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NAVY UNDERWATER SOUND REFERENCE LAB ORLANDO FL F/G 11/10
MEASUREMENTS ON GOODYEAR ELASTOMER-COATED REINFORCED PANELS. (U)
FEB 64

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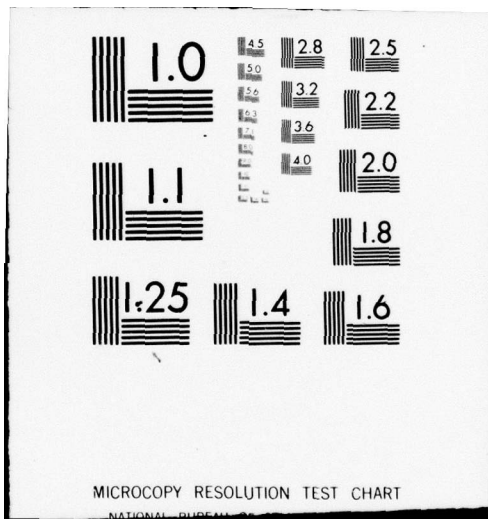
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LEVEL II

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Measurements on
Goodyear Elastomer-Coated Reinforced Panels

⑫ 12p.

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3 February 1964

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CALIBRATION REPORT No. 2131

Subj: Goodyear elastomer-coated reinforced panels; measurements on

Ref: (a) Goodyear Aerospace Corp ltr WS-4916 of 15 Nov 1963 to BUSHIPS
(b) BUSHIPS ltr NObsr 91065 Ser 688E-537 of 16 Dec 1963

Encl: (1) Tables 1 through 10

Transmission loss measurements were made for

1. Seven elastomer-coated cord-reinforced panels, one elastomer-coated metal-reinforced panel, and one gum-rubber panel were evaluated for the Goodyear Aerospace Corp. as requested in reference (a) and authorized in reference (b) in connection with contract NObsr 91065. The 6 x 6-ft square panels are described in Table 1, enclosure (1).

2. The transmission loss of each panel was measured at 5° intervals by an "insertion loss" method at orientations from 0° to 45° measured from a line normal to the test panel at the center. The results of these measurements are shown in Tables 2 through 10. For measurements of this type the accuracy is ±0.2 dB. The dimensions of the panels allowed the use of continuous-wave sound at low frequencies, where pulsing is not practical. *deg.*
stabilized.

3. At the request of Mr. Theodore Underwood, Goodyear representative, the transmission loss was measured on panel serial 377-3 with each side of the panel facing the sound source. The difference was negligible.

4. Reflection from panel serial ~~265-0~~ ^a which had a low transmission loss at all frequencies and angles, and ~~serial 377-3~~ ^{one} which had the highest transmission loss per inch thickness of the cord-reinforced materials, was measured over the frequency range 5 to 20 kc by both continuous-wave and pulsing techniques. The results by the two methods were substantially the same, and the reflection varied from 2% of incident-sound intensity for panel ~~265-0~~ to 7% for panel ~~377-3~~. Measurements were limited to normal incidence and frequencies above 5 kc by panel size. The reflection did not appear to be a function of frequency. *The second*
the first

5. Reflection measurements on the remaining seven panels could not be made in the time scheduled for these tests, and because of other priority work.

6. On the basis of paragraph 3 of reference (b) the data reported here are unclassified.

Charles R. Bobo
CHARLES R. BOBO
Acoustic Calibration Division

Copy to:
BUSHIPS (Code 688E)(2)
Goodyear Aerospace Corp. (H. Boyd)(2)
Goodyear Tire and Rubber Co (T. Underwood)(1)
USRL (200)(1)

1
DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

Table 1

PANEL DESCRIPTION*

Goodyear Elastomer Panels

Panel No.	Thickness (inches)	Reinforcement
265-0**	1-3/4	none
373-3	1-7/8	cord
374-2	1-3/16	cord
374-3	1-3/4	cord
374-4	2-5/16	cord
375-3	1-3/4	cord
376-3	1-5/8	cord
377-3	1-1/4	cord
378-3	7/8	cord and steel

* Type of elastomer and of cord not indicated by manufacturer.
 ** Stated to be gum rubber.

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Table 2

TRANSMISSION LOSS
(in decibels)

Goodyear Elastomer Panel No. 265-0
Water temp: 15°C

Freq (kc)	Angle of Incidence
	0-45°
2	0.7
3	0.7
4	0.7
5	0.7
6	0.9
7	0.9
8	1.0
9	0.8
10	0.9
12	1.0
14	0.6
16	0.9
18	0.8
20	0.8

Table 3

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 373-3
Water temp: 15°C

Freq (kc)	Angle of Incidence				
	0-25°	30°	35°	40°	45°
2	1.0	1.0	1.0	1.0	1.0
3	1.0	1.0	1.0	1.0	1.2
4	1.0	1.0	1.2	1.5	1.7
5	1.2	1.2	1.5	1.7	2.1
6	1.3	1.3	1.7	1.9	2.5
7	1.6	1.6	1.9	2.2	2.4
8	1.7	1.7	2.1	2.3	2.6
9	1.9	1.9	2.3	2.6	3.0
10	1.8	1.8	1.9	2.3	2.9
12	1.5	1.8	2.0	2.5	3.2
14	1.7	1.9	2.1	2.5	3.4
16	1.9	1.9	2.3	3.1	3.7
18	1.9	2.2	2.6	3.5	4.5
20	2.0	2.4	3.0	4.1	5.3

Table 4

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 374-2
Water temp: 15°C

Freq (kc)	Angle of Incidence				
	0-25°	30°	35°	40°	45°
2	0.8	0.8	0.8	0.8	0.8
3	0.8	0.8	0.8	0.8	0.8
4	0.8	0.8	0.8	0.8	0.9
5	0.8	0.8	1.1	1.3	1.4
6	1.2	1.2	1.4	1.7	1.9
7	1.2	1.2	1.5	1.7	2.0
8	1.5	1.5	1.7	1.7	1.9
9	1.5	1.5	1.7	1.8	1.9
10	1.4	1.5	1.7	1.9	2.1
12	1.4	1.6	2.1	2.3	2.5
14	1.0	1.2	1.7	1.9	2.2
16	1.2	1.4	1.5	2.0	2.3
18	1.0	1.2	1.8	2.2	3.0
20	1.3	1.5	1.8	2.5	3.1

Table 5

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 374-3
Water temp: 15°C

Freq (kc)	Angle of Incidence					
	0-20°	25°	30°	35°	40°	45°
2	1.0	1.0	1.1	1.4	1.5	1.6
3	1.0	1.0	1.2	1.4	1.5	1.6
4	1.0	1.0	1.2	1.4	1.5	1.7
5	1.0	1.3	1.3	1.7	1.8	2.1
6	1.2	1.4	1.6	2.0	2.2	2.5
7	1.4	1.6	1.8	2.3	2.4	2.7
8	1.7	2.3	2.4	2.6	2.8	3.2
9	1.8	1.8	1.9	2.3	2.5	3.2
10	1.7	1.8	1.9	2.2	2.3	2.5
12	1.2	1.7	1.9	2.4	2.4	2.8
14	1.2	1.5	1.7	2.3	2.5	3.1
16	1.7	1.7	2.2	2.5	2.9	3.6
18	1.7	1.8	2.4	2.8	3.5	4.2
20	2.1	2.2	2.6	3.1	3.7	4.5

Table 6

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 374-4
Water temp: 15°C

Freq (kc)	Angle of Incidence					
	0-20°	25°	30°	35°	40°	45°
2	1.0	1.0	1.0	1.1	1.2	1.3
3	1.0	1.0	1.0	1.2	1.4	1.6
4	1.0	1.2	1.3	1.6	2.0	2.2
5	1.0	1.5	1.7	2.0	2.5	2.8
6	1.4	1.8	2.0	2.4	2.8	3.2
7	1.7	2.0	2.2	2.6	2.9	3.4
8	1.9	2.1	2.2	2.6	3.1	3.4
9	2.1	2.4	2.5	2.8	3.2	3.7
10	2.3	2.6	2.8	2.9	3.3	3.9
12	1.6	2.2	2.5	2.9	3.4	4.0
14	1.3	1.7	2.0	2.6	3.3	4.1
16	1.4	1.8	2.2	2.5	3.4	4.4
18	1.8	2.3	2.7	3.4	4.1	5.0
20	2.1	2.5	2.9	3.7	5.0	5.9

Table 7

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 375-3
Water temp: 15°C

Freq (kc)	Angle of Incidence				
	0-25°	30°	35°	40°	45°
2	0.5	0.5	0.6	0.6	0.6
3	0.5	0.5	0.7	0.7	0.8
4	0.5	0.6	0.8	0.8	0.9
5	0.6	0.6	0.8	1.0	1.2
6	0.7	0.8	0.8	1.0	1.2
7	0.8	0.9	1.0	1.2	1.4
8	1.0	1.1	1.1	1.3	1.5
9	1.3	1.4	1.5	1.6	1.8
10	0.8	0.9	1.1	1.3	1.8
12	0.8	1.0	1.3	1.7	2.2
14	0.7	1.0	1.3	1.9	2.6
16	0.7	1.3	1.6	2.4	3.5
18	0.8	1.4	1.7	2.4	3.5
20	1.2	1.8	2.0	2.9	3.8

Table 8

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 376-3
Water temp: 15°C

Freq (kc)	Angle of Incidence			
	0-30°	35°	40°	45°
2	0.6	0.7	0.7	0.8
3	0.6	0.7	0.7	0.9
4	0.7	0.8	0.9	1.1
5	0.7	0.9	1.1	1.2
6	0.9	1.0	1.2	1.6
7	0.9	1.1	1.3	1.6
8	1.0	1.3	1.4	1.7
9	1.0	1.4	1.6	1.8
10	1.1	1.4	1.6	1.8
12	1.1	1.4	1.6	2.0
14	1.1	1.4	1.5	2.1
16	1.3	1.6	2.0	2.4
18	1.3	1.6	2.0	2.6
20	1.4	1.7	2.4	3.0

Table 9

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 377-3
Water temp: 15°C

Freq (kc)	Angle of Incidence					
	0-20°	25°	30°	35°	40°	45°
2	0.7	0.7	0.7	0.8	0.8	1.0
3	0.7	0.7	0.7	0.9	1.0	1.0
4	0.7	0.7	0.9	1.2	1.4	1.6
5	0.8	0.8	1.2	1.4	1.6	1.9
6	1.3	1.3	1.5	1.8	2.4	2.7
7	1.5	1.5	1.7	2.1	2.3	2.7
8	1.6	1.6	1.9	2.8	2.8	3.1
9	1.6	1.6	2.2	2.2	3.0	3.1
10	1.6	1.6	1.8	2.0	2.4	2.9
12	1.2	1.4	1.8	2.1	2.6	3.2
14	1.4	1.4	1.8	1.9	2.4	3.0
16	2.0	2.2	2.3	2.7	3.1	3.8
18	2.2	2.3	2.7	2.9	3.7	4.5
20	2.2	2.4	2.7	3.1	3.7	4.8

Table 10

TRANSMISSION LOSS
(in decibels)

Goodyear Reinforced Elastomer Panel No. 378-3
Water temp: 15°C

Freq (kc)	Angle of Incidence					
	0-20°	25°	30°	35°	40°	45°
2	0.6	0.6	0.6	0.6	0.6	0.6
3	0.8	0.8	0.8	0.8	0.8	0.8
4	0.9	0.9	0.9	0.9	0.9	0.9
5	0.9	0.9	0.9	0.9	0.9	0.9
6	1.1	1.1	1.1	1.1	1.1	1.1
7	1.3	1.3	1.3	1.3	1.4	1.5
8	1.4	1.4	1.4	1.4	1.5	1.6
9	1.7	1.7	1.7	1.7	1.8	1.9
10	1.7	1.7	1.8	1.8	1.9	2.1
12	2.0	2.1	2.2	2.2	2.3	2.4
14	2.2	2.3	2.3	2.3	2.4	2.6
16	3.0	3.2	3.3	3.4	3.7	4.0
18	3.5	3.6	3.6	3.9	4.2	4.6
20	3.7	4.1	4.3	4.5	5.0	5.2