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USL Problem
No. 1-151-00-00

U. S. NAVY UNDERWATER SOUND LABORATORY
FORT TRUMBULL, NEW LONDON, CONNECTICUT

(6) THE SAVONIUS WATER CURRENT METER.

by

(10) George F./Carey

(9) USL Technical Memorandum No. 922-119-60

(11) 3 November 1960

(14) USL-TM-922-119-60

On 4 August 1960 the author visited the David Taylor Model Basin for the purpose of calibrating five (5) Savonius water current meter rotors in the range of .1 to 1 knot.

The water current meters were developed for Project Artemis by Dr. Victor Anderson of the Marine Physical Laboratory of the Scripps Institution of Oceanography.

Figure 1 is a block diagram of the water current meter and its associated equipment. The details of the Savonius rotor are shown in figures 2 thru 4.

The wiring diagram (figure 5) shows that the transmitter consists of a 100 cycle oscillator which is transformer coupled to an amplifier. The Savonius rotor functions as a salt water switch which varies the coupling of the transformer thus it amplitude modulates the 100 cycle oscillator producing six pulses per second per revolution of the rotor.

Figure 6 is a copy of the calibration curves for rotors 1 thru 4 inclusive. This calibration was accomplished by a commercial concern for MPL in Convairs' tank in San Diego, California.

Figure 7 is the calibration curves for rotors 5 thru 9 inclusive. The data for these curves was taken by the author at DTMB on carriage No. 3.

Since the calibration curves group quite well, it would seem that an average curve could be drawn to be used by all future rotors without the necessity of calibration. The maximum variation of 17% from an average occurred at low speeds.

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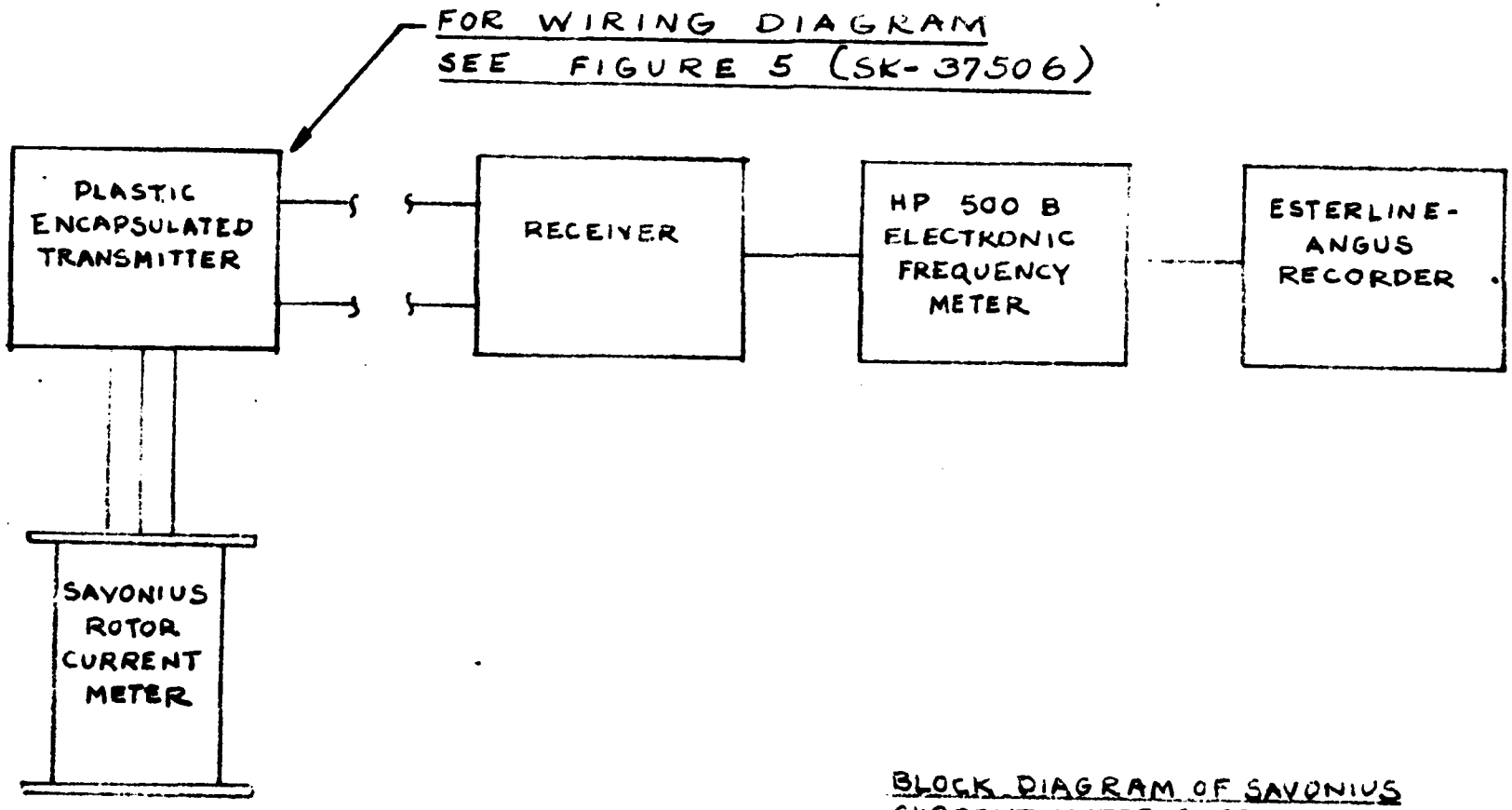
Caution should be exercised in such a procedure because of the possible occurrence of other rotors like No. 8 which produce erratic nonreproducible data.

George F Carey

G. F. Carey
Mechanical Engineer



BLOCK DIAGRAM OF SAVONIUS CURRENT METER & ASSOCIATED EQUIPMENT.

FIGURE 1

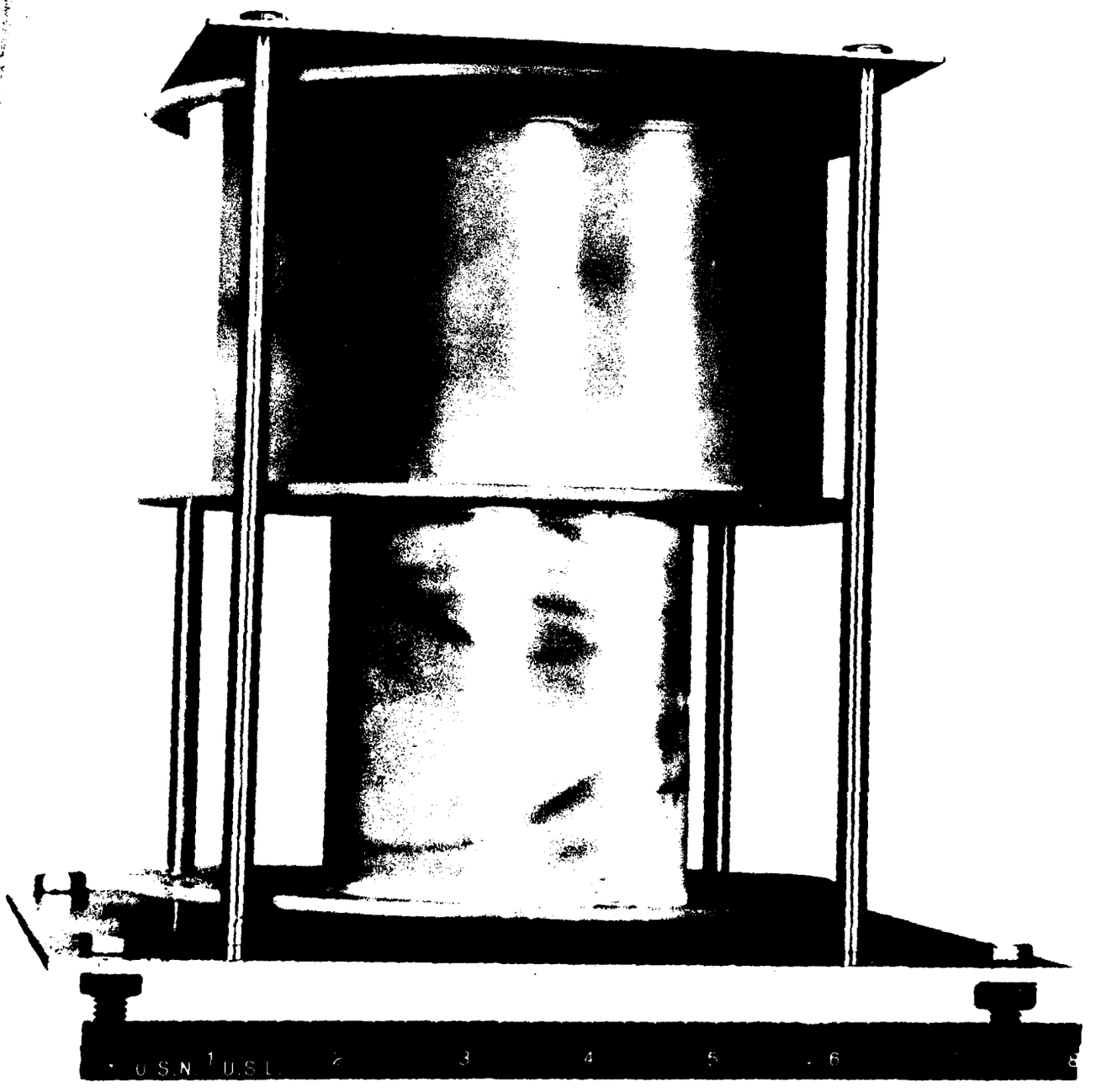


Fig. 2 - Plastic Savonius Rotor

U. S. Navy Underwater Sound Laboratory
NP24 - 19450 - 10 - 60

Official Photograph

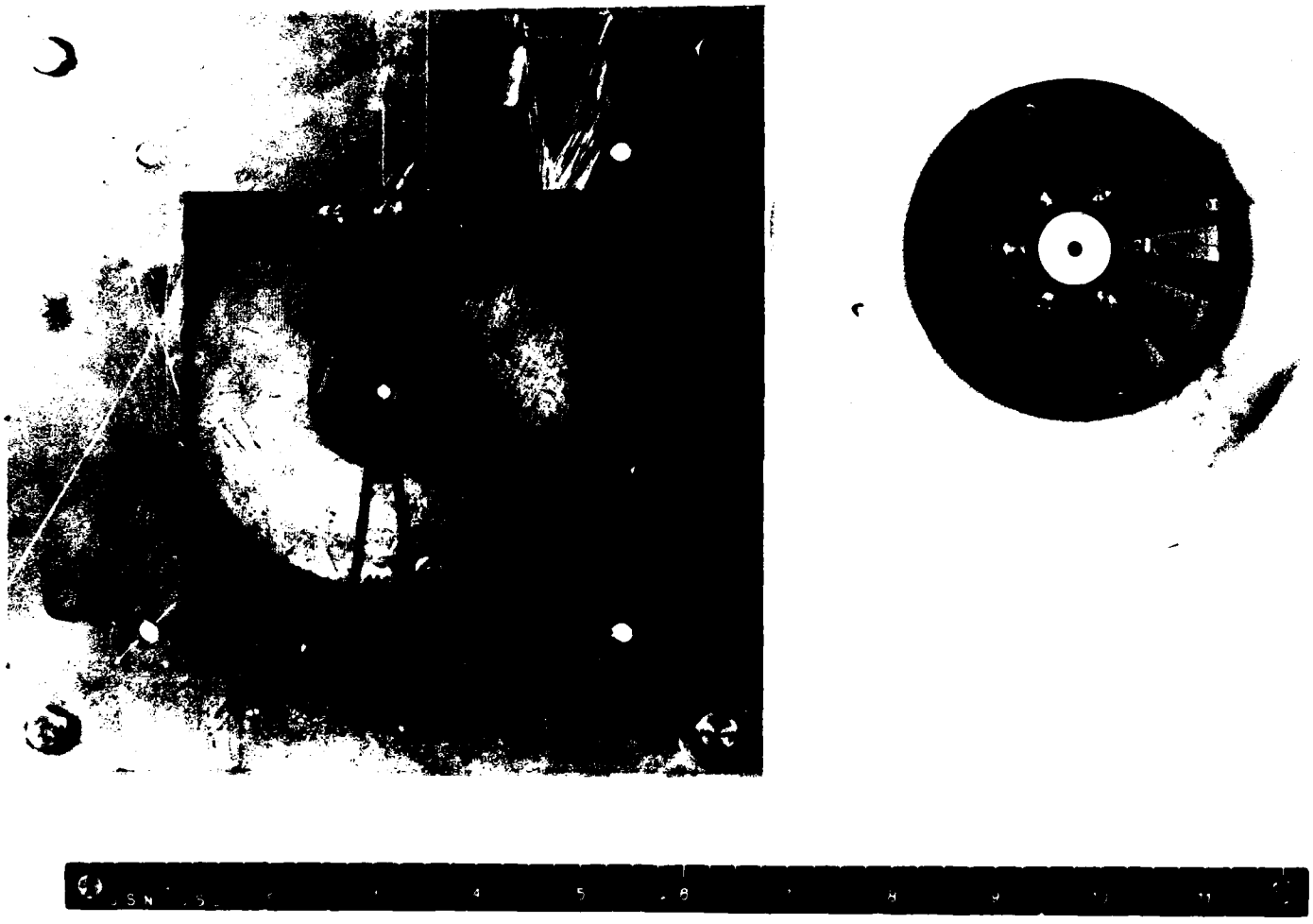
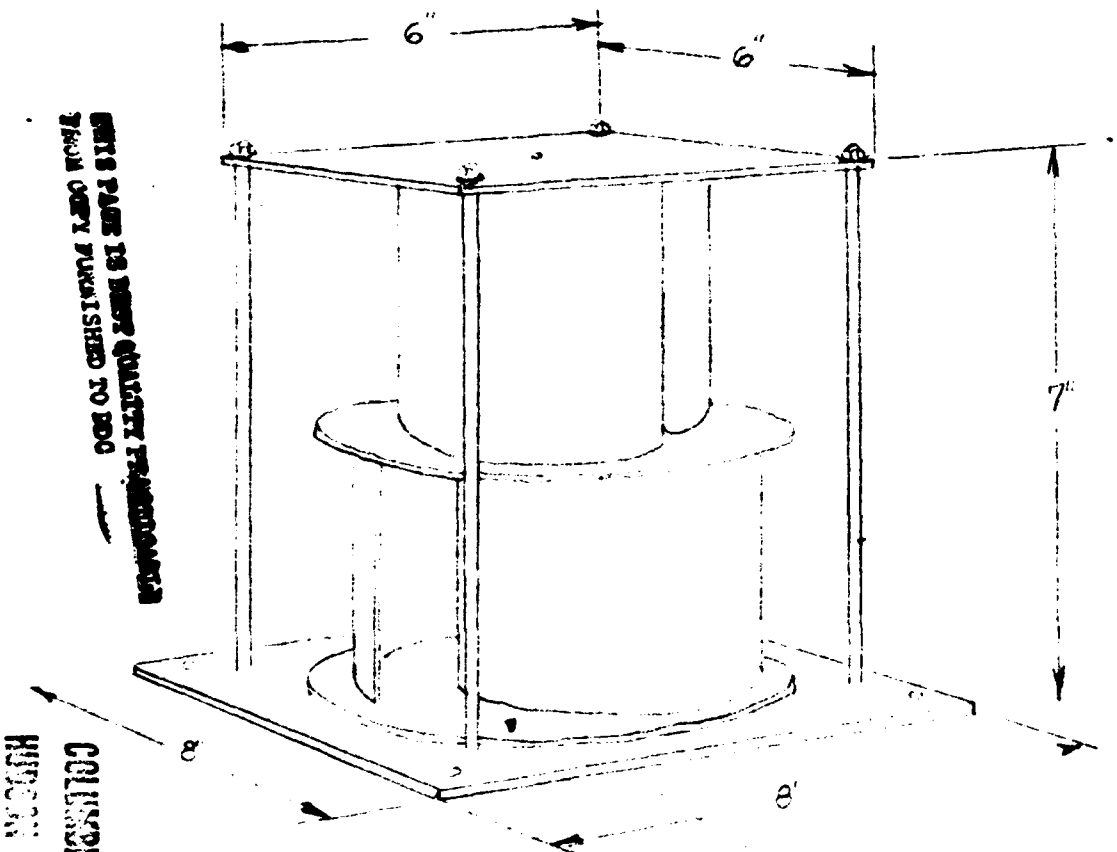


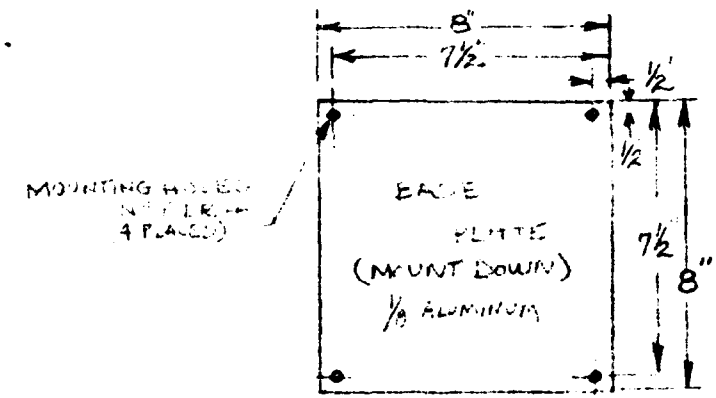
Fig. 3 - Savonius Rotor Salt Water Switch

U. S Navy Underwater Sound Laboratory
NP24 - 19451 - 10 - 60

Official Photograph

REVISIONS			
	DESCRIPTION	DATE	
1	NOTE 1 MODIFIED	10/9/60	





MOUNTING HOLES
NO. 7 DRILL
4 PLACES

NOTES:

1. MOUNT ROTOR WITH AXIS IN VERTICAL PLANE AND 8"X8" BASE DOWN
2. OVERALL DIMENSIONS ARE APPROXIMATE FOR CLEARANCE ONLY.

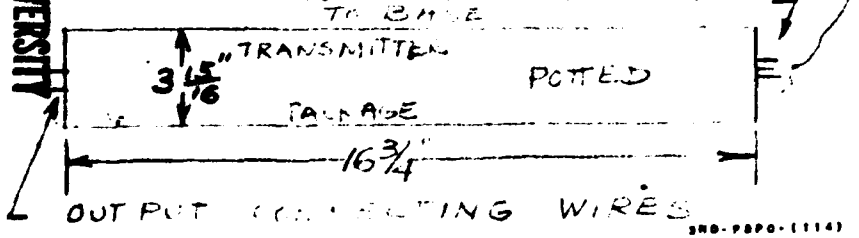


FIGURE 4

U. S. NAVY UNDERWATER SOUND LABORATORY Fort Trumbull, New London, Connecticut			
CURRENT METER ROTOR MOUNT ASSEMBLY			
DR [illegible] DATE 7/20/60	MAT'L	NO. REQ'D —	ASSOC. NO.
CHK [illegible] DATE [illegible]	FINISH	SCALE None	JOB ORDER USL-60-20
APP'D DATE		SK- 37337	

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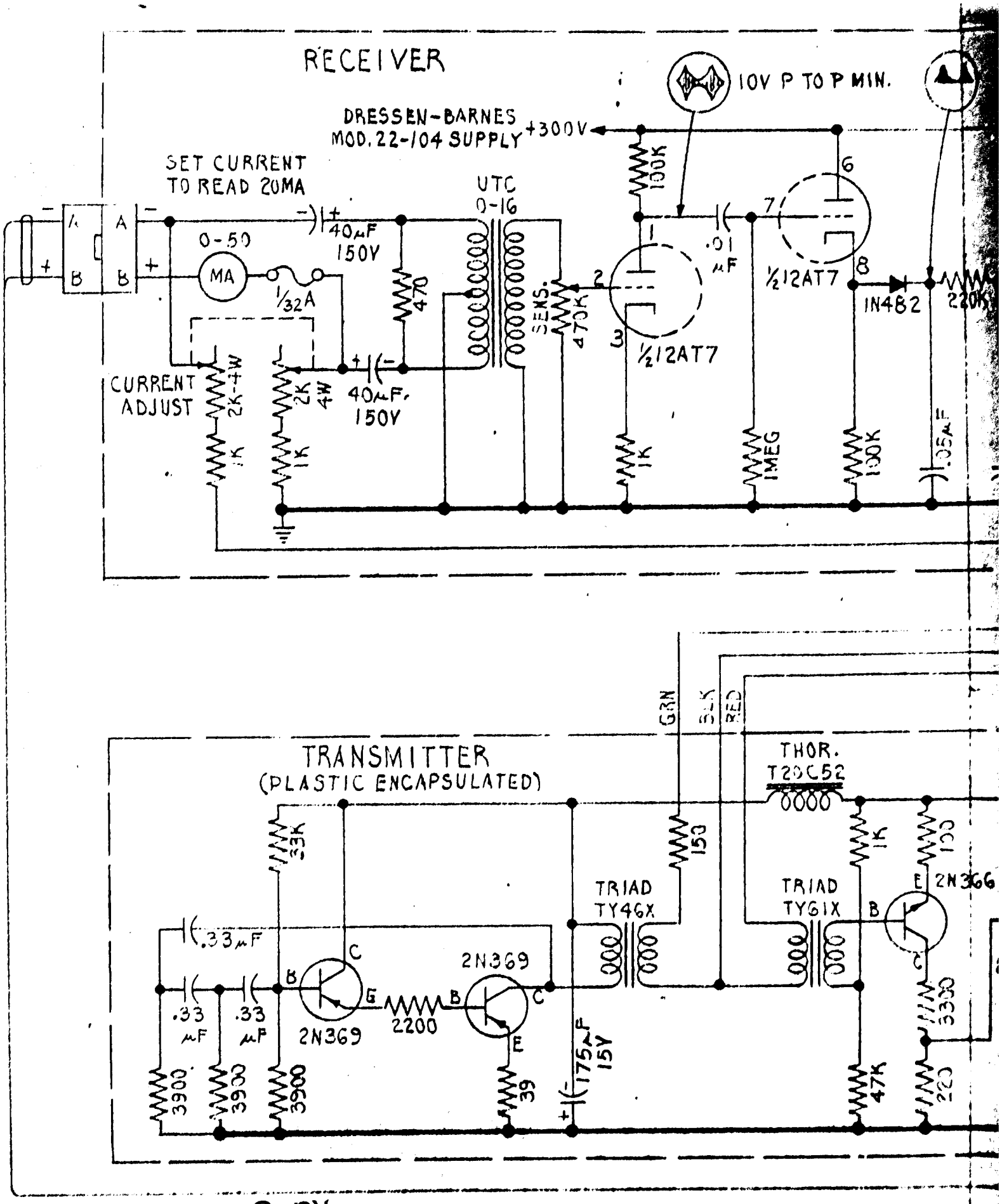

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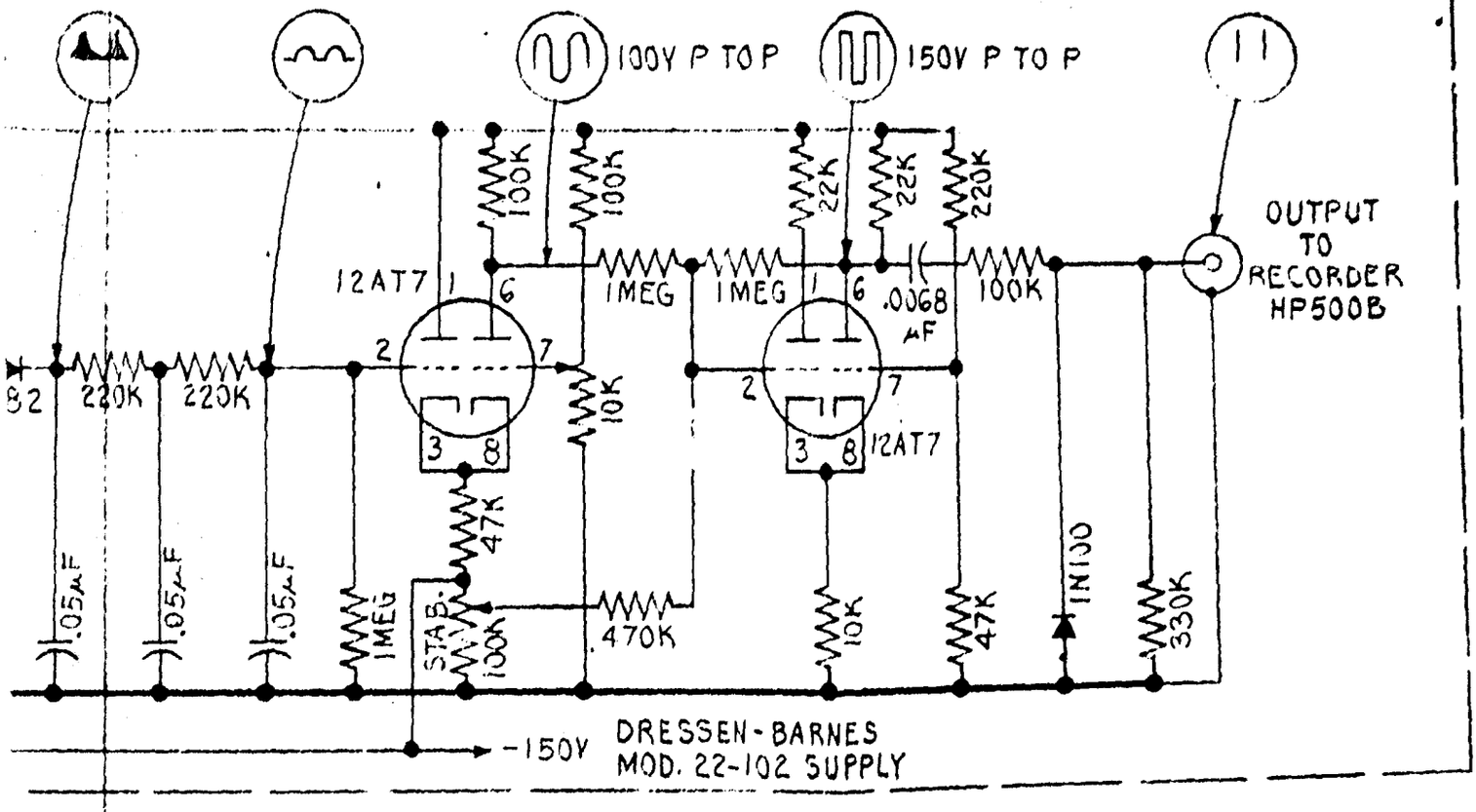

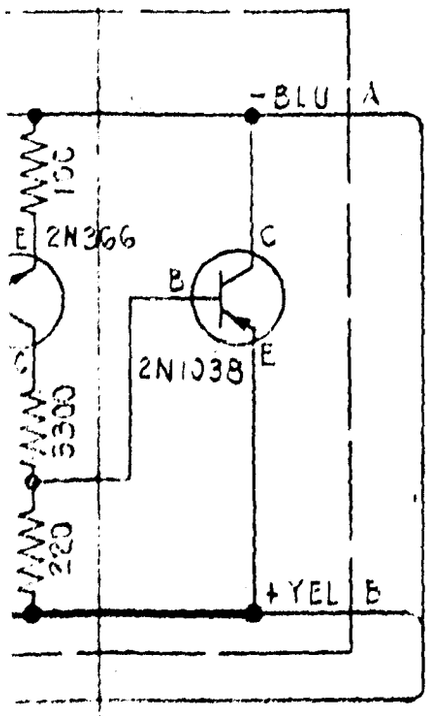

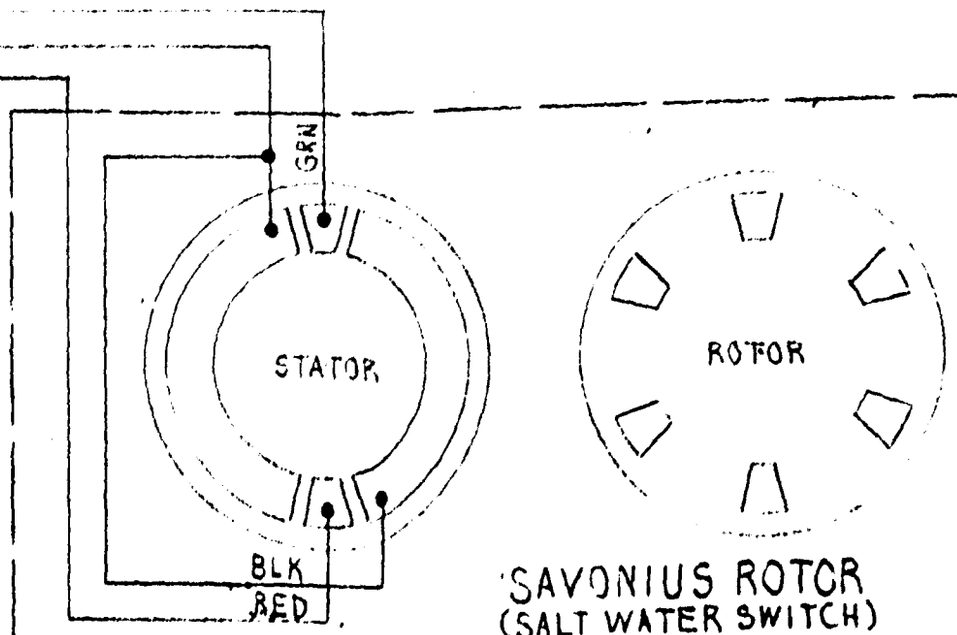

SAVONIUS ROTOR
(SALT WATER SWITCH)

FIGURE 5

U. S. NAVY UNDERWATER SOUND LABORATORY
Fort Trumbull New London Connecticut

SAVONIUS WATER CURRENT METER

DR H.S.W. DATE 8-22-60	MATL 2	NO REQD	ASSOC NO
CHK DATE 9-6-60	FINISH	SCALE	JOB ORDER 1-161-00-00
APP'D.: DATE 9-6-60		SK-37806	

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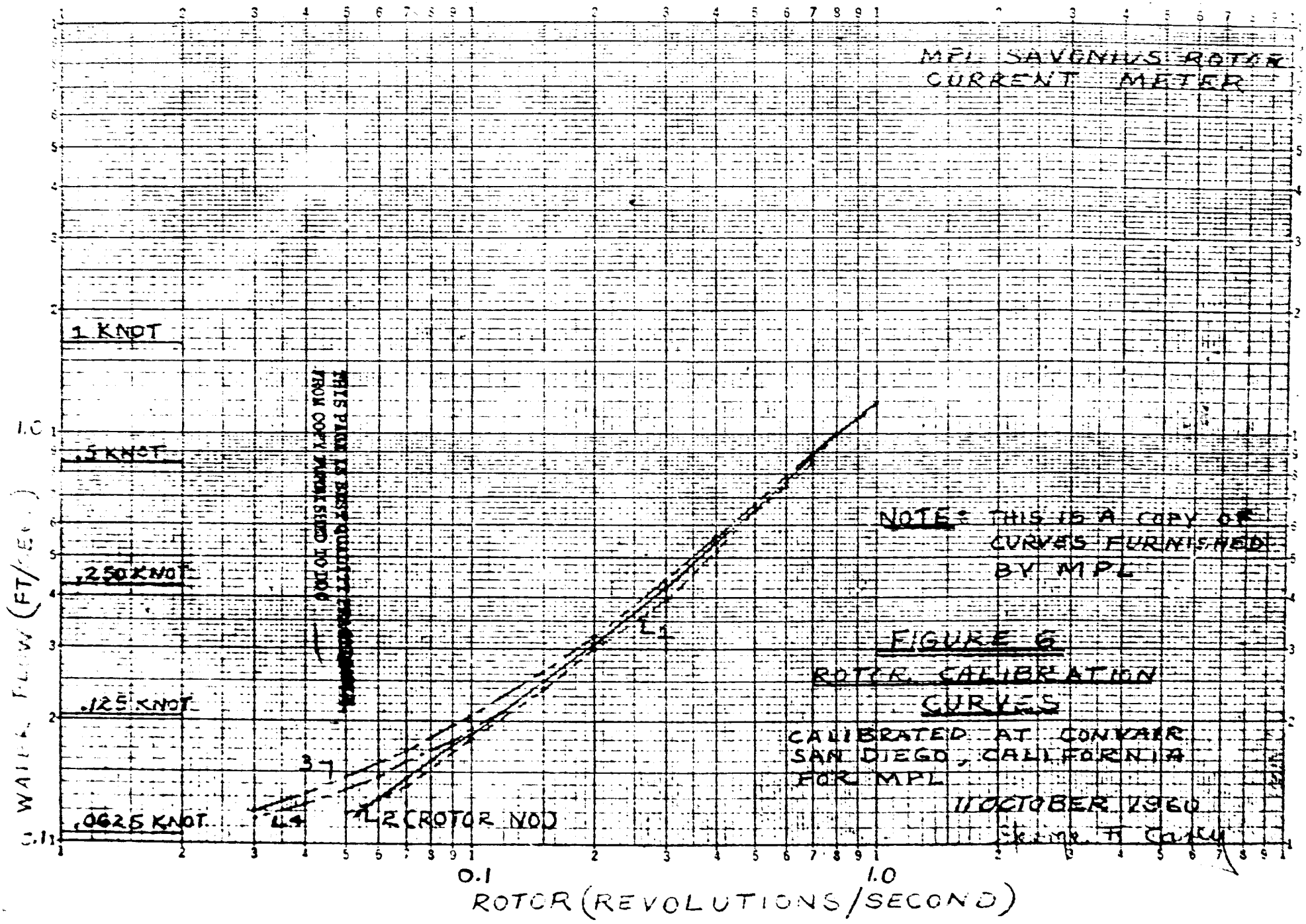
MPL SAVONIUS ROTOR
CURRENT METER
1 KNOT
.5 KNOT
.250 KNOT
.125 KNOT
.0625 KNOT
1.0
0.1
WATER FLOW (FT/SEC)
ROTOR (REVOLUTIONS/SECOND)
L1
L2 (ROTOR NOD
NOTE: THIS IS A COPY OF CURVES FURNISHED BY MPL
FIGURE 6
ROTOR CALIBRATION CURVES
CALIBRATED AT CONVAIR SAN DIEGO, CALIFORNIA FOR MPL
11 OCTOBER 1960

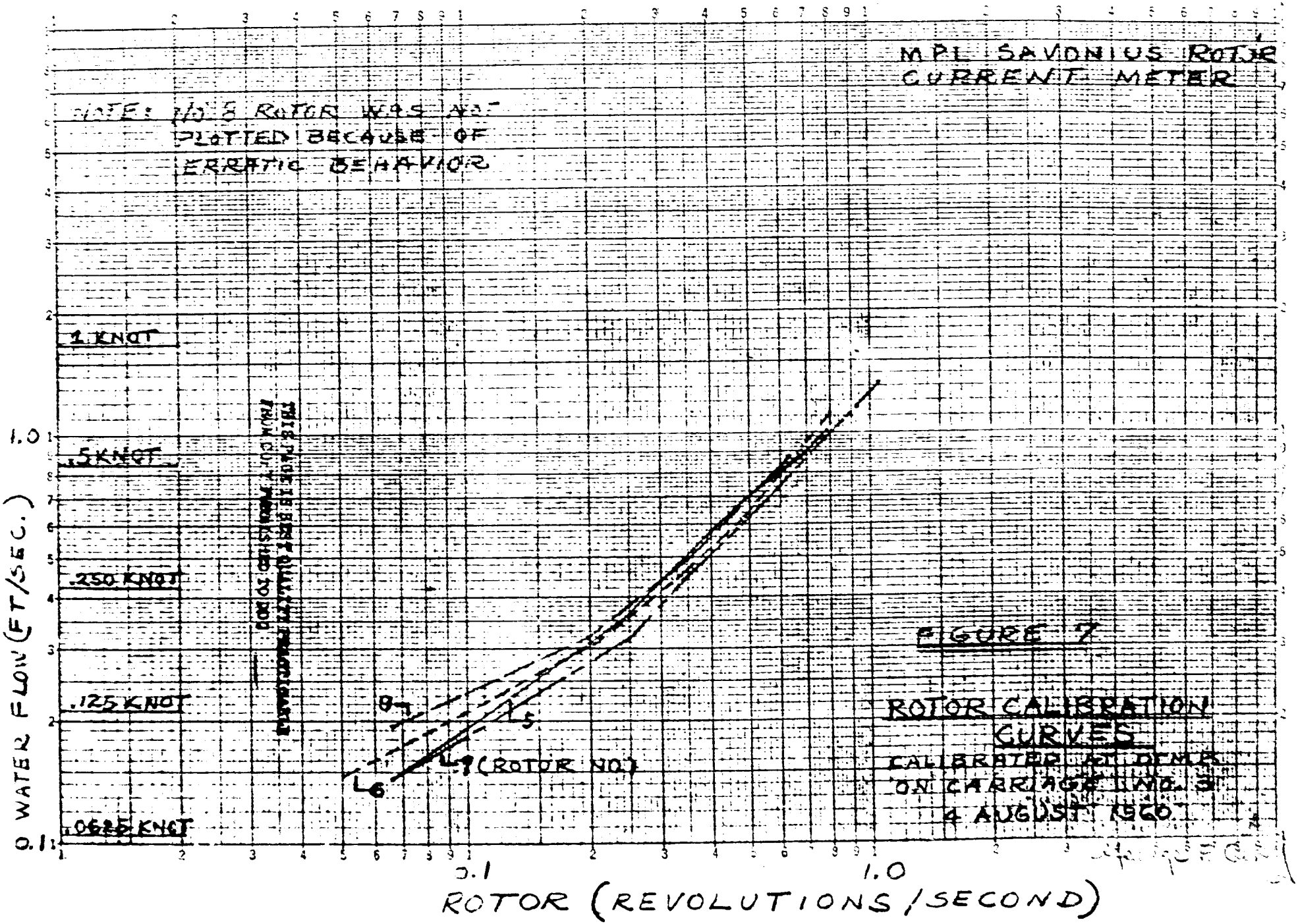

FIGURE 7

ROTOR CALIBRATION CURVES

CALIBRATED AT DTMB ON CARRIAGE UNIT NO. 3

4 AUGUST 1960