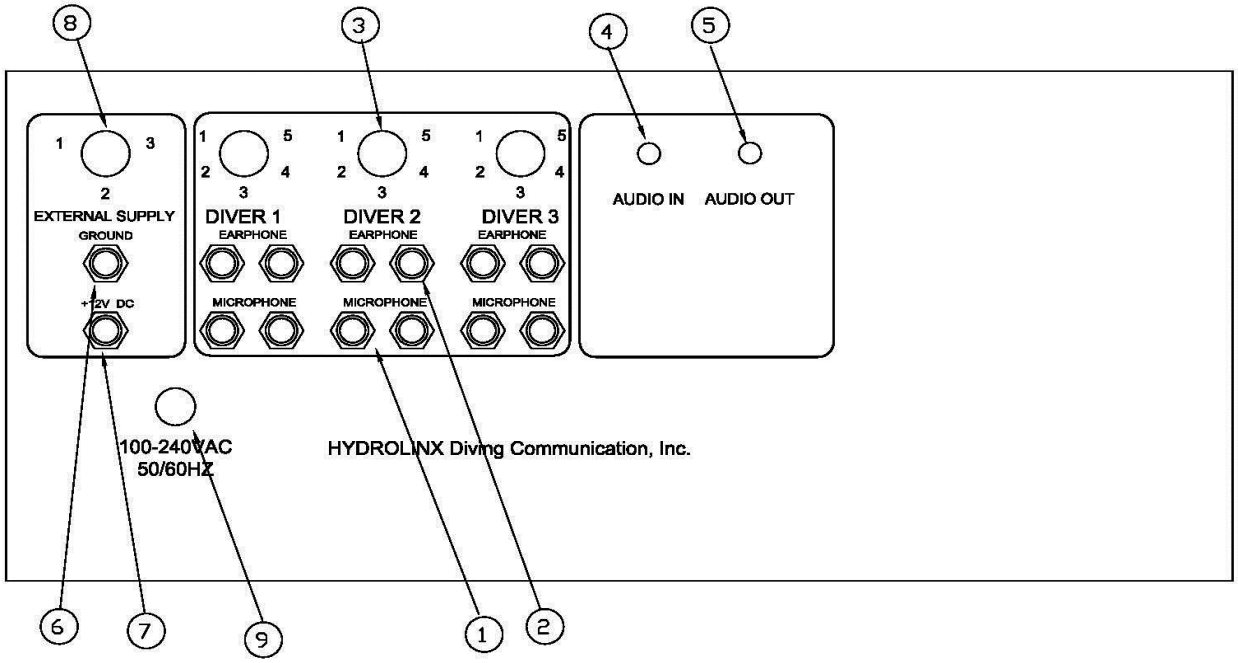

Figure 2. Rear Panel Layout

1. **Diver Microphone Binding Posts:** Each diver has dual red Microphone Binding Posts. They normally function as microphone (input) connectors. In 2-Wire mode, when any PTT switch is pressed, they change function to earphone (output).

2. **Diver Earphone Binding Posts:** Each diver has dual black Earphone Binding Posts that are used only in 4-Wire connection mode.

3. **Diver Circular Connector:** Each Diver has a circular connector for connection to a diver umbilical or a Comm. Speaker. A matching plug (part no. 1016) for each circular connector is included with the intercom. Table 2 below shows the pin assignments:

Table 2. Diver Circular Connector Pinout

Pins	Description
1 & 2	Diver Microphone
3 & 4	Diver Earphone
5	Ground
6	Diver Call, for HS702 Chamber Comm. Speaker

- **Pins 1&2 (Diver Microphone):** These pins normally function as microphone (input) connectors. In 2-Wire mode, when any PTT switch is pressed, they change function to earphone (output). These pins are connected in parallel with the Diver Microphone Binding Posts and function in the same way.
- **Pins 3&4 (Diver Earphone):** These pins conduct the intercom output to a diver earphone or Comm. Speaker. These pins are connected in parallel with the Diver Earphone Binding Posts and function in the same way.

- **Pin 5 (Ground):** This pin is connected to the negative side of the internal battery. It is used to connect Comm. Speaker to ground. It should be connected to Pin 5 of Comm. Speaker.

- **Pin 6 (Diver Call):** This pin is used for chamber applications only. It carries the CALL signal from HS702 Comm. Speaker to the intercom. It should be connected to Pin 6 of the HS702 Comm. Speaker.

4. **Audio In:** This red RCA audio connector receives standard audio line-level signals from another device. The intercom's audio mixer outputs this signal to the tender and divers. Audio-In may be connected to Audio-Out of another HYDROLINX intercom to accommodate more than three divers. It may also be connected to a wireless tender device, a phone, a playback device, etc.

5. **Audio Out:** This black RCA audio connector sends a standard audio line-level signal to another device. It outputs the mixed audio from the tender and the divers. Audio-Out may be connected to Audio-In of another HYDROLINX intercom to accommodate more than three divers. It may also be connected to a wireless tender device, a phone, a recording device, etc.

6. **Ground:** This black Binding Post is for connecting the intercom to earth ground and to the negative side of an external 12 V DC power source.

7. **External 12 V DC:** This red Binding Post is for connecting to the positive side of an external 12 V power source, such as external batteries or a regulated power supply. It charges the internal battery.

8. **External 12V DC Power Supply:** This 3-pin circular connector is wired in parallel with the External 12 V DC Binding Post and Ground Binding Post as an alternative means of connecting to an external 12 V power source, such as external batteries or a regulated power supply. It charges the internal battery. A matching plug (part no. 1013) is included with the intercom. Table 2 below shows the pin assignments :

Table 2. External 12V DC Power Supply pin-out

Pins	Description
1	+12 V DC (positive side of DC supply)
2	Earth Ground
3	DC Ground (negative side of DC supply)

9. **External AC Power:** This cord supplies 100-240 V AC power to an internal battery charger for the internal 12V battery. The Intercom circuits are powered by the internal 12V battery.

5 Intercom Connections

5.1 Tender Connections

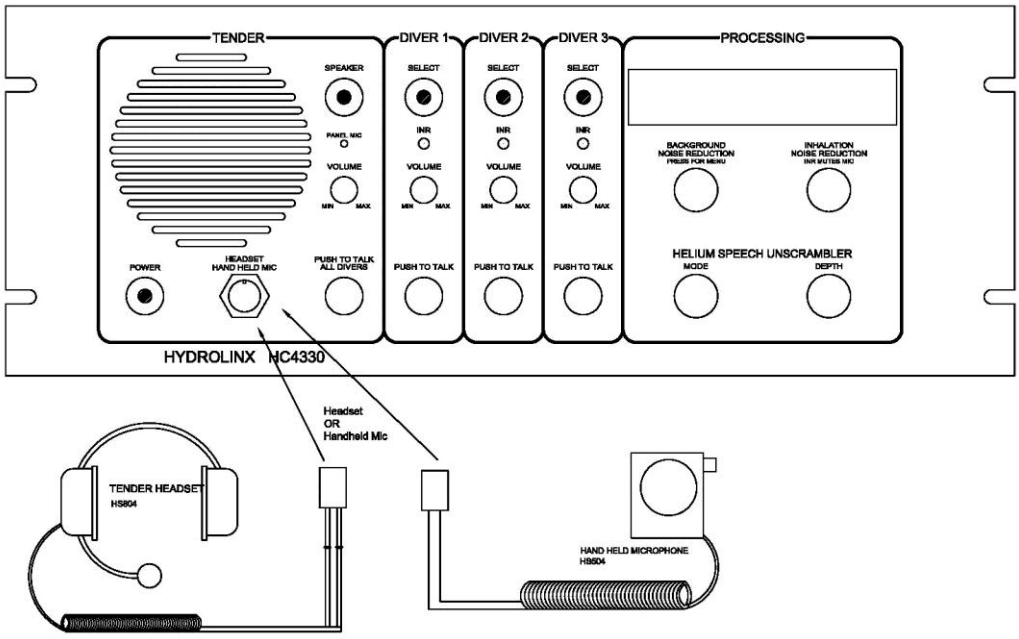

Figure 3. Front Panel Tender Connection

There are three ways for the tender to communicate with divers:

1. **Tender Headset:** The tender may communicate through a headset connected to the HEADSET / HAND HELD MIC connector on the front panel. In 4-Wire mode, whether diving or in a chamber with a headset, all divers can speak to each other and to the tender simultaneously without using PTT switches. In 2-Wire mode, diving or using Comm. Speakers, the tender must press a PTT switch to speak to divers and for divers to hear each other.
2. **Panel Speaker with Handheld Microphone:** The tender may speak through a handheld microphone that is connected to HEADSET / HAND HELD MIC connector on the front panel and listen to the Panel Speaker which must be switched ON. The tender speaks to all divers when pressing the handheld microphone button.
3. **Panel Speaker with Panel Microphone:** The tender may communicate through the built-in Panel Speaker and Microphone. The Panel Speaker must be switched ON. Pressing any PTT switch will activate the Panel Microphone.

The Tender Volume Control may be used to adjust the loudness of the Panel Speaker or the headset earphone to a comfortable level. Adjust the Tender Volume Control to a comfortable level while listening to the divers talking.

5.2 Diver Connections (2-Wire Mode)

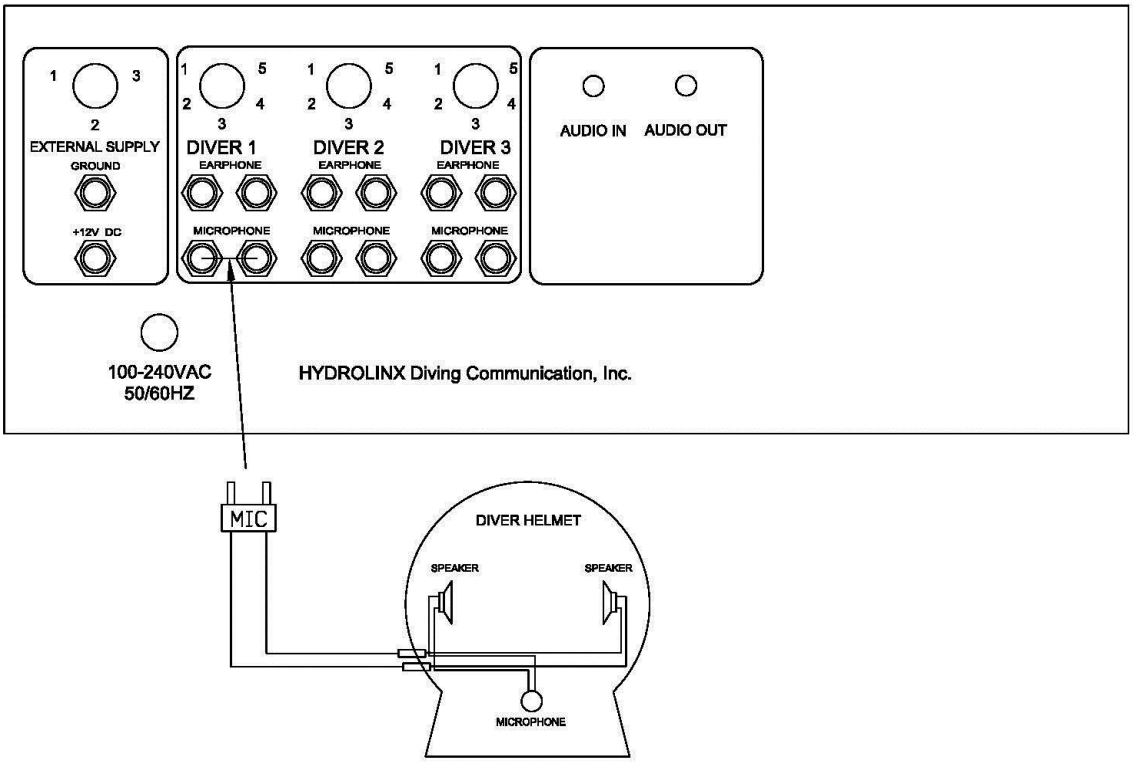

Figure 4. Diver Connections for 2-Wire Mode Operation

Using a two wires cable, connect one wire to one of the red Diver Microphone Binding Posts and the other wire to the other red Diver Microphone Binding Post. Inside the helmet, both speakers and the microphone should be connected in parallel.

Alternatively, pins 1&2 of the circular connector above the Binding Posts may be used.

The Diver Volume Controls may be adjusted to set the loudness of their earphones. While the tender is talking to each diver, adjust the diver's volume control until the diver indicates that a comfortable level has been reached.

The tender may speak to all divers by pressing the handheld microphone button or by pressing the PTT-ALL switch. The tender may speak to a single diver by pressing that diver's PTT switch. Divers can hear other divers only when the tender presses one of the PTT-Diver switches.

Table 3 below shows the 2-Wire communication paths.

Table 3. 2-Wire Mode Communication Paths

TENDER		DIVERS		
Tender Talks Through	**Tender Presses**	**Diver 1 Hears**	**Diver 2 Hears**	**Diver 3 Hears**
Handheld Mic.	Handheld Button	Tender	Tender	Tender
Panel Mic. Headset Mic.	PTT-ALL	Tender	Tender	Tender
	PTT-Diver 1	Tender Diver 2 Diver 3	None	None
	PTT-Diver 2	None	Tender Diver 1 Diver 3	None
	PTT-Diver 3	None	None	Tender Diver 1 Diver 2
	None	None	None	None

5.3 Diver Connections (4-Wire Mode)

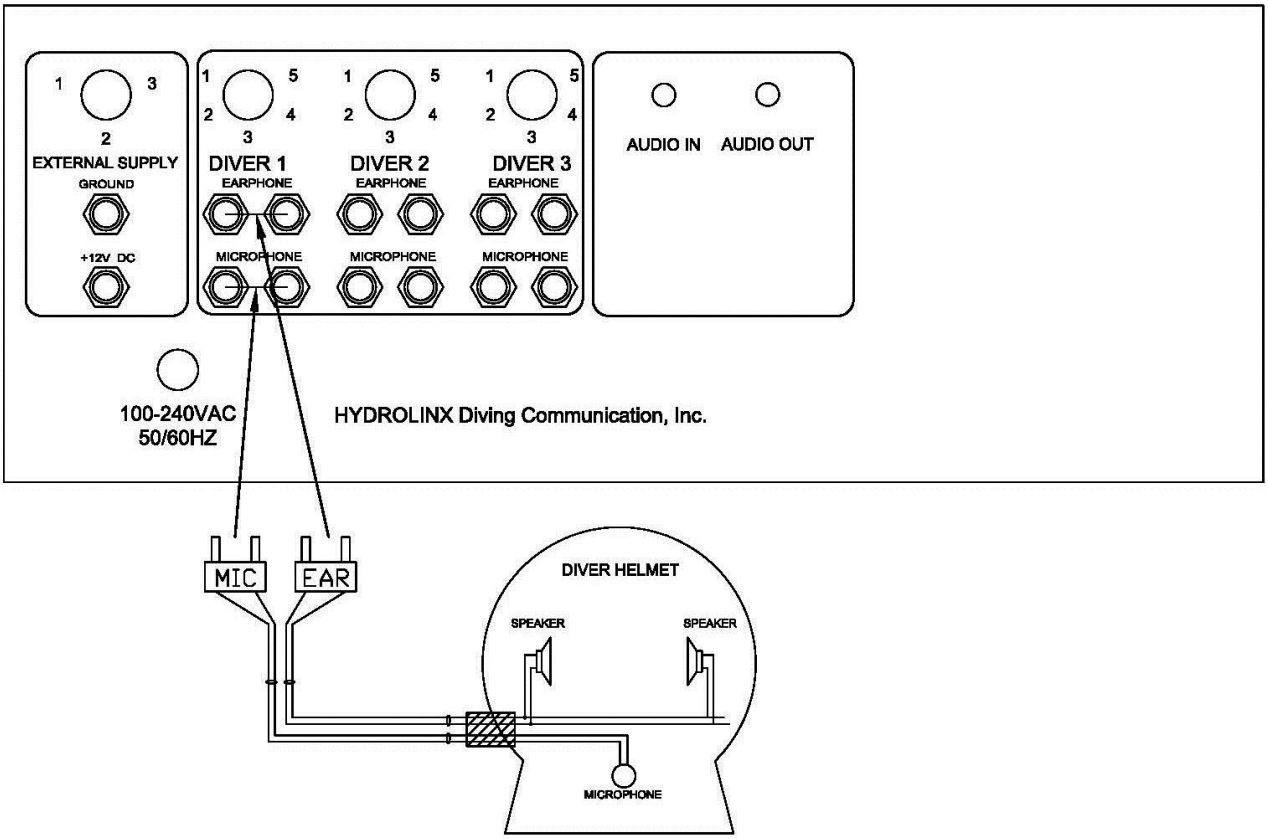

Figure 5. Diver Connections for 4-Wire Mode Operation

Using a cable with two twisted-pair shielded wires, connect the first twisted pair to the Diver Microphone Binding Posts (red) and connect the second twisted pair to the Diver Earphone Binding Posts (black). In the helmet, connect the first twisted pair to the microphone and the second twisted pair to both speakers in parallel.

Alternatively, pins 1&2 of the circular connector above the Binding Posts may be used for the microphone connections and pins 3&4 for the speaker connections.

If acoustic feedback occurs when increasing a Diver Volume Control, flip the microphone wires connections for that diver.

The Diver Volume Controls may be adjusted to set the loudness of their earphones. While the tender is talking to each diver, adjust the diver's volume control until the diver indicates that a comfortable level has been reached.

In 4-Wire mode, the divers and tender may speak to each other at any time. The tender may speak to all divers three ways:

- Headset at any time without using a PTT switch.
- Handheld Microphone (HHM) by pressing the HHM button.
- Panel Microphone by pressing any PTT switch. The Panel Speaker must be ON.

HYDROLINX intercoms permit the tender to speak privately to a single diver. This is done by pressing that diver's PTT switch. Table 4 below shows the 4-Wire communication paths.

Table 4. 4-Wire Mode Communication Paths

TENDER		**DIVERS**		
Tender Talks Through	**Tender Presses**	**Diver 1 Hears**	**Diver 2 Hears**	**Diver 3 Hears**
Headset Mic.	None	ALL	ALL	ALL
Handheld Mic.	Handheld Button	Tender	Tender	Tender
Panel Mic. Headset Mic.	PTT-ALL	Tender	Tender	Tender
	PTT-Diver 1	Tender Diver 2 Diver 3	None	None
	PTT-Diver 2	None	Tender Diver 1 Diver 3	None
	PTT-Diver 3	None	None	Tender Diver 1 Diver 2

5.4 Chamber Connections

Any diver circular connector on the rear panel of the intercom can be connected to a Comm. Speaker.

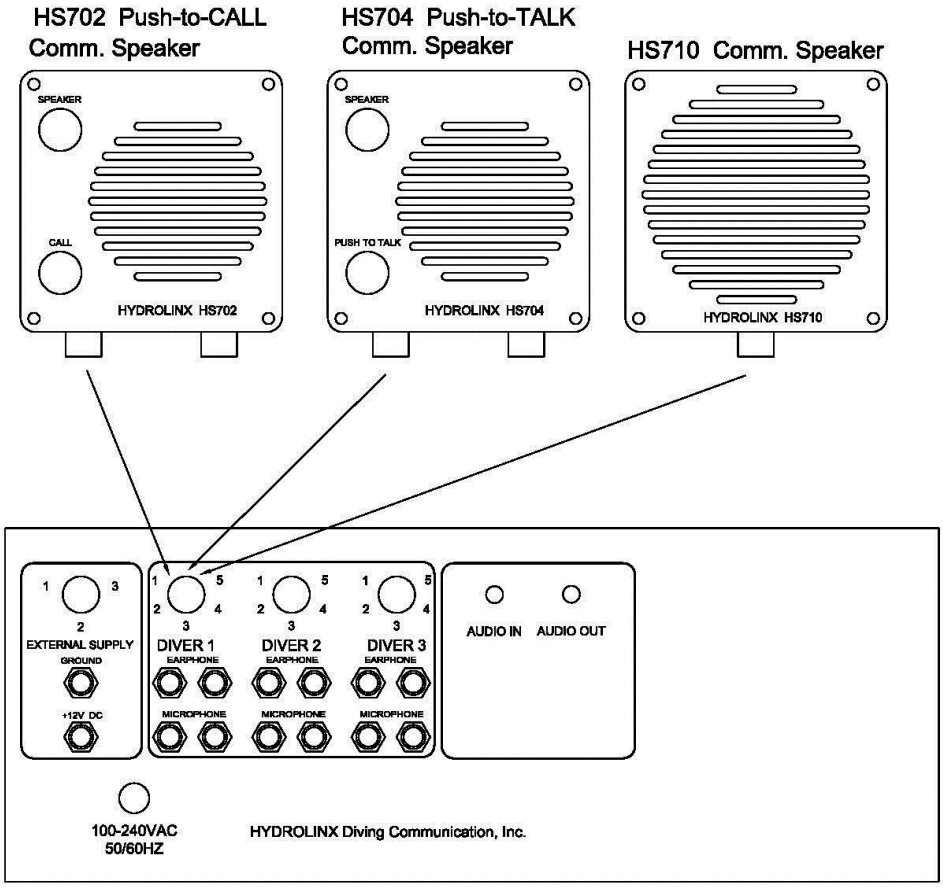

Figure 6. Intercom Connection to Comm. Speaker

HYDROLINX offers three Comm. Speakers, which are listed below:

5.4.1 HS702 Push-To-CALL Comm. Speaker

The HS702 allows the diver to talk to the tender without pressing a switch (hands free). The tender must press a PTT switch or Handheld Microphone (HHM) button for divers to hear. By default, the HS702 functions as a microphone for divers. When the tender presses any PTT switch or a HHM button, it becomes a speaker. The HS702 has a CALL switch, for emergency calls to the tender. When diver presses CALL switch, the intercom generates a loud beeping sound and displays a CALL message on the LCD. HS702s are normally used inside chambers, permitting divers to talk back and forth with the tender without pressing switches. They can be used outside chambers as well.

5.4.2 HS704 Push-To-TALK Comm. Speaker

The HS704 requires the diver to press a Push-To- TALK switch in order to talk to the tender. By default, The HS704 functions as a speaker for divers to hear all conversations. When the diver presses the Push-To- TALK switch, it becomes a microphone. HS704s are normally used in high noise areas, like on ship decks or outside chambers, etc. where an open microphone is not suitable. They can be used inside chambers as well.

5.4.3 HS710 Comm. Speaker

The HS710 is only a speaker. Use it anywhere that all conversations need to be heard. The HS710 speaker is more powerful than the ones in HS702s and HS704s. This makes HS710s suitable wherever loud sound is needed.

The rear panel has circular connectors for connection to Comm. Speakers. The Intercom and Comm. Speaker connectors are identical and have the same. Do not use the binding posts for connection with Comm. Speakers because the circular connectors have extra pins (Ground and Call) that are required for the HS702 and HS704 Comm. Speakers.

To connect a HS702 or HS704 Comm. Speaker, it is necessary to build a Comm. Speaker Cable with a HYDROLINX 1016 plug at each end. Use a cable with three twisted shielded wires. Connect one twisted shielded pair to pins 1&2 (Microphone), connect the second twisted shielded pair wires to pins 3&4 (Speaker). Use one wire of the third twisted pair for pin 5 (Ground) and the other for pin 6 (CALL). Be sure to use pin 5 for Ground and pin 6 for CALL. Do not swap pins 5&6. The cable must be wired straight through, as illustrated in Figure 7 below.

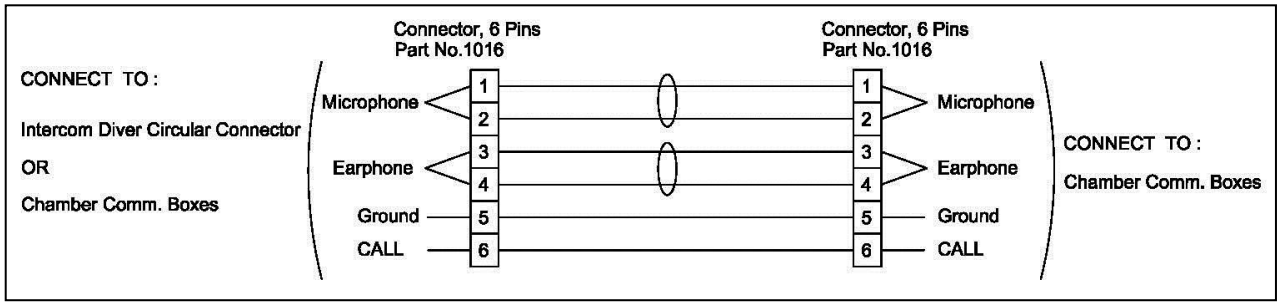

Figure 7. Pin-out for Comm. Speaker Cable

Comm. Speakers may be connected in parallel with another Comm. Speakers, by using a Cable described above. The HS702 and HS704 have two connectors that are wired in parallel internally. Either connector may be used for connection to the intercom, a headset or to another Comm. Speaker.

To connect a HS710 Comm. Speaker to the intercom, a Cable described above, may be used, but some connections will not be used. Alternatively, single twisted pair shielded cable may be used. In that case, only pins 3&4 (Speaker) need be connected.

5.5 Audio Line Input / Output Connections

The Audio-In and Audio-Out connectors expand the capabilities of HYDROLINX intercoms. They handle standard level-line audio signals and mate with standard RCA audio connectors and cables. Below are some typical audio connections:

5.5.1 Wireless Tender

Figure 9 illustrates a HYDROLINX WHS809 Wireless Tender system. The remote unit (2) is connected to a single-ear Headset, for the wireless tender to communicate with the wired tender and the divers. The master unit (1) should be connected to the intercom's Audio RCA jacks using the attached Adaptor Cable. Connect red to red and black to black. The Wireless Tender is a full-duplex system and functions like 4-Wire mode communications. It has no PTT switch. The WHS809 Wireless Tender includes the Adaptor Cable and Headset.

Figure 9. Wireless Tender System

5.5.2Two Intercoms (wired)

A standard RCA audio cable (Figure 11) may be used to connect two HYDROLINX intercoms. Simply, connect Audio-Out from one intercom to Audio-In of the other and vice versa. As Figures 12 and 13 illustrate, HYDROLINX Rack Mount and Portable intercoms may be connected without restrictions.

Figure 11. RCA audio cable

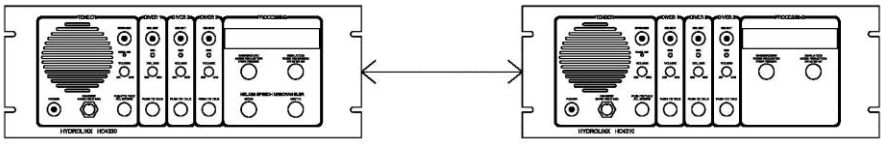

Figure 12. Connected Rack Mount Intercoms

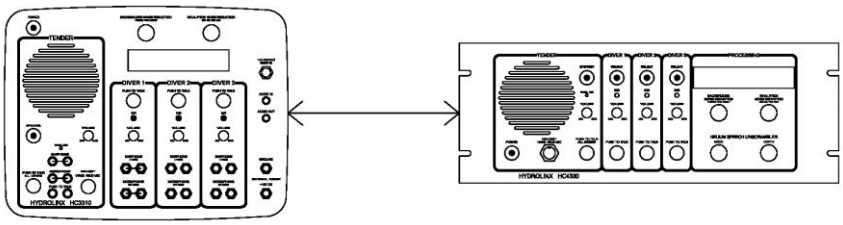

Figure 13. Connected Portable and Rack Mount Intercoms

5.5.3Two Intercoms (wireless)

Figure 14 illustrates two intercoms connected wirelessly with a HYDROLINX WM825 Wireless Module. Simply, connect each unit's Adaptor Cable to one of the intercom's Audio RCA jacks. Connect red to red and black to black. HYDROLINX Rack Mount and Portable intercoms may be connected without restrictions.

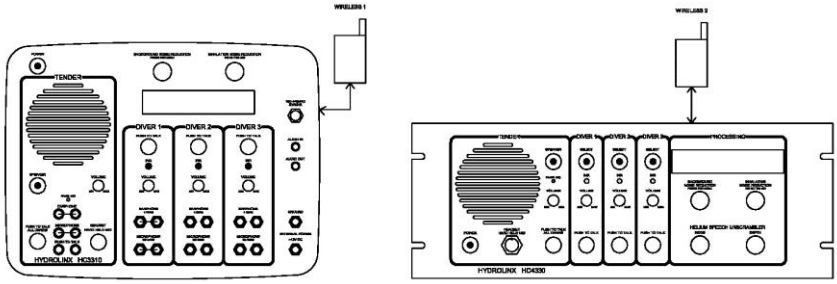

Figure 14. Wireless Connection between Intercoms

5.5.4Phone

A phone may be connected to the Audio-In and Audio-Out ports. This allows anyone, anywhere to speak and listen to the tender and the divers.

5.5.5 Audio Recorder

A standard RCA audio cable may be used to connect an audio recorder to the Audio-Out RCA Jack. The standard line-level signal from the Audio-Out port is compatible with most audio recorders.

5.5.6Audio Player

A standard RCA audio cable may be used to connect an audio player to the Audio-In RCA Jack. The standard line-level signal from most audio players is compatible with the Audio-In RCA Jack.

5.6 Power Connections

HYDROLINX intercoms are powered by an internal 12 V rechargeable battery. Two external power sources may be used to charge and sustain the internal battery. These include 100-240 V AC and 12V DC. Intercoms may be operated with or without external power. To charge the internal battery, simply connect one of the external power sources. The Intercom Power Switch may be ON or OFF. Five hours are needed to fully charge the internal battery.

> **CAUTION:** Before connecting 100-240 V AC power, verify that the AC power cord and connector are completely dry. There should be no water on the connector or cord.

The external 12V DC Circular Connector or Binding Posts can be connected to external 12 V batteries or to a 12 V DC power supply that provides a regulated, stable voltage.

> **CAUTION:** In a case using external 12V DC power supply, the output must be well insulated from its AC source.

6 Full System Configuration

HYDROLINX Rack Mount Intercoms are featured for both diving and/or chamber applications. For optimum performance and easier control of diver settings, connect only one helmet or Comm. Speaker per diver channel (circuit). However, the intercom also works when connecting more than one Diver Helmet or Comm. Speaker to the same diver channel (circuit). Figure 8 below shows an example configuration with both applications

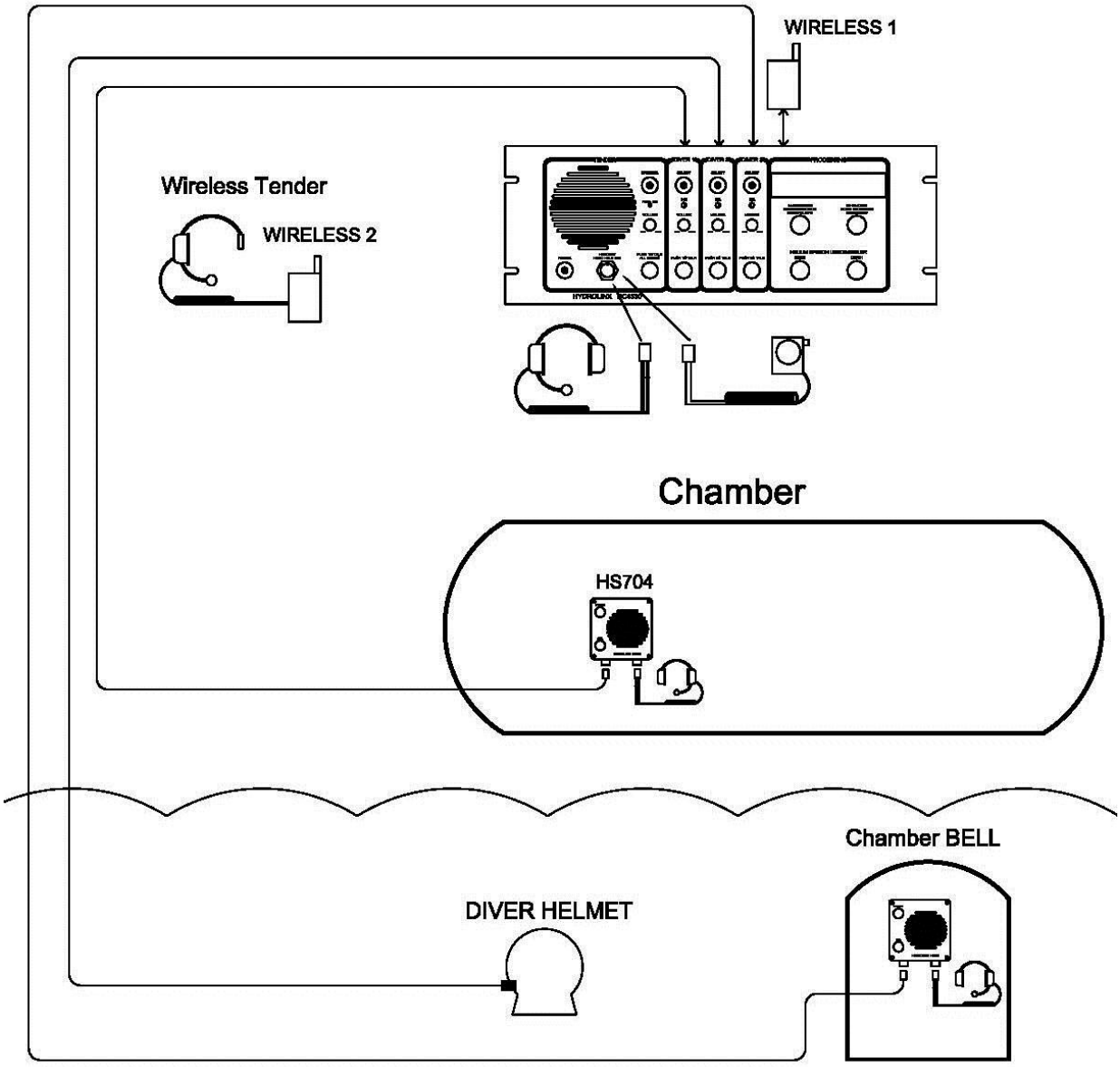

Figure 8. System Configuration for Combined Diving and Chamber Applications

7 Operating Procedures

Although HYDROLINX intercoms use advance technology for Noise Reduction, they are easy and simple to operate.

7.1 Basic Setup

1. Set the intercom on the deck or a secured shelf.
2. Connect a headset or a handheld microphone to the front panel, or turn on the Panel Speaker to enable the Panel Microphone. For more about this, see **Tender Connections**.
3. Connect the diver cables as described in **Diver Connections (2-Wire Mode)**, **Diver Connections (4-Wire Mode),** or **Chamber Connections**.
4. Set all volume controls to mid-scale.
5. Press the Power button and verify that the Power LED indicates a fully charged battery (steady green).
6. Communicate with divers while adjusting their volume controls as needed.

7.2 Inhalation Noise Reduction (INR)

Starting from 0 (normal default), gradually increase the INR setting while listening for inhalation noise and observing the INR LED (yellow) for each diver. When the INR is properly adjusted, the INR LEDs indicate that diver inhalation noise is being muted. As a safety benefit, the INR LEDs show that the divers are breathing. Avoid oversetting the INR value, as it could mute some of the speech.

7.3 Background Noise Reduction (BNR)

Starting from 0 (normal default), gradually increase the BNR setting to reduce background noise. Avoid oversetting the BNR value, as it could distort the speech. However, some distortion is acceptable for improved intelligibility.

7.4 Helium Speech Unscrambler (HSU)

1. Set the HSU MODE to 3.
2. Adjust the HSU DEPTH for the most intelligible, natural sounding speech.
3. Further improvement may often be achieved by switching the MODE and making slight adjustments to the DEPTH.

Setting INR, BNR and/or HSU to 0 disables these features. Disabling all of them, bypasses all advanced processing and permits everyone to hear the normal diver speech with inhalation and background noises. Increasing them above 0 activates advanced processing. INR, BNR and HSU may be used individually or in combination.

8 Menu and Advanced Settings

Press the BNR knob to display the LCD menu. Rotate the BNR knob to select a menu option (1-9). Then press the BNR button again to change the option's setting. Below is list of menu options:

Menu Option 1: LCD Light ON / OFF

This option turns the LCD backlight ON or OFF. The default setting is ON.

Menu Option 2: BNR, INR, HSU : All DV / Each DV

This option selects the setting mode to affect all divers simultaneously (**All DV**) or each diver individually (**Each DV**). After setting this option and exiting the menu, changes to INR, BNR, MODE or DEPTH will affect all divers simultaneously or a selected diver alone. The normal default is **All DV**. After setting **Each DV**, the LCD will show ***D1*** indicating that diver 1 is selected for changes. Press the INR, MODE, or DEPTH knob to rotate the diver selection **D1, D2**, and **D3**.

Menu Option 3: Mic. Volume DV1: 1 - 9

This option adjusts the microphone volume for Diver 1. The normal default value is 5. Press the BNR knob to rotational increase the values (1-9). This setting applies to all microphones connected in parallel; that is, multiple Comm. Speakers and/or helmet microphones. So the setting may have to be a compromise that works well enough for all microphones. This is a critical setting. Keep it at the default value (5) unless it must be changed. If it is too high, the diver's voice will distort. If it is too low, the diver's voice will sound weak.

Menu Option 4: Mic. Volume DV2: 1 - 9

This option adjusts the microphone volume for Diver 2. See Option 3 above for more details.

Menu Option 5: Mic. Volume DV3: 1 - 9

This option adjusts the microphone volume for Diver 3. See Option 3 above for more details.

Menu Option 6: Save as Default Set.

This option saves the BNR, INR, MODE and DEPTH settings for all divers, and all menu settings, as future defaults. For this action, simply press the BNR knob on this option. Thereafter, the intercom will power up with the new default values.

While saving the settings, the LCD panel will display the caution "**Wait 60 Sec. Keep power ON.**". Do not turn the intercom OFF until the LCD displays "**Done. Press any button.**"

Menu Option 7: Reset Default Set.

This option restores the original (manufacturer's) default settings. For this action, simply press the BNR knob on this option. Thereafter, the intercom will power up with the original default values. . While restoring the settings, the LCD panel will display the caution "**Wait 60 Sec. Keep power ON.**". Do not turn the intercom OFF until the LCD displays "**Done. Press any button.**"

Menu Option 8: Serial No. 12345678

This option displays the intercom's serial number.

Menu Option 9: Exit

This option will exit the LCD menu mode. For this action, simply press the BNR knob on this option. Thereafter, the intercom will display settings normally.

9 Diver CALL

This function works only with the HS702 Comm. Speaker. When a diver presses the CALL button on a HS702 Comm. Speaker, the intercom will generate a loud beeping sound and CALL notification text will appear on the LCD display, as below:

((((CALL))))
From Diver: 1/2/3

This text will stay on the LCD panel until the tender presses any button.

For the CALL function to work, pins 5&6 of the circular connector on the intercom rear panel must be connected to the Comm. Speaker as shown in figure 7 above. It is critical for the system to function, not to flip the use of pins 5&6. Be sure that pin 5 is connected to pin 5 and pin 6 to pin 6 in the cable. Inside the chamber, divers send a call signal to the tender by pressing the CALL button on the HS702.

10 Replacing the Internal Battery

1. Use only a 12V, 7AH rechargeable, sealed lead acid battery such as a **Panasonic LC-R127R2P**, **YUASA NP7-12-A** or **Power Sonic PS1270F1**.
2. Turn the Power Switch to OFF. Place the case on a flat work surface.
3. Unplug all connections from front and rear panels. Be sure to disconnect the External AC Power and the External DC supply from any power sources.
4. Using a Phillips head screw driver, remove all 4 screws from the top cover.
5. Remove the top cover and set it on the side.
6. Using same screw driver, from the rear panel, remove the 2 screws located above the battery, which are holding the battery bracket.
7. Save the screws, washers, and nuts for reuse.
8. Remove the battery terminal clips.
9. Carefully pull out the old battery. Then place the new battery.
10. Attach the clips to the new battery. Connect the RED wire to the +12V battery terminal (RED) and the BLACK wire to the Ground battery terminal (BLACK).
11. Return the bracket above the battery. Replace the 2 screws of the bracket with its washer and nut.
12. Place the cover on the top.
13. Replace the top cover 2 screws located on the sides of the cover.
14. Replace the top cover 2 screws located on the rear panel.

11 Safety Requirements

HYDROLINX Intercoms are manufactured to high quality and safety. Nevertheless, underwater diving operations are always potentially hazardous and users must take reasonable precautions to ensure diver safety.

Diver safety is the highest priority at HYDROLINX Diving Communication, Inc. All HYDROLINX internal power supplies are CE & UL certified. Also, the external DC power source is not directly connected to the diver umbilical connectors. Earth Ground is connected to the front panel.

To ensure diver safety, single-use cables must be used between intercoms and diver helmets. Never combine communication wires in a cable with wires for other purposes, such as lighting, welding, power, etc.

If an external power supply is connected to the External 12 V DC Circular Connector or Binding Posts, it must be a 12 V DC regulated power supply that is well insulated from its AC power source.

Before connecting the External 100-240 V AC power, be sure to verify that the cord and the connector are completely dry. There should be no moisture on connector or cord.

If external 100-240 V AC 50/60Hz is connected make sure the applied power is stable. Also for extra safety, use a fast acting external Ground Fault Interrupter that activates in less than 10 msec.

Connect a good, solid Earth Ground source to pin 2 of the External DC Power circular connector on the rear panel.

Rack mount intercoms are made for indoor use only. The front panel components are water sealed to the panel. But the chassis is not water resistant or water proof. If you intend to use rack mount intercoms outside, then be sure to use a water proof case that is built for standard 19 inch rack mount chasses.

All HYDROLINX products include but not limited to Intercoms, Comm. Speakers, and Headset are designed to be used in less than 23.5% of Oxygen concentration environment.

Be sure to read and apply every safety requirement.

12 Specifications

Operating voltage:	12 V DC recommended. Operate between 7-16V DC.
Idle current:	0.29 A.
Max. overload current:	3.00 A.
LCD current:	0.01 A.
External DC supply:	12 V DC.
External AC supply:	100-240 V AC, 50/60 Hz.
Internal battery charger:	12 V DC (**CE and UL certified**).
Internal battery:	Rechargeable, sealed lead acid, 12 V, 7 Amp Hour.
Battery charge time:	5 hours to Maximum.
Battery operation life:	18 hours from full charge.
Audio output power:	8 Watt Max. for tender or each diver.
Audio output protection:	Over load and short circuit.
Maximum output voltage:	7 Vrms @ 12 V supply.
Microphone impedance:	100 ohm, diver and tender.
Diver Microphone:	-70 dB sensitivity, dynamic microphone, 5-300 ohm.
Auxiliary audio input:	Impedance 600 ohm, standard audio line-level signal.
Auxiliary audio output:	Impedance 600 ohm, standard audio line-level signal.
Frequency response:	350-6500 Hz.
Advanced BNR filter:	-30 dB noise reduction, within voice frequency range.
Operating temperatures:	32°F to 140°F (0°C to 60°C).
Storage temperatures:	-4°F to 158°F (-20°C to 70°C).
Mounting	Standard Rack Mount, 19 x 7 inches (4U)
Dimensions:	19 x 12 x 6.97 inches (7.5 x 4.7 x 2.7 cm).
Weight:	12 lbs (5.5 Kg).

13 Technical information

Noise Reduction Technology

Inhalation Noise Reduction (INR) and Background Noise Reduction (BNR) are the most important factors to specialize an intercom for diving applications. Over the years, large companies around the world have studied the diver noise problems. But, although their research provided great information and analyses, their Noise Reduction algorithms never developed sufficiently. This is because diver speech, as well as inhalation and bubble noise, change with many factors including depth, helmet, regulator valve, air or helium gas mixture, etc.

HYDROLINX revived the prospect of achieving clear diver communications, by analyzing each factor's effect on diver speech, inhalation noise, and background noise and devising solutions for each factor. The speech characteristics of different divers were also taken into account. HYDROLINX then designed complex proprietary algorithms that analyze and characterize diver microphone signals, in any mixture of air and Helium, distinguishing speech from background noise and inhalation noise. To these were added algorithms that implement INR, BNR and HSU (seven algorithms) filtering. These are applied sequentially to each diver's microphone signal individually to achieve the highest speech intelligibility and clarity available today.

This new technology is historical and it advances the standard of performance in production diving intercoms.

Background Noise Reduction (BNR) Algorithm

This algorithm attenuates continuous noise caused by gas flow, bubbles, etc. The processor tracks background noises that are within the vocal frequency range and subtracts them from the microphone signal. The tender can adjust the attenuation level for the best speech quality.

Inhalation Noise Reduction (INR) Algorithm

This algorithm mutes diver inhalation noises. It does this by analyzing the microphone signal, over a wide frequency band, for air and helium speech that it distinguishes from noise. It then mutes only the noise only. The tender optimizes inhalation detection by setting the INR control for best performance.

Helium Speech Unscrambler (HSU) Algorithm

This complex algorithm analyzes the power spread of helium voice signals over a wide frequency band, setting parameters for the speech translation process. HYDROLINX devised 7 modes for Helium speech unscrambling. The tender selects the best one by adjusting a mode control. The DEPTH adjust the frequency expansion ratio. The proper setting of seven HSU modes and DEPTH translate helium distorted speech into intelligible, normal sounding speech by shifting the power spread of Helium speech appropriately. HYDROLINX uses advanced digital signal processors and the proprietary algorithms to achieve superior performance.

Although HYDROLINX Intercoms use Digital Signal Processing technology to provide extra functions for advanced users, they are as easy to operate as basic analog diving radios.

14 Warranty

HYDROLINX Diving Communication, Inc. provides a **Two Year Limited Warranty** on all products. All products are warranted against defects in materials and workmanship. This warranty is conditional on our determination that the product has not been abused, misused. Corrosion on front panel components is part of natural deterioration and is not covered under this warranty. Warranty repair services must be performed by HYDROLINX or an authorized HYDROLINX repair shop. Only HYDROLINX components are approved for on-site repairs. Use of substitutes will invalidate this warranty.

HYDROLINX should be contacted directly, before returning a product for repair service, in or out of warranty. The RMA number issued by HYDROLINX must appear legibly on the package. The customer should include complete contact information in the package and a statement of the problem. Units returned for warranty service should be safely packaged and insured. HYDROLINX will not be responsible for damage in shipment. Freight charges to HYDROLINX are the customer's responsibility.

Read this manual completely before using HYDROLINX Intercom, to ensure the knowledge of all functions, connections, operational procedures and safety warnings.