Type F36 TRANSDUCER

General Description

The USRD Type F36 Transducer is designed to provide smooth response in the frequency range 10 Hz to 20 kHz when used as a hydrophone. It is useful also as a sound source in the range 1 to 20 kHz. Figure 42 is a photograph of the transducer.

Fig. 42. USRD Type F36 Transducer.

The sensitive element consists of seven lead zirconate-titanate capped cylinders mounted one above the other to form a line 19.4-cm long. The elements are housed within an oil-filled butyl rubber boot over a framework of six steel rods that provide protection and support without affecting the acoustic characteristics. The transducer is supplied with 30 m of 2-conductor, shielded, neoprene-sheathed cable.

Specifications

Frequency range:	10 Hz to 20 kHz, as hydrophone
Free-field voltage sensitivity:	-201 dB re 1 V/μPa at end of 30-m cable
Transmitting voltage response:	124 dB re 1 μPa/V at 10 kHz
Maximum driving voltage:	150 V rms
Nominal capacitance:	60000 pF (with 30-m cable)
DC resistance:	greater than 1000 MΩ
Maximum hydrostatic pressure:	2.7 MPa (270-m depth)
Operating temperature range:	0 to 35°C
Weight with 30-m cable:	4 kg
Shipping weight:	6 kg

Electroacoustic Characteristics

Figure 43 is a typical free-field voltage sensitivity curve for the Type F36 Transducer, measured in terms of open-circuit voltage at the end

of 30 m of cable. The sensitivity of each transducer is provided by the calibration curve furnished with it. Sensitivity depends on the frequency characteristics of the amplifier used and on the resistance and capacitance of the input circuit (including transducer, cable, and amplifier input impedance). The capacitance of the transducer with 30 m of cable is greater than 60,000 pF. The input impedance of the amplifier should be at least 3 MΩ to insure that its effect on the response of the transducer at low frequencies is negligible.

The sensitivity of the Type F36 transducer does not vary significantly with temperature in the range 5 to 30°C. No changes have been observed in the sensitivity of the transducer with hydrostatic pressure up to 2.7 MPa (270-m depth).

Additional cable can be used with the transducer; however, the added cable will increase the shunt capacitance, and the over-all sensitivity will be correspondingly lower.

The transmitting voltage response from 1 to 25 kHz is shown in Fig. 44. It is recommended that the transducer not be used above 20 kHz.

Directivity. The transducer is omnidirectional within ±0.5 dB in the plane (XY) normal to its longitudinal axis. The vertical (XZ plane) directivity is equivalent to that of a 20.3-cm line. Typical vertical directivity patterns are shown in Fig. 45.

Preparation for Use

Figure 46 is a dimensioned outline drawing showing the orientation of the transducer. Attach a fixture to the molded cable gland as near as possible to the transducer. When no fixture is used, a line should be attached to the lifting eyes to remove the tension from the cable and the gland. A pad eye is provided at the lower end of the transducer also, so that a weight can be attached if necessary. The weight should not be greater than 12 kg. Wash the entire transducer with a wetting agent. Air bubbles must be removed as completely as possible when the transducer is lowered into the water, to avoid erroneous results. Permit the temperature of the transducer to stabilize with that of the water before making any measurement.

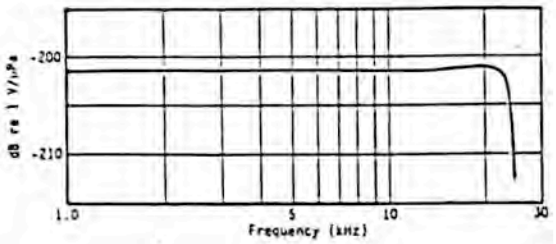

Fig. 43. Typical free-field voltage sensitivity, Type F36 Transducer.

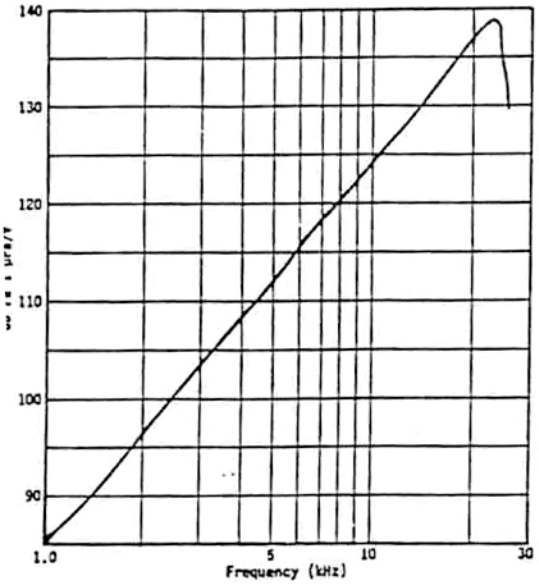

Fig. 44. Typical transmitting voltage response, Type F36 Transducer.

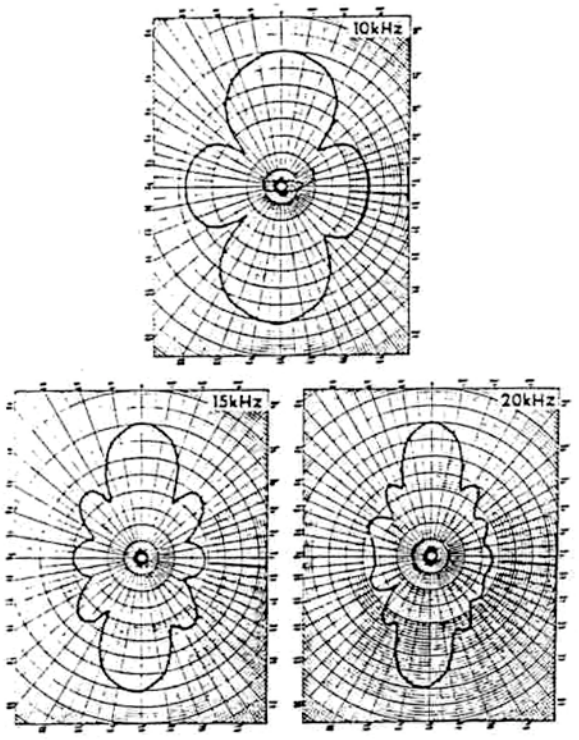

Fig. 45. Typical directivity patterns in the vertical (XZ) plane, Type F36 Transducer. Scale: center to top of grid, each pattern, equals 50 dB.

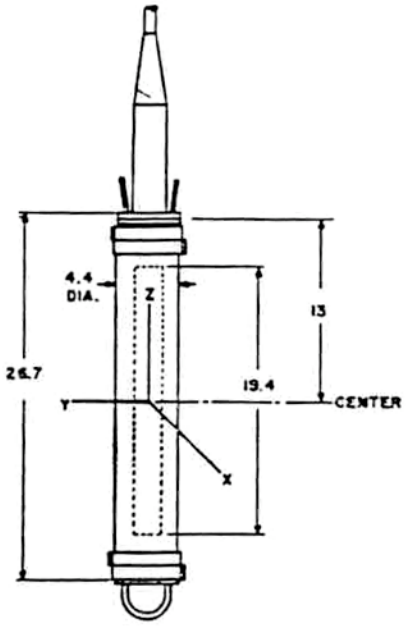

Fig. 46. (Left) Dimensions in centimeters) and orientation of Type F36 Transducer.