



**RJE International, Inc.
Irvine, California**

**TECHNICAL MANUAL
UNDERWATER ACOUSTIC LOCATOR SYSTEM
MODEL PRS-275 AND THE DPR-275 DIVER PINGER
RECEIVER**

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This manual should be read in its entirety prior
to operation of the PRS-275 or the DPR-275

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SECTION I GENERAL INFORMATION

1.1. INTRODUCTION.

This manual contains the description, theory, installation and maintenance for the Underwater Acoustic Locator System Model PRS275.

1.1.1. *SYMBOLS AND ABBREVIATIONS.* All symbols and abbreviations used in this manual are in accordance with the ANSI Y14.15 and MIL-STD-12, respectively.

1.2. DESCRIPTION.

1.2.1. The Underwater Acoustic Locator System Model PRS-275 consists of an Underwater Acoustic Receiver Model DPR-275 and accessory items as listed in TABLE 1 and shown in FIGURE 1. The receiver is a portable hand-held, battery-powered device. It is designed for use in detecting and locating an underwater sound source emitting a signal in the 5 to 80 kHz. range.

1.2.2. The receiver assembly is designed to operate at any depth to 200 meters (650 feet) and possesses slight positive buoyancy. The receiver housing is constructed of corrosion resistant materials and will withstand prolonged exposure to salt water.

The DPR-275 receiver and accessories are packed in a watertight transit case. The battery compartment is located on the front of the receiver (Hydrophone end). Waterproof tuning and gain controls are located on the rear end for ease in underwater operations. The specifications for the receiver are listed in TABLE 2.

1.2.3. Detection range of an acoustic signal from a beacon will vary greatly depending upon the depth of the water and the ambient conditions. In relatively shallow water, i.e., 180 meters (600 feet), and wave heights of .3 to .62 meters (1 to 2 feet) such signals are often heard for a distance of 2 to 3 nautical miles. This range may be decreased by half due to noise caused by marine animals, small boats, whitecaps and thermal layers in the water. When the signal comes from greater depths, the surface coverage is also affected by the slant range or distance between the sound source and the receiver. At depths of 1.80 km (6000 feet) the surface coverage will likely shrink to an approximate circle 1.6 to 3.2 km (1 to 2 miles) in diameter. These factors should be taken into consideration in setting up a search pattern.



FIGURE 1. UNDERWATER ACOUSTIC LOCATOR SYSTEM, MODEL PRS-275

TABLE 1. RECEIVER COMPONENTS

QTY	NOMENCLATURE	PART NUMBER
1	Underwater Acoustic Receiver.....	DPR-275
1	Hydrophone	PRS275-01
1	Submersible Headphone	PRS275-02
1	Staff Hydrophone Holder with Extension Cable	PRS275-03
1	Staff Handle/Extension Assembly	PRS275-04
2	Staff Extension Section	PRS275-05
2	Staff Extension Tightening Rod	PRS275-06
1	Transit Case	PRS275-07
1	Transit Case Liner (Bottom)	PRS275-08
1	Technical Manual	03-TM-053
1	O-Ring Lubricant (3 dram vial)	O-LUBE

SPARE PARTS

1	Seal Screw	PRS275-09
1	O-Ring	PRS275-10

TABLE 2. PRD275 RECEIVER SPECIFICATIONS

Identification	DPR-275
Frequency Range	Continuously tunable from 5 kHz. to 80 kHz.
Receiver Gain	95 dB minimum at 37.5 kHz.
Equivalent Noise Input	.4 μ V rms max at 37.5 kHz
Receiving Bandwidth	Response down minimum of 10dB at \pm 500 Hz from center frequency with 3uV signal input
Audio Output	50 mW minimum at peak response between 1000-3000 Hz into 600 Ohm load
Hydrophone Sensitivity	Not less than -185 dB with respect to 1V/ μ Pa @ 37.5 kHz. into a 16 k Ohm load
Receiver Directivity	Acoustic response down at least 10dB at \pm 30° to max. at 37.5 kHz
Power Source	2 "C" cell batteries provides 30 hours of normal operation
Operating Temperature ..	-18° to 54° C (0° to 130°F)
Storage Temperature	-54° to 60° C (-65° to 140°F)
Dimensions	10.7 cm Diameter 22 cm Length (4.2" Diameter 8.63" Length)
Weight	2.5 kg. (5 lbs.) in air with batteries
Operating Depth	200 meters (650 feet) maximum

SECTION II OPERATION

2.1. THEORY OF OPERATION.

2.1.1. The DPR-275 is a battery-operated Underwater Acoustic Signal Receiver that detects the underwater acoustic pulse generated by a beacon in the range of 5 kHz. to 80 kHz. by means of a hydrophone attached to its frame. The incoming signal from the hydrophone is amplified by the tunable preamplifier, which is tracked with the local oscillator at a frequency difference of approximately 1.7 kHz. The mixer combines the two signals and amplifies the difference frequency which is fed into the audio amplifier where additional gain is provided. The receiver is provided with a gain control in order to prevent overload of the preamplifier at high signal levels. Threading on the hydrophone end allows the hydrophone to be screwed into the Receiver or Staff Hydrophone Holder and an o-ring seal prevents water from leaking into the submerged housing.

2.2. MODE SELECTION.

2.2.1. *DPR MODE.* The Receiver is operable as a self-contained unit for diver use FIGURE 2.



**FIGURE 2. RECEIVER CONNECTED TO
SUBMERSIBLE HEADSET AND HYDROPHONE
(DPR MODE)**

2.2.2. *PRS MODE.* The Receiver is operable from a small boat when used with its auxiliary Staff Hydrophone Holder FIGURE 3. Receiver control functions are the same for both modes of operation.



**FIGURE 3. ACOUSTIC LOCATOR WITH
SUBMERSIBLE HEADSET AND STAFF
HYDROPHONE HOLDER (PRS MODE)**

2.2.3. The hydrophone attached to the Auxiliary Support Staff is immersed from a boat during preliminary search operations. When the maximum signal area is located, the receiver is reassembled for use by the diver in order to pinpoint the target.

2.2.4. The directional characteristics of the receiver provide bearing determination. Upon arrival at maximum signal area, a diver then follows the signal to the submerged item to effect recovery.

2.3. CONTROLS.

2.3.1. *On/Off Volume Control.* The control switch is in the OFF position when the control is fully counterclockwise. To turn the receiver on, rotate the knob clockwise to operate switch, then continue until a signal or background noise of comfortable level is heard in the headphone.

2.3.2. *Frequency Tuning Control.* The Frequency Tuning Control permits reception of an acoustic signal operating anywhere within the 5 to 80 kHz. frequency range. If the signal source is a 37.5 kHz. beacon, the receiver operator should vary the frequency control slowly through the 35 to 40 kHz. range until the desired signal is heard. Adjust the Tuning Control for best audio response.

2.3.3. *Gain Control.* As the receiver approaches the signal source, the audio level will increase. At very close range the operator must reduce the gain setting in order to prevent saturation and apparent loss of directivity. The receiver will also provide a visible signal indication by means of a signal strength bar.

2.3.4. *Signal Strength Bar.* The bar is a visual indicator of signal strength and directivity displayed by an equalizer-like string of blinking LEDs. The LEDs will flash with each acoustic output pulse emitted by a beacon or similar sound source.



FIGURE 4. RECEIVER CONTROLS

2.3.5. *LCD Display Backlighting.* The Unit has a built-in tilt sensor that will activate the backlighting. The backlight will stay on for 10 seconds every time it senses movement.

2.4. ASSEMBLY AND OPERATION FROM A BOAT.

2.4.1. For boat use, the Submersible Headphone should be connected to the DPR-275 Receiver output connector FIGURE 2. Apply a small quantity of o-ring lubricant to the mating surfaces of the connector to facilitate assembly.

2.4.2. If the hydrophone is in the receiver, remove it by rotating it counterclockwise, and immediately install it into the Staff Hydrophone Holder. Insert the hydrophone connector plug into the input jack on the free end of the Staff Hydrophone Holder, as shown in FIGURE 6. Then rotate the hydrophone clockwise until it is well seated (watertight closed).



FIGURE 6. MATING HYDROPHONE WITH HYDROPHONE HOLDER

Install the extension hydrophone cable connector plug into the input jack of the Receiver at the hydrophone end as shown in FIGURE 7. Rotate the extension hydrophone cable connector clockwise until it is fully seated (watertight closed).



FIGURE 7. MATING EXTENSION HYDROPHONE CONNECTOR WITH A RECEIVER INPUT JACK.

CAUTION

KEEP WATERTIGHT CONNECTORS FREE OF DIRT AND SAND. PRESENCE OF MINUTE DIRT PARTICLES MAY IMPAIR THE WATERTIGHT SEAL RESULTING IN ELECTRICAL MALFUNCTION. APPLY A LIGHT COATING OF O-RING LUBRICANT TO CONNECTORS TO FACILITATE EASY MATING.

2.4.3. Connect the Staff Handle Assembly and one or all the Extension Sections as required to the Staff Hydrophone Holder. Hand tighten the sections together. The total length of Staff Handle Assembly, two Extension Sections, and Staff Hydrophone Holder is approximately two meters long.

2.4.4. Position the Handle on the Staff Handle Assembly so that it is pointed toward the maximum response of the Hydrophone i.e., the front face of the Hydrophone. Lock it in this position by tightening the Staff Handle Ring Nut. The handle will then serve as a visible bearing indicator on the maximum received signal when the Hydrophone is not visible to the operator.

2.4.5. Lower the Hydrophone into the water, turn the Receiver on, adjust GAIN control to a suitable sound level. Adjust the FREQUENCY tuning control to the desired by turning the frequency knob clockwise or counterclockwise and scan the area for a beacon signal. Verification of receiver operation, evaluation of ambient condition and anticipated detection range may be established by the use of a spare test beacon on the site before starting actual search operations. Upon detecting a beacon signal, peak the FREQUENCY Tuning Control and readjust the GAIN Control for comfortable listening level. As the signal source is approached it is necessary to reduce the gain in order to maintain directivity. If no beacon signal is heard on the first rotation, conduct subsequent rotations while slowly tuning the Receiver.

Note

If the boat has a deep hull or keel it will be necessary to search for beacon signals on both the port and starboard sides of the boat. A deep hull or keel can cast an acoustic shadow and cause the beacon signal to be inaudible.

2.4.6. When the operation from the boat is concluded, proceed with diver operation.

2.5. ASSEMBLY AND OPERATION BY A DIVER.

2.5.1. If the Hydrophone is not already in the Receiver, remove it from the Staff Assembly Extension Cable Connector by rotating it counterclockwise. Insert the Hydrophone plug into the DPR-275 Receiver input jack connector as shown in FIGURE 8, and hand tighten in place by turning it clockwise. Be sure Hydrophone is seated properly to ensure a watertight seal.



FIGURE 8. MATING HYDROPHONE WITH RECEIVER.

2.5.2. Plug the Submersible Headphone into the Receiver Headphone connector then turn the unit on. The receiver will provide a signal indication by means of flashing LEDs built into the Signal Strength Bar indicator with or without the Submersible Headset.

2.5.3. The receiver is now ready for submerged operation by the diver. While the Volume Control is preset at minimum, the Gain Control is preset at maximum, turn respective knobs for suitable volume and/or flashing of the LEDs when signal is received. If the frequency has previously been set for best reception and left undisturbed, no retuning should be necessary. The receiver should be rotated to establish the bearing to the strongest signal. As the diver approaches the bottom, he should also make vertical scans. The beacon may be in wreckage above the bottom. The directivity of the Hydrophone is conical, similar to the beam of a flashlight. Again remember to reduce the gain as the beacon is approached to avoid overload of the Receiver and apparent loss of directivity.

2.5.4. When a beacon signal is detected, reduce the gain control setting for minimum comfortable listening level, and peak the tuning control. Reduce the gain control setting as the signal source is approached which maintains the directional characteristics of the receiver.

2.5.5. When operation is completed, rinse all parts with fresh water and wipe dry before storing them in the watertight transit case.

CAUTION

DO NOT ALLOW BLACK ACOUSTIC WINDOW OF
HYDROPHONE TO BE CUT, PUNCTURED OR
OTHERWISE DAMAGED.

SECTION III MAINTENANCE

3.1. BATTERY REPLACEMENT.

3.1.1 If the DPR-275 Receiver display reads BAT the receiver batteries have dropped below the level required for operation and should be replaced. Perform all maintenance procedures in a clean and dry environment and always turn off unit before replacing the batteries.

The battery compartment is located at the front end of the receiver (See FIGURE 9). To access the battery compartment remove the hydrophone by rotating it counterclockwise, carefully pull the depleted batteries out of the battery compartment via the pull-string then install two new 1.5 volts "C" size alkaline battery in the same orientation as outlined by the polarity stickers. Note: Accidental insertion of batteries with reversed polarity will cause no damage since reverse current flow is prevented by a protective diode inside the Receiver. The unit simply will not operate. Ensure that a good contact is made with the battery holder terminals. Prior to repositioning the Hydrophone make sure the o-rings on the Hydrophone are seated properly in the o-ring groove. Also make sure that both the threads on the hydrophone and the receiver end are properly greased and free from debris. Replace o-rings if necessary then re-install the Hydrophone and tighten it securely. A good seal will prevent unit from flooding.



FIGURE 9. BATTERY COMPARTMENT

3.1.2. The battery compartment is located at the front end of the DPR-275 Receiver See FIGURE 9. To access the battery compartment, remove the Hydrophone by rotating it counterclockwise. Carefully pull the depleted battery out of the battery compartment via the pull-string. Install two new 1.5 volt "C" size Alkaline batteries in the same orientation as outlined by the polarity stickers. Ensure that a good contact is made with the battery holder terminals. Prior to repositioning the Hydrophone make sure the o-ring on the Hydrophone is seated properly in the o-ring groove.

Also make sure that both the threads on the hydrophone and the receiver end are properly lubricated and free from debris. Replace o-ring if necessary, then reinstall the Hydrophone and tighten it securely. A good seal will prevent unit from flooding.

3.2. BATTERY LIFE.

Battery operating life will be approximately 30 hours depending on the type and manufacturer of the battery.

3.3. CLEANING.

The DPR-275 Receiver is constructed of corrosion-resistant materials. However, after each usage rinse the unit with fresh water to prevent accumulation of salt or other contaminants. This also applies to the Staff Hydrophone Holder and the Submersible Headset.

CAUTION

THE RECEIVER HAS VERY HIGH INHERENT RELIABILITY AND SHOULD PROVIDE MAINTENANCE-FREE SERVICE AS LONG AS THE VARIOUS WATER SEALS IN THE RECEIVER HOUSING AND HYDROPHONE REMAIN INTACT.

3.4. O-RING REPLACEMENT.

Should the o-ring water seals become worn or damaged, replace them with new ones. After removal of the damaged o-ring, wipe o-ring groove clean then lubricate o-ring and threads prior to reinstallation. Depending upon usage, routine periodic replacement is recommended.

3.5. SEAL SCREW.

The Receiver is equipped with a Seal Screw located next to the handle and opposite from the Headset female connector. Removal of the screw will equalize pressure within the receiver and assist with the removal of the hydrophone. Once the pressure is equalized replace the screw.

3.6. STORAGE.

When long term storage of the Underwater Locator System is required, remove the battery from its compartment, clean the unit thoroughly and place it in the transit case. Make sure it is stored in a cool dry environment.

3.0 Returning Product for Service

When shipping a product back to RJE from either inside or outside the United States, the following instructions will help ensure the equipment arrives with the minimum possible delay. Any deviation from these instructions increases the potential for delay.

Step 1 - Get a Return Authorization

The best way to make sure RJE is aware of your intentions to ship equipment is to obtain a Return Material Authorization (RMA) before sending the shipment. Return Material Authorizations are issued by Sales Administration or Customer Service and are used to notify us of your needs in advance of arrival so we can provide a faster turnaround. When requesting a Return Material Authorization, please give us the following information.

- What is being shipped (include the serial number)
- When you plan to send the shipment
- What problem(s) need correction
- When you need the instrument returned

When the Return Material Authorization is issued, we will tell you the RMA number. Please include this number on all packages and correspondence.

Mark the Package(s)

To: RJE International, Inc. (RMA Number)
15375 Barranca Parkway, Suite B107
Irvine, California 92618

Step 3 - Update RJE International

Send the following information by fax or telephone to RJE.

Attention: Sales Administration
Fax: (949) 727-0070
Phone: (949) 727-9399

- Detailed descriptions of what you are shipping (number of packages, sizes, weights, and contents).
- The name of the freight carrier
- Master Air bill number
- Carrier route and flight numbers for all flights the package will take

SECTION IV WARRANTY

RJE International warrants that this equipment (referred to as the unit) will be free from defects in materials and workmanship, when used under normal operating conditions as determined solely by RJE International, for a period of one (1) year from the date of shipment from RJE International.

As the sole remedy for breach of the foregoing warranty, RJE International shall repair or replace, at RJE International's option, any unit, component or part thereof found defective or nonconforming within said one (1) year period from the date of shipment. Customer shall give RJE International notice of any defect or nonconformity and, if so instructed by RJE International, customer shall, at its expense, ship the unit, component or part to RJE International. If RJE International determines that the unit, component or part is actually defective or nonconforming, it shall, at its expense, ship a new or a rebuilt unit, component or part to the customer. The customer shall be responsible to perform, at its own expense, any necessary installation work related to any defective or nonworking unit, component or part. The functionality and operational aspects of the unit is determined by the unit operating within the specifications and is dependent of proper maintenance as required to be performed by the customer.

RJE International shall not be liable for any expense or damages resulting from interruptions in the operation of the unit.

RJE International shall not be liable for the cost of any repairs undertaken by the customer or any third party without RJE International prior written authorization.

RJE International shall not be liable for any incidental, special consequential or exemplary damages arising out of the installation, use, testing, servicing or maintenance of any unit, component or part. This warranty is given in lieu of all other warranties, express or implied, included the warranties of merchantability or fitness for a particular purpose.

RJE International's total liability under this warranty is limited to the remanufacture or replacement of the unit, component or part.