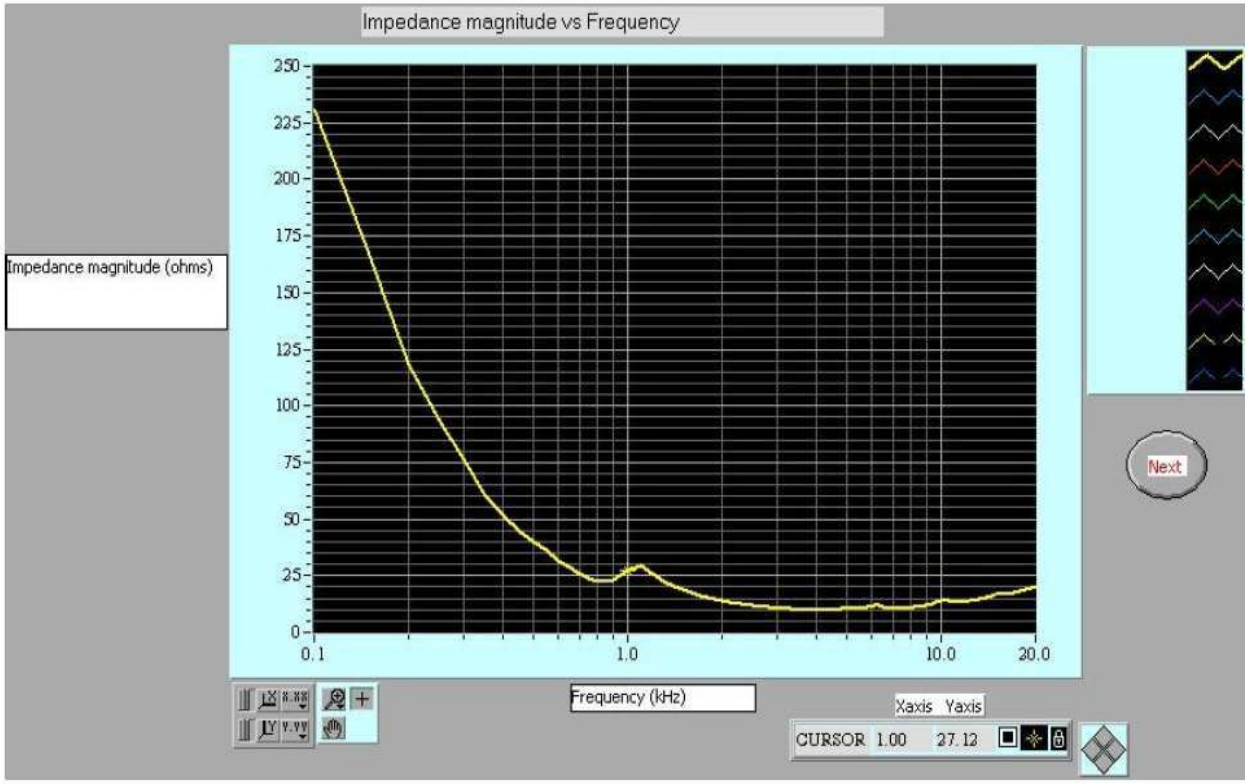
Lubell LL964C Underwater Acoustic Transducer (UAT) Instructions

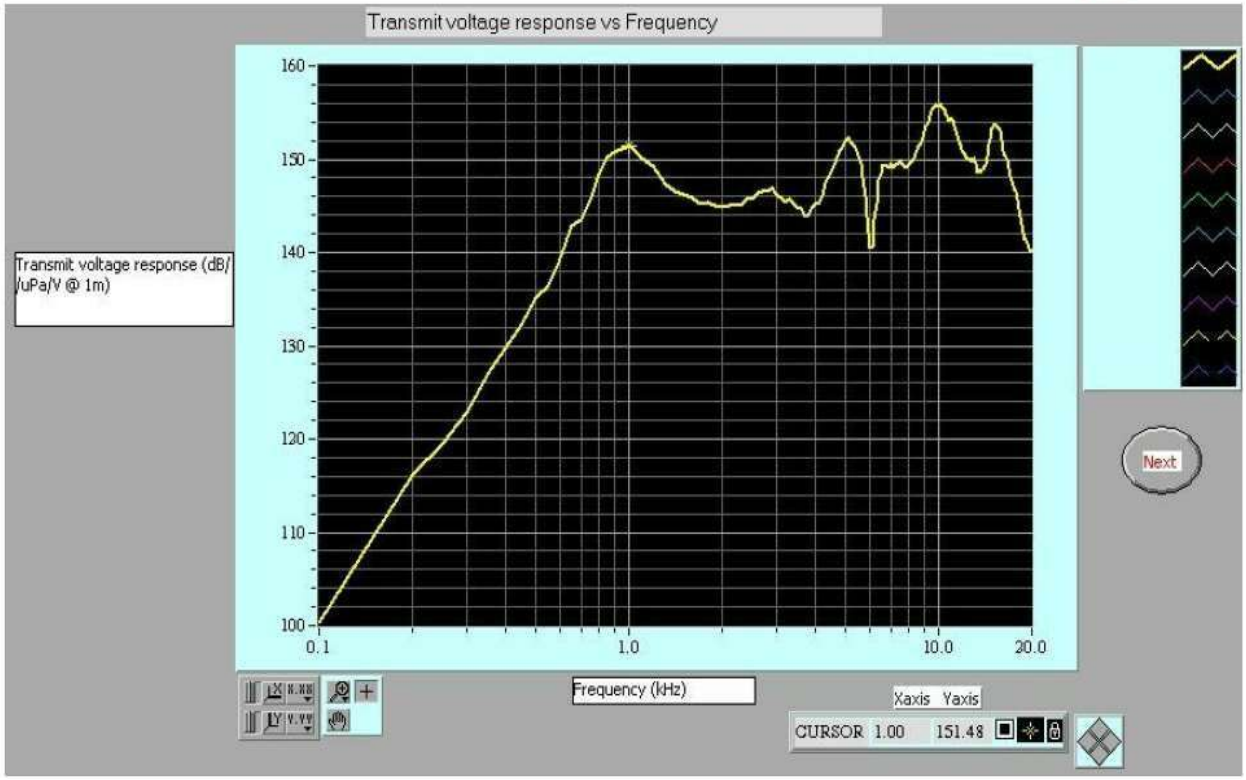
The Lubell LL964C (cage-mount w/ hardwired cable), LL964C-MCBH (cage-mount w/ Subconn MCBH3MAS bulkhead connector and mating Subconn MCIL3F//MCDLS-F cable assemblies), and LL916H (harness-mount w/hardwired cable) are high-performance piezoelectric underwater acoustic transducers developed, patented, and manufactured by Lubell Labs, Inc. of Columbus Ohio.

The LL964C/H is designed for operation in the 200 Hz to 23 kHz frequency range, and provides output levels up to 180 dB/uPa/m @ 1 kHz when driven at full 40 Vrms drive. (The LL964C/H is the high-impedance version of the popular 20 Vrms Lubell LL916C/H, allowing very long cable runs with minimal insertion loss.) The LL964C/H may be used in tank, river, and ocean at depth range of 1.83 m - 15.24 m.

1. The LL964C/H is rated at 40 Vrms maximum voltage and 1.5 amps maximum current (whichever comes first) between the frequency range of 200 Hz to 23 kHz. Please monitor these values with proper instrumentation to ensure that they are not exceeded.
2. The LL964C/H requires 32 ohms of total external resistance, which can be a combination of cable *round-trip* resistance plus resistance from a series 50-watt power resistor of the correct resistance value inserted in each white speaker lead. (An Ohmite D175K50RE (or equivalent) adjustable power resistor may be used in place of fixed-value resistor, but must be derated linearly based on the percentage of the active resistance winding being used.)
3. To help protect the LL964C/H speaker and the amplifier, a Bussman AGC-1.5-R fuse placed in a Bussman BK/HFB-R fuse holder may be inserted in each speaker's white signal lead.
4. The Crown XLi 800 is recommended for powering up to four LL964C/H underwater acoustic transducers per channel. This amplifier has a class AB output stage, which works well with the reactive load that the Lubell LL964C/H presents. The amplifier is also UL listed, and rated for Class 2 wiring. For safety, please power the amplifier from a grounded GFCI protected outlet.
5. The TVR on following page indicates output level of the LL964C/H with 1 Vrms applied.
6. A rope or boom must be attached to the LL964C/H for raising and lowering the unit from the water. Do not tow the unit, unless incorporated into a hydrodynamic body such as a tow fish.
7. Please operate the LL964C/H at minimum depth of 1.83 m, and a maximum depth of 15.24 m.
8. Please keep divers a minimum distance of 1.83 meters from an operating speaker, and vacate the water during inclement weather and lightning storms.
9. Inspect cables before each use, and return to Lubell Labs for replacement in the event of damage.

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