Undersea Systems International, Inc.

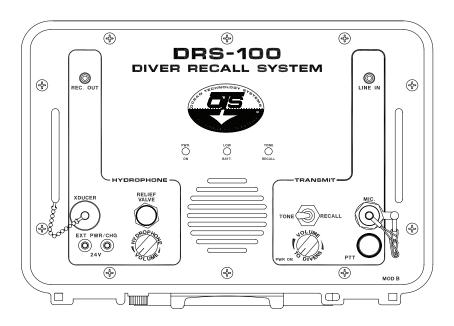*dba*

OCEAN TECHNOLOGY SYSTEMS

DIVER RECALL SYSTEM

DRS-100

MOD B

USER'S MANUAL

"Technology in Depth"

- IMPORTANT SAFETY NOTICE -

It is absolutely essential that all users are properly trained and equipped and fully understand this user's manual before attempting to use the DRS-100 (mod B) Diver Recall/Hydrophone System.

Read and fully understand the battery charging section of this manual <u>before</u> you attempt to charge or operate the DRS-100.

While the DRS-100 provides divers with good underwater communications, <u>it does not change or eliminate the potential hazards of diving!</u>

- NOTE -

This manual and the information contained herein are provided for use as a maintenance and operation guide. No license or rights to manufacture, reproduce, and/or sell either the manual or the articles described herein are given. Ocean Technology Systems reserves the right to change specifications without notice.

506016-000 (rev. M)

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SECTION 1

INTRODUCTION

Thank you for choosing the Ocean Technology Systems DRS-100 (mod B) Diver Recall/Hydrophone System. With the DRS-100, you can recall free-swimming divers with a solid tone, intermittent tone, or voice transmissions. The underwater listeners need not wear any special diving equipment to hear. Topside personnel can even transmit music or any other audio signal by connecting the source to the line-in jack on the DRS-100 panel. The DRS-100 can even be used as a hydrophone, allowing the user to listen to marine biological and man-made sounds present in the water. These sounds can be recorded easily via the external record output jack on the front panel.

How do the divers hear? Sound is transmitted through the water omnidirectionally by an underwater transducer. The typical range is 500 meters but depends on the biological/ambient noise level. Divers within range listen using only their ears; no electronic equipment is necessary.

The DRS-100 Diver Recall System provides the following:

- A self-contained control module with a housing that is sturdy, resistant to marine corrosion, o-ring sealed, and constructed of lightweight materials
- A transducer attached to 25 feet of cable
- An HSM-10 hand-held microphone with a push-to-talk button
- Two maintenance-free rechargeable batteries
- An RCS-30 smart charger

Before operating or charging the DRS-100 Diver Recall System, read this entire manual. In addition to the instructions for use and maintenance of the system, there are some important safety issues all users must be familiar with before operation. Should you have any questions, please contact your local Ocean Technology Systems (OTS) dealer, or feel free to contact OTS directly (see p. 13 for OTS contact information).

1.1   SPECIFICATIONS

Input voltage: 24 VDC

Input current: 7 amps maximum

Idle current: 75 mA

Audio power (PEP*):   *Recall & tone:* 132 watts
                          Voice: 132 watts

Frequency response: 500 to 4000 Hz

Recall oscillation rate: 5 Hz

Beam pattern: Omnidirectional

Transducer cable: 25 feet in length

Transducer: Anodized aluminum

Fuse type: 6 amps, slow-blow (use slow-blow fuse only)

Transducer: *Size:*   9 in. diameter, 6 in. axial length
                          Weight: 13 lbs. in air, 2 lbs. in water

Low-battery LED: Flashes at approximately 20 volts

Battery type: Two 12-volt, 2.6 amp-hour, maintenance-free re-
                          chargeable cells (in series)

Battery life: 5 hours at 20% duty cycle (Recall/Tone mode)
                          3 hours nominal when using auxiliary input (medium
                          volume)

Microphone type: Push-to-talk, front panel (optional hand-held with
                          PTT available)

Size: *Depth:*   10.6 in. (including handle and hinges)
                          Length: 14 in.
                          Height: 4.7 in. without cover
                                       6.5 in. with cover

Weight: 15 lbs.

Battery charging time: 2-3 hours (the RCS-30 automatically switches to
                          maintenance mode when the battery is fully charged,
                          indicated by the LED turning *green*)

RCS-30 smart charger: 90 to 260 VAC input; 24 VDC, 1300 mA, 50/60 Hz
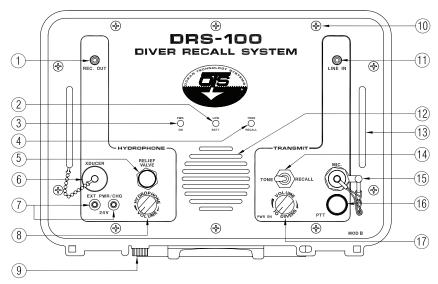   output

———————
* Peak envelope power

Figure 1. Features of the DRS-100B

1.2 FEATURES AND FUNCTIONS

Refer to Figure 1. Terms in all capital letters correspond to the labels on the DRS-100 panel.

1. **REC. OUT:** This female RCA jack allows topside personnel to record underwater sounds. Use a male RCA plug and any recorder.

2. **LOW BATT.:** This LED will illuminate *red* (flashing) when the battery level reaches approximately 20 volts. The unit can operate with as little as 12 volts. *Note: Recharge the batteries as soon as possible after the low-battery light illuminates.*

3. **PWR. ON:** This green LED will illuminate when power is *on.*

4. **TONE/RECALL:** This LED illuminates *red* when the *continuous tone* is utilized and *green* when the *intermittent tone* is activated.

5. **Panel RELIEF VALVE:** Open this valve when charging the internal rechargeable batteries. It must be completely open (counterclockwise) when charging (see charging instructions), and closed during normal operation to prevent water from entering the housing.

   Also be sure to open the valve to maintain equalized pressure if the DRS-100 will undergo airline shipment.

6. **XDUCER:** This jack is used to connect the underwater transducer to the DRS-100 unit.

7. **EXT PWR/CHG:** This jack is used to charge the internal batteries or to use the optional EXT-24 external power supply (p/n 910091-000) (115 volts AC input to 24 volts DC output) (+ red, – black).

8. **Hydrophone VOLUME:** This knob controls volume to the front-panel speaker. All sound in the water within range will be amplified through this speaker. Rotation clockwise increases, and counterclockwise decreases, listening volume to the front-panel speaker.

9. **Housing Relief Valve:** This valve automatically equalizes internal pressure during air travel.

10. **Front-Panel Screws:** There are ten Phillips screws located around the front panel. Each screw has its own o-ring seal. When removing the screws and front panel, ensure that you do not lose or damage the o-rings. Tighten the screws only enough to ensure the panel is sealed against its o-ring.

11. **LINE IN:** This RCA jack allows the operator to transmit an external audio source into the water (e.g., cassette recordings or inputs from a master public address system).

12. **Front-Panel Speaker:** The front-panel speaker is used to listen to any underwater sounds within range (e.g., biological or from human activity). The hydrophone volume control (#8) adjusts the listening volume.

13. **Handle:** You will find two handles on the front panel. Use these to remove the front panel after the ten front-panel screws (#10) are removed.

14. **TONE/RECALL:** When this toggle switch is pushed and held to the left, the unit will emit a continuous tone, while the Tone/Recall LED (#4) illuminates *red*. Push and hold the toggle switch to the right for the DRS-100 to emit an intermittent tone, indicated by *green* illumination of the same LED.

15. **MIC.:** This jack is used to connect an HSM-10 hand-held microphone to the unit. Voice transmission can now take place via the hand-held microphone. Without the hand-held microphone, voice transmission can be accomplished via the front-panel speaker (#12) and PTT button (#16).

16. **PTT:** This is a push-to-talk (PTT) control. When the DRS-100's power is on, the user can depress and hold the PTT button and talk into the front-panel speaker. His voice will be received by all divers within range. The volume to the divers is controlled via the transmitter volume control (#17).

17. **To Divers (transmit) VOLUME:** Clockwise rotation past the detent turns the unit on, indicated by the green "PWR ON" LED's (#3) illumination if the battery condition is good. This control adjusts the volume to the divers. Rotation clockwise increases and counterclockwise decreases the volume. Generally three fourths of a turn clockwise is the best position. Full counterclockwise rotation past the detent turns the DRS-100 off.

SECTION 2

SETUP AND OPERATION

2.1   SETUP

1.   Set the DRS-100 Diver Recall/Hydrophone System on a flat surface where you will use it, with the carrying handle facing the user.

2.   Open the housing by pulling up on the clamps located on either side of the carrying handle, and raise the lid.

3.   Fully close the relief valve (Fig. 1, #5) on the panel by rotating it clockwise.

4.   If you will use an external power source, connect its banana plugs to the "EXT PWR/CHG" jack (Fig. 1, #7) on the DRS-100 panel, being careful to observe polarity (match the red and black). Activate the external power source, if necessary, but leave the DRS-100 power off. If you will use the internal batteries, proceed to Section 3 (Batteries and Charging, p. 7) before continuing.

5.   Remove the protective cover from the transducer receptacle (Fig. 1, #6).

6.   Locate the connector on the transducer (underwater speaker) end of the transducer cable. Insert the transducer connector into the transducer receptacle on the panel, and rotate the ring until a good connection is obtained.

7.   Strain-relieve the transducer cable by securing a rope to the strain relief clip on the transducer. Additionally, tape the rope about every 12 inches to the transducer cable, with all of the strain on the rope.

8.   Lower the rope secured to the transducer into the water, and secure the rope to a solid object above the surface.

> _Note:_
> • _Never lower the transducer into the water without a rope to relieve the strain, or damage may occur. The transducer cable alone will not support the weight of the transducer._
> • _Do not lower the transducer deeper than 25 feet._

2.2   OPERATION

2.2.1   POWER AND VOLUME CONTROL: To activate the unit's power, rotate the "To Divers" (transmit) volume control (Fig. 1, #17) clockwise. The green "PWR ON" LED (Fig. 1, #3) should illuminate. To adjust the hydrophone listening volume, turn the hydrophone volume control (clockwise rotation increases the volume).

The hydrophone is listening as soon as you turn on the DRS-100. If you do not want to listen to the front-panel speaker, turn the volume down.

2.2.2   TRANSMISSION:

2.2.2.1   Tone/Recall Mode: For tone transmission, move the "TONE/RECALL" switch (Fig. 1, #14) either right for *intermittent tone* or left for *continuous tone.* The tone/recall LED (Fig. 1, #4) illuminates *green* when the DRS-100 is in intermittent tone mode and *red* when in continuous tone mode.

Note: The volume control knobs do not affect the volume when using the tone/ recall feature. Transmit volume control is used to control the volume only when in PTT or hand-held microphone mode. Tone/recall mode automatically puts full power to the transducer.

2.2.2.2   Voice Communication: For voice communication to divers or swimmers, set the transmitter volume (Fig. 1, #17) to about half volume. If you will use a hand-held microphone (e.g., the HSM-10) with a push-to-talk (PTT) switch, insert the microphone connector into the jack (Fig. 1, #15), depress the PTT button, and talk into the microphone. Otherwise, press and hold the PTT switch (Fig. 1, #16) and talk into the front-panel speaker (Fig. 1, #12). To increase the transmission volume, rotate the transmit volume control (Fig. 1, #17) clockwise. Release the PTT button when you have finished transmitting.

2.2.2.3   External Audio: To transmit audio from an external source, connect an RCA plug leading from the source to the DRS-100's "line-in" jack (Fig. 1, #11).

Note:
• *When a standard line-out source is connected to the "line-in" jack, the transmitter activates. If your sound source has no DC path to ground (DRS-100 chassis ground) via the output circuit of your device, you may need an adapter (OTS p/n 914024-000). Additionally, be careful not to allow salts, water, minerals, etc. to build up around this jack, because they could cause the transmitter to activate due to electrical conduction at the jack.*
• *The line input connection will accommodate unbalanced line signals (2 V_{PP} at 600 ohms). Any source level similar to this is suitable for driving the DRS-100 line input. The source must present a **DC** path of at least 15 Kohms to ensure the transmit circuit activates.*

2.2.3   RECORDING: To record audio signal received from the hydrophone or that you transmit into the water, insert a male RCA plug into the record-out jack (Fig. 1, #1). Connect the other end to your recorder's microphone input.

SECTION 3

BATTERIES AND CHARGING

The DRS-100 Diver Recall System is equipped with rechargeable, maintenance-free batteries (two 12-volt batteries wired in series) and comes with an RCS-30 smart charger. It is not necessary to remove the batteries to recharge the system.

Note: The battery you receive may have upgraded specifications from what is stated in this manual. Due to advancing battery technologies, we continually upgrade our batteries and chargers. Contact OTS (p. 13) or your local OTS dealer to find out the latest available battery and charger.

The DRS-100 can be powered by an external 24-VDC, 7-amp power source (the EXT-24 external power supply, sold separately, is available to convert 115 VAC to 24 VDC) or by its internal rechargeable gel-cell batteries. If an external 24-VDC power supply is used, the internal batteries will partially recharge. The charging source must provide at least 28 volts, 500 mA for batteries to come to a fully charged condition.

When the low-battery LED (Fig. 1, #2) begins to flash red, the battery voltage has decreased to 20 volts. Although the DRS-100 can operate with as little as 12 volts, we recommend that you recharge the batteries (Section 3.1) as soon as possible after the LED starts to illuminate. If the batteries no longer hold a charge, replace them (Section 3.2).

3.1 BATTERY CHARGING PROCEDURE

WARNING: To avoid damage or injury, read and follow all the instructions below before attempting to recharge the batteries.

If you are going to operate the DRS-100 outside the USA, you will need to purchase the appropriate power cord for the region of operation. Power cords are available for: Australia (606014-003), UK (606014-002), and Europe (606014-001).

1. Open the cover.
2. Turn the relief valve (Fig. 1, #5) fully counterclockwise to open it.
3. Locate the 24-volt "EXT PWR/CHG" jack (Fig. 1, #7), and insert the plugs (+ red and – black) from the RCS-30 smart charger.

   Note: Be certain that black is connected to black and red to red. If they are reversed, no harm will occur to the DRS-100, but the batteries will not charge.

4. Connect the RCS-30 smart charger to any power source providing between 90 and 260 volts AC, 50 or 60 Hz.
5. The red LED on top of the battery charger should illuminate to indicate the charger is properly connected. The charger may be disconnected when the

LED turns *green,* indicating a full charge, or may be left connected indefinitely as the charger automatically switches to the "maintenance charge" mode.

- IMPORTANT SAFETY WARNING NOTES -

• **Batteries can excrete hydrogen gasses during the charging cycle. To minimize gas build-up, open the pressure relief valve (Fig. 1, #5) on the panel while recharging the batteries. Do not release the pressure relief valve and turn on the DRS-100 until a minimum of 15 minutes have elapsed after the charging cycle has been completed and the charger is disconnected from the front panel. *Failure to follow this procedure may result in damage to the unit or serious injuries due to an explosion!!!***

• **Never use the RCS-30 smart charger to charge only one 12-volt battery. Damage or injury may occur.**

6. After a charging period*,* remove the RCS-30 smart charger from the power source.

7. Disconnect the red and black charging plugs from the front panel.

8. After a resting period of at least 15 minutes, rotate the panel's relief valve clockwise to its closed position.

Note: The RCS-30 smart charger cannot be used as an external power supply. It does not supply enough current.

3.2   BATTERY REMOVAL/REPLACEMENT

If the batteries no longer can hold a charge, you will need to replace them with the Ocean Technology Systems RB-30 battery kit. Follow this procedure to remove and replace the batteries:

1. Remove the ten front-panel screws (Fig. 1, #10).

2. Gently remove the control panel by pulling on the handles (Fig. 1, #13).

3. Disconnect the panel's connectors from P8, P10, P11, P12, and P13 of the circuit board.

4. Remove the battery jumper (Fig. 2, #19) and the interconnection cable (#18) from the batteries.

5. Remove all the hex nuts (Fig. 2, #22) from the battery brackets.

6. Remove the battery bracket (Fig. 2, #23) from the batteries.

7. Remove the batteries (Fig. 2, #24).

8. Slide the new batteries into place.

9. Reinstall the battery bracket, and secure it with the hex nuts.

10. Connect one end of the battery jumper (Fig. 2, #19) to a terminal marked "BLACK" on one of the new batteries.

11. Connect the other end of the battery jumper to the *red* terminal of the *other* battery.

12. Connect one end of the interconnection cable (Fig. 2, #18) to the remaining black and red terminals.

13. Reconnect J8, J10, J11, J12, and J13 to the circuit board assembly. J10, J11, J12, and J13 are labeled and should be connected to the corresponding plugs on the circuit board (P10, P11, etc.). J8 is probably not labeled but is the one remaining connector of the wiring harness that attaches to the circuit board; it should be connected to P8.

14. Check the o-ring (Fig. 2, #21) on the inside of the housing for debris or damage. Replace it if necessary.

15. Reinstall the front panel and the ten front-panel screws (just tightly enough to make a good seal).
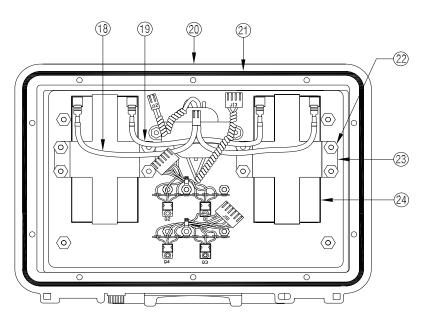
16. Fully charge the batteries (Section 3.1, p. 7).

Figure 2. Battery Compartment Layout

Key

18. Battery interconnection cable
19. Battery jumper
20. Housing
21. Housing o-ring

22. Hex nut, #8-32 (battery bracket mounting)
23. Battery bracket
24. Battery

SECTION 4

MAINTENANCE AND TROUBLESHOOTING

Solidly designed and ruggedly constructed, the DRS-100 Diver Recall/Hydrophone System should provide long, trouble-free operation if basic preventive maintenance is performed regularly according to the instructions in this section. Information for troubleshooting is also provided in the event a malfunction does occur.

4.1   GENERAL

This section provides information for maintenance, functional checks, and adjustments of the DRS-100 Diver Recall System. The preventive maintenance portion (Section 4.2) serves as a guide in proper maintenance of the DRS-100 to prolong its service life and avoid performance failures. The troubleshooting portion (Section 4.3) provides the necessary information and procedures for solving basic problems that may arise and seeking further assistance if a service technician is needed. Removal and replacement procedures are provided for various parts to assist during maintenance and troubleshooting. A list of recommended spare parts appears in the Appendix at the end of the manual. For service personnel or technically inclined users, documentation for more advanced troubleshooting of the DRS-100 is available from Ocean Technology Systems (see p. 13 for contact information).

4.2   PREVENTIVE MAINTENANCE

The DRS-100 system must be maintained properly for trouble-free operation.

4.2.1   CHECK PRIOR TO EVERY DIVE: Perform the following checks on the DRS-100 before every dive.

1. Examine the DRS-100 unit, checking for any damage to the exterior.

2. Open the lid and check for any damage to controls or connectors.

3. Check the connectors for bent or corroded pins.

4. Check the microphone and transducer cables for cuts and abrasions.

5. If the low-battery LED is flashing, charge the unit prior to use (Section 3.1, p. 7). If the batteries do not charge, replace them (Section 3.2, p. 8).

4.2.2   MAINTENANCE FOLLOWING THE DIVE: After each dive, the following preventive maintenance should be performed.

1. Charge the batteries (Section 3.1, p. 7) if the voltage is low (the low-battery LED is flashing).

2. Disconnect all connectors from the front panel.

3. After use, remove any salt spray or moisture accumulated on the front panel (use a damp cloth with a mild detergent solution).

4. Remove any debris from the o-ring located on the inside of the cover (Fig. 2, #21).

5. Rinse the transducer in fresh, clean water, and dry it before storage.

6. Keep the hand-held microphone as dry as possible (if applicable).

7. Keep the bulkhead connector free of debris and moisture.

8. Lubricate the seals with Zip Slip silicone grease or equivalent. If the seals show wear or damage, replace them instead.

4.3   TROUBLESHOOTING

This section contains instructions for troubleshooting the DRS-100 Diver Recall System. The information found in Section 2, Setup and Operation (p. 5), should be used to supplement the information in this section.

Refer to Table 1 for instructions for troubleshooting basic problems with your DRS-100. If the problem you are experiencing is not mentioned in the table, or if you have tried the suggested solutions and the problem persists, contact Ocean Technology Systems (see contact information on p. 13) for technical support or arrangements to send in the unit for repair.

4.4   REMOVAL OR REPLACEMENT OF PARTS

4.4.1   ELECTRONICS CHASSIS REMOVAL: To remove the electronics chassis from the housing, remove the ten panel screws. Carefully pull the electronics chassis straight out, taking care not to catch any wiring on the edge of the box or to place undue stress on the circuit board connectors or cables.

4.4.2   BATTERY REPLACEMENT: If the battery pack fails and requires replacement, remove the battery container and replace the batteries (Section 3.2, p. 8).

4.4.3   FUSE REPLACEMENT: If the fuse blows, replace it with a 6.0-amp, type MDL-6 slow-blow fuse. This fuse is located on the internal board.

TABLE 1: Troubleshooting

Symptom	Probable Cause	Remedy
No power to unit	Batteries exhausted	Recharge batteries.
	Failure of external DC power supply	Check DC power source and connection.

Symptom	Probable Cause	Remedy
	Fuse F1 open	Replace fuse.
Batteries do not charge	Batteries defective	Replace batteries.
	Charger defective	Replace charger.
	Battery terminals loose	Check connections (tighten if necessary).
No microphone input	Microphone defective	Replace microphone.
	Microphone connector defective	Replace connector.
No transmission or reception	Defective U/W speaker, connector, or cable	Replace speaker or speaker connector, or repair cable.
	Loose or disconnected Molex connector to output transformer	Reconnect.
	Output transformer defective	Replace transformer.
	Panel speaker defective	Replace panel speaker.

-APPENDIX-

SPARE PARTS

- LL-98: transducer with strain-relief eyelet (p/n 900189-000)
- HSM-10: deluxe, noise-cancelling hand-held microphone (p/n 910041-000)
- Line-in adapter cable (p/n 914024-000) (optional)
- RCS-30: smart charger with connector (p/n 910363-000 thru -003)
- RB-30: two maintenance-free, 12-volt batteries (p/n 900041-000)
- Fuse: 6-1/4 amps, slow-blow (p/n F007)
- Housing, Underwater Kinetics (p/n 134033-001)
- Housing o-ring (included with housing)
- Hex nut, 8-32, for mounting of battery bracket (p/n 246007-000)
- Battery bracket (p/n 136007-000)
- Battery interconnection cable (p/n 914023-000)
- US power cord for RCS-30 (p/n 606014-000)
- European power cord for RCS-30 (p/n 606014-001)
- UK power cord for RCS-30 (p/n 606014-002)
- Australian power cord for RCS-30 (p/n 606014-003)

Undersea Systems International, Inc.
dba
Ocean Technology Systems

LIMITED WARRANTY

Ocean Technology Systems' DRS-100 mod B is fully warranted against defects in materials and workmanship for a period of one 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 one 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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