

AD-A071 628

NAVY UNDERWATER SOUND REFERENCE LAB ORLANDO FL
CALIBRATION OF SCANNING SONAR TRANSDUCER TR-117A/SQS-4 MOD 3 SE--ETC(U)
OCT 57

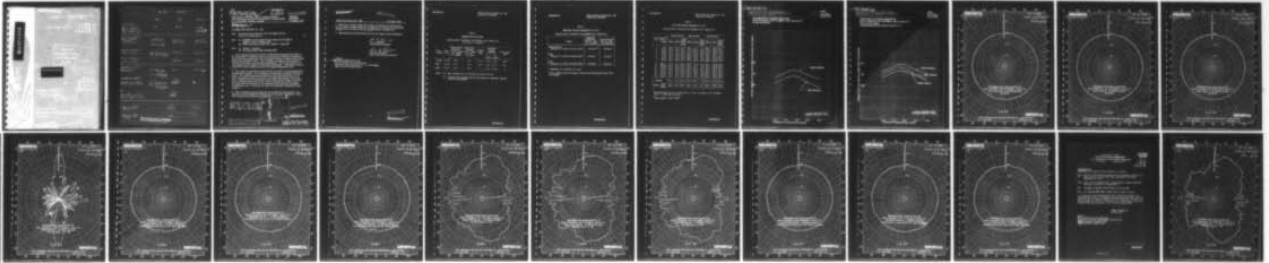
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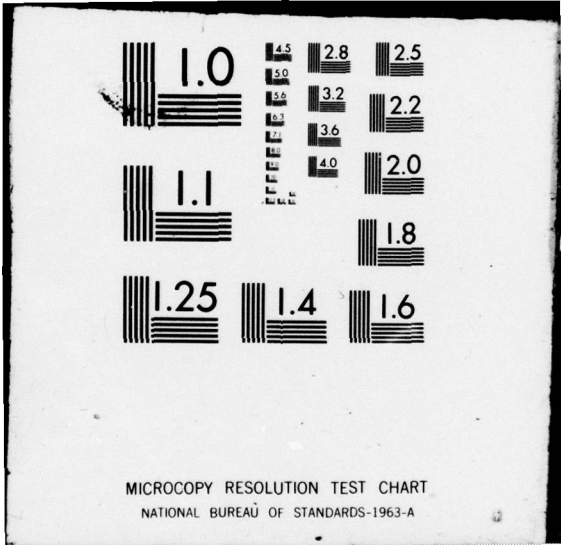
USRL-CALIBRATION-1468

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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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UNCLASSIFIED

Calibration Report No. 1465
Project No. 1995

ADA 071628

1. MOST Project

①

LEVEL

⑥

Calibration of
Damping Rate Transducer
TR-117A/229-4 Mod 3
Serial 2-6.

⑦

USRL-CALIBRATION-1465

⑬

27 p.

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REPRODUCTION
RESTRICTED
A

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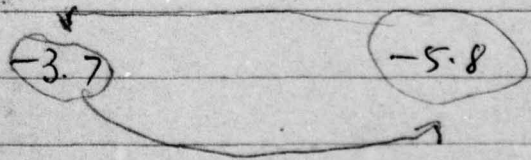
Department of the Army
Office of Naval Research
CIVILIAN BOARD REFERENCE LABORATORY
Orlando, Florida

UNCLASSIFIED
334 300

AM/SOS -4 Mod 3

	Spec	GE	Saugame
Transmitting Power response (db re 1 μbar per watt at 1 yd)	76	75.9	77.8 (calculated)
Receiving Response db re 1 volt per microbar Search section	-80 ± 1.5 original -83 ± 1.5 modified	-80.7 ± 0.5 (Average of 8)	-81.6 ± 0.4 (Average of 4)
Receiving Response UMCC Section	-85 ± 1.5 original -90 ± 1.5 modified	-86.5 ± 0.7	-86.8 ± 0.2
Receiving Response LMCC Section	"	-83.8 ± 0.6	84.3 ± 0.4
Impedance, Search (Phase Angle Variations)	± 2° of the mean original ± 2° std deviation (modified)	± 1.2°	± 1.1° approx
Impedance UMCC		+4.6 -4.9 ± 4.9°	*
Impedance LMCC (Phase angle variations)	± 5° of the mean (original) ± 5° std deviation (modified)		
Impedance LMCC (Phase angle variations)	"	-3.7 +2.0 ± 3.7	

Efficiency (db)
Search



Efficiency (db)
UMCC

-8.8 -9.0

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Calibration Report No. 1465

3 October 1957

4. Impedance measurements were made on 16 staves for each section, and the spread of phase angle was ± 2 degrees for the search section and ± 5 degrees for the MCC sections, as specified in reference (a).
5. Measurements with the delay line were not made on this transducer.

E. A. Barnes
E. A. BARNES
Measurements Branch

Eva M. Raybun
EVA M. RAYBUN
Head, Data Reduction Branch

Copy to:

BUSHIPS (848)(1)(with encl)

Harris Transd Corp (1)(with encl)

Gen Elec (1)(with encl)(Attn: K. C. Greenhalgh)

USRL Code 210 (1)(with encl)

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Table 1

TRANSMITTING EFFICIENCY

Scanning Sonar Transducer TR-117A/SQS-4 Mod 3 Serial X-2
All Staves in Parallel

Trans Section	Freq (kc)	Trans Current Response (db re 1 μ bar per ampere at 1 meter)	Trans Power Response (db re 1 μ bar ² per watt at 1 yard)	Direct Index (db)	Equivalent Series Impedance		Efficiency (db)
					R (ohms)	X (ohms)	
Search	12.00	73.8	75.9	10.0	0.74	1.73	-5.8
UMCC	12.00	67.9	67.4	14.7	1.34	-0.77	-9.0
LMCC	12.00	67.9	67.2	—	1.40	-0.35	—

- Notes: (1) Peak response for all sections was about 11.85 kc
- (2) Transmitting responses have been corrected to represent average value for any azimuth

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USRL Calibration Report No. 1465
Project No. RP-1805C

Table 2

FREE-FIELD VOLTAGE SENSITIVITY AT 12 KC

Scanning Sonar Transducer TR-117A/SQS-4 Mod 3 Serial X-2

Staves	Measured Sensitivity (db re 1 volt per microbar)	Specification ^a (db re 1 volt per microbar)
Search Section Average of 8 staves (drawing 19394)	-80.7±0.5 ^b	-80.0±1.5
UMCC Average of 8 staves (drawing 19394)	-86.5±0.7	-85.0±1.5
LMCC Average of 8 staves (drawing 19394)	-83.8±0.6	-85.0±1.5

^a Reference (f), section 3.4.1.14.2

^b The ± number shows the range of variation of individual staves from the average.

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Table 3

EQUIVALENT SERIES IMPEDANCE AT 12 KC

Scanning Sonar Transducer TR-117A/SQS-4 Mod 3 Serial X-2

Stave No.	Stave (a) Position (deg)	Search Section			UMCC Section			LMCC Section		
		R (ohms)	X (ohms)	Phase (b) Angle (deg)	R (ohms)	X (ohms)	Phase Angle (deg)	R (ohms)	X (ohms)	Phase Angle (deg)
1	3.75	37.4	73.3	63.0	79.4	-8.7	-6.3	98.6	-18.7	-10.7
2	11.25	38.5	71.9	61.8	73.5	-10.3	-8.0	95.2	-19.0	-11.3
3	18.75	36.2	73.1	63.7	78.4	-11.8	-8.6	91.8	-20.2	-12.4
4	26.25	37.4	72.4	62.7	74.7	-16.4	-12.4	90.3	-12.6	-7.9
5	33.75	35.5	74.8	64.6	81.2	-13.8	-9.6	95.0	-15.2	-9.1
6	41.25	36.3	72.6	63.4	80.0	-12.8	-9.1	91.1	-16.4	-10.2
7	48.75	36.0	71.3	63.2	78.5	-6.3	-4.6	87.6	-21.2	-13.6
8	56.25	36.4	71.5	63.0	77.2	-13.9	-10.2	98.8	-15.8	-9.1
41	303.75	35.0	71.8	64.0	78.5	-8.6	-6.2	94.1	-19.8	-11.9
42	311.25	37.3	74.5	63.4	74.5	-9.7	-7.4	94.8	-19.8	-11.8
43	318.75	35.3	71.2	63.6	79.9	-11.2	-8.0	81.9	-19.7	-13.5
44	326.25	35.5	73.0	64.1	83.2	-12.5	-8.5	73.5	-17.6	-13.5
45	333.75	36.0	73.3	63.8	77.5	-13.2	-9.7	96.0	-22.1	-13.0
46	341.25	36.1	70.1	62.8	80.3	-9.6	-6.8	86.1	-18.1	-11.9
47	348.75	36.3	72.0	63.2	81.1	-4.1	-2.9	88.3	-21.2	-13.5
48	356.25	36.2	74.1	64.0	81.7	-9.0	-6.3	87.4	-18.4	-11.9
Average		36.3	72.6	63.4	78.7	-10.7	-7.8	90.6	-18.5	-11.6
Spread (low)		35.0	70.1	61.8	73.5	-4.1	-2.9	73.5	-12.6	-7.9
Spread (high)		38.5	74.8	64.6	83.2	-16.4	-12.4	98.6	-22.1	-13.6

^a Clockwise from 000 when looking down at top of transducer, and clockwise from 0 on USRL polar patterns.

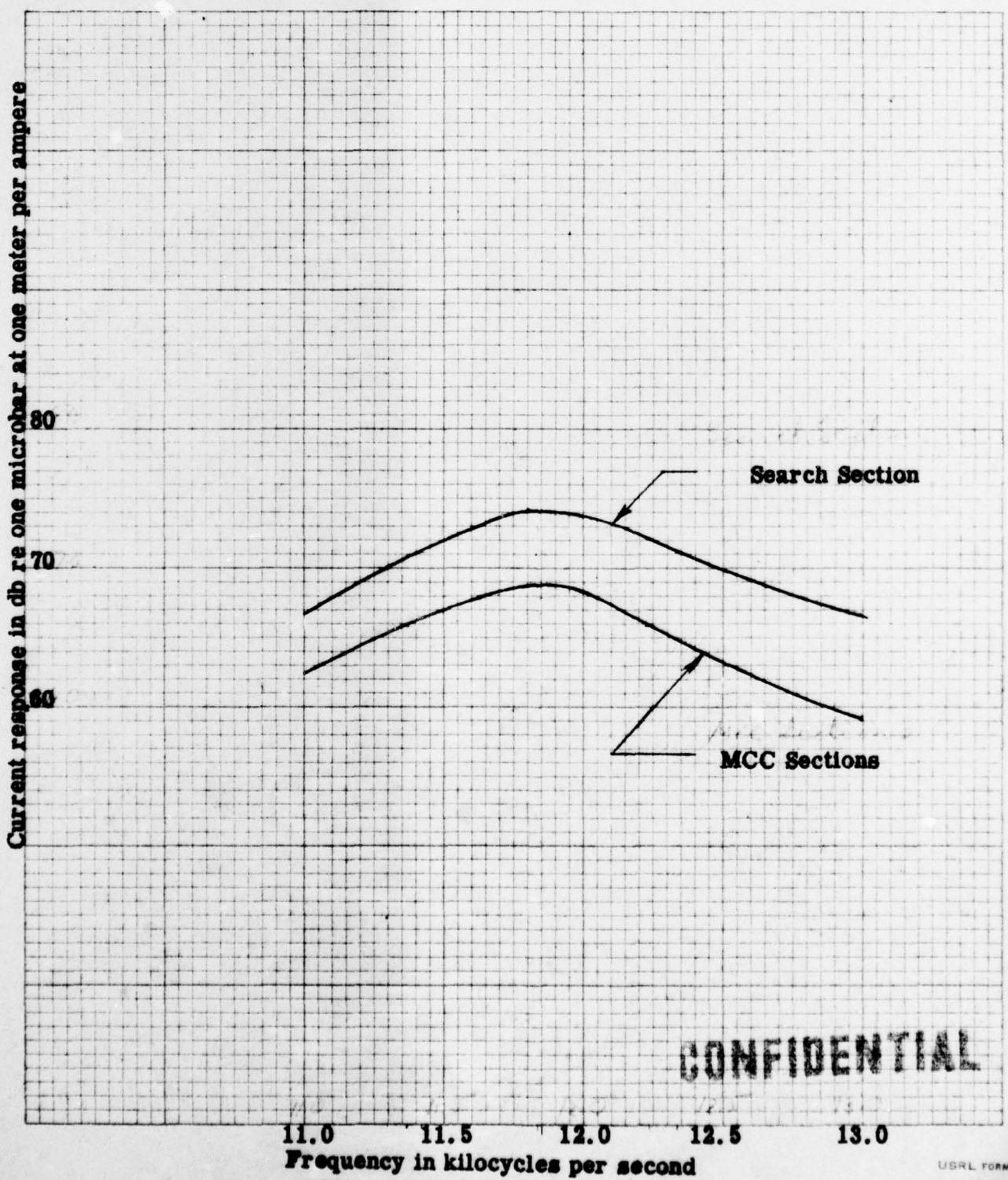
^b Phase angle $\theta = \tan^{-1} (X/R)$

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Department of the Navy, Office of Naval Research
UNDERWATER SOUND REFERENCE LABORATORY
P. O. Box 3629, Orlando, Florida

USRL No. **19393**
Proj. No. **RP-1805C**
Date: **25 Sep 1957**

TRANSMITTING CURRENT RESPONSE
Sonar Transducer TR-117A/SQS-4, Mod 3 Serial X-2
All Staves Parallel



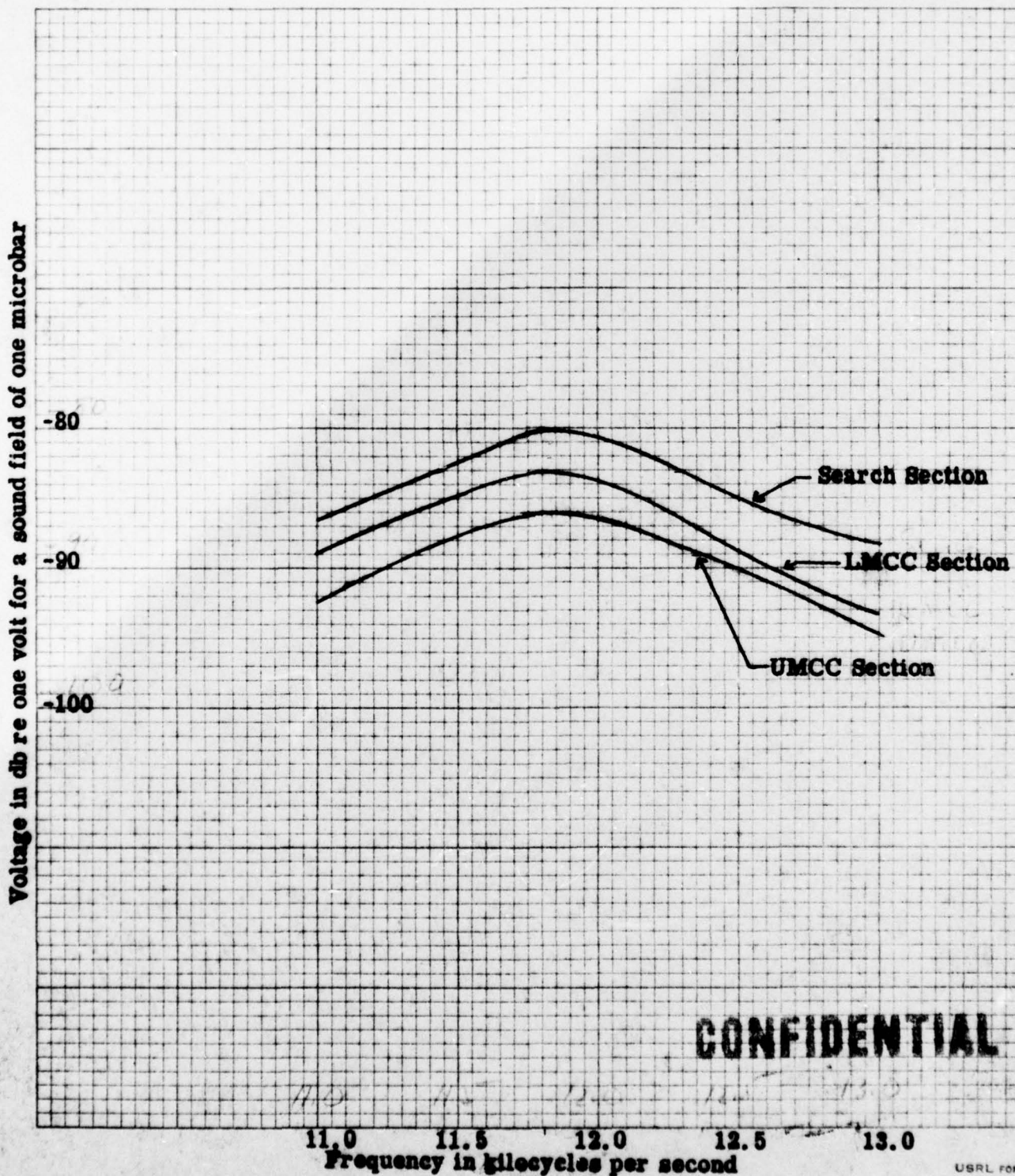
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UNDERWATER SOUND REFERENCE LABORATORY
P. O. Box 3629, Orlando, Florida

USRL No 19394
Proj. No RP-1805C
Date: 26 Sep 1957

FREE-FIELD VOLTAGE SENSITIVITY
Sonar Transducer TR-117A/SQS-4, Mod 3 Serial X-2
Open-circuit voltage
Average Sensitivity for Staves 45-48 and 1-4



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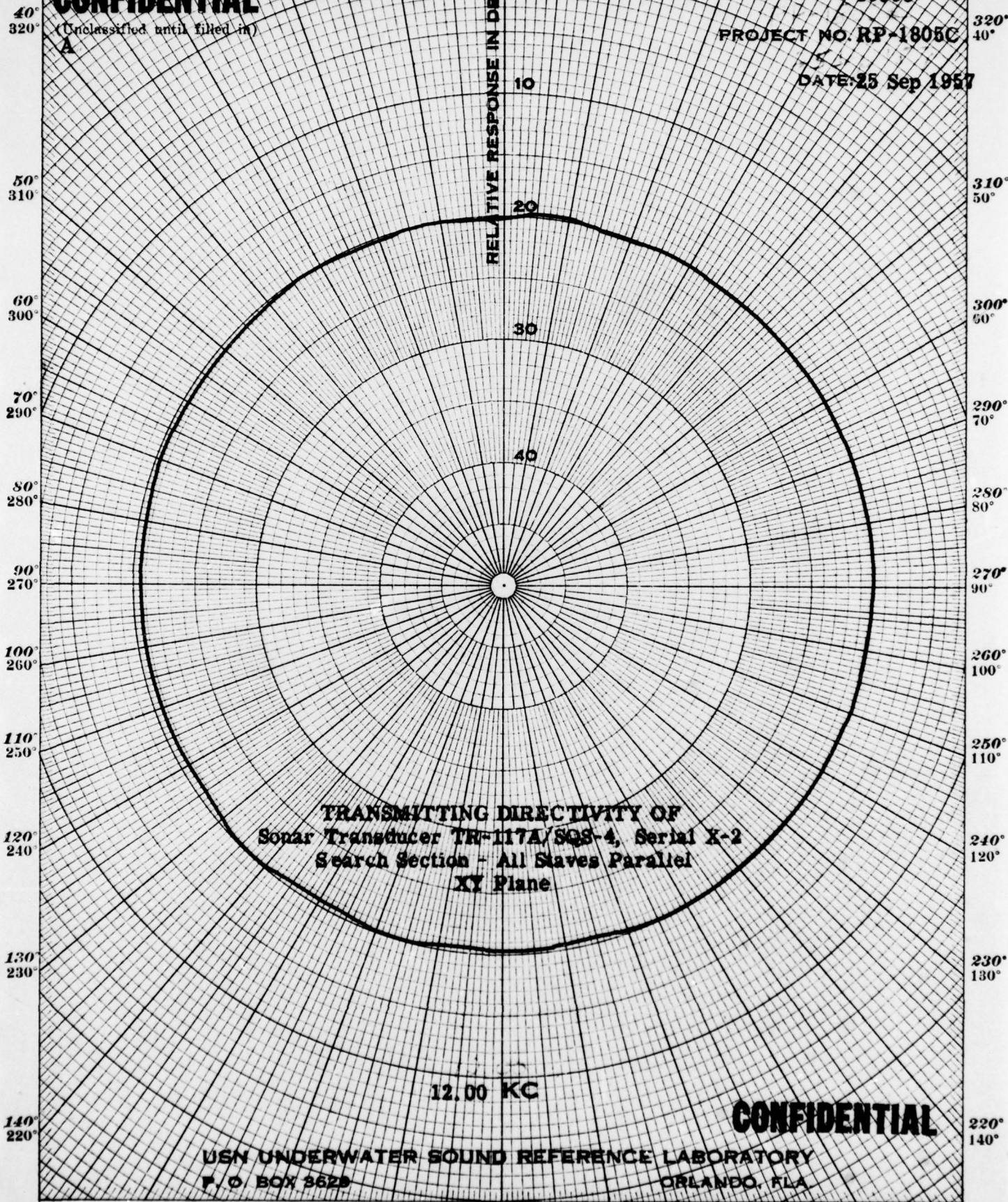
USRL NO. 19395

PROJECT NO. RP-1805C

DATE: 25 Sep 1957

CODING BOOK COMPANY, INC. WATWOOD, MASSACHUSETTS

NO. 3124, POLAR CO. ORDINATE.



TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Search Section - All Staves Parallel
XY Plane

12.00 KC

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USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3628

ORLANDO, FLA

150° 160° 170° 180° 190° 200° 210° 200° 190° 180° 170° 160° 150°
NAVY 5770 AND JAY 150°

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(Unclassified until filled in)

USRL NO. 19896

PROJECT NO. RP-18050

DATE: 25 Sep 1957

RELATIVE RESPONSE IN DB

10

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SGS-4, Serial X-2
Search Section - All Staves Parallel
XY Plane

11.65 KC

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USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3629 ORLANDO, FLA.

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CODEX PAPER COMPANY, INC. NORWOOD, MASSACHUSETTS
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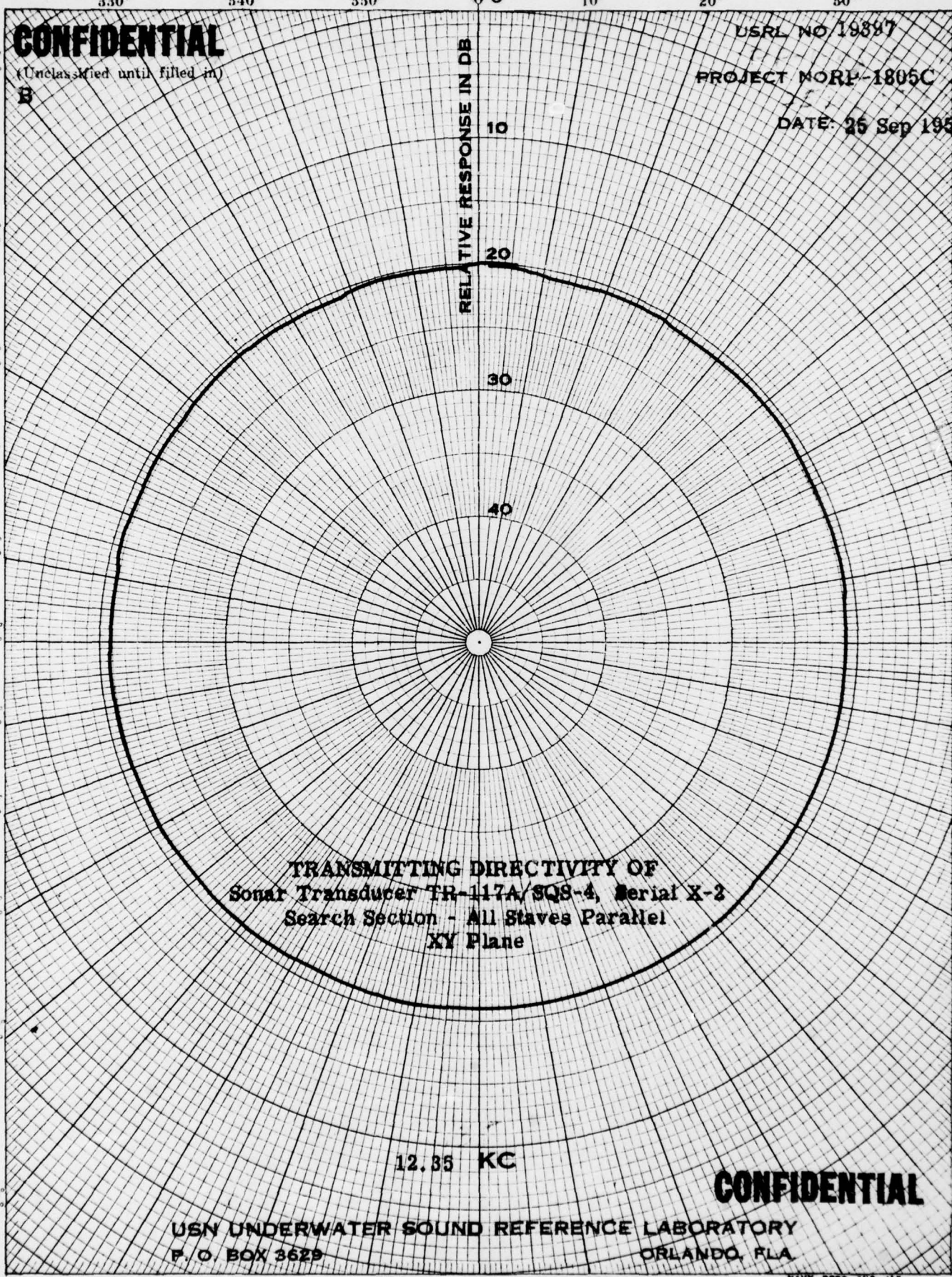
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USRL NO 19387

PROJECT MORP-1805C

DATE: 26 Sep 1957



TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Search Section - All Staves Parallel
XY Plane

12.35 KC

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USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3629 ORLANDO, FLA.

150° 160° 170° 180° 190° 200° 210° 200° 190° 180° 170° 160° 150°

WOODWARD-GLOUCESTER CO. INC. PRINTED IN U.S.A.

NAVY BUREAU OF NAVAL OPERATIONS

30° 20° 10° 0° 350° 340° 330°
330° 340° 350° 10° 20° 80°

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(Unclassified until filled in)

AE

USRL NO 18398

PROJECT NO. RP-1805C

DATE: 27 Sep 1957

RELATIVE RESPONSE IN DB

10

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Search Section - All Staves Parallel
Vertical Plane, $\theta = 60^\circ$

12.00 KC

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P. O. BOX 3629 ORLANDO, FLA.

150° 160° 170° 180° 190° 200° 210°
210° 200° 190° 180° 170° 160° 150°

NO. 3124. MOLAR CO. CONDUITE.
CODER BOOK COMPANY, INC. WOODBRIDGE, MASSACHUSETTS

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CONFIDENTIAL

(Unclassified until filled in)

AG

USRL NO 18399

PROJECT NO RP-1805C

DATE: 27 Sep 1957

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RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Search Section - All Staves Parallel
Vertical Plane, $\phi = 60^\circ$

11.65 KC

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USN UNDERWATER SOUND REFERENCE LABORATORY
P.O. BOX 3629
ORLANDO, FLA

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NAVY USE ONLY

CODING MARK COMPANY, INC. WOODBRIDGE, CONNECTICUT

NO 3124, POLAR CO. COMPANY, INC.

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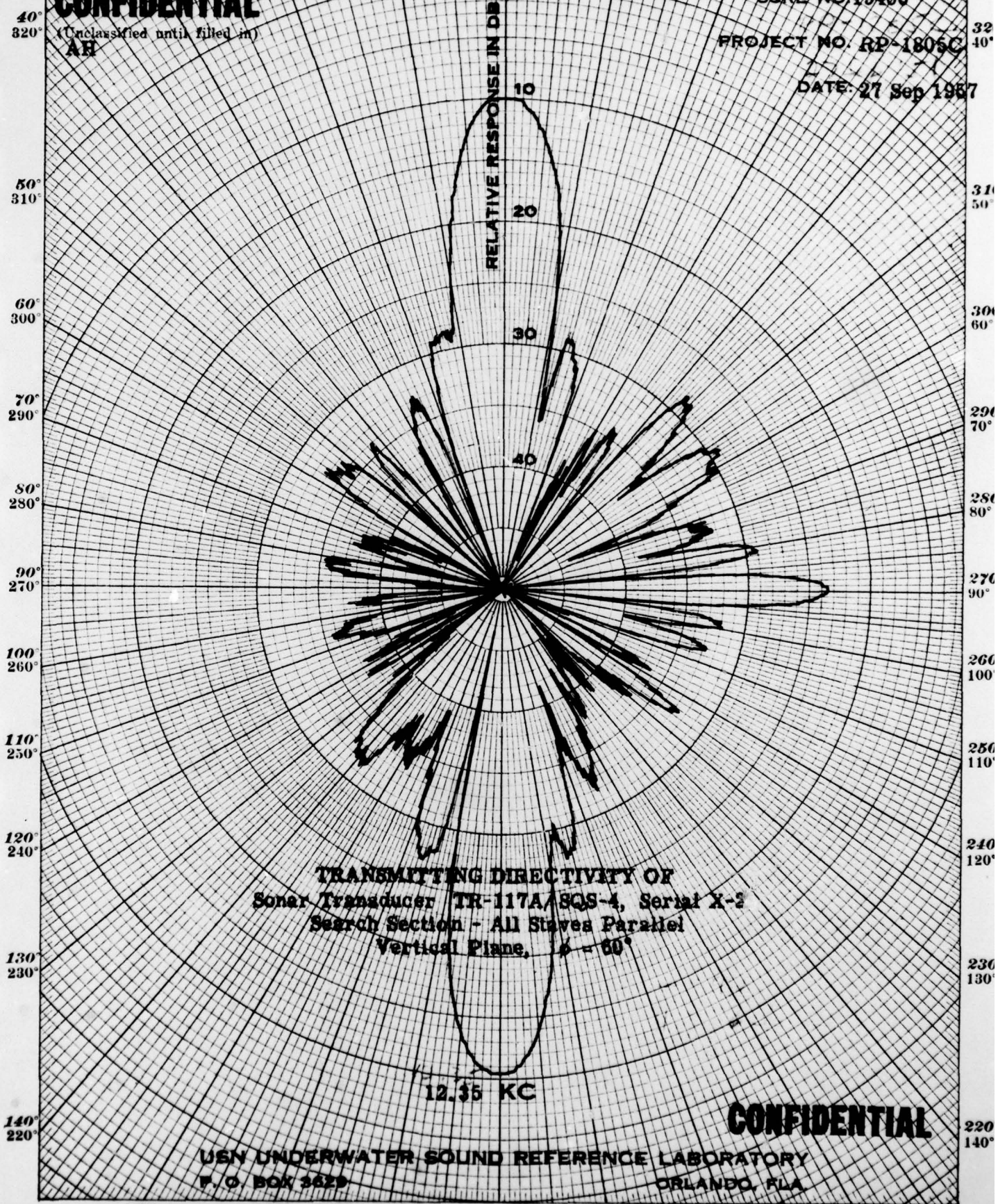
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AR

USRL NO 19400

PROJECT NO. RP-1805C

DATE: 27 Sep 1957



TRANSMITTING DIRECTIVITY OF
Sonar Transducer / TR-117A / SQS-4, Serial X-2
Search Section - All Staves Parallel
Vertical Plane, $\theta = 60^\circ$

12.35 KC

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P. O. BOX 3629 ORLANDO, FLA

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NO. 3124 POLAR CO-ORDINATE. CODEX BOOK COMPANY, INC. WOODBRIDGE, CONNECTICUT

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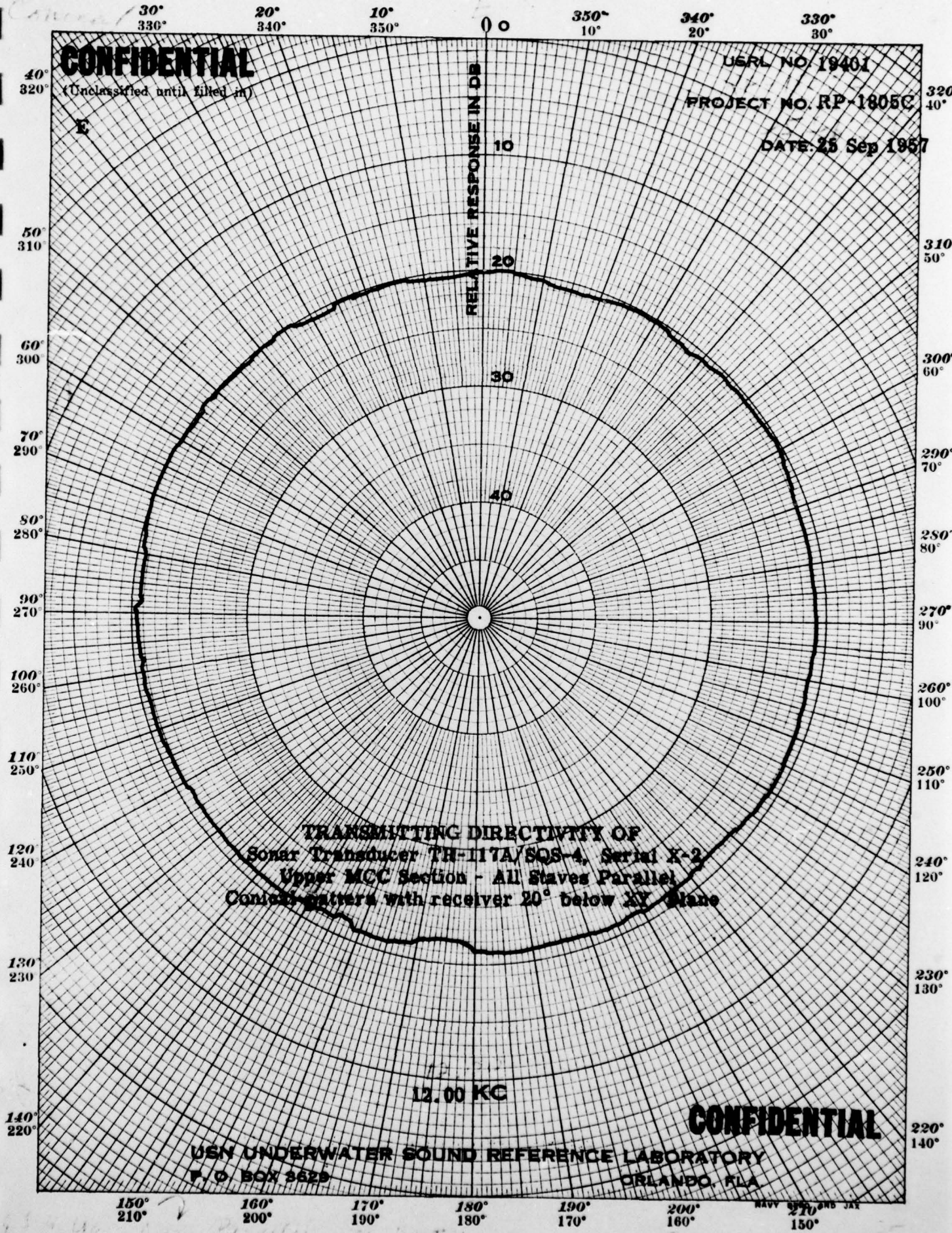
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USRL NO. 19401

PROJECT NO. RP-1805C

DATE: 25 Sep 1957

RELATIVE RESPONSE IN DB



TRANSMITTING DIRECTIVITY OF
 Sonar Transducer TH-117A/SQS-4, Serial X-2
 Upper MCC Section - All Staves Parallel
 Conical pattern with receiver 20° below XY plane

12.00 KC

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 P.O. BOX 3629
 ORLANDO, FLA

NAVY DEPT. AND JAY

CODEX BOOK COMPANY, INC. WOODBRIDGE, N.J. 07095

NO. 3124. POLAR CO. ORIGINATE.

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USRL NO 19402

PROJECT NO RP-1805C

DATE: 25 Sep 1957

RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Upper MCC Section - All Staves Parallel
Conical pattern with receiver 20° below XY plane

11.85 KC

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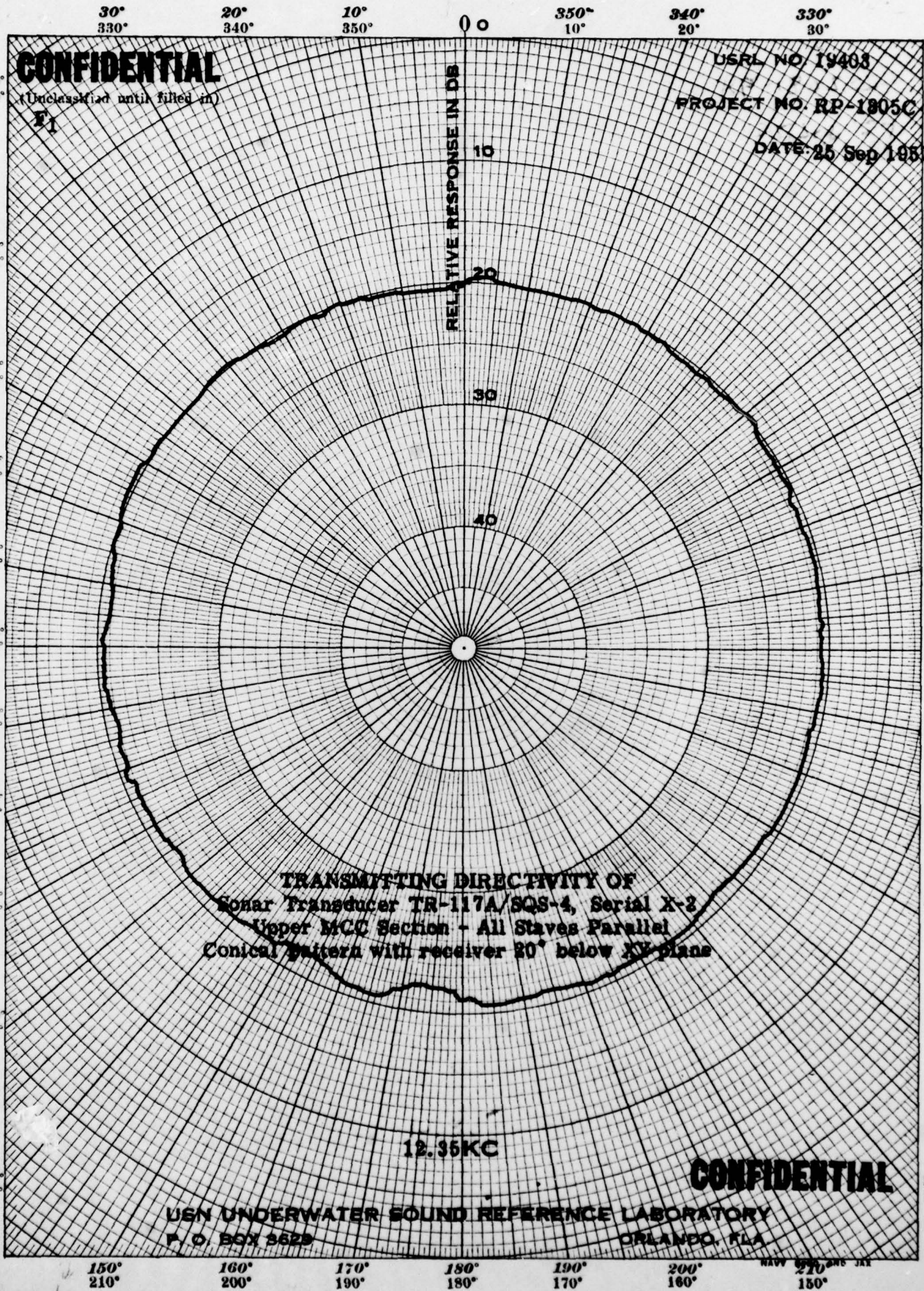
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NO. 3124. SOLAR CO. ORLANDO, FLA. CODEX BOOK COMPANY, INC. WOODBRIDGE, N.J.

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USRL NO 19403
 PROJECT NO. RP-1805C
 DATE: 25 Sep 1957

TRANSMITTING DIRECTIVITY OF
 Sonar Transducer TR-117A/SQS-4, Serial X-2
 Upper MCC Section - All Staves Parallel
 Conical pattern with receiver 20° below XY plane

12.35 KC

USN UNDERWATER SOUND REFERENCE LABORATORY
 P. O. BOX 3629 ORLANDO, FLA

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NO. 3124, POLAR CO-ORDINATE, INC. WOOD, ACHU

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 100° 260°
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AJ

USRL NO. 19404

PROJECT NO. RP-1805C

DATE 27 Sep 1957

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240° 120°
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220° 140°

RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Upper MCC Section - All Staves Parallel
Vertical Plane, $\delta = 60^\circ$

12.00KC

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P.O. BOX 3629
ORLANDO, FLA

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NAVY OBS. DIV. JAY
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CODEX COPY COMPANY, INC. WARREN, MASSACHUSETTS
TELEPHONE NO. 0124

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330° 340° 350° 10° 20° 30°

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AK

USRL NO. 19405

PROJECT NO. RP-18050

DATE 27 Sep 1957

RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Upper MCC Section - All Staves Parallel
Vertical Plane, $\theta = 60^\circ$

11.65 KC

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USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3629 ORLANDO, FLA

150° 160° 170° 180° 190° 200° 210° 220°
210° 200° 190° 180° 170° 160° 150°

CODEX BOOK COMPANY, INC. WOODBRIDGE, CONNECTICUT

NO. 3124 POLAR CO. QUINCY, ILL.

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290° 70°
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(Unclassified until filled in)

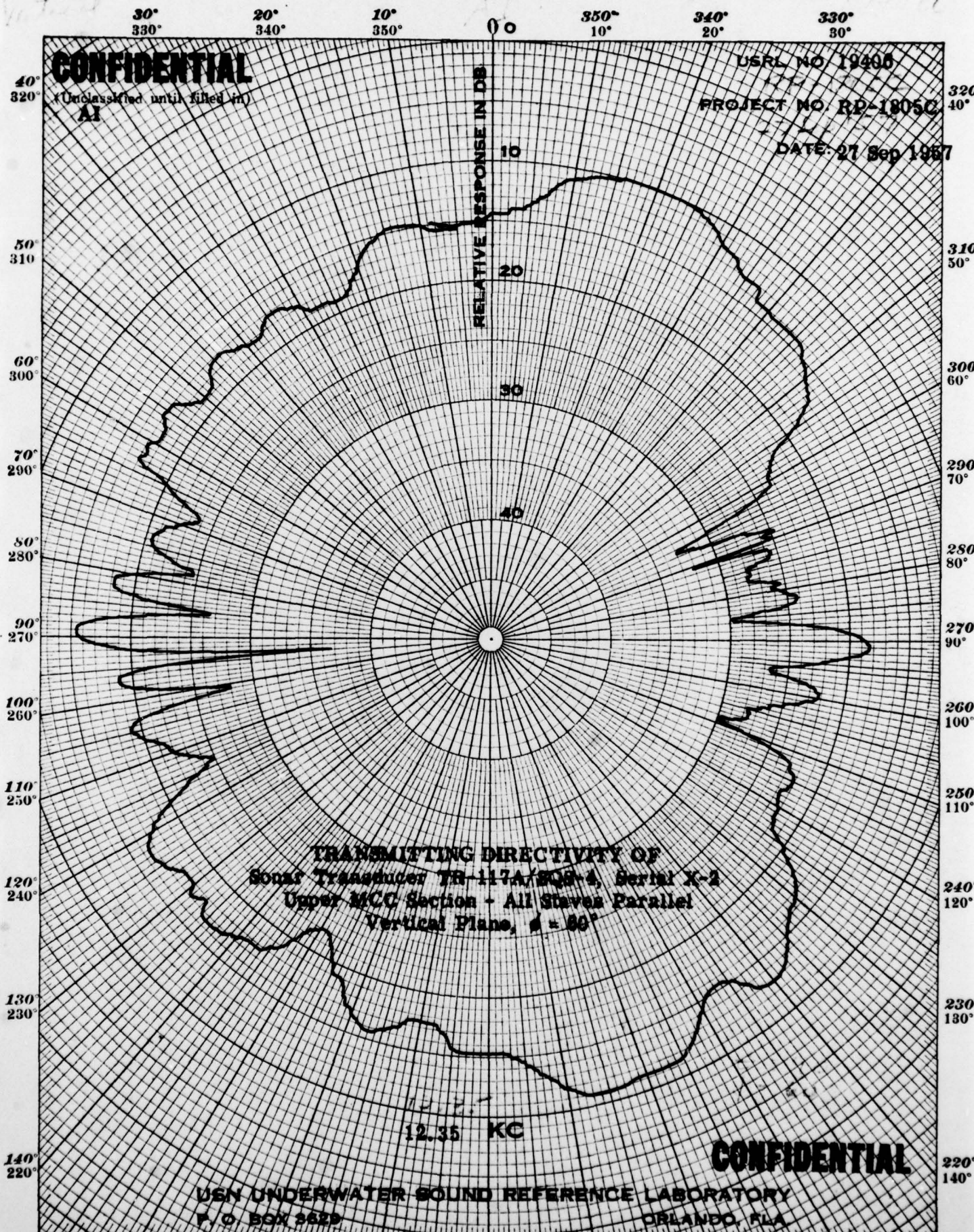
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USRL NO. 19400

PROJECT NO. RP-18050

DATE: 27 Sep 1957

RELATIVE RESPONSE IN DB



TRANSMITTING DIRECTIVITY OF
 Sonar Transducer TR-117A/SQS-4, Serial X-2
 Upper MCC Section - All Staves Parallel
 Vertical Plane, $\theta = 90^\circ$

12.35 KC

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 P. O. BOX 3629 ORLANDO FLA

CODEX BOOK COMPANY, INC. MARWOOD MASSACHUSETTS
 NO. 3124 POLAR CO-ORDINATE

150° 210° 160° 200° 170° 190° 180° 180° 190° 170° 200° 160° 210° 150°

SQS-4 Upper - parallel -> 247° -> 150° 28

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CONFIDENTIAL

(Unclassified until filled in)

H₁

USRL NO 19487

PROJECT NO RP-1805C

DATE: 25 Sep 1967

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RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Lower MCC Section - All Staves Parallel
Conical pattern with receiver 20° below XY plane

12.00 KC

CONFIDENTIAL

USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 2629 ORLANDO, FLA

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170°
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200°
160°

NAVY BUREAU OF SOUND JAX
150°

MOORE CO. INC. WOODBRIDGE, N.J. 07095

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330° 340° 350° 10° 20° 30°

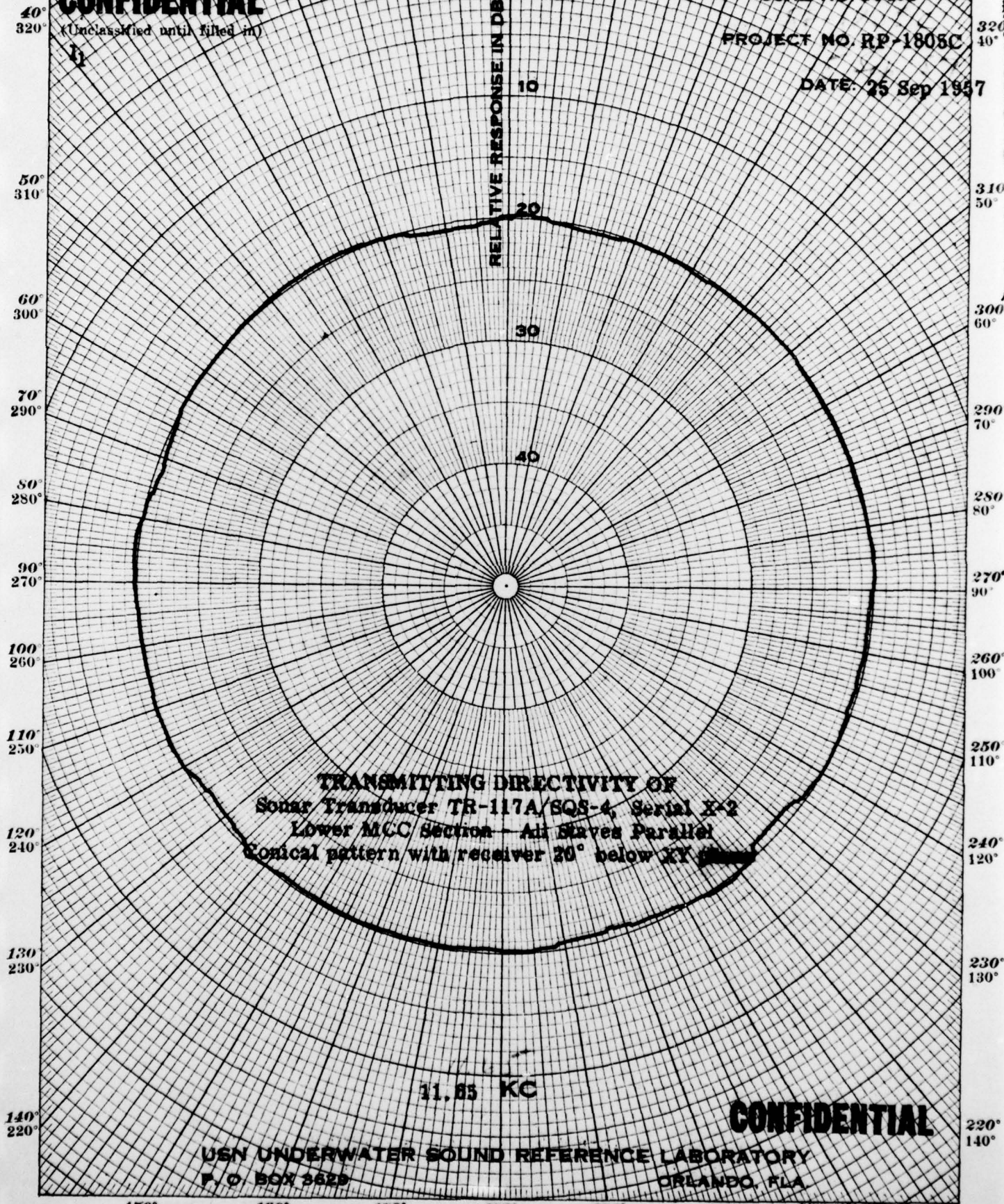
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(Unclassified until filled in)

USRL NO 19488

PROJECT NO. RP-1805C

DATE 25 Sep 1957

RELATIVE RESPONSE IN DB



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P.O. BOX 3625 ORLANDO, FLA

150° 160° 170° 180° 190° 200° 210°
210° 200° 190° 180° 170° 160° 150°

CODEX BOOK COMPANY, INC. NORWOOD, MASSACHUSETTS
NO. 3124, POLAR COORDINATE

30°
330°

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340°

10°
350°

0°

350°
10°

340°
20°

330°
30°

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(Unclassified until filled in)

G₁

USRL NO. 19408

PROJECT NO. RP-1805C

DATE: 25 Sep 1957

RELATIVE RESPONSE IN DB

10

20

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40

TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A/SQS-4, Serial X-2
Lower MCC Section - All Staves Parallel
Conical pattern with receiver 20° below XY plane

12.35 KC

CONFIDENTIAL

USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3628
ORLANDO, FLA

150°
210°

160°
200°

170°
190°

180°
180°

190°
170°

200°
160°

210°
150°

NAVY OPER. AND JAG

CODEX BOOK COMPANY, INC., NORWOOD, MASSACHUSETTS
NO. 3124, SOLAR CO. QUINCY, ILL.

40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°

320° 40°
310° 50°
300° 60°
290° 70°
280° 80°
270° 90°
260° 100°
250° 110°
240° 120°
230° 130°
220° 140°

DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH

U. S. N. UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3629 ORLANDO, FLORIDA

Address Reply To
Director USN-USRL,
P. O. Box 3629
Orlando, Florida
And Refer To:

Code 120
RP-1805
Ser T007-58
7 January 1958

CONFIDENTIAL

REGISTERED MAIL

CONFIDENTIAL (Unclassified when enclosure is removed)

From: Director, USN Underwater Sound Reference Laboratory, Orlando, Fla.
To: Chief, Bureau of Ships (Code 848), Department of the Navy,
Washington 25, D. C.

Subj: Sonar, contract NObsr-71072, scanning sonar transducer TR-117A/
SQS-4 Mod 3 serial X-2; calibration of

Ref: (a) USRL ltr RP-1805 serial T308-57 of 11 Oct 1957

Encl: (1) Drawings USRL 19885, 19886, 19887 (1 print of each)

1. It has just been discovered that three directivity patterns were unintentionally omitted from USRL Calibration Report No. 1465, which was concerned with the subject equipment and was forwarded by reference (a). These drawings are forwarded as enclosure (1). They should be inserted in USRL Calibration Report No. 1465 to follow drawing 19409.

JOHN M. TAYLOR, Jr.
By direction

Copy to:

Harris Transd Corp (1) (with encl)
Gen Elec Co, Syracuse (Greenhalgh) (1)(with encl)
INSMAT Bridgeport (without encl)
INSMAT Syracuse (without encl)

CONFIDENTIAL

CONFIDENTIAL

1091024-58

30° 20° 10° 0° 350° 340° 330°
330° 340° 350° 10° 20° 30°

CONFIDENTIAL

(Unclassified until filled in)

AM

USRL NO 19885

PROJECT NO. RP-1805C

DATE: Sep 1957

RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
Sonar Transducer TR-117A, SQS-4, serial X-2
Lower MCC Section - All Staves Parallel
Vertical Plane, $\phi = 60^\circ$

12.00 KC

CONFIDENTIAL

USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3629 ORLANDO, FLA

150° 160° 170° 180° 190° 200° 210°
210° 200° 190° 180° 170° 160° 150°

CORTEX BOOK COMPANY, INC. NORWOOD, MASSACHUSETTS
PRINTED IN U.S.A.

NO. 3124. POLAR CO ORDINATE.

40 320
50 310
60 300
70 290
80 280
90 270
100 260
110 250
120 240
130 230
140 220

320° 40°
310° 50°
300° 60°
290° 70°
280° 80°
270° 90°
260° 100°
250° 110°
240° 120°
230° 130°
220° 140°

NAVY BUREAU OF NAVAL STORES

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AL

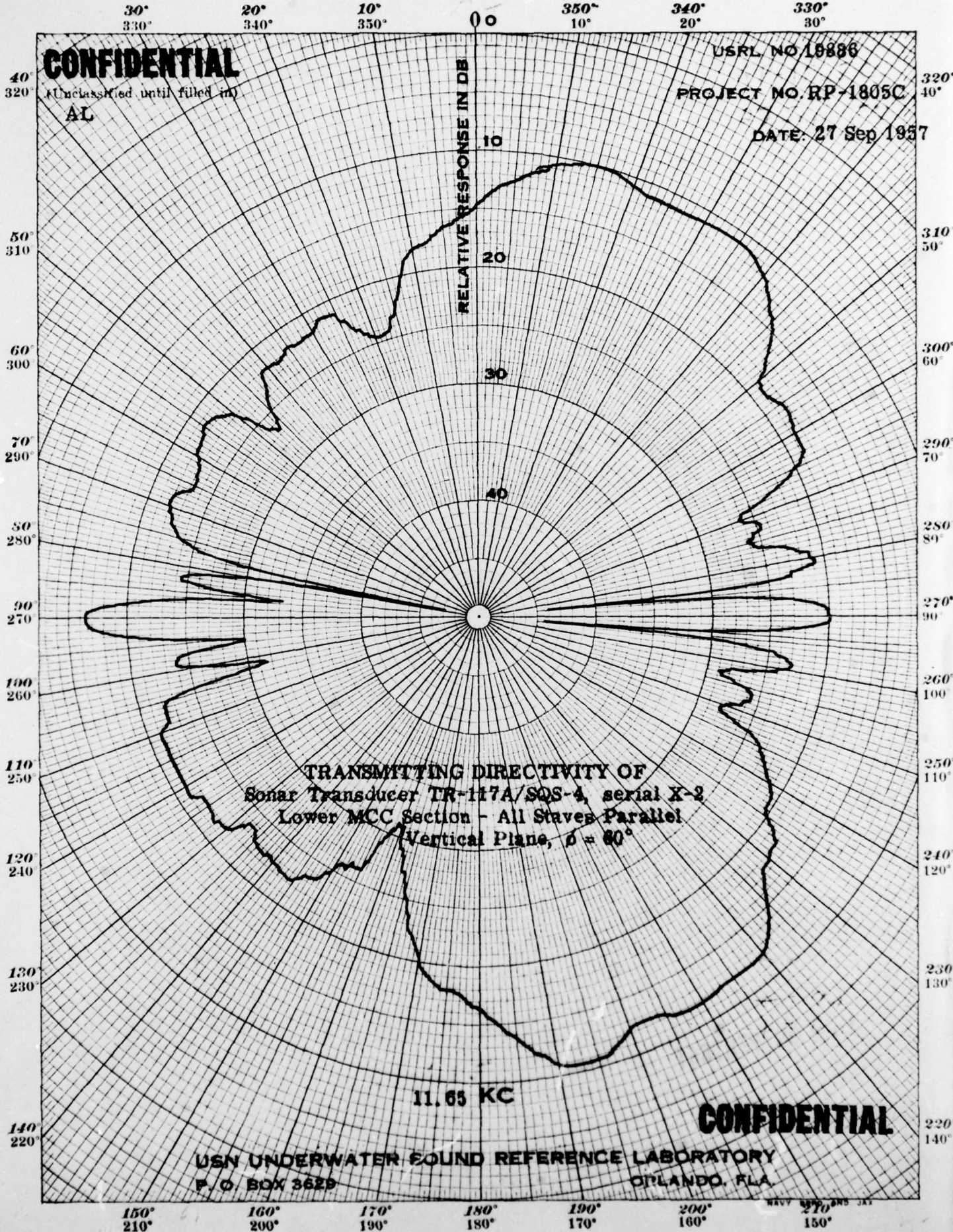
USRL NO 19886

PROJECT NO RP-1805C

DATE: 27 Sep 1957

CODEX BOOK COMPANY, INC. NORWOOD, MASSACHUSETTS, PRINTED IN U.S.A.

NO. 3124 POLAR CO-ORDINATE.



30°
380°

20°
340°

10°
350°

0°

350°
10°

340°
20°

330°
30°

CONFIDENTIAL
(Unclassified until filled in)

USRL NO 19887

PROJECT NO. RP-1805C

DATE: 27 Sep 1957

AN

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CODEX BOOK COMPANY, INC., NORWOOD, MASSACHUSETTS,
PRINTED IN U.S.A.

NO. 3124, POLAR CO-ORDINATE.

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140°

RELATIVE RESPONSE IN DB

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TRANSMITTING DIRECTIVITY OF
SonaR Transducer TR-117A/SQS-4, serial X-2
Lower MCC Section - All Staves Parallel
Vertical Plane, $\phi = 60^\circ$

12.35 KC

CONFIDENTIAL

USN UNDERWATER SOUND REFERENCE LABORATORY
P. O. BOX 3629

ORLANDO, FLA

150°
210°

160°
200°

170°
190°

180°

190°
170°

200°
160°

210°
150°

UNCLASSIFIED

NAVY GPO: 1957 O-311