APPENDIX D

IRIO-JPM-123 SEISMIC TEST REPORT
H_2 CONTAINMENT [illegible]

GENERAL ELECTRIC
SPACE DIVISION
PHILADELPHIA

PROGRAM INFORMATION REQUEST / RELEASE

PIR NO.	*CLASS. LTR.	OPERATION	PROGRAM	SEQUENCE NO.	REV. LTR.
	U	1R10	JPM	123	

*USE "C" FOR CLASSIFIED AND "U" FOR UNCLASSIFIED

FROM B. Morton, Project Engineer
Analyzer Systems
Room U-4018 - Ext. 1037

TO F.P. Rudek, Manager
Analyzer Systems
Room U-4018 - Ext. 6064

DATE SENT	DATE INFO. REQUIRED	PROJECT AND REQ. NO.	REFERENCE DIR. NO.
5/18/77		JPM CONTAINMENT ANALYZER	SEE SECTION E

SUBJECT

SEISMIC TEST REPORT - H_2 CONTAINMENT ANALYZER

INFORMATION REQUESTED/RELEASED

A. SUMMARY

A Containment Analyzer system and additional "piggyback" hardware items were successfully qualified through the seismic environment (DBE, Foreign Coefficients) per the test plan outlined in 1R10-JPM-115 and 1R53-409. The items tested are described in Section B below. A photograph is presented in Attachment 1 and a sketch in Attachment 2.

B. ITEMS TESTED

1. Hydrogen Containment Analyzer

- 47C238807, electronics and readout/alarm panel
- 47E231417G1, hydrogen sensor
- KP1912, Kaman Pressure Sensor

C. TEST EQUIPMENT UTILIZED

Quantity	Item
1	2 pen recorder
1	1 pen recorder
1	MB C-150 Shaker System
A/R	[illegible] 4.38% H_2/N_2
1	[illegible]al Volt Meter
1	Seismic Test Fixture

S023-508-17-18-0

J. Fuller
J. Murphy
F. Rudek (2)
F. DiSanto
R. Bernard

PAGE NO. 1 OF 8

RETENTION REQUIREMENTS

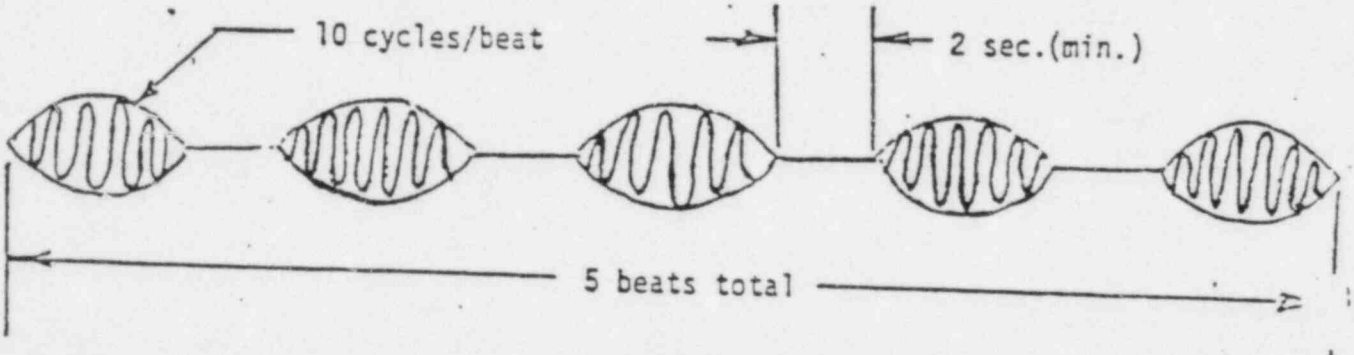
COPIES FOR	MASTERS FOR
1 MO.	3 MOS.
3 MOS.	6 MOS.
6 MOS.	12 MOS.
MOS.	MOS.
	DO NOT DESTROY

FORM 1020 B REV. (9-75)

C. DISCUSSION OF SEISMIC TEST

A DBE foreign coefficient seismic test was performed per the test plan outlined in Reference 1. Test procedure details are described in Reference 2 as applicable. Some additional test procedure details are described in Reference 3 as applicable.

All seismic testing was performed using the MB C-150 shaker. For each of the 3 axes, a sine sweep was performed to identify any resonant frequencies. The sine sweep was performed from 5 to 35 Hertz at one octave per minute. A sine beat was then performed at each frequency. The sine beat was shaped as follows:



SINE BEAT

The table below presents the resonant frequencies as well as other useful data.

Axis	Sine Sweep g Level (g's)	Resulting Resonant Frequencies (Hz)	Sine Beat g Level (g's)
Transverse	.5	26.6	3.00
Longitudinal	.5	24.1	3.00
Vertical	.25	26.0 & 33.0	.29

For future reference, a summary by run number is shown in Attachment 3.

A sketch of the instrumentation and fixturing is shown in Attachment 2. A photograph of the test set-up is shown in Attachment 1.

D. DISCUSSION OF TEST DATA

1. Pass/Fail Criteria

The criteria for a successful DBE seismic test are as follows:

(a) There shall be no alarm actuation during the seismic test.

(b) The hardware shall function within spec subsequent to performance of the seismic test.

(c) The sensor output may shift during the test but must remain within the calibration adjustment capability of the electronics.

2. Conclusions

(a) Results of the post test check out and inspection of the hardware show all assemblies to be fully operational and undamaged by the seismic environment.

(b) There was no alarm actuation produced by the 47C238807 electronics assembly.

Hence, the hardware tested successfully passed the seismic test criteria.

3. Test Set-Up

Prime hardware data obtained during pre-test and post-test checkout and during the seismic test vibration are shown in paragraph 4, Test Data. The sample gases used during these tests were as follows:

Pre-Test: 4.38% H_2/N_2

During Test: Ambient Air

Post-Test: 4.38% H_2/N_2

A simulated hydrogen sensor signal (i.e., an oxygen sensor monitoring oxygen in the ambient air sample gas) and the Kaman Pressure Sensor KP1912 were used to provide inputs to the H_2 Analyzer (47C238807) during the dynamic portions of the test.

S023-506-17-18-0

3. (Continued)

The prime hardware was powered and the analog outputs of (1) the channel and (2) alarm relay status were monitored on strip chart recorders. The two recorder speeds were set to 1 inch per hour (position A) and 1.5 inches per hour between seismic tests and increased to 1 inch per minute (position F) and 1.5 inches per minute during seismic tests.

4. Test Data

(a) Sensor Pre and Post Test Data

DRAWING NO.	PRE-TEST (MV)	POST-TEST (MV)	% OF READING CHANGE	F.S.	% OF FULL SCALE
47E231417G1	9.28*	10.74*	+15.7	10%	+6.9

(b) Kaman Pressure Sensor (KP1912) Pre and Post Test Data

Total Pressure	Pre-Test V_{out}	Post-Test V_{out}	% Full Scale
Ambient	2.00	2.01	+ .17

(c) Electronics Pre and Post Test Data
47C238807 (1 H_2 Analyzer Channel)

Function Switch	Pre-Test V_{out} (Meter)	Post-Test V_{out} (Meter)	% Full Scale
Zero	1.042 (0%)	1.045 (0%)	+ .06
Read	5.034 (9.8%)	5.035 (9.8%)	+ .02

(d) Electronics Data During Test

The maximum peak to peak variation of signal from the electronics assembly during the vibration environment was as follows:

47C238807 4% Full Scale**

* 4.38% H_2/N_2

** Includes effect of entire analyzer; i.e., sensor, pressure transducer and signal conditioning electronics.

E. REFERENCES

1. Test Plan: PIR 1R10-JPM-115, Containment Analyzer Seismic Test, B. Morton, 4-18-77.

2. Test Procedure Details (As Applicable): PIR 1R53-409, Seismic Testing..., C. Mayforth, 11-15-74.

3. Additional Test Procedure Details (As Applicable): PIR 1R42-245, Procedure for Seismic Testing..., 11-19-74.

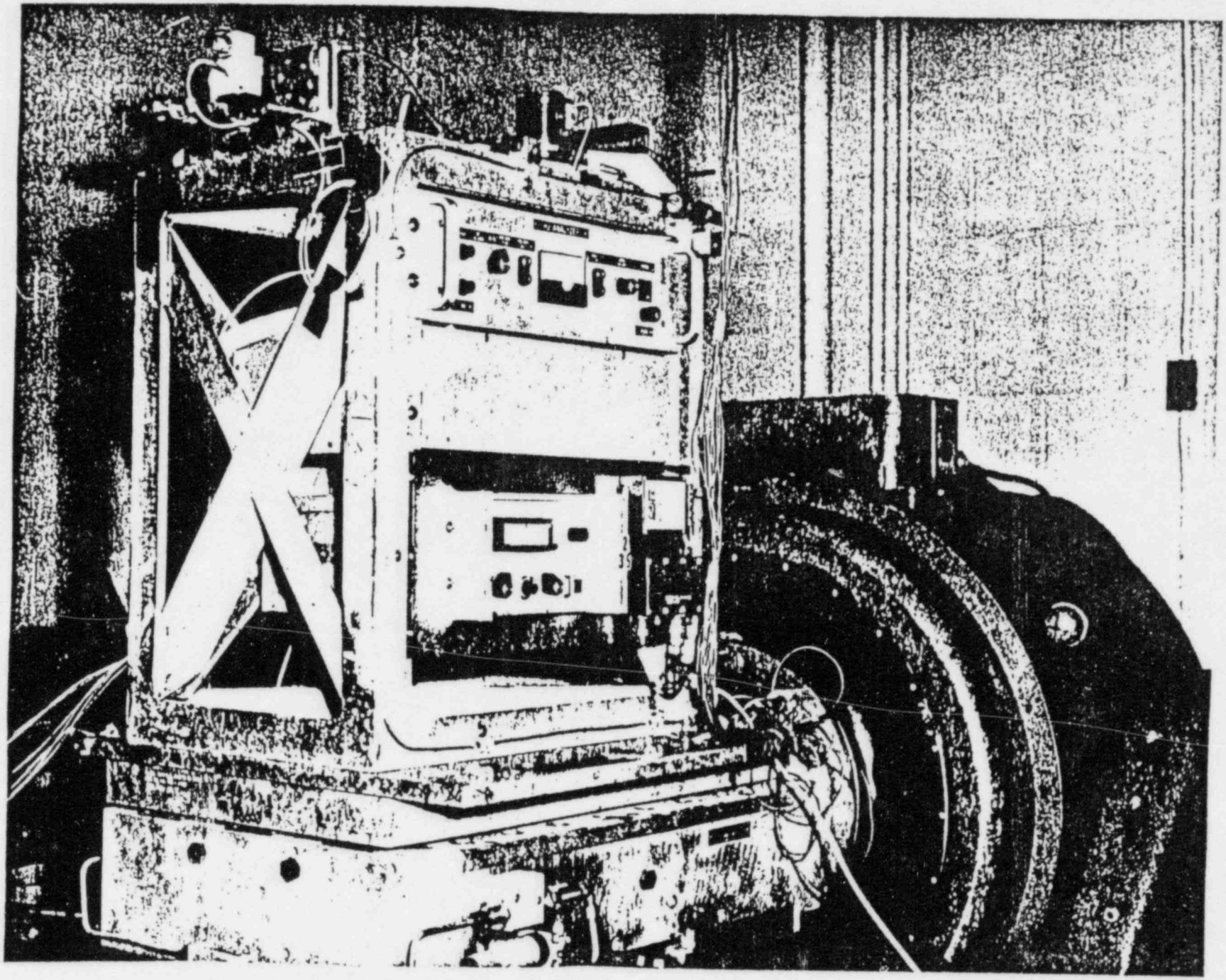
4. Spec. 9713-J-8, ...Technical Spec..., Bechtel, 10-15-75 (Paragraph 4.10.2, Seismic Tests).

5. Memo, JPM Vibration Test Results, J. Fuller, 5-17-77.

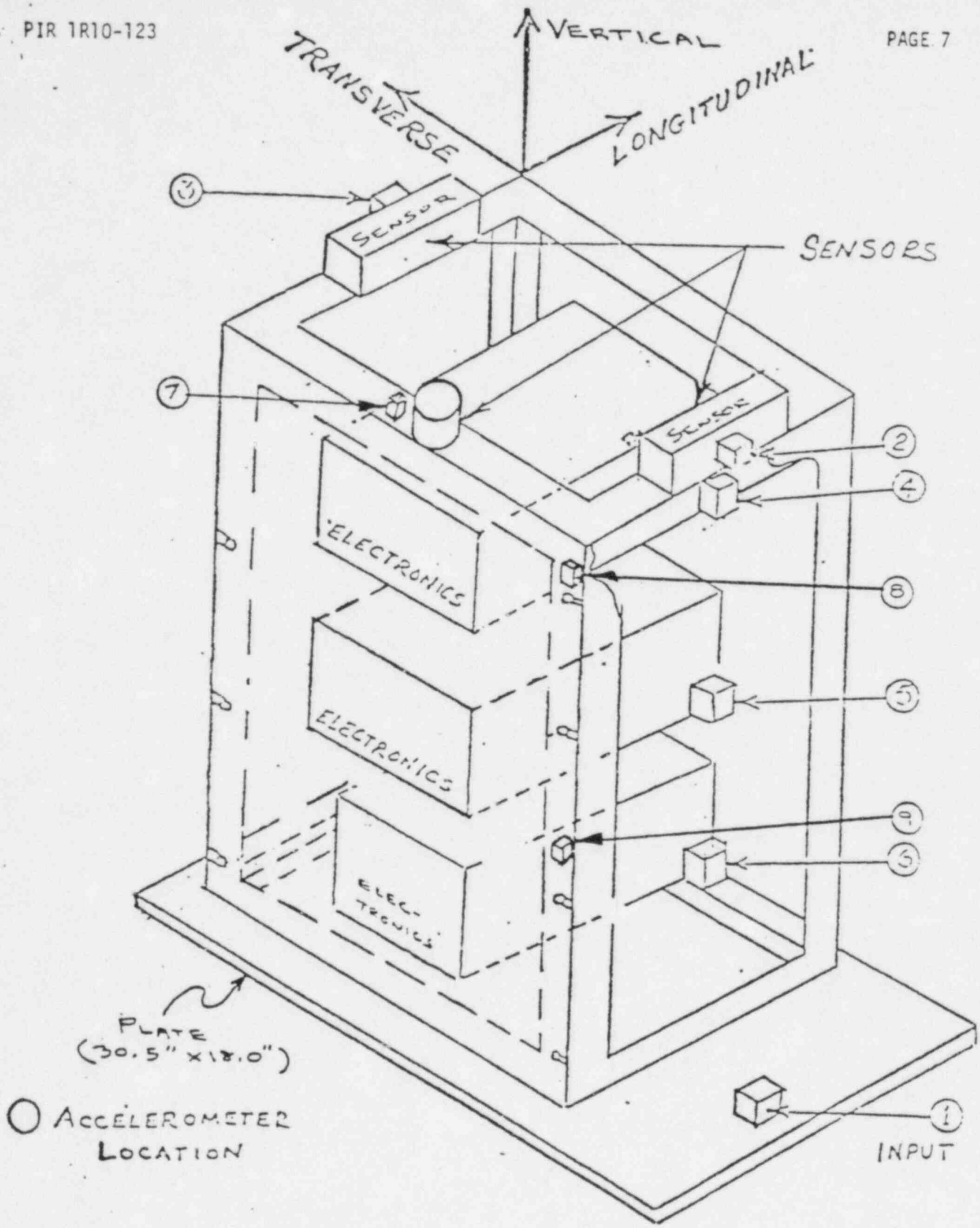
6. PIR 1R10-JPM-118, Test Results..., B. Morton, 5-18-77.

Bruce Morton, Project Engineer
Analyzer Systems
Room U-4018 - Ext. 1037

/mes



ATTACHMENT 1 - SEISMIC TEST SET-UP FOR TRANSVERSE AXIS



ANALYZER SYSTEM TEST SET-UP

ATTACHMENT 2 S023-508-17-18-0

ATTACHMENT 3

LIST OF TEST RUNS

RUN NO.	AXIS	DESCRIPTION
1	Transverse	Calibration run
2	"	Sine Sweep: 5-35 hz @ .5g, 1 octave/minute
3	"	Sine Beat: 26.6 hz @ 3.0g, 5 beats
4	Longitudinal	Calibration run
5	"	Sine Sweep: 5-35 hz @ .5g, 1 octave/minute
6	"	Sine Beat: 24.1 hz @ 3.0g, 5 beats
7	Vertical	Sine Sweep: 5-35 hz @ .25g, 1 octave/minute
8	"	Sine Beat: 26 hz @ .29g, 5 beats
9	"	Sine Beat: 33 hz @ .29g, 5 beats