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Stephen, Roy

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FORCED VIBRATION TESTS, NORTH FORK DAM, CALIFORNIA, OCTOBER 1974

Report to Department of the Army Waterways Experiment Station

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DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF CALIFORNIA, BERKELEY

DEPARTMENT OF CIVIL ENGINEERING

FORCED VIBRATION TESTS, NORTH FORK DAM, CALIFORNIA, OCTOBER 1974

A Report to the

CORPS OF ENGINEERS

by

Roy M. Stephen

College of Engineering
Department of Civil Engineering
University of California
Berkeley, California

January 1975

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CORPS OF ENGINEERS
VICKSBURG, MISSISSIPPI

FORCED VIBRATION TESTS NORTH FORK DAM, CALIFORNIA OCTOBER 1974

by

Roy M. Stephen

OBJECTIVE

The objective of the forced vibration study was to determine the resonant frequencies and mode shapes of the North Fork Dam.

DESCRIPTION OF THE DAM

The North Fork Dam is located near Auburn, California, on the North Fork of the American River (Fig. 1). The dam was built in 1939 to trap sediments from hydraulic gold mining operations upstream, but the mines were closed down shortly after the dam was completed.

The dam is a constant-angle arch dam with a maximum height of 155 ft. and a crest length of 620 ft. The crown thickness varies from 22 ft. at the base to 6.8 ft. at the crest. The overflow spillway is a section 200 ft. long near the center of the dam and is depressed 3 ft. below the normal crest elevation. The reservoir is very narrow, having a maximum width of about 700 ft. and a length of about 5 miles. Fig. 2 shows a view of the dam from the access road above the dam. A plan of the dam is shown in Fig. 3 with the profile looking downstream shown in Fig. 4.

TEST EQUIPMENT

General

The eccentric-mass vibration generators and the procedures employed in the tests are described in Chapters 7 and 8, respectively, of the book entitled Earthquake Engineering (Editor, Wiegel; Publisher, Prentice-Hall).(1)

Vibration Generators

Forced vibrations were produced by two rotating-mass vibration generators or shaking machines, located as shown in Fig. 5. These machines were developed at the California Institute of Technology under the supervision of the Earthquake Engineering Research Institute for the Office of Architecture and Construction, State of California. Each machine consists of an electric motor driving two pie-shaped baskets or rotors, each of which produces a centrifugal force as a result of the rotation. The two rotors are mounted on a common vertical shaft and rotate in opposite directions so that the resultant of their centrifugal forces is a sinusoidal rectilinear force. When the baskets are lined up in the position shown, a peak value of the sinusoidal force will be exerted. The structural design of the machines limits the peak value of force to 5,000 lbs. This maximum force may be attained at a number of combinations of eccentric mass and rotational speed, since the output force is proportional to the square of the rotational speed as well as the mass of the baskets and the lead plates inserted in the baskets. The relationship between output force and frequency of rotation of the baskets for different basket loads is shown in Fig. 6.

The speed of rotation of each motor driving the baskets is controlled by an Electronic Amplidyne housed in a control unit (see Fig. 5). The control unit allows the machines to be synchronized or operated 180^{0} out-of-phase. A complete description of the vibration generators is given in (2).

Accelerometers

The transducers used to detect horizontal acceleration of the dam were Statham Model A4 linear accelerometers, with a maximum rating of $\pm$ 0.25g.

Equipment for Measurement of Frequency

For the vibration generators the vibration excitation frequencies were determined by measurement of the speed of rotation of the electric motor driving the baskets. A tachometer, attached to a rotating shaft driven by a transmission belt from the motor, generated a sinusoidal signal of frequency 300 times the frequency of rotation of the baskets. Hence, the maximum accuracy of frequency measurements was $\pm$ 1 count in the total number of counts in a period of 1 second (the gating period), i.e., $\pm$ 1/3 of 1% at 1 cps and $\pm$ 1/9 of 1% at 3 cps.

Recording Equipment

The electrical signals for all accelerometers were fed to amplifiers and then to a Honeywell Model 1858 Graphic Data Acquisition System with 8" wide chart. In frequency-response tests, the digital counter reading was observed and recorded manually on the chart alongside the associated traces.

TEST ARRANGEMENT AND PROCEDURE

Equipment Location

One vibration generator was bolted to the crest of the dam adjacent to Station 6. This generator was the master generator during the test program. The other generator or slave was bolted to the crest of the dam adjacent to Station 10. The arrangement of this equipment on the crest of the dam is shown in Fig. 5. The machines were oriented so that they could apply radial exciting forces (either in-phase, or 180° out-of-phase) to the dam.

The Honeywell recorder was located in a small building near the South abutment of the dam.

The linear accelerometers were placed on the crest of the dam as shown in Fig. 7. When the accelerometers were placed to detect radial motion, the accelerometer cables pointed south. For tangential recording the accelerometers were oriented with the cables pointing downstream.

The sensitivity of the recording system was set so that 1 inch deflection on the recording chart reflected an acceleration of 0.001g.

Experimental Procedure and Reduction of Data

The quantities normally determined by a dynamic test of a structure are: resonant frequencies, mode shapes, and damping capacities. The experimental procedures and reduction of data involved in determining these quantities are described in the next section.

Resonant Frequencies

With the equipment described on the previous page resonant frequencies are determined by sweeping the frequency range of the vibration generators from 0.5 to 10 cps.

The vibration generators exciting frequency is increased slowly until acceleration traces on the recording chart are large enough for measurement. Above this level the frequency is increased in steps until the upper speed limit of the machine is reached. Near resonance, where the slope of the frequency-response curve is changing rapidly, the frequency-interval steps are as small as the speed control permits. These steps are relatively large in regions away from resonance. Each time the frequency is set to a particular value, the vibration response is given sufficient time to become steady-state, before the acceleration traces are recorded. At the same time, the frequency of vibration as recorded on a digital counter, is observed and written on the chart with its corresponding traces. Plotting the vibration response at each frequency step results in a frequency-response curve.

Mode Shapes

Once the resonant frequencies of a structure have been found, the mode shapes at each of these frequencies may be determined. Generally, there are insufficient accelerometers, or insufficient recorder channels, to measure the vibration amplitude of all the required points simultaneously. Thus, it is necessary, after recording the amplitudes of a number of points, to stop the vibration, shift the accelerometers to new positions, and then vibrate the structure at resonance once more. This procedure is repeated until the vibration amplitude of all required points has been recorded.

The structure may not vibrate at exactly the same amplitude in each test run because it is impossible to vibrate the structure at precisely the same frequency each run. Therefore, it is necessary to maintain one reference accelerometer (preferably at a point of maximum displacement) during all the mode shape measurements for a particular mode. Subsequently, all vibration amplitudes can be adjusted to a constant modal amplitude.

In addition it is necessary to make corrections to the recorded amplitudes to compensate for differences between calibration factors. Absolute calibration is not required for mode shapes and cross-calibration is sufficient. The accelerometers and all equipment associated with them in their respective recording channels are cross-calibrated simply by placing them all together so that they measure the same vibration. Cross-calibration is carried out normally at the start and finish of each day. The average calibration factors as derived from the pre- and post-test calibration runs are used to adjust the recorded amplitudes.

Damping Capacities

Damping capacities may be found from resonance curves in the normalized frequency-response curves by the formula:

$$\zeta = \frac{f}{2f}$$

where

ζ = damping factor,

f = resonant frequency,

Δf = difference in frequency of the two points on the resonance curve with amplitudes of $1\sqrt{2}$ times the resonant amplitude.

Strictly, the expression for ζ is only applicable to the displacement resonance curve of a linear, single degree of freedom system with a small amount of viscous damping. However, it has been used widely for systems differing appreciable from that for which the formula was derived, and it has become accepted as a reasonable measure of damping. In this respect it should be remembered that in the case of full-size civil engineering structures it is not necessary to measure damping accurately in a percentage sense. It is sufficient if the range in which an equivalent viscous damping coefficient lies is known. Meaningful ranges might be defined as: under 1%; 1-2%; 5-10%; over 10%.

Other Test Data

Hydrodynamic readings were taken at three stations by lowering a pressure transducer over the upstream fall of the dam and recording the hydrodynamic pressures at a number of sections up the face of the dam. Readings were taken for each of the resonant frequencies.

Sonic vibration measurements were made at two locations near the South abutment of the dam. Two readings were taken at each of two locations. (3)

EXPERIMENTAL RESULTS

Frequency Response

In searching for the resonant frequencies, accelerometers were located at Stations 6, 8 and 10. For the in-phase forced vibrations the output of the accelerometer at Station 8 was observed, and for the out-of-phase vibrations the output of the accelerometer at Stations 6 or 10 was observed. The initial frequency search was started at about 3.5 cps and ran up to the maximum output of the generators, which in this case was at about 9.25 cps, due to a line voltage of 208 volts rather than the 220 volts required for full 10 cps output. This initial search was carried out for both in-phase and out-of-phase conditions.

After the initial responses had been completed and the range of the resonance conditions located more detailed response searches were conducted. The results of these resonance frequency searches are tabulated in Table I. Along with the double amplitude acceleration reading shown in the tables, the normalized single amplitude displacements in inches are also given. The double amplitude acceleration readings are for a force which increases with the square of the exciting frequency, and each acceleration amplitude should be divided by the corresponding square of its exciting frequency to obtain so-called normalized curves equivalent to those for a constant force (assuming linear stiffness and damping for the structural system). If the original acceleration amplitudes are divided by the frequency to the fourth power, displacement frequency-response values for constant exciting forces are obtained. In cases of fairly low damping (under 5%), there is little difference between results obtained for resonant frequencies and damping capacities measured from the different curves.

Frequency-response curves, in the form of double amplitude acceleration versus exciting frequency are plotted directly from the data tabulated in Table I and are shown successively in Figs. 8 through 20. From these frequency searches two out-of-phase and two in-phase resonant frequencies were determined, namely f_1 = 5.80 cps; f_3 = 7.62 cps and f_2 = 6.30 cps, f_4 = 8.53 cps, respectively.

Mode Shapes

Once the resonant frequencies were determined, the crest and vertical mode shapes were found. Both radial and tangential readings were taken. The acceleration readings were adjusted or normalized and then corrected with the appropriate calibration factors. In the case of the crest modes the readings were adjusted relative to the readings at Station 6 and for the vertical modes the readings were adjusted relative to the reading at the crest of the dam for the vertical section measured.

The results of the mode shape data are given in Table II and are arranged sequentially on the days the data was taken. Table III summarizes the mode shape data and, in the case of the crest modes where data was taken at the same station on different runs, the average of all of the runs is shown.

The crest mode shapes are plotted in Fig. 21 for the out-of-phase frequencies and in Fig. 22 for the in-phase frequencies. The vertical mode shapes are shown in Figs. 23 through 25.

Damping Capacities

The damping capacities are shown on the resonant frequency curves and varied from approximately 2 to 5 percent. Damping capacities were not obtained for the fourth mode because of the nature of the response curves.

Hydrodynamic Results

Hydrodynamic data was taken at a number of sections at Stations 6, 8 and 10, and this data is tabulated in Table IV.

Sonic Tests

Sonoscope readings were taken at two locations to determine the concrete properties. Two readings were taken through the tower at Station 2 and the average velocity was found to be 15,300 ft/sec. Two readings were taken through the crest approximately 6 inches below the upstream curve to straight face transition point and the average of these two readings was found to be 11,500 ft/sec.

REFERENCES

1. Wiegel, R. L., Earthquake Engin-ering, Prentice-Hall, Inc. 1970.

2. Hudson, D. E., "Synchronized Vibration Generators for Dynamic Tests of Full-Scale Structures," Earthquake Engineering Research Laboratory Report, California Institute of Technology, 1962.

3. ACI Monograph No. 2 - Evaluation of Concrete Properties from Sonic Tests.

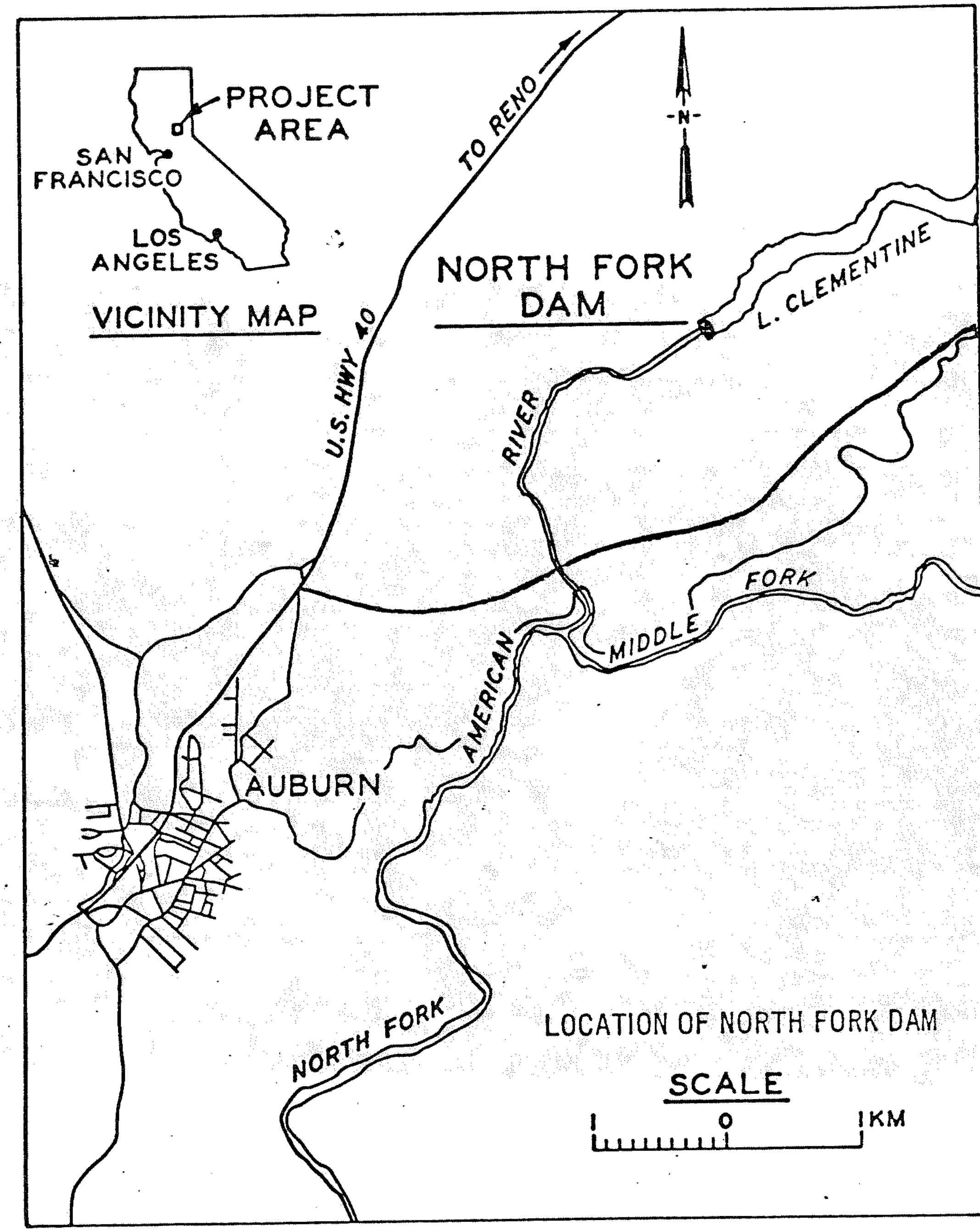


FIG 1 LOCATION OF NORTH FORK DAM

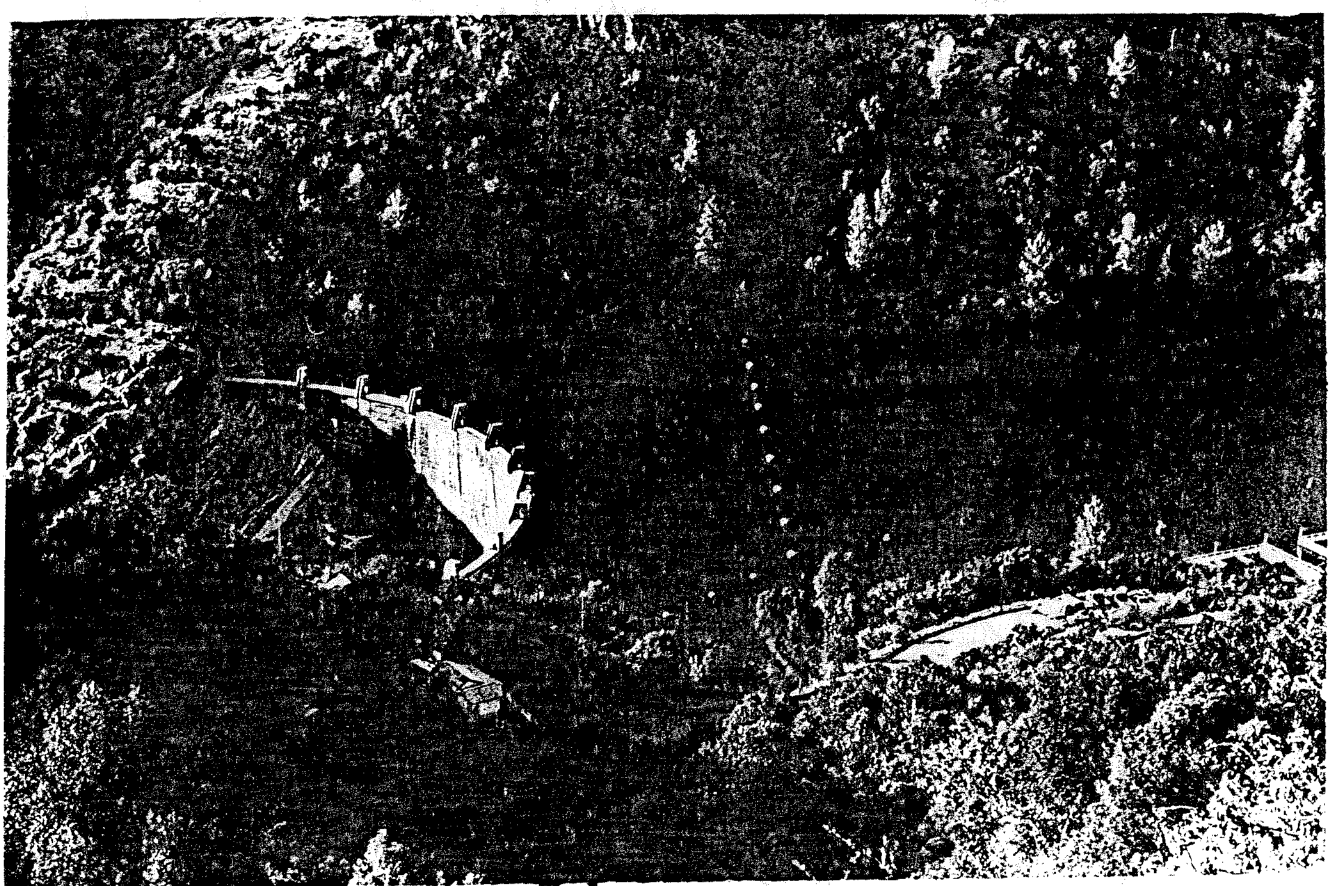


FIG. 2. VIEW OF DAM.

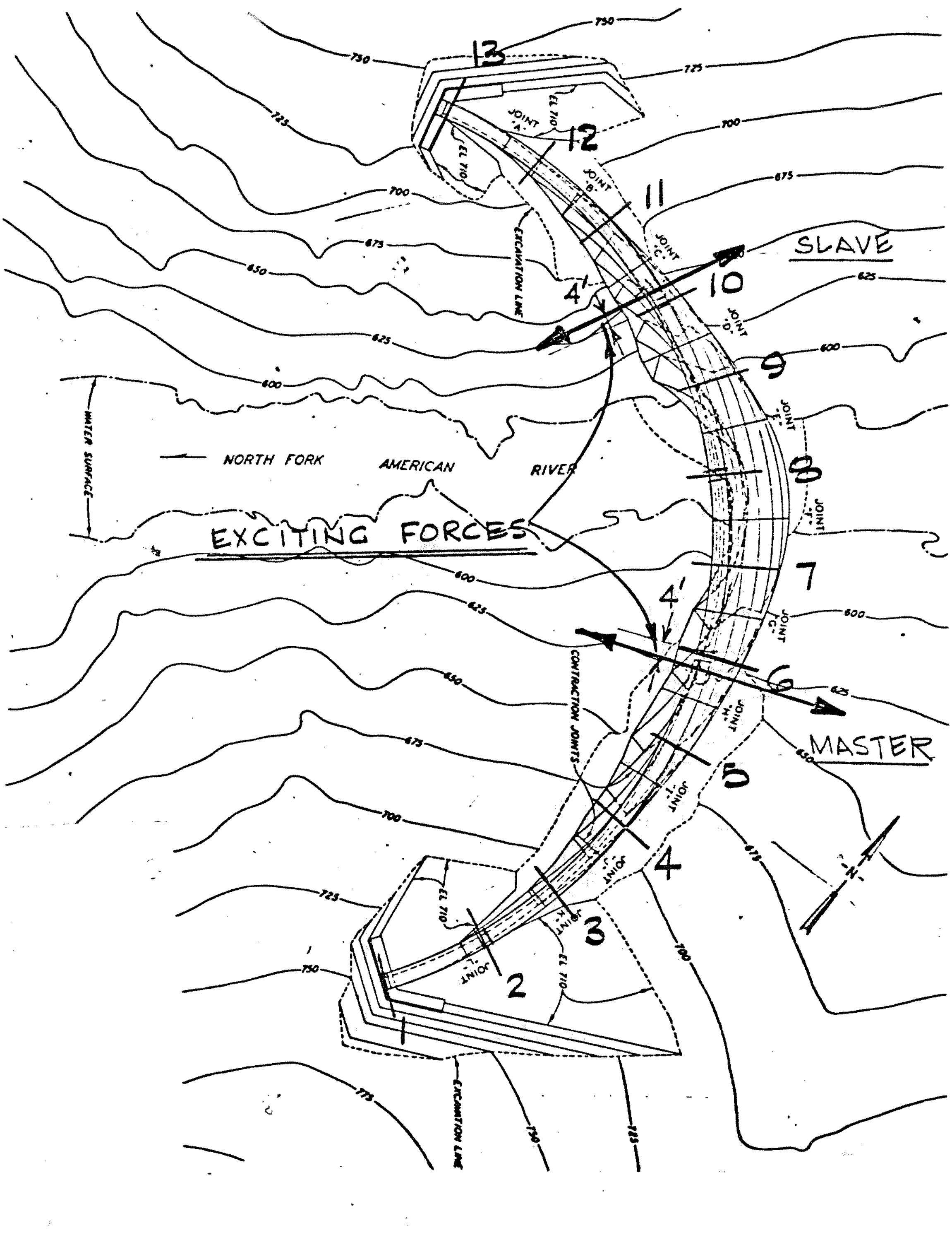


FIG 3 PLAN OF NORTH FORK DAM

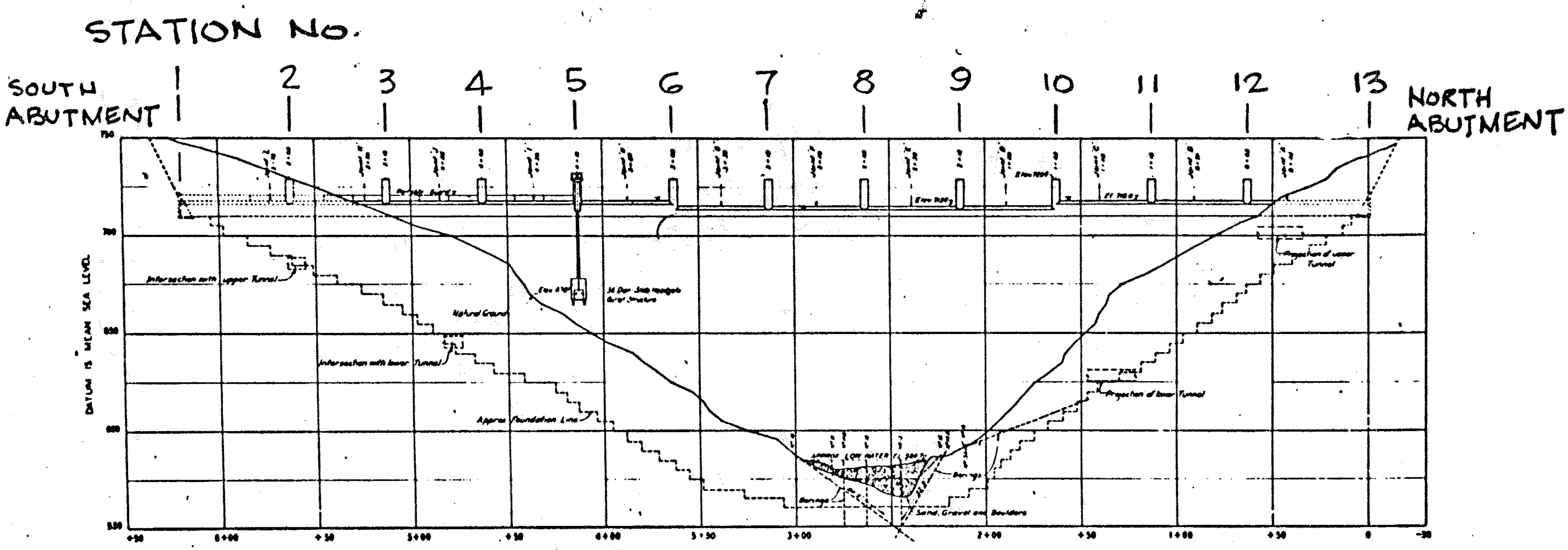
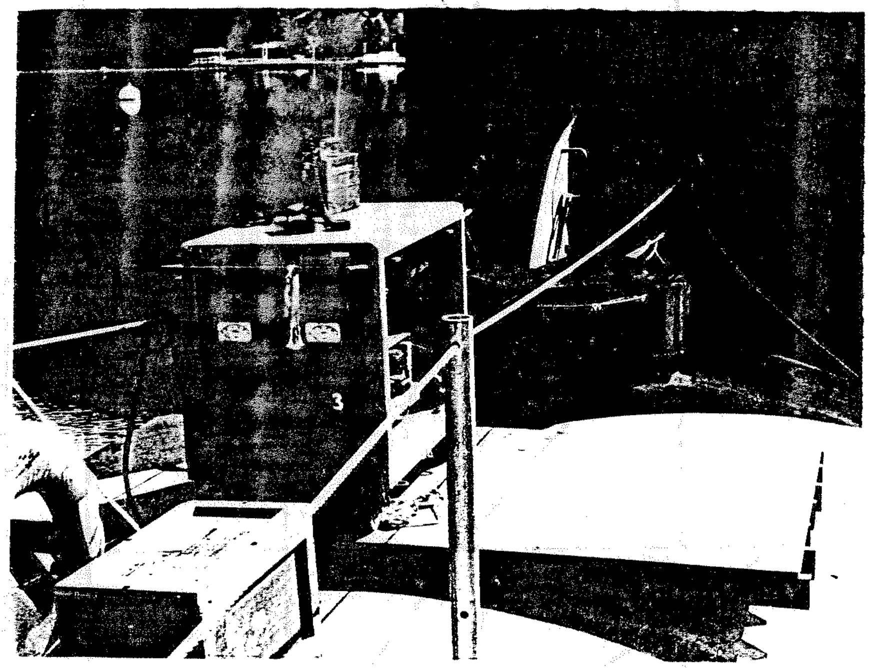
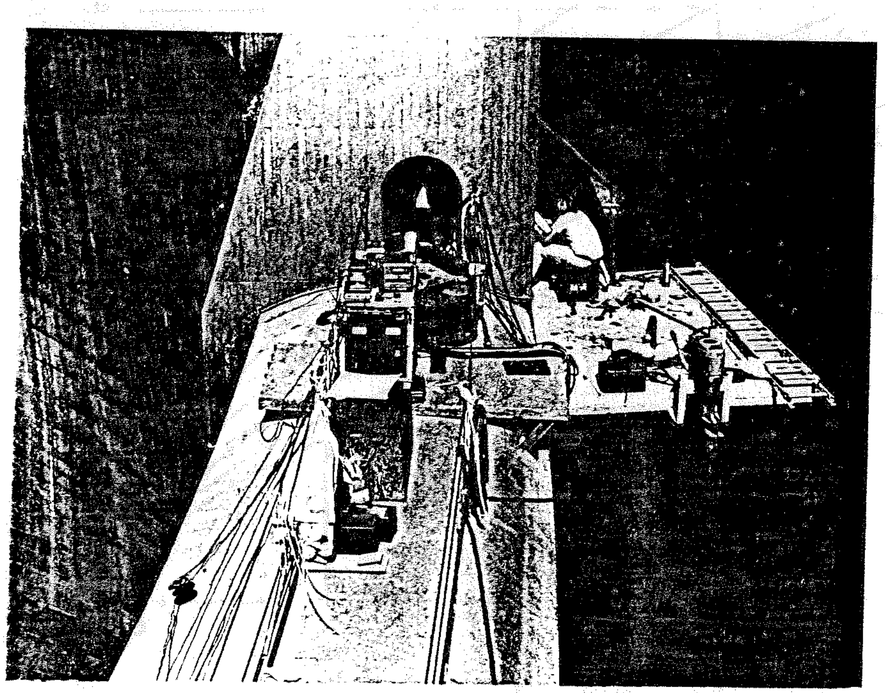


FIG 4 PROFILE LOOKING DOWNSTREAM



ADJACENT TO STATION 10



ADJACENT TO STATION 6

FIG. 5. LOCATION OF FORCED VIBRATION GENERATORS.

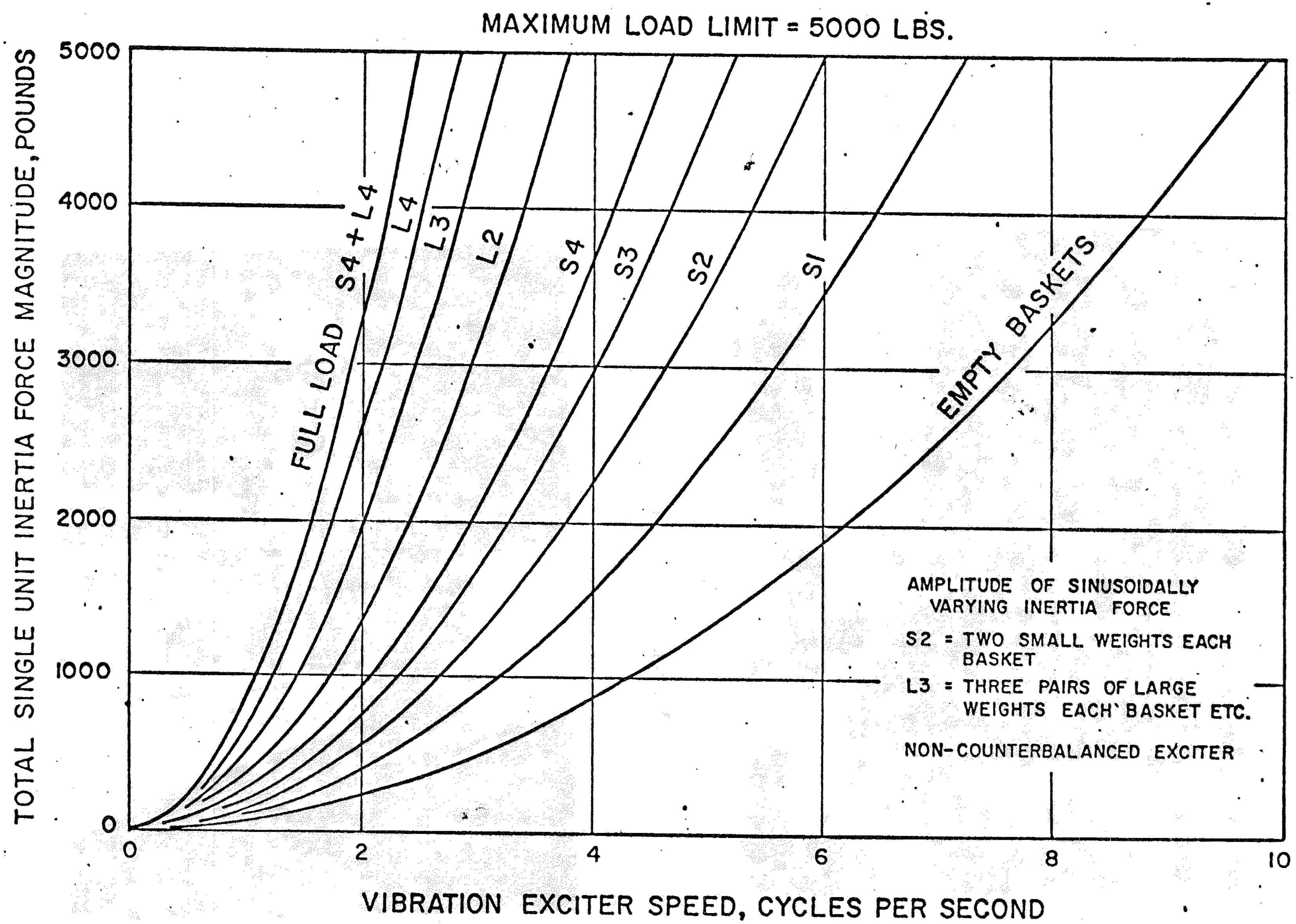


FIG. 6, VIBRATION FORCE OUTPUT vs. SPEED—NON-COUNTERBALANCED (AFTER HUDSON (2)).

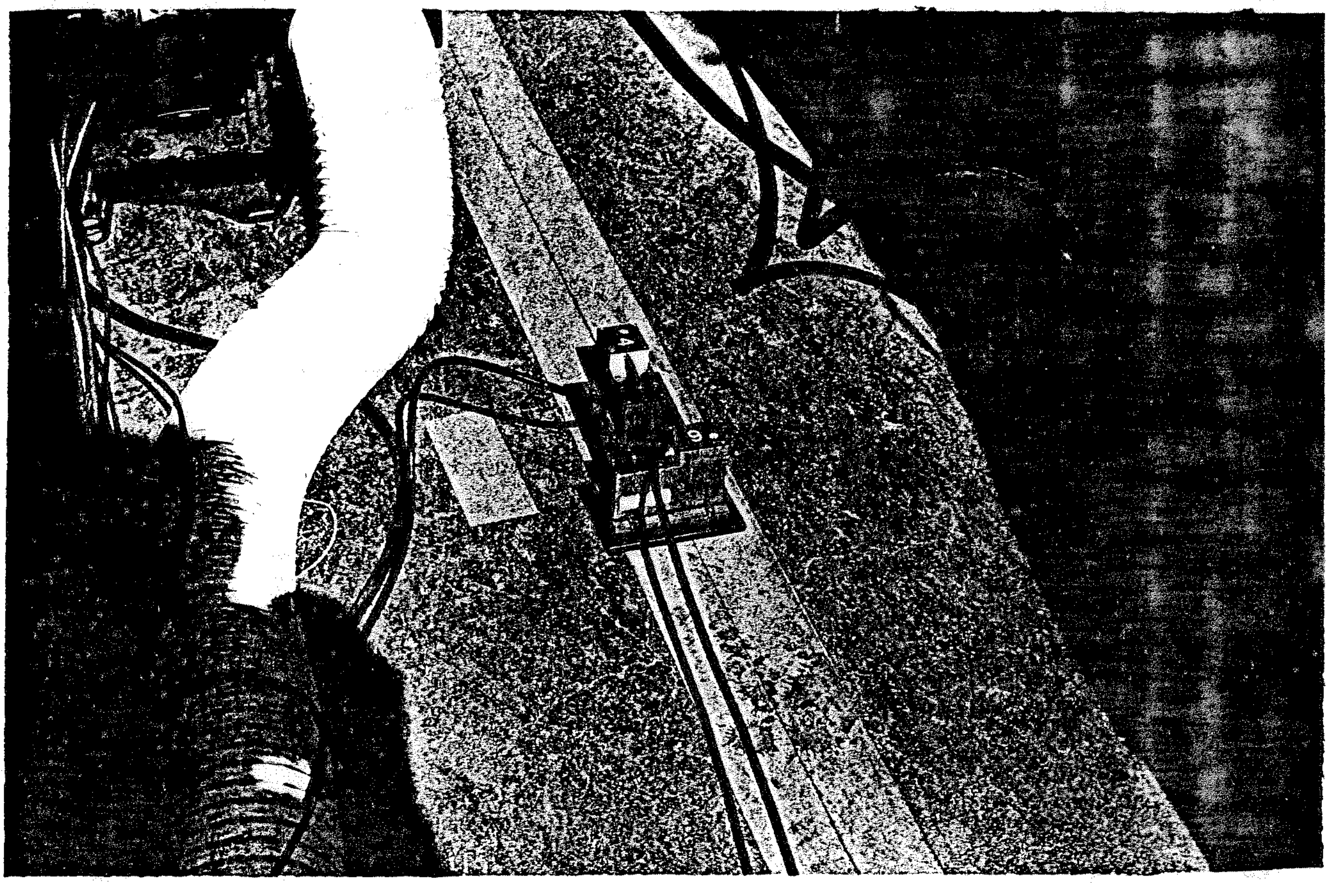


FIG. 7. LINEAR ACCELEROMETERS ON CREST OF DAM.

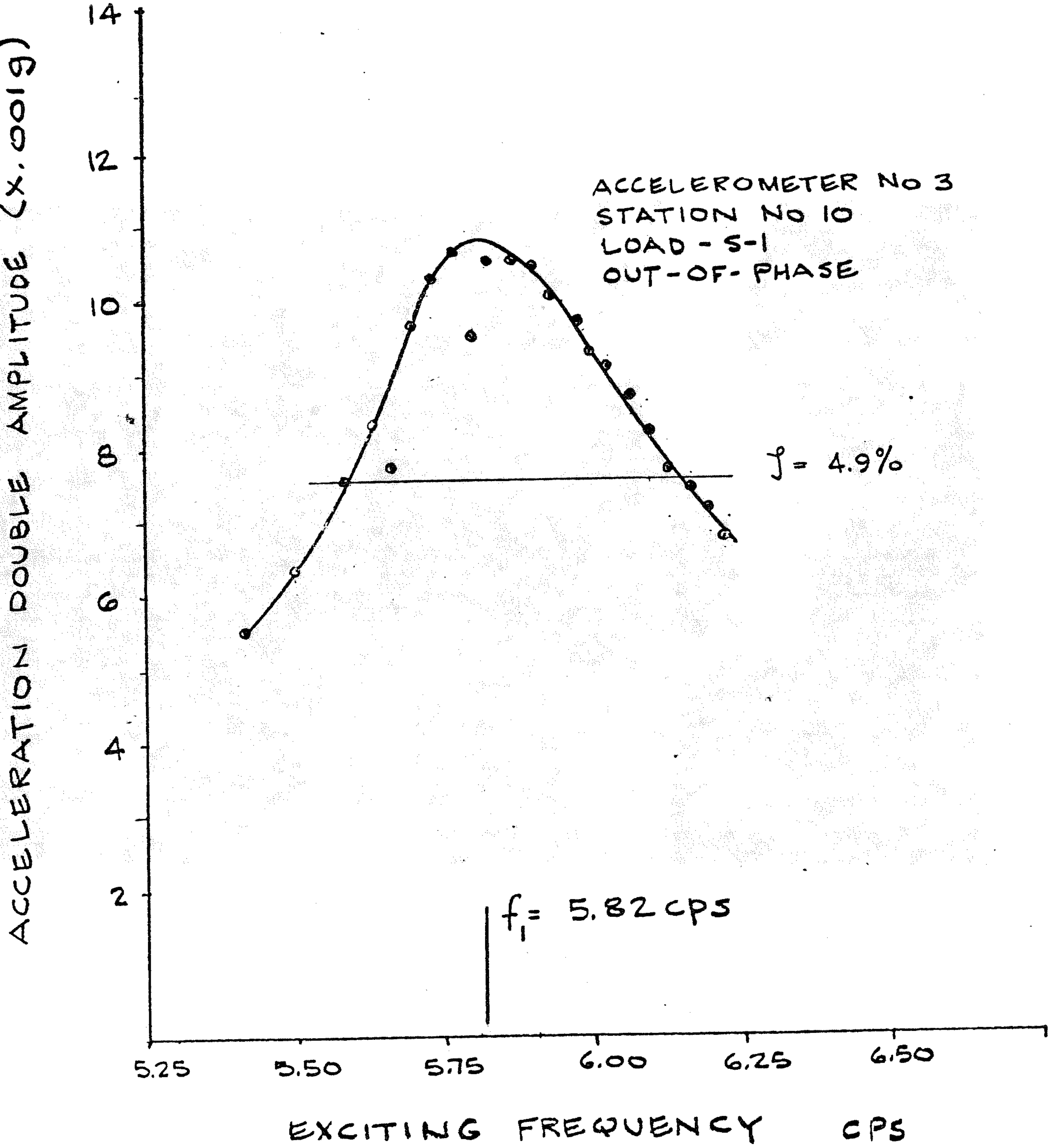


FIG 8 RESONANCE CURVE: 1ST MODE

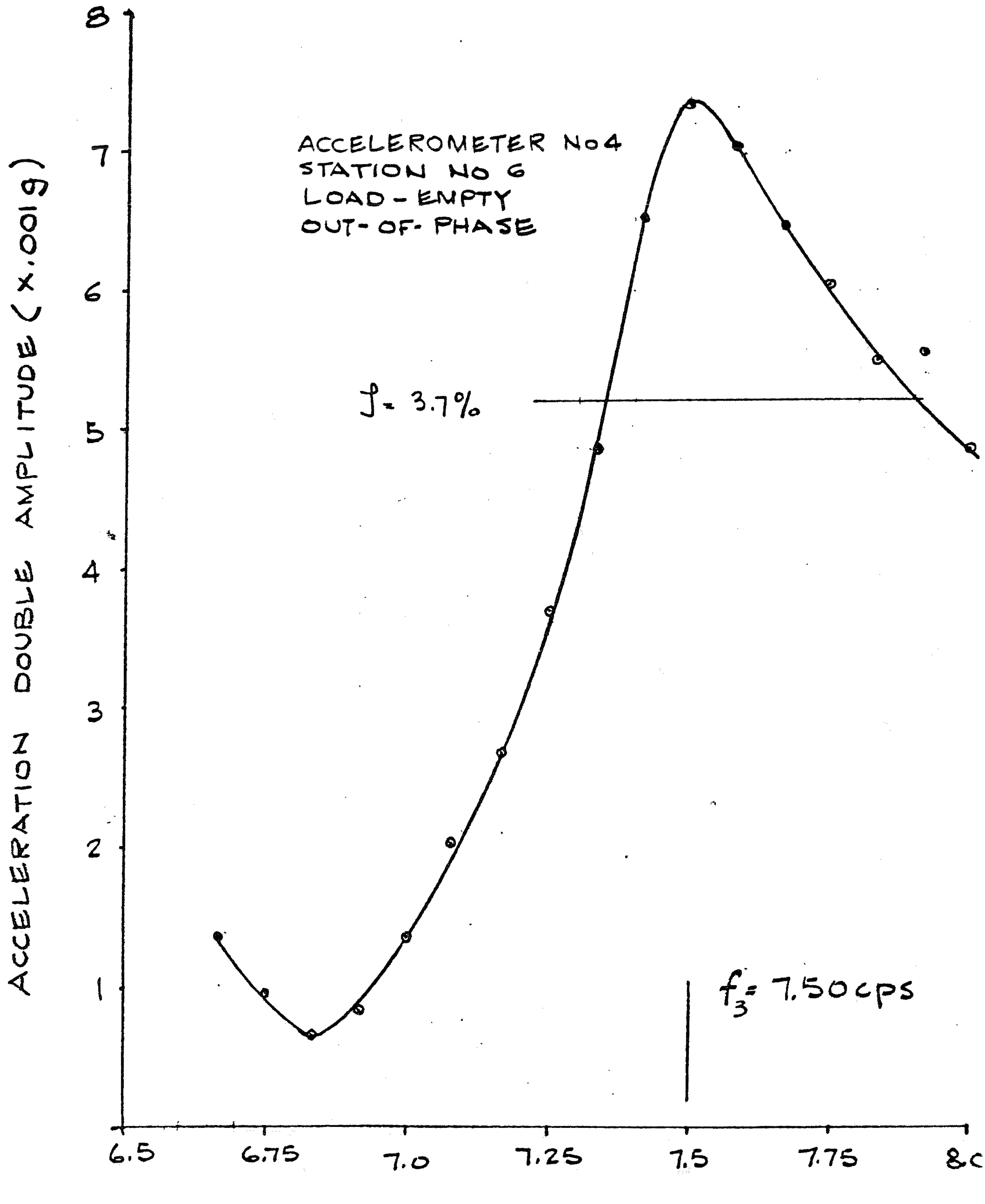


FIG 9 RESONANCE CURVE: 3RD MODE

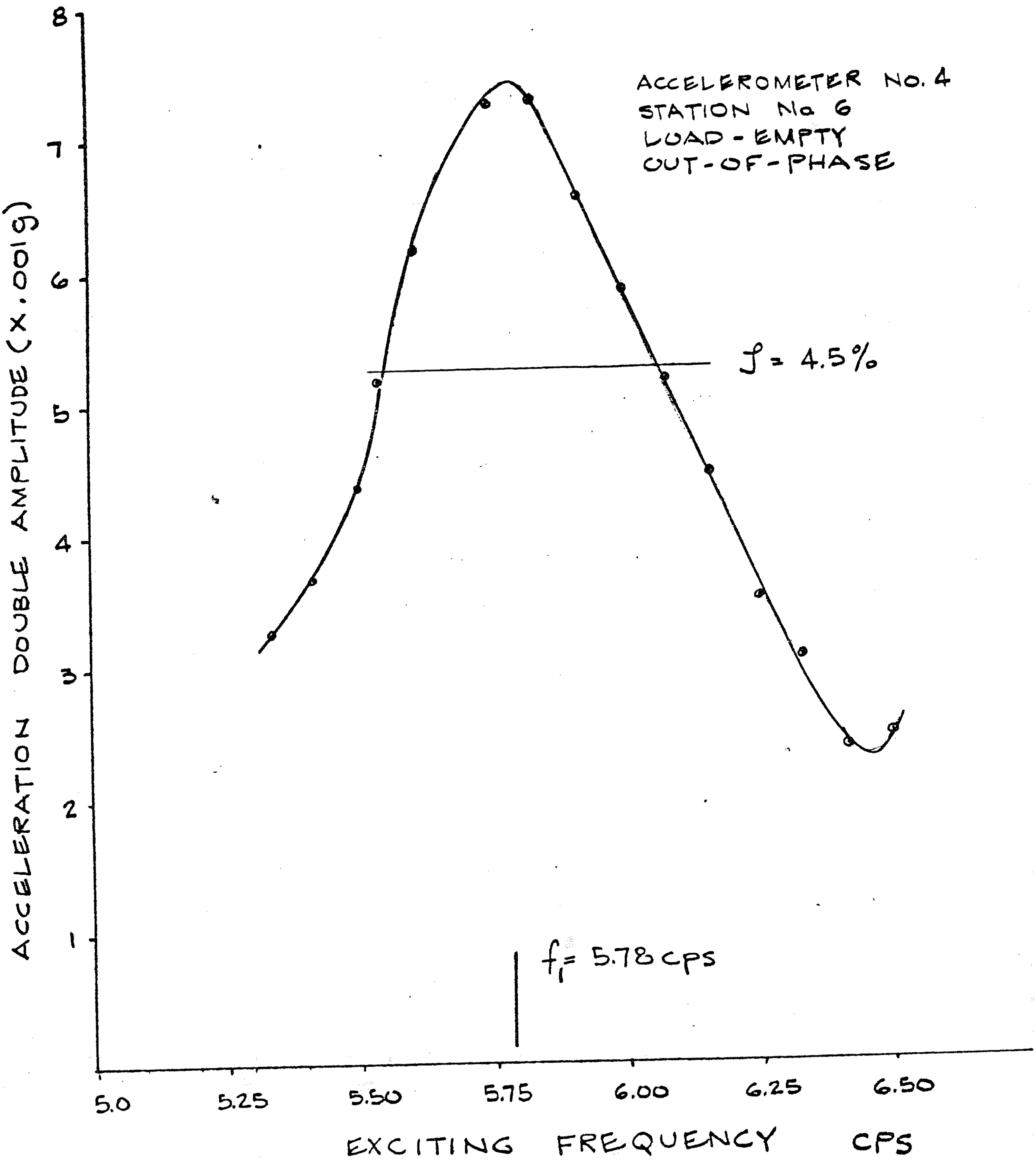


FIG 10 RESONANCE CURVE: 1ST MODE

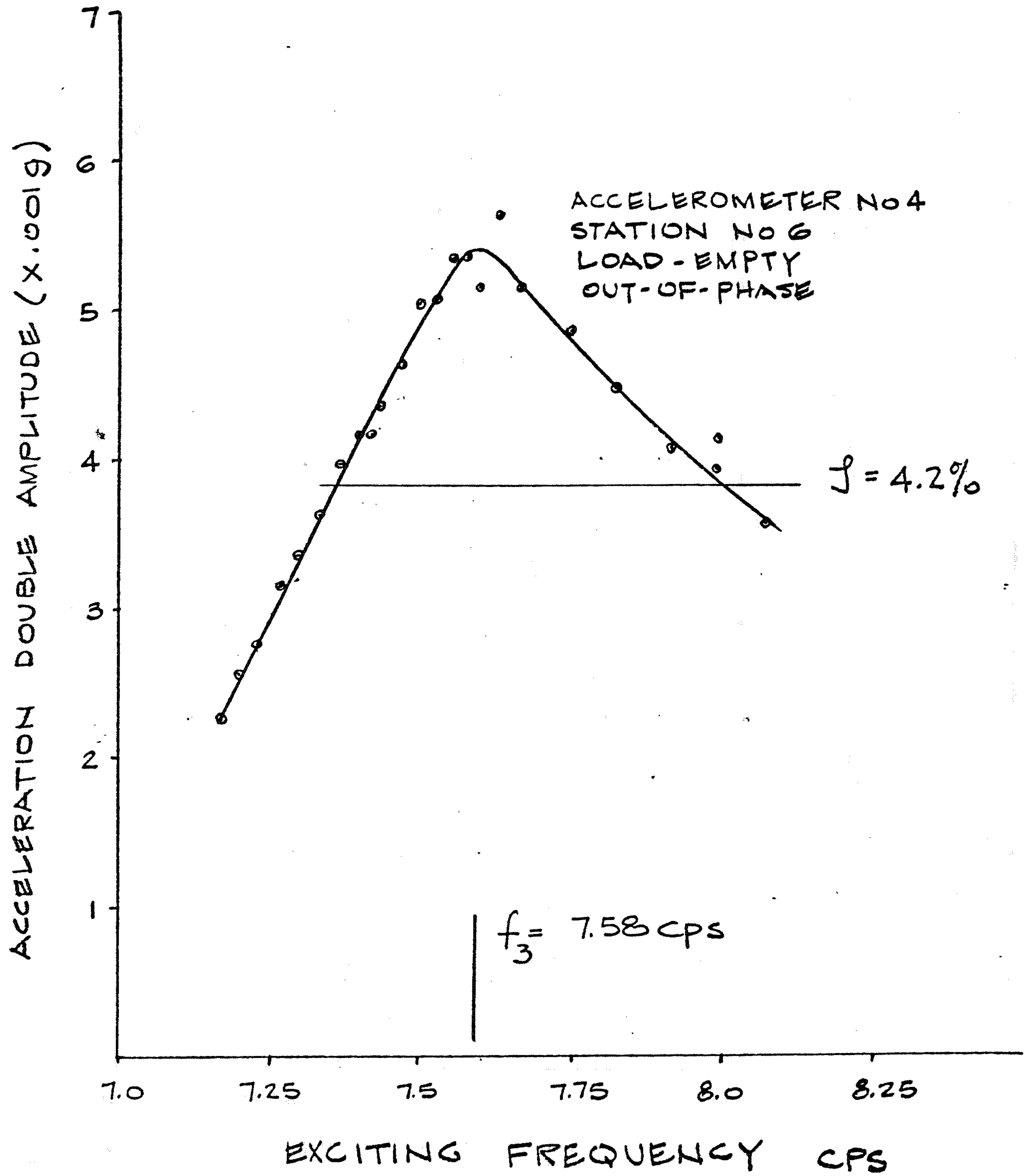


FIG 11 RESONANCE CURVE: 3RD MODE

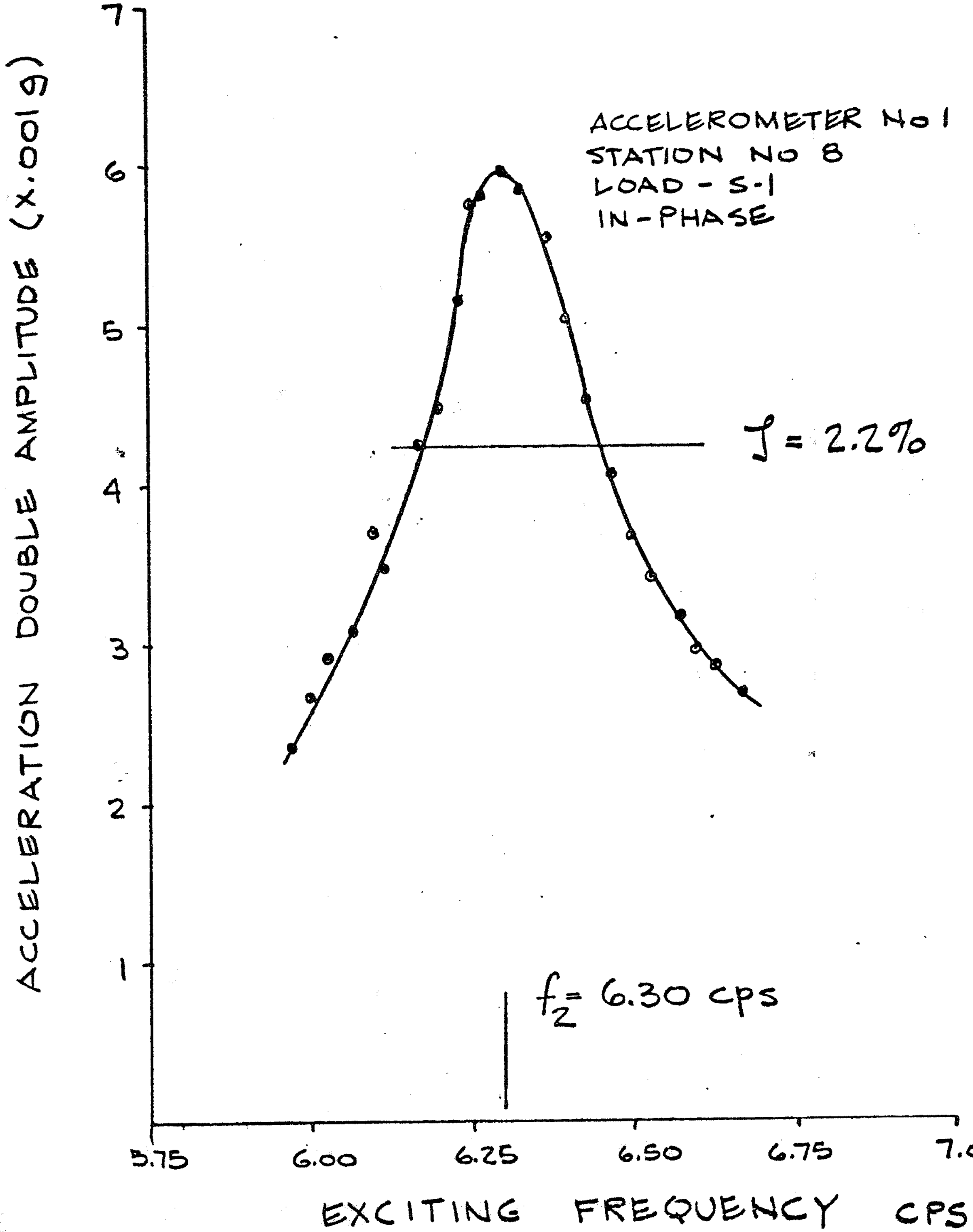


FIG 12 RESONANCE CURVE: 2ND MODE

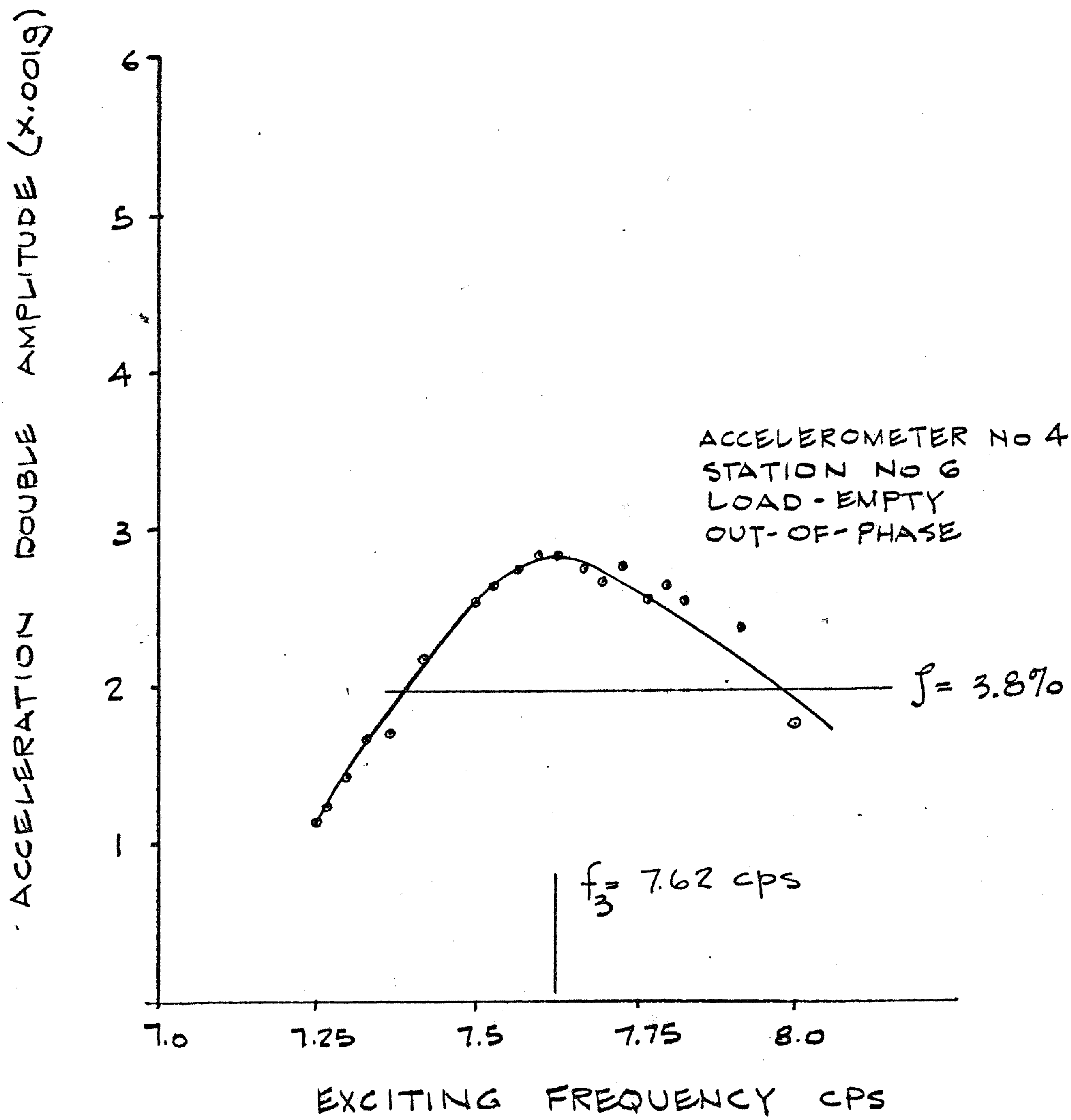


FIG 13 RESONANCE CURVE: 3RD MODE

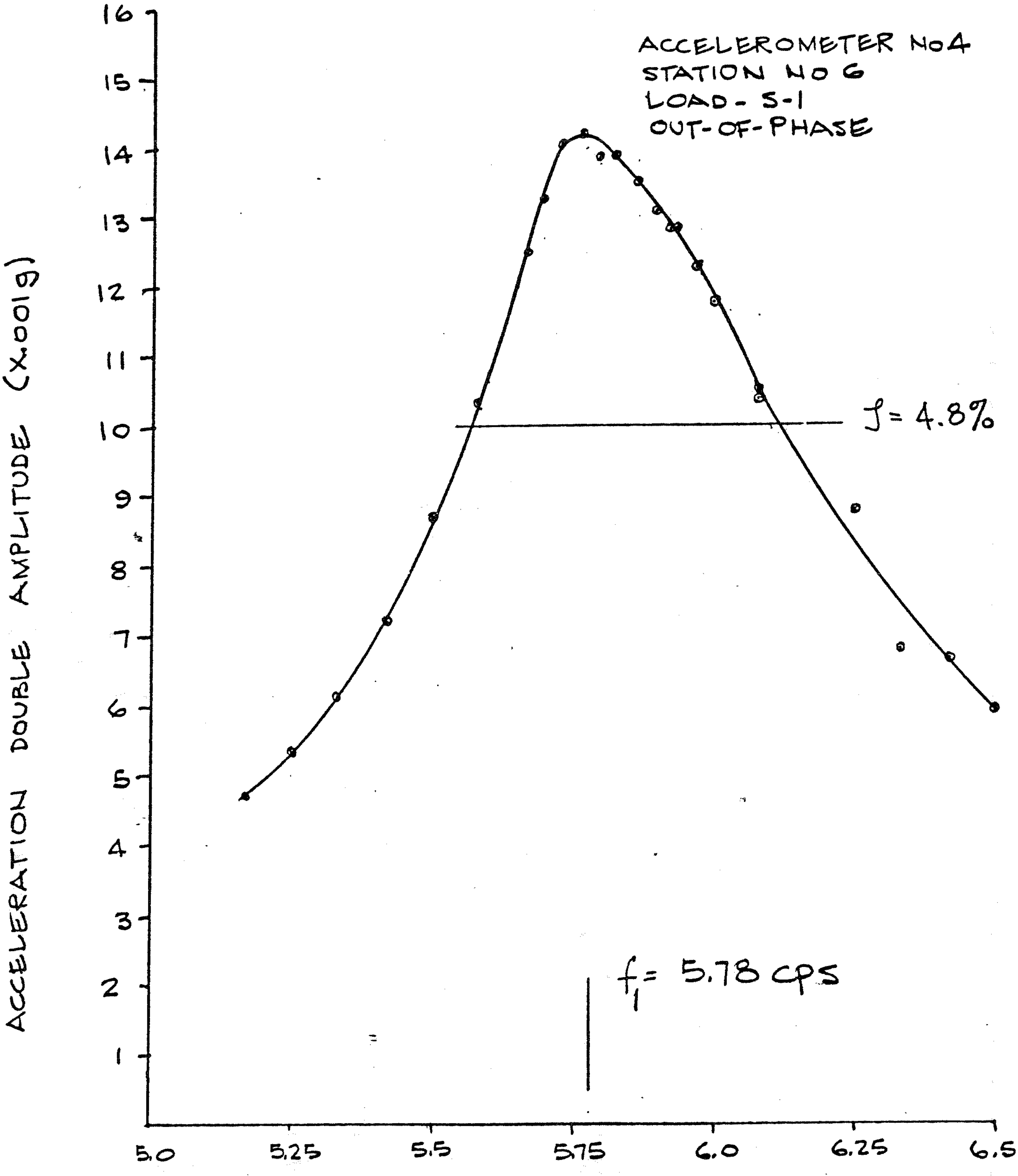


FIG 14 RESONANCE CURVE: 1ST MODE

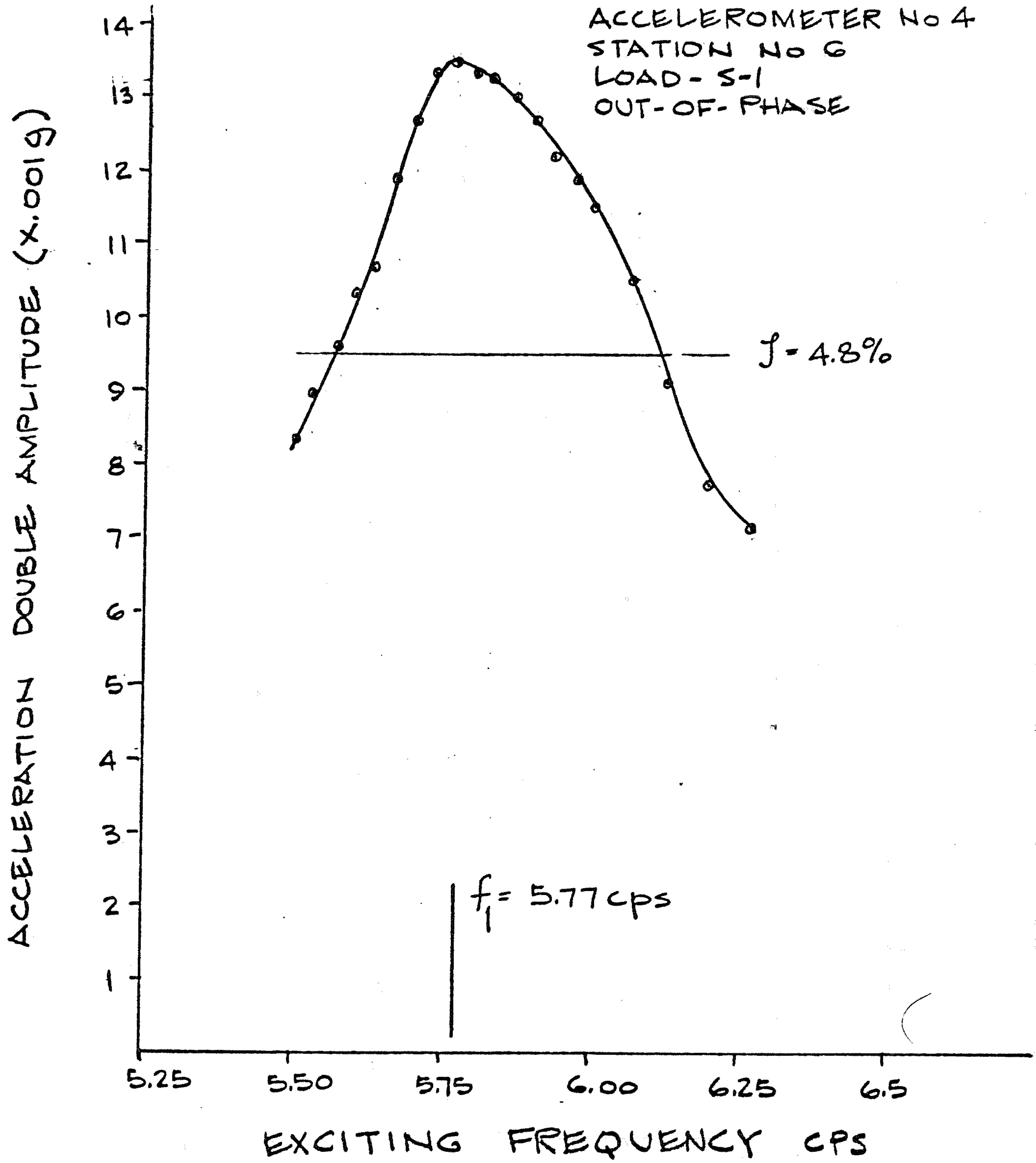


FIG 15 RESONANCE CURVE: 1ST MODE

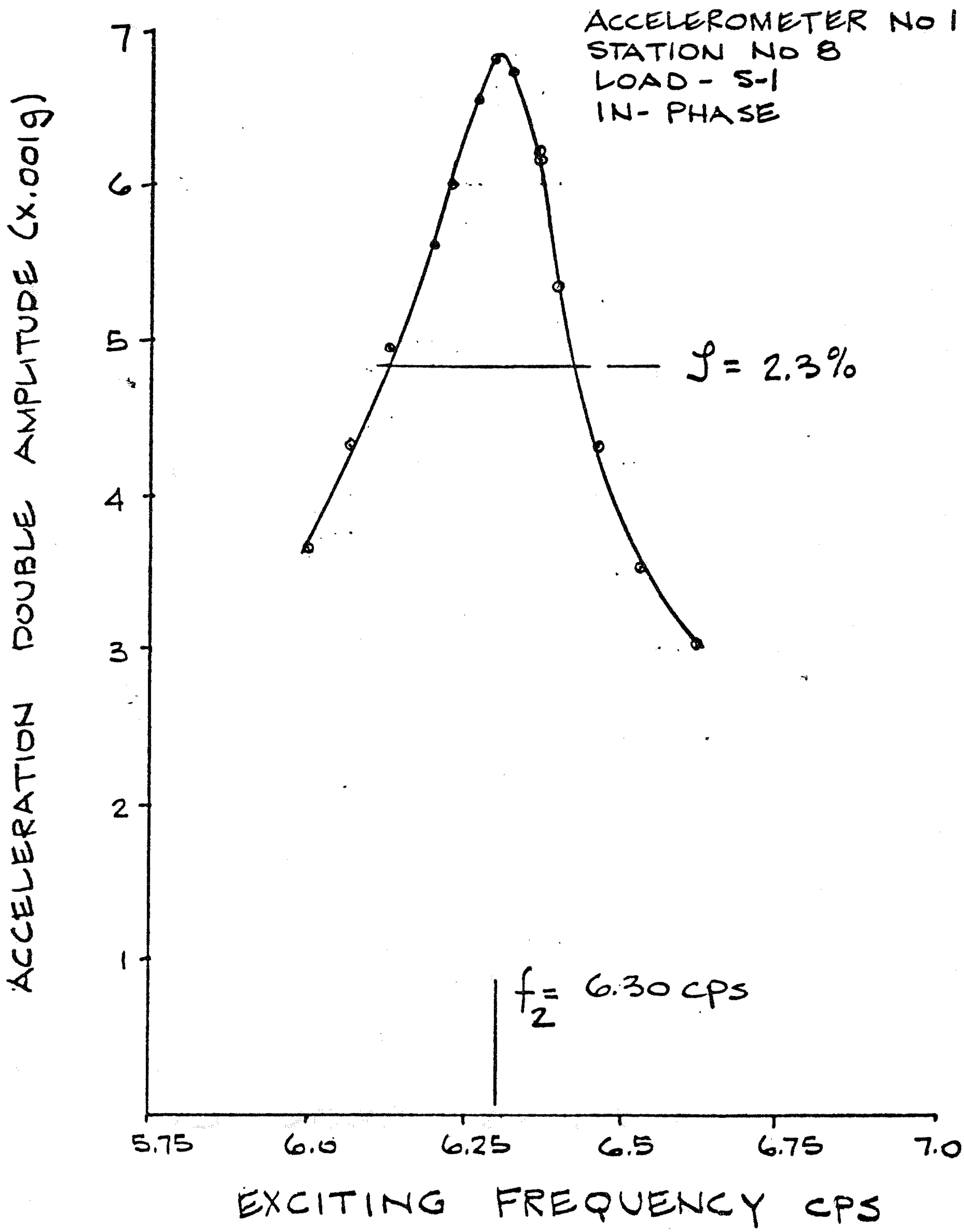


FIG 16 RESONANCE CURVE: 2[ND] MODE

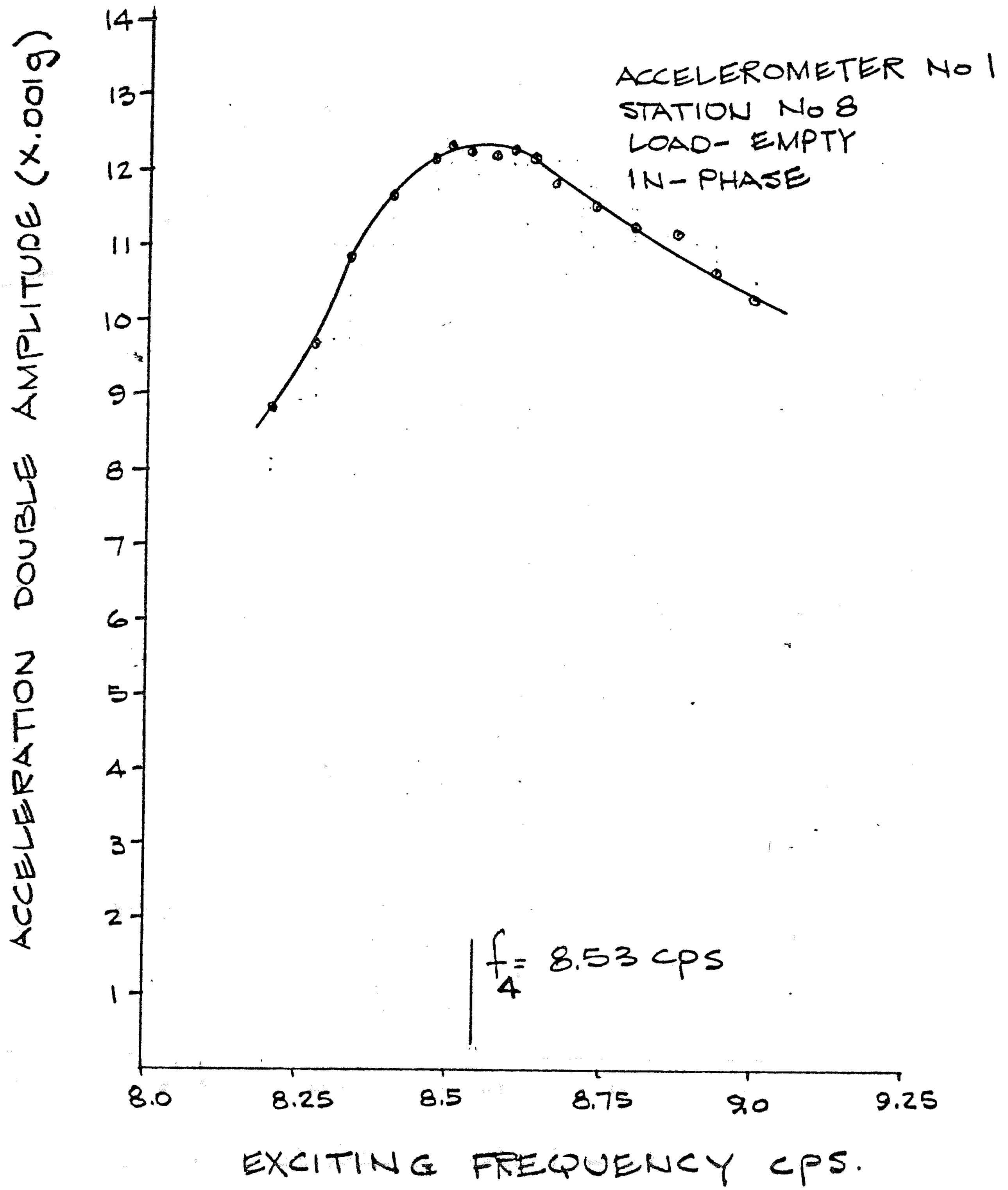


FIG 17 RESONANCE CURVE: 4TH MODE

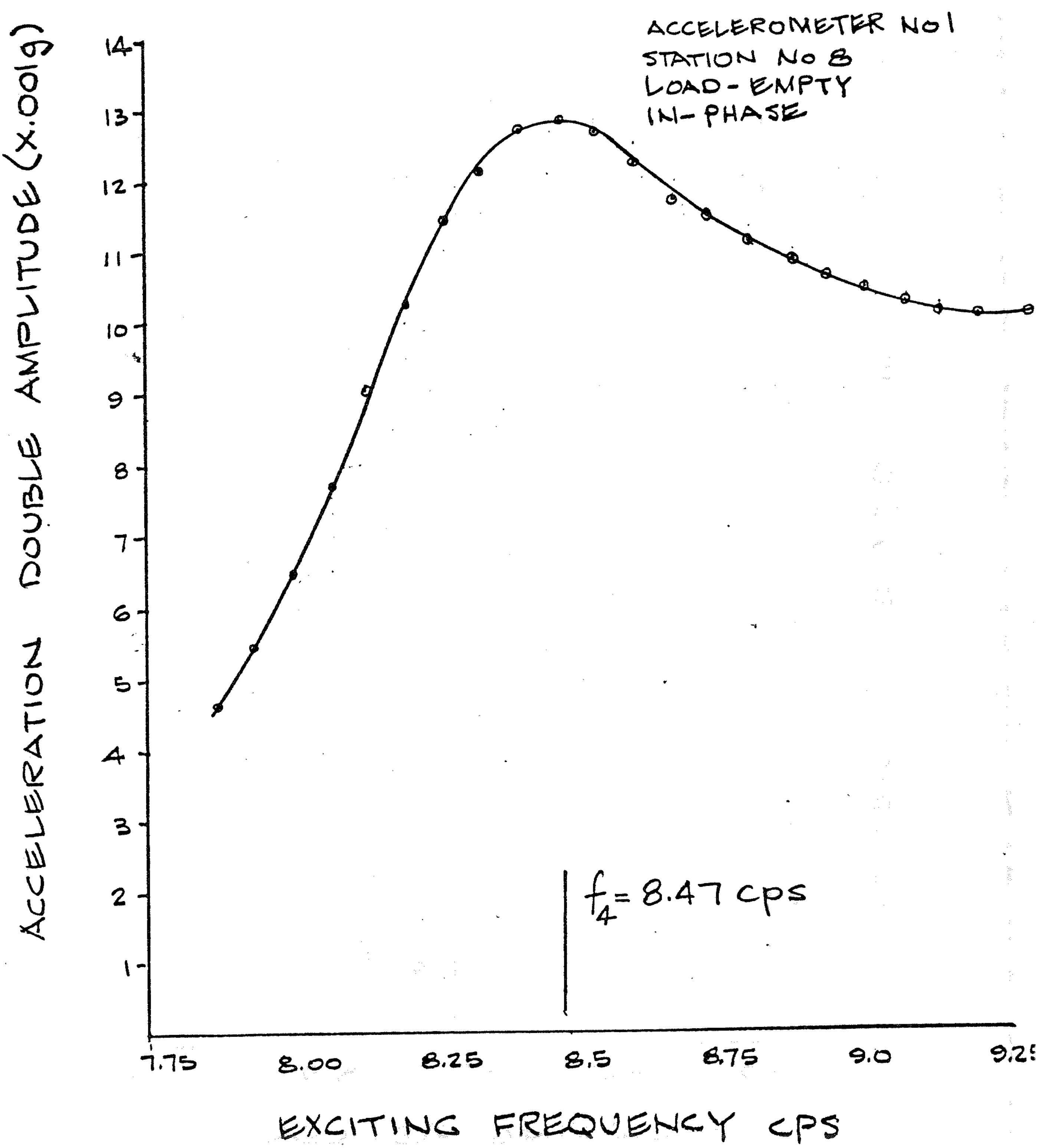


FIG 18 RESONANCE CURVE: 4TH MODE

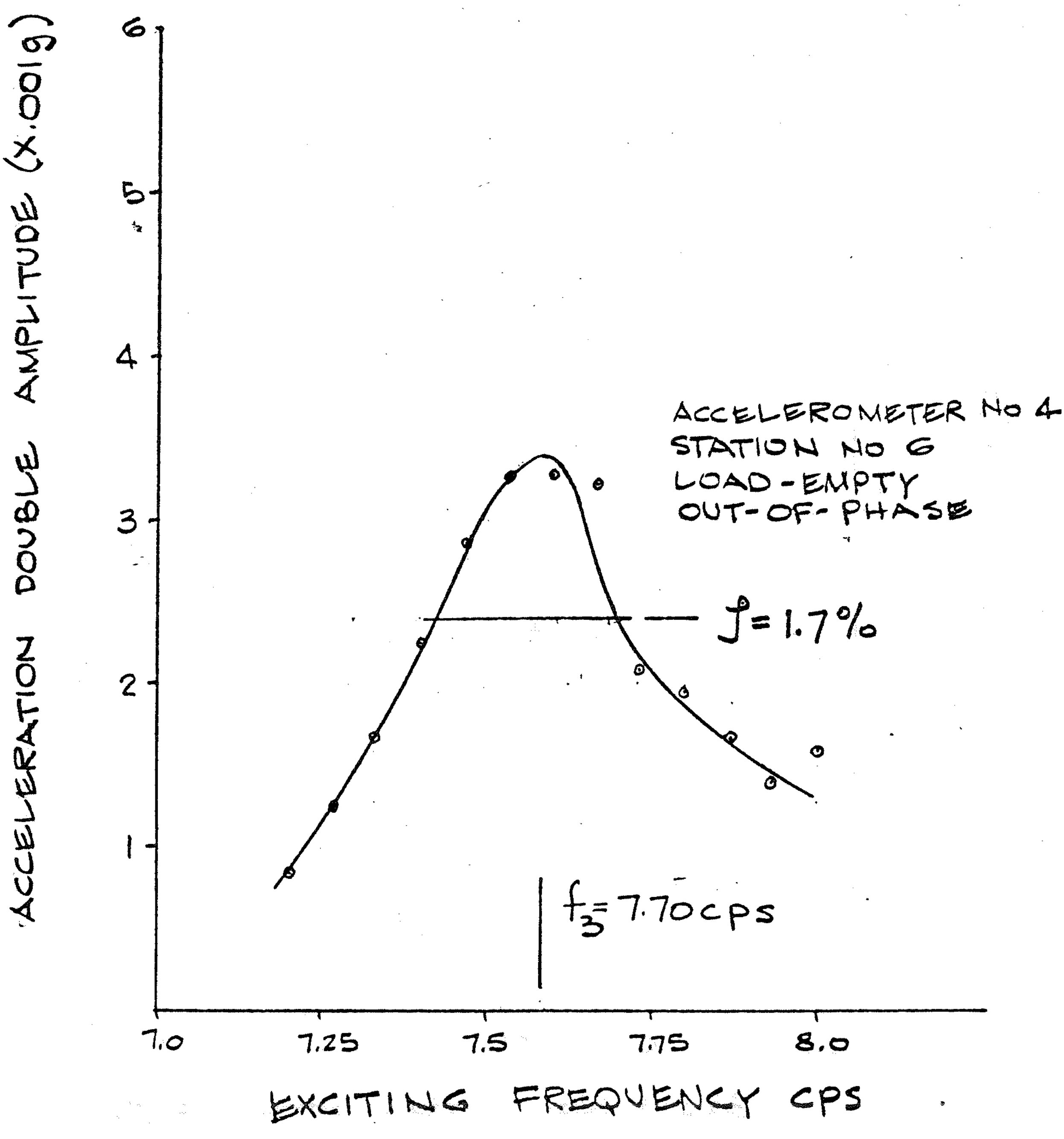


FIG 19 RESONANCE CURVE: 3RD MODE

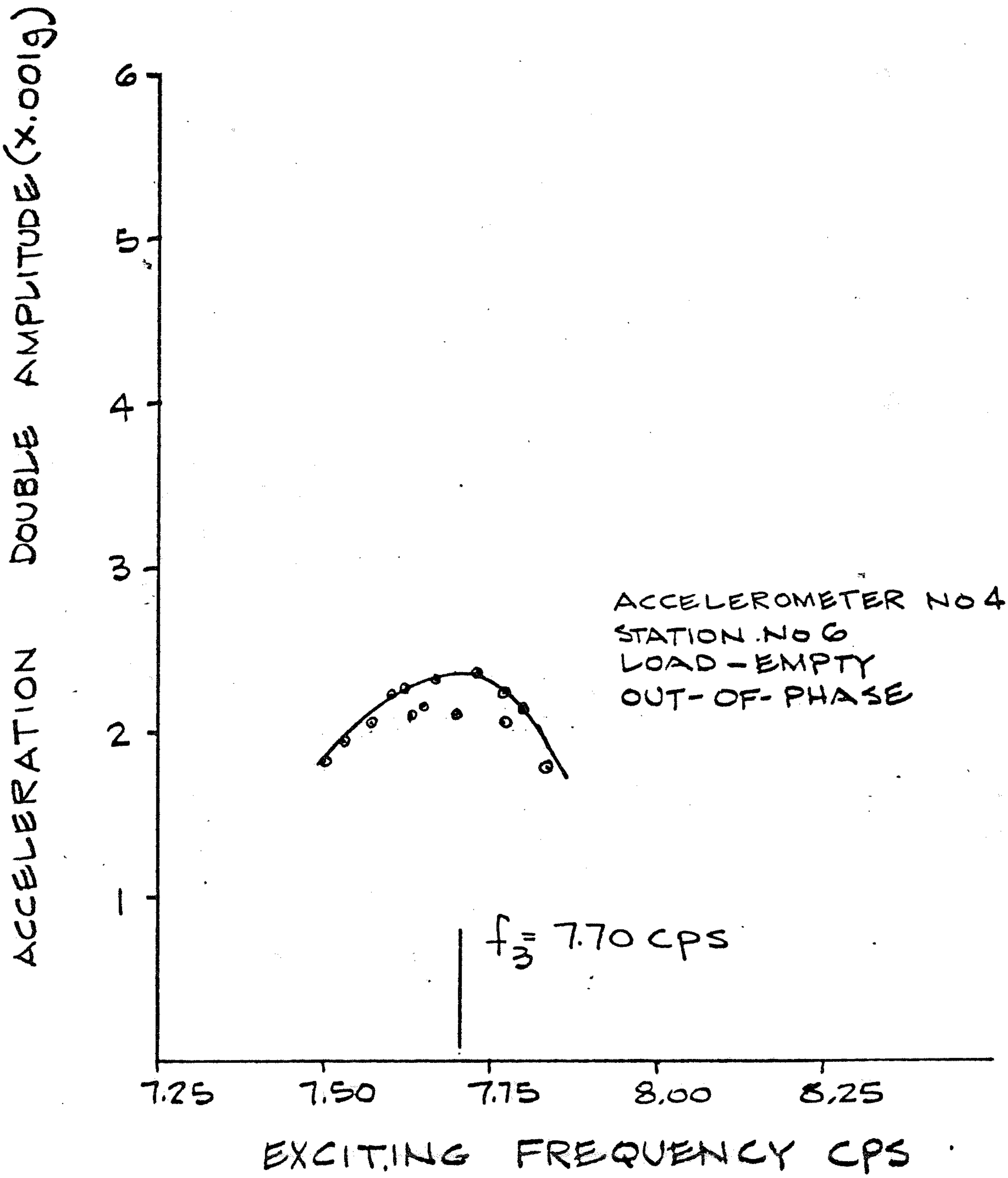


FIG 20 RESONANCE CURVE: 3RD MODE

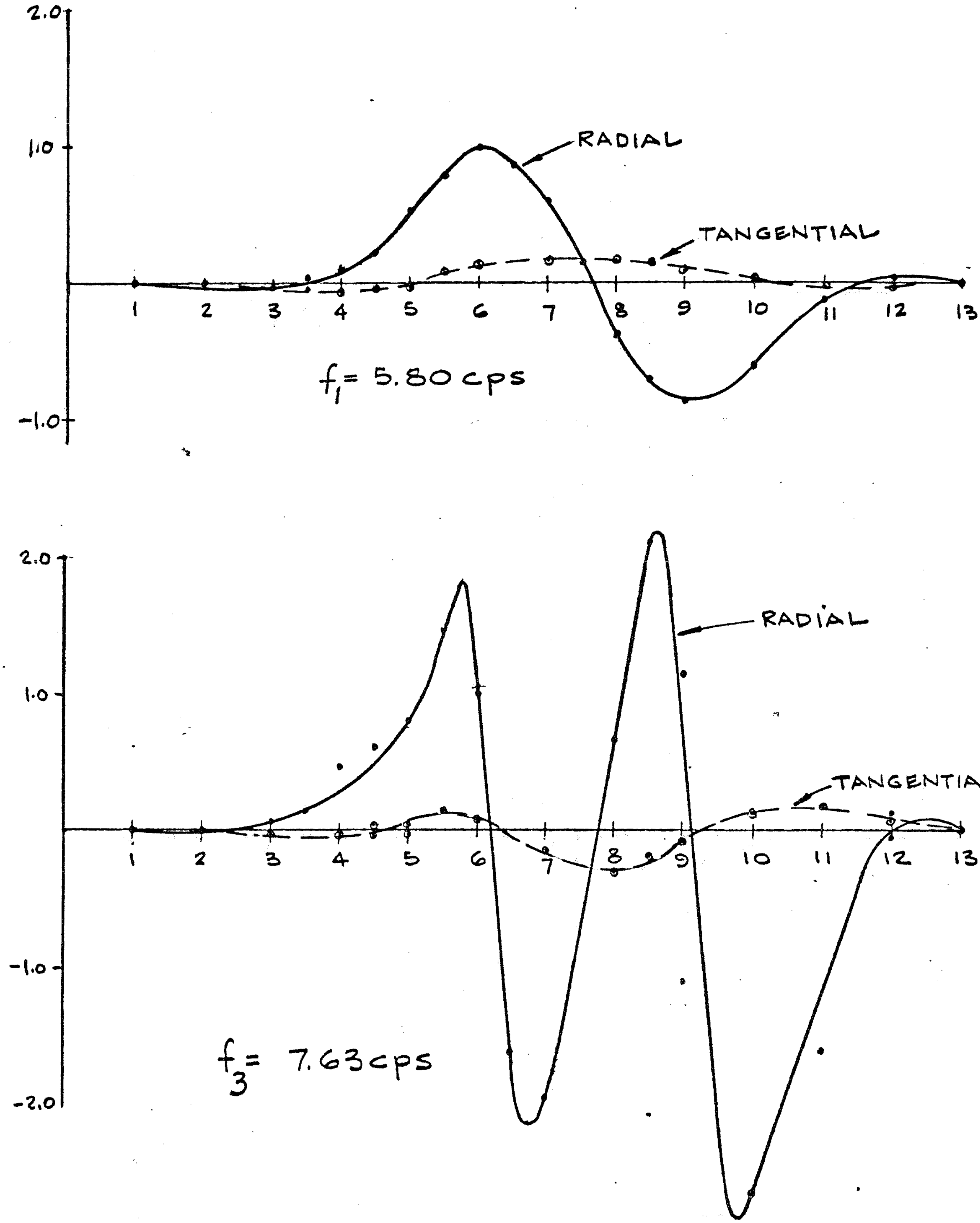


FIG 21 OUT-OF-PHASE CREST-MODE SHAPES

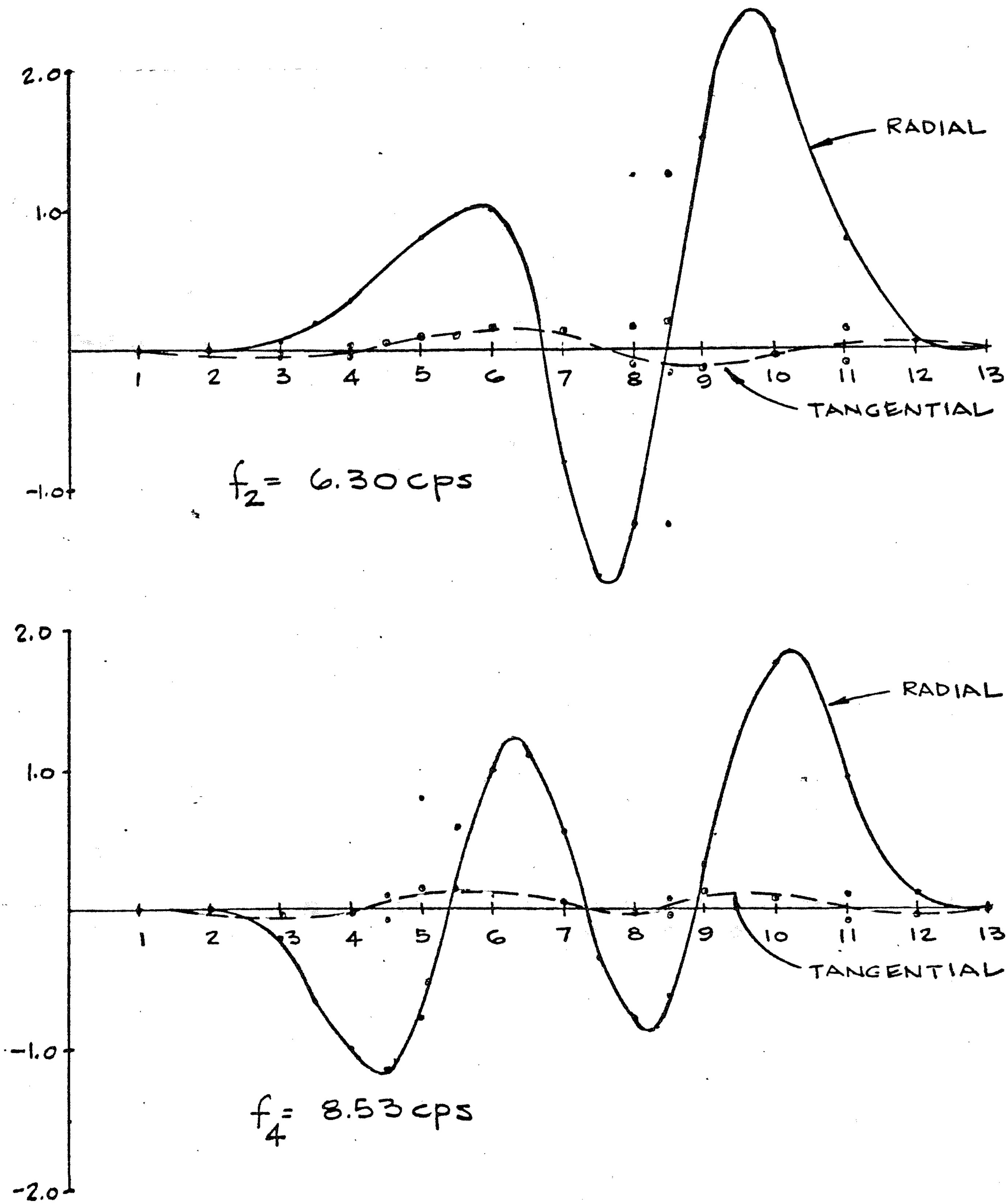


FIG 22 IN-PHASE CREST - MODE SHAPES

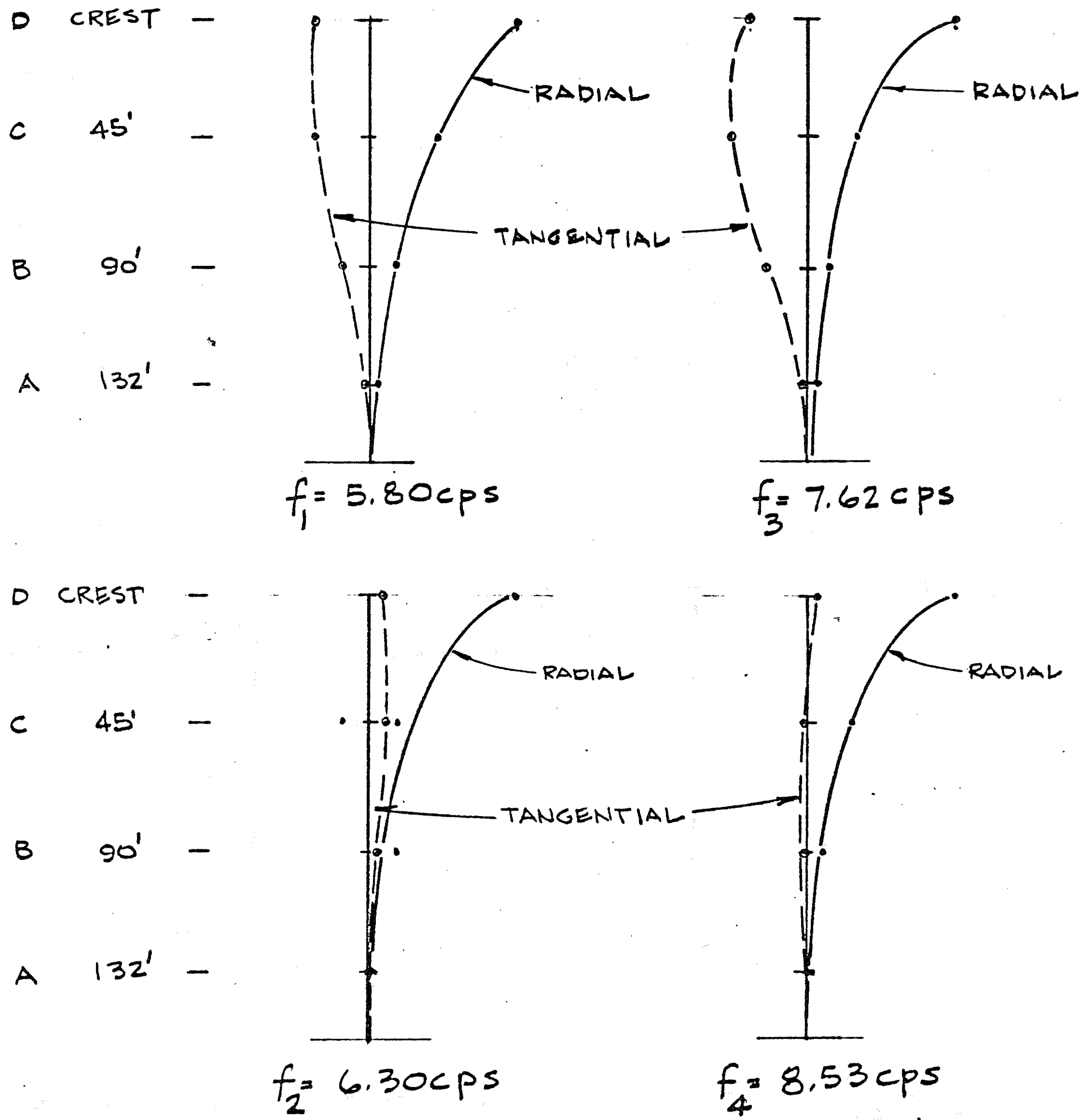


FIG 23 VERTICAL MODE-SHAPES
SECTION 8

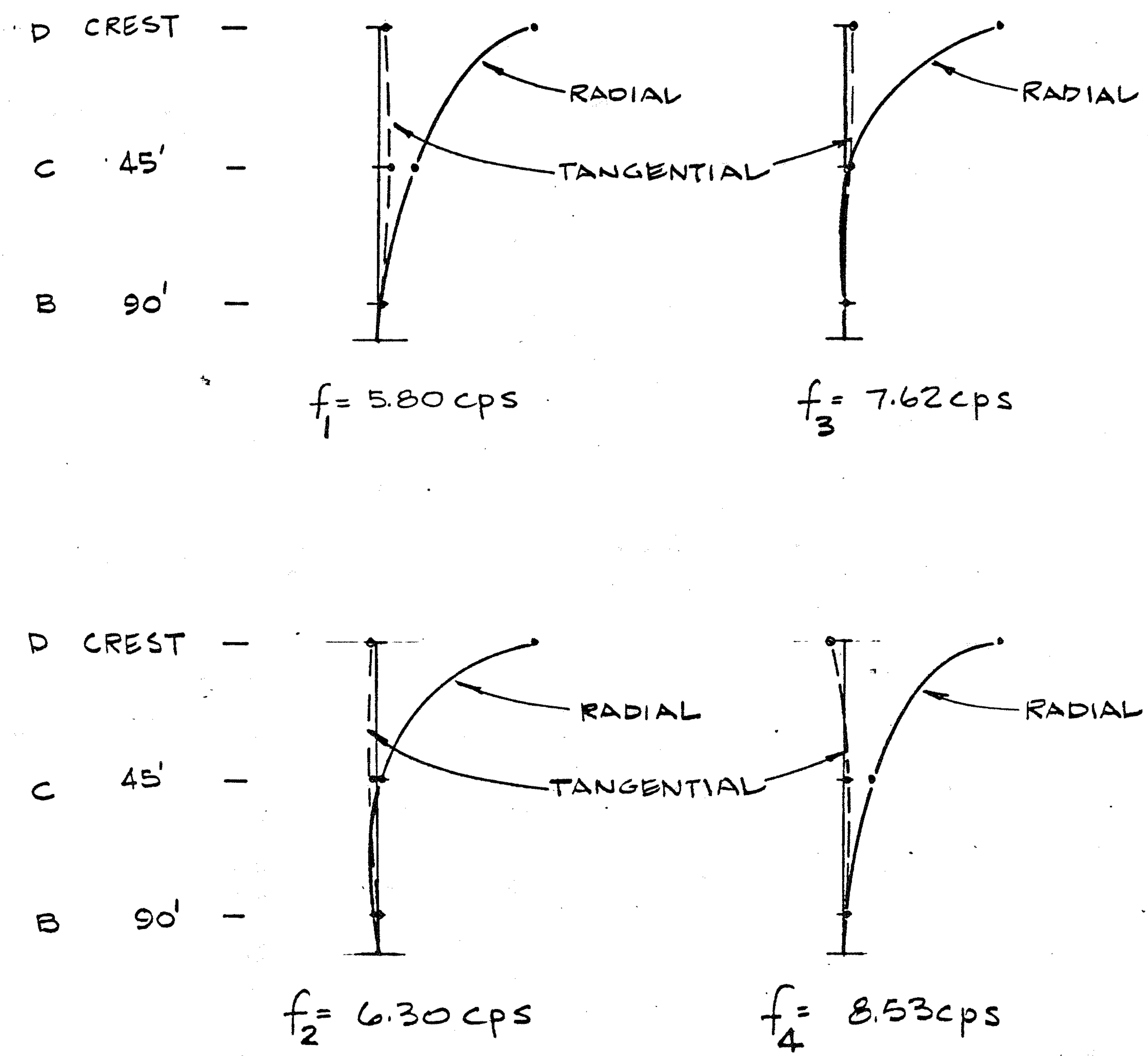


FIG 24 VERTICAL MODE-SHAPES
SECTION 10

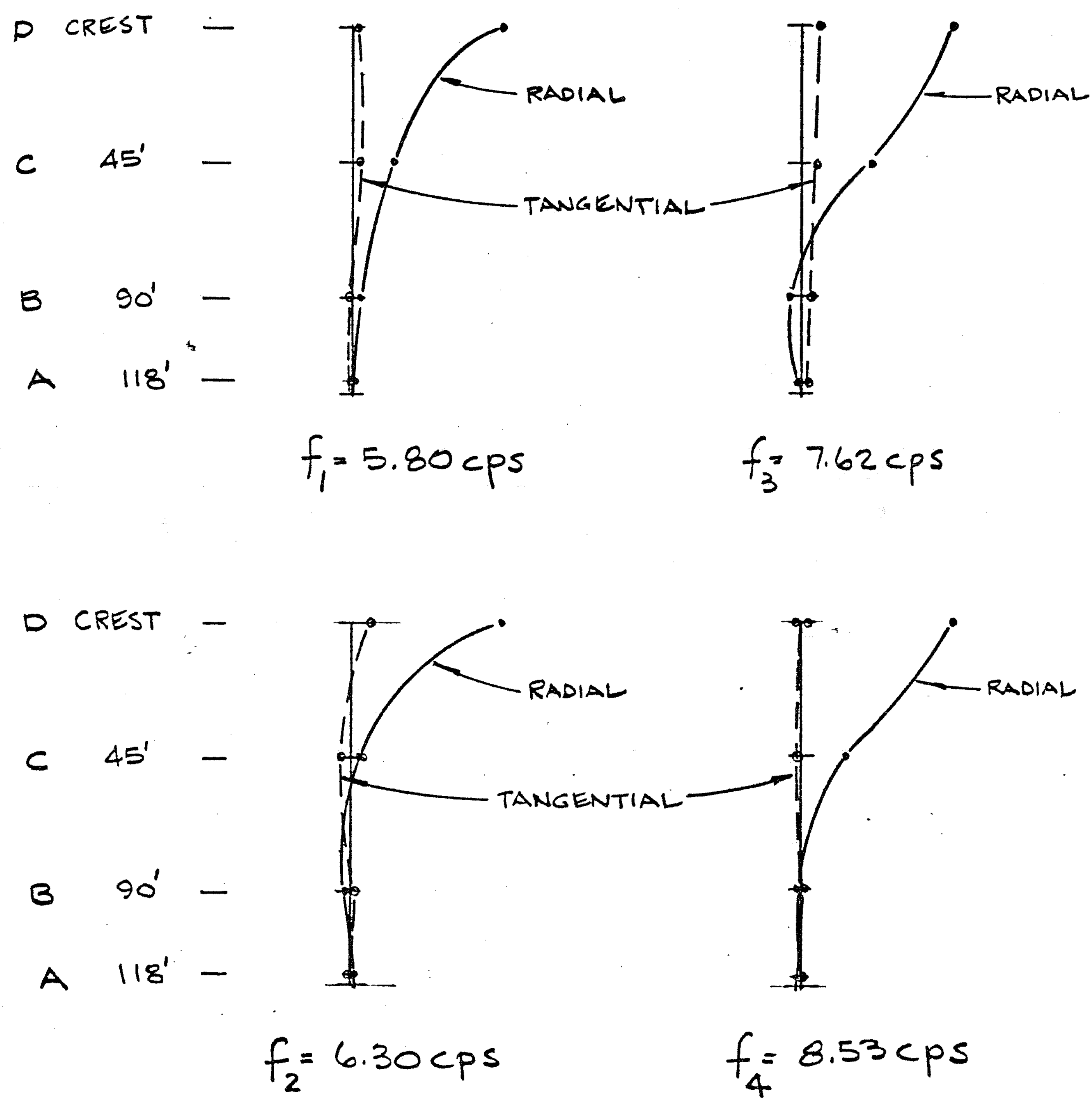


FIG 25 VERTICAL MODE-SHAPES
SECTION 6

TABLE I - RESULTS OF RESONANCE FREQUENCY SEARCH

Date: September 19, 1974

Roll: No. 2A and 3

Resonance frequency search:

Load = Empty two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
5.33	3.24	1.97×10^{-5}
5.42	3.67	2.08×10^{-5}
5.50	4.36	2.33×10^{-5}
5.58	5.17	2.61×10^{-5}
5.67	6.13	2.91×10^{-5}
5.75	7.24	3.24×10^{-5}
5.83	7.28	3.08×10^{-5}
5.92	6.55	2.61×10^{-5}
6.00	5.85	2.21×10^{-5}
6.08	5.15	1.85×10^{-5}
6.17	4.44	1.50×10^{-5}
6.25	3.50	1.12×10^{-5}
6.33	3.05	0.92×10^{-5}
6.42	2.38	0.68×10^{-5}
6.50	2.49	0.68×10^{-5}

TABLE I - CONT'D

Date: September 19, 1974

Roll: No. 3

Resonance frequency search:

Load = Empty two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
6.67	1.37	3.42×10^{-6}
6.75	.97	2.31×10^{-6}
6.83	.68	1.53×10^{-6}
6.92	.82	1.75×10^{-6}
7.00	1.36	2.77×10^{-6}
7.08	2.01	3.90×10^{-6}
7.17	2.69	4.96×10^{-6}
7.25	3.70	6.56×10^{-6}
7.33	4.87	8.27×10^{-6}
7.42	6.51	1.06×10^{-5}
7.50	7.32	1.13×10^{-5}
7.58	7.02	1.04×10^{-5}
7.67	6.49	0.91×10^{-5}
7.75	6.02	0.81×10^{-5}
7.83	5.50	0.71×10^{-5}
7.92	5.57	0.69×10^{-5}
8.00	4.89	0.58×10^{-5}

TABLE I - CONT'D

Date: September 19, 1974

Roll: No. 4

Resonance frequency search:

Load = S-1 two machines

Direction: radial out-of-phase

Accelerometer No. 3 located at Station No. 10

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
5.42	5.48	3.11×10^{-5}
5.50	6.35	3.40×10^{-5}
5.58	7.58	3.83×10^{-5}
5.63	8.30	4.04×10^{-5}
5.67	7.73	3.66×10^{-5}
5.70	9.65	4.47×10^{-5}
5.73	10.30	4.68×10^{-5}
5.77	10.65	4.70×10^{-5}
5.80	9.50	4.11×10^{-5}
5.83	10.55	4.47×10^{-5}
5.87	10.55	4.35×10^{-5}
5.90	10.43	4.21×10^{-5}
5.93	10.05	3.98×10^{-5}
5.97	9.70	3.74×10^{-5}
6.00	9.28	3.50×10^{-5}
6.03	8.90	3.29×10^{-5}
6.07	8.68	3.13×10^{-5}
6.10	8.20	2.90×10^{-5}
6.13	7.63	2.64×10^{-5}
6.17	7.42	2.51×10^{-5}
6.20	7.18	2.38×10^{-5}
6.23	6.75	2.19×10^{-5}

TABLE I - CONT'D

Date: September 19, 1974

Roll: No. 5

Resonance frequency search:

Load = Empty two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
7.17	2.26	4.18×10^{-6}
7.20	2.57	4.68×10^{-6}
7.23	2.76	4.94×10^{-6}
7.27	3.18	5.57×10^{-6}
7.30	3.35	5.77×10^{-6}
7.33	3.62	6.14×10^{-6}
7.37	3.98	6.60×10^{-6}
7.40	4.15	6.77×10^{-6}
7.42	4.15	6.70×10^{-6}
7.43	4.35	7.00×10^{-6}
7.47	4.61	7.25×10^{-6}
7.50	5.02	7.76×10^{-6}
7.53	5.05	7.69×10^{-6}
7.57	5.32	7.93×10^{-6}
7.58	5.32	7.89×10^{-6}
7.60	5.14	7.54×10^{-6}
7.63	5.61	8.10×10^{-6}
7.67	5.13	7.25×10^{-6}
7.75	4.84	6.57×10^{-6}
7.83	4.48	5.83×10^{-6}
7.92	4.07	5.06×10^{-6}
8.00	4.12	4.92×10^{-6}
8.00	3.92	4.68×10^{-6}
8.08	3.57	4.10×10^{-6}

TABLE I - CONT'D

Date: September 20, 1974

Roll: No. 6

Resonance frequency search:

Load = S-1 two machines

Direction: radial in-phase

Accelerometer No. 1 located at Station No. 8

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
5.97	2.33	8.98×10^{-6}
6.00	2.68	1.01×10^{-5}
6.03	2.90	1.07×10^{-5}
6.07	3.09	1.11×10^{-5}
6.10	3.70	1.31×10^{-5}
6.13	3.48	1.21×10^{-5}
6.17	4.23	1.43×10^{-5}
6.20	4.49	1.49×10^{-5}
6.23	5.14	1.67×10^{-5}
6.25	5.73	1.84×10^{-5}
6.27	5.80	1.84×10^{-5}
6.30	5.99	1.86×10^{-5}
6.33	5.85	1.78×10^{-5}
6.37	5.54	1.65×10^{-5}
6.40	5.01	1.46×10^{-5}
6.43	4.51	1.29×10^{-5}
6.47	4.04	1.13×10^{-5}
6.50	3.67	1.01×10^{-5}
6.53	3.40	9.15×10^{-6}
6.57	3.17	8.33×10^{-6}
6.60	2.96	7.63×10^{-6}
6.63	2.85	7.22×10^{-6}
6.67	2.69	6.65×10^{-6}

TABLE I - CONT'D

Date: September 20, 1974

Roll: No. 7A-8

Resonance frequency search:

Load = Empty two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
7.25	1.13	2.00×10^{-6}
7.27	1.24	2.17×10^{-6}
7.30	1.41	2.43×10^{-6}
7.33	1.66	2.81×10^{-6}
7.37	1.70	2.82×10^{-6}
7.42	2.16	3.49×10^{-6}
7.50	2.51	3.88×10^{-6}
7.53	2.61	3.97×10^{-6}
7.57	2.72	4.05×10^{-6}
7.60	2.82	4.14×10^{-6}
7.63	2.81	4.06×10^{-6}
7.67	2.74	3.87×10^{-6}
7.70	2.66	3.70×10^{-6}
7.73	2.76	3.78×10^{-6}
7.77	2.57	3.45×10^{-6}
7.80	2.64	3.49×10^{-6}
7.83	2.53	3.29×10^{-6}
7.92	2.38	2.96×10^{-6}
8.00	1.75	2.09×10^{-6}

TABLE I - CONT'D

Date: September 20

Roll: No 8 and 9

Resonance frequency search:

Load = S-1 two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
5.17	4.71	3.23×10^{-5}
5.25	5.37	3.46×10^{-5}
5.33	6.15	3.73×10^{-5}
5.42	7.20	4.08×10^{-5}
5.50	8.70	4.65×10^{-5}
5.58	10.38	5.24×10^{-5}
5.67	12.50	5.92×10^{-5}
5.70	13.28	6.16×10^{-5}
5.73	14.03	6.37×10^{-5}
5.77	14.20	6.27×10^{-5}
5.80	13.85	5.99×10^{-5}
5.83	13.85	5.87×10^{-5}
5.87	13.55	5.59×10^{-5}
5.90	13.10	5.29×10^{-5}
5.92	12.85	5.12×10^{-5}
5.93	12.85	5.09×10^{-5}
5.97	12.30	4.74×10^{-5}
6.00	11.80	4.46×10^{-5}
6.08	10.40	3.72×10^{-5}
6.08	10.55	3.78×10^{-5}
6.25	8.80	2.82×10^{-5}
6.33	6.80	2.07×10^{-5}
6.42	6.63	1.91×10^{-5}
6.50	5.98	1.64×10^{-5}

TABLE I - CONT'D

Date: September 30, 1974

Roll: No. 17

Resonance frequency search:

Load = S-1 two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
5.50	8.34	4.46×10^{-5}
5.53	8.98	4.70×10^{-5}
5.57	9.60	4.88×10^{-5}
5.60	10.33	5.14×10^{-5}
5.63	10.95	5.33×10^{-5}
5.67	11.85	5.61×10^{-5}
5.70	12.65	5.86×15^{-5}
5.73	13.12	5.96×10^{-5}
5.77	13.22	5.8×10^{-5}
5.80	13.15	5.59×10^{-5}
5.83	13.05	5.53×10^{-5}
5.87	12.80	5.28×10^{-5}
5.90	12.68	5.12×10^{-5}
5.93	12.20	4.83×10^{-5}
5.97	11.90	4.58×10^{-5}
6.00	11.52	4.35×10^{-5}
6.07	10.52	3.79×10^{-5}
6.13	9.10	3.15×10^{-5}
6.20	7.78	2.58×10^{-5}
6.27	6.95	4.41×10^{-5}

TABLE I - CONT'D

Date: September 30, 1974

Roll: No. 17 and 18

Resonance frequency search:

Load = S-1 two machines

Direction: radial in-phase

Accelerometer No. 1 located at Station No. 8

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
6.00	3.66	1.38×10^{-5}
6.07	4.31	1.55×10^{-5}
6.13	4.96	1.72×10^{-5}
6.20	5.61	1.86×10^{-5}
6.23	6.00	1.95×10^{-5}
6.27	6.58	2.08×10^{-5}
6.30	6.81	2.12×10^{-5}
6.33	6.73	2.05×10^{-5}
6.37	6.18	1.84×10^{-5}
6.37	6.22	1.85×10^{-5}
6.40	5.37	1.57×10^{-5}
6.47	4.35	1.21×10^{-5}
6.53	3.51	9.45×10^{-6}
6.60	3.01	7.76×10^{-6}

TABLE I - CONT'D

Date: September 30, 1974

Roll: No. 18

Resonance frequency search:

Load = Empty two machines

Direction: radial in-phase

Accelerometer No. 1 located at Station No. 8

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
8.20	8.85	0.95×10^{-5}
8.27	9.73	1.01×10^{-5}
8.33	10.88	1.11×10^{-5}
8.40	11.73	1.15×10^{-5}
8.47	12.20	1.16×10^{-5}
8.50	12.40	1.16×10^{-5}
8.53	12.33	1.14×10^{-5}
8.57	12.28	1.11×10^{-5}
8.60	12.35	1.10×10^{-5}
8.63	12.20	1.08×10^{-5}
8.67	11.88	1.03×10^{-5}
8.73	11.55	9.73×10^{-6}
8.80	11.30	9.22×10^{-6}
8.87	11.20	8.85×10^{-6}
8.93	10.65	8.20×10^{-6}
9.00	10.35	7.72×10^{-6}

TABLE I - CONT'D

Date: October 1, 1974

Roll: No. 20 and 21

Resonance frequency search:

Load = Empty two machines

Direction: radial in-phase

Accelerometer No. 1 located at Station No. 8

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
7.87	4.65	5.93×10^{-6}
7.93	5.46	6.76×10^{-6}
8.00	6.51	7.78×10^{-6}
8.07	7.78	8.98×10^{-6}
8.13	9.05	1.01×10^{-5}
8.20	10.28	1.11×10^{-5}
8.27	11.45	1.20×10^{-5}
8.33	12.18	1.24×10^{-5}
8.40	12.78	1.26×10^{-5}
8.47	12.83	1.22×10^{-5}
8.53	12.70	1.17×10^{-5}
8.60	12.25	1.10×10^{-5}
8.67	11.78	1.02×10^{-5}
8.73	11.50	9.69×10^{-6}
8.80	11.18	9.12×10^{-6}
8.87	10.90	8.62×10^{-6}
8.93	10.63	8.18×10^{-6}
9.00	10.48	7.82×10^{-6}
9.07	10.30	7.45×10^{-6}
9.13	10.15	7.15×10^{-6}
9.20	10.13	6.92×10^{-6}
9.33	10.15	6.55×10^{-6}

TABLE I - CONT'D

Date: October 1, 1974

Roll: No. 22

Resonance frequency search:

Load = Empty two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
7.20	.84	1.53×10^{-6}
7.27	1.25	2.19×10^{-6}
7.33	1.69	2.86×10^{-6}
7.40	2.25	3.67×10^{-6}
7.47	2.87	4.51×10^{-6}
7.53	3.26	4.96×10^{-6}
7.60	3.26	4.78×10^{-6}
7.67	3.21	4.54×10^{-6}
7.73	2.09	2.86×10^{-6}
7.80	1.95	2.58×10^{-6}
7.87	1.69	2.16×10^{-6}
7.93	1.40	1.73×10^{-6}
8.00	1.60	1.91×10^{-6}

TABLE I - CONT'D

Date: October 1, 1974

Roll: No. 23

Resonance frequency search:

Load = Empty two machines

Direction: radial out-of-phase

Accelerometer No. 4 located at Station No. 6

Frequency in cps.	Double Amplitude Acceleration Reading X.001 g	Normalized Single Amplitude Displacement (inches)
7.50	1.83	2.83×10^{-6}
7.53	1.95	2.97×10^{-6}
7.57	2.06	3.07×10^{-6}
7.60	2.23	3.27×10^{-6}
7.62	2.27	3.29×10^{-6}
7.63	2.11	3.05×10^{-6}
7.65	2.19	3.13×10^{-6}
7.67	2.32	3.28×10^{-6}
7.70	2.11	2.94×10^{-6}
7.73	2.39	3.28×10^{-6}
7.77	2.25	3.02×10^{-6}
7.77	2.06	2.77×10^{-6}
7.80	2.16	2.86×10^{-6}
7.83	1.80	2.34×10^{-6}

TABLE II - MODE SHAPE DATA

Date: September 25, 1974

Roll No: 11 and 12

Relative Calibration (Run 1) 1:05 P.M.

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc.					180° Out-of-Phase						In-Phase						AVG.
	Shunt				@ 1740 cts(S-1)			@ 2240 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)			
No.	INIT. 11:40AM	FINAL 1:05PM	AVG.	REL.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	M.F.
1	1.97	1.93	1.95	.94	15.05	1.06	.89	1.95	1.06	.89	3.52	1.03	.91	20.30	1.16	.81	0.88
2	1.17	1.16	1.16	.56	15.33	1.08	.52	1.78	.97	.58	3.22	.94	.60	20.75	1.18	.47	0.54
3	2.23	2.21	2.22	1.07	17.25	1.22	.88	1.96	1.07	1.00	3.51	1.03	1.04	19.85	1.13	.95	0.97
4	2.10	2.07	2.08	1.00	14.13	1.00	1.00	1.84	1.00	1.00	3.41	1.00	1.00	17.55	1.00	1.00	1.00
5	1.43	1.43	1.43	.69	14.85	1.05	.66	2.01	1.09	.63	3.78	1.11	.62	19.80	1.13	.61	0.63
6	2.07	2.07	2.07	1.00	15.33	1.08	.93	2.17	1.18	.85	3.95	1.16	.86	20.85	1.19	.84	0.87
7	2.25	2.25	2.25	1.03	13.93	.99	1.09	1.89	1.03	1.05	3.63	1.06	1.02	17.40	.99	1.09	1.07
8	0.92	2.29	2.29	1.10	14.90	1.05	1.05	2.20	1.20	.92	3.95	1.16	.95	20.50	1.17	.94	0.96

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II (Continued)

Date: September 25, 1974

Roll No: 12 and 13

Crest Mode Shape - Set-up No. 2

Calibration Factors

ACC NO.	INITIAL SHUNT 2:15 P.M.	FINAL SHUNT 4:15 P.M.	AVG. SHUNT	REL SHUNT	AVG. M. F.	C.F.
1	1.97	1.96	1.96	.94	.88	.94
2	1.17	1.18	1.18	.56	.54	.96
3	2.22	2.22	2.22	1.06	.97	.92
4	2.08	2.07	2.08	1.00	1.00	1.00
5	1.45	1.44	1.44	.69	.63	.91
6	2.09	2.06	2.08	1.00	.87	.87
7	2.25	2.23	2.24	1.08	1.07	.99
8	2.29	2.28	2.28	1.10	.96	.87

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes - Radial)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8	.94	-5.44	-1.44	-1.35	-13.6	-0.86	- .81
2	12	.95	.14	.04	.04	+ 1.64	+0.10	+ .10
3	10	.91	10.00	2.65	2.41	+30.4	+1.93	+1.78
4	6	1.00	3.78	1.00	1.00	+15.75	+1.00	+1.00
5	11	.91	3.32	0.88	.80	+15.98	+1.01	+ .92
6	9	.87	6.74	1.78	1.55	+ 5.15	+0.33	+ .29
7	7	.99	-3.44	-0.91	- .90	+ 8.43	+0.54	+ .53
8	5	.87	3.70	0.98	.85	±14.65	±0.93	± .81

Adj. Read = (C. F.) x (rel. read)

TABLE II - Continued

Date: September 25, 1974

Crest Mode Shape - Set-up No. 2 (cont'd)

Adjusted Relative Amplitude (Symmetrical Modes - Tangential)

ACCELEROMETER			@ 2560 cts (Empty)			@ 1890 cts (S-1)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.94	-.19	-.01	-.01	-.73	-.19	-.18
2	12	.96	.73	.05	-.05	±.17	±.04	±.04
3	10	.92	+.63	+.04	+.04	-.34	-.09	-.08
4	6	1.00	+1.07	+.07	+.07	+.75	+.20	+.20
5	11	.91	-1.46	-.09	-.08	+.52	+.14	+.13
6	9	.87	+2.19	+0.14	+.12	-.80	-.21	-.18
7	7	.99	-1.4	-.09	-.09	+.55	+.15	+.15
8	5	.87	+2.41	+.15	+.13	+.33	+.09	+.08
9	6R	1.00	+15.75	+1.00	+1.00	+3.78	+1.00	+1.00

R = Radial

TABLE II - (Continued)

Date: September 25, 1974

Crest Mode Shape - Set-up No. 2 (Continued)

Adjusted Relative Amplitude (Anti-symmetrical Modes-Radial)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2240 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.94	-5.50	-0.42	- .39	∓1.19	∓ .53	∓ .50
2	12	.95	+ .09	+0.01	+ .01	± .27	± .12	± .11
3	10	.91	-8.55	- .65	- .59	+5.84	+2.58	+2.35
4	6	1.00	+13.25	1.00	+1.00	+2.26	1.00	+1.00
5	11	.91	-2.00	- .15	- .14	±3.16	±1.40	±1.27
6	9	.87	-12.93	- .98	- .85	∓2.72	∓1.20	∓1.04
7	7	.99	+7.42	.56	+ .55	±3.68	±1.63	±1.61
8	5	.87	+7.75	.58	+ .50	±1.65	±0.73	± .64

Adjusted Relative Amplitude (Anti-Symmetrical Modes - Tangential)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2240 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.94	+ 2.38	+ .18	+ .17	+ .6	+ .27	+ .25
2	12	.95	- .11	- .01	+ .15	+ .07	.07	.07
3	10	.91	- .76	- .06	- .05	+ .15	.07	.06
4	6	1.00	+ 1.2	+ .09	+ .09	+ .22	+ .10	+ .10
5	11	.91	- .3	- .02	- .02	+ .35	+ .15	+ .14
6	9	.87	+ 2.12	+ .16	+ .14	+ .27	+ .12	+ .10
7	7	.99	+ 2.05	+ .15	+ .15	+ .44	+ .19	+ .19
8	5	.87	- .25	- .02	- .02	- .08	- .04	- .03
9	6R	1.00	+13.25	+1.00	+1.00	2.26	+1.00	+1.00

R = Radial

TABLE II - (Continued)

Date: September 25, 1974

Roll No: 13

Crest Mode Shape - Set-up No. 3

Calibration Factors

ACC NO.	INITIAL SHUNT 4:15 P.M.	FINAL SHUNT 6:30 P.M.	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.96	1.96	1.96	.95	.88	.93
2	1.18	1.17	1.18	.57	.54	.95
3	2.22	2.20	2.21	1.07	.97	.91
4	2.07	2.06	2.06	1.00	1.00	1.00
5	1.44	1.43	1.44	.70	.63	.90
6	2.06	2.08	2.07	1.01	.87	.86
7	2.23	2.25	2.24	1.09	1.07	.98
8	2.28	2.29	2.28	1.11	.96	.86

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8	.93	∓5.38	∓1.12	∓1.04			
2	13	.95	0	0	0			
3	10	.91	+9.55	+1.99	+1.81			
4	6	1.00	+4.81	+1.00	+1.00		*	
5	4	.90	±1.30	±0.27	± .24			
6	3	.86	-0.30	-0.06	- .05			
7	2	.98	0	0	0			
8	1	.86	0	0	0			

Adj. Read = (C. F.) x (rel. read)
*Motor burned out just prior to taking readings.

TABLE II - (Continued)

Date: September 25, 1974

Crest Mode Shape - Set-up No. 3. (cont'd)

Adjusted Relative Amplitude (Symmetrical Modes - Tangential)

ACCELEROMETER			@,1890 cts(S-1)			@2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.93	+.63	+.13	+.12	1.89	-0.12	-.11
2	13	.95	-.02	-0	-0	.07	0	0
3	10	.91	-.28	-.06	-.05	.22	+.01	±.01
4	6	1.00	+.55	+.11	+.11	1.31	+.08	+.08
5	4	.90	∓.17	∓.04	∓.04	-1.01	-.08	-.06
6	3	.86	±.05	±.01	±.01	-.54	-.03	-.03
7	2	.98	+ 0	0	0	-.16	-.01	-.01
8	1	.86	- 0	0	0	-.09	-.01	-.01
9	6R	1.00	+4.81	+1.00	+1.00	+15.75	+1.00	+1.00

R = Radial

TABLE II - (Continued)

Date: September 25, 1974

Crest Mode Shape - Set-up No. 3 (Continued)

Adjusted Relative Amplitude (Anti-symmetrical Modes - Radial)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2240 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.93	-5.59	-0.44	- .41	±1.20	± .63	± .59
2	13	.95	0	0	0	0	0	0
3	10	.91	-8.75	-0.68	- .62	-3.12	-1.63	-1.48
4	6	1.00	+12.8	+1.00	+1.00	+1.92	1.00	+1.00
5	4	.90	+1.15	+0.09	+ .08	+1.04	.54	+ .49
6	3	.86	- .29	-0.02	- .02	+ .11	.06	+ .05
7	2	.98	- .03	-0.00	- 0	0	0	0
8	1	.86	0	0	0	0	0	0

Adjusted Relative Amplitude (Anti-Symmetrical Modes - Tangential)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2240 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.93	+2.47	+ .19	+ .18	- .66	- .34	- .32
2	13	.95	-	-	-	-	-	-
3	10	.91	+ .18	+ .01	+ .01	+ .12	+ .06	+ .05
4	6	1.00	+1.4	+ .11	+ .11	+ .12	+ .06	+ .06
5	4	.90	- .37	- .03	- .03	- .10	- .05	- .05
6	3	.86	- .16	- .01	- .01	- .07	- .04	- .03
7	2	.98	- .07	- .01	- .01	-	-	-
8	1	.86	-	-	-	-	-	-
9	6R	1.00	+12.80	+1.00	+1.00	+1.92	+1.00	+1.00

R = Radial

TABLE II (Continued)

Date: September 30, 1974

Roll No: 15 and 16

Relative Calibration (Run 4) 1:45 P.M.

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc. No.	Shunt P. M.				180° Out-of-Phase						In-Phase					
					@ 1740 cts(S-1)			@ 2240 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
	INIT. 1:15 PM	FINAL 1:45 PM	AVG.	REL.	DYN READ	REL. DYN	M.F.	DYN READ	REL. DYN	M.F.	DYN READ.	REL. DYN	M.F.	DYN READ	REL. DYN.	M.F.
1	1.97	1.94	1.96	.96	14.53	1.07	.90	2.05	1.01	.95	4.19	1.06	.91	18.45	1.20	.80
2	1.16	1.17	1.16	.57	14.90	1.09	.52	2.18	1.07	.53	4.31	1.09	.52	18.80	1.22	.47
3	2.18	2.17	2.18	1.06	14.08	1.03	1.03	2.12	1.04	1.02	4.14	1.04	1.02	17.70	1.15	.92
4	2.06	2.04	2.05	1.00	13.63	1.00	1.00	2.03	1.00	1.00	3.97	1.00	1.00	15.40	1.00	1.00
5	1.42	1.40	1.41	.69	14.53	1.07	.64	2.27	1.12	.62	4.32	1.00	.63	17.30	1.12	.62
6	2.04	2.03	2.04	1.00	14.92	1.09	.92	2.46	1.21	.83	4.47	1.13	.88	18.15	1.18	.85
7	2.20	2.20	2.20	1.07	13.28	.97	1.10	2.13	1.05	1.02	4.06	1.02	1.04	14.80	.96	1.11
8	2.24	2.23	2.24	1.09	14.12	1.04	1.05	2.51	1.24	.88	4.46	1.12	.97	18.15	1.18	.92

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II (Continued)

Date: September 30, 1974

Roll No: 19

Relative Calibration (Run 8) 5:55 PM

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc.					180° Out-of-Phase						In-Phase						Av for Day
	Shunt P. M.				@ 1740 cts(S-1)			@ 2240 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)			M.F.
No.	INIT. 5:30 PM	FINAL 5:55 PM	AVG.	REL.	DYN. READ	REL. DYN.	M.F.	DYN READ	REL. DYN.	M.F.	DYN READ	REL. DYN	M.F.	DYN. READ.	REL. DYN.	M.F.	M.F.
1	1.96	1.95	1.96	.95	14.03	1.10	.86	1.79	1.12	.85	3.43	1.12	.85	19.80	1.24	.77	0.86
2	1.16	1.14	1.15	.56	13.33	1.05	.53	1.70	1.06	.53	2.93	.96	.58	18.35	1.15	.49	0.52
3	2.17	2.17	2.17	1.05	13.50	1.06	.99	1.72	1.08	.97	3.22	1.06	.99	18.75	1.17	.90	0.98
4	2.05	2.06	2.06	1.00	12.75	1.00	1.00	1.60	1.00	1.00	3.05	1.00	1.00	16.00	1.00	1.00	1.00
5	1.41	1.41	1.41	.68	13.45	1.05	.65	1.78	1.11	.61	3.35	1.10	.62	18.05	1.13	.60	0.62
6	2.04	2.03	2.04	.99	13.85	1.09	.91	1.92	1.20	.83	3.45	1.13	.88	19.05	1.19	.83	0.87
7	2.17	2.19	2.18	1.06	12.28	.96	1.10	1.58	.99	1.07	3.05	1.00	1.06	15.10	.94	1.13	1.08
8	2.23	2.23	2.23	1.08	13.63	1.07	1.01	1.96	1.23	.88	3.47	1.14	.95	19.45	1.22	.89	0.94

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II - (Continued)

Date: September 30, 1974

Roll No: 16

Crest Mode Shape - Set-up No. 5

Calibration Factors

ACC NO.	INITIAL SHUNT 2:10 pm	FINAL SHUNT 2:55 pm	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.97	1.96	1.96	.95	.86	.91
2	1.17	1.16	1.16	.56	.52	.93
3	2.17	2.18	2.18	1.06	0.98	.92
4	2.07	2.05	2.06	1.00	1.00	1.00
5	1.42	1.40	1.41	.68	.62	.91
6	2.05	2.03	2.04	.99	.87	.88
7	2.22	2.21	2.22	1.08	1.08	1.00
8	2.25	2.25	2.25	1.09	.94	.86

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8R	.91	-5.35	-1.58	-1.44	-12.58	- .77	- .70
2	8T	.93	- .92	- .27	- .25	- 1.25	- .08	- .07
3	3½R	.92	± .73	± .22	± .20	-11.8	- .72	- .66
4	6R	1.00	+3.39	+1.00	+1.00	+16.28	+1.00	+1.00
5	4R	.91	±1.51	± .45	± .41	-17.88	-1.10	-1.00
6	3R	.88	± .23	± .07	± .06	- 4.28	- .26	- .23
7	2R	1.00	0	0	0	0	0	0
8	1R	.86	0	0	0	0	0	0

Adj. Read = (C. F.) x (rel. read)

R = Radial T = Tangential

Date: September 30, 1974

Crest Mode Shape - Set-up No. 5 (cont'd)

Adjusted Relative Amplitude (Anti-symmetrical Modes)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2240 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8R	.94	-5.28	-.39	-.35	±1.16	±.67	±.61
2	8T	.93	+1.76	+.13	+.11	∓.53	∓.30	∓.28
3	3 1/2	.92	∓.33	∓.02	∓.02	±.25	±.14	±.13
4	6R	1.00	+13.58	1.00	+1.00	+1.74	1.00	1.00
5	4R	.91	+1.21	+.09	+.08	+.53	+.30	+.27
6	3R	.88	-.31	-.02	-.02	-.11	-.06	-.05
7	2R	1.00	0	0	0	0	0	0
8	1R	.86	0	0	0	0	0	0

R = Radial T = Tangential

TABLE II - Continued

Date: September 30, 1974

Roll No: 17 and 18

Crest Mode Shape - Set-up No. 6

Calibration Factors

ACC NO.	INITIAL SHUNT 2:55 pm	FINAL SHUNT 5:15 pm	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.96	1.95	1.95	.94	.86	.91
2	1.17	1.16	1.16	.56	.52	.93
3	2.18	2.18	2.18	1.05	0.88	.93
4	2.07	2.07	2.07	1.00	1.00	1.00
5	1.43	1.42	1.42	.69	.62	.90
6	2.04	2.09	2.06	1.00	.87	.87
7	2.19	2.22	2.20	1.06	1.08	1.02
8	2.27	2.24	2.26	1.09	.94	.86

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8R	.91	-6.81	-1.42	-1.29	-12.40	- .81	- .74
2	8T	.93	-0.55	- .11	- .10	- 0.30	- .02	- .02
3	3½R	.93	±0.89	± .19	+ .18	-10.83	- .71	- .66
4	6R	1.00	+4.79	+1.00	+1.00	+15.30	1.00	1.00
5	4R	.90	±1.79	± .37	± .33	-16.73	-1.09	- .98
6	3R	.87	-0.33	- .07	- .06	- 4.01	-0.26	- .23
7	6T	1.02	+0.76	+ .16	+ .16	± 0.84	±0.05	+ .05
8	5R	.86	+4.21	+ .88	+ .76	∓13.35	∓ .87	∓ .75

Adj. Read = (C. F.) x (rel. read) R = Radial T = Tangential

Date: September 30, 1974

Crest Mode Shape - Set-up No. 6 (Cont'd)

Adjusted Relative Amplitude (Anti-symmetrical Modes)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2240 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8R	.91	-4.88	-.37	-.34	+1.12	±.65	±.59
2	8T	.93	+2.12	+.16	+.15	∓.54	∓.31	∓.29
3	3 1/2R	.93	±0.33	±.03	±.03	+.19	+.11	+.10
4	6R	1.00	+13.12	+1.00	+1.00	+1.73	1.00	+1.00
5	4R	.90	+1.11	+.08	+.07	+.46	+.27	+.24
6	3R	.87	-0.29	-.02	-.02	+.08	+.05	+.04
7	6T	1.02	+1.54	+.12	+.12	+.14	+.08	+.08
8	5R	.85	+7.51	+.57	+.49	+1.66	+.96	+.83

R = Radial T = Tangential

TABLE II - (Continued)

Date: September 30, 1974

Crest Mode Shape - Set-up No. 7 (Cont'd)

Adjusted Relative Amplitude (Symmetrical Modes - Radial)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	7 1/2R*	.91	-3.09	-1.74	-1.58	-6.59	-.41	-.37
2	7 1/2R*	.93	-3.18	-1.79	-1.66	-6.06	-.38	-.35
3	6R	1.00	+1.78	+1.00	+1.00	+15.93	1.00	1.00

R = Radial

* One accelerometer was placed on each side of a construction joint.

TABLE II (Continued)

Date: October 1, 1974

Roll No: 20

Relative Calibration (Run 9) 10:06 A.M.

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc. No.	Shunt A. M.				180° Out-of-Phase @ 1740 cts(S-1)			180° Out-of-Phase @ 2240 cts(Empty)			In-Phase @ 1890 cts(S-1)			In-Phase @ 2560 cts(Empty)		
	INIT. 9:30 AM	FINAL 10:06AM	AVG.	REL.	DYN READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.
1	1.89	1.89	1.89	.95	13.68	1.08	.88	1.86	1.07	.89	4.85	1.06	.90	16.30	1.18	.81
2	1.14	1.14	1.14	.57	13.98	1.10	.52	1.91	1.10	.52	4.91	1.07	.53	16.30	1.18	.48
3	2.15	2.16	2.16	1.08	13.45	1.06	1.02	1.90	1.09	.99	4.74	1.03	1.05	16.05	1.16	.93
4	2.00	2.00	2.00	1.00	12.68	1.00	1.00	1.74	1.00	1.00	4.59	1.00	1.00	13.85	1.00	1.00
5	1.38	1.40	1.39	.70	13.43	1.06	.66	1.97	1.13	.62	4.93	1.07	.65	15.60	1.13	.62
6	2.04	2.03	2.04	1.02	14.10	1.11	.92	2.21	1.27	.80	5.20	1.13	.90	16.65	1.20	.85
7	2.18	2.20	2.19	1.10	12.58	.99	1.11	1.86	1.07	1.03	4.67	1.02	1.08	13.25	.96	1.15
8	2.23	2.24	2.24	1.12	14.10	1.11	1.01	2.35	1.35	.83	5.28	1.15	.97	16.75	1.21	.93

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II (Continued)

Date: October 1, 1974

Roll No: 24

Relative Calibration (Run 14) 6:20 P.M.

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc.	Shunt P. M.				180° Out-of-Phase						In-Phase						Av for Day
					@ 1740 cts(S-1)			@ 2285 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)			
No.	INIT. 6:00 AM	FINAL 6:20PM	AVG.	REL	DYN. READ.	REL. DYN	M.F.	READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	M.F.
1	1.87	1.87	1.87	.94	13.43	1.07	.88	1.82	1.09	.86	5.35	1.08	.87	17.55	1.20	.78	.86
2	1.14	1.13	1.14	.57	14.22	1.14	.50	2.03	1.22	.47	5.75	1.16	.49	19.55	1.33	.43	.49
3	2.15	2.14	2.14	1.07	13.22	1.06	1.01	1.85	1.11	.96	5.31	1.07	1.00	17.20	1.17	.91	.98
4	2.01	2.00	2.00	1.00	12.50	1.00	1.00	1.67	1.00	1.00	4.95	1.00	1.00	14.65	1.00	1.00	1.00
5	1.40	1.39	1.40	.70	13.15	1.05	.67	1.92	1.15	.61	5.43	1.10	.64	16.25	1.11	.63	.64
6	2.05	2.04	2.04	1.02	13.78	1.10	.93	2.07	1.24	.82	5.66	1.14	.89	17.50	1.19	.86	.87
7	2.19	2.19	2.19	1.10	12.40	.99	1.11	1.74	1.04	1.06	5.00	1.01	1.09	13.90	.95	1.16	1.10
8	2.25	2.23	2.24	1.12	13.70	1.10	1.02	2.17	1.30	.86	5.75	1.16	.97	17.60	1.20	.93	.94

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II - (Continued)

Date: October 1, 1974

Roll No: 21

Crest Mode Shape - Set-up No. 10

Calibration Factors

ACC NO.	INITIAL SHUNT	FINAL SHUNT	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.89	1.89	1.89	.95	.86	.91
2	1.13	1.14	1.14	.57	.49	.86
3	2.14	2.15	2.14	1.07	.98	.92
4	2.01	2.00	2.00	1.00	1.00	1.00
5	1.39	1.38	1.38	.69	.64	.93
6	2.03	2.04	2.04	1.02	.87	.85
7	2.19	2.18	2.18	1.09	1.10	1.01
8	2.25	2.23	2.24	1.12	.94	.84

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes)

ACCELEROMETER			@ 1890 cts (S-1)			@ 2560 cts (Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8R	.91		*		-12.55	- .86	- .78
2	8T	.86				+ 0	0	0
3	7½R	192				- 5.62	- .38	- .35
4	6R	1.00				+14.60	1.00	+1.00
5	6T	.93				± .82	± .06	± .06
6	6½R	.85				+18.88	+1.29	+1.10
7	7R	1.01				+ 7.75	+ .53	+ .54
8	5½R	.84				+ 9.00	+ .62	+ .52

Adj. Read = (C. F.) x (rel. read)

* No data taken on this run. R = Radial T = Tangential

TABLE II - (Continued)

Date: October 1, 1974

Roll No: 24

Crest Mode Shape - Set-up No. 12

Calibration Factors

ACC NO.	INITIAL SHUNT 3:30 pm	FINAL SHUNT 5:45 pm	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.87	1.87	1.87	.93	.86	.92
2	1.14	1.14	1.14	.57	.49	.86
3	2.16	2.15	2.16	1.07	.98	.92
4	2.01	2.01	2.01	1.00	1.00	1.00
5	1.40	1.39	1.40	.70	.64	.91
6	2.04	2.04	2.04	1.01	.87	.86
7	2.21	2.19	2.20	1.09	1.10	1.01
8	2.27	2.25	2.26	1.12	.94	.84

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Anti-Symmetrical Modes)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8R	.92	- 5.31	- .42	- .39	±1.41	± .72	± .66
2	8T	.86	2.25	.18	+ .15	± .67	± .34	± .29
3	7½R	.92	1.65	.13	+ .12	-2.12	-1.08	- .99
4	6R	1.00	12.78	1.00	+1.00	+1.97	+1.00	+1.00
5	6T	.91	1.53	.12	+ .11	+ .22	+ .11	+ .10
6	6½R	.86	12.43	.97	+ .83	-3.72	-1.89	-1.63
7	7R	1.01	7.15	.56	+ .57	-4.01	-2.04	-2.06
8	5½R	.84	11.35	.89	+ .75	+3.12	+1.58	+1.33

Adj. Read = (C. F.) x (rel. read) R = Radial T = Tangential

TABLE II - (Continued)

Date: October 1, 1974

Roll No: 24

Crest Mode Shape - Set-up No. 13

Calibration Factors

ACC NO.	INITIAL SHUNT	FINAL SHUNT	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.87	1.87	1.87	.93	.86	.92
2	1.14	1.14	1.14	.57	.49	.86
3	2.16	2.15	2.16	1.07	.98	.92
4	2.01	2.01	2.01	1.00	1.00	1.00
5	1.40	1.39	1.40	.70	.64	.91
6	2.04	2.04	2.14	1.01	.87	.86
7	2.21	2.19	2.20	1.09	1.10	1.01
8	2.27	2.25	2.26	1.12	.94	.84

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes-Radial)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ. READ
1	8	.92	+ 4.41	∓1.09	∓1.00	-12.20	- .84	- .77
2	11	.86	+ 3.33	+ .83	+ .71	+15.38	+1.05	+ .90
3	10	.92	+10.00	+2.48	+2.28	+25.75	+1.77	+1.63
4	6	1.00	+ 4.03	+1.00	+1.00	+14.58	+1.00	+1.00
5	9	.91	+ 6.35	+1.58	+1.44	+ 4.88	+ .33	+ .30
6	5	.86	+ 3.21	+ .80	+ .69	∓13.90	∓ .95	∓ .82
7	7	1.01	- 2.85	- .71	- .72	+ 7.95	+ .55	+ .56
8	5½	.84	+ 4.67	+1.16	+ .97	+10.48	+ .72	+ .60

Adj. Read = (C. F.) x (rel. read)

TABLE II - (Continued)

Date: October 1, 1974

Crest Mode Shape - Set-up No. 13 (cont'd)

Adjusted Relative Amplitude (Symmetrical Modes-Tangential)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.92	∓ .66	∓ .16	∓ .15	∓ .25	∓ .02	∓ .02
2	11	.86	± .57	± .14	± .12	±1.34	± .09	± .08
3	10	.92	- .33	- .08	- .07	+1.64	+ .11	+ .10
4	6	1.00	+ .42	+ .10	+ .10	+ .97	+ .07	+ .07
5	9	.91	- .49	- .12	- .11	± 1.74	± .12	± .11
6	5	.86	+ .29	+ .07	+ .25	+2.07	+ .14	+ .13
7	7	1.01	+ .43	+ .11	+ .11	+ .68	+ .05	+ .05
8	5 1/2	.84	+ .47	+ .12	+ .10	+2.24	+ .15	+ .13
9	6R	1.00	4.03	1.00	1.00	+14.58	+1.00	+1.00

R = Radial

TABLE II - (Continued)

Date: October 1. 1974

Crest Mode Shape - Set-up No. 13 (Continued)

Adjusted Relative Amplitude (Anti-symmetrical Modes - Radial)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.92	- 5.35	- .43	- .40	+1.50	+ .84	+ .77
2	11	.86	- 1.99	- .16	- .14	±4.09	±2.30	±1.98
3	10	.92	- 8.48	- .57	- .52	±7.05	±3.96	±3.64
4	6	1.00	+12.58	+1.00	+1.00	+1.78	+1.00	+1.00
5	9	.91	-12.25	- .97	- .88	∓2.35	∓1.32	∓1.20
6	5	.86	+ 7.37	+ .59	+ .51	+1.33	+ .75	+ .64
7	7	1.01	+ 7.25	+ .58	+ .59	±4.01	±2.25	±2.27
8	5½	.84	+11.38	+ .90	+ .76	+3.25	+1.83	+1.54

Adjusted Relative Amplitude (Anti-Symmetrical Modes - Tangential)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.92	+ 2.13	+ .17	+ .16	- .63	- .35	- .32
2	11	.86	- .44	- .03	- .03	- .38	- .21	- .18
3	10	.92	± .24	± .02	± .02	+ .37	+ .15	+ .14
4	6	1.00	+ 1.04	+ .08	+ .08	+ .18	+ .10	+ .10
5	9	.91	+ .48	+ .04	+ .04	+ .17	+ .09	+ .09
6	5	.86	- .42	- .03	- .03	± .06	± .03	± .03
7	7	1.01	+ 1.62	+ .13	+ .13	- .21	- .12	- .12
8	5½	.84	+ .73	+ .06	+ .06	+ .31	+ .17	+ .14
9	6R	1.00	+12.58	+1.00	+1.00	+1.78	+1.00	1.00

R = Radial

TABLE II (Continued)

Date: October 2, 1974

Roll No: 25

Relative Calibration (Run 15) 10:05 AM

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc. No.	Shunt A. M.				180° Out-of-Phase						In-Phase					
					@ 1740 cts(S-1)			@ 2285 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
	INIT. 9:25 AM	FINAL 10:05AM	AVG.	REL.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.
1	1.92	1.90	1.91	.96	14.05	1.11	.86	2.44	1.21	.79	4.56	1.10	.87	16.58	1.25	.77
2	1.16	1.14	1.15	.58	13.45	1.06	.55	1.92	.96	.60	4.40	1.06	.55	14.90	1.12	.52
3	2.14	2.14	2.14	1.07	13.58	1.07	1.00	2.26	1.12	.96	4.47	1.08	.99	15.38	1.20	.89
4	2.00	2.00	2.00	1.00	12.65	1.00	1.00	2.01	1.00	1.00	4.14	1.00	1.00	13.25	1.00	1.00
5	1.39	1.39	1.39	.70	13.28	1.05	.67	2.26	1.12	.62	4.42	1.07	.65	14.63	1.10	.64
6	2.04	2.02	2.03	1.02	13.98	1.11	.92	2.52	1.25	.82	4.75	1.15	.89	16.40	1.24	.82
7	2.19	2.18	2.18	.109	12.35	.98	1.11	2.06	1.02	1.07	4.15	1.00	1.09	12.50	.94	1.16
8	2.24	2.23	2.24	1.12	14.02	1.11	1.01	2.72	1.35	.83	4.83	1.17	.96	16.85	1.27	.88

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II (Continued)

Date: October 2, 1974

Roll No: 26

Relative Calibration (Run 18) 6:50 PM

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc.	Shunt P. M.				180° Out-of-Phase						In-Phase						Av. fo day
					@ 1740 cts(S-1)			@ 2285 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)			
No.	INIT. 5:10 PM	FINAL 6:50 PM	AVG.	REL.	DYN READ	REL DYN	M.F.	DYN READ	REL. DYN	M.F.	DYN READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	M.F.
1	1.91	1.92	1.92	.96	13.55	1.09	.88	2.44	1.24	.93	4.94	1.13	.85	15.98	1.18	.81	.85
2	1.13	1.14	1.14	.57	13.55	1.09	.52	2.32	1.18	.48	4.92	1.13	.50	16.25	1.20	.48	.53
3	2.16	2.16	2.16	1.07	13.25	1.07	1.00	2.24	1.14	.94	4.76	1.09	.98	15.80	1.17	.91	.96
4	2.01	2.01	2.01	1.00	12.42	1.00	1.00	1.96	1.00	1.00	4.36	1.00	1.00	13.55	1.00	1.00	1.00
5	1.39	1.40	1.40	.70	13.08	1.05	.67	2.10	1.07	.65	4.66	1.07	.65	15.48	1.14	.61	.65
6	2.02	2.02	2.02	1.00	13.80	1.11	.90	2.21	1.13	.88	4.81	1.10	.91	16.95	1.25	.80	.87
7	2.20	2.19	2.26	1.09	12.35	.99	1.10	1.80	.92	1.18	4.24	.97	1.12	13.38	.99	1.10	1.12
8	2.24	2.23	2.24	1.11	13.78	1.11	1.00	2.18	1.11	1.00	4.89	1.12	.99	17.58	1.30	.85	.94

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II - (Continued)

Date: October 2, 1974

Roll No: 26

Crest Mode Shape - Set-up No. 16

Calibration Factors

ACC NO.	INITIAL SHUNT 11:25 am	FINAL SHUNT 1:20 pm	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.92	1.91	1.92	.96	.85	.89
2	1.14	1.13	1.14	.57	.53	.93
3	2.15	2.17	2.16	1.08	.96	.89
4	2.00	2.01	2.00	1.00	1.00	1.00
5	1.40	1.40	1.40	.70	.65	.93
6	2.02	2.02	2.02	1.01	.87	.86
7	2.18	2.21	2.20	1.10	1.12	1.02
8	2.24	2.25	2.24	1.12	.94	.84

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes - Radial)

ACCELEROMETER			@ 1890 cts (S-1)			@ 2560 cts (Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8	.89	∓ 5.93	∓1.51	∓1.34	-12.43	- .91	- .81
2	10	.93	-10.80	+2.75	+2.56	+27.15	+1.99	+1.85
3	8½	.89	± 5.55	±1.41	+1.25	- 2.50	- .70	- .62
4	6	1.00	+ 3.93	+1.00	+1.00	+13.63	+1.00	+1.00
5	5	.93	+ 3.55	+ .90	+ .84	-10.08	- .74	- .69
6	4½	.86	-----	-----	-----	-18.28	-1.34	-1.15
7	4	1.02	± 1.50	± .38	± .39	-13.43	- .99	-1.01
8	3	.84	± .28	± .07	± .06	- 3.94	- .29	- .24

Adj. Read = (C. F.) x (rel. read)

TABLE II - (Continued)

Date: October 2, 1974

Crest Mode Shape - Set-up No. 16 (cont'd)

Adjusted Relative Amplitude (Symmetrical Modes - Tangential)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.89	±.73	+.19	+.17	± .20	± .01	± .01
2	10	.93	-.28	-.07	-.07	± .95	± .07	± .07
3	8 1/2	.89	±.83	±.21	±.19	± 1.01	± .07	± .07
4	6	1.00	+.59	+.15	+.15	+ .76	+ .06	+ .06
5	5	.93	+.35	+.09	+.08	± 1.89	± .14	± .13
6	4 1/2	.86	+.23	+.06	+.05	± 1.51	± .11	± .09
7	4	1.02	±.12	±.03	±.03	- .43	- .03	- .03
8	3	.84	-.06	-.02	-.02	- .74	- .05	- .04
9	6R	1.00	3.93	1.00	1.00	13.63	+ 1.00	+ 1.00

R = Radial

TABLE II - (Continued)

Date: October 2, 1974

Crest Mode Shape - Set-up No. 16 (Continued)

Adjusted Relative Amplitude (Anti-symmetrical Modes - Radial)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.89	- 5.60	- .42	- .37	+1.43	+ .82	+ .73
2	10	.93	- 8.62	- .65	- .60	∓6.13	∓3.41	∓3.17
3	8½	.89	-12.40	- .78	- .69	±4.23	±2.35	±2.09
4	6	1.00	+13.35	+1.00	+1.00	+1.80	+1.00	+1.00
5	5	.93	+ 7.55	+ .57	+ .53	+1.91	+1.06	+ .99
6	4½	.86	+ 3.79	+ .28	+ .24	+1.24	+ .69	+ .59
7	4	1.02	+ 1.10	+ .08	+ .08	+1.52	+ .84	+ .86
8	3	.842	- .09	- .02	- .02	+ .09	+ .05	+ .04

Adjusted Relative Amplitude (Anti-Symmetrical Modes - Tangential)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8	.89	+ 2.31	+ .17	+ .15	∓ .64	- .37	- .38
2	10	.93	+ .25	+ .02	+ .02	+ .40	+ .22	+ .20
3	8½	.89	+ 1.86	+ .14	+ .12	∓ .42	∓ .23	∓ .20
4	6	1.00	+ 1.04	+ .08	+ .08	+ .09	+ .05	+ .05
5	5	.93	± .22	± .02	± .02	± .10	± .06	± .06
6	4½	.86	- .29	- .02	- .02	± .11	± .06	± .05
7	4	1.02	- .39	- .03	- .03	- .06	- .03	- .03
8	3	.84	- .16	- .01	- .01	- .02	- .01	- .01
9	6R	1.00	+13.35	+1.00	+1.00	+1.80	+1.00	+ 1.00

R = Radial

TABLE II - (Continued)

Date: October 2, 1974

Roll No: 26

Vertical Mode Shape - Section 8 - Set up No. 17

Calibration Factors

ACC NO.	INITIAL SHUNT	FINAL SHUNT	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.91	1.90	1.90	.94	.85	.90
2	1.14	1.14	1.14	.56	.53	.95
3	2.16	2.16	2.16	1.07	.96	.90
4	2.02	2.01	2.02	1.00	1.00	1.00
5	1.40	1.40	1.40	.69	.65	.94
6	2.02	2.03	2.02	1.00	.87	.87
7	2.22	2.20	2.21	1.09	1.12	1.03
8	2.24	2.24	2.24	1.11	.94	.85

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8DR	.90	-5.31	-1.20	-1.08	-12.35	- .88	- .79
2	8AR	.95	± .16	± .04	± .04	- .23	- .02	- .02
3	8BR	.90	- .89	- .20	- .18	- 1.25	- .09	- .08
4	6DR	1.00	+4.41	+1.00	+1.00	+14.00	+1.00	+1.00
5	8AT	.94	0	-	-	- .04	- .0	-
6	8BT	.87	- .26	- .06	- .05	+ .15	+ .01	+ .01
7	8CR	1.03	± .87	± .20	± .20	- 3.10	- .22	- .22
8	8CT	.85	- .56	- .13	- .11	+ .43	+ .03	+ .03
1	8DT	.90	- .50	- .11	- .10	- .72	- .05	- .05

Adj. Read = (C.F.) x (rel. read)

TABLE II - (Continued)

Date: October 2, 1974

Vertical Mode Shape- Section 8 - Set-up No. 17 (cont'd)

Adjusted Relative Amplitude (Anti-Symmetrical Modes)

ACCELEROMETER			@ 2285 cts (Empty)			@1740 cts (S-1)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8DR	.90	+1.51	+.77	-.69	-5.38	-.43	-.38
2	8AR	.95	+.07	+.04	+.04	-.26	-.02	-.02
3	8BR	.90	+.22	+.11	+.10	-1.03	-.08	-.07
4	6DR	1.00	+1.97	+1.00	+1.00	+12.5	+1.00	+1.00
5	8AT	.94	-.09	-.05	-.05	+.16	+.01	+.01
6	8BT	.87	-.45	-.23	-.20	+1.11	+.09	+.08
7	8CR	1.03	+.43	+.22	+.22	-2.19	-.18	-.18
8	8CT	.85	-.85	-.43	-.37	+2.17	+.17	+.14
9	8DT	.90	-.60	-.30	-.27	+2.04	+.16	+.14

TABLE II (Continued)

Date: October 3, 1974

Roll No: 27 and 28

Relative Calibration (Run 19) 2:40 PM

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc.	Shunt P. M.				180° Out-of-Phase						In-Phase						
					@ 1740 cts(S-1)			@ 2285 cts(Empty)			@ 1890 cts(S-1)			@ 2560 cts(Empty)			
No.	INIT. 2:10 PM	FINAL 2:40 PM	AVG.	REL.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	AVG. M.F.
1	1.88	1.89	1.88	.94	13.40	1.08	.87	2.63	1.06	.89	4.41	1.06	.89	16.33	1.18	.80	.8
2	1.13	1.13	1.13	.57	13.48	1.09	.52	2.71	1.10	.52	4.44	1.07	.53	16.85	1.22	.47	.5
3	2.12	2.12	2.12	1.07	13.32	1.07	1.00	2.74	1.11	.96	4.47	1.08	.99	16.32	1.18	.91	.9
4	2.00	1.98	1.99	1.00	12.42	1.00	1.00	2.47	1.00	1.00	4.15	1.00	1.00	13.80	1.00	1.00	1.0
5	1.37	1.37	1.37	69	13.08	1.05	.66	2.72	1.10	.63	4.43	1.07	.64	15.15	1.10	.63	.6
6	2.00	2.01	2.00	1.01	13.78	1.11	.91	3.03	1.23	.82	4.72	1.14	.89	16.92	1.23	.82	.8
7	2.29	2.29	2.29	1.15	12.00	.97	1.19	2.51	1.02	1.13	4.07	.98	1.17	12.72	.92	1.25	1.1
8	2.26	2.27	2.26	1.14	13.10	1.05	1.09	3.21	1.30	.88	4.66	1.12	1.02	16.82	1.22	.93	.9

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II - (Continued)

Date: October 3, 1974

Roll No: 28

Vertical Mode Shape - Section 10 - Set-up No. 20

Calibration Factors

ACC NO.	INITIAL SHUNT 3:40 P.M.	FINAL SHUNT 4:10 P.M.	AVG. SHUNT	REL SHUNT	AVG. M. F.	C.F.
1	1.90	1.11	1.12	.95	.86	.91
2	1.14	1.11	1.12	.56	.51	.91
3	2.12	2.14	2.13	1.06	.96	.91
4	2.00	2.00	2.00	1.00	1.00	1.00
5	1.37	1.38	1.38	.69	.64	.93
6	2.00	2.00	2.00	1.00	.86	.86
7	2.30	2.31	2.30	1.15	1.18	1.03
8	2.30	2.30	2.30	1.15	.98	.85

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes)

ACCELEROMETER			@ 1840 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCA-TION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	8JR	.91	+6.31	-1.35	-1.23	+11.775	- .84	- .76
2	10BR	.91	- .03	- .01	- .01	+ .15	+ .01	+ .01
3	10DR	.91	+9.375	+2.01	+1.83	+25.35	+1.82	+1.66
4	6DR	1.00	+4.66	+1.00	+1.00	+13.95	+1.00	+1.00
5	10BT	.93	+ .08	+ .02	+ .02	± .19	± .01	± .01
6	10CT	.86	± .34	± .07	± .06	+ .34	+ .02	+ .02
7	10CR	1.03	+1.25	+ .03	+ .03	+ 3.61	+ .26	+ .27
8	10DT	.85	- .43	- .09	- .08	- 2.99	- .21	- .18

Adj. Read = (C. F.) x (rel. read)

TABLE II - (Continued)

Date: October 3, 1974

Vertical Mode Shape - Section 10 - Set-up No. 20 (Cont'd)

Adjusted Relative Amplitude (Anti-symmetrical Modes)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	8R	.91	-5.30	-.43	-.39	±1.45	1.04	±.95
2	10BR	.91	-.1	-.01	-.01	+.02	.01	+.01
3	10DR	.91	-8.58	-.69	-.63	±6.05	432	3.93
4	6R	1.00	+12.38	+1.00	+1.00	+1.40	+1.00	+1.00
5	10BT	.93	-.18	-.01	-.01	+.02	.01	+.01
6	10CT	.86	-.56	-.05	-.04	±.14	.10	±.09
7	10CR	1.03	-1.77	-.14	-.14	∓.10	.07	∓.07
8	10DT	.85	±.32	±.03	±.03	±.44	.31	±.26

TABLE II (Continued)

Date: October 4, 1974

Roll No: 29

Relative Calibration (Run 21) 10:30 AM

Accelerometer Locations = All placed at Station No. 6 radial for radial pick-up.

Acc. No.	Shunt A M.				180° Out-of-Phase @ 1740 cts(S-1)			180° Out-of-Phase @ 2285 cts(Empty)			In-Phase @ 1890 cts(S-1)			In-Phase @ 2560 cts(Empty)			Avg
	INIT. 8:50 AM	FINAL 10:30AM	AVG.	REL.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	DYN. READ.	REL. DYN.	M.F.	M.F
1	1.89	1.91	1.90	.95	13.70	1.08	.88	2.30	1.31	.73	4.51	1.15	.83	15.33	1.16	.82	.8
2	.81	1.12	.96	.48	13.63	1.07	.45	1.95	1.11	.43	4.23	1.08	.44	16.00	1.21	.40	.
3	2.11	2.12	2.12	1.07	13.75	1.08	.99	2.01	1.14	.94	4.27	1.09	.98	15.70	1.19	.90	.
4	1.99	1.99	1.99	1.00	12.68	1.00	1.00	1.76	1.00	1.00	3.93	1.00	1.00	13.20	1.00	1.00	1.
5	1.36	1.37	1.36	.68	15.93	1.26	.54	1.95	1.11	.61	4.24	1.08	.63	14.68	1.11	.61	.
6	1.94	1.94	1.94	.97	14.25	1.12	.87	2.21	1.26	.77	4.55	1.16	.84	16.48	1.25	.78	.
7	2.09	2.10	2.10	1.06	12.3	.97	1.09	1.78	1.01	1.05	3.90	.99	1.07	12.45	.94	1.13	1.
8	2.20	2.21	2.20	1.11	14.43	1.14	.97	2.54	1.44	.77	4.68	1.19	.93	17.02	1.29	.86	.

M. F. = (rel. shunt)/(rel. dyn.)

M.F. = Multiplication factor

TABLE II - (Continued)

Date: October 4, 1974

Roll No: 29

Vertical Mode Shape - Section 6 - Set-up No. 22

Calibration Factors

ACC NO.	INITIAL SHUNT 12:05 P.M.	FINAL SHUNT 12:25 P.M.	AVG. SHUNT	REL SHUNT	AVG. M.F.	C.F.
1	1.89	1.89	1.89	.94	.82	.87
2	1.13	1.12	1.12	.56	.43	.77
3	2.12	2.12	2.12	1.06	.95	.90
4	2.00	2.00	2.00	1.00	1.00	1.00
5	1.36	1.37	1.36	.68	.60	.88
6	1.94	1.94	1.94	.97	.82	.84
7	2.09	2.11	2.10	1.05	1.08	1.03
8	2.20	2.20	2.20	1.10	.88	.80

C. F. = Calibration Factor = (av. M.F.)/(rel. shunt)

Adjusted Relative Amplitude (Symmetrical Modes)

ACCELEROMETER			@ 1890 cts(S-1)			@ 2560 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ. READ	READ	REL READ	ADJ. READ
1	6CR	.87	+ .26	.06	+ .05	+4.60	.32	+ .29
2	6AR	.77	+ .07	.02	+ .02	+ .19	.01	+ .01
3	6CT	.90	± .49	.11	± .09	- .71	.05	- .04
4	6DR	1.00	+4.27	1.00	+1.00	+4.38	1.00	+1.00
5	6AT	.88	± .07	.02	± .02	- .16	.01	- .01
6	6DT	.84	+ .69	.16	+ .13	± .87	.06	± .05
7	6BR	1.03	- .08	.02	- .02	- .44	.03	- .03
8	6BT	.80	+ .13	.03	+ .02	+ .37	.03	+ .02

Adj. Read = (C. F.) x (rel. read)

TABLE II - (Continued)

Date: October 4, 1974

Vertical Mode Shape - Section 6 - Set-up No. 22 (Cont'd)

Adjusted Relative Amplitude (Anti-symmetrical Modes)

ACCELEROMETER			@ 1740 cts(S-1)			@ 2285 cts(Empty)		
NO.	LOCATION	C.F.	READ	REL READ	ADJ READ	READ	REL READ	ADJ READ
1	6CR	.87	+4.19	.32	+.28	±1.17	.51	±.44
2	6AR	.77	+.27	.02	+.02	-.10	.04	-.03
3	6CT	.90	+.52	.04	+.04	+.24	.10	+.09
4	6DR	1.00	+13.12	1.00	+1.00	+2.30	1.00	+1.00
5	6AT	.88	-.19	.01	-.01	+.07	.03	+.03
6	6CT	.84	+.61	.05	+.04	+.32	.14	+.12
7	6BR	1.03	+.56	.04	+.04	-.19	.08	-.08
8	6BT	.80	-.21	.02	-.02	+.15	.07	+.06

TABLE III - SUMMARY OF MODE-SHAPE DATA

CREST MODE SHAPE DATA

Anti-Symmetrical Mode: f = 5.80 cps (1740 cts)

Loc								
Date	9/25/74		9/30/74		10/1/74		10/2/74	Avg.
Rm. No.	2	3	5	6	12	13	16	
1R		0	0					0
1T								0
2R		0	0					0
2T		-.01						-.01
3R		-.02	-.02	-.01			-.02	-.02
3T		-.01					-.01	-.01
3-1/2R			∓.02	±.02				±.02
3-1/2T								--
4R		+.08	+.08	+.07			+.08	+.08
4T		-.03					-.03	-.03
4-1/2R							+.24	+.24
4-1/2T							-.02	-.02
5R	+.50			+.49		+.51	.53	+.52
5T	-.02					-.03	±.02	-.02
5-1/2R					+.75	+.76		+.76
5-1/2T						+.06		+.06
6R	+1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6T	+.09	+.11		+.12	+.11	.08	.08	+.10
6-1/2R					+.83			+.83
6-1/2T								--
7R	+.55				+.57	+.59		+.59
7T	+.15					+.13		+.14
7-1/2R					+.12			+.12
7-1/2T								--
8R	-.39	-.41	-.35	-.34	-.39	-.40	-.37	-.38
8T	+.17	+.18	+.11	+.15	+.15	+.16	+.15	+.16
8-1/2R							-.69	-.69
8-1/2T							+.12	+.12
9R	-.85					-.88		-.87
9T	+.14					+.04		+.09
10R	-.59	-.62				-.52	-.60	-.60
10T	-.05	+.01				±.02	+.02	+.03
11R	-.14					-.14		-.14
11T	-.02					-.03		-.03
12R	+.01							+.01
12T	-.01							-.01
13R		0						0
13T		--						--

TABLE III - CONTINUED

CREST MODE SHAPE DATA

Symmetrical Mode: f = 6.30 cps (1890 cts')

Loc / Date / Rm. No.	9/25/74		9/30/74			10/1/74	10/2/74	Avg.
	2	3	5	6	7	13	16	
1R		0	0					0
1T		0						0
2R		0	0					0
2T		0						0
3R		-.05	±.05	-.05			±.06	±.06
3T		±.01					-.02	-.02
3-1/2R			±.20	+.18				+.19
3-1/2T								--
4R		±.24	±.41	±.33			±.39	±.34
4T		∓.04					±.03	±.03
4-1/2R							--	--
4-1/2T							.06	.06
5R	+.85			+.76		+.69	.84	+.79
5T	+.08					+.07	.08	+.08
5-1/2R						+.97		+.97
5-1/2T						+.10		+.10
6R	+1.00	1.00	1.00	1.00	1.00	1.00	1.00	+1.00
6T	+.20	+.11		+.16		.10	.15	+.15
6-1/2R								--
6-1/2T								--
7R	-.90					-.72		-.81
7T	+.15					+.11		+.13
7-1/2R					-1.62			-1.62
7-1/2T								--
8R	-1.35	∓1.04	-1.44	-1.29		∓1.00	∓1.34	+1.24
8T	-.18	+.12	-.25	-.10		∓.15	±.17	±.16
8-1/2R							±1.25	±1.25
8-1/2T							±.19	±.19
9R	+1.55					+1.44		+1.50
9T	-.18					-.11		-.15
10R	+2.41	+1.81				+2.28	+2.56	+2.27
10T	-.08	-.05				-.07	-.07	-.07
11R	+.80					+.71		+.76
11T	+.13					±.12		±.13
12R	+.04							+.04
12T	±.04							±.04
13R		0						0
13T		-0						0

TABLE III - CONTINUED

CREST MODE SHAPE DATA

Symmetrical Mode: f = 8.53 cps (2560 cts)

Loc								
Date	9/25/74	9/30/74			10/1/74		10/2/74	Avg.
Rm. No.	2	5	6	7	10	13	16	
1R		0						0
1T								--
2R		0						0
2T								--
3R		-.23	-.23				-.24	-.23
3T							-.04	-.04
3-1/2R		-.66	-.66					-.66
3-1/2T								--
4R		-1.00	-.98				-1.01	-1.00
4T							-.03	-.03
4-1/2R							-1.15	-1.15
4-1/2T							±.09	±.09
5R	±.81	∓.75				∓.82	-.69	∓.77
5T	+.13					+.13	±.13	+.13
5-1/2R					+.52	+.60		+.56
5-1/2T						+.13		+.13
6R	+1.00	1.00	1.00	1.00	1.00	+1.00	+1.00	+1.00
6T	+.07		±.05		±.06	+.07	+.06	+.07
6-1/2R					+1.10			+1.10
6-1/2T								--
7R	+.53				+.54	+.56		+.54
7T	-,09					+.05		+.07
7-1/2R				-.35				-.35
7-1/2T								--
8R	-.81	-.70	-,74		-.78	-.77	-.81	-.77
8T	-.01	-.07	-.02		0	-.02	+.01	-.03
8-1/2R							-.62	-.62
8-1/2T							±.07	±.07
9R	+.29					+.30		+.30
9T	+.12					±.11		+.12
10R	+1.78					+1.63	1.85	+1.75
10T	+.04					+.10	±.07	+.07
11R	+0.92					+.90		+.91
11T	-0.08					±.08		±.08
12R	+.10							+.10
12T	-.05							-.05
13R								0
13T								0

TABLE III - CONTINUED

CREST MODE SHAPE DATA

Anti-Symmetrical Mode: f = 7.63 cps (2285 cts)

Loc								
Date	9/25/74		9/30/74		10/1/74		10/2/74	Avg.
Rm. No.	2	3	5	6	12	13	16	
	(2240cts)	(2240)	(2240)	(2240)	(2285)	(2285)	(2285)	
1R		0	0					0
1T		--						--
2R		0	0					0
2T		--						--
3R		+.05	-.05	+.04			+.04	+.05
3T		-.03					-.01	-.02
3-1/2R			±.13	+.10				+.12
3-1/2T								--
4R		+.49	+.27	+.24			+.86	+.47
4T		-.05					-.03	-.04
4-1/2R							+.59	+.59
4-1/2T							±.05	±.05
5R	±.64			+.83		.64	+.99	+.78
5T	-.03					±.03	±.06	±.04
5-1/2R					+1.33	+1.54		+1.44
5-1/2T						+.14		+.14
6R	1.00	1.00	1.00	1.00	1.00	1.00	+1.00	1.00
6T	.10	+.06		+.08	+.10	+.10	+.05	+.08
6-1/2R					-1.63			-1.63
6-1/2T								
7R	±1.61				-2.06	±2.27		±1.98
7T	+.19					-.12		-.16
7-1/2R					-.99			
7-1/2T								
8R	∓.50	±.59	±.61	±.59	±.66	+.77	+.73	+.64
8T	+.25	-.32	+.28	+.29	±.29	-.32	-.32	-.30
8-1/2R							±2.09	±2.09
8-1/2T							-.20	-.20
9R	∓1.04					∓1.20		∓1.12
9T	+.10					+.09		+.10
10R	+2.35	-1.48				±3.64	∓3.17	∓2.66
10T	+.06	+.05				+.14	+.20	+.11
11R	±1.27					±1.98		±1.63
11T	+.14					+.18		+.16
12R	±.11							±.11
12T	+.07							+.07
13R		0						
13T		--						

TABLE III - SUMMARY OF MODE-SHAPE DATA

Set Up # 17

Vertical Mode Shape

Section 8

ACC NO.	LOCATION	f = 5.80 cps.		f = 6.30		f = 7.62		f = 8.53	
		ADJ.	NORMAL	ADJ.	NORMAL	ADJ.	NORMAL	ADJ.	NORMAL
1	8DR	- .38	1.00	-1.08	1.00	+ .69	1.00	- .79	1.00
2	8AR	- .02	.05	± .04	± .04	+ .04	.06	- .02	.03
3	8BR	- .07	.18	- .18	.17	+ .10	.14	- .09	.10
4	6DR	+1.00	-2.63	+1.00	- .93	1.00	1.44	1.00	-1.27
5	8AT	+ .01	- .03	0	0	- .05	- .07	0	0
6	8BT	+ .08	- .21	- .05	.05	- .20	- .29	+ .01	- .01
7	8CR	- .18	+ .47	± .20	± .19	+ .22	+ .32	- .22	+ .28
8	8CT	+ .14	- .37	- .11	.10	- .37	- .54	+ .03	- .04
9	8DT	+ .14	- .37	- .10	.09	- .27	- .39	- .05	.06

TABLE III - SUMMARY OF MODE-SHAPE DATA

Set Up # 20

Vertical Mode Shape

Section 10

ACC NO.	LOCATION	f = 5.80 cps.		f = 6.30		f = 7.62		f = 8.53	
		ADJ.	NORMAL	ADJ.	NORMAL	ADJ.	NORMAL	ADJ.	NORMAL
1	8DR	- .39	.62	-1.23	- .67	± .95	+ .24	- .76	- .46
2	10BR	- .01	.02	- .01	- .01	+ .01	0	+ .01	+ .01
3	10DR	- .63	1.00	+1.83	1.00	±3.93	1.00	+1.66	1.00
4	6DR	+1.00	-1.59	+1.00	.55	+1.00	± .25	+1.00	.60
5	10BT	- .01	.02	+ .02	.01	+ .01	0	± .01	± .01
6	10CT	- .04	.06	± .06	± .03	± .09	.02	+ .02	+ .01
7	10CR	- .14	.22	+ .03	+ .02	∓ .07	.02	+ .27	.16
8	10DT	± .03	± .05	- .08	- .04	± .26	.07	- .18	- .11

TABLE III - SUMMARY OF MODE-SHAPE DATA

Set Up # 22

Vertical Mode Shape

Section 6

ACC NO.	LOCATION	f = 5.80 cps.		f = 6.30		f = 7.62		f = 8.53	
		ADJ.	NORMAL	ADJ.	NORMAL	ADJ.	NORMAL	ADJ.	NORMAL
1	6CR	+ .28		+ .05		± .44		+ .29	
2	6AR	+ .02		+ .02		- .031		+ .01	
3	6CT	+ .04		± .09		+ .09		- .04	
4	6DR	+1.00		+1.00		+1.00		+1.00	
5	6AT	- .01		± .02		+ .03		- .01	
6	6DT	+ .04		+ .13		+ .12		± .05	
7	6BR	+ .04		- .02		- .08		- .03	
8	6BT	- .02		+ .02		+ .06		+ .02	

TABLE IV HYDRODYNAMIC PRESSURE DATA

DATE: October 2, 1974

SECTION NO.: 6

Depth Below Crest of Dam (feet)	Pressure (psi) Frequencies (cps)			
	Out-of-Phase		In-Phase	
	5.80	7.62	6.30	8.53
100	.06	.03	.006	.05
90	.06	.02	.006	.04
80	.06	.02	.006	.04
70	.06	.02	.006	.04
60	.06	.02	.006	.04
50	.07	.02	.007	.05
40	.07	.02	.011	.06
30	.07	.02	.010	.06
20	.07	.02	.012	.05
10	.06	.01	.012	.07
6" Below Water Surface	.01	.00	.002	.06

TABLE IV HYDRODYNAMIC PRESSURE DATA (Continued)

DATE: October 4, 1974

SECTION NO.: 8

Depth Below Crest of Dam (feet)	Pressure (psi) Frequencies (cps)			
	Out-of-Phase		In-Phase	
	5.80	7.62	6.30	8.53
100	.012	.003	.003	.006
80	.014	.005	.011	.012
60	.022	.002	.020	.021
40	.028	.004	.025	.032
20	.027	.006	.026	.040
8" Below Water Surface	.006	.002	.005	.008

TABLE IV HYDRODYNAMIC PRESSURE DATA (Continued)

DATE: October 4, 1974

SECTION NO.: 10

Depth Below Crest of Dam (feet)	Pressure (psi)			
	Frequencies (cps)			
	Out-of-Phase		In-Phase	
	5.80	7.62	6.30	8.53
60	.048	.002	.029	.088
40	.048	.002	.032	.090
20	.048	.006	.036	.092
8" Below Water Surface	.007	.004	.008	.016