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ELECTROACOUSTIC MEASUREMENTS ON MASSA TR-208A TRANSDUCERS SERIA--ETC(U)
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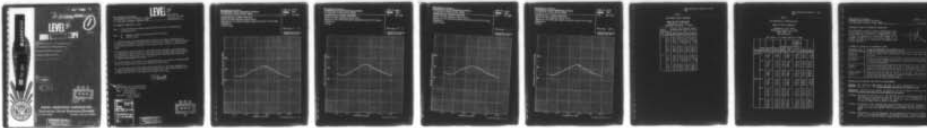
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Electroacoustic Measurements on
Massa TR-208A Transducers
Serials 24102 and 24141

11
18 Jun 1976

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Underwater Sound Reference Division

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18 June 1970

CALIBRATION REPORT No. 3123

Subj: Massa TR-208A transducers serials 24102 and 24141; electroacoustic measurements on

Encl: (1) Drawings USRD 62724 through 62727 and 45001
(2) Tables 1 and 2

1. Electroacoustic measurements were provided on the subject transducers as the result of a telephone conversation on 17 April 1970 between Mr. James Stockton of the Applied Research Laboratory, University of Texas, and Mr. Ivor Groves of USRD.

2. Transmitting current response, equivalent series impedance, and high-power electroacoustic characteristics were measured in the Anechoic Tank Facility during the period June 1969 to June 1970. The measurement conditions and the results are shown in enclosures (1) and (2). given.

3. Orientation was according to the method described for a piston on drawing USRD 45001; the serial number was in the direction of the +Z axis.

4. All measurements reported here that are described in "American Standard Procedures for Calibration of Electroacoustic Transducers, Particularly Those for Use in Water, Z24.24-1957" were made in accordance therewith.

V. P. Benedetti
V. P. BENEDETTI

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USRD No. 62724

~~3883~~ 3883

Date: - Jun 1969

TRANSMITTING CURRENT RESPONSE

Massa TR-208A Transducer Serial 24102

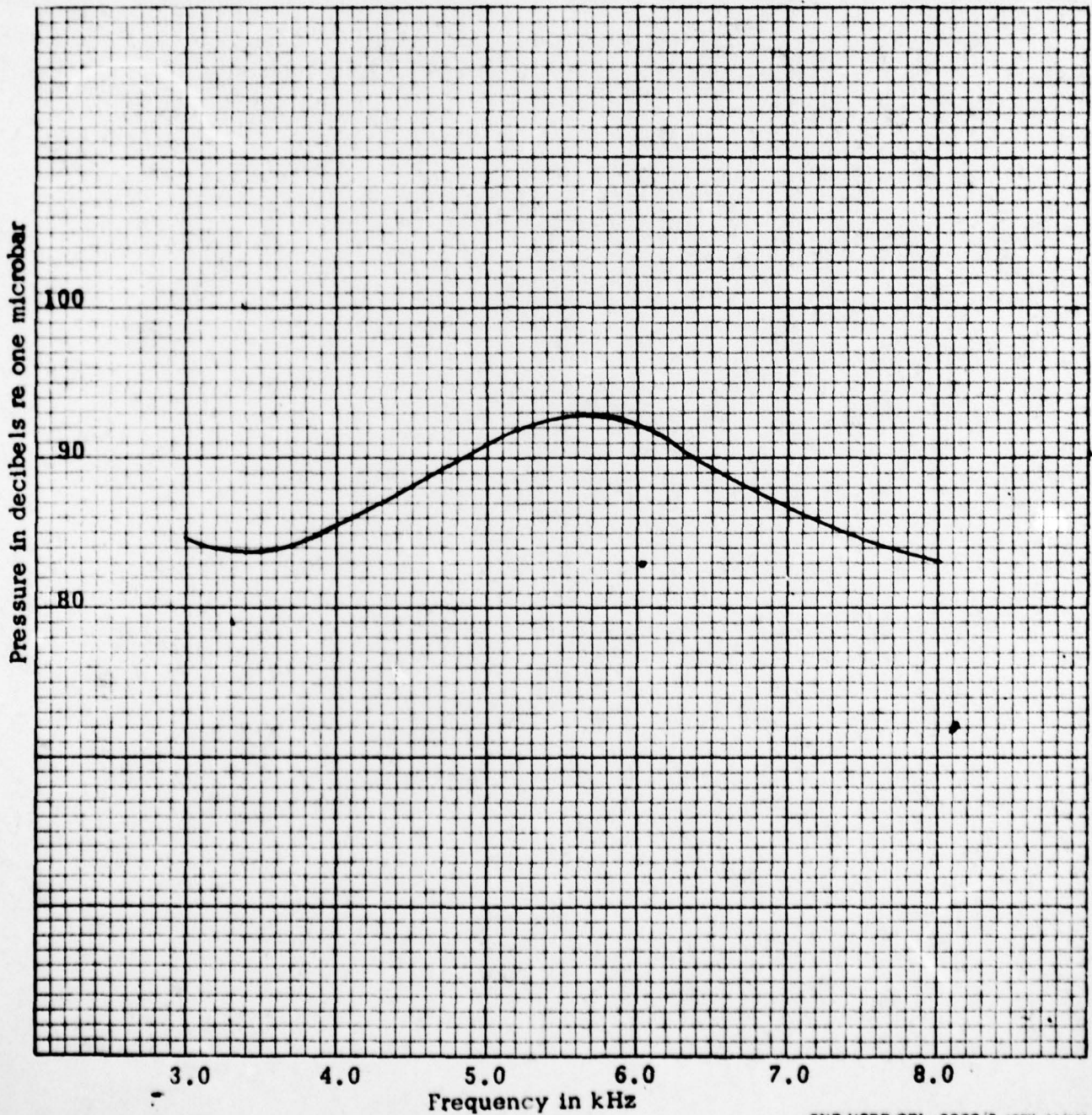
Pressure at one meter per ampere measured at end of 30-ft cable

Unbalanced

0 and 25 psig

Water temp: 3 °C

MEASUREMENTS MADE IN AC-
CORDANCE WITH AMERICAN
STANDARD Z.24.24-1957



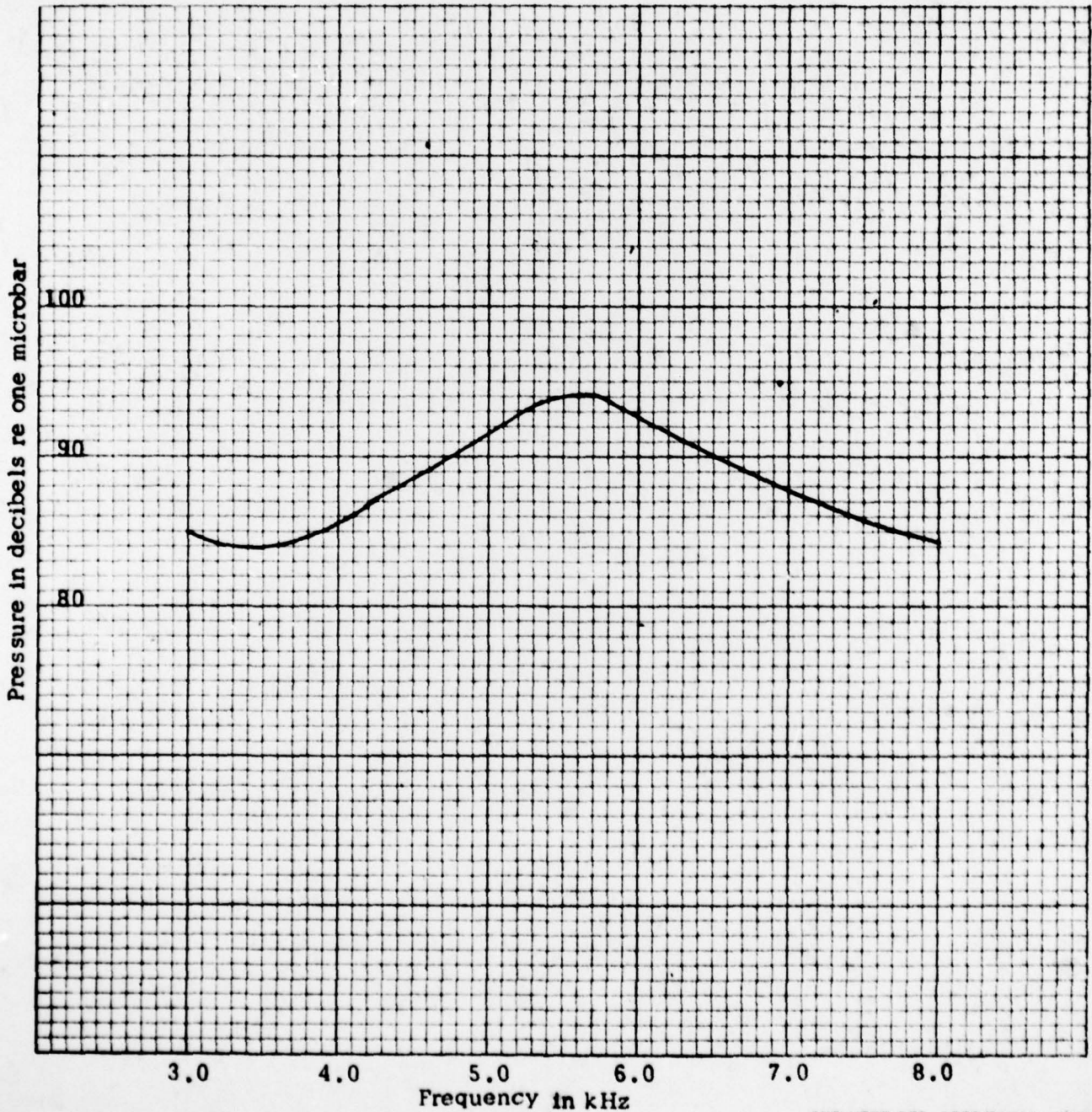
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USRD No. 62725
 3883
Date: Apr 1970

TRANSMITTING CURRENT RESPONSE
Massa TR-208A Transducer Serial 24102
Pressure at one meter per ampere measured at end of 30-ft cable
Unbalanced
25 psig

Water temp: 25 °C

MEASUREMENTS MADE IN AC-
CORDANCE WITH AMERICAN
STANDARD Z 24.24-1957



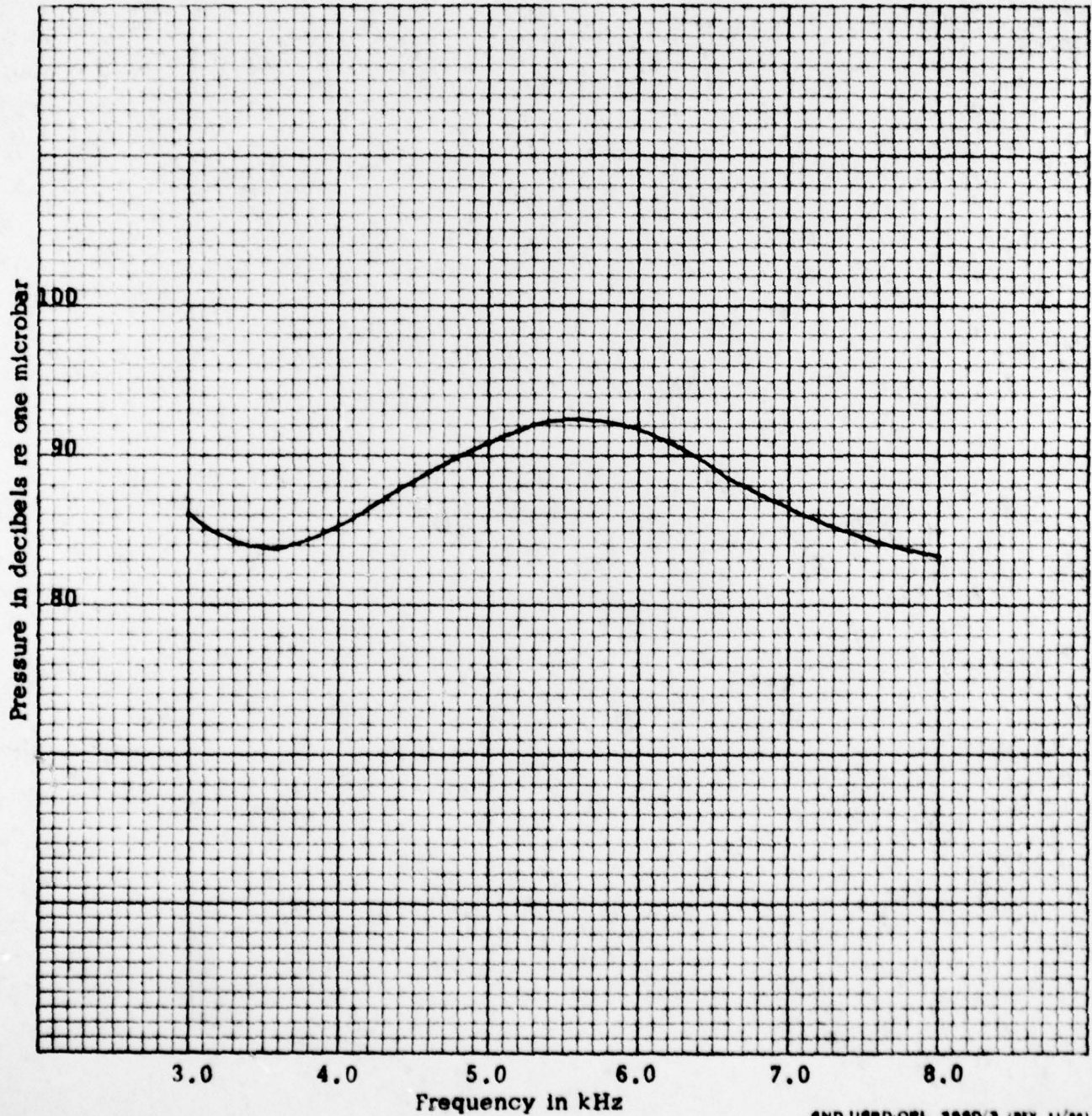
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USRD No. 62726
~~3883~~ 3883
Date: Jun 1969

TRANSMITTING CURRENT RESPONSE
Massa TR-208A Transducer Serial 24141
Pressure at one meter per ampere measured at end of 30-ft cable
Unbalanced
0 and 25 psig

Water temp: 3 °C

MEASUREMENTS MADE IN ACCORDANCE WITH AMERICAN STANDARD Z.39.24-1957



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USRD No. 62727
~~3883~~ 3883
Date: Apr 1970

TRANSMITTING CURRENT RESPONSE
Massa TR-208A Transducer Serial 24141
Pressure at one meter per ampere measured at end of 30-ft cable
Unbalanced
25 psig

Water temp: 25°C

MEASUREMENTS MADE IN AC-
CORDANCE WITH AMERICAN
STANDARD Z 39.24-1957

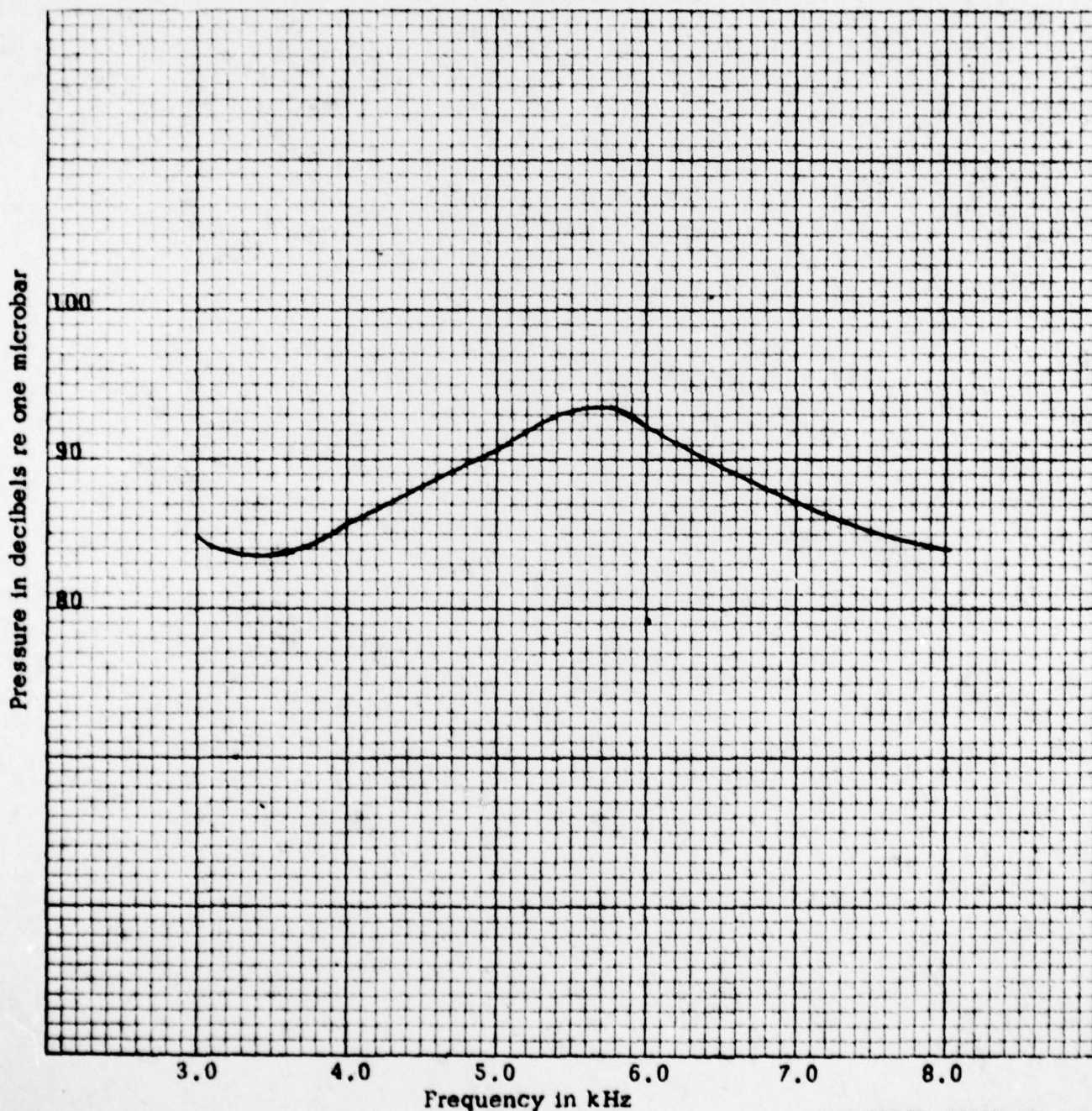


Table 1

EQUIVALENT SERIES IMPEDANCE

Measurements made in Accordance with American Standard Z39.14-57

Massa TR-208A Transducers
Unbalanced; 30-ft cable
Hydrostatic pressure: 25 psig

Water temp (°C)	Freq (kHz)	Serial 24102		Serial 24141	
		R (ohms)	X (ohms)	R (ohms)	X (ohms)
3	3.5	20.7	-46.8	21.8	-52.4
	4.0	22.0	-18.3	22.7	-22.0
	4.5	30.9	-2.73	31.5	-5.70
	5.0	49.6	1.86	48.8	-2.20
	5.5	70.7	-19.6	67.1	-22.3
	6.0	55.1	-51.9	52.7	-50.4
	6.5	28.8	-51.4	28.4	-50.3
	7.0	17.0	-42.0	17.0	-41.5
25	3.5	20.7	-51.9	20.5	-56.2
	4.0	20.0	-22.8	20.1	-24.6
	4.5	26.5	-6.72	28.0	-6.90
	5.0	42.8	5.64	49.0	3.23
	5.5	79.6	-10.6	75.5	-26.5
	6.0	54.2	-56.9	46.6	-54.0
	6.5	25.7	-51.4	24.3	-48.5
	7.0	15.2	-41.3	15.7	-40.1

Measurements made in accord
ence with American Standard
Z39.1-1957

Table 2

ELECTROACOUSTIC CHARACTERISTICS

Massa TR-208A Transducers

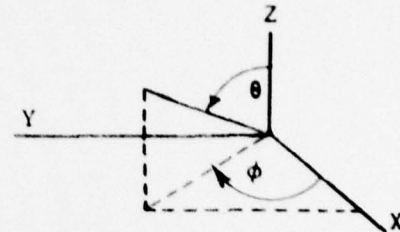
Unbalanced; 30-ft cable
Hydrostatic pressure: 25 psig
Water temp: 3°C
High-power data

Duty cycle: 6% (3-msec pulse at 20 pps)

Serial	Freq (kHz)	Voltage (rms V)	Current (rms A)	Phase angle (deg)	Driving power (W)	Sound pressure level (dB re 1 µbar at 1 m)	R (ohms)	X (ohms)
24102	5.0	75.0	1.51	2	113	94.7	49.6	1.73
		150	2.98	2	447	100.7	50.3	1.76
		157	3.17	2	497	101.3	49.5	1.73
	5.5	78.0	1.08	-16	81.0	93.8	69.4	-19.9
		158	2.19	-17	331	99.9	69.0	-21.1
		190	2.57	-16	469	101.4	71.1	-20.4
		194	2.68	-16	500	101.7	69.6	-20.0
	6.0	77.0	1.07	-43	60.3	92.9	52.6	-49.1
		156	2.20	-43	251	99.1	51.9	-48.4
		208	2.94	-43	447	101.6	51.7	-48.3
		220	3.09	-43	497	102.1	52.1	-48.6
	24141	5.0	73.0	1.52	-5	111	94.7	47.8
105			2.13	-4	223	97.8	49.2	-3.44
147			3.02	-3	443	100.7	48.6	-2.55
156			3.20	-3	499	101.3	48.7	-2.55
5.5		75.0	1.07	-18	76.3	93.2	66.7	-21.6
		105	1.52	-19	151	96.3	65.3	-22.5
		148	2.12	-19	297	99.3	66.0	-22.7
		187	2.66	-18	473	101.3	66.9	-21.7
		194	2.77	-18	511	101.6	66.6	-21.6
6.0		77.0	1.07	-42	61.2	92.8	53.5	-48.2
		109	1.55	-42	126	95.9	52.3	-47.1
		153	2.18	-43	244	98.8	51.3	-47.9
		214	3.09	-43	484	101.9	50.7	-47.2
		220	3.18	-43	512	102.1	50.6	-47.2

COORDINATE SYSTEM FOR TRANSDUCER ORIENTATION

The left-handed coordinate system of the American Standard Procedures for Calibration of Electroacoustic Transducers Particularly Those for Use in Water, Z24.24-1957, is used. The transducer is fixed with respect to the coordinate system and has its acoustic center at the origin. The angle ϕ is equivalent to the azimuth angle in sonar operation.



PLACEMENT OF TRANSDUCER IN COORDINATE SYSTEM

Transducer Type	Transducer Orientation in Coordinate System
Point, or Spherical	Points on surface that coincide with the X and Z axes shall be specified.
Cylindrical, or Line	The axis of the cylinder or line shall coincide with the Z axis. A reference mark in the XZ plane and in the direction of the positive X axis will be specified.
Plane, or Piston	The plane or piston face shall be in the YZ plane with the X axis normal to the face at its acoustic center. A reference mark in the XZ plane and in the direction of the positive Z axis will be specified.
Other Configurations	Orientation shall be shown by sketch or description. This category includes line and piston types of transducers operated in an orientation other than those specified above.

ORIENTATIONS FOR RESPONSE AND DIRECTIVITY MEASUREMENTS

Response. The calibration measurements are made for sound propagated parallel to the positive X axis ($\phi = 0, \theta = 90$), unless otherwise specified on the response curve.

Directivity. The plane of the pattern is specified, and the following conventions are observed, if another orientation is not specified on the pattern:

XY Planes: The positive X axis ($\phi = 0, \theta = 90$) coincides with the zero-degree direction on the pattern and the positive Y axis ($\phi = 90, \theta = 90$) is at 90 degrees measured in a clockwise direction. Rotation is around the Z axis; the positive Z axis is directed upward from the plane of the paper.

XZ Planes: The positive X axis coincides with the zero-degree direction and the positive Z axis ($\theta = 0$) is at 90 degrees measured in a clockwise direction. Rotation is around the Y axis; the negative Y axis is directed upward from the plane of the paper.

YZ Planes: The positive Y axis coincides with the zero-degree direction and the positive Z axis is at 90 degrees measured in a clockwise direction. Rotation is around the X axis; the positive X axis is directed upward from the plane of the paper.