

SYSTEM 3300

Diver Recall System



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INTRODUCTION

Thank you for your purchase of the Lubell Labs 3300 Diver Recall System. The 3300 is ideal for recalling commercial and recreational divers back to the boat or habitat, and has a typical recall range of over 500 meters. The system is easy to set up and operate, and operates off standard 12 volt marine batteries or gel cells used for underwater lighting.

Only the highest grade materials are used in the manufacture of the Federal Siren and the Lubell underwater transducer, making for a system that can be depended on. Careful production tolerances and attention to detail make for accuracy that you can hear!

The system includes a Federal PA300 siren amplifier and a Lubell LL916 cage mounted underwater transducer. The PA300 is used by thousands of police and fire departments because of its excellent performance and reliability. Lubell Labs performs circuit modifications, pots the circuit board, and adds rear panel connectors, making for a system that is equally dependable for diver recall.

Please read this manual and familiarize yourself with the features and capabilities of this system. If you have any questions, please call us at (614) 235-6740 between 8:30 - 17:00 eastern time, or e-mail us at sales@lubell.com.

SYSTEM DESCRIPTION

The Lubell Labs System 3300 consists of the Lubell Labs LL916 cage mounted underwater transducer with attached 25' cable, and a modified Federal Model PA300 siren amplifier.

The system is intended for portable or permanent installation on Coast Guard ships and dive boats, and comes with a mounting bracket, rubber feet, hardware, and a fused power cable for connection to a portable 12V marine battery or the boat's electrical system.

The PA300's connections include a phono jack input (speaker level, for connection to 2-way marine radio for voice rebroadcast), a 1/4" mono phone jack output (for connection to the LL916), and Faston power cable (for connection to 12V battery via fused power cable).

The system provides wail, yelp, and priority siren tones, as well public-address (PA), radio rebroadcast and an air horn sound.

The siren may be installed in any boat with a 12-volt electrical system. It is protected against failure modes (including reversed polarity) by a fuse that is replaceable without tools.

A noise-cancelling microphone is attached to prevent loss or theft. It provides high quality voice reproduction without feedback "squeal". The microphone push-to-talk switch overrides any siren signal for instant PA use. PA and radio volume are adjustable by means of a front panel GAIN control.

LL916 U/W TRANSDUCER DESCRIPTION

The Lubell Labs Model LL916 cage mounted transducer was designed to meet the need for a durable high output unit, selling at a reasonable price. When attached to the PA300, it broadcasts recall tones in the 800Hz to 1700Hz range at a guaranteed SPL of 180dB/uPa/m. This level translates to a nominal 500 meter recall range in the open ocean, and up to several miles in channel conditions.

The LL916 transducer integrates features from LL Model I and LL Model II prototypes, and the LL900 series production transducers. The piston closure of the Model I provides ruggedness at a reasonable cost, while the improved acoustic design of the Model II enhances the quality and quantity of available sound. The protective enhancements of the LL900 series (including cage and EPDM redundant seals) make for an extremely durable commercial product.

The rigid casting, flanged piston design of the transducer makes possible the attainment of low Q in a small size underwater radiator, while the integral compliance element presents an optimum load to the driving element.

The shell of the LL916 is made up of two halves that serve the dual functions of piston radiator and water tight enclosure for driving element and electronics. Electrical variations are changed to force variations using the piezoelectric effect. The force variations move the opposing pistons in unison against the reaction of radiation resistance and mass. Because of the high impedance of aqueous media, small excursions of the pistons produce acoustic waves of considerable strength.

The LL916's marine-grade aluminum pistons are protected against corrosion by virtue of a 30 mil cross-linked PVC coating. A rugged PVC/stainless steel cage protects the transducer and it's coating against contact with the boat deck or hull. (Although the transducer is enclosed in a cage, proper care MUST be taken to avoid scraping the PVC coating off the transducer as this will expose the underlying aluminum leading to corrosion/delamination.) A 25' heavy duty cord is hardwired to the transducer and is fitted with a genuine Switchcraft 1/4" phone plug for connection to the battery operated Federal PA300 siren only.

SPECIFICATIONS: LL916 U/W TRANSDUCER

Frequency Range725Hz-1800Hz *

Maximum Voltage25V rms @ 725Hz - 1800Hz

Impedance 16 ohms +/- 2.5 ohms between 725Hz - 1800Hz

Directivity Omnidirectional

Output Level 180dB/uPa/m +/- 3dB

Operating Depth 6' (1.83m) minimum, 50' (15.24m) maximum

Dimensions (HWD).....10.750" x 10.750" x 8.750"

Net Weight15 lbs.

Shipping Weight17 lbs.

SPECIFICATIONS: PA300 SIREN

Input Voltage11VDC to 16VDC

Quiescent Current 120ma. max

Operating Current7 amperes, max.

Operating Temp. Range -30 degrees C to +65 degrees C.

Siren Frequency Range725Hz to 1800Hz

Cycle Rate Wail: 15 cycles/min.
Yelp: 220 cycles/min.
Priority: 1300 cycles/min.

Input Impedance 2000 ohms

Input Sensitivity 0.55 volts rms (20 volts rms out)

Voltage Output25V rms

Dimensions(HWD) 2.5" x 6.5" x 8.5" @ 4.5 lbs.

INSTALLATION OF PA300 SIREN

SAFETY MESSAGE TO INSTALLERS OF ELECTRONIC SIRENS

- Read and understand all instructions in manual before installation and operation of siren.
- Installation and testing to be performed by qualified electronic technician only. Product servicing on Federal siren to be performed by authorized service center; Servicing on Lubell transducer to be performed by Lubell Labs only.
- DO NOT connect this system to the positive terminal of the battery until installation is complete, and you have verified that there are no shorts to ground.
- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged.
- After testing is complete, provide a copy of this manual to all operating personnel.

UNPACKING THE SYSTEM

After unpacking the SYSTEM 3300, examine the siren and the transducer for damage that may have occurred in transit. If the equipment has been damaged, file a claim immediately with the carrier stating the extent of damage.

INSTALLATION: BRACKET MOUNTING SIREN

Because the electronic siren comes with rubber feet and a mounting bracket, it can be used portably or installed. The included swing bracket and hardware enables it to be mounted in a variety of positions. **IMPORTANT:** The PA300 siren must be mounted in a dry location within the cabin (along with loud hailer and 2-way radio) to prevent damage to the sensitive electronics. It is also important that the unit gets proper ventilation, to prevent overheating during use. To install the unit under/above the dash, determine the mounting location and proceed as follows:

1. Use the mounting bracket as a template and scribe two drill positioning marks at the selected mounting location under or above the dash.
2. Drill two 1/4-inch diameter holes at the drill positioning marks.
3. Secure the mounting bracket to the dash with (2 each) 1/4-20 x 3/4 hex head screws, 1/4 split lockwashers and 1/4-20 hex nuts.
4. Secure the electronic siren to the mounting bracket with 1/4-20 x 3/8 hex head screws and 1/4 split lockwashers.
5. Tilt the unit to the desired position. Tighten the 1/4-20 x 3/8 hex head screws.

INSTALLATION: POWER CABLE

The included power cable is equipped with standard Faston terminals that connect to the mating connectors on the back of the PA300 electronic siren. After siren is bracket mounted, install cable per following:

1. MOLEX TYPE (pre-2004): Connect black negative wire (sockets 4 & 8) to the negative (-) power supply buss, and the red positive wire (sockets 6 & 11) to the positive (+) power supply buss.
2. FASTON TYPE: Connect black negative wire (right Faston) to the negative (-) power supply buss, and the red positive wire (left Faston) to the positive (+) power supply buss.
3. MAKE SURE a 20A fuse is installed in the positive cable fuse holder, and that the circuit can safely provide 20 amps of current.

OPERATION OF SYSTEM 3300

1. Remove LL916 transducer from storage area and uncoil/straighten cable. Attach a rope **securely** to the attachment point on the transducer cage. With boat anchored, lower transducer into the water to a 6' - 20' depth, and attach rope **securely** to a deck rail. Do not use the power cable to raise or lower the transducer as this will damage the cable.
2. Plug the transducer's 1/4" phone plug into the mating phone jack dongle on the rear panel of the PA300 siren (making sure that power is off). Route cable carefully to avoid trips.
3. If used portably, PA300 siren can be powered from 12V gel cell rated to handle 7A load. Attach fused power cord as follows: black wire to negative (-) terminal, then red wire to positive (+) terminal.
4. Relative PA Loudness Adjustment (skip this step if NOT connecting your 2-way marine radio to the PA300 radio input): Connect a patch cord between the existing marine radio speaker terminals, and the phono jack dongle on the rear panel of the PA300 siren. Set siren Selector switch to MANUAL. Depress the microphone push-to-talk switch, speak in a normal voice, and adjust the GAIN control for the desired sound level under the water (usually 100% CW). Turn on the boat's two-way radio and adjust the volume to a comfortable listening level inside the cabin. Then set the siren selector switch to RADIO. Now listen to the radio rebroadcast loudness under the water. If the sound level is too loud or too soft, *gently* adjust the PA300 siren's external (bottom) trim control (R11 or R39) to the correct loudness using a plastic trim control screwdriver (or eye glasses screwdriver). After the adjustment is completed, the loudness of the underwater radio rebroadcast/public address may be varied with the front panel GAIN control on the PA300 siren.
5. For radio rebroadcast, turn siren SELECTOR switch to RADIO and turn on the 2-way radio.
6. For paging divers or swimmers, turn SELECTOR switch to MANUAL, press mic PTT switch, and speak in a normal voice.
7. For diver recall, AIR HORN switch may be toggled for loud burst of sound, providing SELECTOR switch is in MANUAL position. Use other tones to indicate other situations.

BATTERY/CHARGING INFORMATION

Any 12V marine type storage battery may be used to power the System 3300. The battery should be kept fully charged for optimum performance. If the boats onboard battery is used to power the system, be sure not to run the voltage so low that your motor will not restart. The boats electrical system should keep the battery charged, however supplemental charging may be required if battery voltage does not return to normal (usually 12.7-volts).

An automatic 12V trickle charger may be used to keep portable 12 volt marine batteries or gel-cells charged. We highly recommend the Amron 2823-600C automatic charger (from <http://www.amronintl.com>) which can be left on charge indefinitely without damaging the radio or the batteries. Follow all battery and charger instructions carefully, as improper use can cause explosions and/or personal injury.

PRECAUTIONS AND MAINTENANCE

The Lubell Labs model LL916 underwater transducer and the Federal PA300 siren are precision instruments that deserves careful handling. Since there are no user serviceable parts in the siren or transducer, the following simple rules will serve as a guide to achieving maximum life:

1. Take extremely good care of the LL916 transducer cable, as this would be the first point of damage from abuse. Do not use the signal cable to lift, lower, or support the LL916. Instead attach a sturdy 1/4" nylon cord to the cage for this purpose. Inspect cable before each use, and coil neatly when transducer is put away. If cable needs replacement, return to factory.
2. To preserve the transducer's finish, rinse the speaker with tap water after each use to remove traces of salt water. Use a sponge and warm detergent solution occasionally to remove any scum build up. Use Armorall protective wipes on every speaker and cable surface to keep the PVC and EPDM rubber finish supple, and to minimize fading.
3. Be **extremely diligent** not scrape the blue PVC coating on the LL916 transducer! This PVC coating is only 30 mil thick, yet protects the aluminum pistons from corrosion. Corrosion as a result of PVC coating damage is not covered under the warranty, and may eventually damage the unit. If you accidentally damage the transducer's coating, repair it immediately by lightly sanding the area, wiping with alcohol, and applying a liberal coating of Aquaseal wet-suit repair compound to the area. Allow to dry for 24 hours before use.
4. The cage is constructed of stainless steel and is coated with black PVC. It has been tested to a compressional strength of 5000 psi. Avoid scraping the cage on the deck or hull, as the PVC finish is subject to cosmetic damage from abuse.
5. Always remove the transducer from the water before moving the boat!
6. When not in use, store the underwater speaker in a cool, dark, equipment cabinet.

7. Do not connect the LL916 transducer to anything besides the PA300 siren. It is not advisable to input broadband signals (such as music) to the PA300 siren or the LL916 transducer, as this may damage siren and transducer, and void the warranty. If you need to reproduce broadband, please use the Lubell 3400 U/W PA system, or purchase accessory AC205-1/4 transformer box.

CAUTION: The System 3300 is designed for battery operation only.

If the preceding instructions are followed, your Lubell Labs underwater speaker will provide *decades* of sparkling, trouble free performance.

USES OF THE SYSTEM 3300

These remarkable sets are a decade ahead of their time. Many engineers and scientists working in the field of underwater acoustics are still unaware of the feasibility of compressing the size of a low frequency transducer without reducing it's efficiency. A partial list of current uses follows:

Recall of scuba divers to excursion boat

Recall of scuba divers to sunken habitat

Paging of scuba divers & swimmers at popular resorts

Swimming & Scuba Instruction

Gunlap signal for competitive swimming

False start signal for competitive swimming

Public address at Neutral Buoyancy Labs

Interrogation of suspicious or illegal divers by Coast Guard patrol boats

Underwater cinematography

Coordinating underwater work parties, exploration, and treasure hunts

Training or communicating with aquatic mammals

Dispelling waterfowl, aquatic vertebrate, cetacean mammals, and other species away from contaminated waters

OBTAINING SERVICE

Should your transducer require service, please call us at 614-235-6740 to obtain an RMA number. Once return is authorized, please package transducer securely and return via insured UPS to: RMA #: _____, Lubell Labs Inc., 21 N. Stanwood Rd., Columbus, Ohio 43209. Please enclose a note with your return address and phone number so we can reach you with an estimate prior to repairs.

Should your Federal PA300 siren require repair, please call the Federal service department at 708-534-5820 to obtain an RMA number. Once return is authorized, please package transducer securely and return via insured UPS to: RMA #: _____, Federal Signal Service Dept., 2645 Federal Signal Drive, University Park, IL 60466. Please enclose a note with your return address and phone number so Federal can reach you with an estimate prior to repairs.

LIMITED WARRANTY

Lubell Labs, warrants the LL916 to be free from defects in material and workmanship, under normal use and service, for a period of 5 years on parts replacement and 5 years on labor from the date of delivery to the first user-purchaser. Federal Signal warrants the PA300 to be free from defects in material and workmanship, under normal use and service, for a period of 3 years on parts replacement and 1 year on labor from the date of delivery to the first user-purchaser.

During this warranty period, the obligation of Lubell Labs or Federal Signal is limited to repairing or replacing, as appropriate Company may elect, any part or parts of such product which after examination by Company discloses to be defective in material and/or workmanship.

The Company will provide warranty for any unit which is delivered, transported prepaid, to the appropriate factory (per Obtaining Service section above) for examination and such examination reveals a defect in material and/or workmanship.

This warranty does not cover travel expenses, the cost of specialized equipment for gaining access to the product, or labor charges for removal and re-installation of the product. Not covered under the warranty are: Lamps, cords, water damage to amplifier, water damage to transducer as a result of coating or cable damage, coating damage on transducer or cage.

This warranty does not extend to any unit which has been subjected to abuse, misuse, improper installation, or which has been inadequately maintained; nor to units which have problems relating to service or modification at any facility other than the Company.

THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL LUBELL LABS BE LIABLE FOR ANY LOSS OF PROFITS OR ANY INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY SUCH DEFECT IN MATERIAL OR WORKMANSHIP.