COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD 1961 No. 47

GARDNER AND NAYLOR VIBRATION TESTS, HAWTHORN, VICTORIA 1961

by

A.M. Radeski

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ABSTRACT

Vibrations produced by an air fan with a new type of mounting were measured for Gardner and Naylor Pty.Ltd. The vibrations were below the limit of human perceptibility under the conditions which applied during the tests.

1. INTRODUCTION

This Record describes an investigation carried out by the Bureau of Mineral Resources at the request of Messrs. Gardner and Naylor, Air Conditioning and Heating Engineers, of 192 Burwood Road, Hawthorn.

The purpose of the investigation was to measure vibrations transmitted to the floor by one of their electric-motor-driven air fans in which a new type of shock mounting was used.

According to Messrs Gardner and Naylor the usual way of mounting fans and compressors is by using proprietary rubber shock-absorbers; the unit investigated was mounted on six spiral compression springs, resting in turn on blocks of solid rubber approximately 1 inch thick.

The investigation was carried out at the company's factory by A. Radeski, technical officer of the Bureau, on 5th April 1961.

2. INSTRUMENTS AND METHODS

The instrument used to record vibrations was a Sprengnether Portable Blast and Vibration Seismograph, Serial No. 1577.

This instrument records 3 mutually perpendicular components of the ground vibration on a moving strip of photographic paper. A record shows the ground motion magnified 100 times, with timing lines at intervals of 0.02 seconds.

Four recordings were taken; they are listed in Table 1 below :-

TABLE 1.

Record No.	Position	Remarks
1	1	Air inlet open. No load.
2	2	" " " " "
3	1	Air inlet closed. Full load.
4	2	" " " " "

3. RESULTS

Plate 2 show copies of seismograph records. The letters L, V, and T refer to vibrations in the longitudinal, vertical, and transverse directions relative to the seismograph.

Table 2 shows the magnitude of the three components of ground displacement (taken as half the peak-to-trough amplitude) corresponding to the various locations of the seismograph. The accelerations shown in Table 2 were calculated, on the assumption that the vibrations are sinusoidal, from the equation

$$a = 4\pi^2 f^2 A$$

Where a = maximum acceleration

f = frequency

A = ground displacement.

The resultant acceleration is the vector sum of the accelerations for the three components. The final column of figures shows this resultant acceleration in terms of g, the acceleration due to gravity (=386 in./sec^2).

Records 1 and 2, taken when the fan was running without load, show no measurable vibrations. Records 3 and 4, taken when the fan was under full load, show very small vertical movements, having amplitudes not exceeding 0.0001 inches. Horizontal components were not measurable with this instrument.

The frequency of the recorded vibrations does not have any apparent relation to either the frequency of the fan shock-mounted suspension or to the speed of the fan or motor. The resonance frequency of the suspension is approximately 2-2½ c/s; the speed of the motor and fan are 1440 and 1800 r.p.m. respectively.

According to Reiher and Meister (1931), as quoted by Steffens (1952), the limit of human perceptibility at the frequencies involved is 3 to 4 ten-thousandths of an inch. This would indicate that the measured vibrations cannot be felt.

4. CONCLUSIONS

The measured vibrations are below the level of human perceptibility.

5. REFERENCES

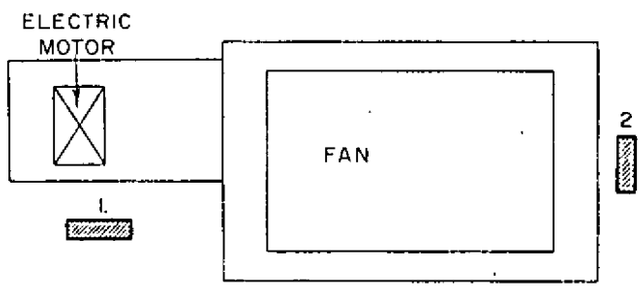
REIHER, H. and MEISTER, F.J. 1931 Die Empfindlichkeit des Menschen gegen Erschutterungen. Forschung aus dem Gebiete des Ingenieurwesen, 2 (11), 381.

STEFFENS, R.J. 1952 The assessment of vibration intensity and its application to the study of building vibrations. Nat. Build. Stud. spec. Rep. 19.

Record	Component	Displacement (in.)	Frequency c/s	Acceler-ation in./sec^2	Resultant acceler-ation in./sec^2	Resultant acceler-ation in terms of g	Remarks
1	L	x	-	-	-	-	No load, air inlet open
	V	x	-	-	-	-	
	T	x	-	-	-	-	
2	L	x	-	-	-	-	No load, air inlet open.
	V	x	-	-	-	-	
	T	x	-	-	-	-	
3	L	x	-	-	-	-	Full load, air inlet closed.
	V	0.0001	5	0.1	0.1	0.0003	
	T	x	-	-	-	-	
4	L	x	-	-	-	-	Full load, air inlet closed.
	V	0.0001	7	0.19	0.19	0.0005	
	T	x	-	-	-	-	

x - too small to be measured.

TABLE 2



GARDNER AND NAYLOR, HAWTHORN, VICTORIA

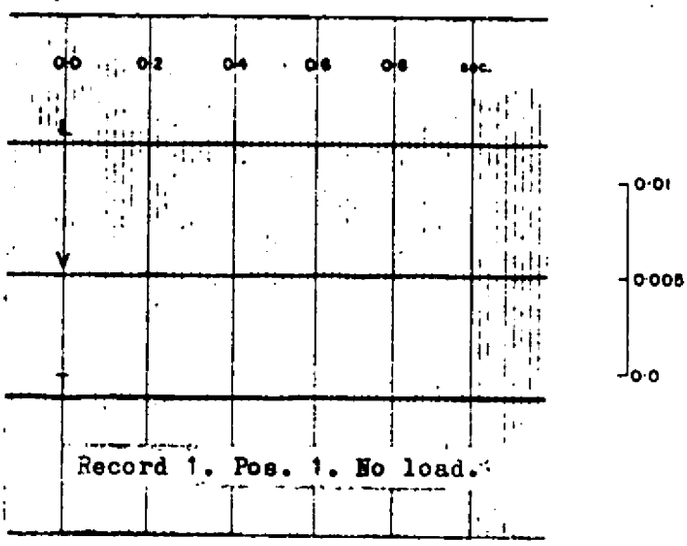
5th APRIL 1961

SEISMOGRAPH LOCATIONS

Seismograph location

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. G344-84

To Accompany Record 1961 No. 47



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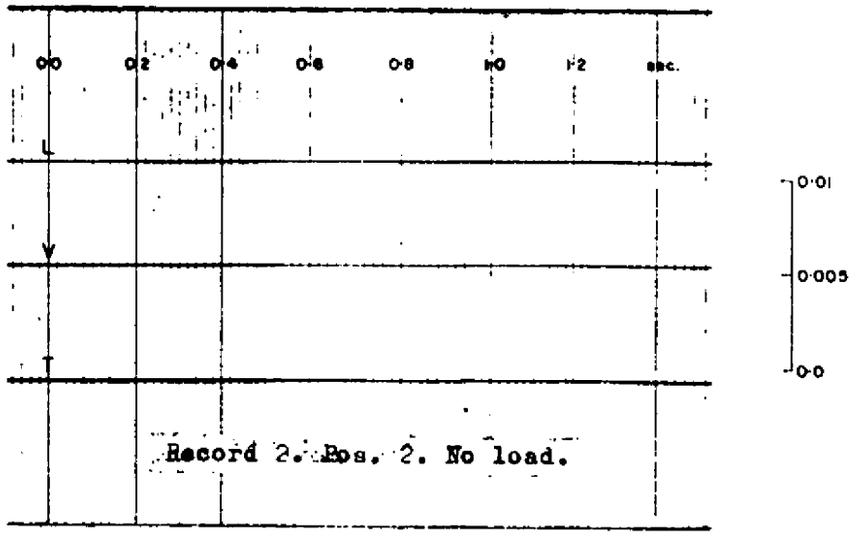

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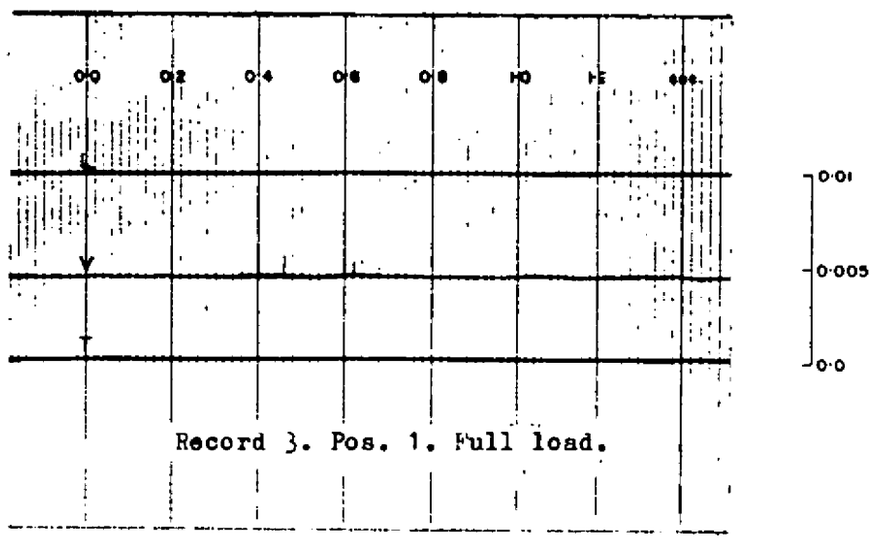
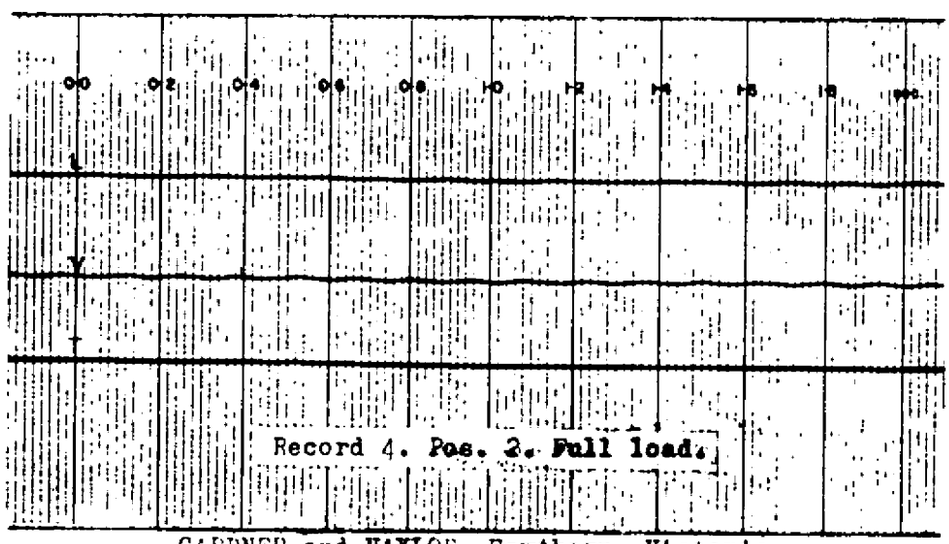


Record 3. Pos. 1. Full load.



Record 4. Pos. 2. Full load.

GARDNER and NAYLOR, Hawthorn, Victoria.

5th April 1961.

VIBRATION TESTS.