DEPARTMENT OF THE NAVY
NAVAL UNDERSEA WARFARE CENTER DIVISION
1176 HOWELL STREET
NEWPORT RI 02841-1708

USRD Calibration Memorandum No. 4167

MEASUREMENTS ON MODEL HTI-99-HF HYDROPHONE

Please contact Mr. A. Paolero at (401) 832-8961 or DSN 432-8961, or email at Anthony.Paolero@navy.mil, Naval Undersea Warfare Center, Division Newport, Code 1531 with any questions.

USRD CALIBRATION MEMORANDUM NO. 4167
OCTOBER 2011

Calibration Memorandum Summary

1. Measurements on the subject hydrophones were made in the Acoustic Open Tank Facility (OTF) on 24 October 2011. Preliminary data was provided to Mr. C. Kirsch of High Tech, Inc. upon completion of the measurements. Funds for this service were provided by High Tech, Inc. Check Number 28098.

2. Free Field Voltage Sensitivity (FFVS) and Directional Response (DR) were measured in the OTF in the frequency range of 1 to 200 kHz, at the water temperature 19.2°C and at a depth of 2.3 m (22.4 kPa). Conditions and results of the measurements are presented in enclosure (1).

3. Orientation of the hydrophones was as described for a cylinder as shown in USRD drawing 62785. The cable exited the hydrophone in the +Z direction with no regard to the +X axis.

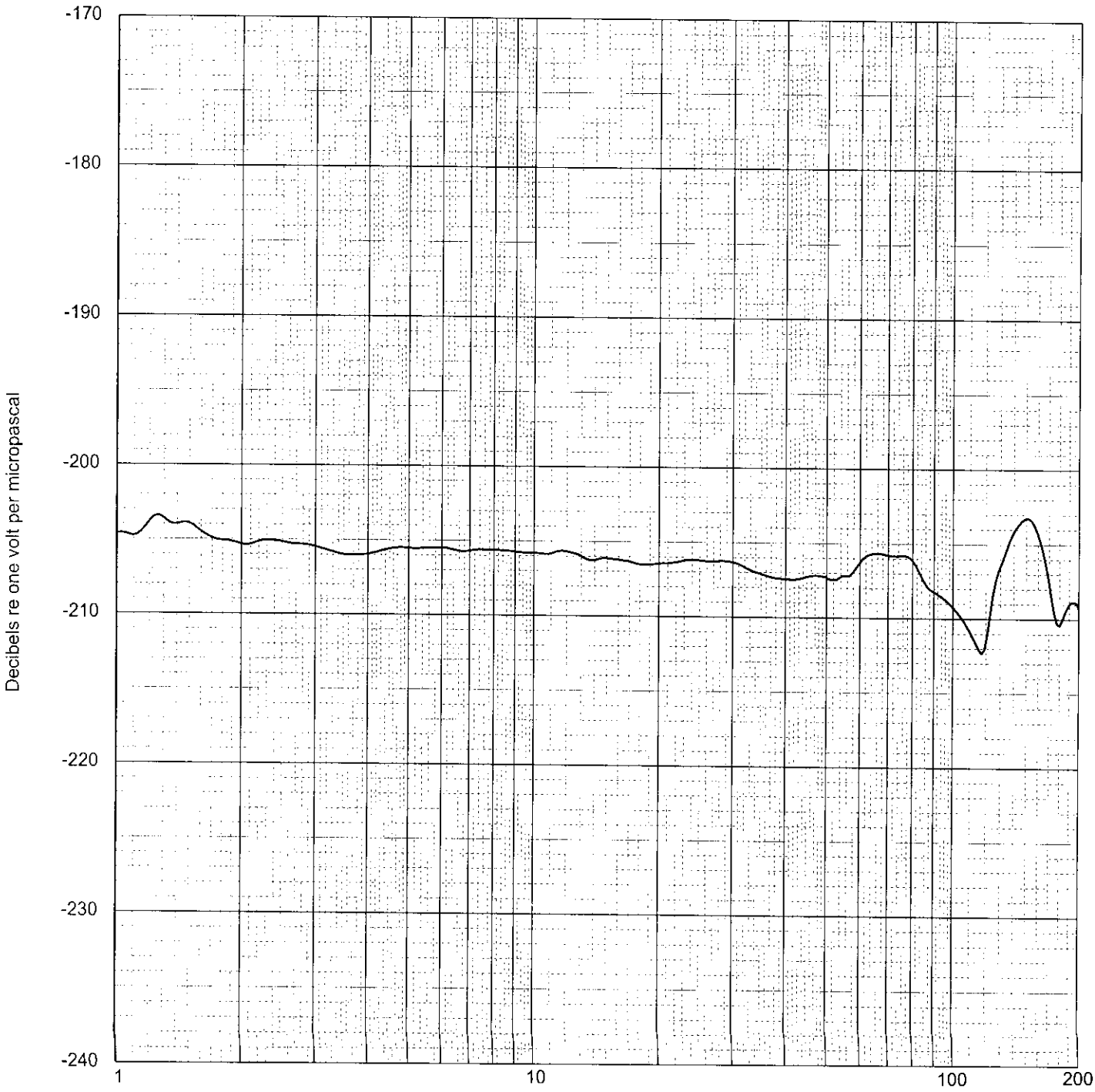
TABLE 1
DATA DIRECTORY

NAVAL UNDERSEA WARFARE CENTER
UNDERWATER SOUND REFERENCE DIVISION
1176 HOWELL STREET, NEWPORT, RI 02841

USRD NO. 4167-1
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

FREE-FIELD VOLTAGE SENSITIVITY

Model HTI-99-HF Hydrophone
Open-circuit voltage measured at end of cable; Unbalanced
19.2 ° C; 2.3 m depth (22.4 kPa)



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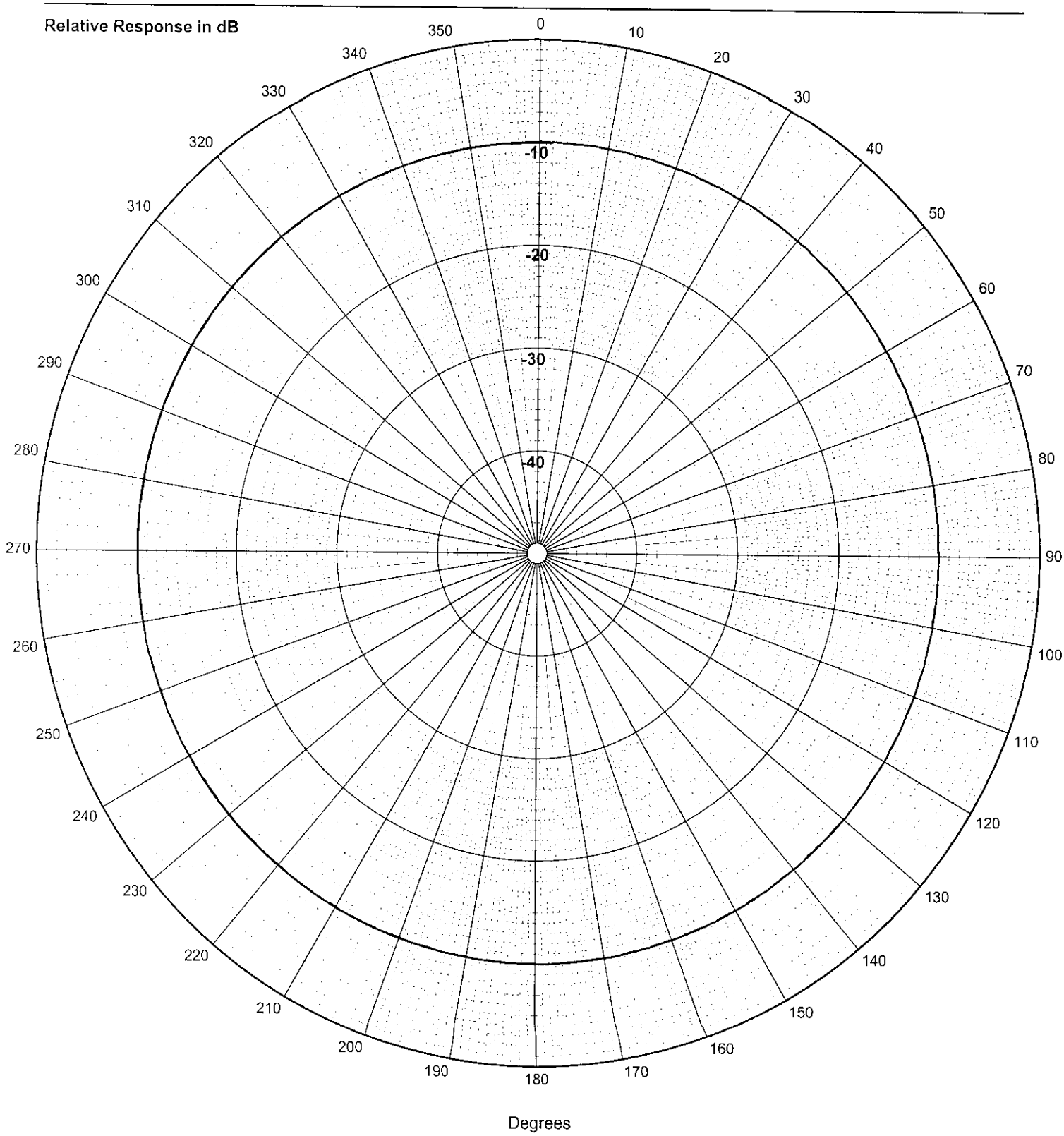
USRD NO: 4167-2
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
10 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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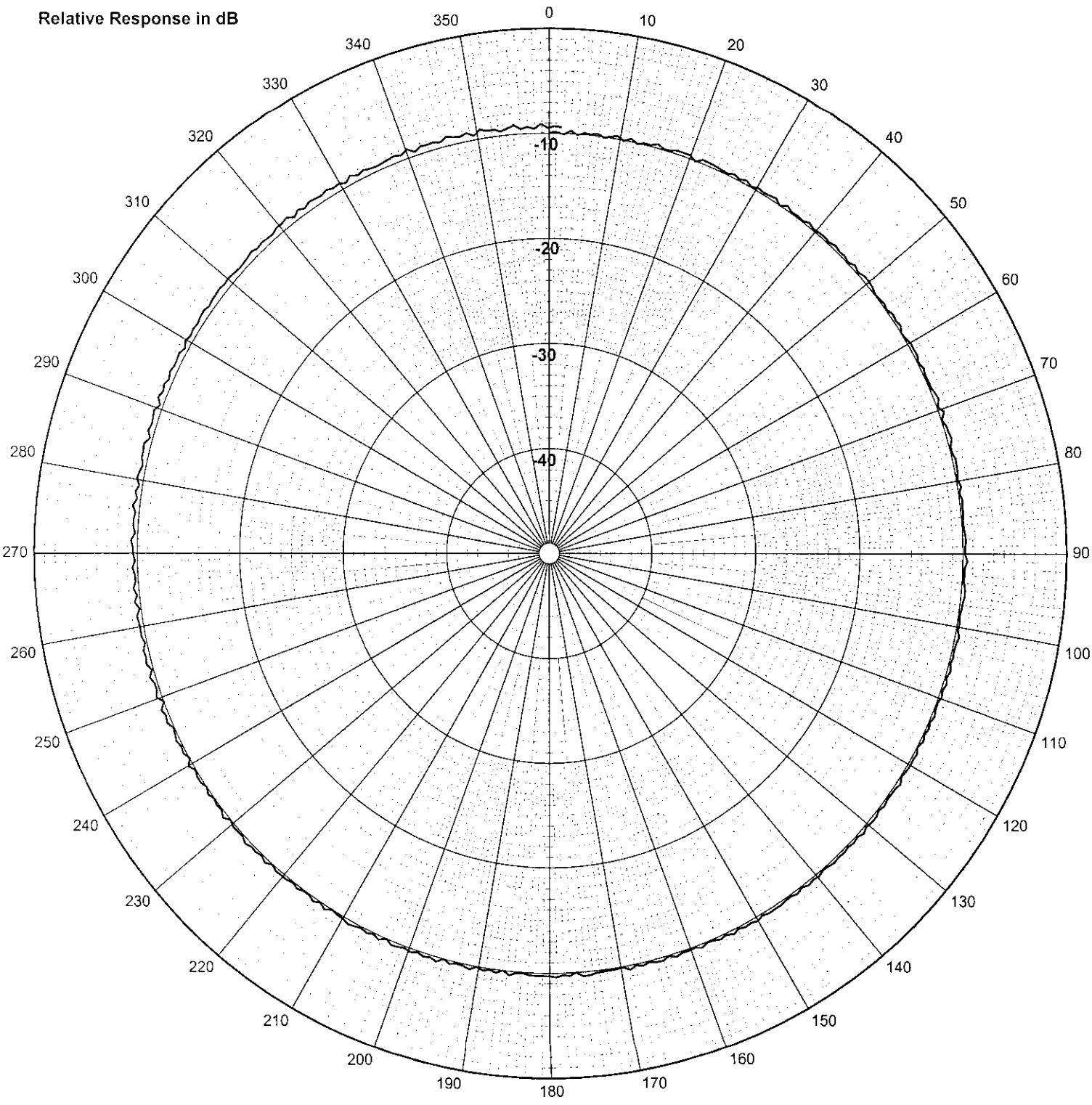
USRD NO: 4167-3
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
30 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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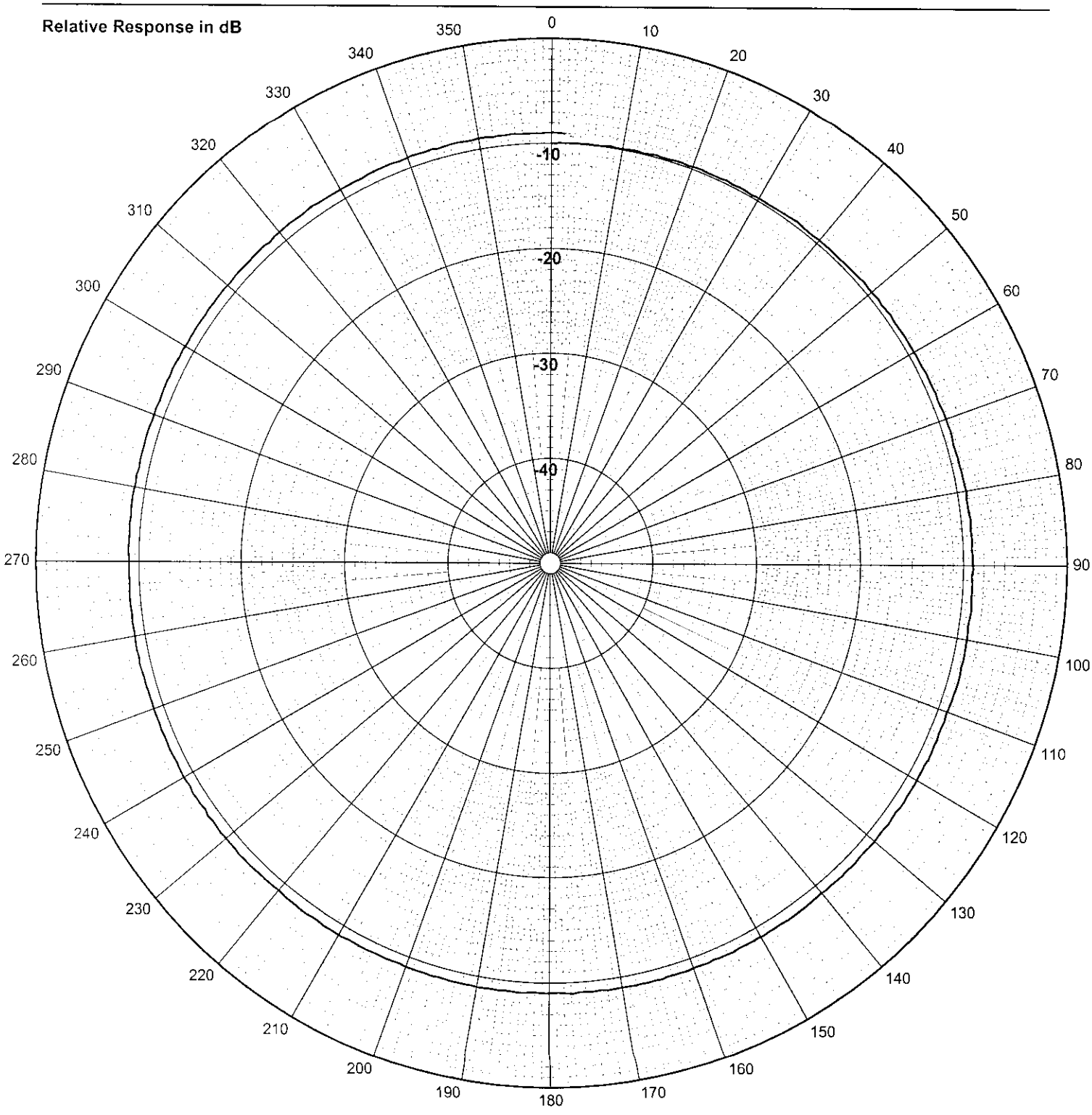
USRD NO: 4167-4
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
50 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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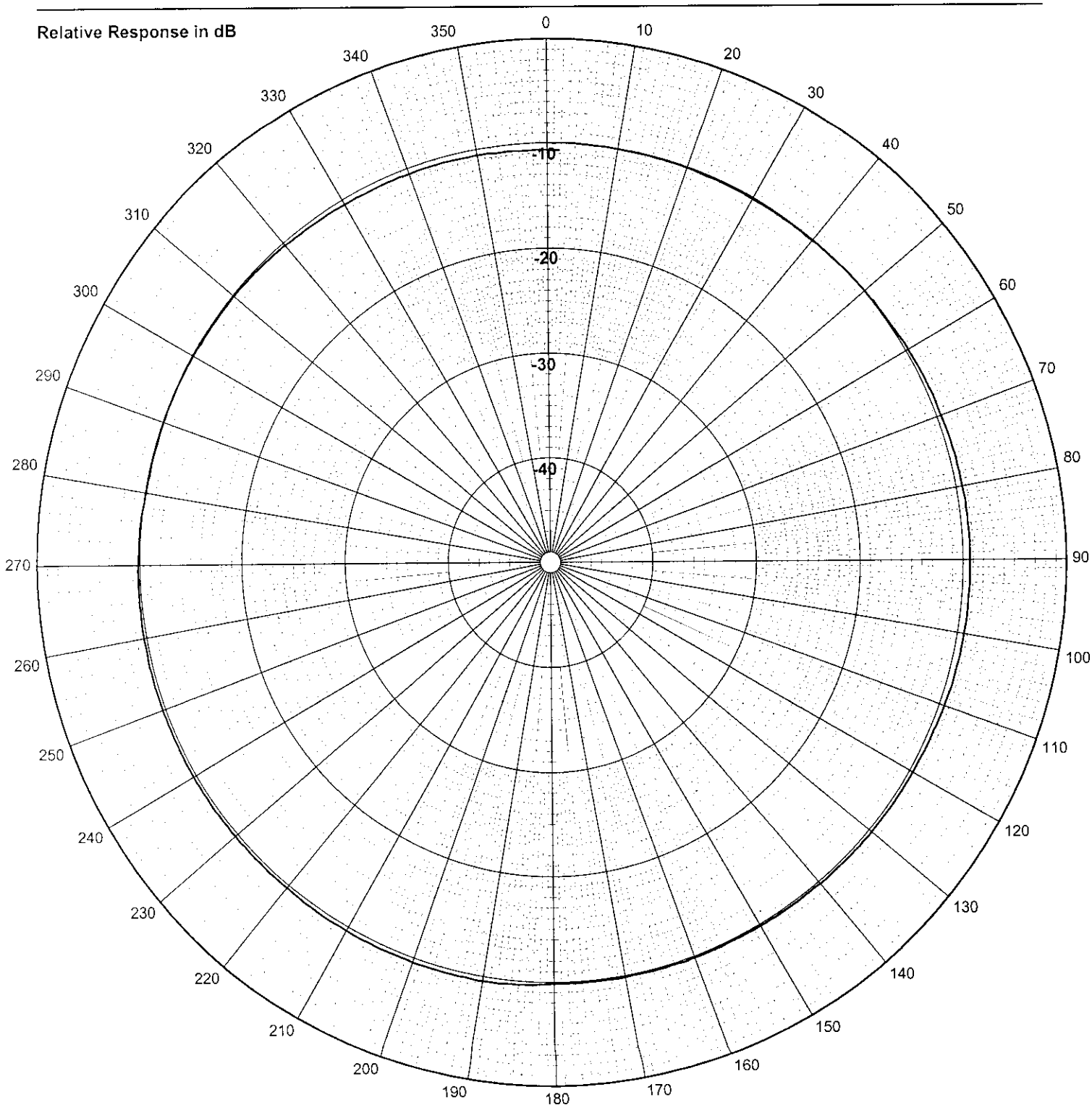
USRD NO: 4167-5
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
80 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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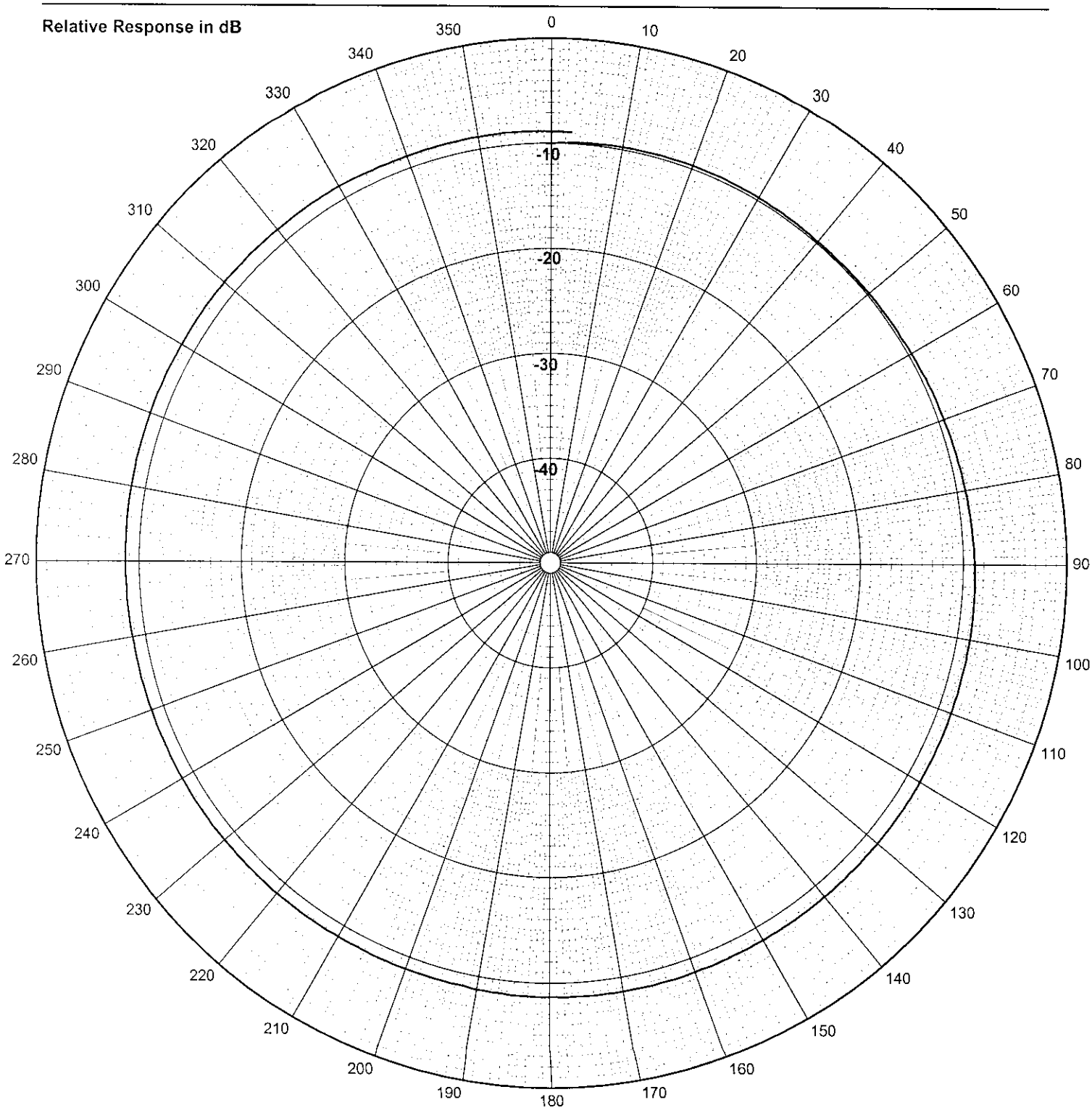
USRD NO: 4167-6
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
100 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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UNDERWATER SOUND REFERENCE DIVISION
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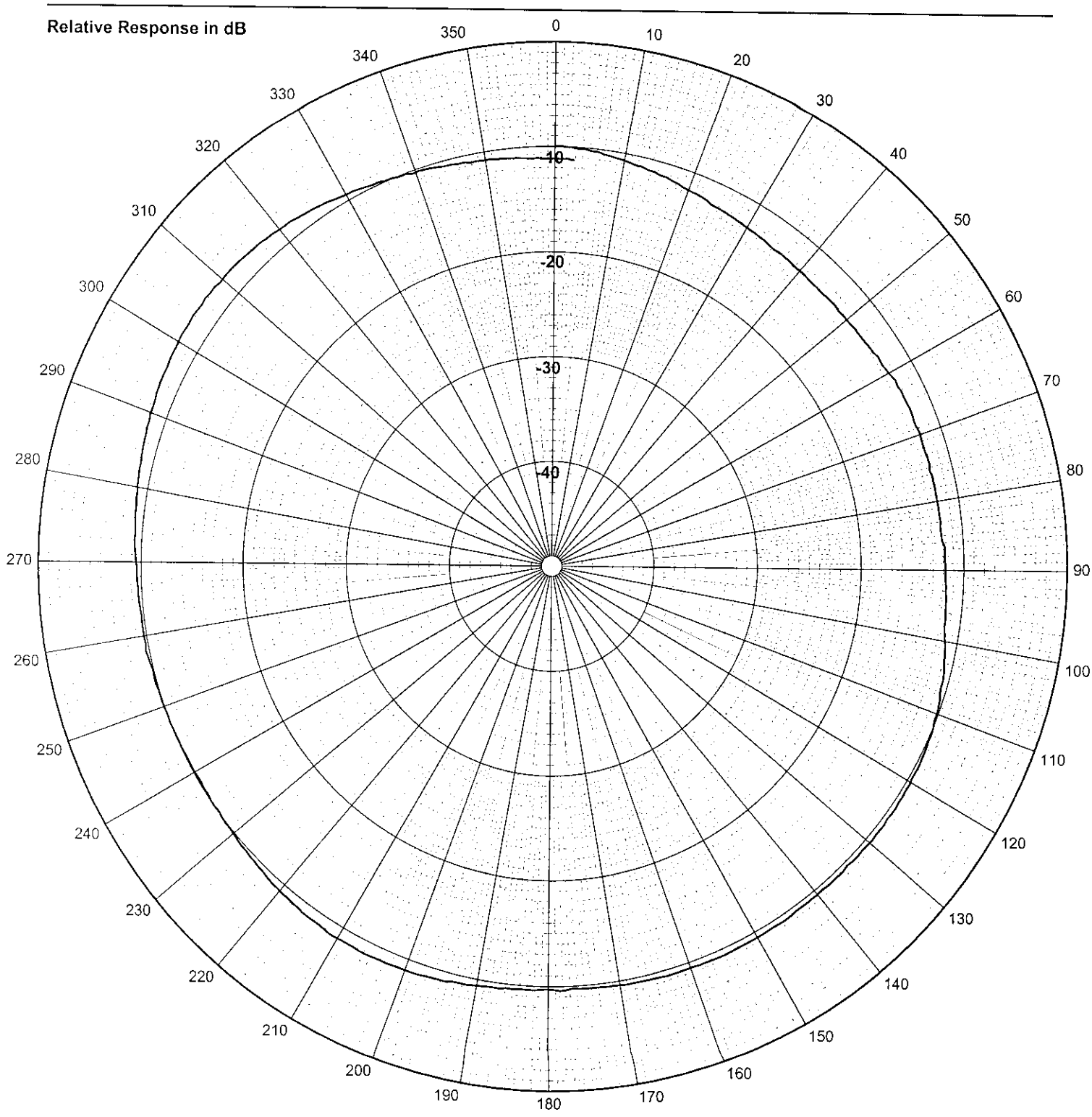
USRD NO: 4167-7
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
125 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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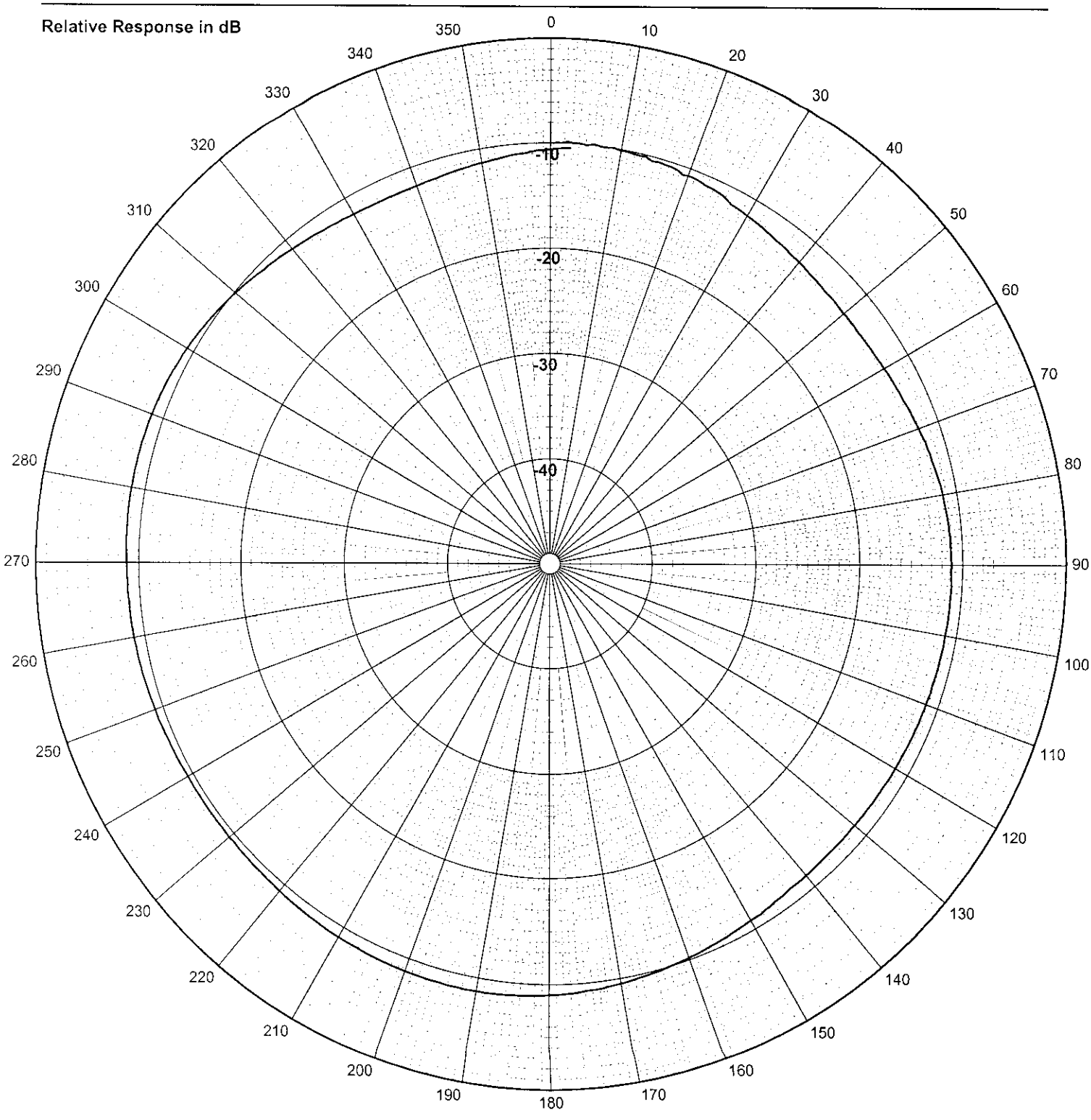
UNDERWATER SOUND REFERENCE DIVISION
1176 HOWELL STREET,NEWPORT,RI 02841

USRD NO: 4167-8
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XY Plane
150 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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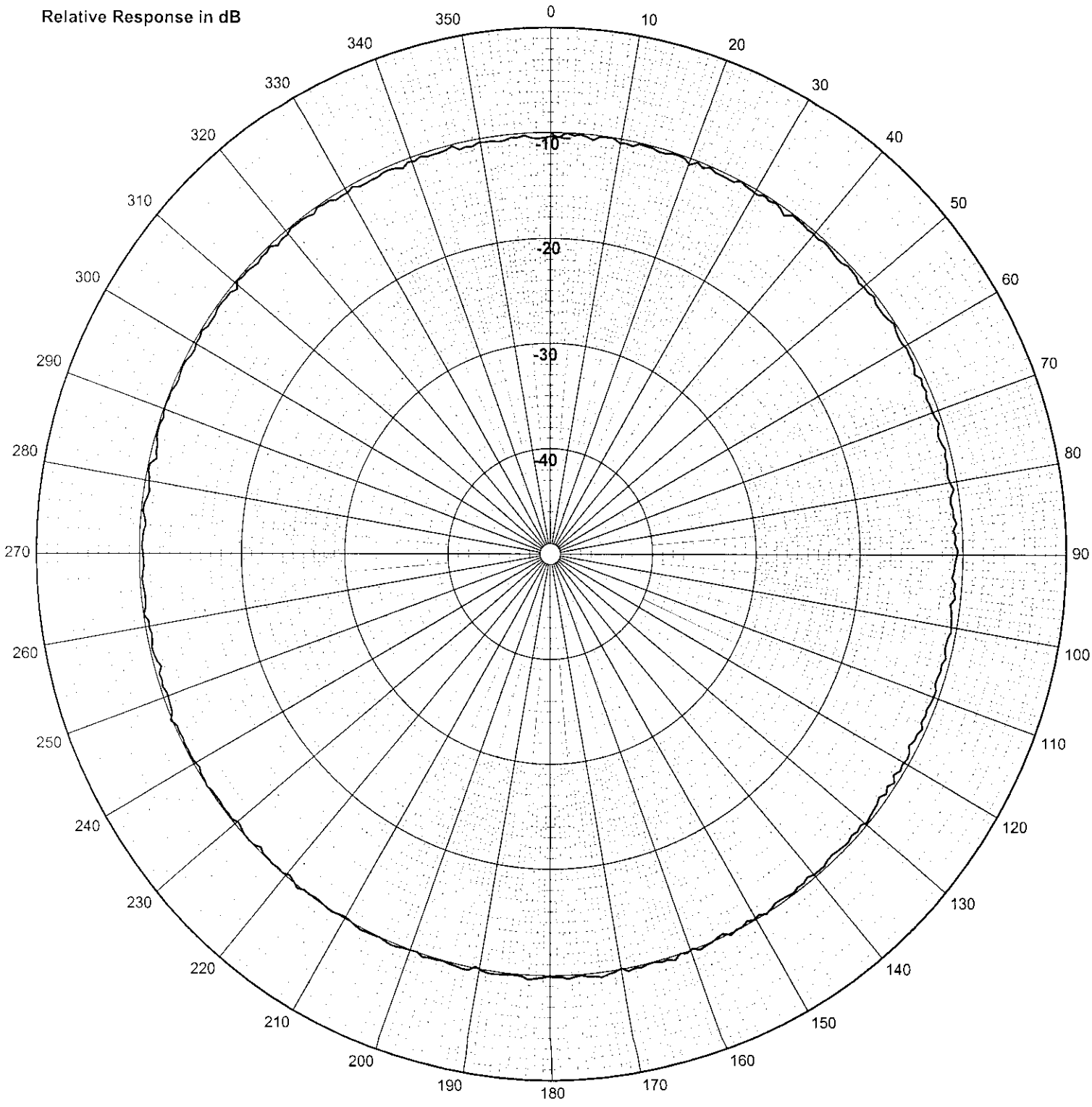
USRD NO: 4167-9
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
10 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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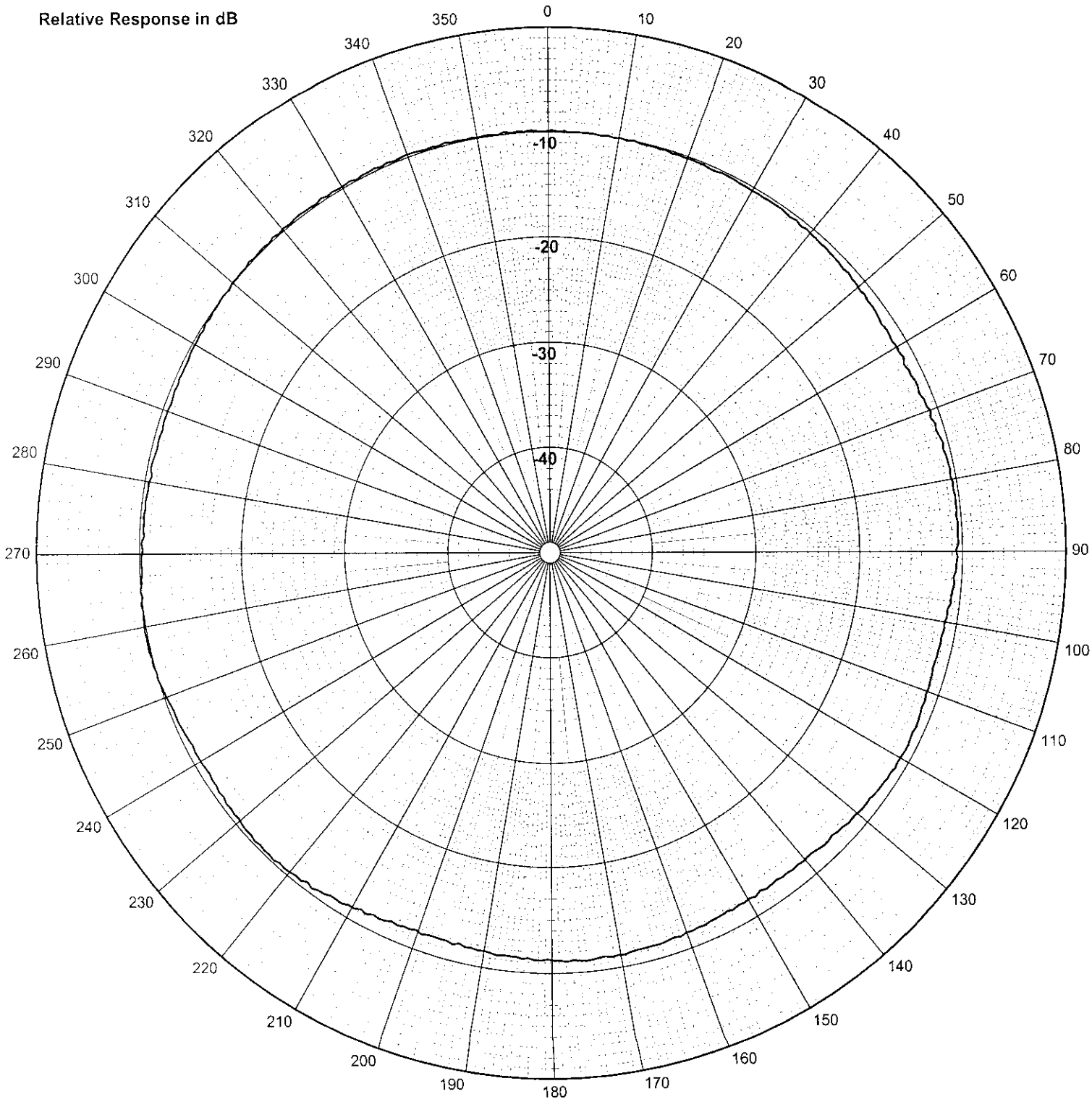
USRD NO: 4167-10
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
30 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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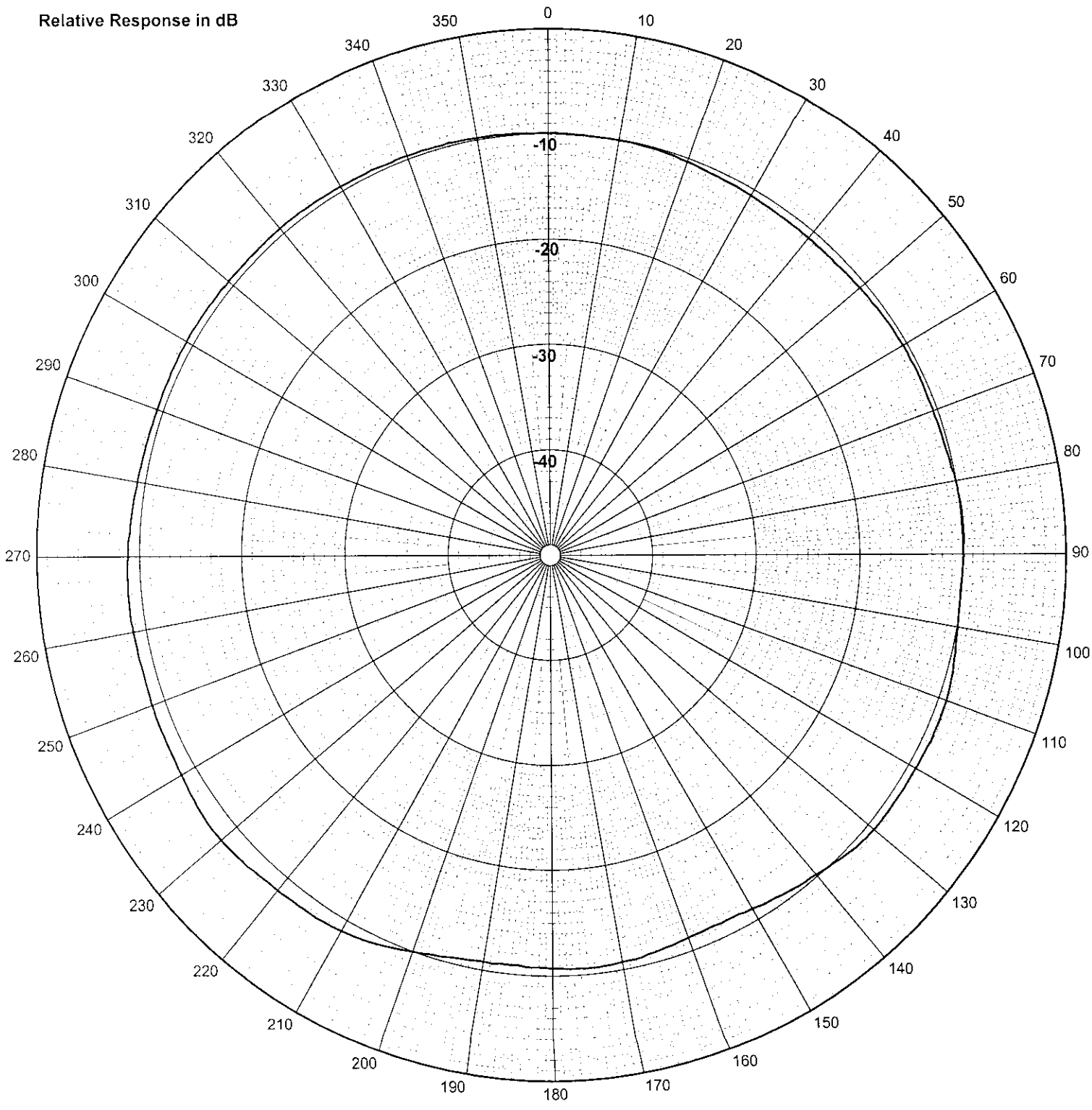
USRD NO: 4167-11
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
50 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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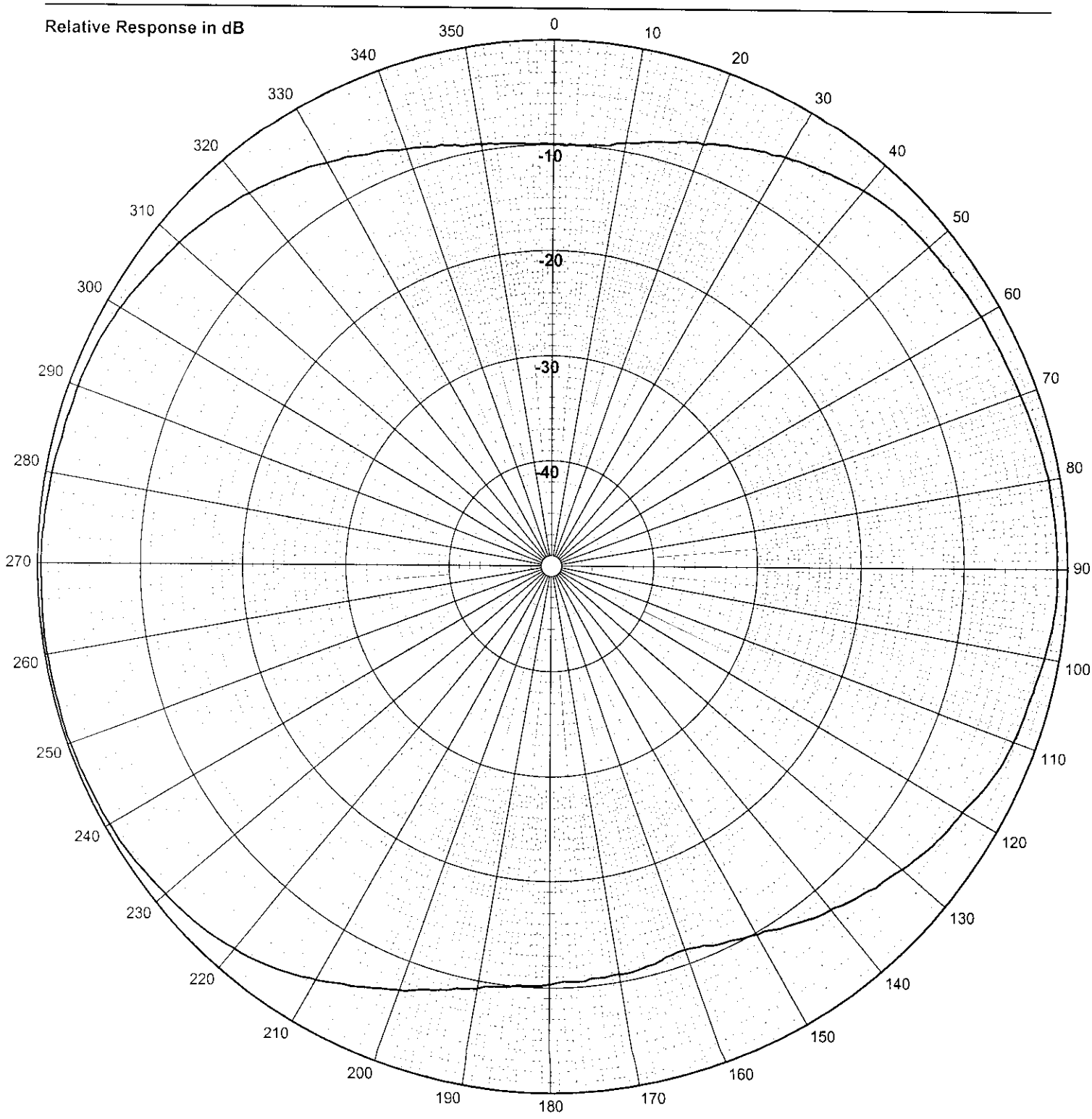
USRD NO: 4167-12
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
80 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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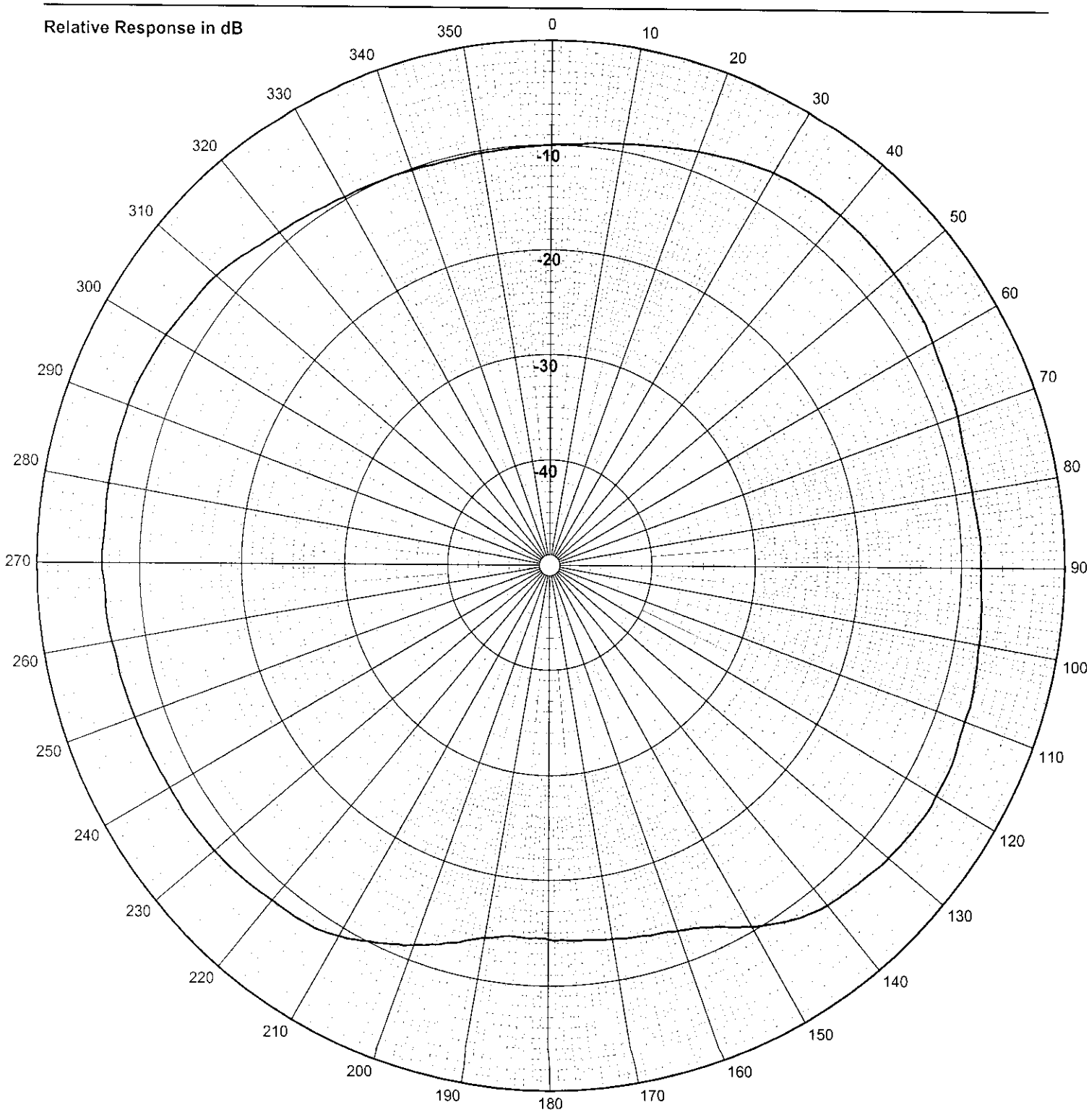
USRD NO: 4167-13
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
100 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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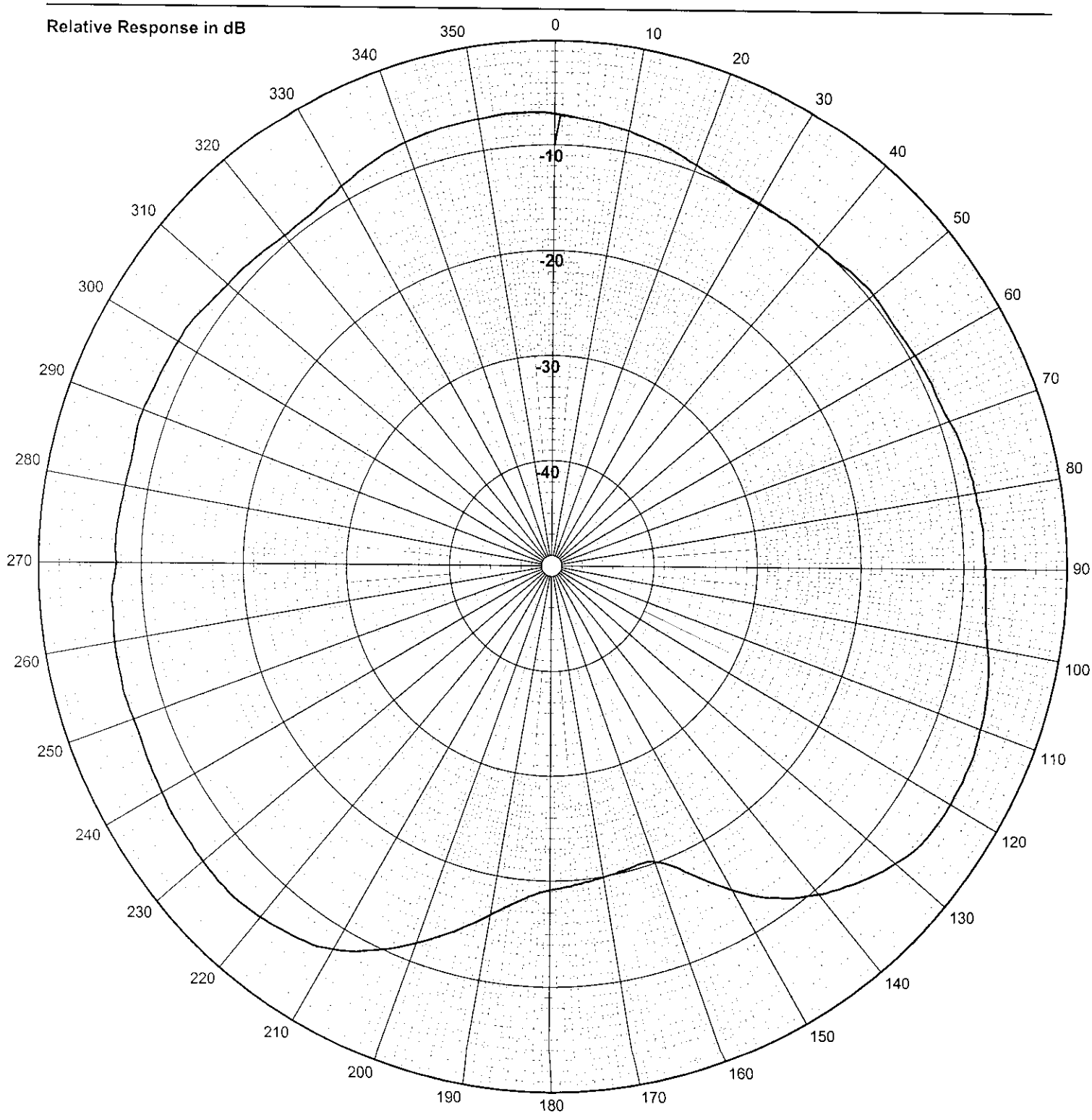
USRD NO: 4167-14
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
125 kHz
19.2° C; 2.3 m depth (22.4 kPa)



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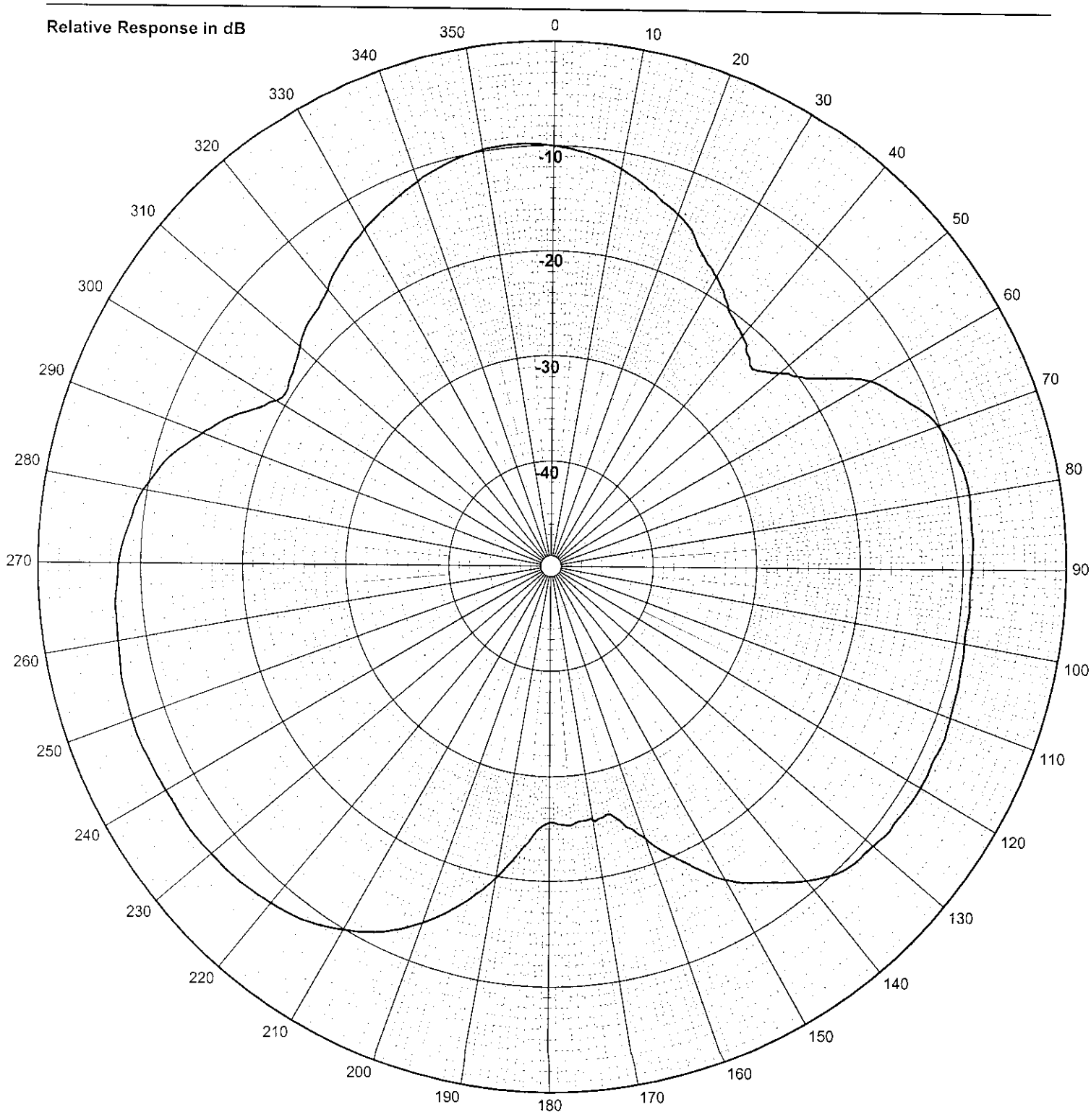
USRD NO: 4167-15
ACOUSTIC OPEN TANK FACILITY
OCTOBER 2011

DIRECTIONAL RESPONSE

Model HTI-99-HF Hydrophone
Receive
XZ Plane
150 kHz
19.2° C; 2.3 m depth (22.4 kPa)



NAVAL UNDERSEA WARFARE CENTER DIVISION
UNDERWATER SOUND REFERENCE DETACHMENT
1176 HOWELL STREET, NEWPORT, RI 02841-1708

USRD DRAWING 62785
(REVISED 1 AUGUST 1995)

COORDINATE SYSTEM FOR TRANSDUCER OR PANEL ORIENTATION

The left-handed coordinate system in the sketch below is affixed to the transducer or panel and moves with it, regardless of its physical position. The angle (θ,ϕ) denotes the direction of sound propagation. Measurements are made with sound propagated parallel to the positive X axis (θ=90°, ϕ=0°) unless otherwise specified.

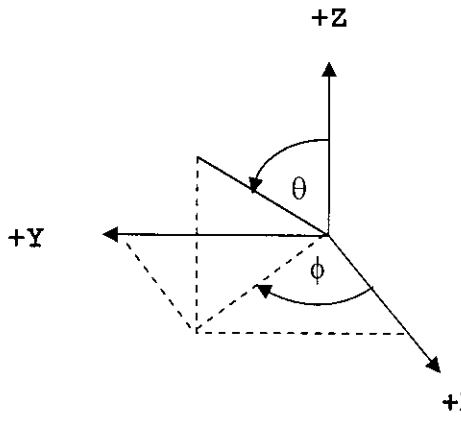
For some measurements, the position of an auxiliary transducer may be specified in terms of cartesian coordinates X, Y, and Z.

Transducers and panels are oriented as follows:

ACOUSTIC SURFACE	ORIENTATION
Cylinder	The cylindrical axis is the Z axis; a reference mark for the +Z direction and for another axis is specified.
Plane	The plane or piston face is the YZ plane, with the X axis normal to the face at the geometric center. A reference mark in the YZ plane is specified.
Sphere	Points on the surface for any two of the three axes are specified.
Other	A sketch of non-conforming configurations is provided.

Directional Response Patterns: Unless otherwise specified, the following apply:

		POSITION OF AXES OR DIRECTIONS ON POLAR PLOTS				
SPECIFIED PLANE	AXIS OF ROTATION	+X AXIS	+Y AXIS	+Z AXIS	θ=45° ϕ=90°	θ=45° ϕ=270°
XY	Z	0°	90° CW	Upward	----------	----------
XZ	Y	0°	Downward	90° CW	----------	----------
YZ	X	Upward	0°	90° CW	----------	----------
ROLL	θ=45° ϕ=270°	0°	----------	----------	90° CW	Upward



Origin is at assumed acoustic center of transducer or panel.