FORM NO. 28-850 (11-66)

153

DOUGLAS

MISSILE & SPACE SYSTEMS DIVISION
DOUGLAS AIRCRAFT CO., INC.

ENGINEERING LABORATORIES & SERVICES
TECHNICAL MEMORANDUM

SEP 1970
RECEIVED
NASA STI FACILITY
INPUT BRANCH

TO: H. T. Sorensen, A-290

FROM: T. J. Sereno, A-270; ext. 2461

SUBJECT: FUEL VENT DIRECTIONAL CONTROL VALVE VIBRATION AND SHOCK TESTS

COPIES TO: C. E. Schroeder, H. B. Mitchell, G. Cameron, W. Keller, C. Hansen, A3-860; T. J. Sereno, A-270; C.W. Wilson, A3-860(16)

CATALOG NO. PDL 86050-1

REPORT NO. TM-OSV40-ENV-06072-1

DATE 11/7/67

REQUESTED BY C. E. Schroeder

E.W.O. 29310 TCD 1T00255 B

TEST PLAN & ITEM NO. H-13A 41412

SALES ORDER 5769-6404

CLASSIFICATION OR RESTRICTION: Unclassified

PREPARED BY: K. H. Gronlund APPROVED BY: T. J. Sereno

R. J. Charlton - Prime Lab Test Engr.

APPROVAL SIGNATURES CERTIFY THAT ALL REQUIREMENTS OF REPORT HAVE BEEN MET INCLUDING THE REPORTING OF NEW TECHNOLOGY/REPORTABLE ITEMS PER SPB'S 92 AND 93. DISCLOSURES ARE MADE ON FORMS 25-207 AND 25-207-1

NEW TECHNOLOGY: ☐ IS CONTAINED IN THIS REPORT, ☒ IS NOT CONTAINED IN THIS REPORT.

ABSTRACT:

INTRODUCTION

Vibration and shock tests were performed for qualification testing of a Fuel Vent Directional Control Valve. The tests were performed at the vibration and shock facility of the Douglas Dynamics Laboratory, Santa Monica, California, on July 25 and July 26, 1967.

PURPOSE

The purpose of the tests was to determine the ability of the test specimen to function properly during and after exposure to vibration and shock environments which simulated flight conditions.

The purposes of this technical memorandum are to describe and document the vibration and shock portions of the tests and to transmit the vibration and shock data obtained from the tests.

13

N70-75960 (ACCESSION NUMBER) (THRU)
92 (PAGES) None (CODE)
CR-113238 (NASA CR OR TMX OR AD NUMBER) (CATEGORY)
FACILITY FORM 602

FORM 850-2 (11-66)

	DOUGLAS AIRCRAFT CO, INC. MISSILE & SPACE SYSTEMS DIVISION SANTA MONICA, CALIFORNIA	QUALIFICATION STATEMENT	[X] DE/Q TEST [ ] FORMAL QUAL

PROGRAM SATURN	TEST PLAN AND ITEM NUMBER SM-41412, H-13A

TEST PLAN LINE ITEM TITLE: FUEL VENT, DIRECTIONAL CONTROL VALVE — PART NO. 1A49988-501

TECHNICAL MEMORANDUM NUMBER(S): TM-DSV4B-PROP-R6072, Rev. A, dated 3-14-68 and TM-DSV4B-PROP-R6072-1, dated 1-7-67

ENGINEERING RESOLUTIONS AND CONCLUSIONS

The Fuel Vent Directional Control Valve met all test requirements set forth in the test control drawing, 1T00255, Rev. B.

(USE CONTINUATION SHEET AS NECESSARY)

STATEMENT OF QUALIFICATION

Based on the Qualification Test results presented in the attached report, it is the conclusion of the Douglas Aircraft Company, that the above item is qualified for use as intended on the Saturn S-IVB.

DESIGN TECHNOLOGY	RELIABILITY ENGINEERING	PROJECT OFFICE-TEST
[signature] 4-2-68 D. D. Hofferth FOR Chief Engineer Saturn Propulsion	[signature] 4-4-68 D.L. Dearing 4/4/68 ASSD - W.H. Kellar 4-8-68	H.B. Mitchell

EQUIPMENT

Test Specimen

The test specimen consisted of the following:

Fuel Vent Directional Control Valve, P/N [illegible], S/N [illegible], test plan item [illegible], manufactured by [illegible] Manufacturing Corp., Los Angeles, California, vendor P/N [illegible]

Backup Structure

Associated Brackets, Hardware, and Plumbing

These components were assembled and installed on a rigid vibration test fixture in a manner which dynamically simulated the vehicle installation. The test fixture was identified as P/N [illegible] and weighed [illegible] pounds.

Test Equipment

ITEM	MANUFACTURER	MODEL	TAG/SER. NO.
Oscillographs (7)	CEC	5-124	[illegible]
			[illegible]
Galvanometers (13)	CEC	[illegible]	*
Accelerometers (17)	Endevco	*	*
Charge Amplifiers (11)	Endevco	2-11	*
		2-13A	
Charge Amplifier	[illegible]	[illegible]	[illegible]
Tape Recorders ( )	Ampex	[illegible]-10	[illegible]
		[illegible]	[illegible]
PSD Equalizer	Ling	[illegible]	[illegible]
Vibration System	Ling	[illegible]	[illegible]
X-Y Recorder	Moseley	[illegible]	[illegible]
Power Integrator	Technical Prod.	[illegible]	[illegible]
Oscillator	Technical Prod.	[illegible]	[illegible]
Analyzer	Technical Prod.	[illegible]	[illegible]
Waveform Synthesizer	Exact	[illegible]	[illegible]
Memoscope	Hughes	[illegible]	[illegible]
Camera	Polaroid	[illegible]	--

* Channel assignments and instrumentation information are presented on pages [illegible] through [illegible].

Accuracy and repeatability were verified by standard calibration procedures during the periodic calibration and certification of the test equipment

PROCEDURE

The test series consisted of sinusoidal sweeps, random excitation, and shock pulses in each of the three mutually perpendicular axes defined on page [illegible]. For A (radial) axis testing, the test specimen was supported on the vertically oriented shaker head; for B (tangential) and C (thrust) axes testing, the specimen was supported on a slip table, and excitation was applied by the horizontally oriented shaker head.

Accelerometers were installed in the locations shown on pages B2 and B3. Accelerometer orientations are described on pages [illegible] through [illegible].

Sinusoidal sweeps were performed from 5 to 2000 to [illegible] cps, with the frequency changing at the rate of one octave per minute. Input levels were as follows:

A (Radial) Axis

FREQUENCY (cps)	LEVEL
5 - 33	.04 inch D.A. Disp.
33 - 180	2.2g (0 - peak)
180 - 240	.0013 inch D.A. Disp.
240 - 2000	[illegible].8g (0 - peak)

B (Tangential) and C (Thrust) Axes

FREQUENCY (cps)	LEVEL
5 - 33	.04 inch D.A. Disp.
33 - 2000	[illegible] g (0 - peak)

Accelerometer response signals during the sinusoidal testing were recorded on oscillographic charts.

Random vibration tests were performed for each axis in the following steps:

1. The spectral density equalizer was set to 1/4 power and the spectrum was checked visually by examination of the equalizer meters.

2. When the setting appeared satisfactory, a brief full-power low-level run was made, during which time the signal response of the control accelerometer was recorded on a magnetic tape loop. The tape loop was subsequently analyzed by a continuous sweep analysis system, with the following filter bandwidths:

FREQUENCY RANGE (cps)	BANDWIDTH (cps)
20 - 40	[illegible]
40 - 100	[illegible]
100 - 2000	[illegible]0

PROCEDURE (continued)

3. When the tape loop analysis showed a satisfactory spectrum, the full-power low-level run was completed, during which another magnetic tape loop was made for subsequent analysis as in step 2.

4. The full-power high-level run was then performed. During this run, a magnetic tape loop was made for subsequent analysis as in step 2.

5. After the random tests were completed, the magnetic tape data were reduced by the Cascade method, with the following filter bandwidths:

FREQUENCY RANGE (cps)	BANDWIDTH (cps)
8 - 16	1.1
16 - 32	3
32 - 65	[illegible]
65 - 130	13
130 - 260	2[illegible]
260 - 520	[illegible]
520 - 1000	104
1000 - 2000	2[illegible]

Random vibration tests were performed for a total of 10 minutes in each axis. Each of these periods was divided into two levels; a 600-second low-level run followed by a 120-second high-level run. Input levels were as follows:

A (RADIAL) AXIS

FREQUENCY (cps)	LEVEL (120 SECOND RUN)	LEVEL (600 SECOND RUN)
20 - 200	.010 g^2/cps	.004 g^2/cps
200 - 280	+2[illegible] db/octave	+2[illegible] db/octave
280 - 560	0.12 g^2/cps	.04[illegible] g^2/cps
560 - 1050	-10 db/octave	-10 db/octave
1050 - 2000	0.01 g^2/cps	.004 g^2/cps

B (TANGENTIAL) AND C (THRUST) AXES

FREQUENCY (cps)	LEVEL (120 SECOND RUN)	LEVEL (600 SECOND RUN)
20 - 200	.01 g^2/cps	.004 g^2/cps
200 - 280	+10 db/octave	+[illegible] db/octave
280 - 560	.05 g^2/cps	.01 g^2/cps
560 - 1050	-[illegible] db/octave	-[illegible] db/octave
1050 - 2000	.01 g^2/cps	.004 g^2/cps

Accelerometer response signals during the random testing were recorded on the digital data system and also on FM magnetic tape.

PROCEDURE (continued)

Before the shock tests were performed, system accuracy was checked as follows:

1. Horizontal scale accuracy was verified by standard calibration procedures during the periodic calibration and certification of the Memoscope.

2. Vertical input deflection was adjusted by inserting a calibration signal corresponding to a known acceleration level and adjusting the Memoscope potentiometer until the trace peaks coincided with the desired vertical scale division.

Shock pulses were shaped by a waveform synthesizer, displayed on a Memoscope, and photographed by a Polaroid camera. The input level for all axes was as follows:

Number	Three pulses per axis
Input Shape	Half sine wave
Acceleration	20g (0 - peak)
Duration	14 ( ) milliseconds

Functional and low-temperature requirements were controlled and monitored by the prime laboratory before, during, and after vibration and shock testing.

RESULTS AND DISCUSSION

Sinusoidal sweep data are presented as plots of acceleration versus frequency on the following pages:

AXIS	PAGE NUMBERS
A(Radial)	[illegible] through [illegible]
B(Tangential)	[illegible] through [illegible]
C(Thrust)	[illegible] through [illegible]

Random vibration data are presented as plots of Power Spectral Density versus Frequency for the high-level (120-second) runs on the following pages:

AXIS	PAGE NUMBERS
A (Radial)	[illegible] through [illegible]
B (Tangential)	[illegible] through [illegible]
C (Thrust)	[illegible] through [illegible]

RESULTS AND DISCUSSION (continued)

Equalization plots of the random inputs as approved by the Task Force representative are presented on pages A40 through A45.

Shock test data are presented as photographic plots of Acceleration versus Time on page A82.

ATTACHMENTS

Pages A1 through A82

Pages B1 through B3

DOUGLAS

INSTRUMENTATION CHANNEL ASSIGNMENTS - DYNAMIC TEST

REPORT NO. R6072-1
PAGE A1
SHEET ___ OF ___
DATE 7-25-67
CONE ITEM H-13A
RUN NO. SINE & RANDOM
AXIS RADIAL "A"

TEST TITLE DIRECTIONAL CONTROL FUEL VENT VALVE — MAGNETIC MODEL CP 105 — DAC # 611823 — FACILITY 249 #2 — UNIT 128
PROJ 261-6464 — ENG 27610 — TEST IT00255 — RECORD SUPER 15 — SEC 27 KC — TAPE REEL NO. ___
P.N. SPECIMEN 1A 49922-501 — S/N 0032 — RECORD CHANNEL TYPE 5-127 — S/N 63524
ENGINEER GRUNWALD/GRIFFITH — EXT 2464 — TAPE SPEED 7½ — SEC
TECHNICIAN SHIRAKI/SCHIOA/KELLY, WM. PARKER — TAPE LENGTH ___ — SEC PAPER ___
STANDARD ACCEL. TYPE ___ S/N ___ AT ___

LOC. NO.	TAPE REC. CHAN	OSC CHAN #1	#2	XDCR CABLE NO.	MEASUREMENT LOCATION	REQD AXIS	XDCR MODEL	SERIAL NO.	XDCR AMP MODEL	SERIAL NO.	OSC CAL VOL MODEL	SERIAL NO.	~~TAPE REC AMP MODEL~~	UP ~~SERIAL~~ NO.	DOWN CALIB LEVEL g's	CALIB ~~SERIAL~~ ~~NO.~~	CHARGE SENS Pk-Pk/Pk g	LOC. NO.
1	1	3	3		CONTROL	SHAKE	2235C	PA25	8FMCVA	EL1822	7-326	11825 / 11711	100 RMS	5 gPk	5 gPk		2.39	1
2	2	5			CORNER OPPOSITE CONTROL	SHAKE	2235C	PA30	2712A	LA39		8444	100 gPk	30	30		2.42	2
3	3	7			CORNER TO RIGHT OF CONTROL	SHAKE	2235C	HB61	2713A	KB25		11261	100	30	30		2.81	3
4	4	9			CORNER TO LEFT OF CONTROL	SHAKE	2235C	HB72	2711	HA30		13352	100	30	30		2.68	4
5	5	11			ON H-13A MODULE } TRI AX	RADIAL	2242C	JA49	2713A	KB14		9146	30	30	10		2.60	5
	6	13			" " "	TANG	2242C	FA86	2711	HA67		7075	30	10	10		1.80	6
	7		5		" " "	THRUST	2242C	ND07	2711	HA28		10539	30	10	10		2.10	7
	8		7		ON SKIRT	SHAKE	2242C	HA13	2713A	KA92		7290	100	10	30		1.95	8
	9		9		ON FIXTURE END AT CENTER STR	SHAKE	2242C	NC05	2711	HA75		8012	100	30	30		2.16	9
10	10		11		ON PIPE	SHAKE	2242C	FA50	2711	HA37		18965	30	30	30		1.95	10
11	11		13		ON H-13A ACTUATOR } BI-AX	SHAKE	2242C	FA39	2713A	KA79		13362	30	30	30		1.91	11
12	12		15		" " "	THRUST	2242C	KA24	2711	HA22	7-326	10548	100 gPk	30 gPk	30 gPk		2.18	12
	14				VOICE													

NOTES & SKETCHES

FORM A2 26-599 (3-65)

DOUGLAS

INSTRUMENTATION CHANNEL ASSIGNMENT DYNAMIC TEST

TEST TITLE DIRECTIONAL CONTROL FUEL VENT VALVE

S.O. 5769-6404 EWO 29310 TCD ITC00255

P/N SPECIMEN 1A 49988-501 S/N 0032

ENGINEER GRONINGER / GRICE EXT 2464

TECHNS. SHIGAKI, SEKIDA / KOTCH, WHITAKER

STANDARD ACCEL. TYPE _____ S.N _____ CAL DUE _____

TAPE REC. MODEL CP-100 DAC # S/N 611828 FACILITY 29402 UNIT 128

RECORD SPEED 15 IN/SEC 27 KC TAPE REEL NO. _____

OSCILLOGRAPH TYPE 5-124 DAC # 635384 611929

PAPER SPEED 0.25 IN/SEC

TIMING LINES _____ SEC PAPER _____

REPORT NO 3RD 12-11

PAGE A2

SHEET _____ OF _____

DATE 7-26-67

LINE/ITEM H-13A

RUN NO. SINE + RANDOM

AXIS TANG. "B"

DOC. NO.	TAPE REC. CHAN	OSC CHAN #1	OSC CHAN #2	XDCR CABLE NO.	MEASUREMENT LOCATION	RESP. AXIS	XDCR MODEL	SERIAL NO.	XDCR AMP MODEL	SERIAL NO.	OSC CALVO MODEL	SERIAL NO.	TAPE REC AMP MODEL	RANDOM μP SERIAL NO. 5-200	SINE μP SERIAL NO. 200-5	DATA CALIB LEVEL g's RMS 5-200	DATA CALIB LEVEL g's PK 200-5	CHARGE SENS PK/PK PK/g	
1	1	3	3		CONTROL	SHAKE	2235C	PA28	8PMCVA	EE 1183	7-326	11195 / 18711	10 g RMS	3g PK	3g PK	3g PK	3g PK	237	
2	2	5			CORNER OPPOSITE CONTROL	SHAKE	2235C	PA30	2713B	LA54			8444	100g PK	10g PK	30g PK	10g PK	237	
3	3	7			CORNER TO RIGHT OF CONTROL	SHAKE	2235C	HB61	2713A	KR25			11261	100 g PK		10		237	
4	4	9			CORNER TO LEFT OF CONTROL	SHAKE	2235C	HB72	2711	HA30			13352	100 g PK		30		268	4
5	5	11			ON H-13A MODULE } TRI AX	RADIAL	2242C	JA49	2713A	KB14			9126	30 g PK		10		220	5
6	6	13			" " " } TRI AX	TANG	2242C	FA86	2711	HA57			7075			10		180	6
7	7		5		" " " } TRI AX	THRUST	2242C	ND07	2711	HA24			10539			10		210	
8	8		7		ON SKIRT	SHAKE	2242C	ND51	2713A	KA92			7290			30		2.10	8
9	9		9		ON FIXTURE END OF CENTER STR.	SHAKE	2242C	NC65	2711	HA75			8012			10		2.16	9
10	13		11		ON PIPE	SHAKE	2242C	FA50	2711	HA37			19965			10		185	10
11	11		13		ON H-13A ACTUATOR } REAR	SHAKE	2242C	FA58	2713B	KA78			13362			10		191	11
12	12		15		" " " } REAR	RADIAL	2242C	KA34	2711	HA22	7-326		10543	30g PK	10g PK	30g PK	10g PK	10g PK	278	12
	14				VOICE														

NOTES & SKETCHES

DOUGLAS

INSTRUMENTATION CHANNEL ASSIGNMENT DYNAMIC TEST

REPORT NO. R6070-2
PAGE A3

SHEET ___ OF ___
DATE 7-26-67
LINE ITEM H-13A
RUN NO. SINE & RANDOM
AXIS THRUST "C"

TEST TITLE DIRECTIONAL CONTROL FUEL VENT VALVE
S.O. 5769-6404 EWO 27210 TCD LT00255
P/N SPECIMEN 1A 49988-501 S/N 0032
ENGINEER GROMLUND / GLICK EXT. 2464
TECHNS. SHIRAKI, SHIEDA / KOTCH, WHITAKER
STANDARD ACCEL. TYPE ___ S/N ___ CAL. DUE ___

TAPE REC. MODEL CP-100 DAC # S/N 611228 FACILITY 249 #2 UNIT 128
RECORD SPEED 15 IN/SEC 22 KC TAPE REEL NO. ___
OSCILLOGRAPH TYPE 5-124 DAC # 635387 611929
PAPER SPEED 0.25 MM/SEC
TIMING LINES ___ SEC PAPER ___

LOC. NO.	TAPE REC. CHAN	OSC CHAN #1	OSC CHAN #2	XDCR CABLE NO.	MEASUREMENT LOCATION	RESP. AXIS	XDCR MODEL	SERIAL NO.	XDCR AMP MODEL	SERIAL NO.	OSC GALVO MODEL	SERIAL NO.	RANDOM ~~TAPE REC AMP MODEL~~	SINE SWEEP UP ~~SERIAL NO.~~ 5-200	UP 200-2KC	DOWN CAL LEVEL g's 2KC-200	DOWN CAL LEVEL ~~SERIAL NO.~~ 200-5	CHARGED BOMB Pk-Pk Pk g	ID
1	1	3	3		CONTROL	SHAKE	2235C	PA28	8PMCVA	EE 11802	7-326	11793	10g RMS	3gPk	3gPk	3gPk	3gPk	2.29	
2	2	5			CORNER OPPOSITE CONTROL	SHAKE	2235C	PA30	2713A	LA39		8449	100gPk	10gPk	30	10	10gPk	2.38	
3	3	7			CORNER TO RIGHT OF CONTROL	SHAKE	2235C	H861	2713A	KB25		11261	100		10	30		2.42	3
4	4	9			CORNER TO LEFT OF CONTROL	SHAKE	2235C	H872	2711	HA30		13351	100		30	30		2.68	4
5	5	11			ON H-13A MODULE } TRI AX	RADIAL	2242C	JA49	2713A	KB14		9126	30		10	10		2.30	5
6	6	13			" " " } TRI AX	TANG	2242C	FA86	2711	HA57		7078	30		10	10		1.80	6
7	7		5		" " " } TRI AX	THRUST	2242C	ND07	2711	HA24		10529	30		10	10		2.10	7
8	8		7		ON SKIRT	SHAKE	2242C	HA13	2713A	KA92		7290	100		30	30		1.95	8
9	9		9		ON FIXTURE END OF CENTER STR.	SHAKE	2242C	NC65	2711	HA75		8012	30		10	10		2.16	9
10	10		11		ON PIPE	SHAKE	2242C	FA50	2711	HA37		18965	30		10	10		1.95	10
11	11		13		ON H-13A ACTUATOR } RI-AX	SHAKE	2242C	FA33	2713A	KA79		12362	30		10	10		1.91	11
12	12		15		" " " } RI-AX	RADIAL	2242C	KA34	2711	HA22	7-326	10543	30gPk	10gPk	10gPk	10gPk	10gPk	2.18	12
13																			13
14	14				VOICE														14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20

NOTES & SKETCHES

DOUGLAS AIRCRAFT COMPANY , INC.

PAGE NO. A4

REPORT NO. R6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N [illegible] S/N [illegible]

NOTE... SEE PAGE B2
FOR PICK UP LOCATION

COMMENT--- REFERENCE CHANNEL

LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....

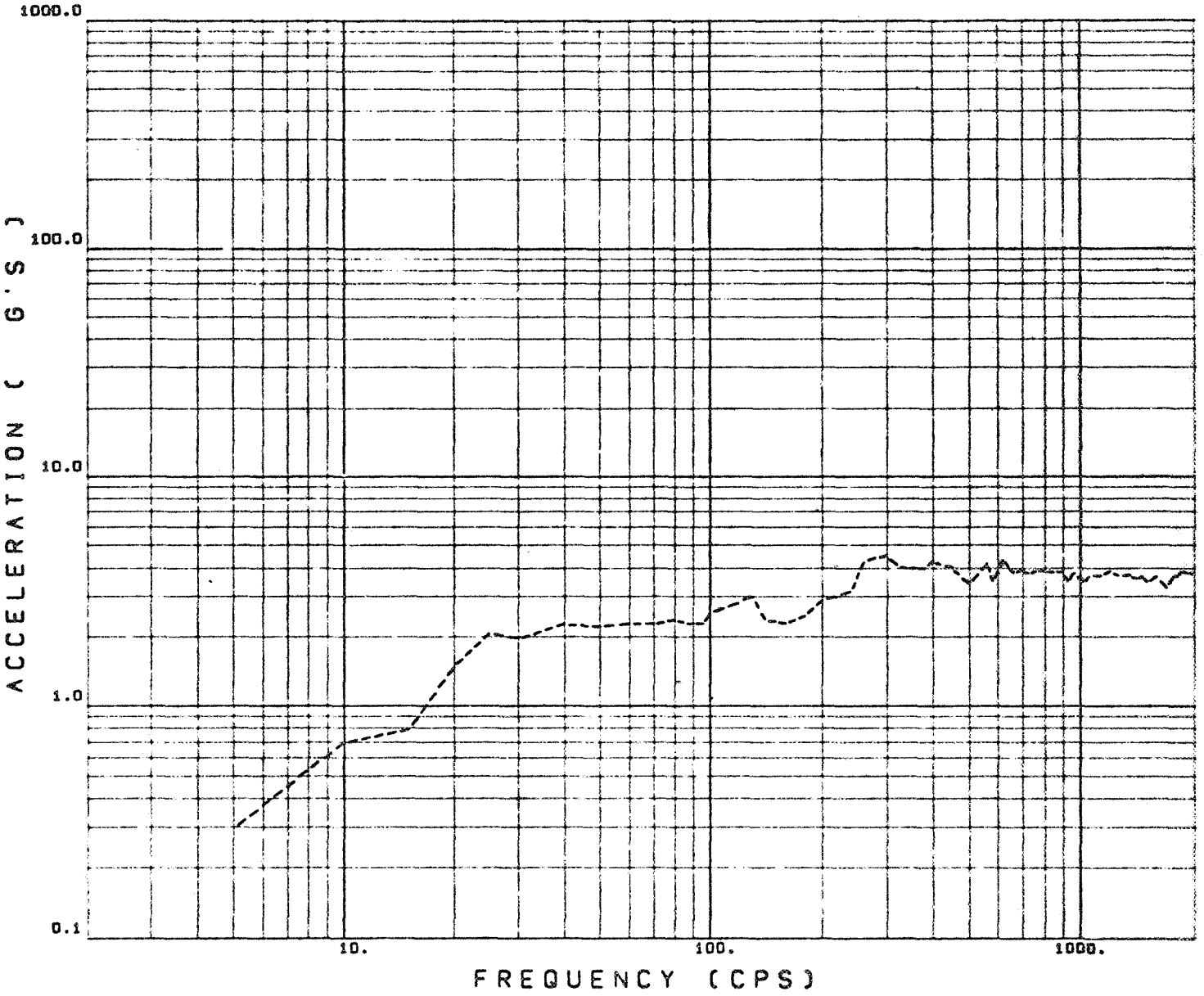
TEST DATE..... 7/25/67

AXIS OF EXCITATION.... (RADIAL) A

PICK UP NUMBER (1)... 1 PA28

PICK UP RESPONSE..... (RADIAL) A

INPUT ACCEL.PER PAGE.. ———



DOUGLAS AIRCRAFT COMPANY , INC.

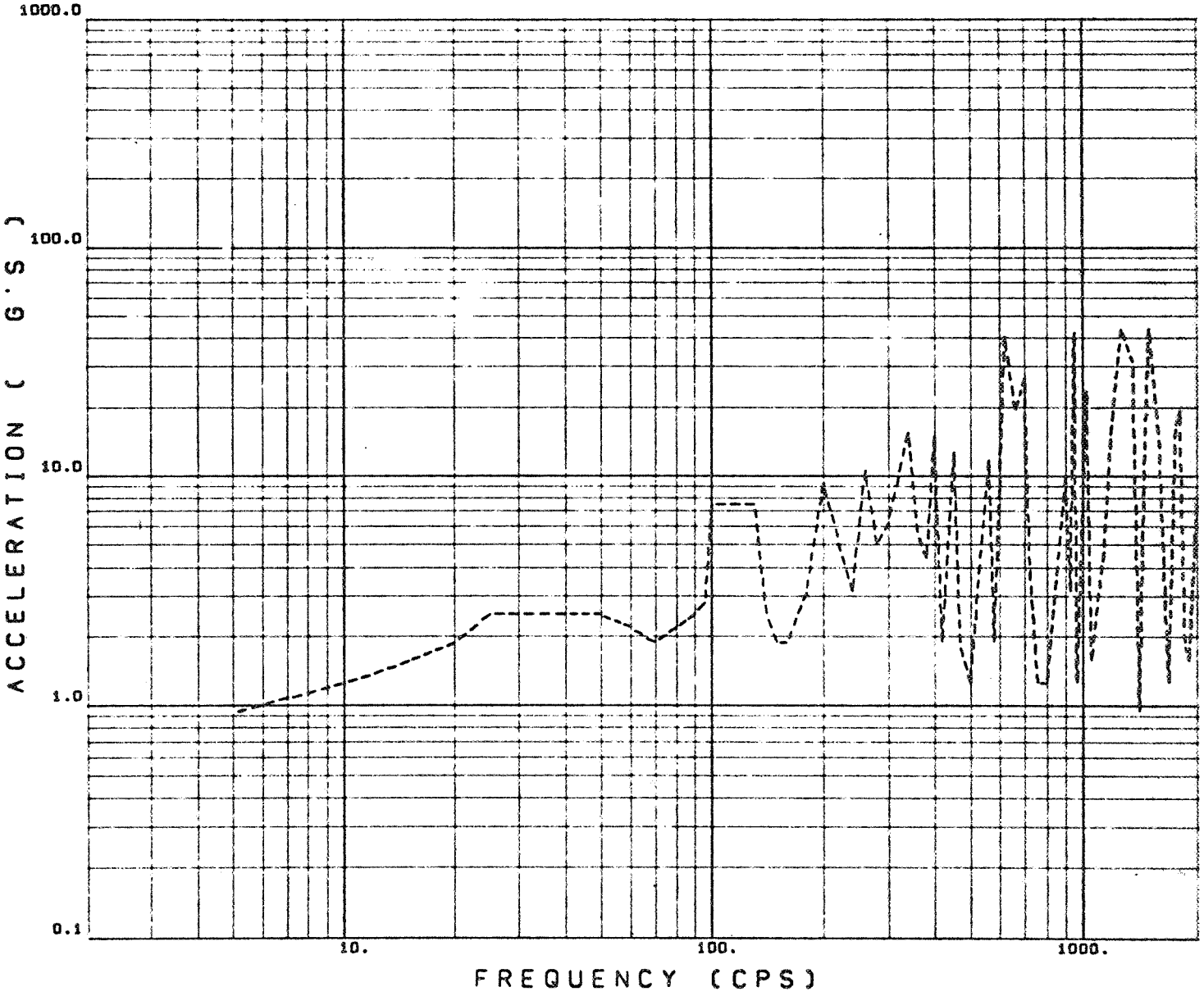
PAGE NO. A5
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- PN 449989-501 S/N 0032
NOTE... SEE PAGE B3
FOR PICK UP LOCATION
COMMENT--- [illegible]
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (2)... 2 PA30
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A4



DOUGLAS AIRCRAFT COMPANY , INC.

PAGE NO. A6

REPORT NO. K6072-I

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION ---P/N 1A49988-501 S/N 0002

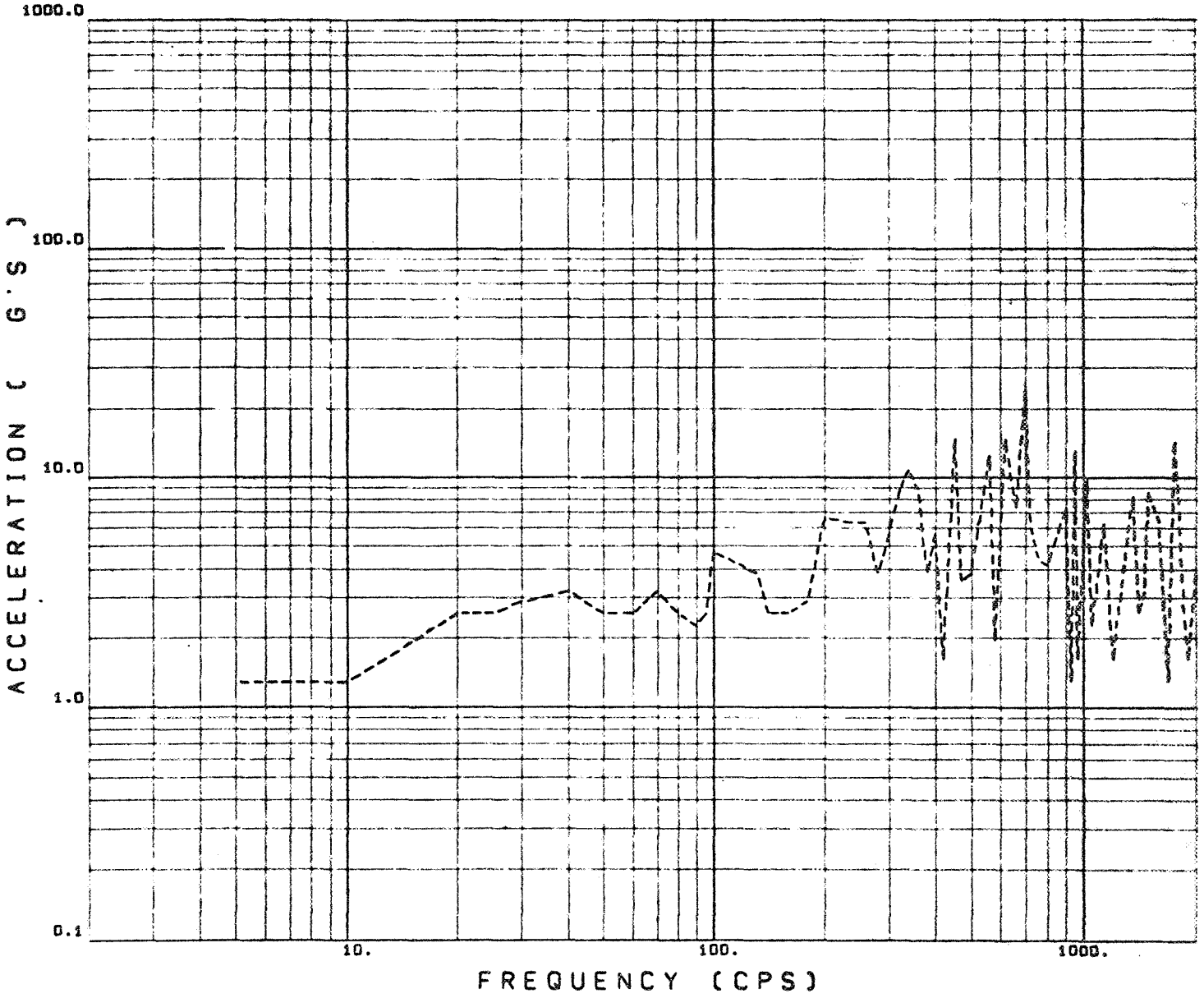
NOTE... SEE PAGE B2
FOR PICK UP LOCATION

COMMENT---

LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....

TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (3)... 3 HB61
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A4



DOUGLAS AIRCRAFT COMPANY , INC.

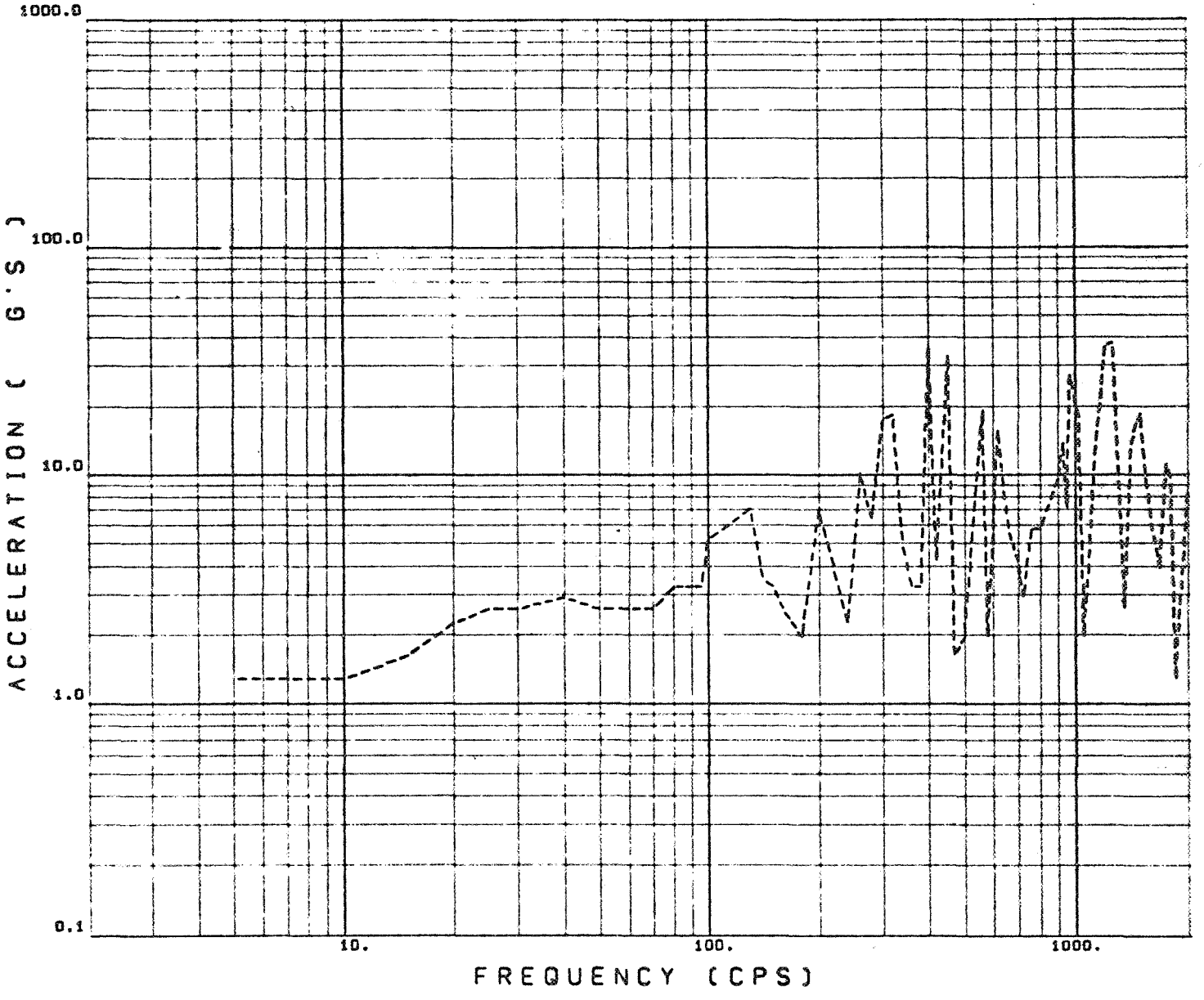
PAGE NO. A7
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 449958-501 S/N 0032
NOTE... SEE PAGE B3
FOR PICK UP LOCATION
COMMENT---
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (4)... 4 HB72
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A4



DOUGLAS AIRCRAFT COMPANY , INC.

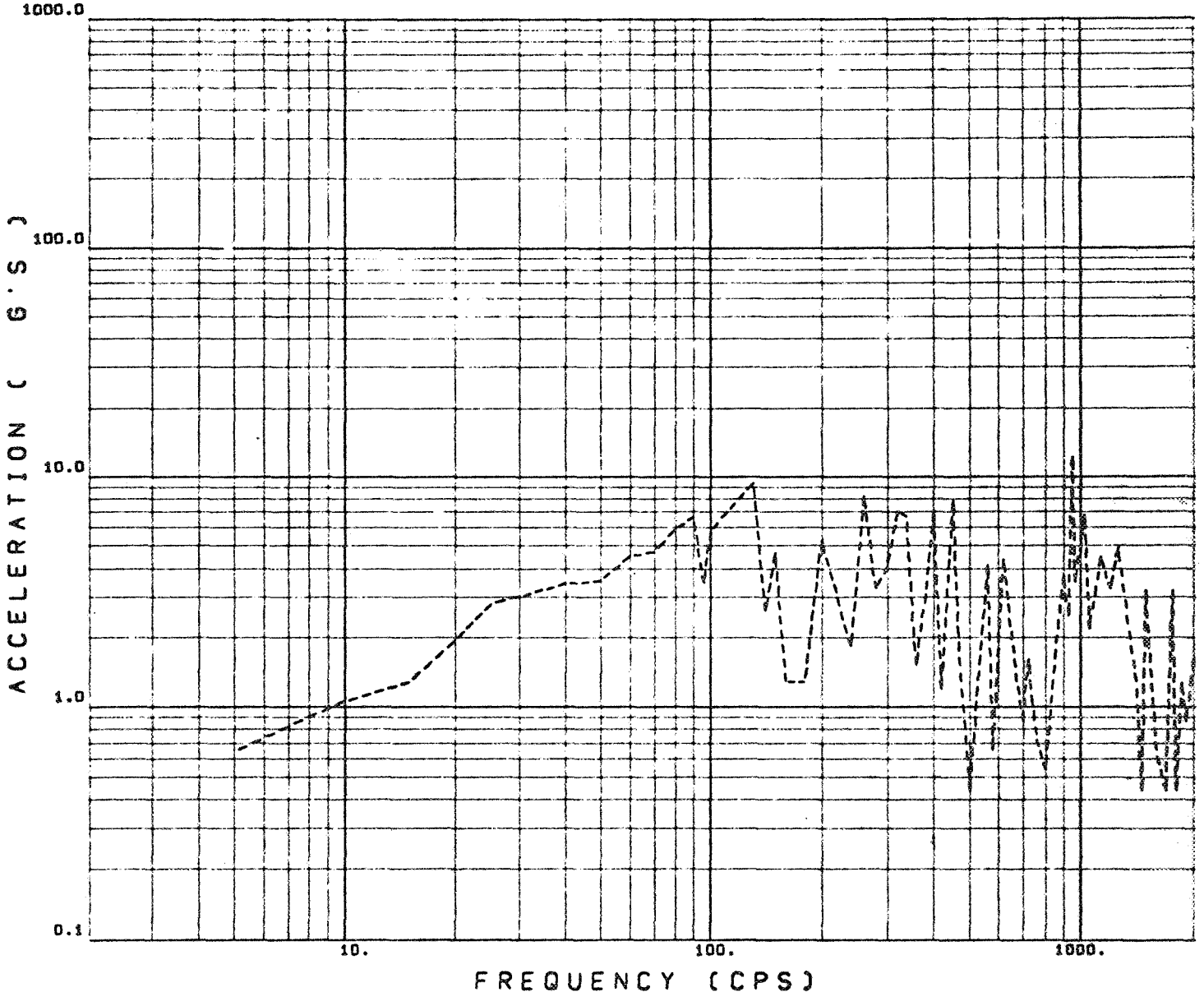
PAGE NO. A3
REPORT NO. R6072-I

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A499[illegible]-501 S/N [illegible]
NOTE... SEE PAGE A2
FOR PICK UP LOCATION
COMMENT--- [illegible]
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (5)... 5 JA49
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A4



DOUGLAS AIRCRAFT COMPANY , INC.

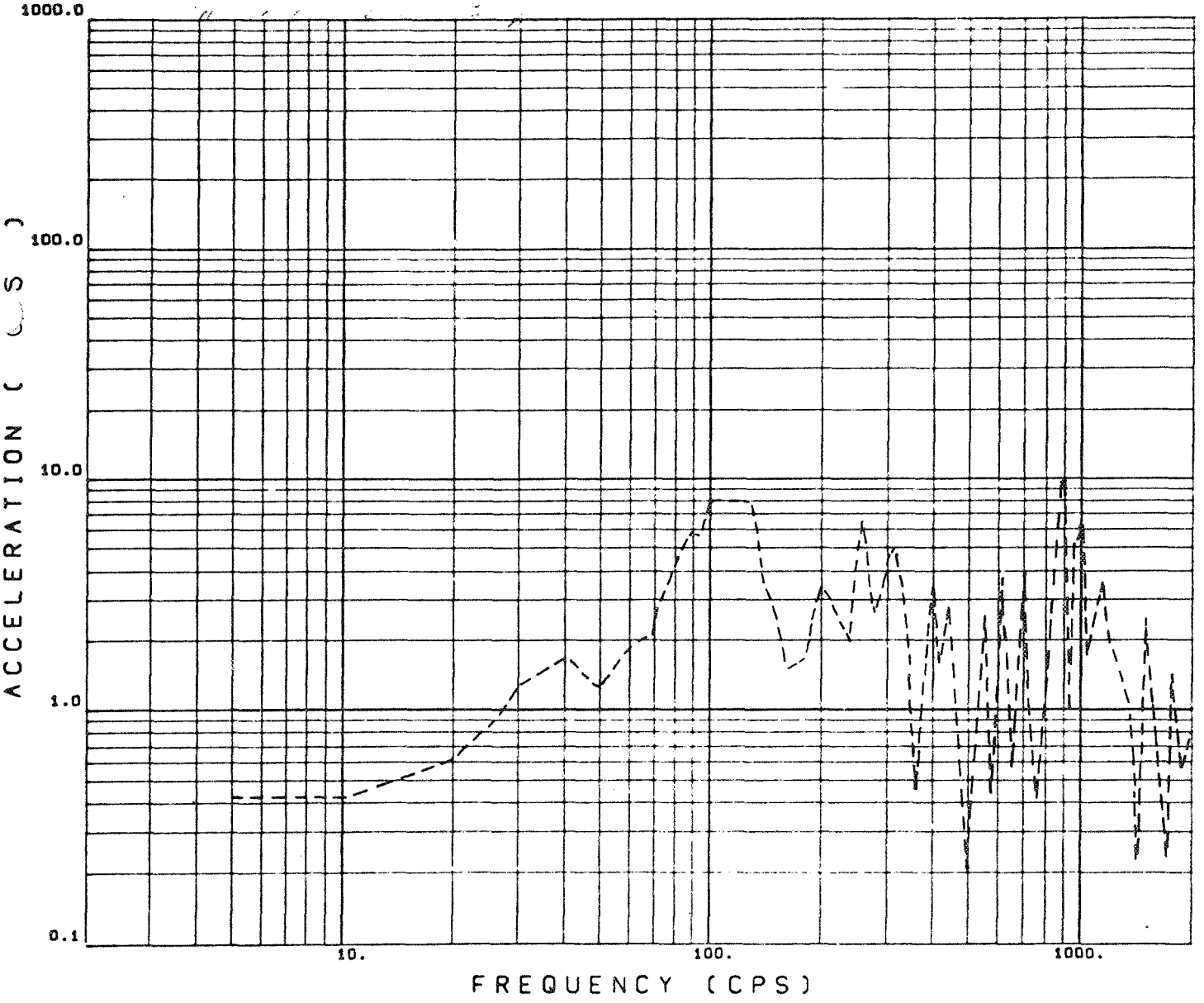
PAGE NO. A9
REPORT NO. 20672-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A+9988-501 S/N 0032 REV. 10-13-67
NOTE... SEE PAGE 3a
FOR PICK UP LOCATION
COMMENT---
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/23/67
AXIS OF EXCITATION.... RADIAL - A
PICK UP NUMBER (5)... 6 FA86
PICK UP RESPONSE..... TANGENTIAL - B
INPUT ACCEL.PER PAGE.. A 4



DOUGLAS AIRCRAFT COMPANY , INC.

PAGE NO. A10

REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N [illegible]

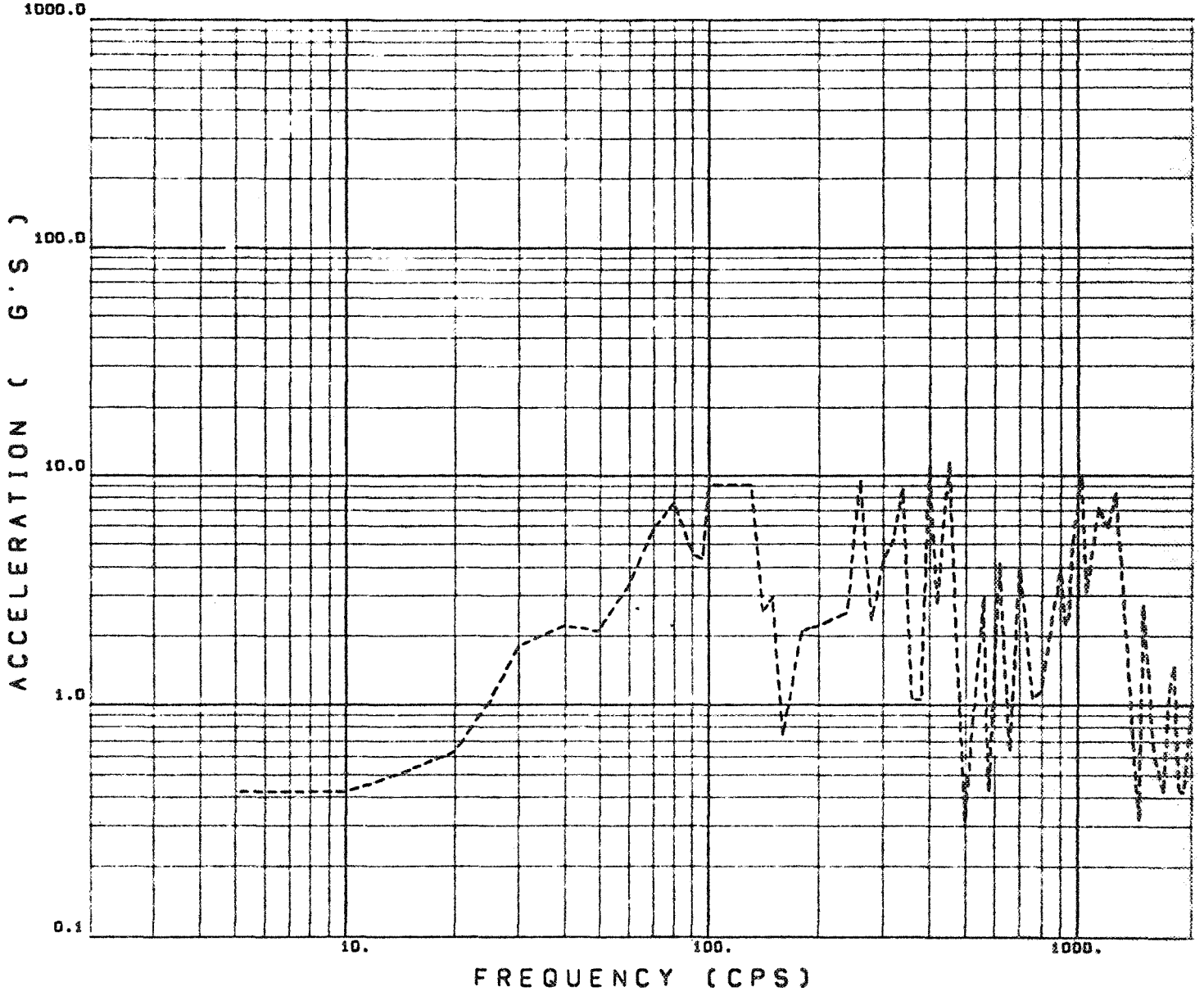
NOTE... SEE PAGE B2
FOR PICK UP LOCATION

COMMENT--- DATA [illegible]

LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....

TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (7)... 7 ND07
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A4



DOUGLAS AIRCRAFT COMPANY , INC.

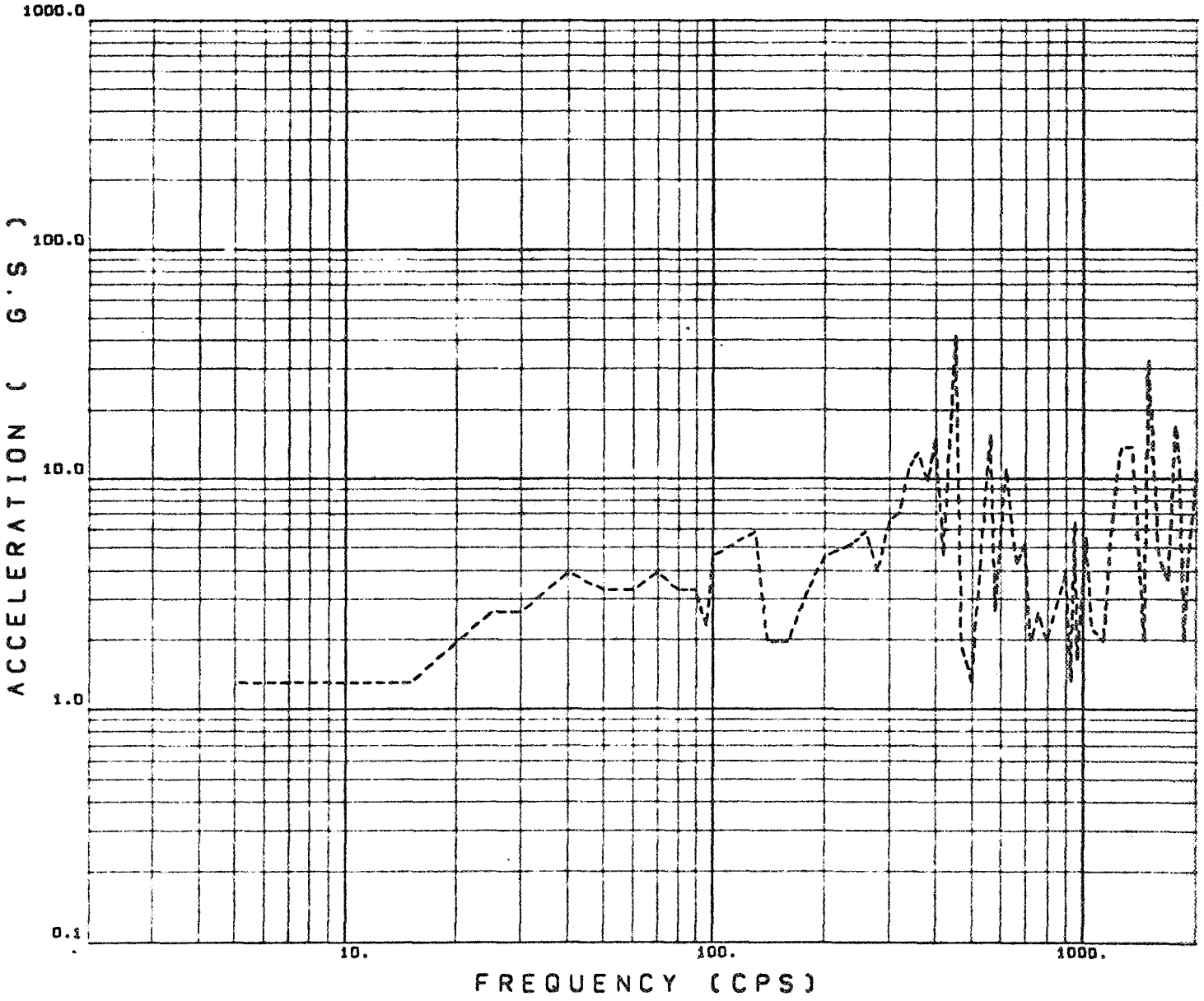
PAGE NO. A11
REPORT NO. R 6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- PN 1349985-501 S/N 0032
NOTE... SEE PAGE L2
FOR PICK UP LOCATION
COMMENT--- DATA [illegible]
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (8)... 8 HA13
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A9



DOUGLAS AIRCRAFT COMPANY , INC.

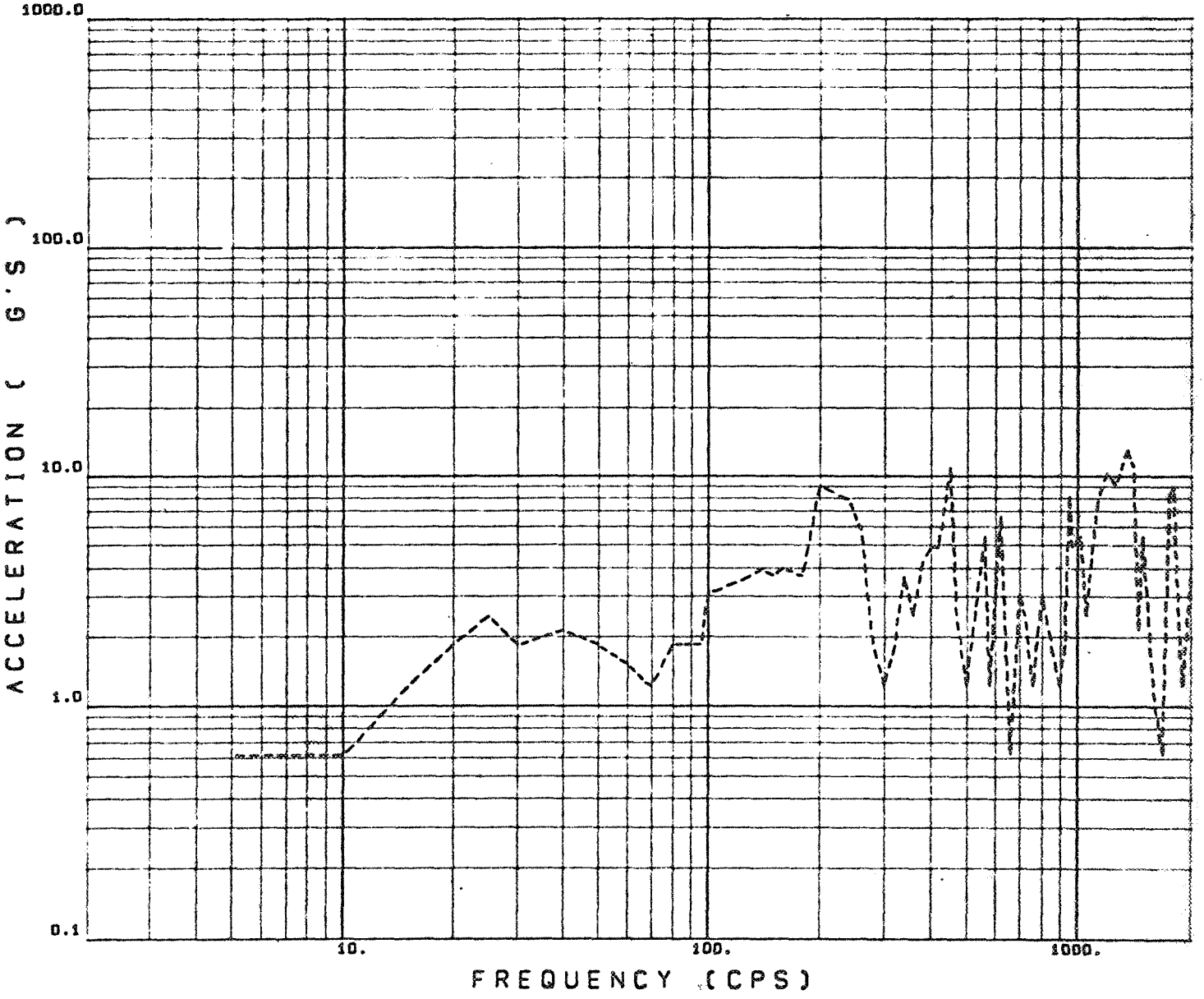
PAGE NO. A12
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- PN 1A4995 [illegible]
NOTE... SEE PAGE B3
FOR PICK UP LOCATION
COMMENT---
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (9)... 9 NC65
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A9



DOUGLAS AIRCRAFT COMPANY , INC.

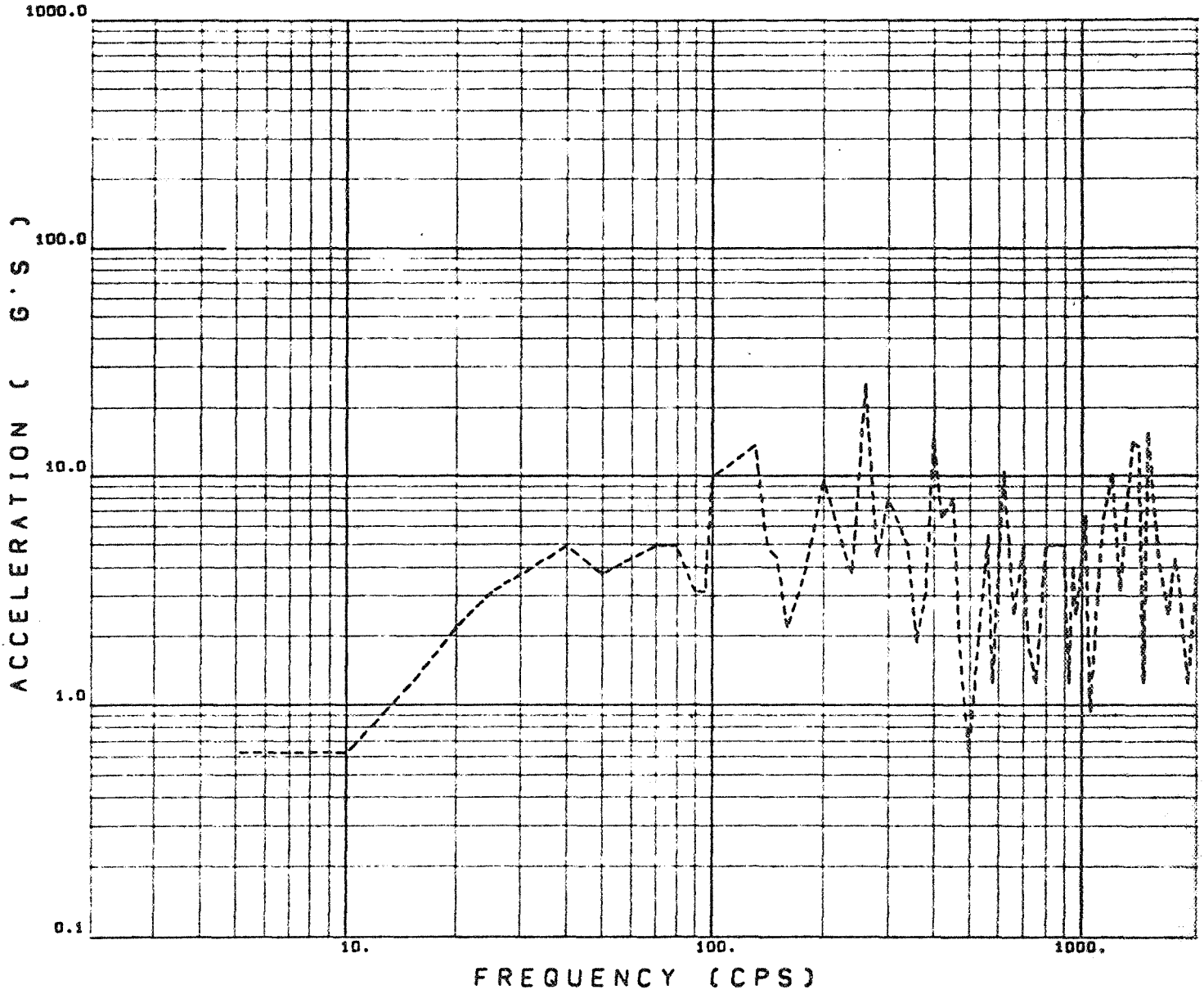
PAGE NO. A13
REPORT NO. R6072-I

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49986-501 S/N 3032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT---
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (1D)... 1D FA5D
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A2



DOUGLAS AIRCRAFT COMPANY , INC.

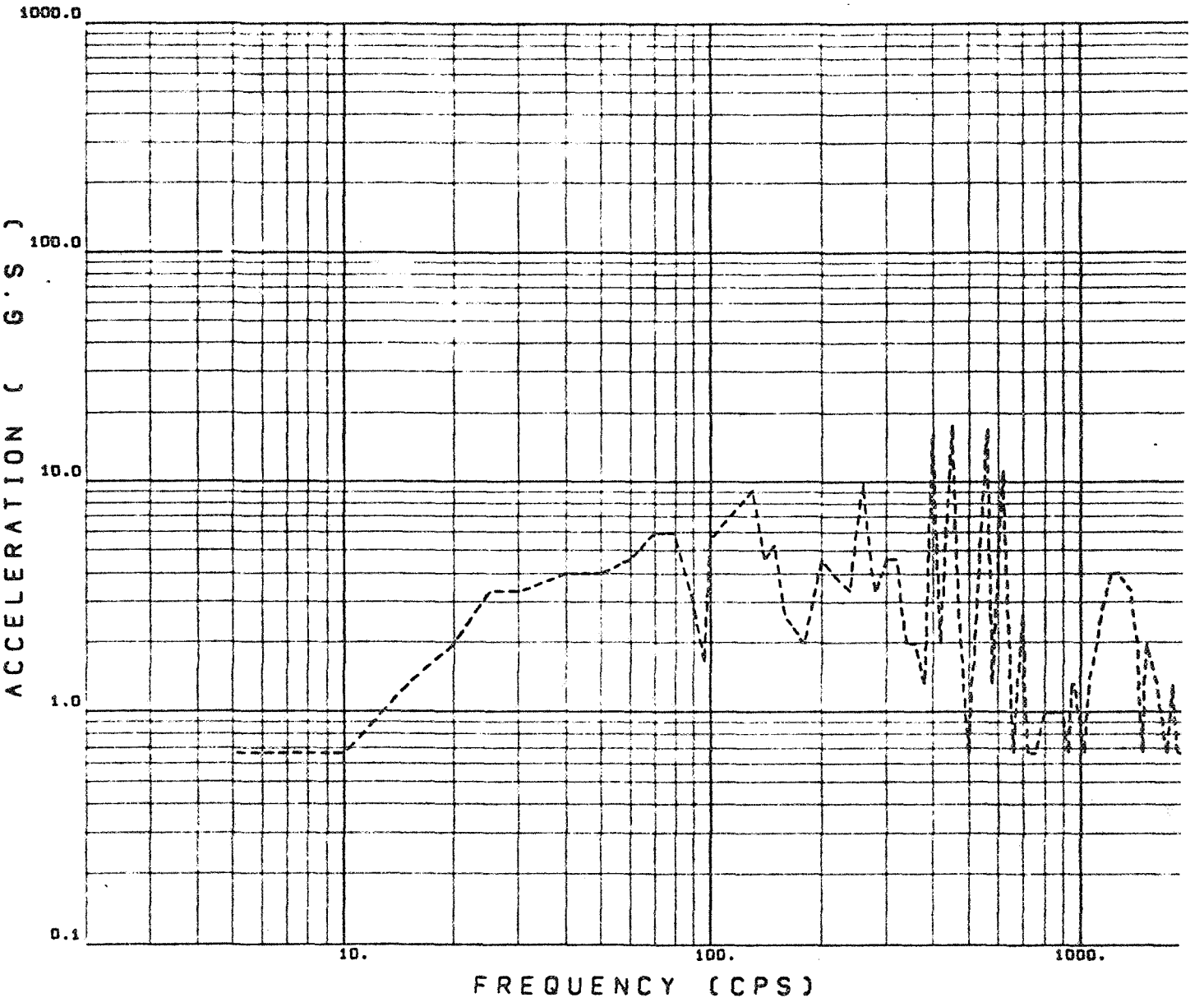
PAGE NO. A14
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49588-501 S/N C032
NOTE... SEE PAGE [illegible]
FOR PICK UP LOCATION
COMMENT---
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (11)... 11 FA88
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A9



DOUGLAS AIRCRAFT COMPANY , INC.

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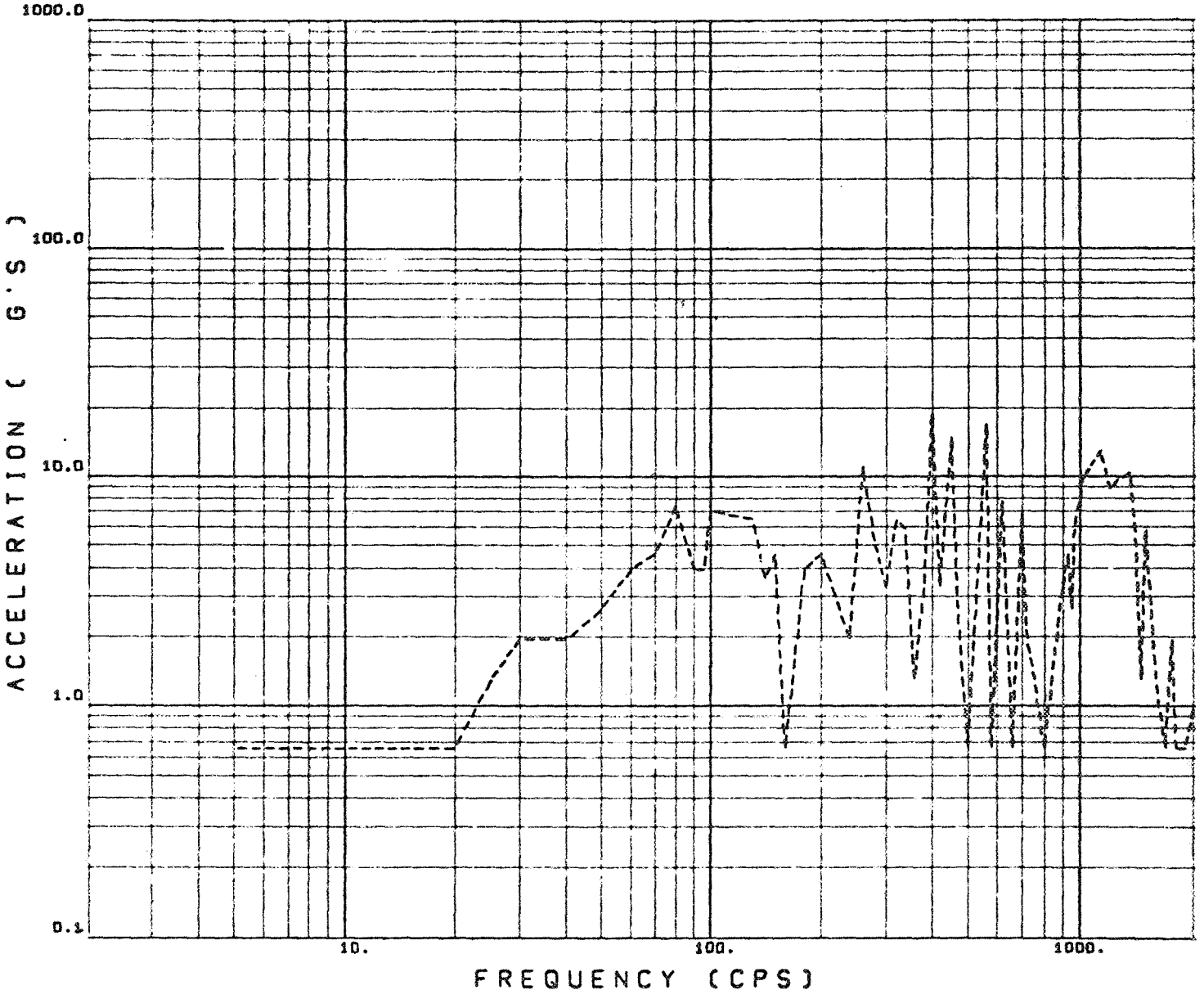
REPORT NO. H6072-I

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 003[illegible]
NOTE... SEE PAGE 32
FOR PICK UP LOCATION
COMMENT--- DATA [illegible]
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/25/67
AXIS OF EXCITATION.... (RADIAL) A
PICK UP NUMBER (12)... 12 KA34
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. 44



DOUGLAS AIRCRAFT COMPANY , INC.

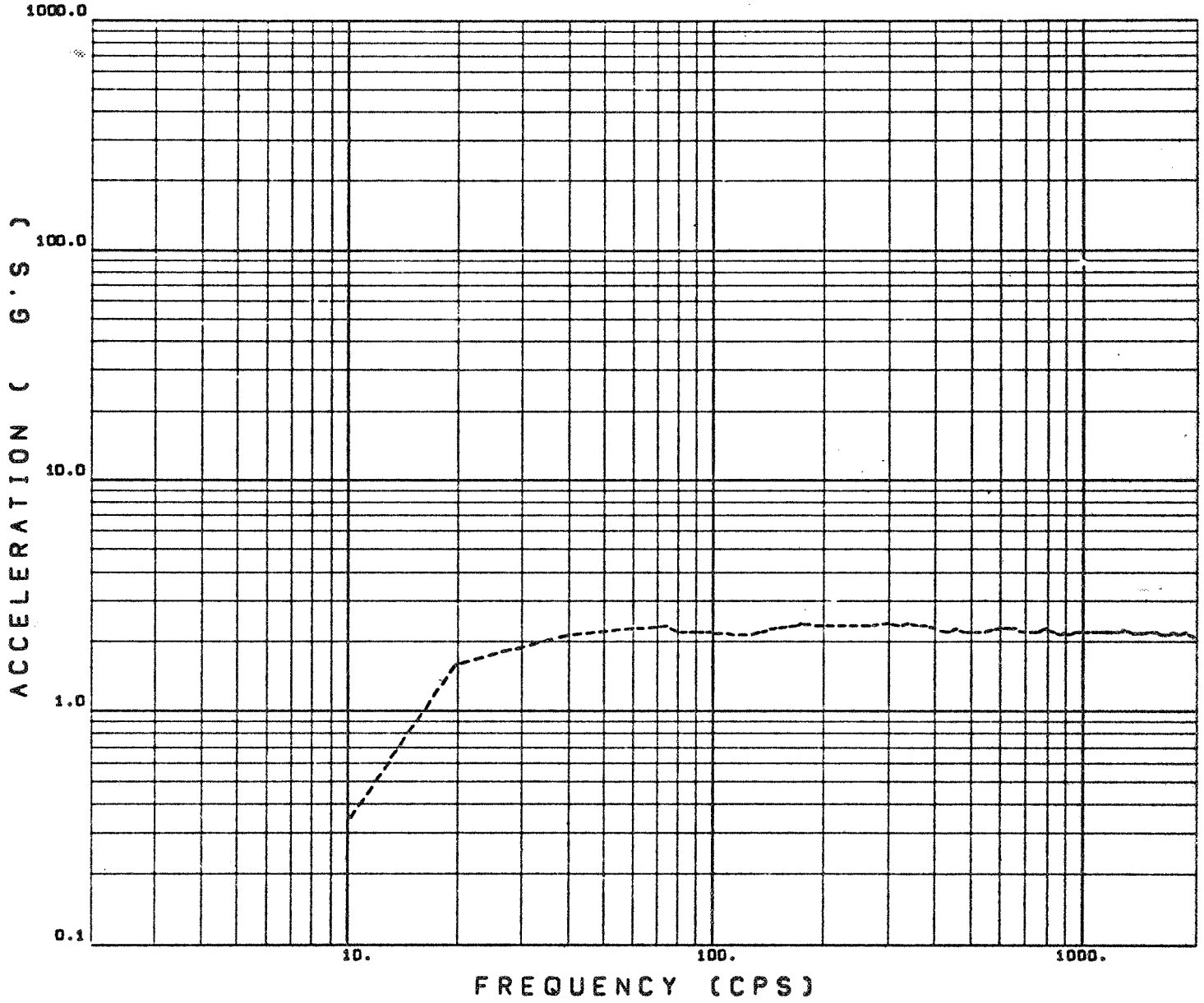
PAGE NO. A16
REPORT NO. 6072-2

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- REFERENCE CHANNEL METER USED TO VERIFY LEVEL BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (1)... 1 PA28
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. ———



DOUGLAS AIRCRAFT COMPANY , INC.

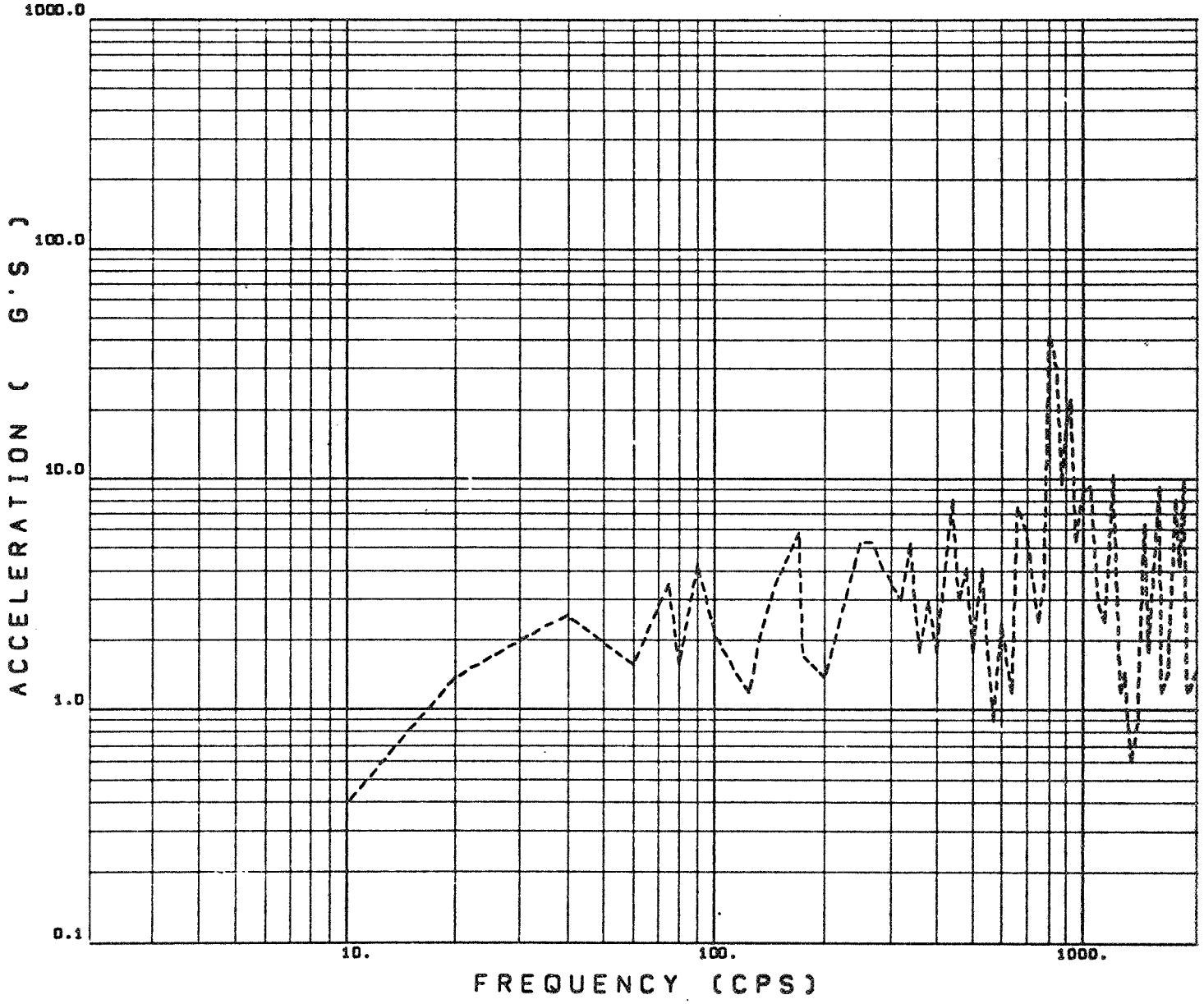
PAGE NO. A17
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B3
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (2)... 2 PA30
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

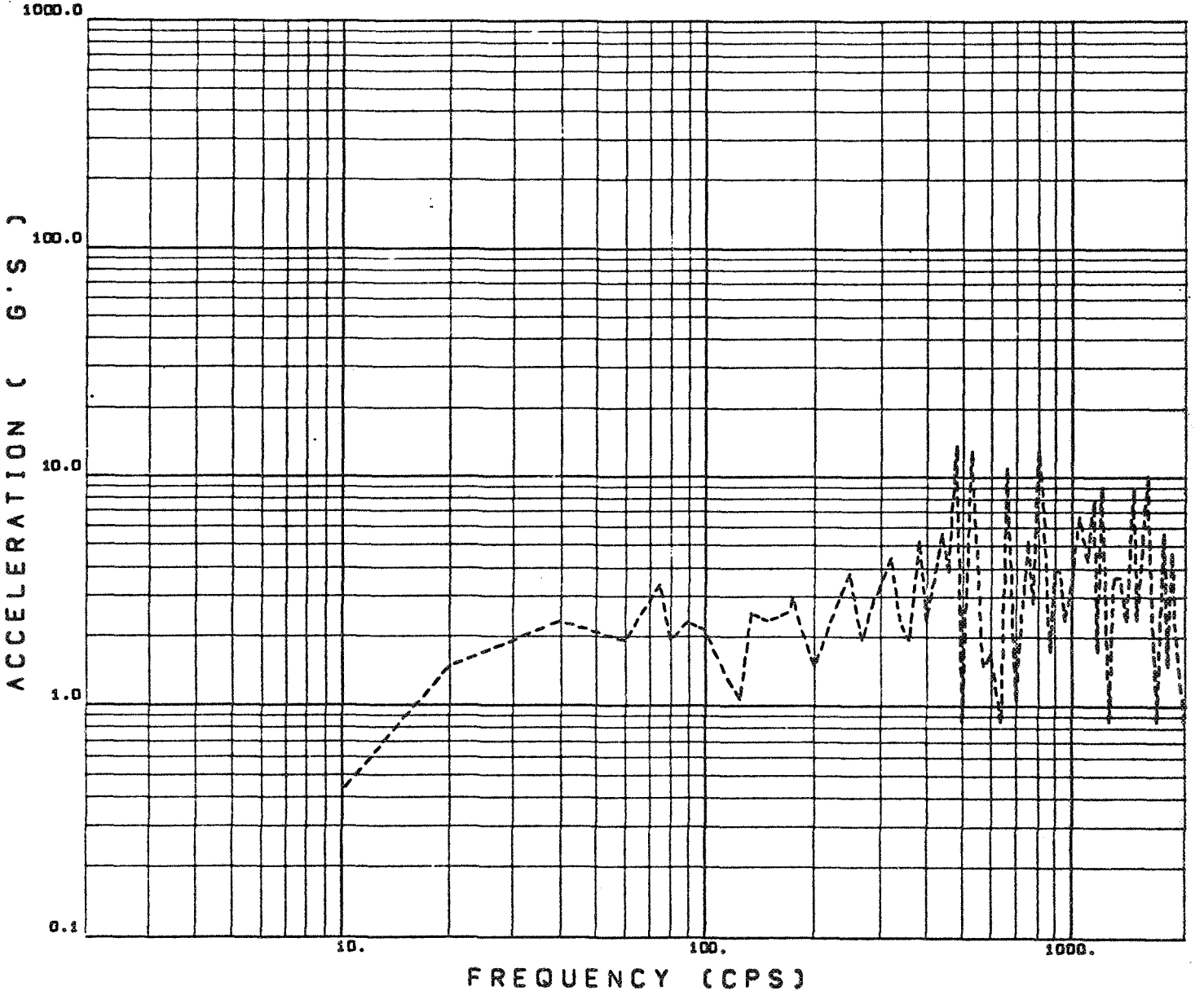
PAGE NO. A18
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (3)... 3 HB61
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

PAGE NO. A19

REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032

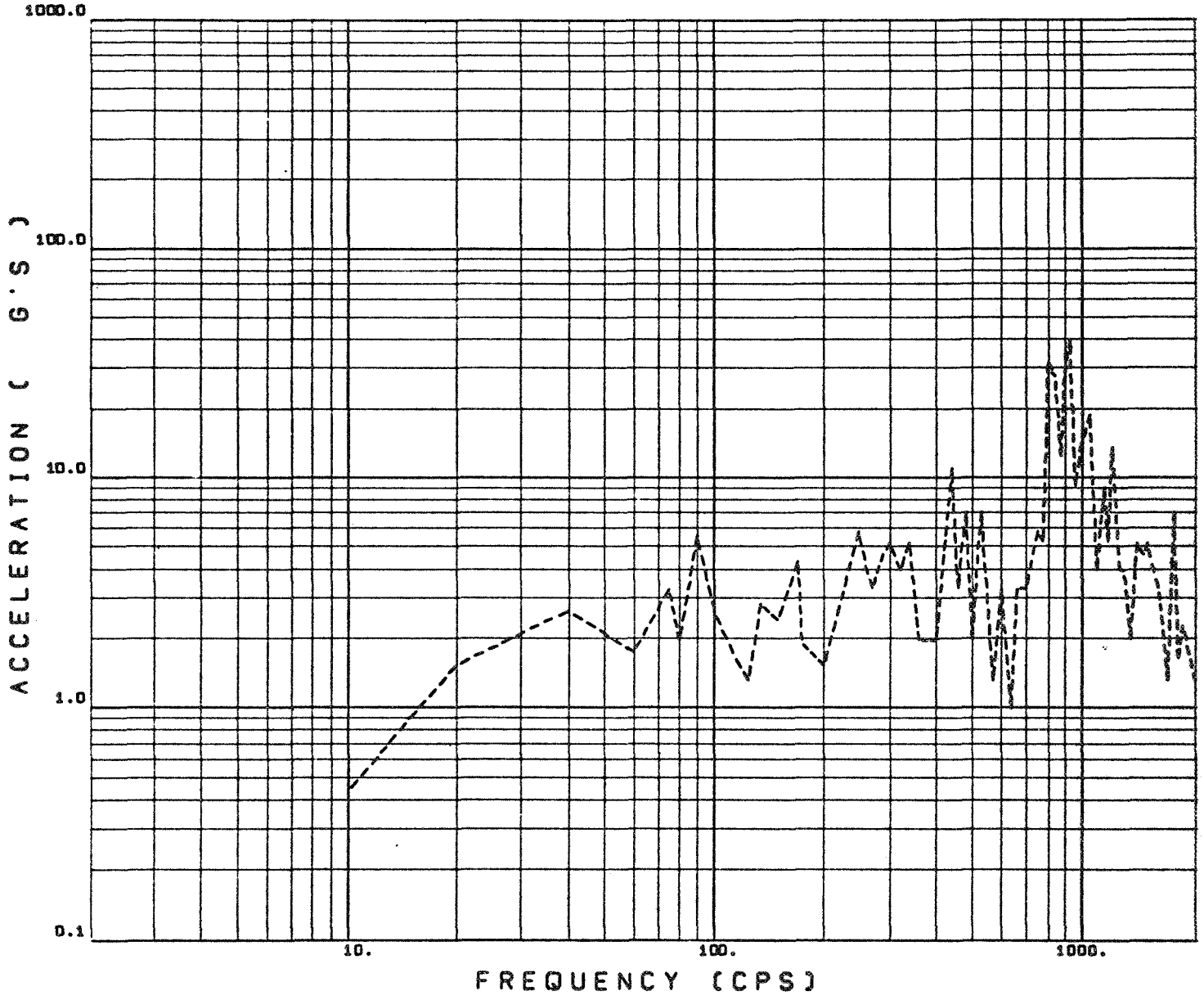
NOTE... SEE PAGE B3 FOR PICK UP LOCATION

COMMENT--- NO DATA BELOW 10 CPS

LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....

TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (4)... 4 HB72
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

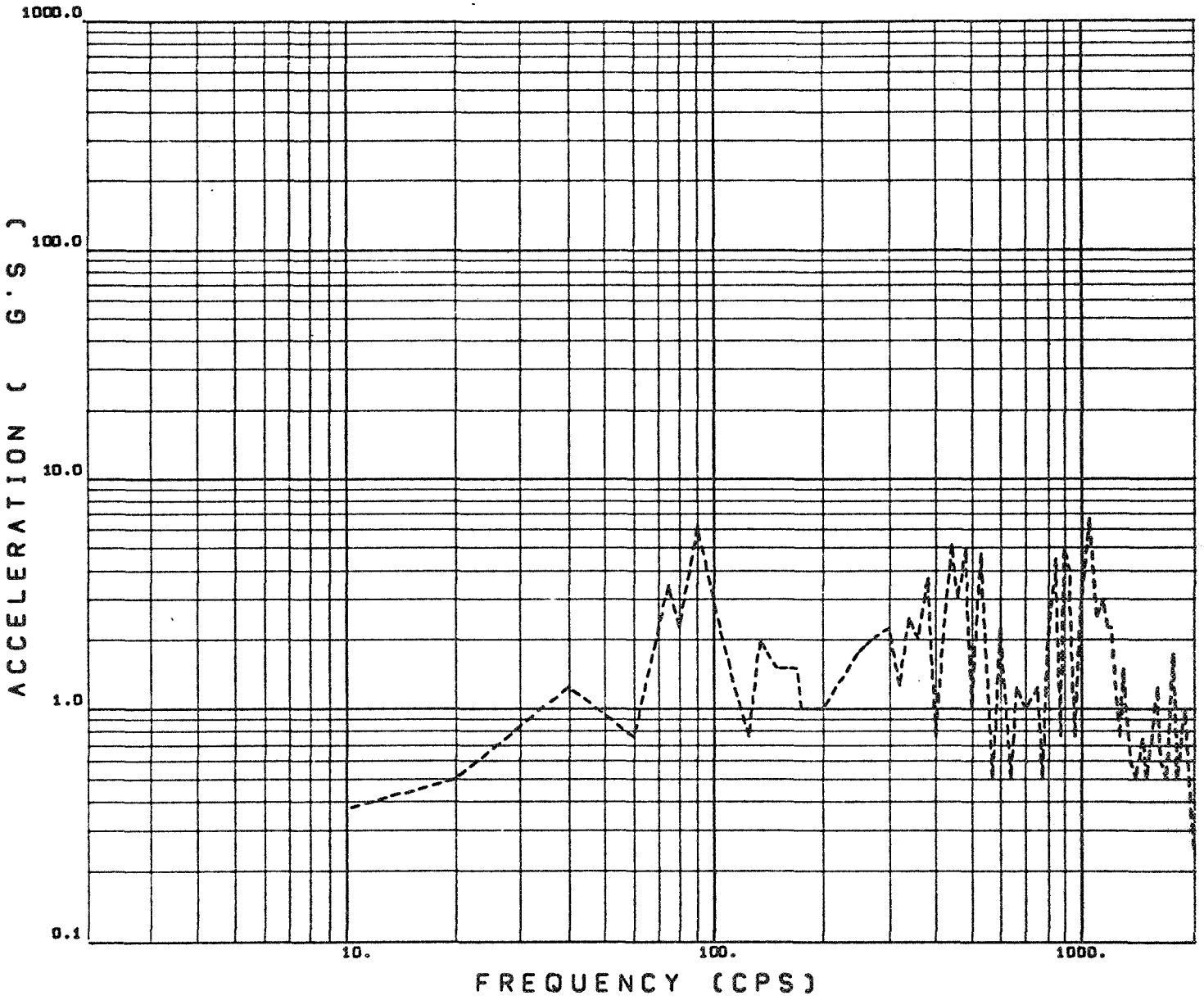
PAGE NO. A20
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL)B
PICK UP NUMBER (5)... 5 JA49
PICK UP RESPONSE..... (RADIAL)A
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

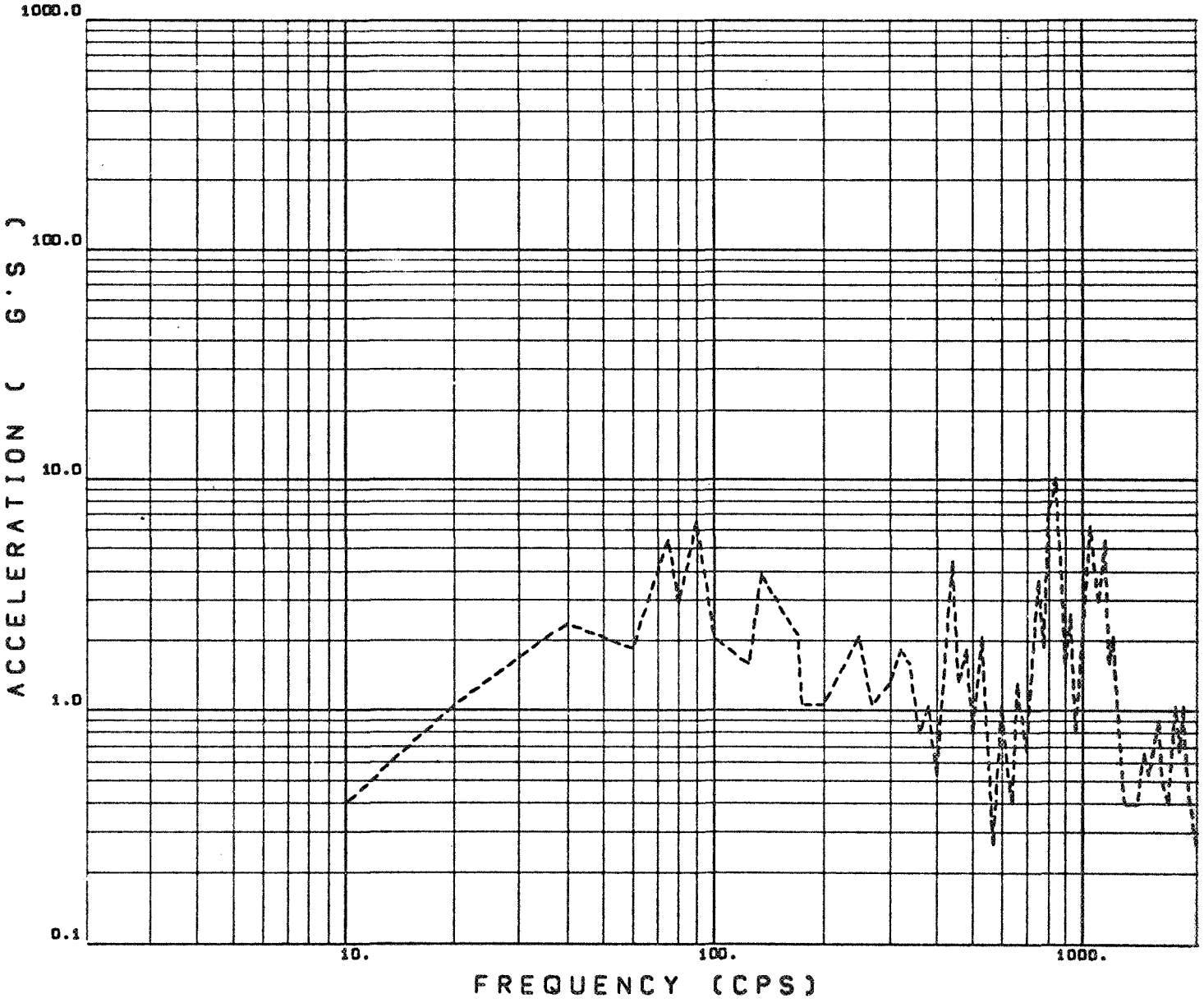
PAGE NO. A21
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (6)... 6 FA86
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A15



DOUGLAS AIRCRAFT COMPANY , INC.

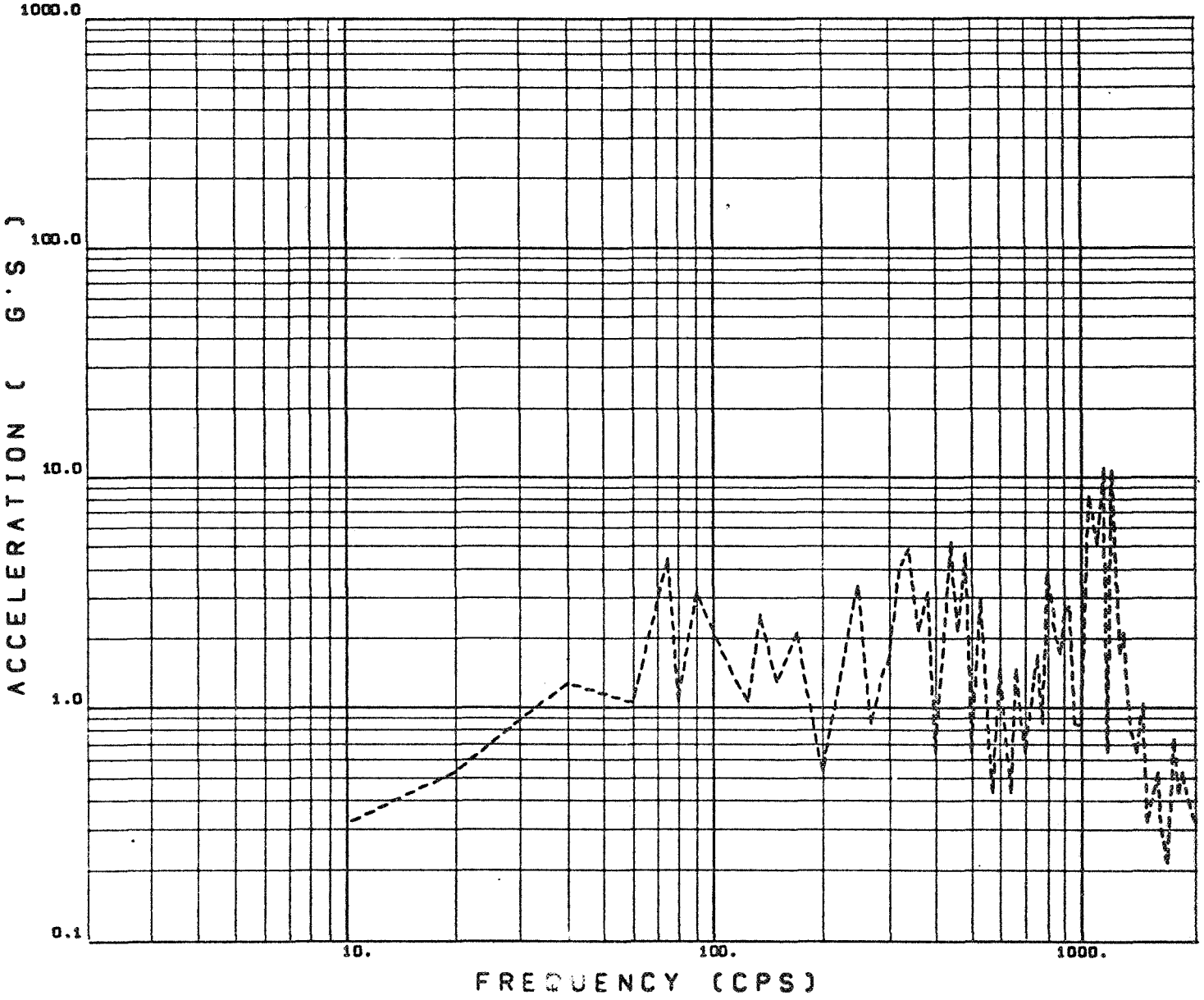
PAGE NO. A22
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (7)... 7 ND07
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

PAGE NO. A23

REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0052

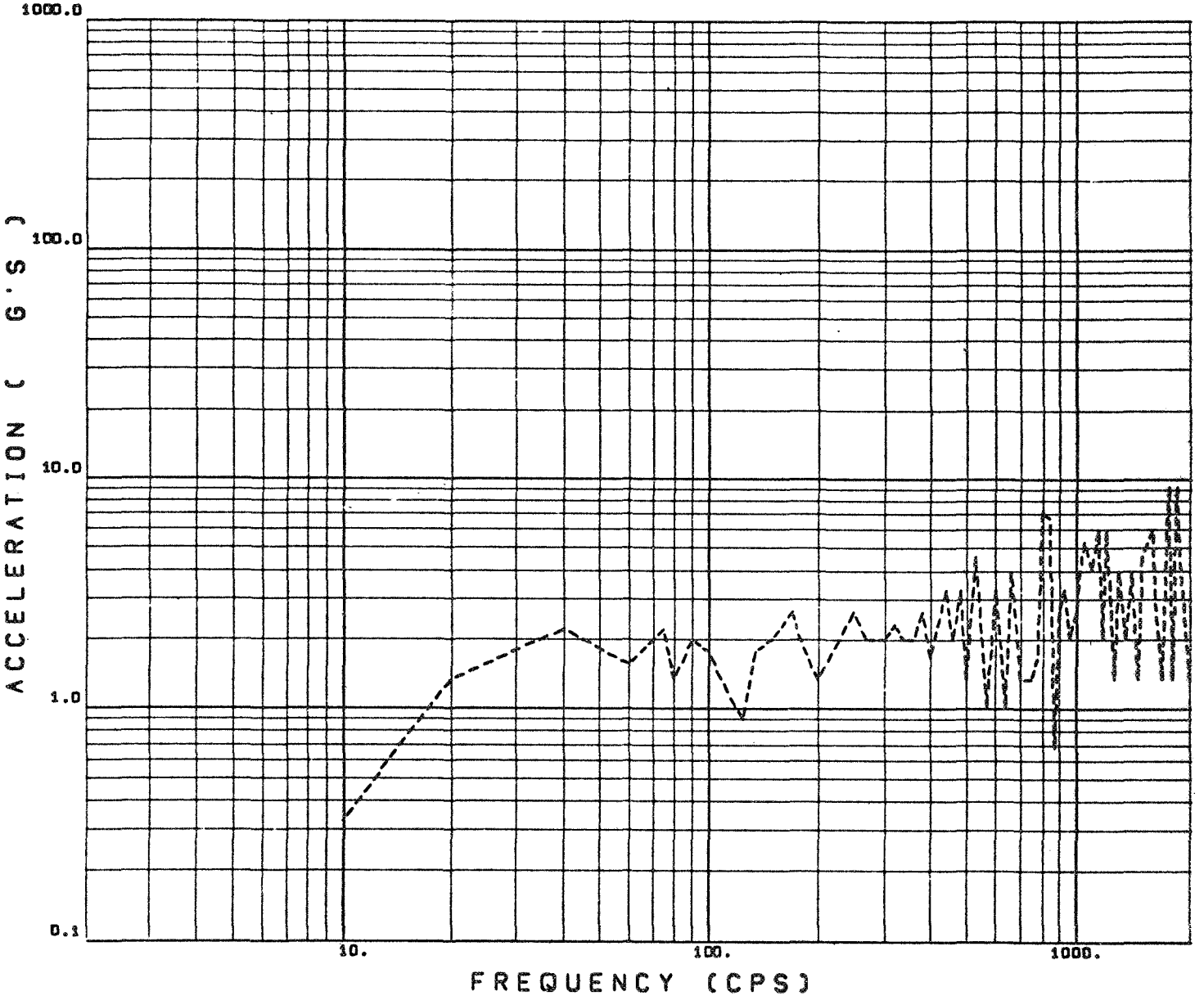
NOTE... SEE PAGE B6
FOR PICK UP LOCATION

COMMENT--- NO DATA BELOW 10 CPS

LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....

TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (8)... 8 ND51
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

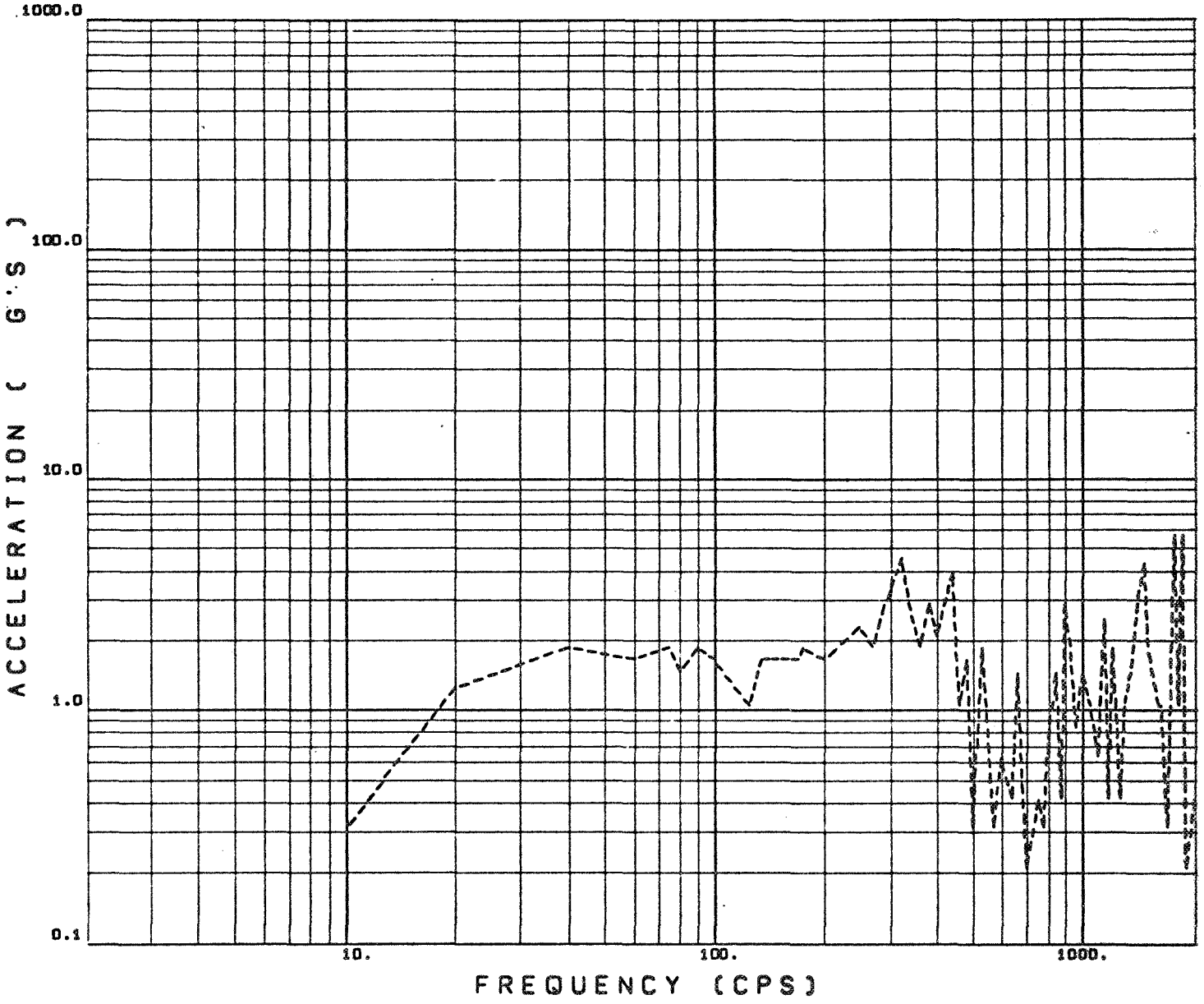
PAGE NO. A24
REPORT NO.

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B3
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (9)... 9 NC65
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

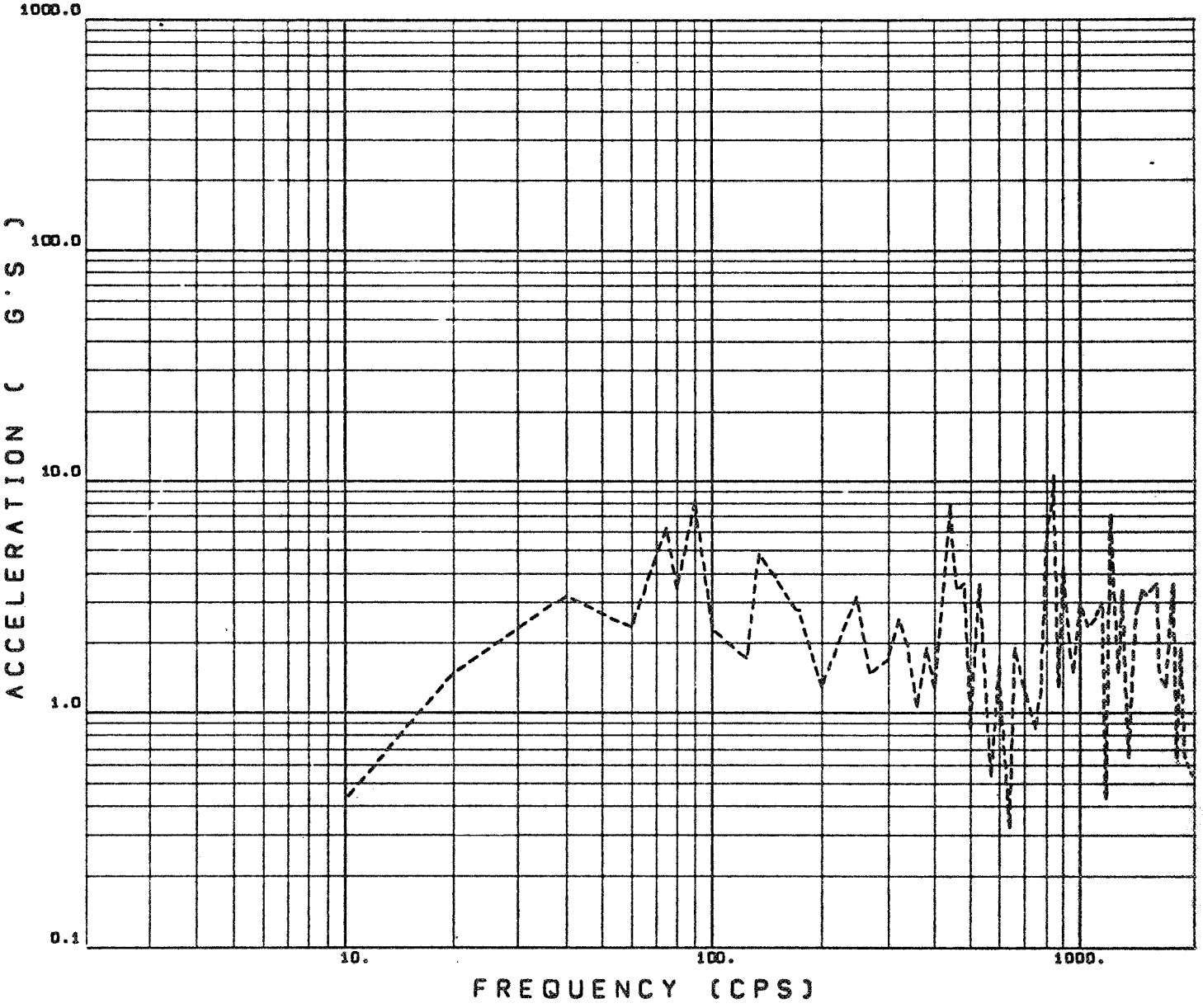
PAGE NO. A25
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N A49938-501 S/N 0032
NOTE... SEE PAGE 22
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL)B
PICK UP NUMBER (10)... 10 FA5D
PICK UP RESPONSE..... (TANGENTIAL)B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

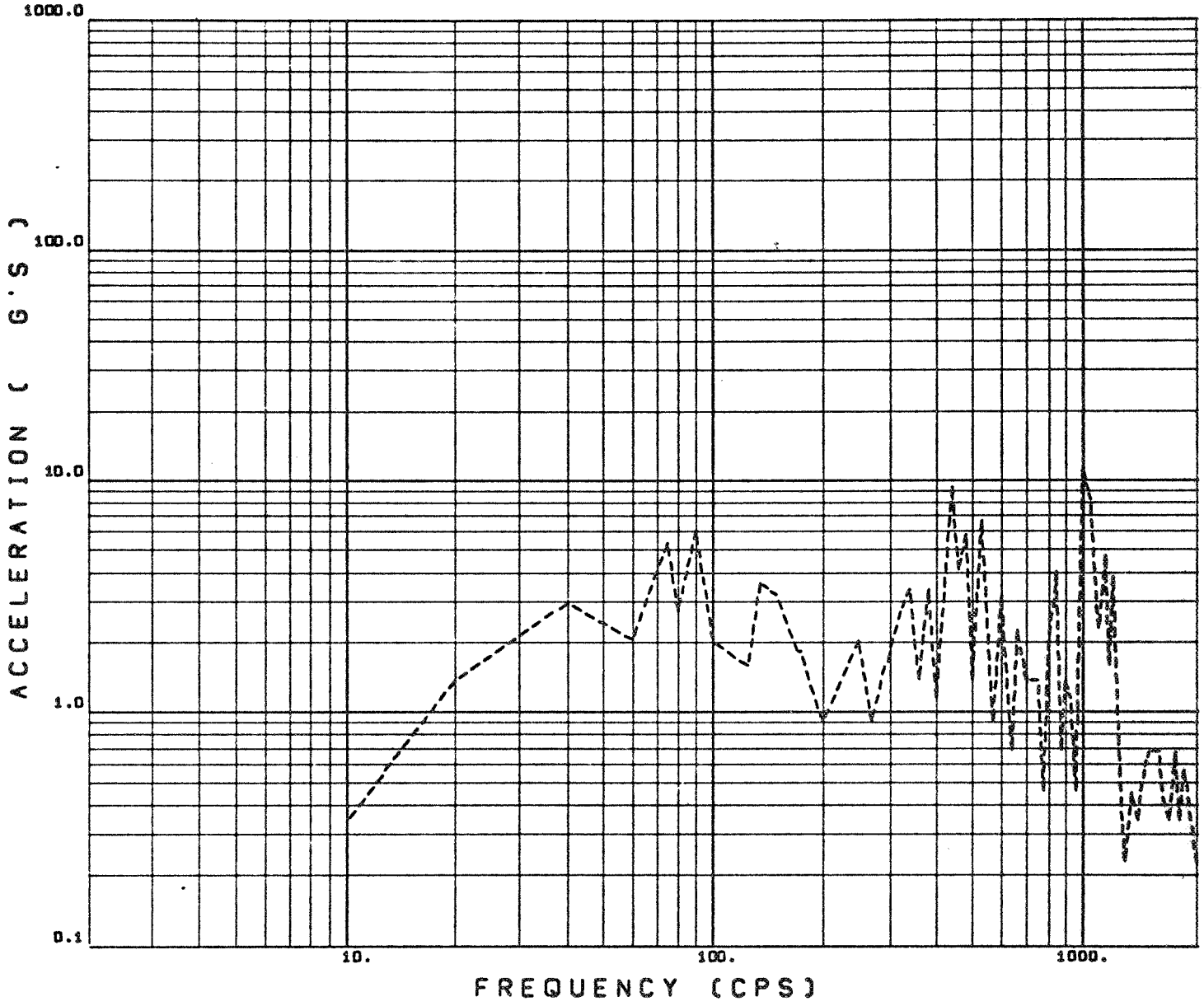
PAGE NO. A26
REPORT NO. _____

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE 3
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW [illegible]
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (11)... 11 FA88
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

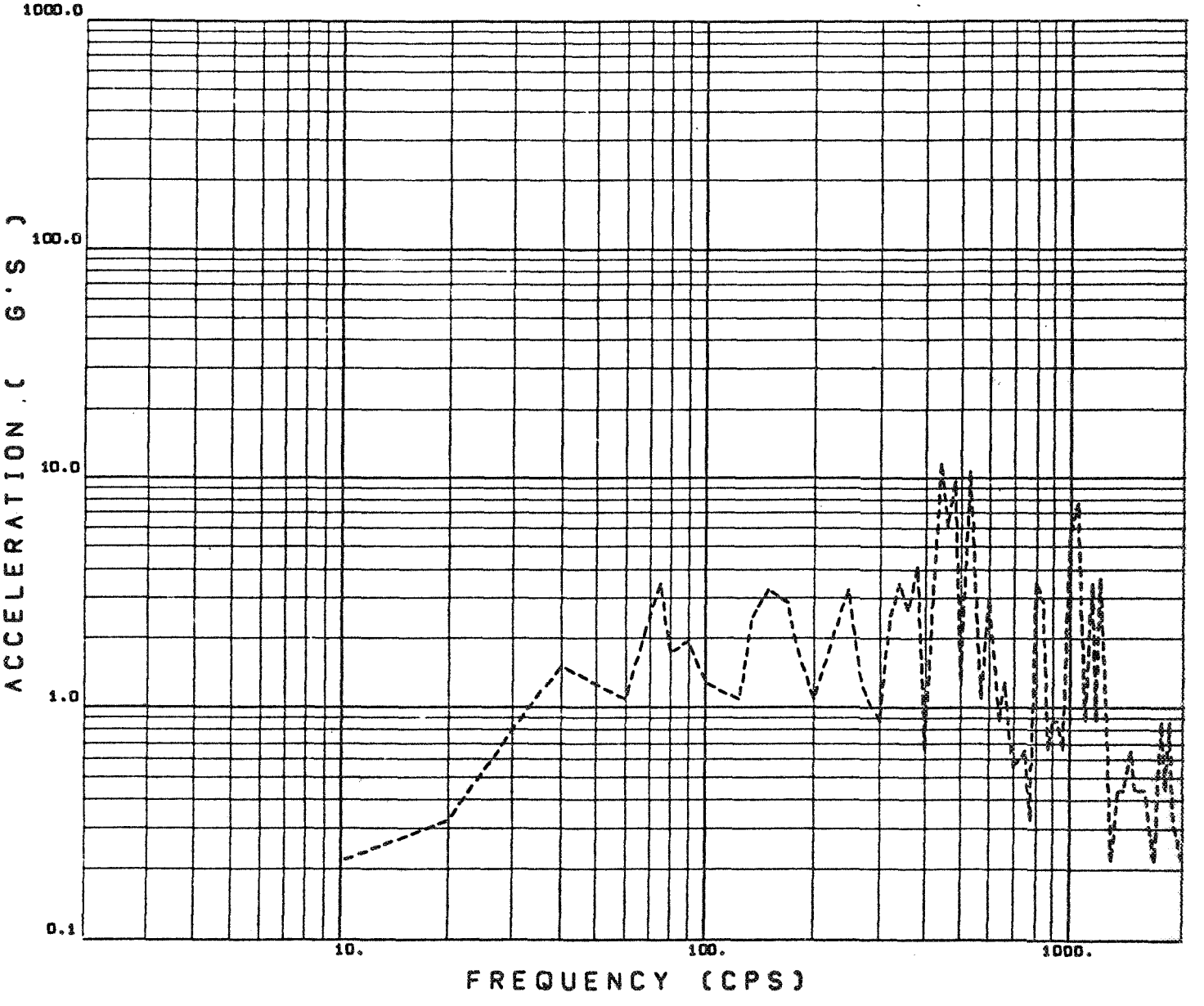
PAGE NO. A27
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49958-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- NO DATA BELOW 10 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 7/26/67
AXIS OF EXCITATION.... (TANGENTIAL) B
PICK UP NUMBER (12)... 12 KA34
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A16



DOUGLAS AIRCRAFT COMPANY , INC.

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REPORT NO. H6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION ---PN 1A499BB-501 SN 0032

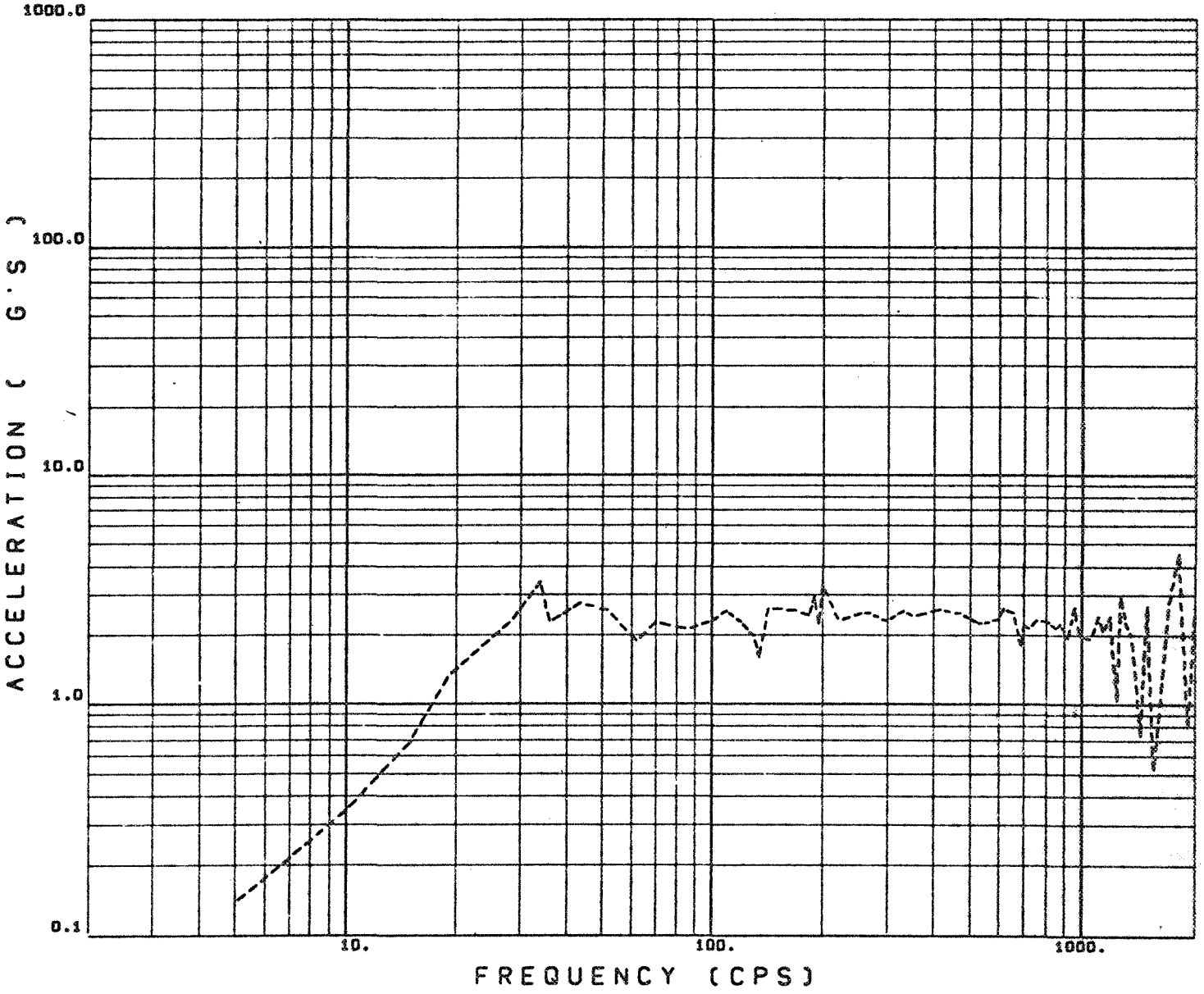
NOTE... SEE PAGE B2
FOR PICK UP LOCATION

COMMENT--- REFERENCE CHANNEL

LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....

TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (1)... 1 PA28
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. ——



DOUGLAS AIRCRAFT COMPANY , INC.

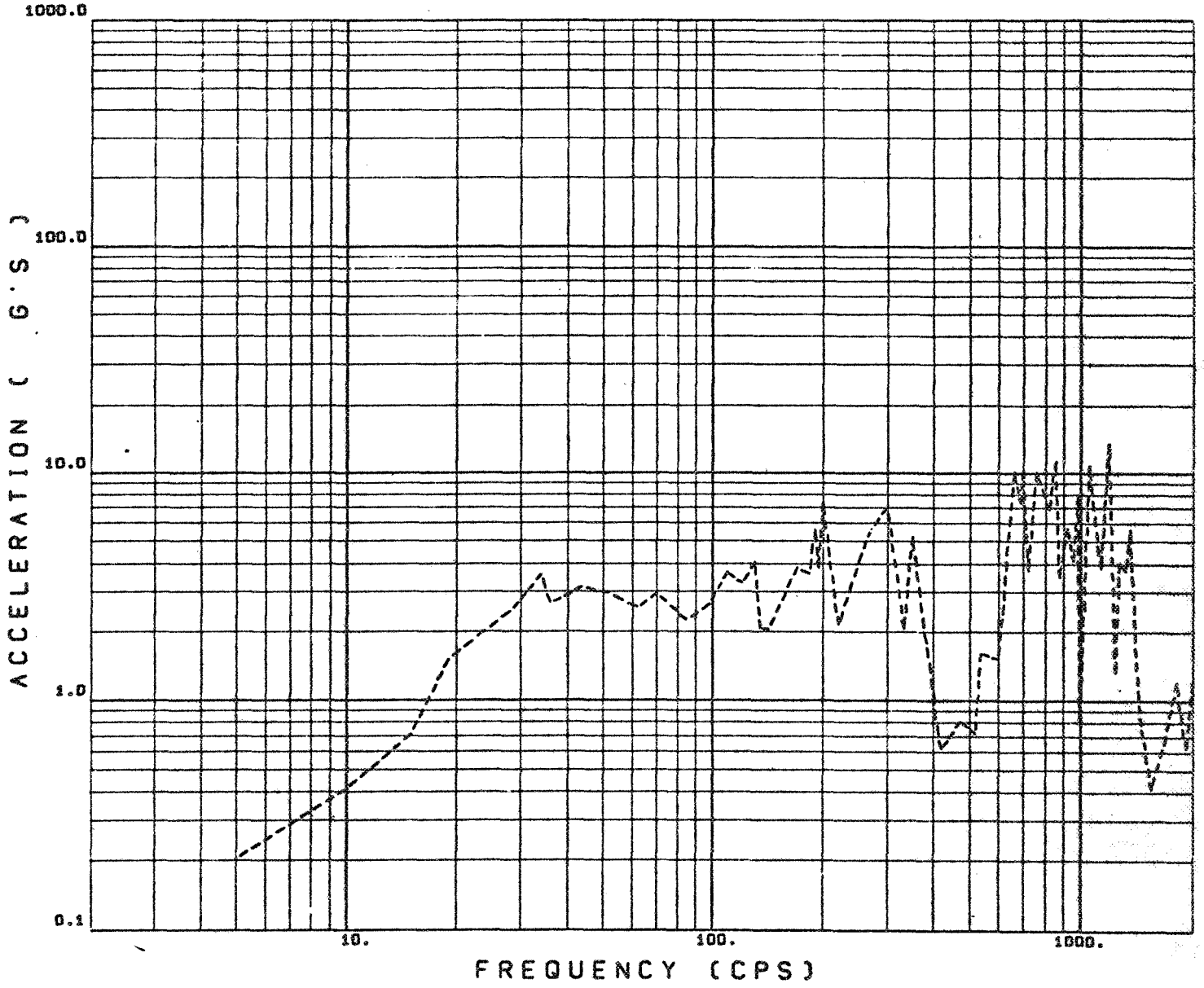
PAGE NO. A29
REPORT NO. 80[illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A[illegible]-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- SATURATED DATA POINTS 760,700,658 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (2)... 2 PA30
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A28



DOUGLAS AIRCRAFT COMPANY , INC.

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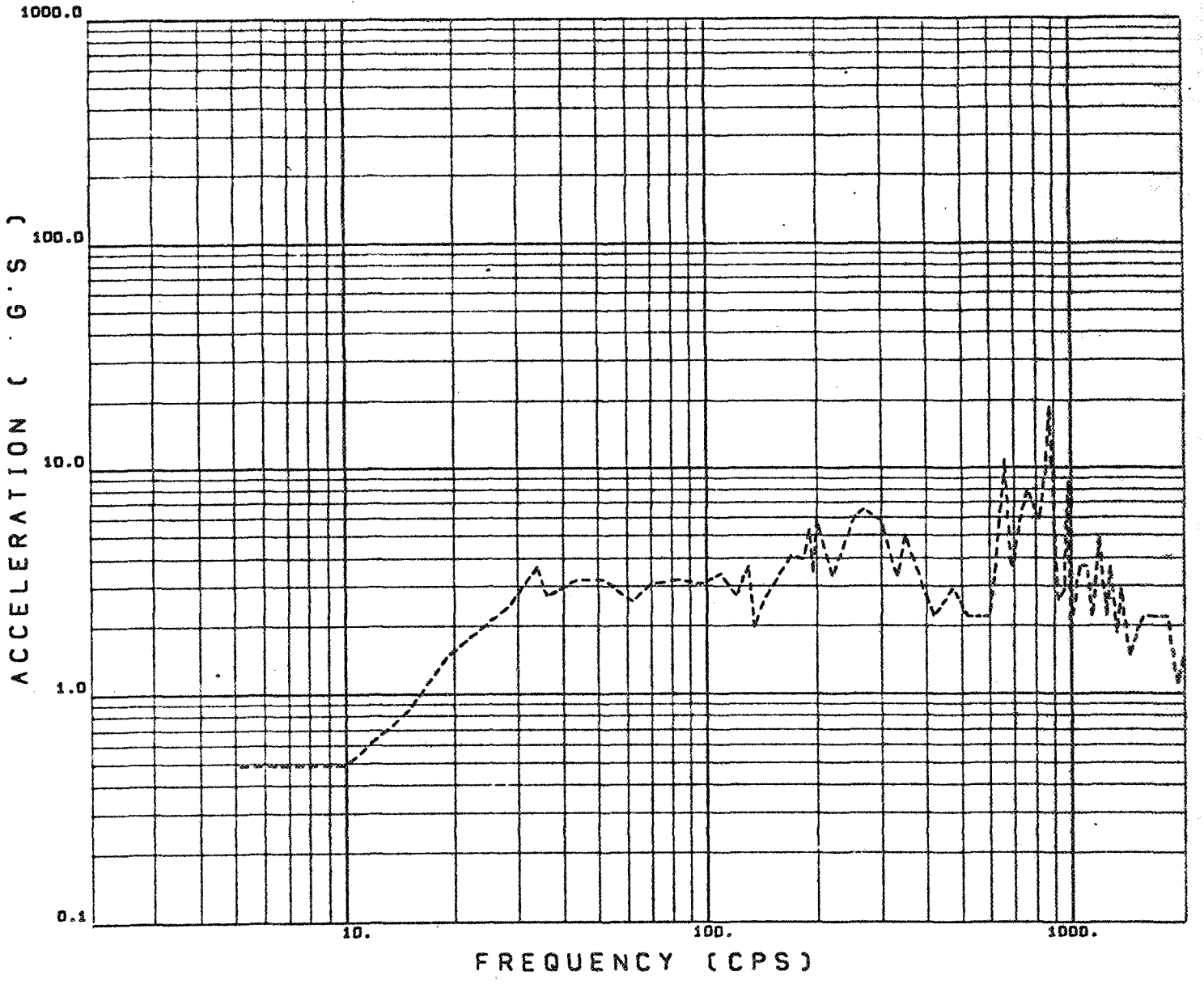
REPORT NO. R6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A4998B-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- DATA INVALID BELOW 10 CPS
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (3)... 3 HB61
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A29



DOUGLAS AIRCRAFT COMPANY , INC.

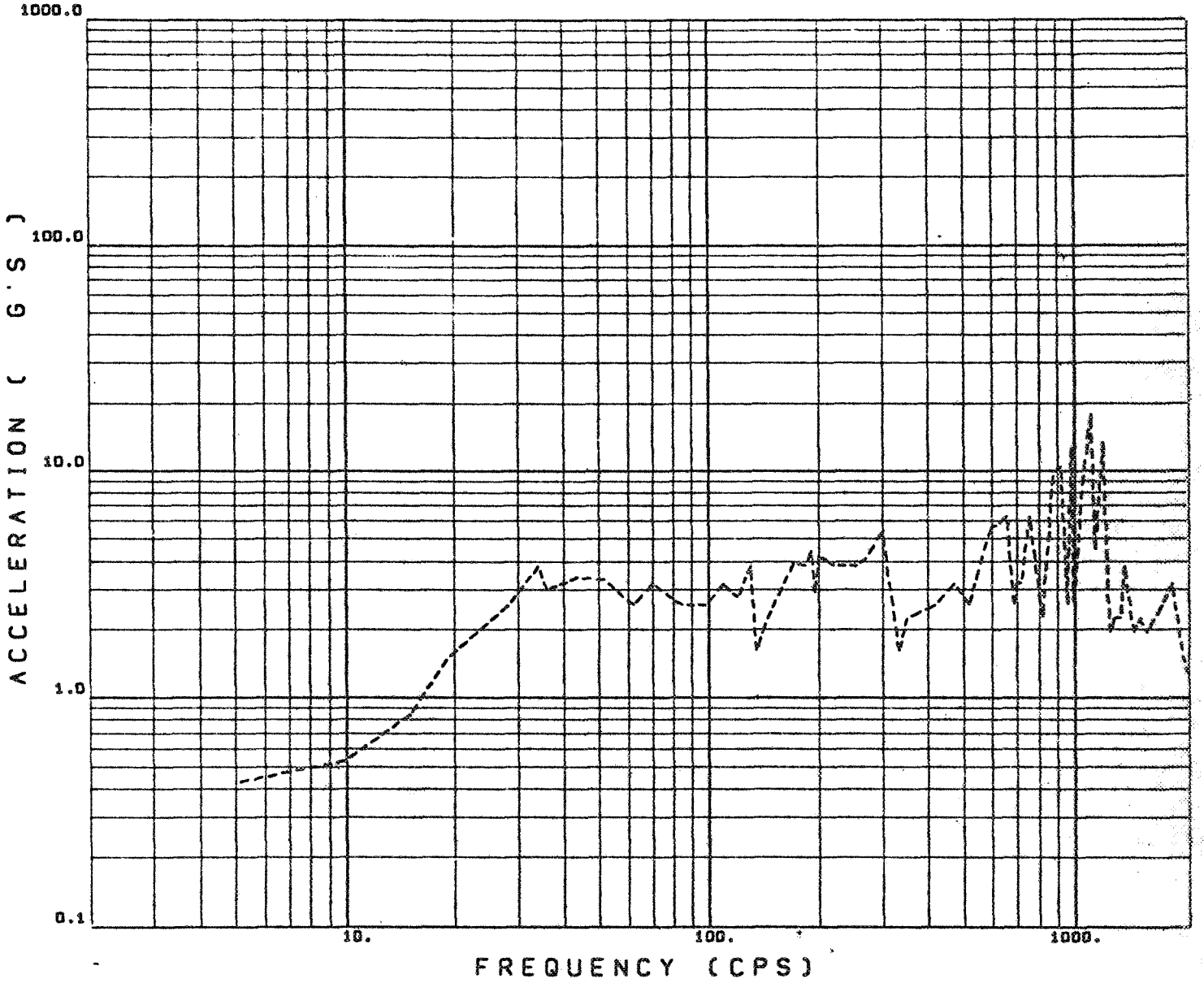
PAGE NO. 421
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49958-501 S/N 2032
NOTE... SEE PAGE 422
FOR PICK UP LOCATION
COMMENT--- DATA INVALID BECAUSE [illegible]
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (4)... 4 HB72
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. 422



DOUGLAS AIRCRAFT COMPANY , INC.

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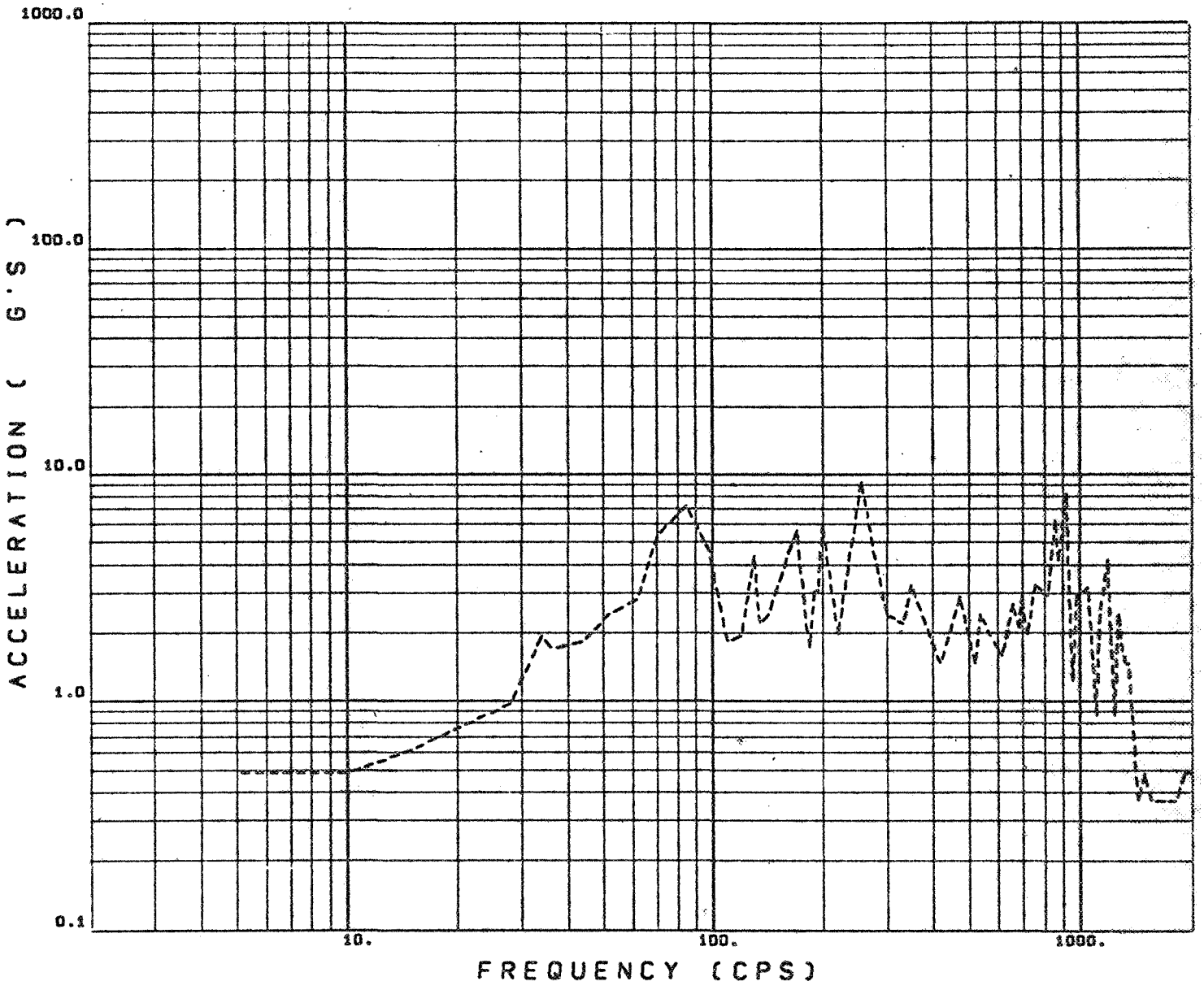
REPORT NO. R6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 003R
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- DATA INVALID BELOW 10CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (5)... 5 JA49
PICK UP RESPONSE..... (RADIAL) C
INPUT ACCEL.PER PAGE.. A28



DOUGLAS AIRCRAFT COMPANY , INC.

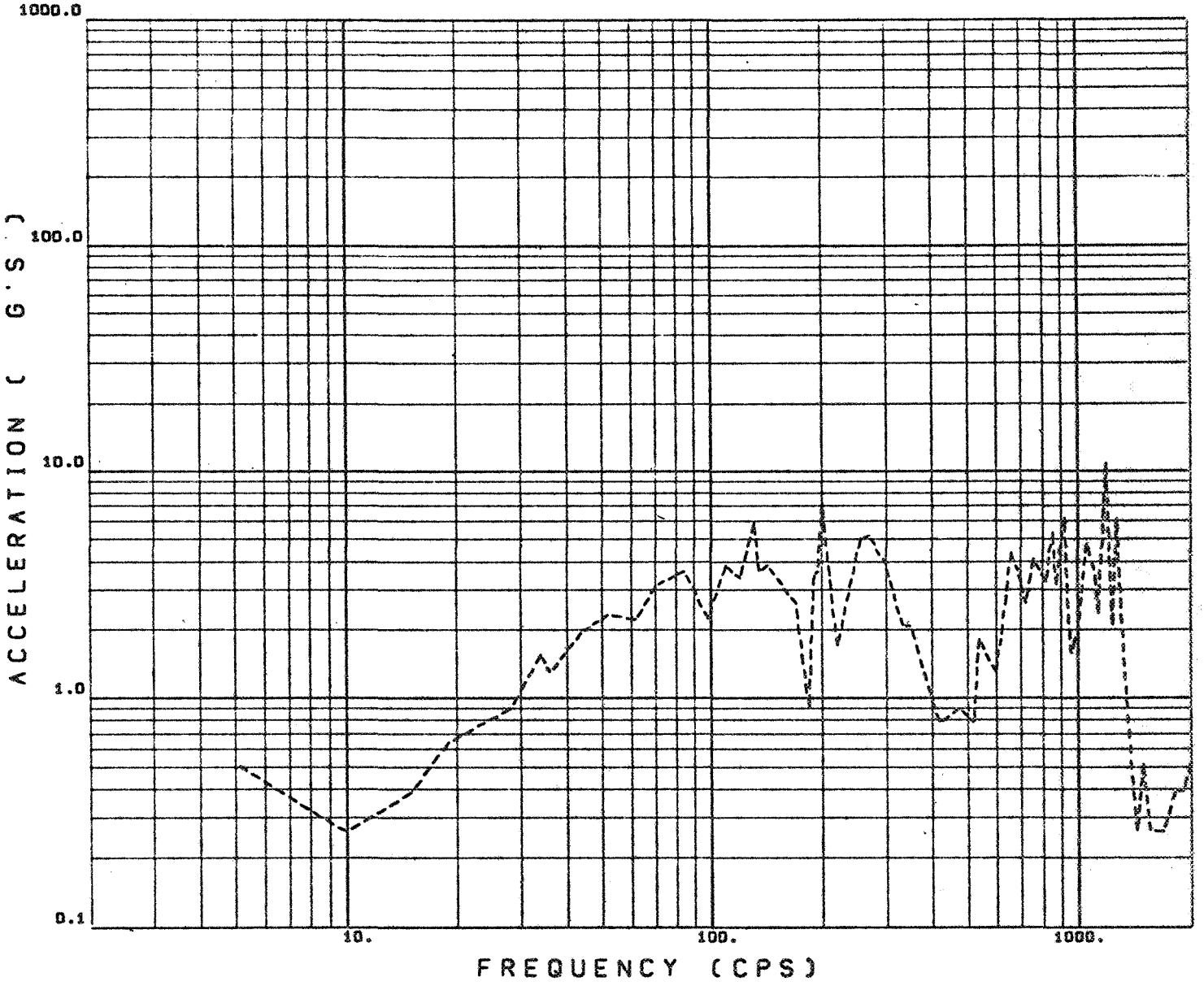
PAGE NO. A33
REPORT NO. R6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- DATA [illegible]
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (6)... 6 FA86
PICK UP RESPONSE..... (TANGENTIAL) B
INPUT ACCEL.PER PAGE.. A23



DOUGLAS AIRCRAFT COMPANY , INC.

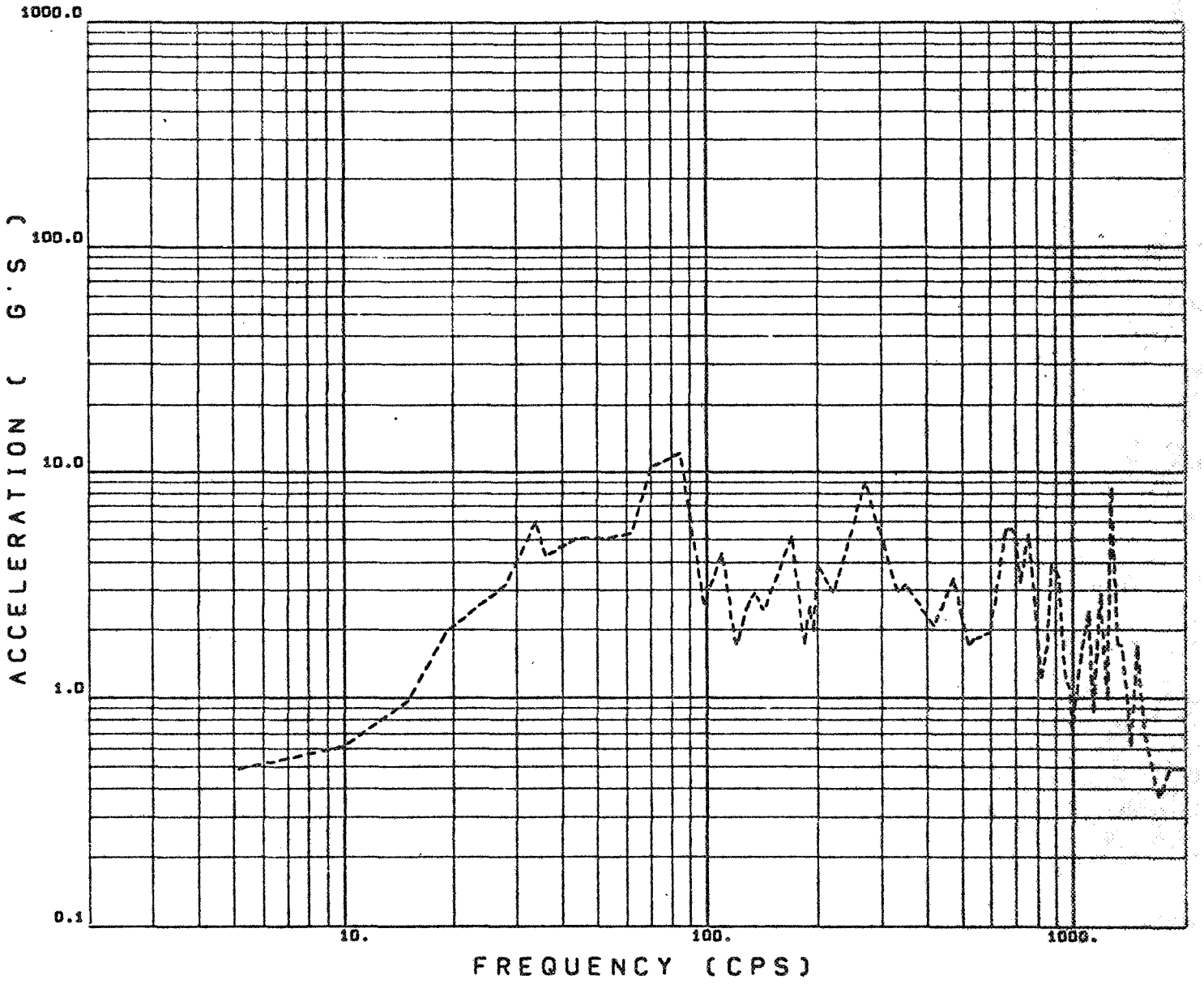
PAGE NO. A34
REPORT NO. 6072-1

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49929-501 S/N 0002
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- DATA INVALID BELOW 15 CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (7)... 7 ND07
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A28



DOUGLAS AIRCRAFT COMPANY , INC.

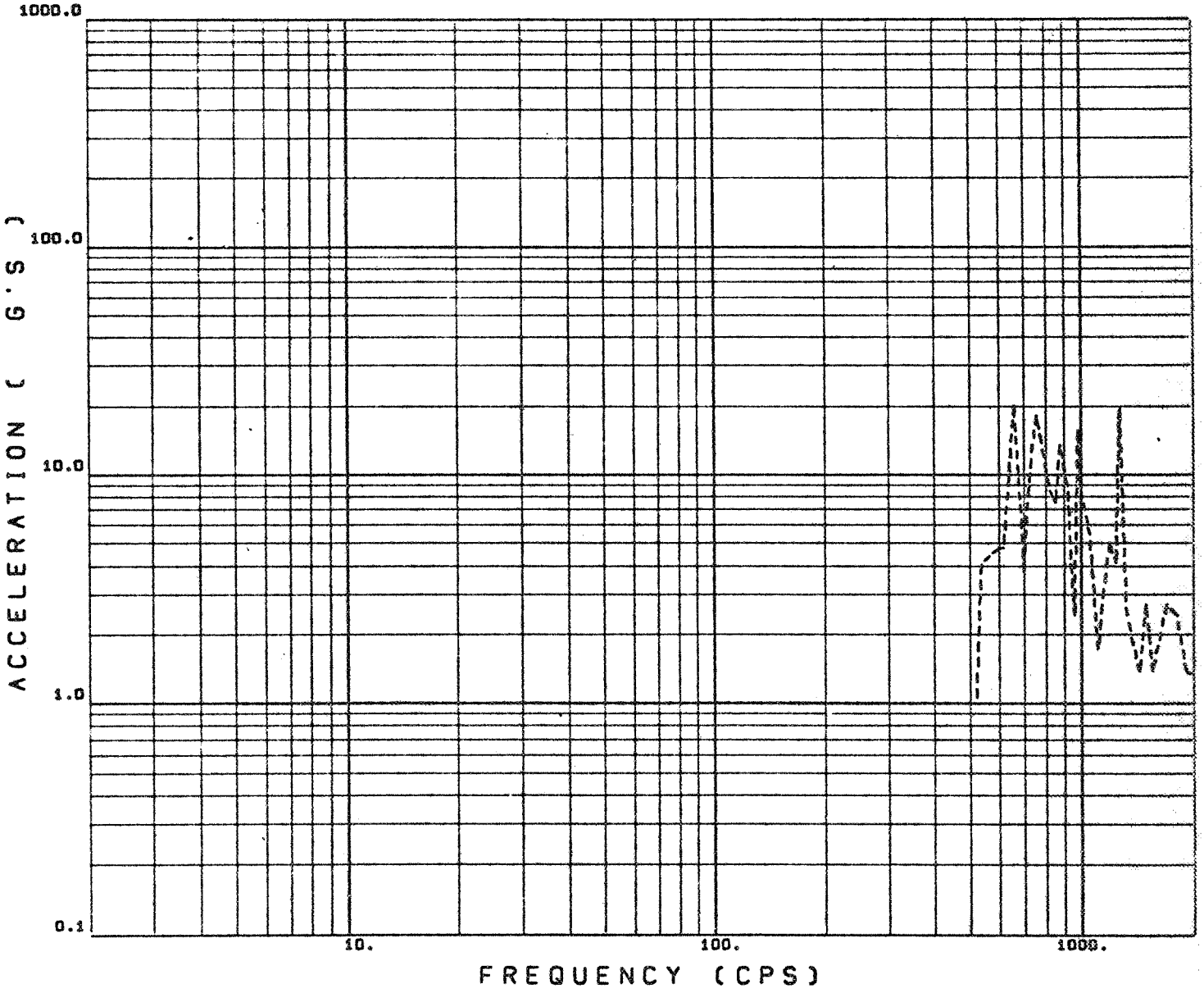
PAGE NO. A35
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A499 98-501 S/N 0032
NOTE... SEE PAGE A2
FOR PICK UP LOCATION
COMMENT--- ACCELEROMETER OFF AT 850 CPS TO 5 CPS ON DOWNSWEEP. NO DATA ON UPSWEEP BECAUSE OF FAULTY ACCELEROMETER
LEGEND...
UPSWEEP
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (8)... 8 HA13
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A22



DOUGLAS AIRCRAFT COMPANY , INC.

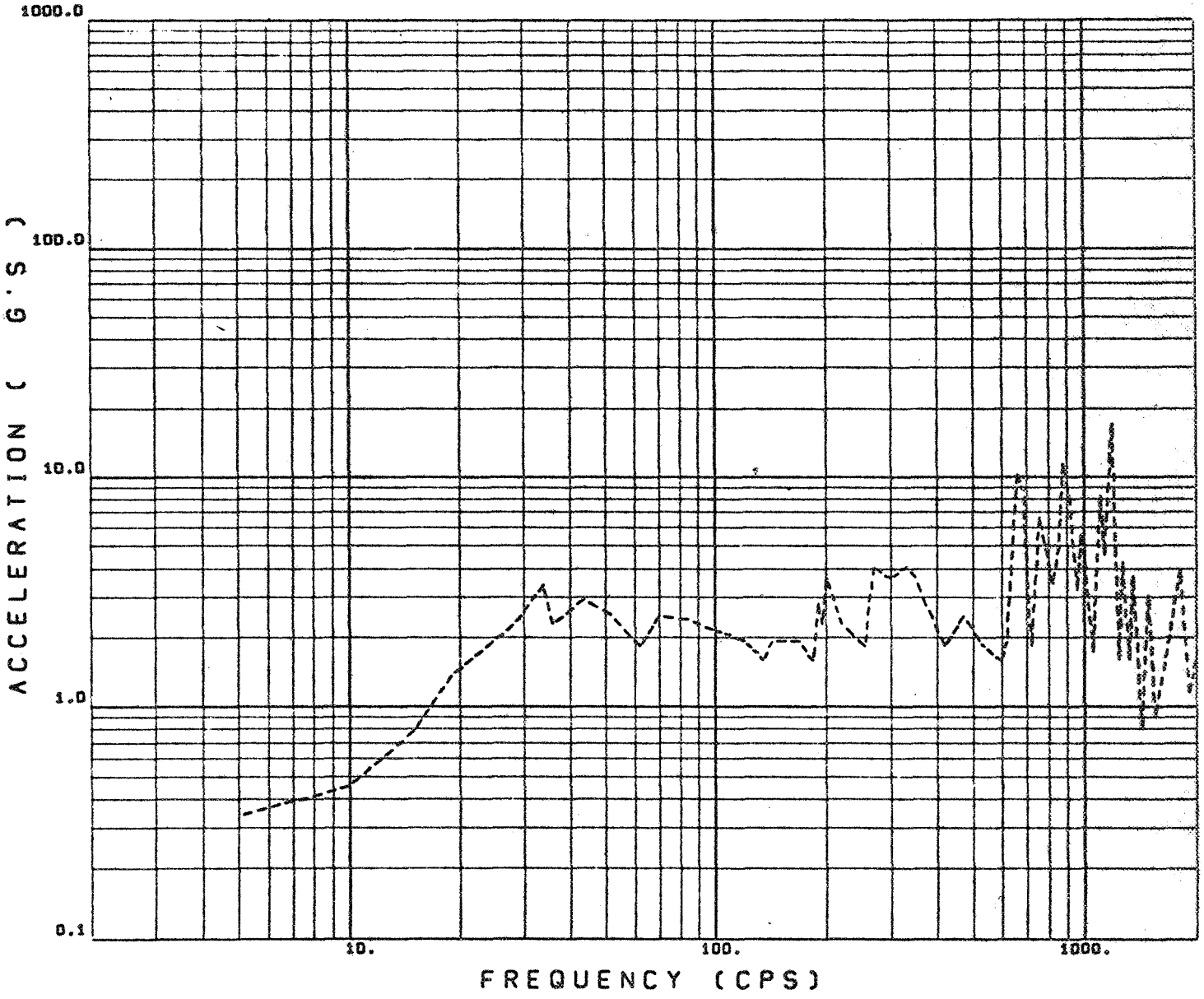
PAGE NO. A36
REPORT NO. R6072-I

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49980-501
NOTE... SEE PAGE B3
FOR PICK UP LOCATION
COMMENT--- DATA INVALID BELOW 10CPS
LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (9)... 9 NC65
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A28



DOUGLAS AIRCRAFT COMPANY , INC.

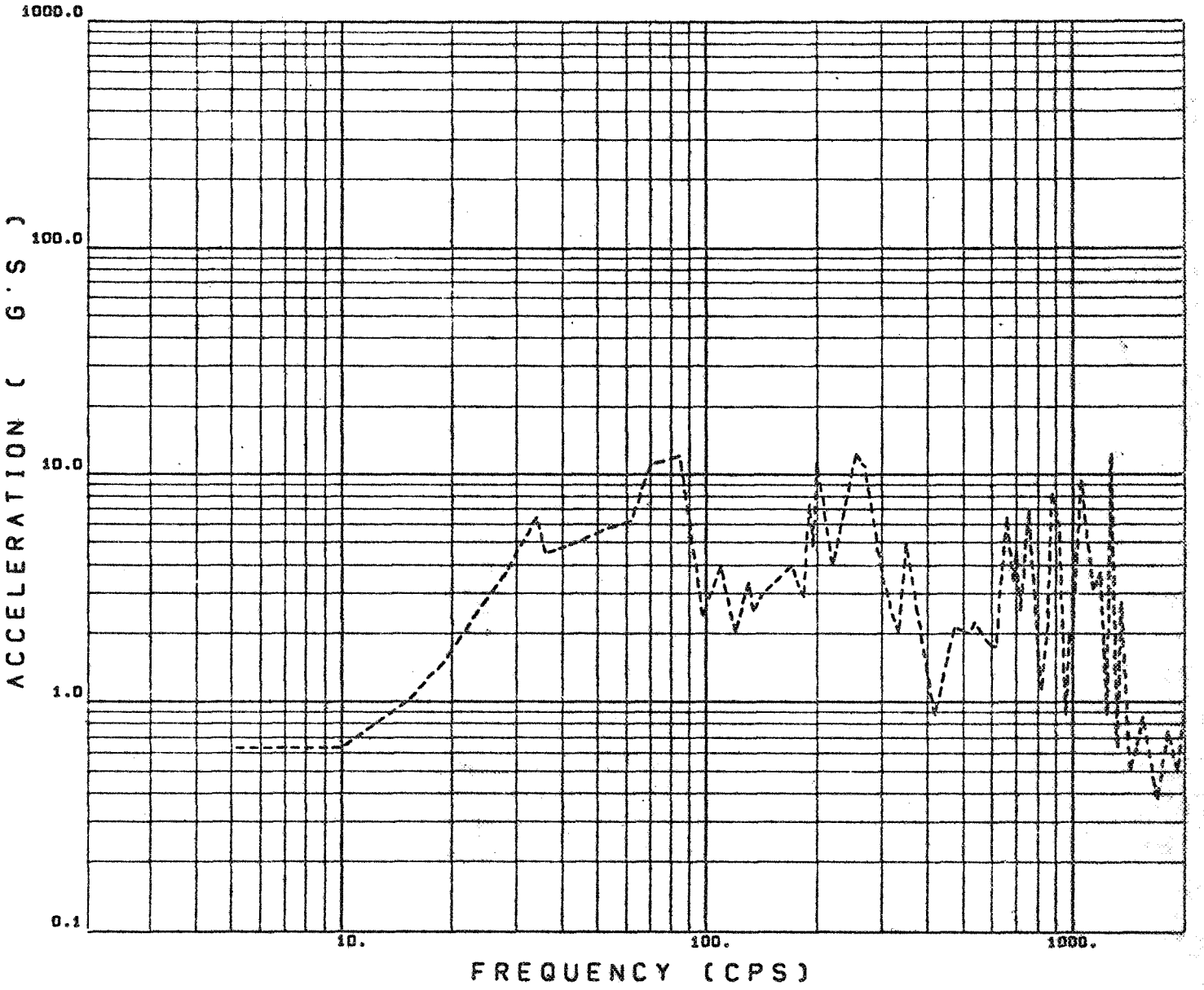
PAGE NO. A37
REPORT NO. [illegible]

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- DATA INVALID BELOW 10 CPS
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (10)... 10 FA50
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A28



DOUGLAS AIRCRAFT COMPANY , INC.

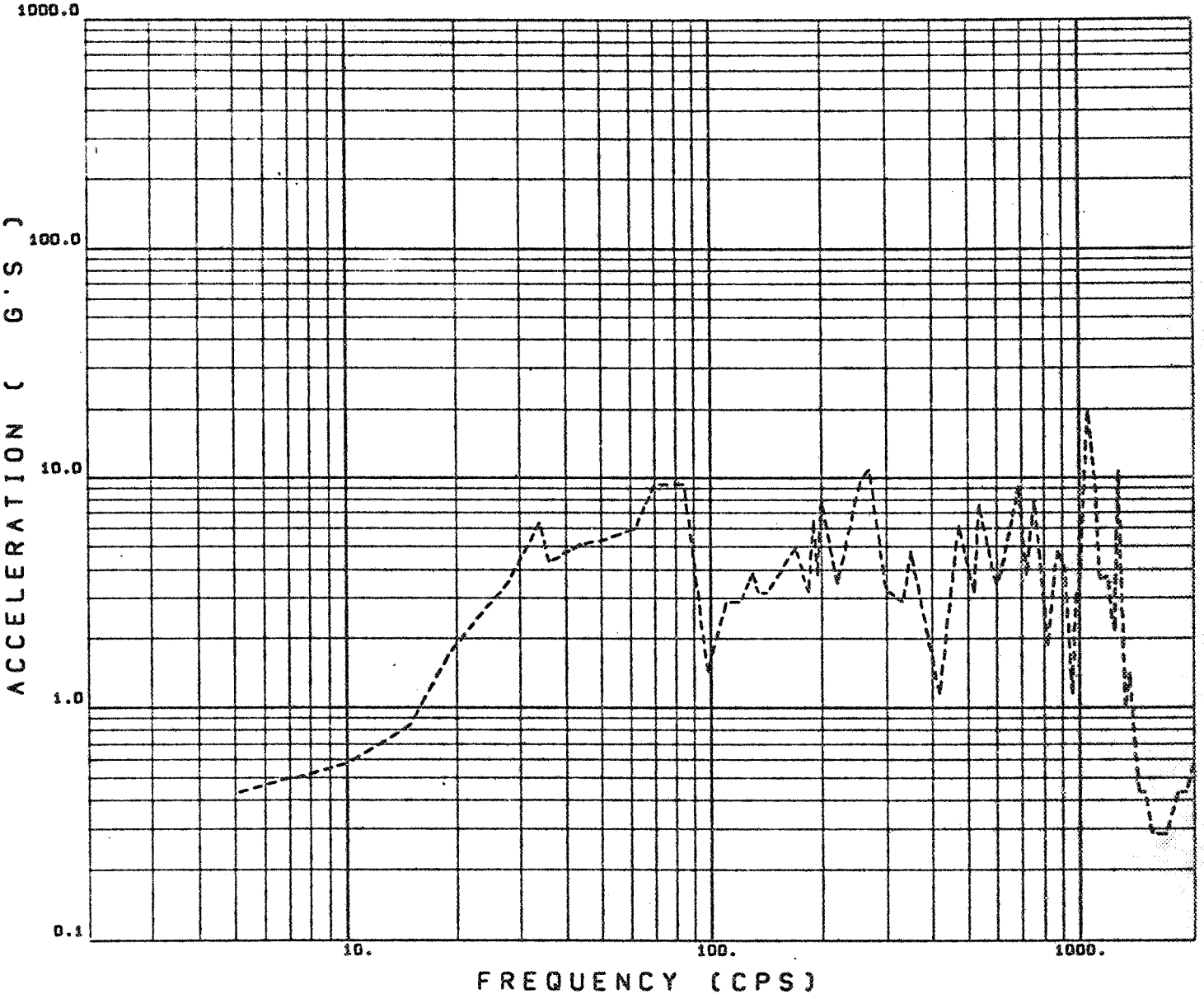
PAGE NO. A38
REPORT NO. ~~R6072-1~~

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0332
NOTE... SEE PAGE B2
FOR PICK UP LOCATION
COMMENT--- DATA [illegible]
LEGEND...
UPSWEEP ——
DOWNSWEEP ------

TEST CONDITIONS....
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (11)... 11 FA88
PICK UP RESPONSE..... (THRUST) C
INPUT ACCEL.PER PAGE.. A28



DOUGLAS AIRCRAFT COMPANY , INC.

PAGE NO. A39

REPORT NO. Y6072-I

SINUSOIDAL FREQUENCY SWEEP

SIV-B DIRECTIONAL CONTROL FUEL VENT VALVE (H-13A)

CONFIGURATION --- P/N 1A49988-501 S/N 0032

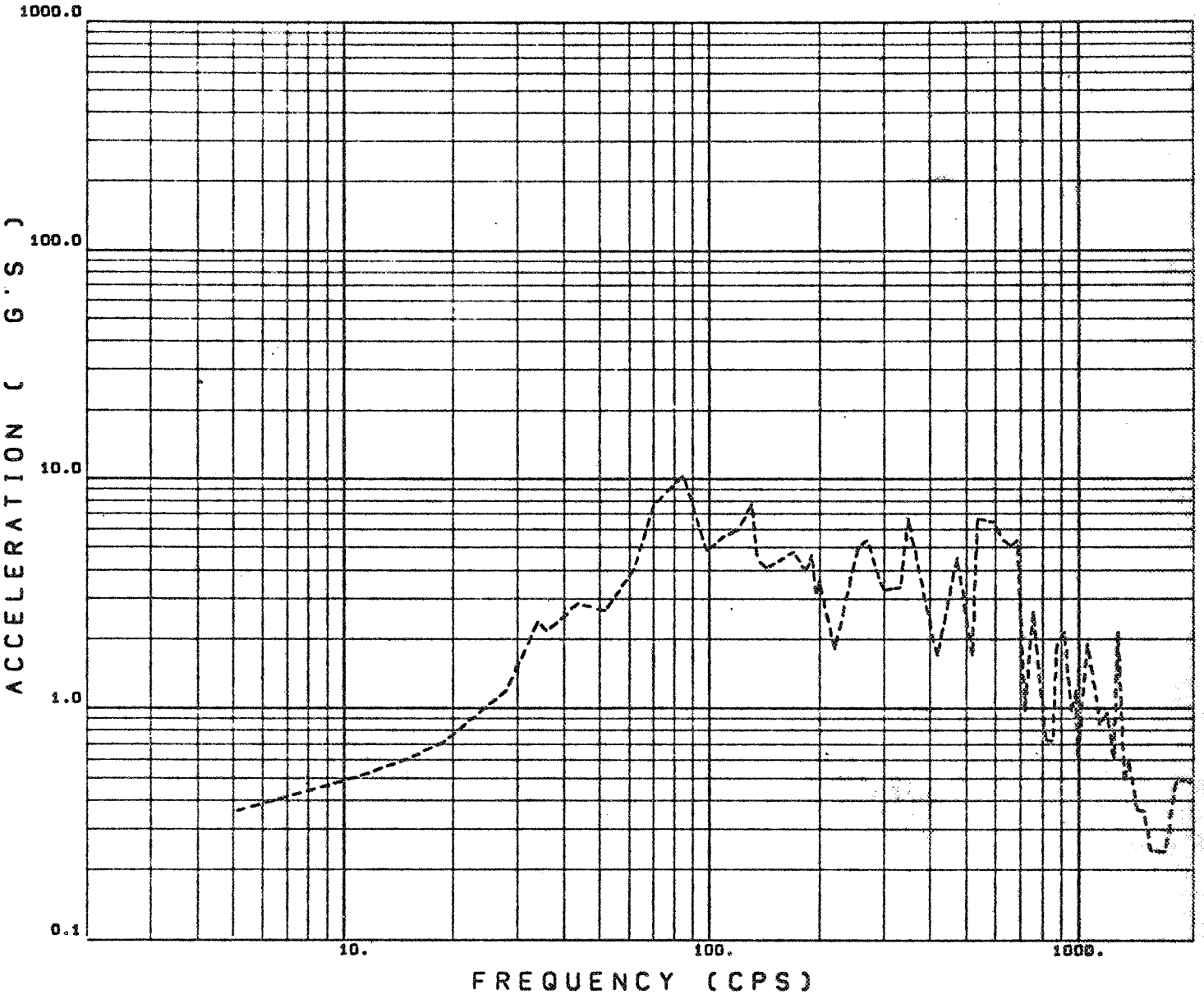
NOTE... SEE PAGE B2
FOR PICK UP LOCATION

COMMENT--- DATA INVALID BELOW 10 CPS

LEGEND...
UPSWEEP ———
DOWNSWEEP ------

TEST CONDITIONS....

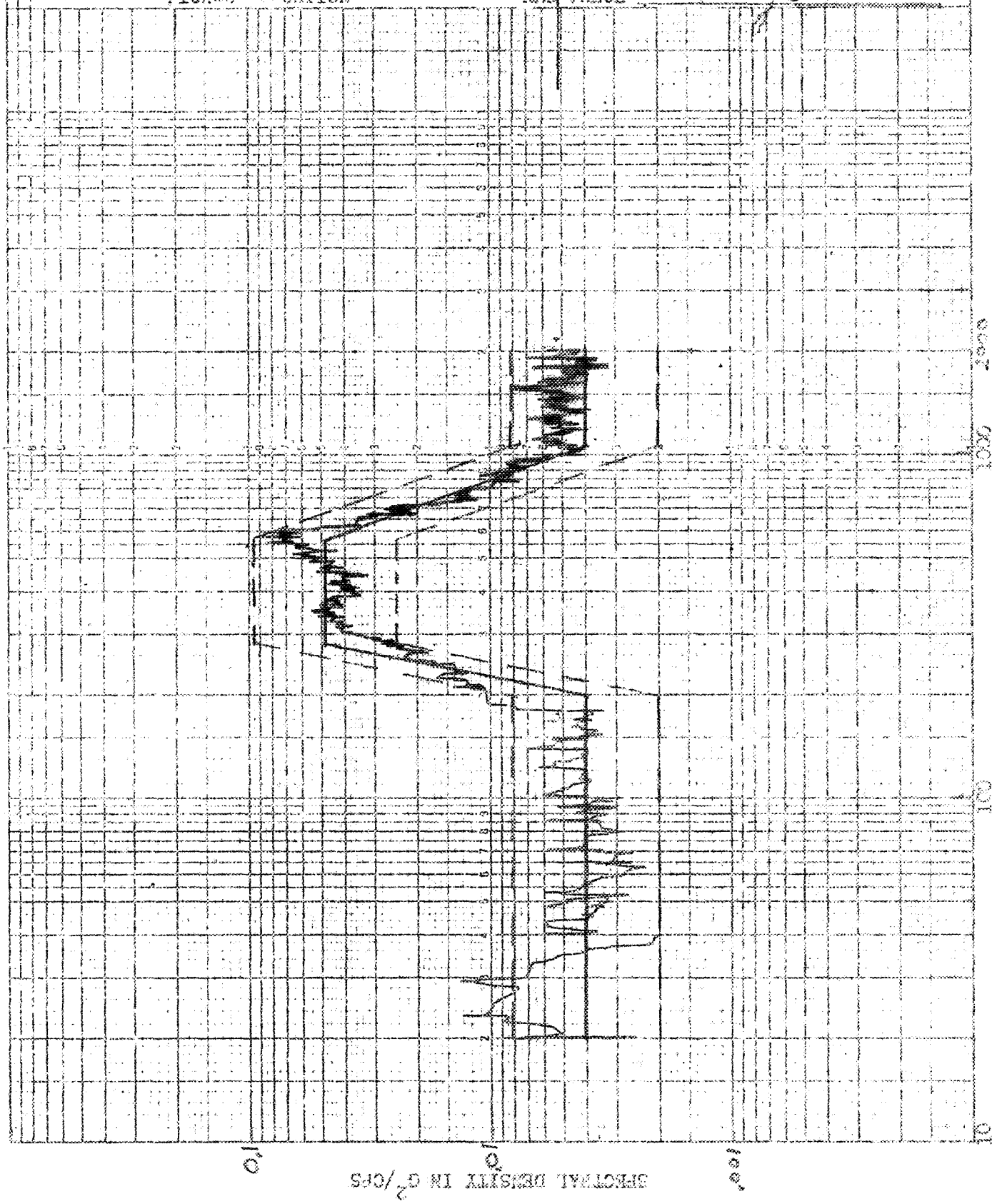
TEST DATE..... 07/26/67
AXIS OF EXCITATION.... (THRUST) C
PICK UP NUMBER (12)... 12 KA34
PICK UP RESPONSE..... (RADIAL) A
INPUT ACCEL.PER PAGE.. A28



DSV-4B RANDOM VIBRATION TEST DURING RUN

FUEL VENT DIRECTIONAL CONTROL VALVE H-13 A

CONFIGURATION	TEST CONDITIONS 10 MINUTES
P/N 1A49988-501	TEST DATE 7-25-67
S/N 0032	AXIS OF EXCITATION A (RADIAL)
NOTE	PICK-UP NUMBER 1
	PICK-UP RESPONSE A
SEE PAGE [illegible] FOR PICK-UP LOCATION	INPUT ACCELERATION PER PAGE —
	RMS VALUE [illegible]



DSV-43 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

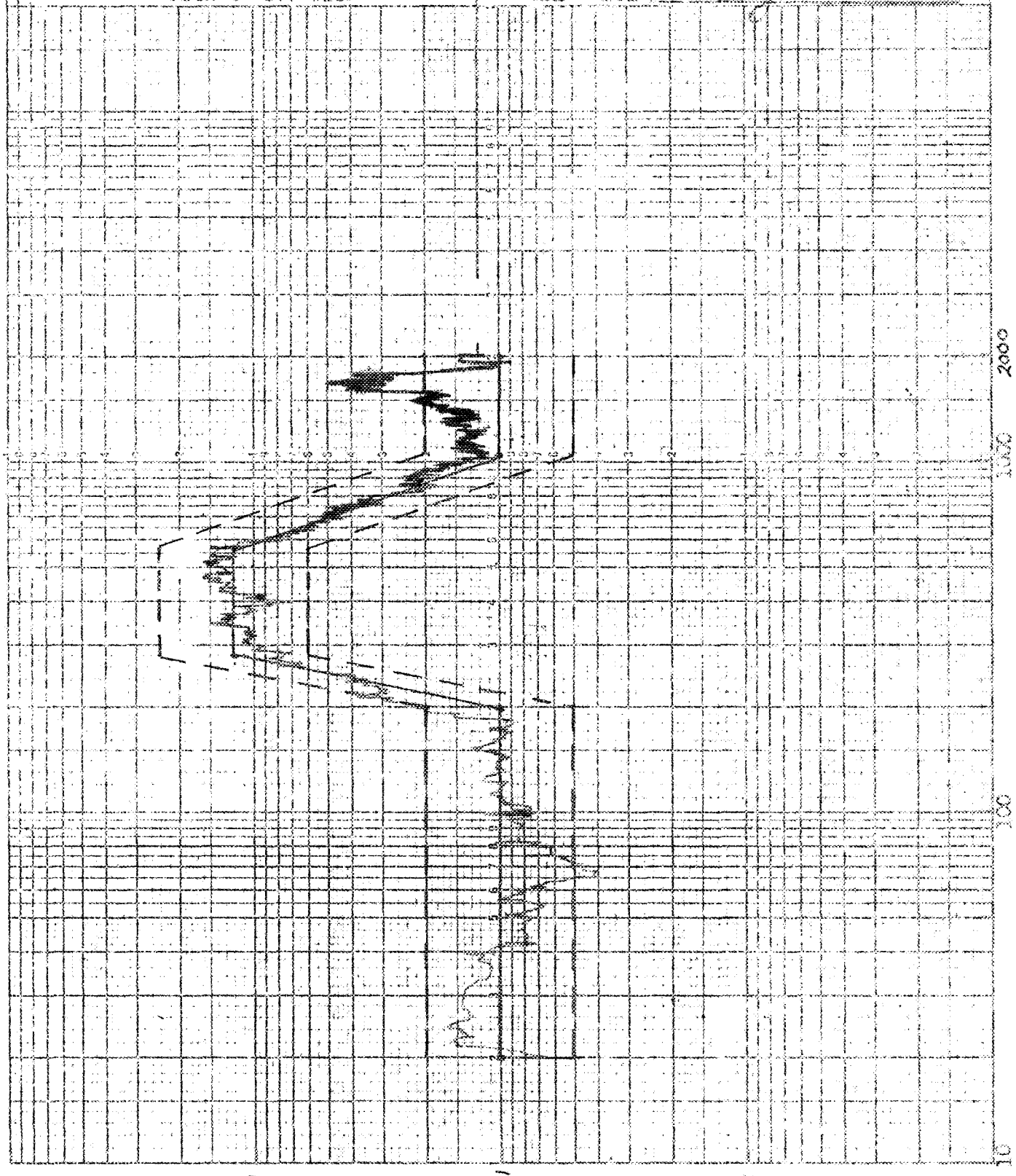
CONFIGURATION

P/N 1A 49988-501
S/N 0032
NOTE

SEE PAGE [illegible] FOR
PICK-UP LOCATION

TEST CONDITIONS 3 MINUTES

TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 1
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE —
RMS VALUE [illegible]



DGV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

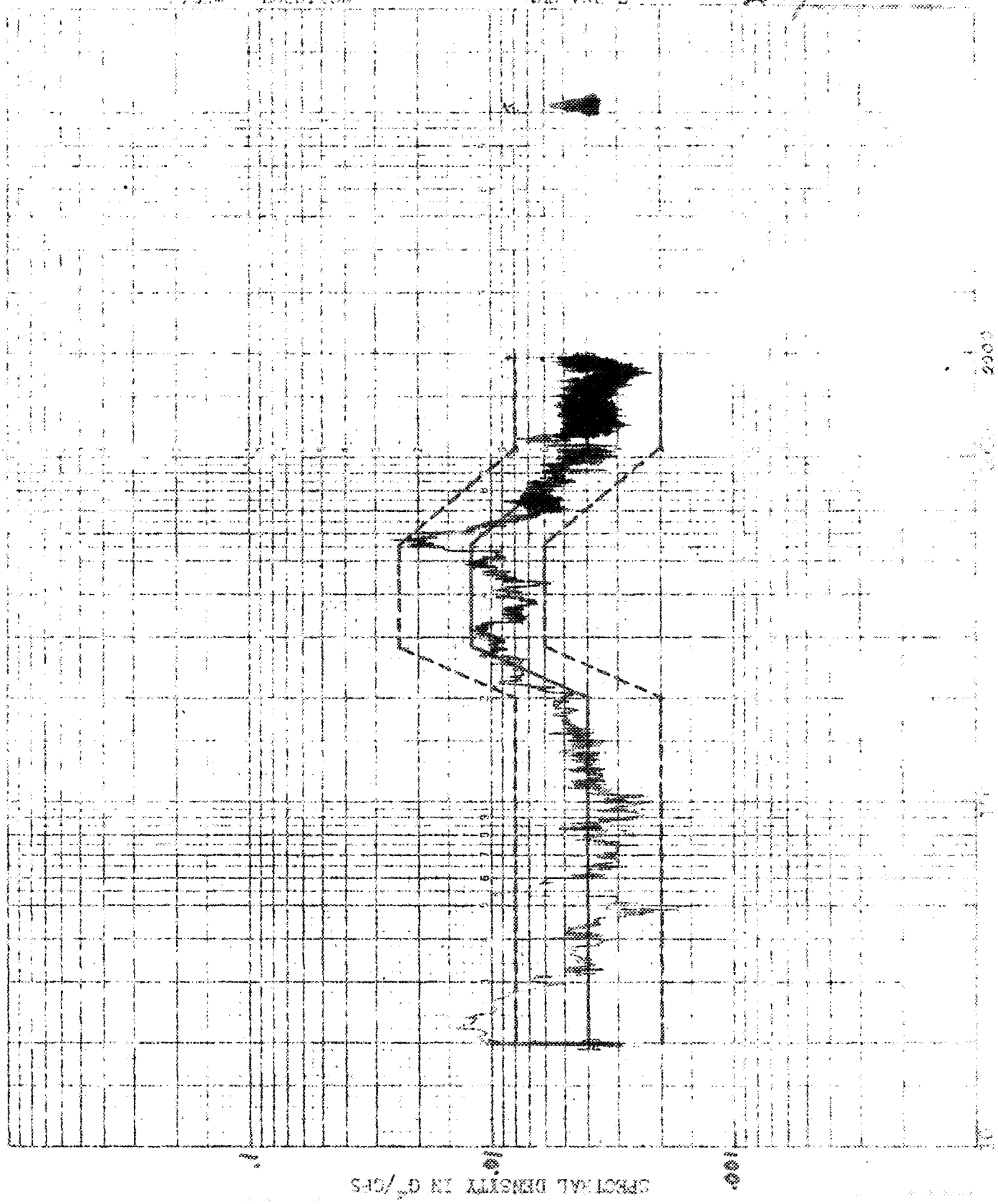
CONFIGURATION

P/N 1A 49928-501
S/N 0032
NOTE

SEE PAGE B2 FOR
FIGURE LOCATION

TEST CONDITIONS 10 MINUTES

TEST DATE 7-26-67
AXIS OF EXCITATION B (TRANS)
FIGURE NUMBER 1
PICK-UP LOCATION B
INPUT ACCELERATION PER TEST
RMS VALUE 2



DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE - H-13A

CONFIGURATION

P/N 1A49988-501

S/N 0032

NOTE

SEE PAGE 82 FOR PICK-UP LOCATION

TEST CONDITIONS 2 MINUTES

TEST DATE 7-26-67

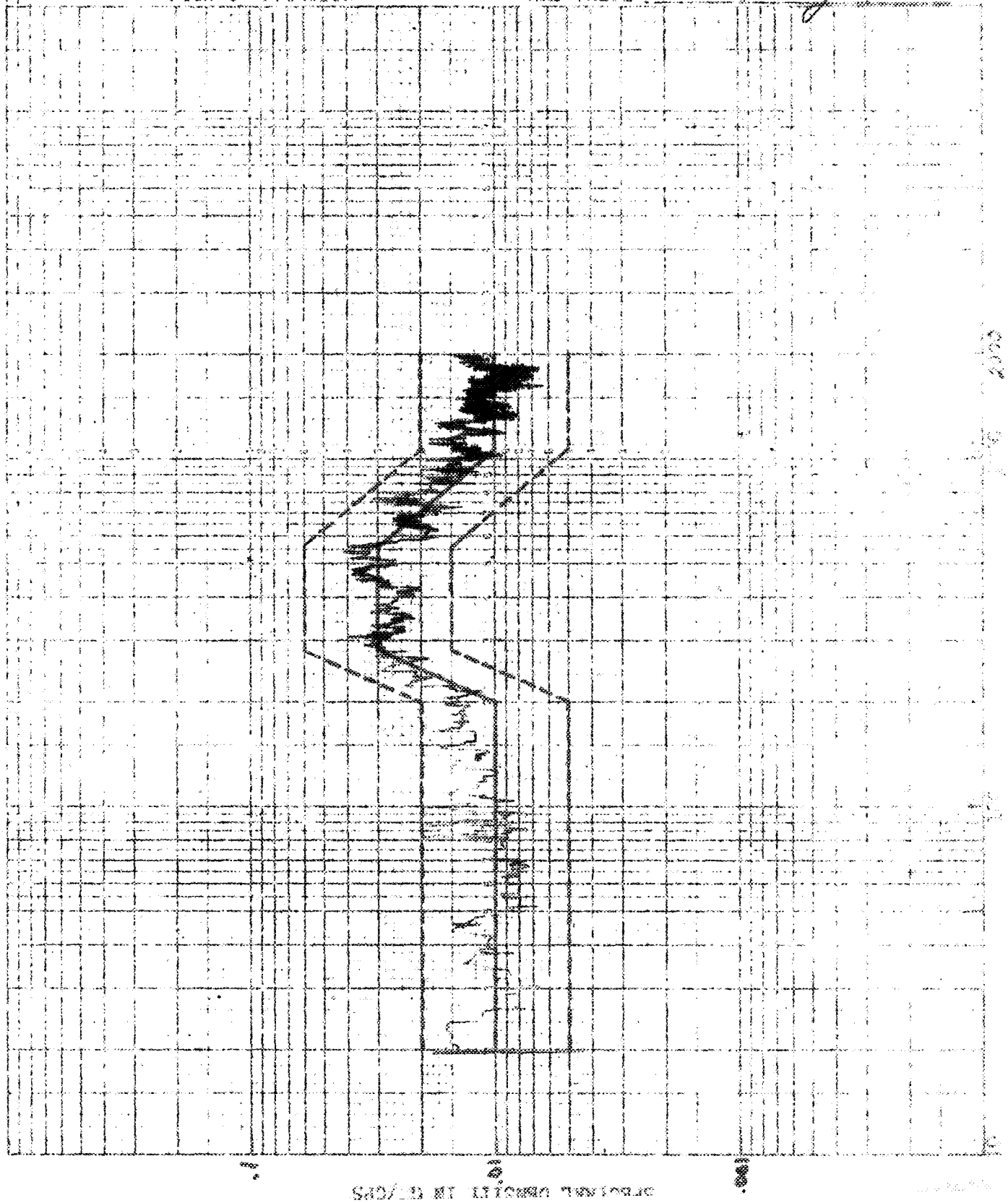
AXIS OF EXCITATION B (TANG)

PICK-UP NUMBER 1

PICK-UP RESPONSE B

INPUT ACCELERATION PER PAGE —

RMS VALUE 5.0 g RMS



DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION

P/N 1A 49988-501

S/N 0032

NOTE

SEE PAGE B2 FOR PICK-UP LOCATION

TEST CONDITIONS 10 MINUTES

TEST DATE 7/26/67

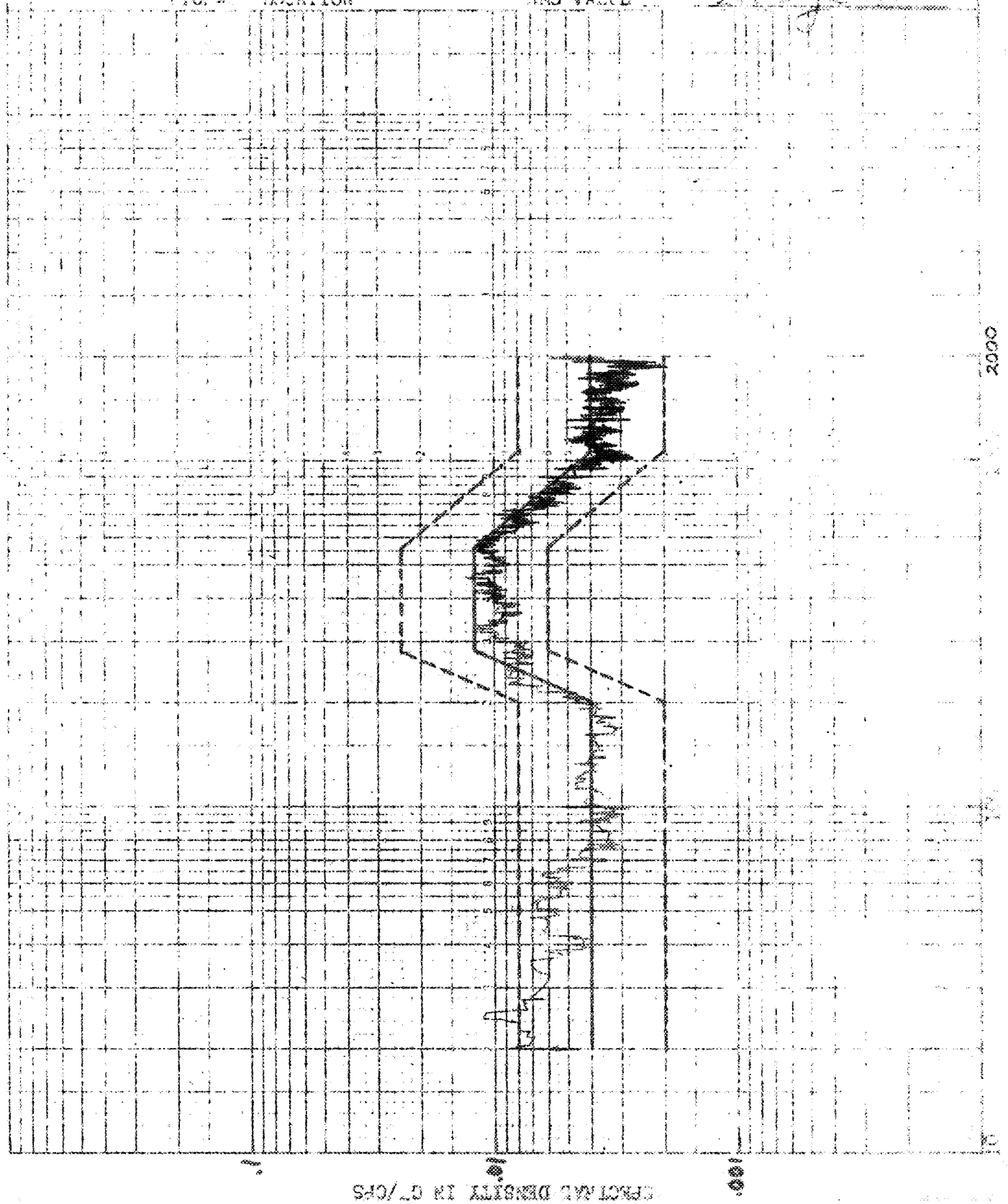
AXIS OF EXCITATION C (THRUST)

PICK-UP NUMBER 1

PICK-UP RESPONSE C

INPUT ACCELERATION PER PAGE —

RMS VALUE [illegible]



DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE - H-13A

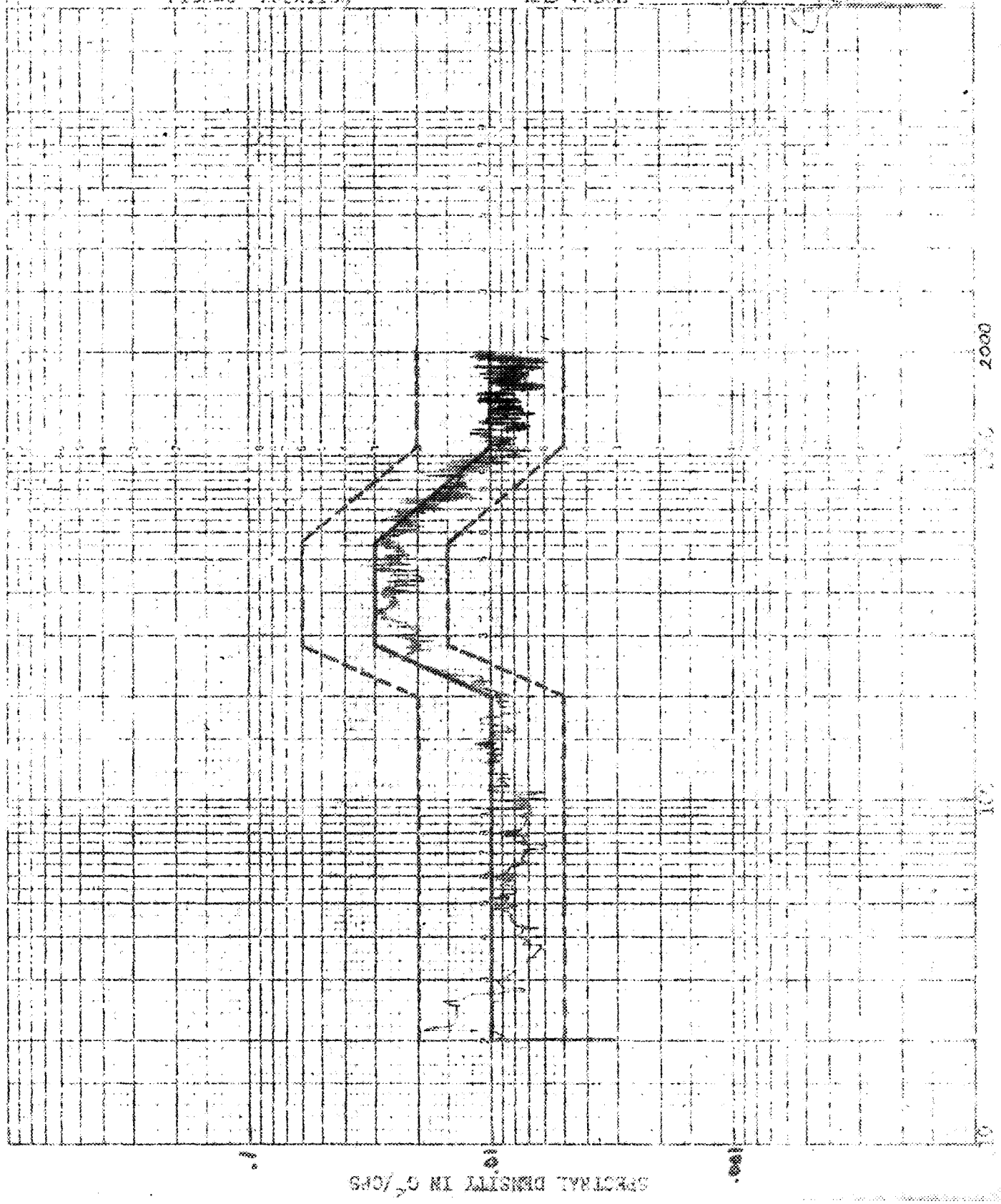
CONFIGURATION

P/N 1A 49988-501
S/N 0032
NOTE

SEE PAGE 82 FOR
PICK-UP LOCATION

TEST CONDITIONS 2 MINUTES

TEST DATE 7-26-67
AXIS OF EXCITATION C (TABLE)
PICK-UP NUMBER 1
PICK-UP RESPONSE C
INPUT ACCELERATION MAX PAGE —
RMS VALUE

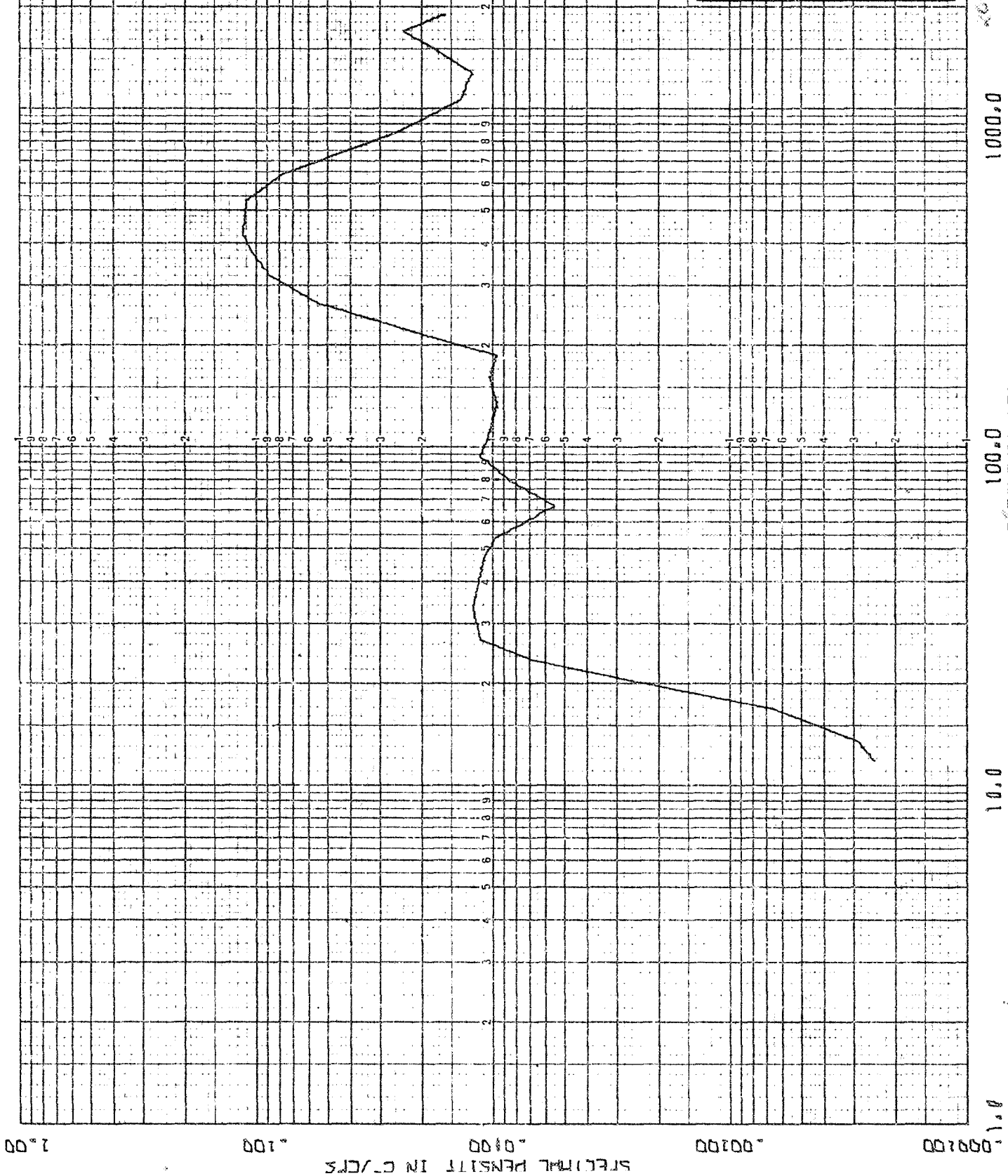


DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-138

CONFIGURATION
P/N 1A49988-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 1
PICK-UP RESPONSE A (RADIAL)
INPUT ACCELERATION PER PAGE —
RMS VALUE 8.9

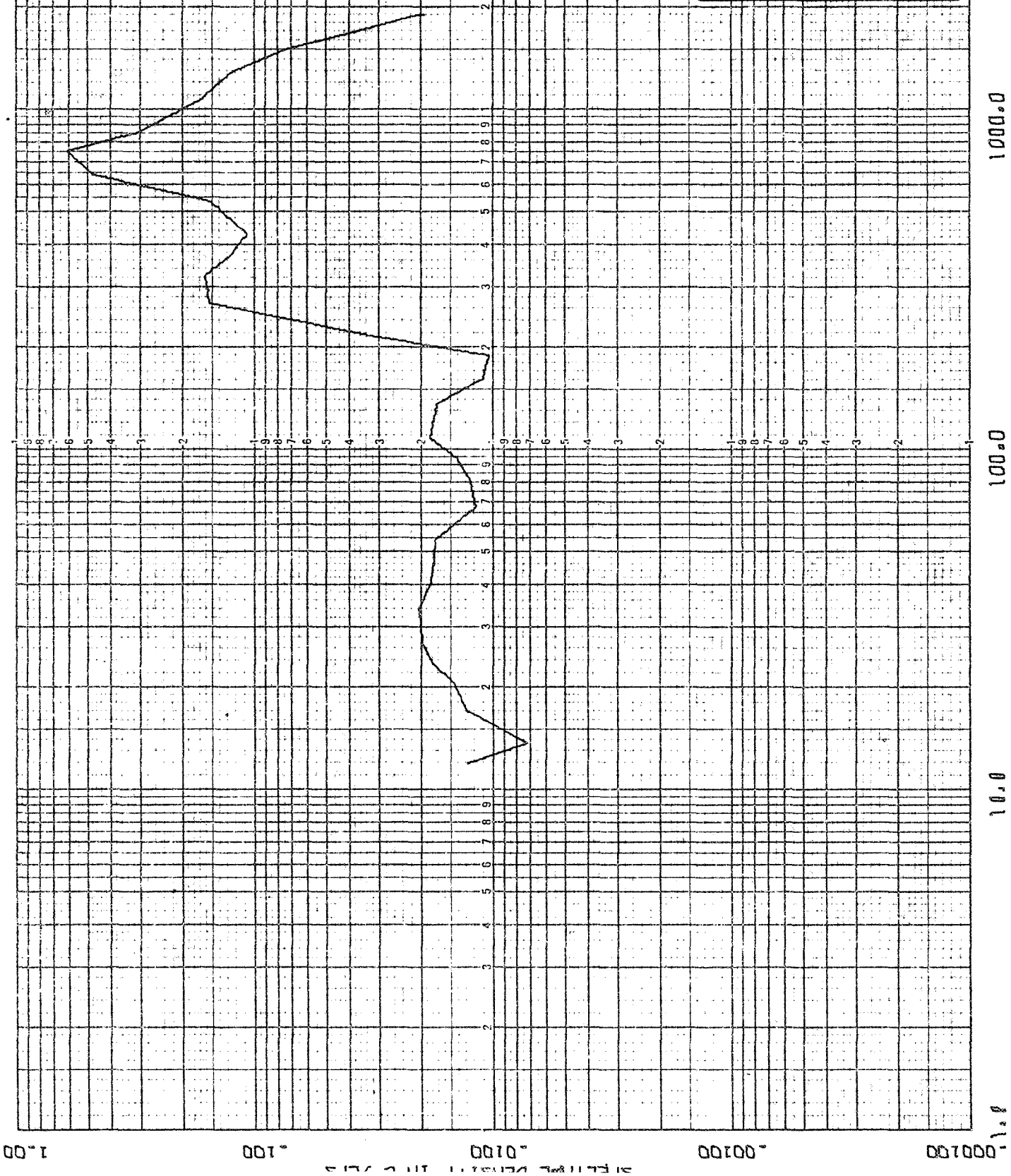


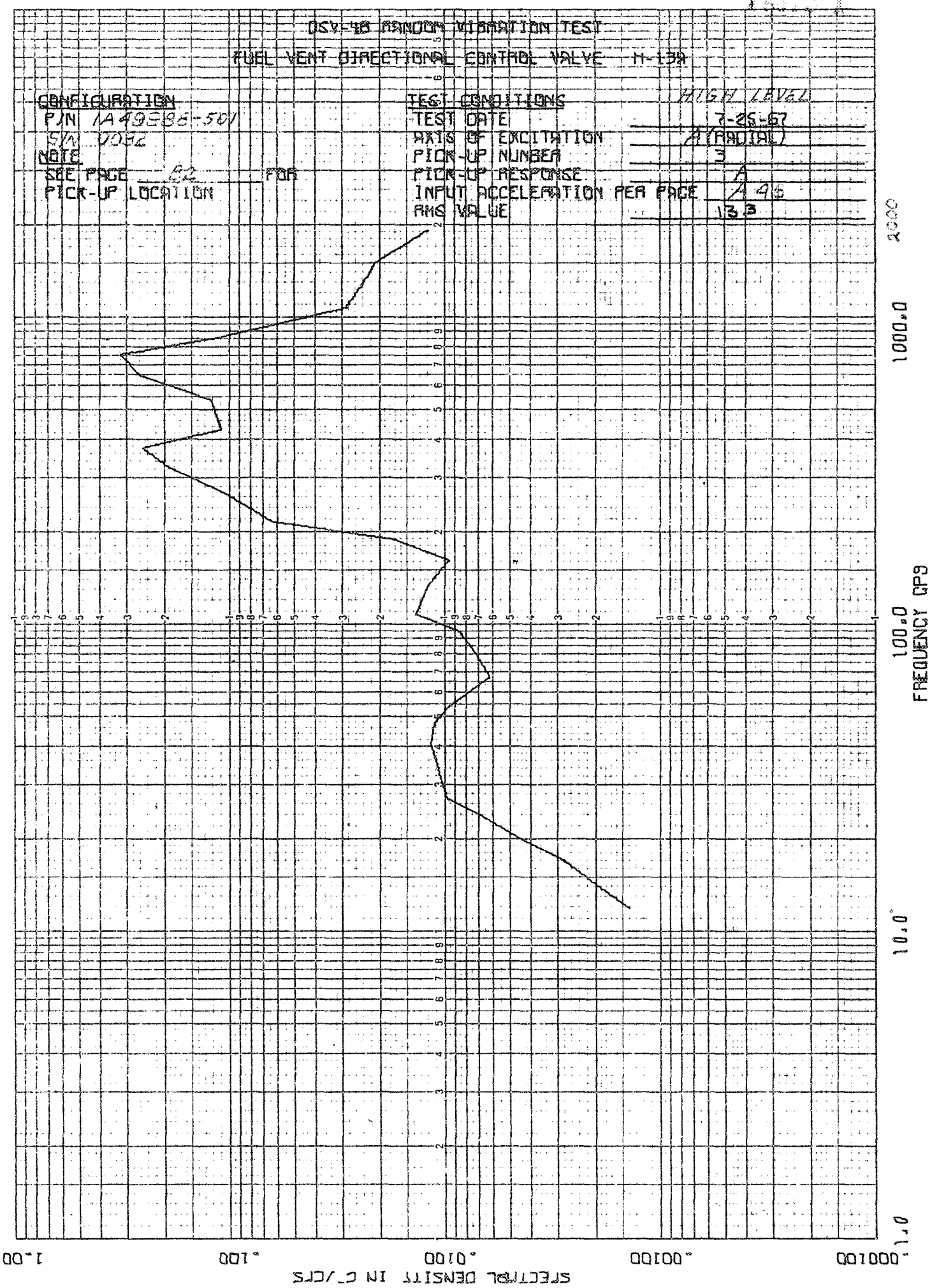
DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A49988-501
S/N 0032
NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 2
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A46
RMS VALUE 18.7




DSV-4B RANDOM VIBRATION TEST
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A
CONFIGURATION
P/N 1A49388-501
S/N 0032
NOTE
SEE PAGE 82 FOR
PICK-UP LOCATION
TEST CONDITIONS
HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 3
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A46
RMS VALUE 13.3
FREQUENCY CPS
SPECTRAL DENSITY IN G²/CPS

DSV-4B RANDOM VIBRATION TEST

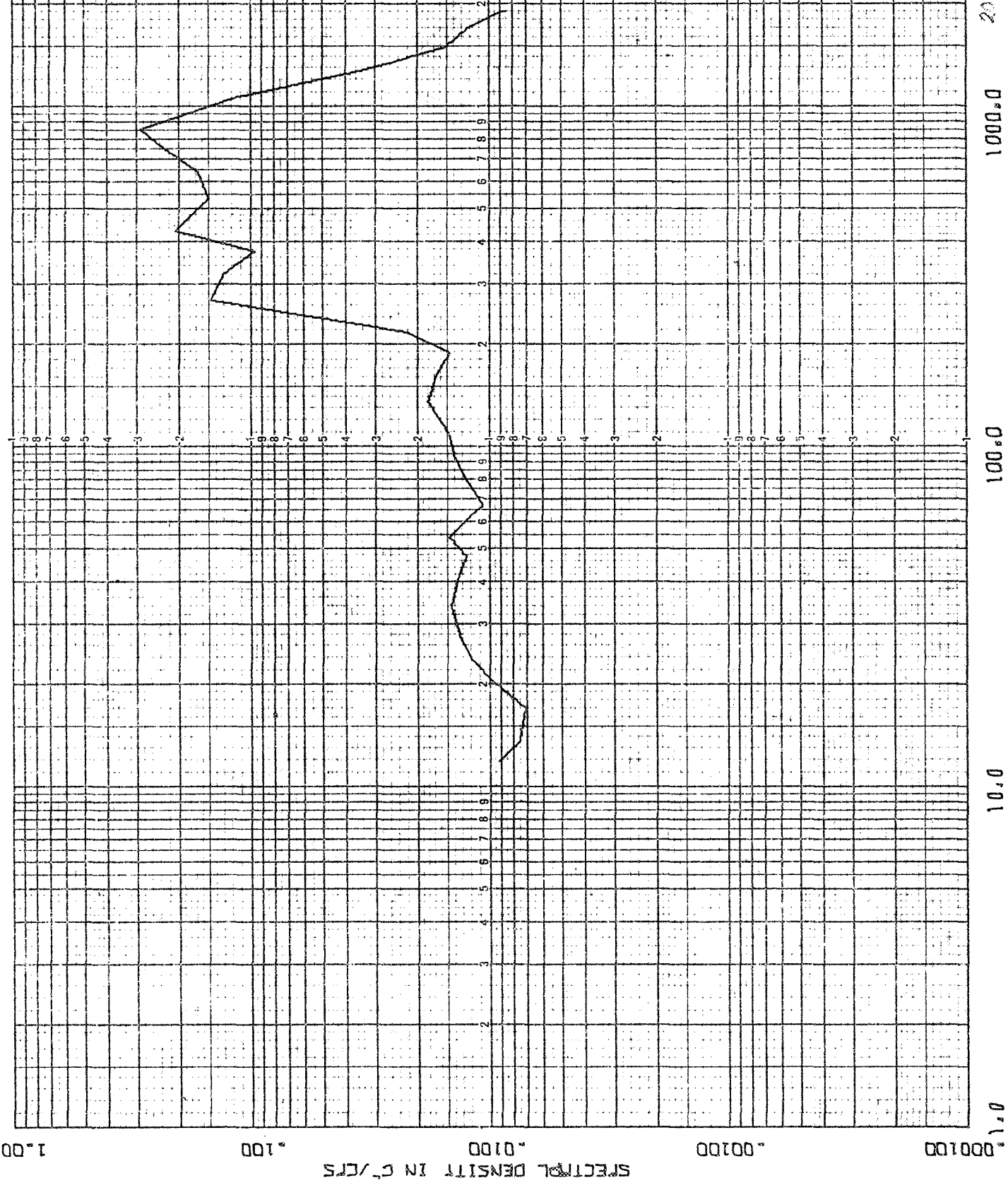
FUEL VENT DIRECTIONAL CONTROL VALVE H-139

CONFIGURATION
P/N 1A49982-541

NOTE
SEE PAGE 83 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 4
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A26
RMS VALUE 14.2

HIGH LEVEL

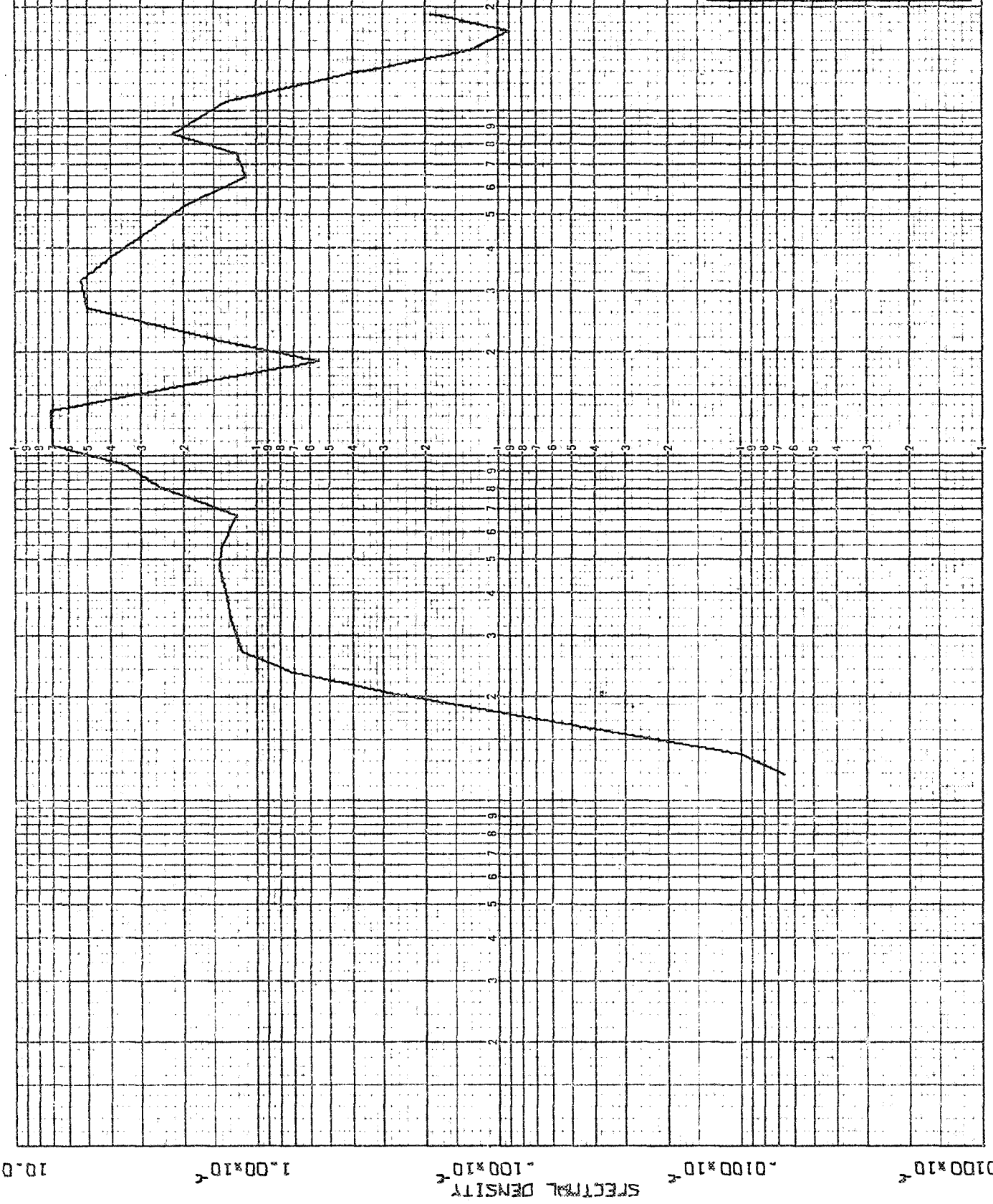


DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE - M-13A

CONFIGURATION
P/N 1A499E3-501
S/N 0052
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-25-67
AXIS OF EXCITATION A(RADIAL)
PICK-UP NUMBER 5
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A46
RMS VALUE 5.7

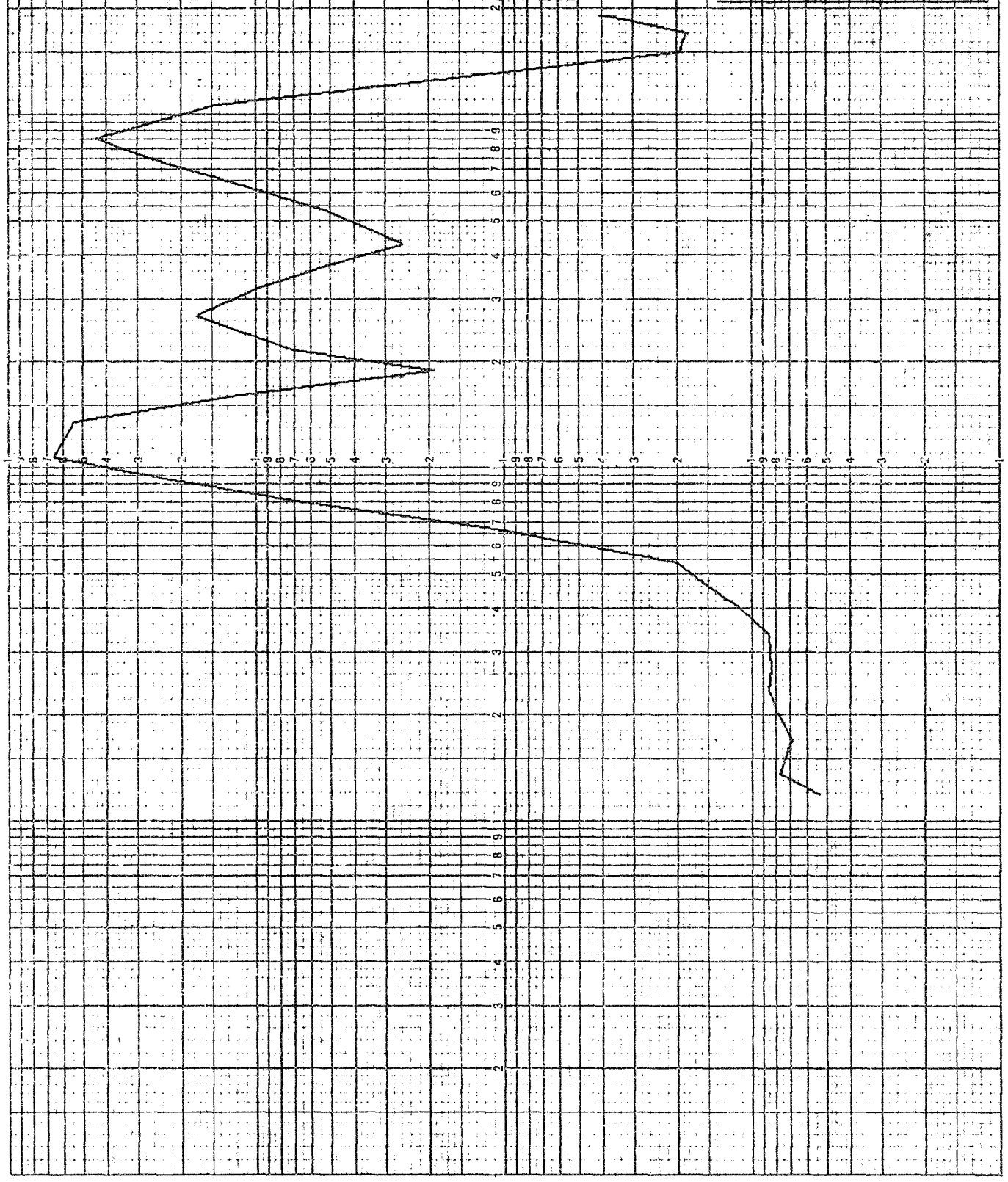


DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N 1A4995E-551
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 6
PICK-UP RESPONSE B
INPUT ACCELERATION PER PAGE A46
RMS VALUE 4.8



OSV-4B RANDOM VIBRATION TEST

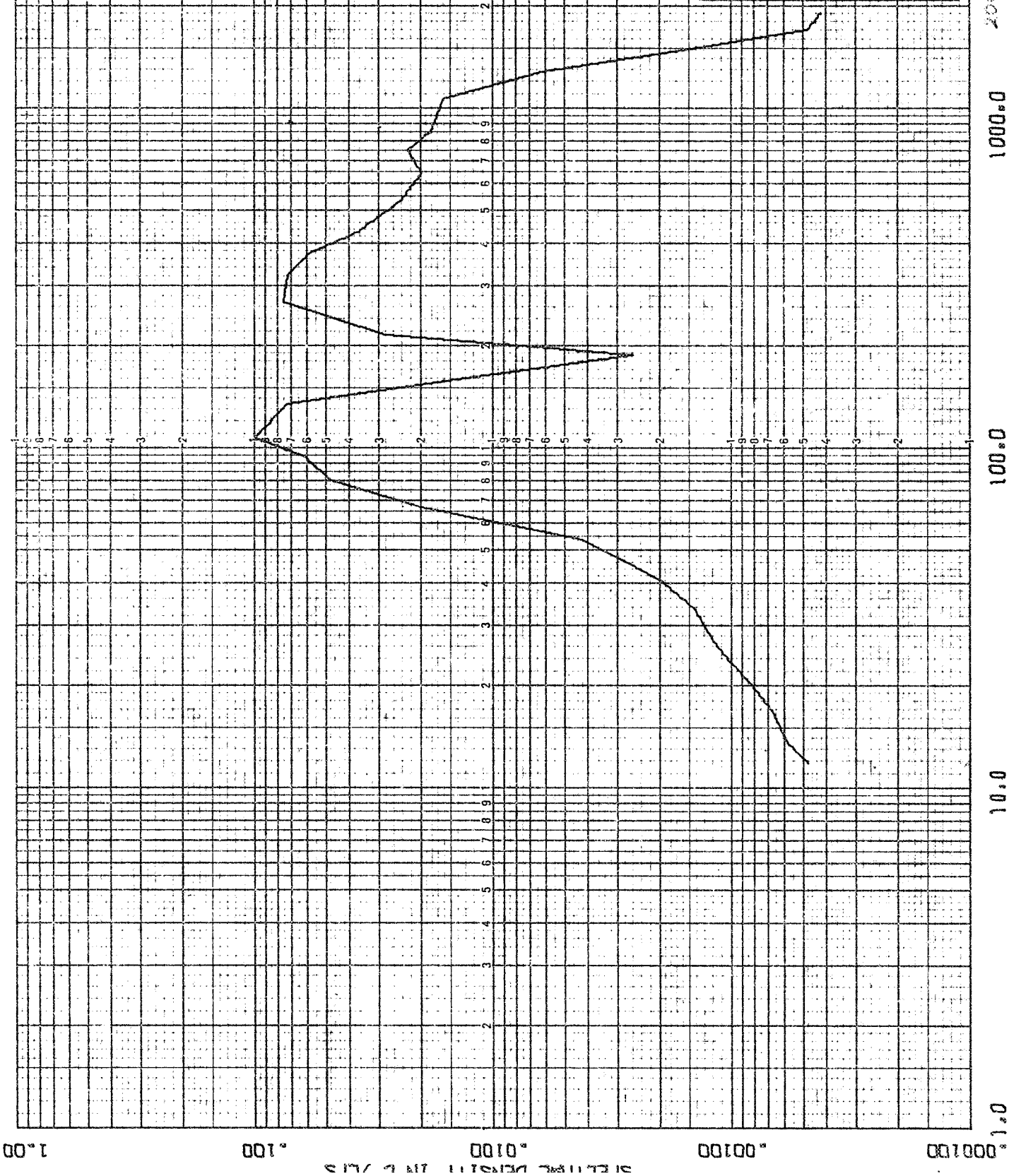
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

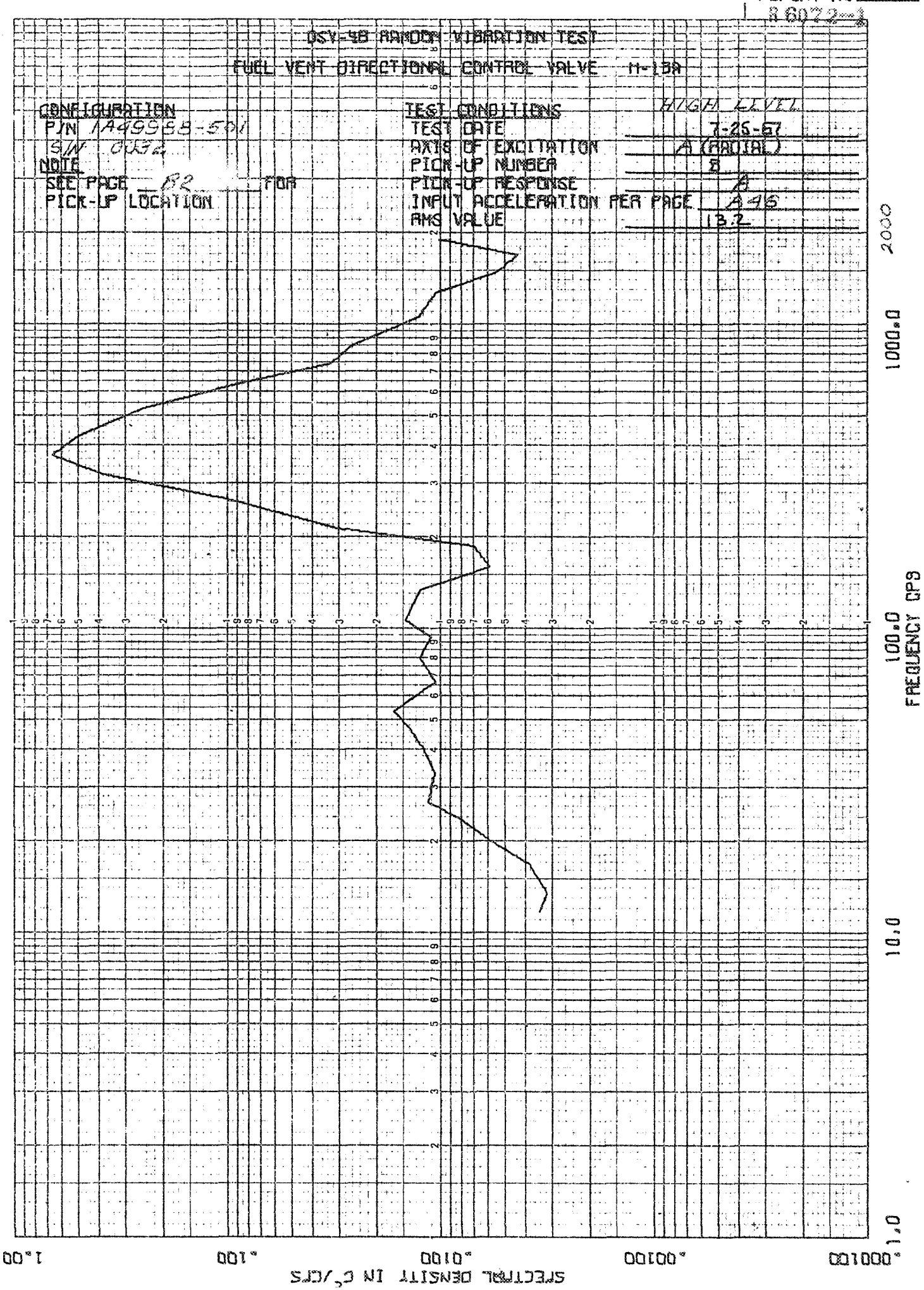
CONFIGURATION
P/N 1A49535-501

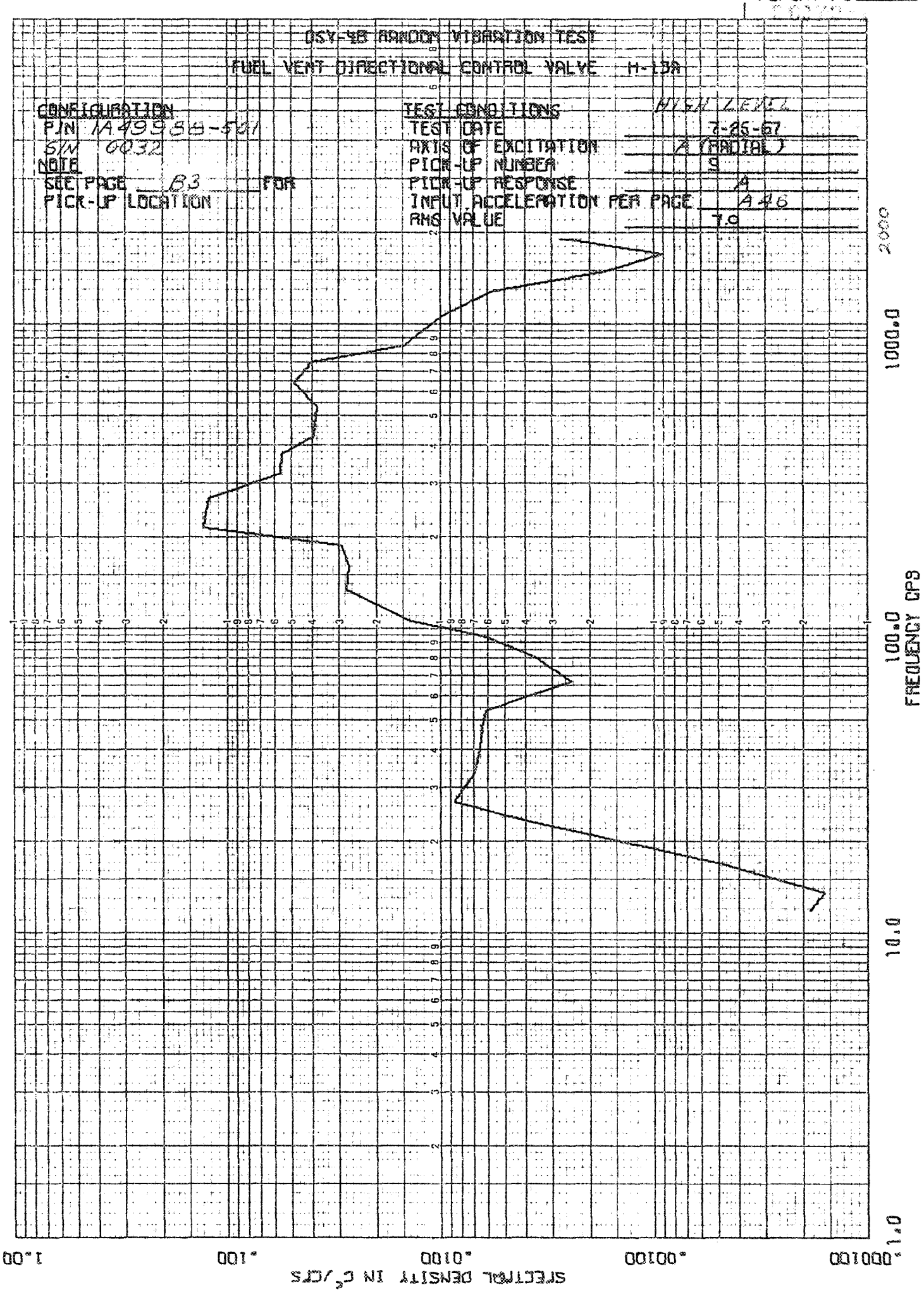
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
HIGH LEVEL

TEST DATE	7-26-67
AXIS OF EXCITATION	A (RADIAL)
PICK-UP NUMBER	7
PICK-UP RESPONSE	C
INPUT ACCELERATION PER PAGE	A 46
RMS VALUE	6.4




DSV-4B RANDOM VIBRATION TEST
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A
CONFIGURATION
P/N 1A49558-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION
TEST CONDITIONS
HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 8
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A45
RMS VALUE 13.2
2000
1000.0
100.0
10.0
1.0
FREQUENCY CPS
.00010
.00100
.0100
.100
1.00
SPECTRAL DENSITY IN G²/CPS


DSV-4B RANDOM VIBRATION TEST
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A
CONFIGURATION
P/N 1A49988-501
S/N 0032
NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION
TEST CONDITIONS HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 9
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A46
RMS VALUE 7.0
FREQUENCY CPS
1.0
10.0
100.0
1000.0
2000
SPECTRAL DENSITY IN G²/CPS
.000100
.00100
.0100
.100
1.00

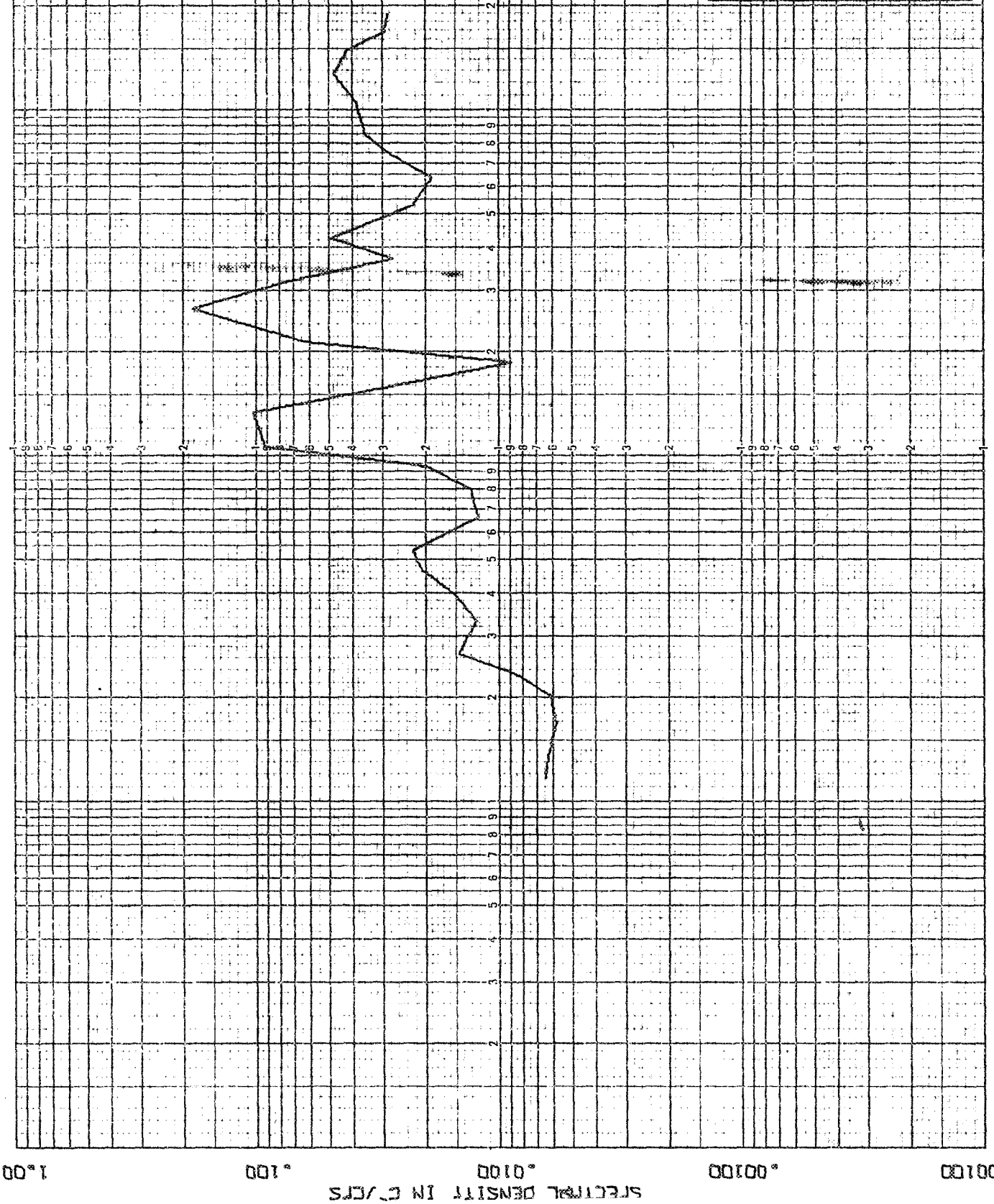
DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A499BE-50Y

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 10
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A-13
RMS VALUE 9.8

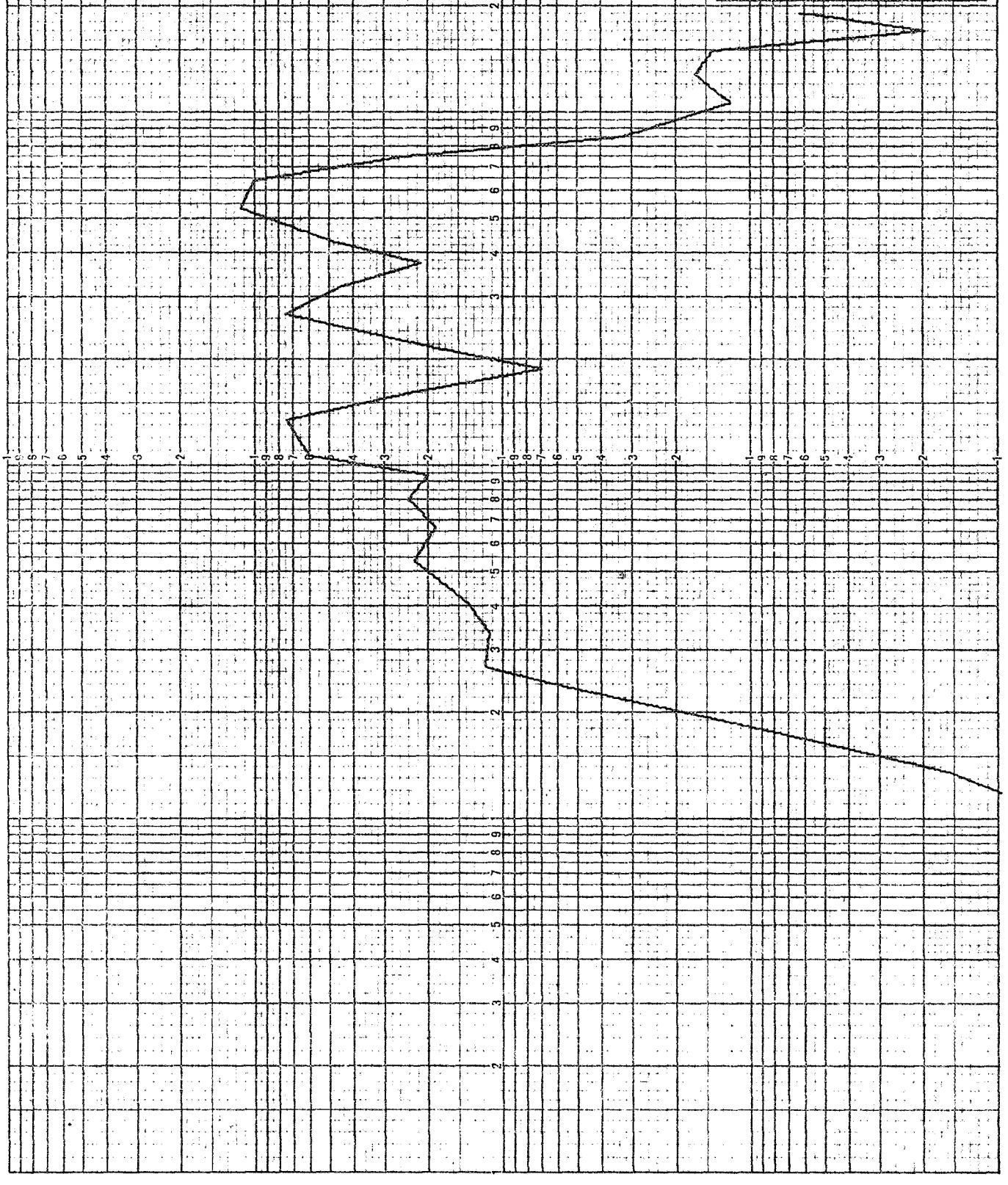


DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N 1A49938-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 11
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A46
RMS VALUE 6.9

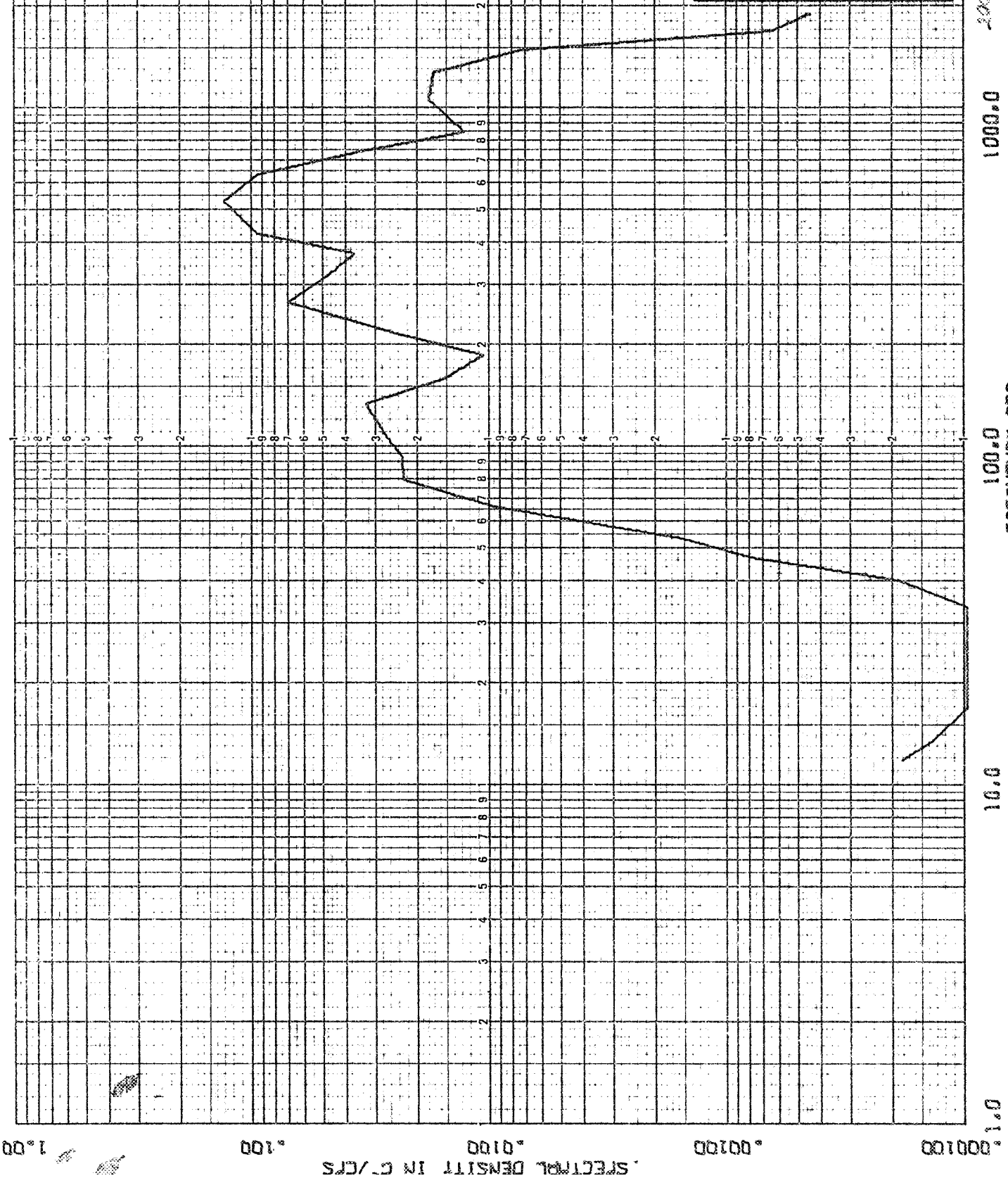


DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A499557-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION A (RADIAL)
PICK-UP NUMBER 12
PICK-UP RESPONSE C
INPUT ACCELERATION PER PAGE A46
RMS VALUE 8.0

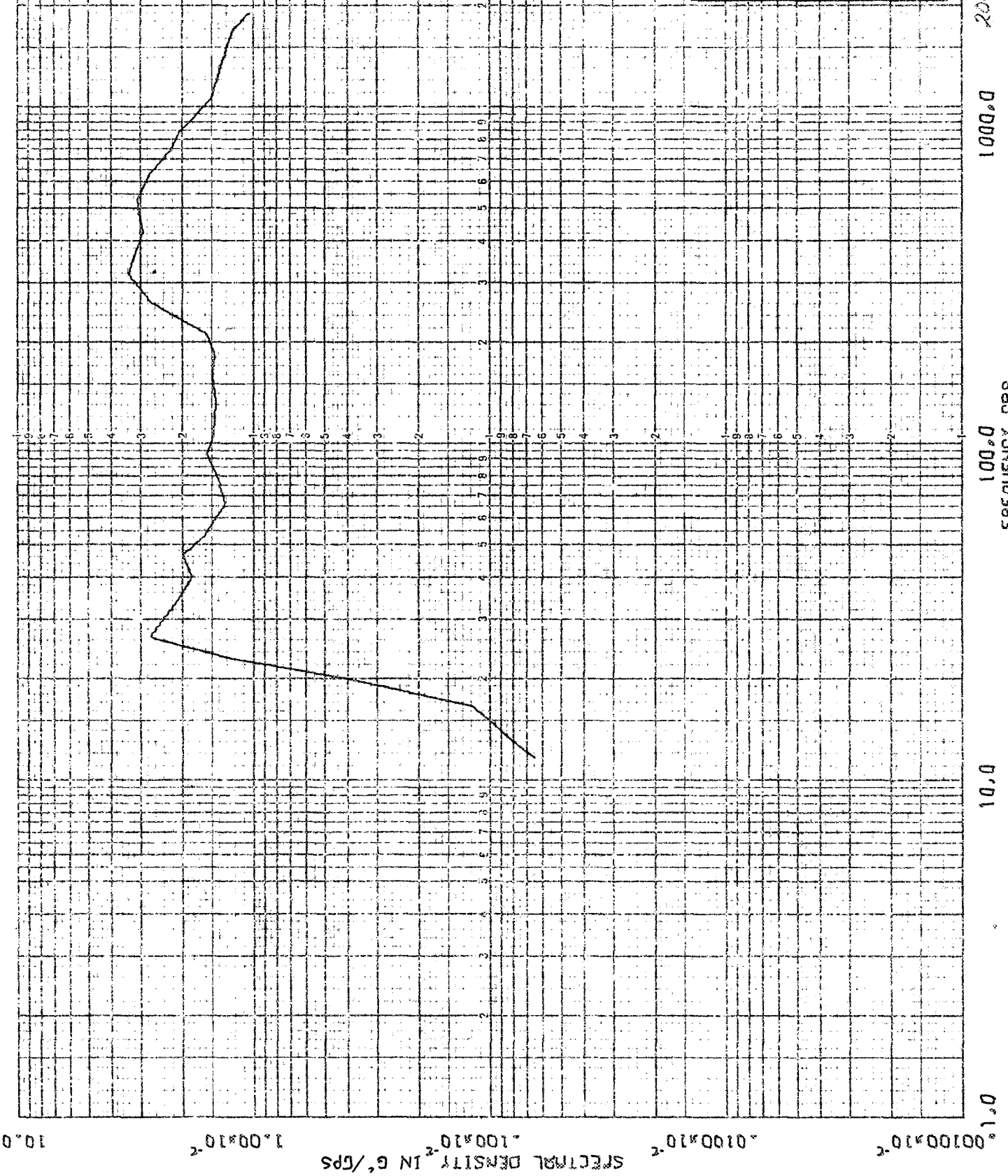


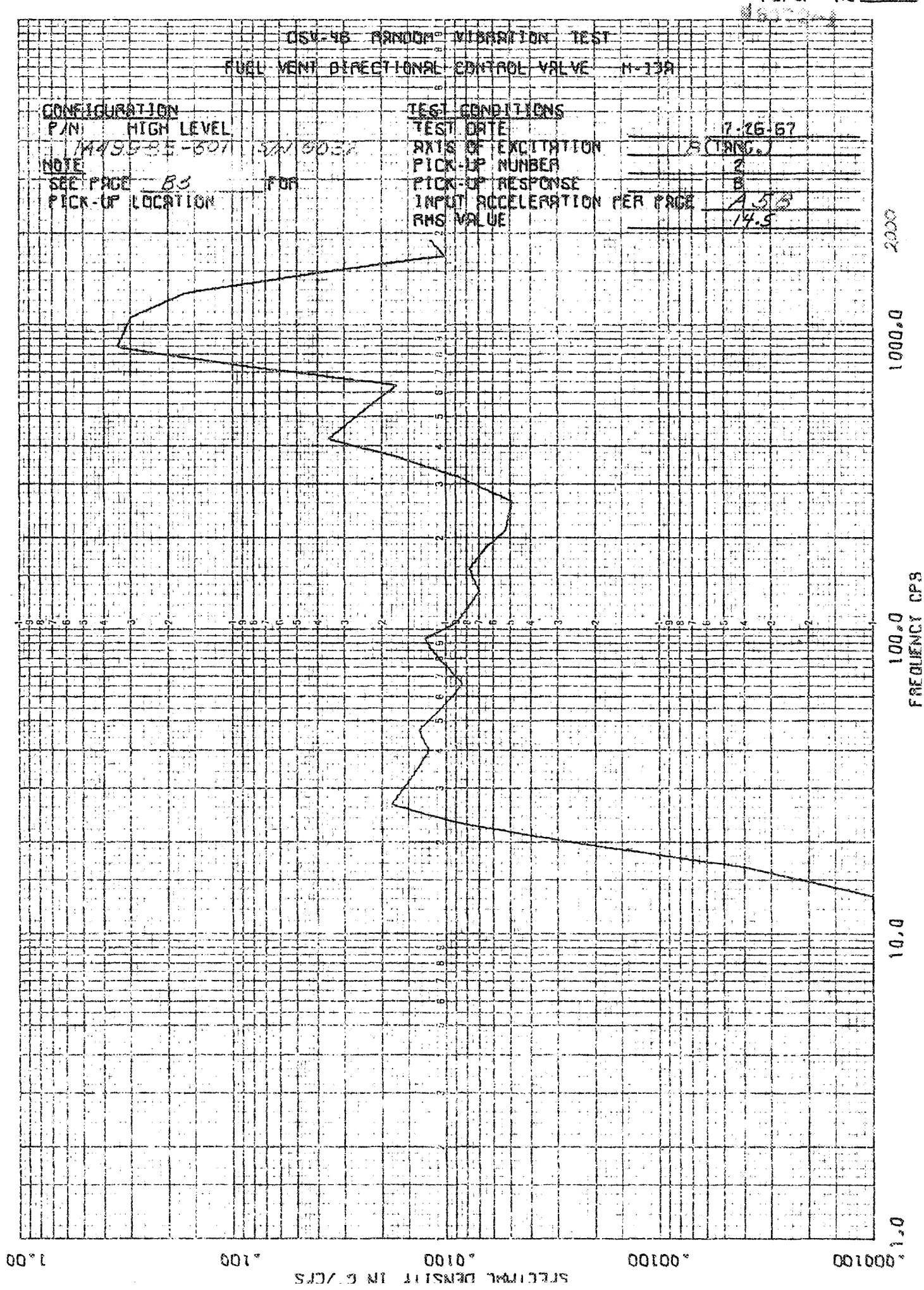
DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N HIGH LEVEL
1249988-501 S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER 1
PICK-UP RESPONSE 8
INPUT ACCELERATION PER PAGE —
RMS VALUE 6.4



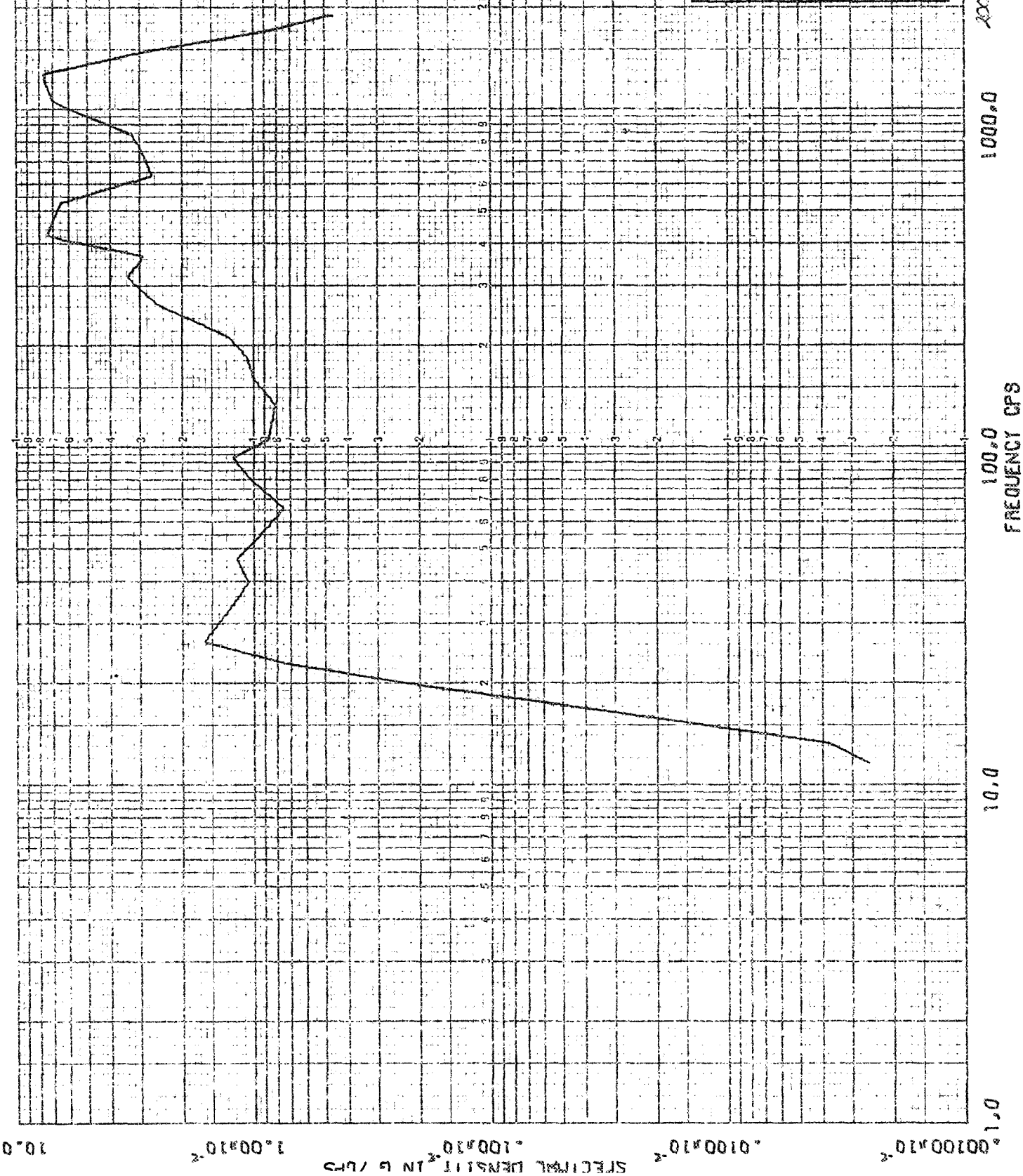

DSV-4B RANDOM VIBRATION TEST
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A
CONFIGURATION
P/N HIGH LEVEL
1A4958E-601 S/N 6032
NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION
TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION A (TANG.)
PICK-UP NUMBER 2
PICK-UP RESPONSE B
INPUT ACCELERATION PER PAGE A5B
RMS VALUE 14.5
2000
1000.0
100.0
10.0
1.0
FREQUENCY CPS
1.00
.100
.0100
.00100
.000100
SPECTRAL DENSITY IN G²/CPS

DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N HIGH LEVEL
1A4558B-501 S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER 3
PICK-UP RESPONSE B
INPUT ACCELERATION PER PAGE A58
RMS VALUE 9.1



DSV-4B RANDOM VIBRATION TEST

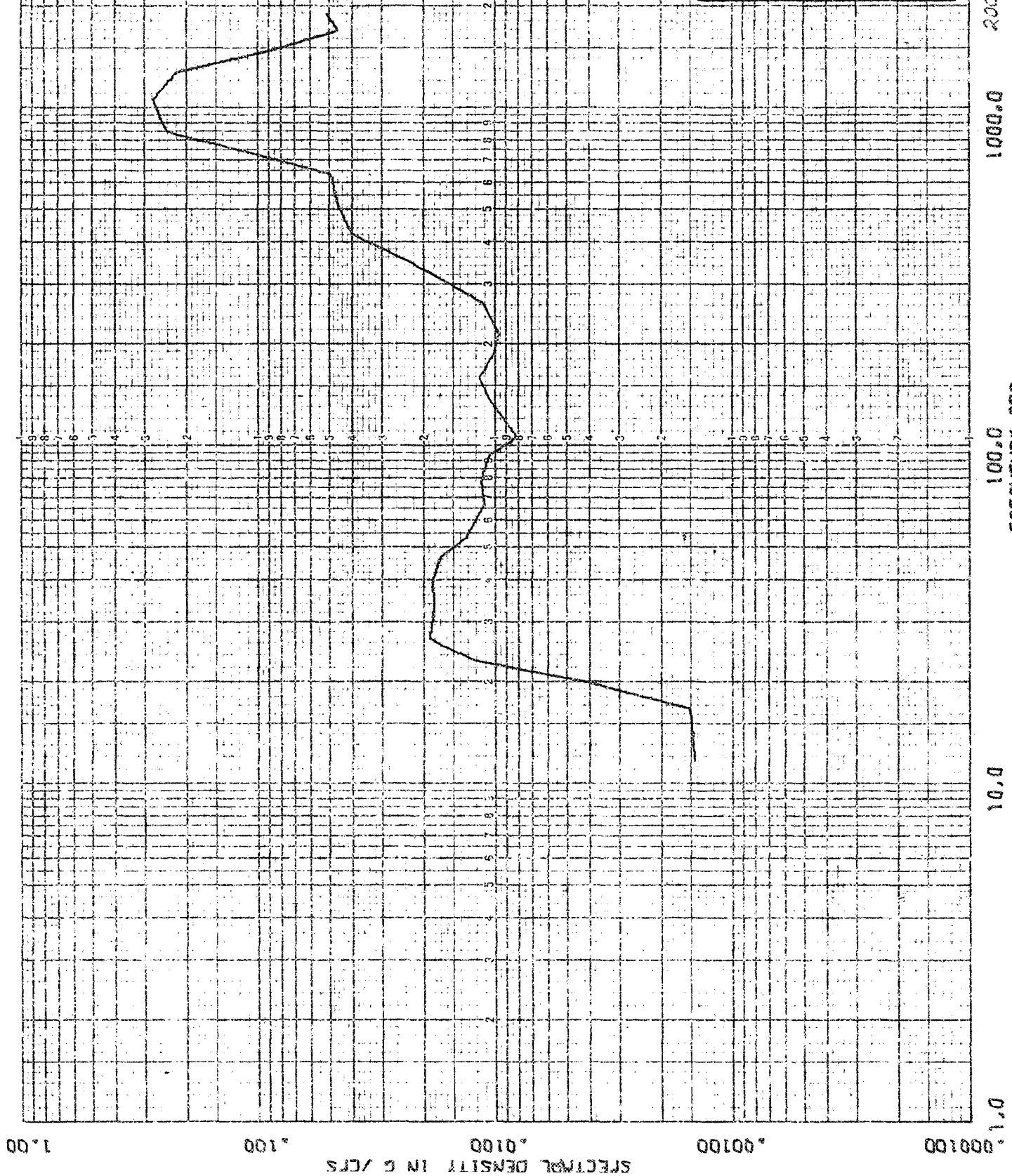
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N HIGH LEVEL
1A45938-501 S/N 0032

NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION

TEST CONDITIONS

TEST DATE	7-26-67
AXIS OF EXCITATION	B (TANG.)
PICK-UP NUMBER	4
PICK-UP RESPONSE	B
INPUT ACCELERATION PER PAGE	A5B
RMS VALUE	17.4



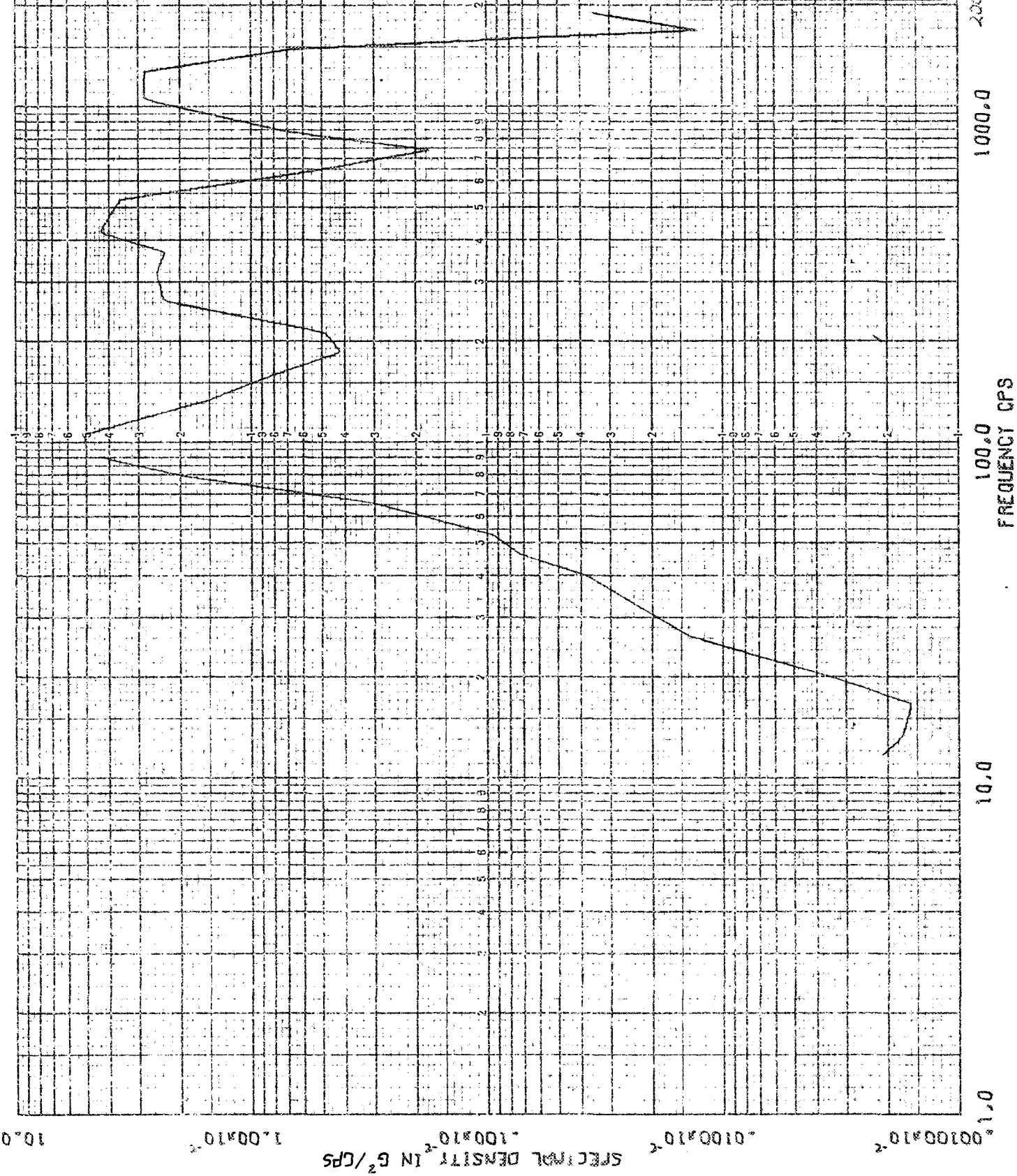
DSV-4B RANDOM VIBRATION TEST

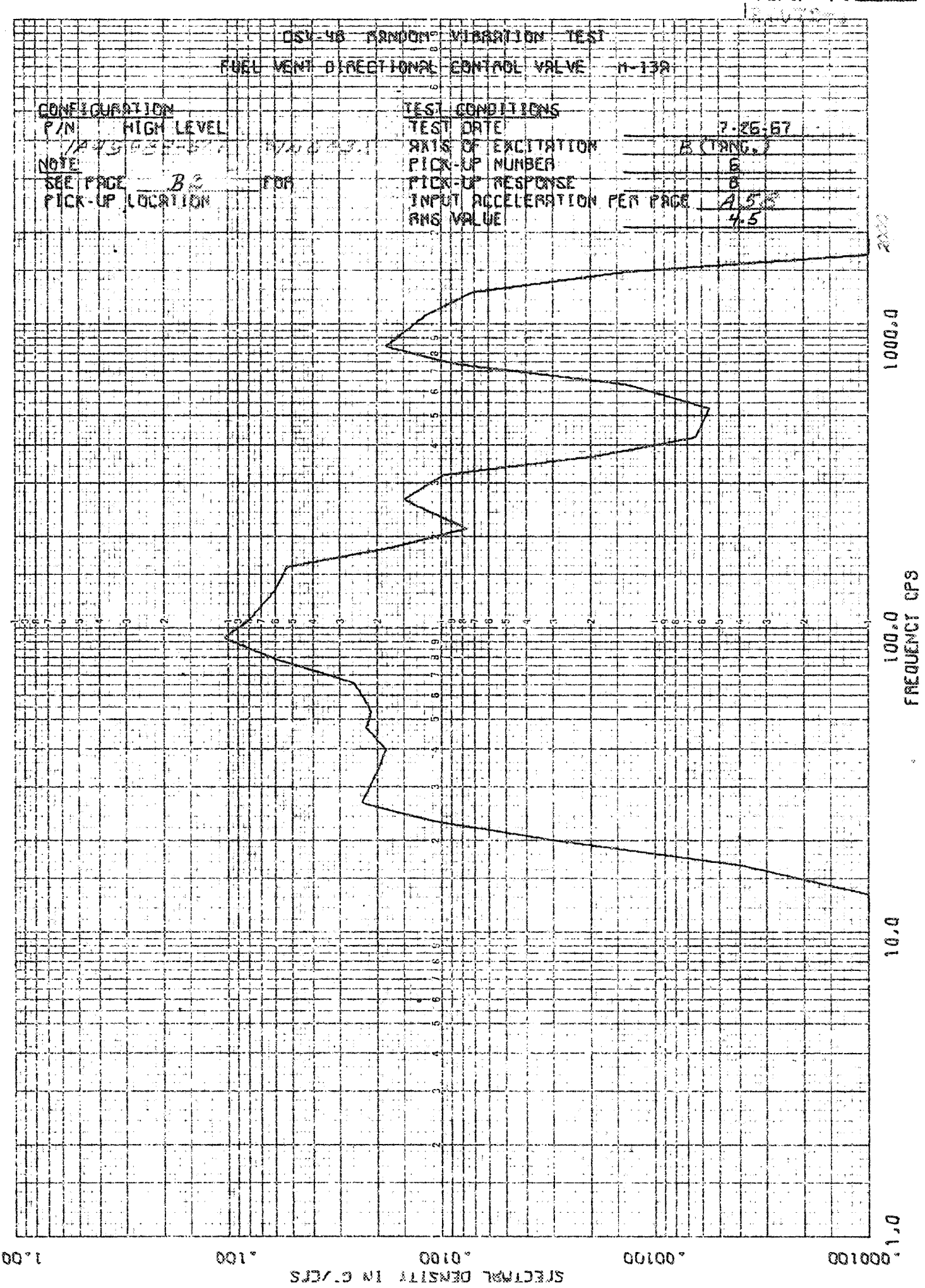
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N HIGH LEVEL
1A[illegible]-501 [illegible]

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 2-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER 5
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE A[illegible]
RMS VALUE 5.8




CSV-48 RANDOM VIBRATION TEST
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A
CONFIGURATION
P/N HIGH LEVEL
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION
TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER 6
PICK-UP RESPONSE 8
INPUT ACCELERATION PER PAGE A5B
RMS VALUE 4.5
1000.0
100.0
10.0
1.0
FREQUENCY CPS
1.00
.100
.0100
.00100
.000100
SPECTRAL DENSITY IN G²/CPS

USV-48 RANDOM VIBRATION TEST

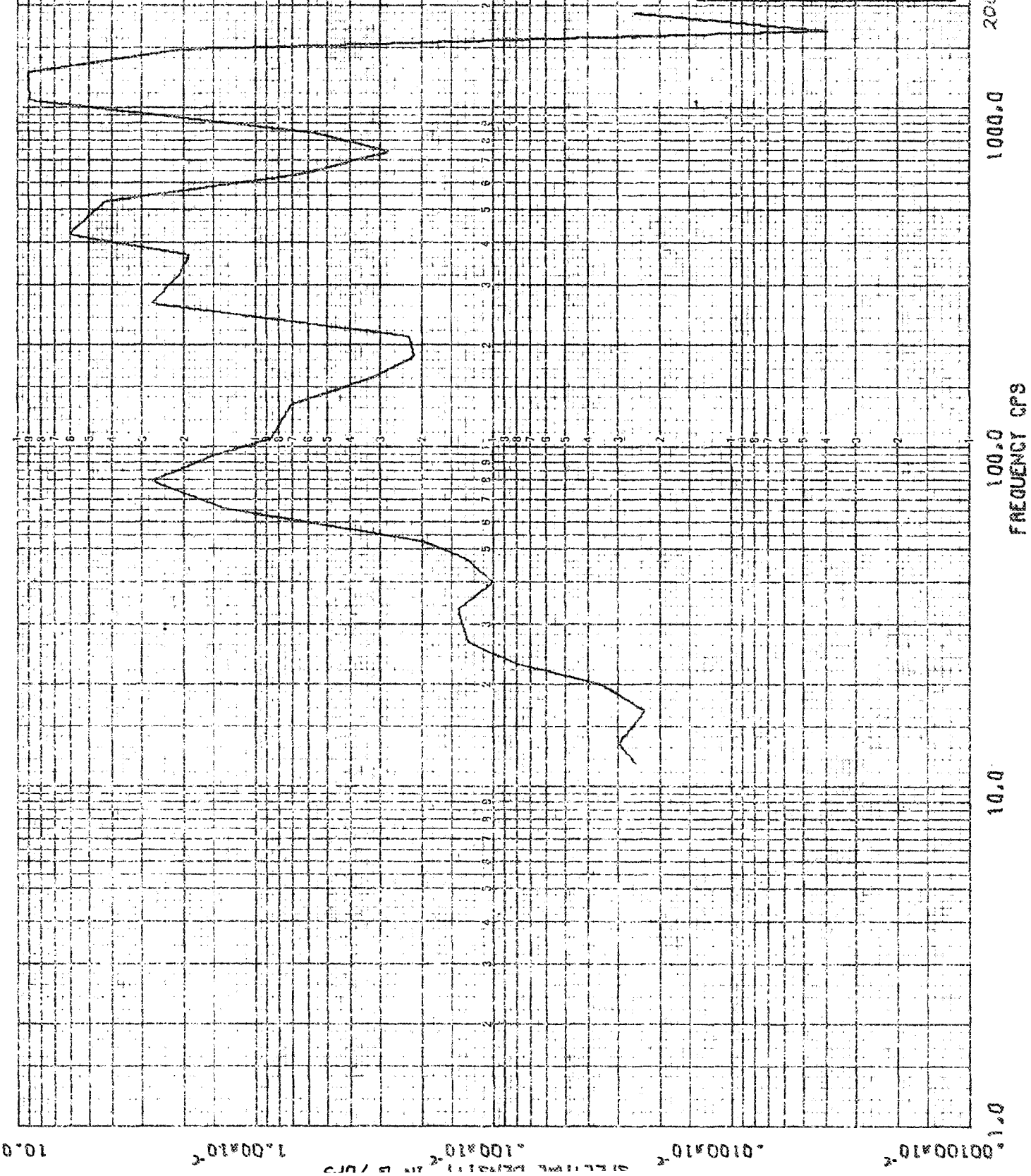
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N HIGH LEVEL
1A40083-501 S/N 0022

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS

TEST DATE	7-26-67
AXIS OF EXCITATION	B (TANG.)
PICK-UP NUMBER	7
PICK-UP RESPONSE	C
INPUT ACCELERATION PER PAGE	A58
RMS VALUE	8.4

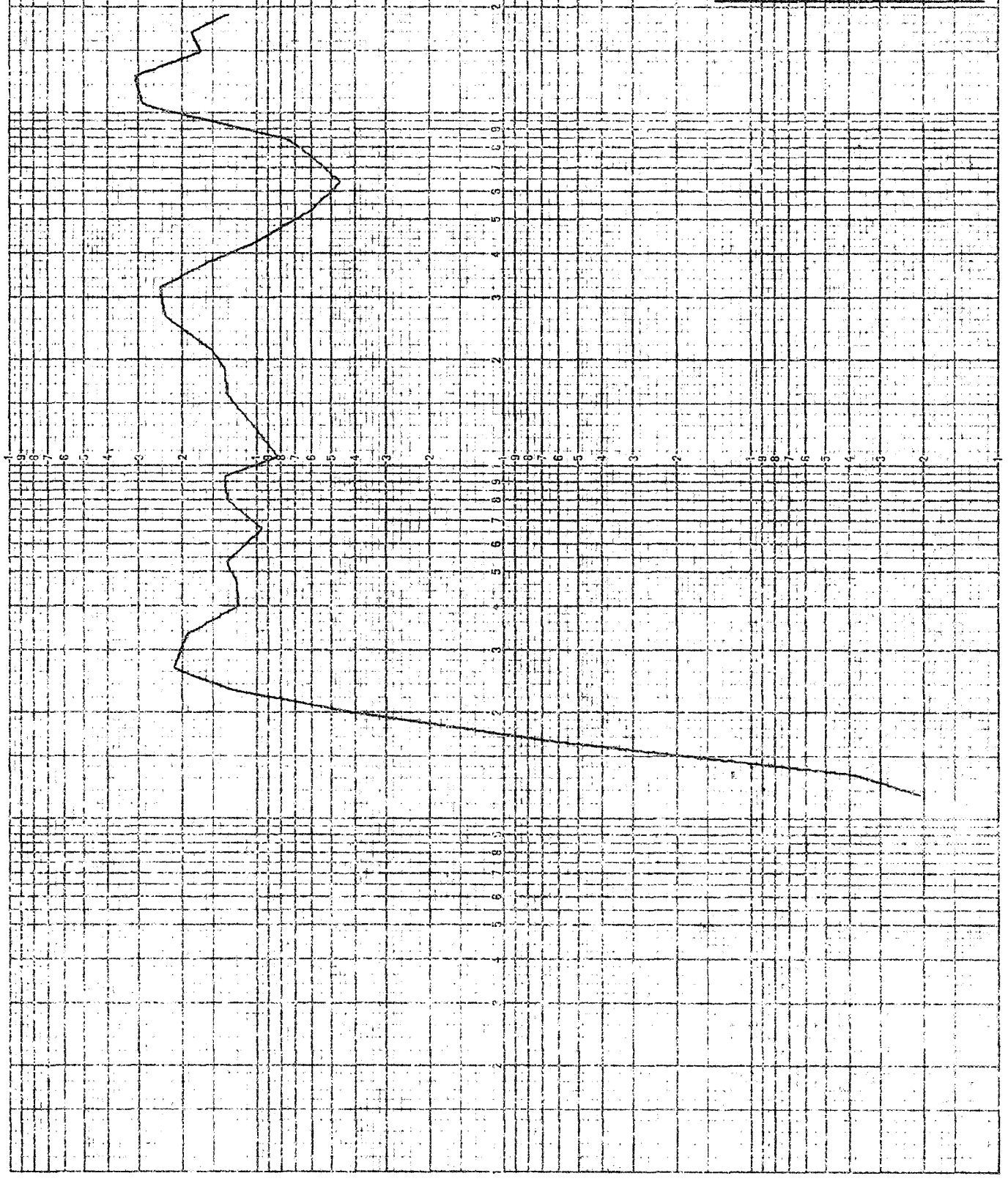


OSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-138

CONFIGURATION
P/N HIGH LEVEL
M490-18-581 S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER B
PICK-UP RESPONSE B
INPUT ACCELERATION PER PAGE A54
RMS VALUE 6.4



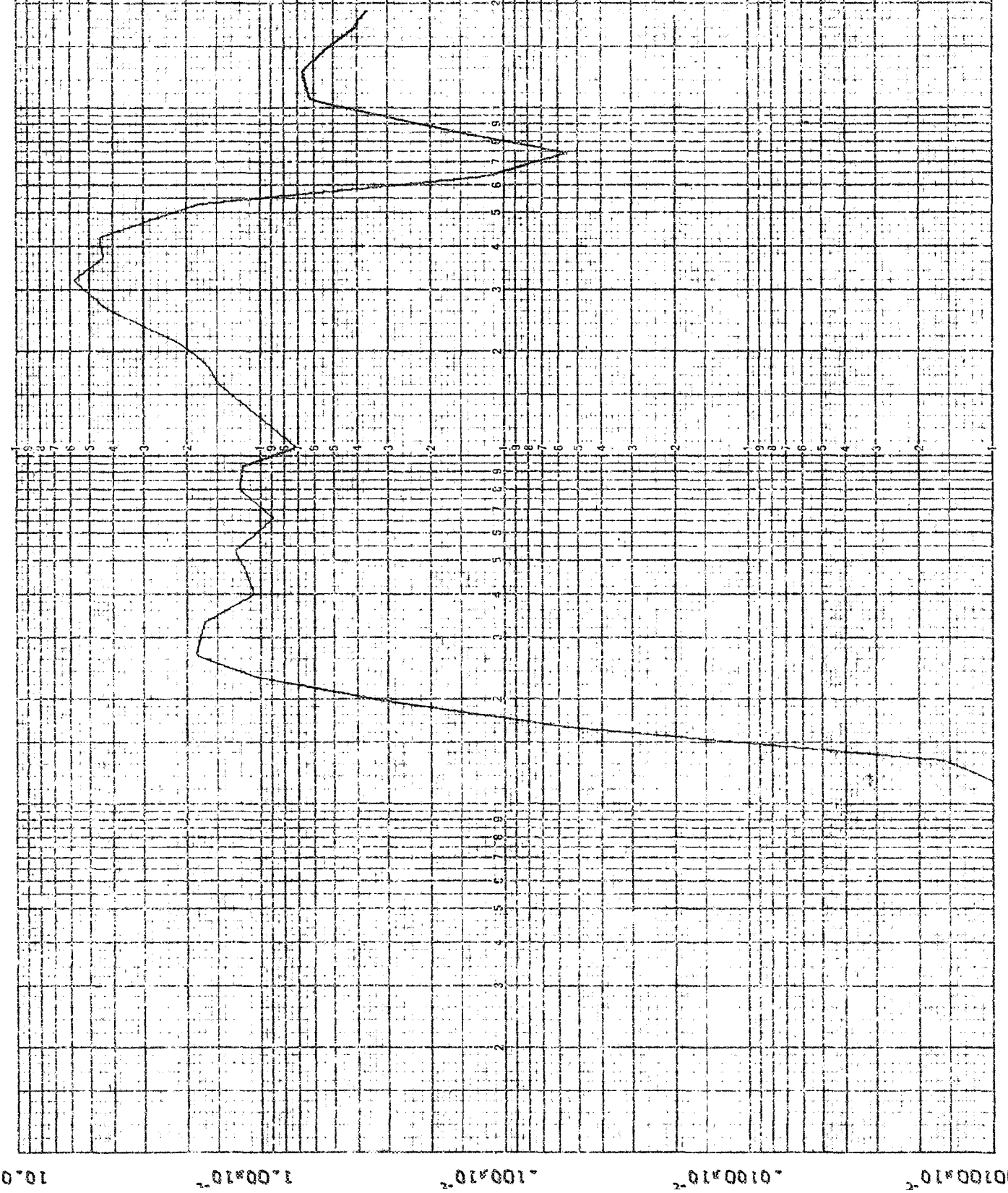
DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N HIGH LEVEL
1A4998B-501 SIN 0052

NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER 9
PICK-UP RESPONSE B
INPUT ACCELERATION PER PAGE A54
RMS VALUE 4.9



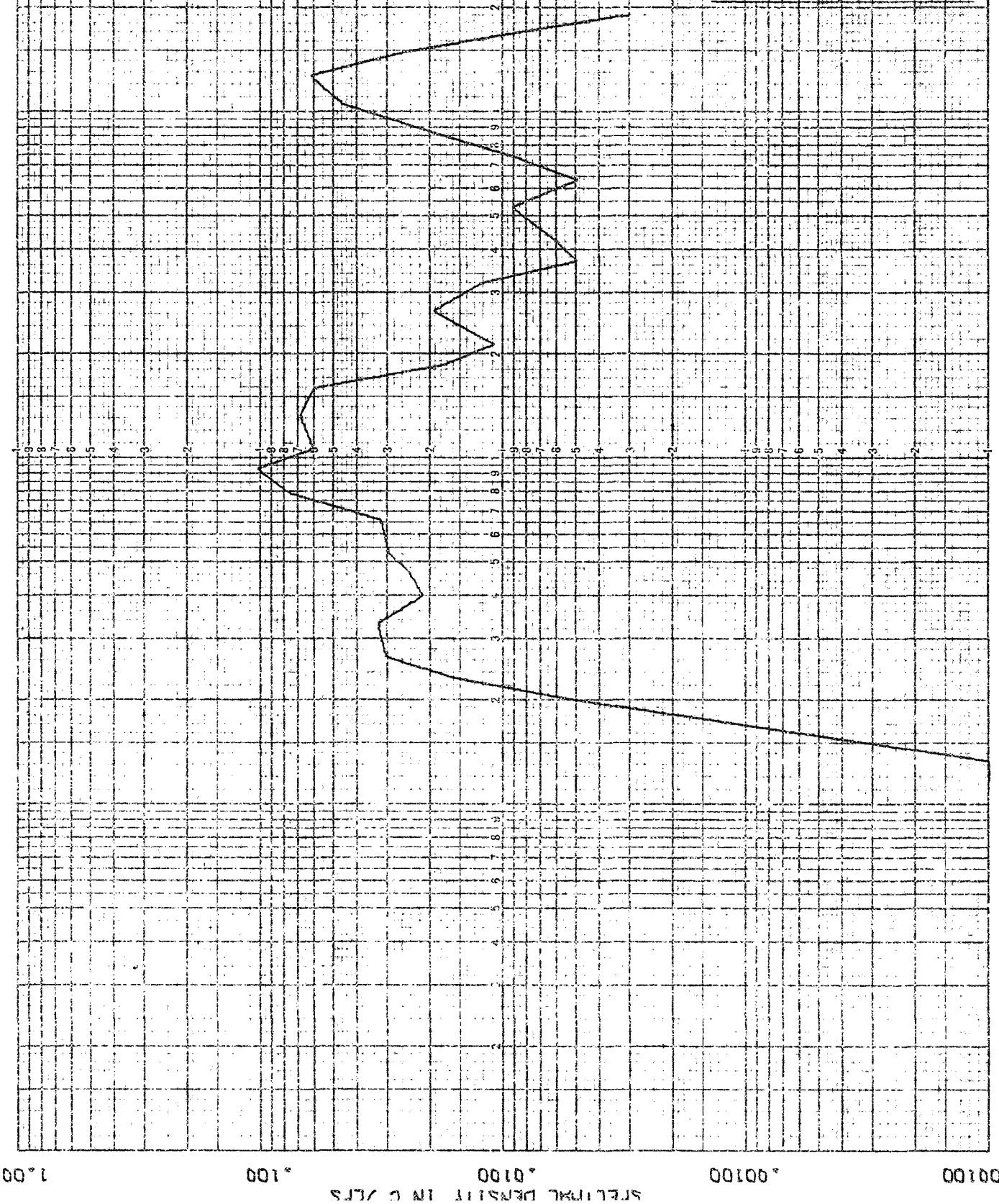
OSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N HIGH LEVEL
1A49935-501 S/N 0032

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B (TANG.)
PICK-UP NUMBER 10
PICK-UP RESPONSE B
INPUT ACCELERATION PER PAGE A53
RMS VALUE 7.6



DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION

P/N HIGH LEVEL

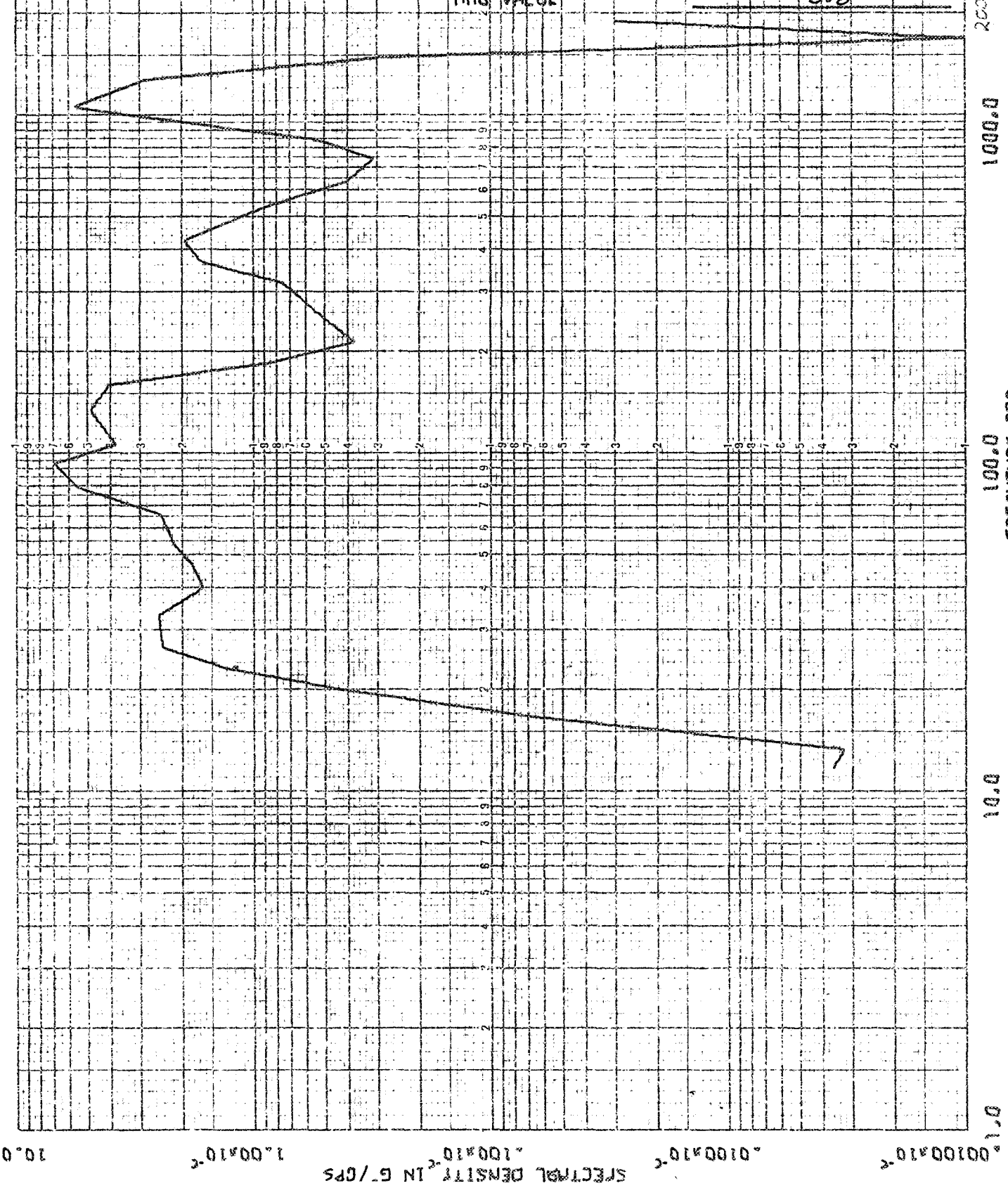
1A49955-501 S/N 0032

NOTE

SEE PAGE B2 FOR PICK-UP LOCATION

TEST CONDITIONS

TEST DATE	7-26-67
AXIS OF EXCITATION	B (TANG.)
PICK-UP NUMBER	11
PICK-UP RESPONSE	B
INPUT ACCELERATION PER PAGE	A58
RMS VALUE	5.8



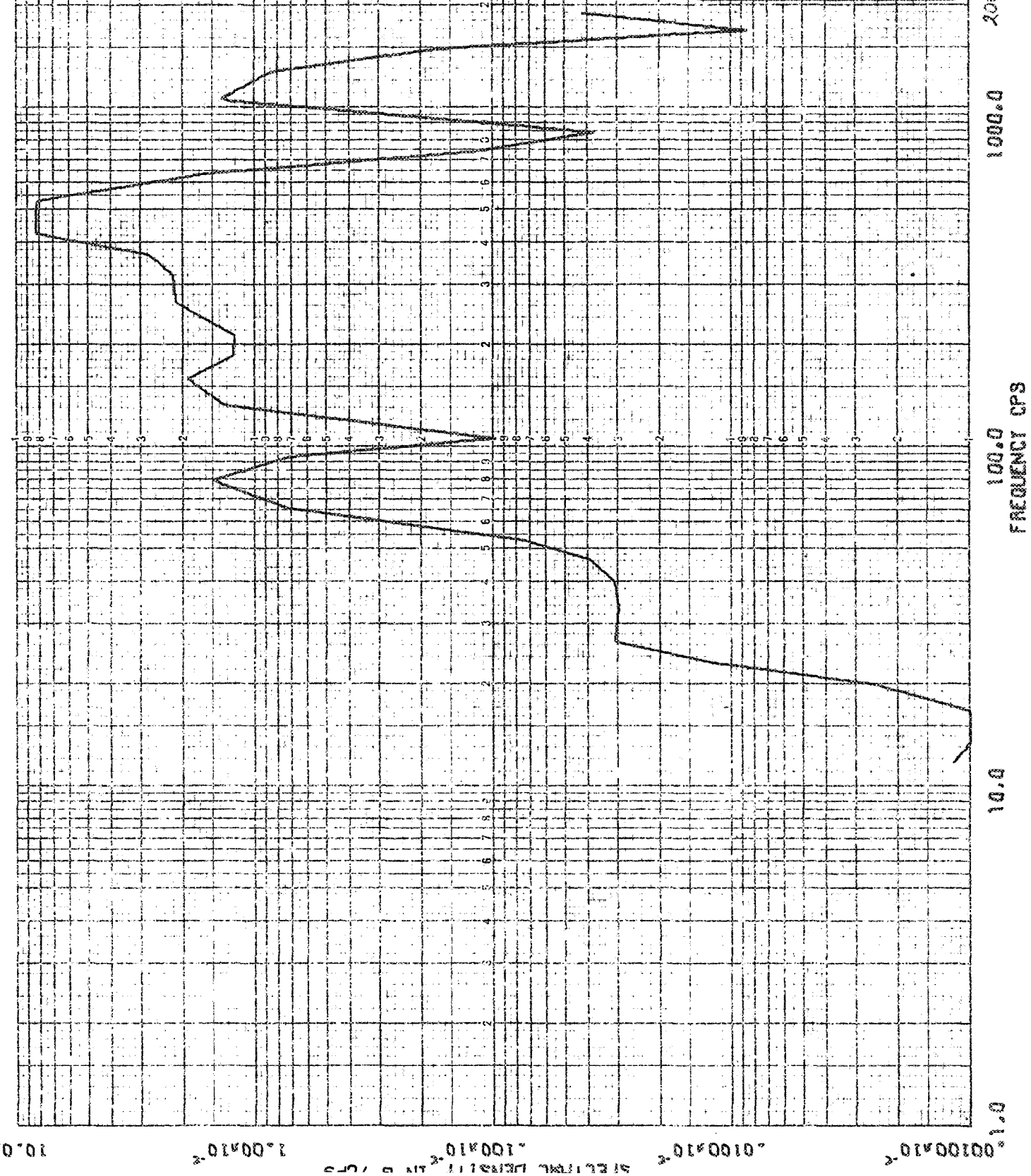
OSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N HIGH LEVEL
1A49543-501 EW0032

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS
TEST DATE 7-26-67
AXIS OF EXCITATION B(TANG.)
PICK-UP NUMBER 12
PICK-UP RESPONSE A
INPUT ACCELERATION PER PAGE
RMS VALUE 5.6



CSV-48 RANDOM VIBRATION TEST

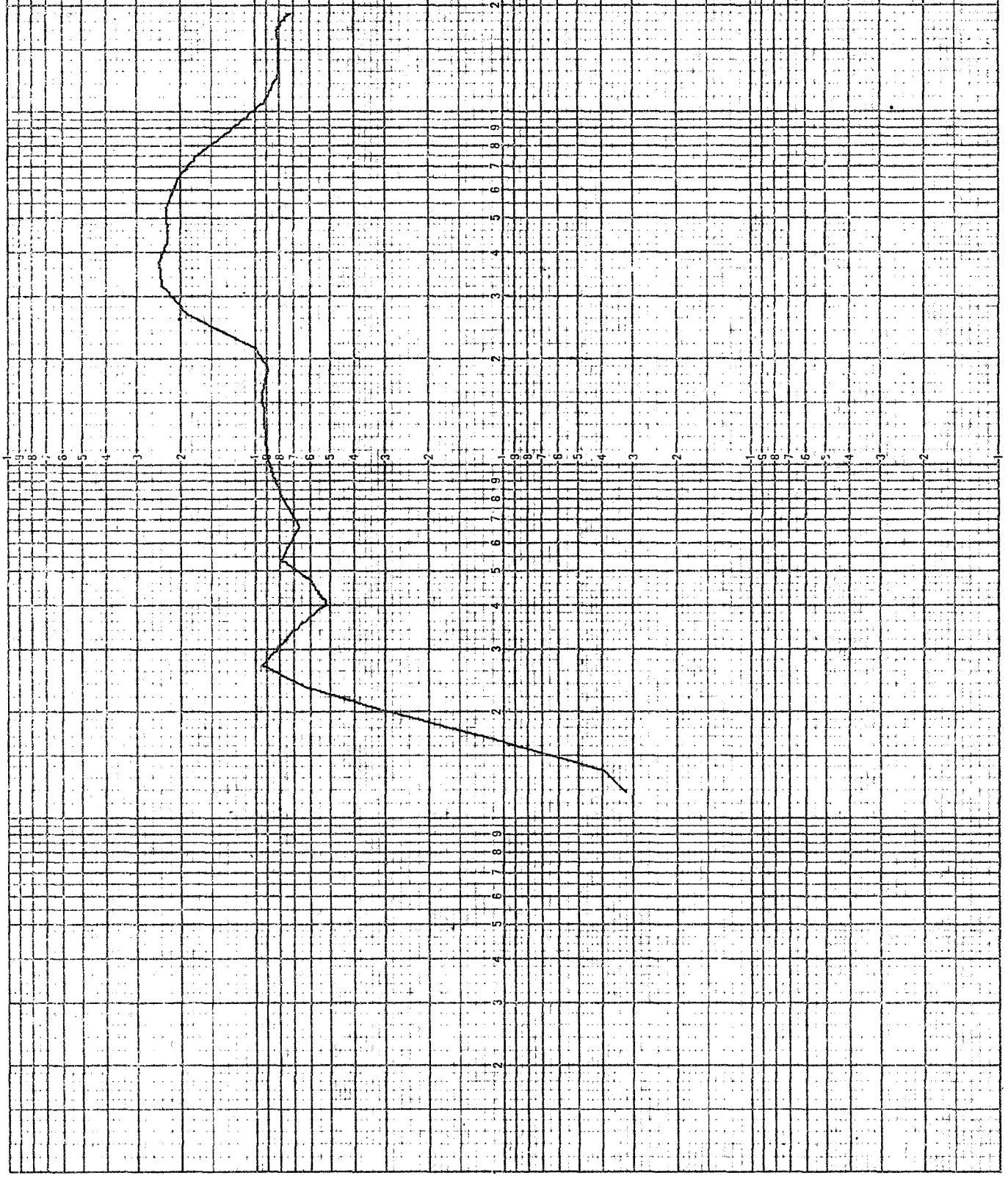
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A49988-501
S/N 003A

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL

TEST DATE	7-26-67
AXIS OF EXCITATION	C (THRUST)
PICK-UP NUMBER	1
PICK-UP RESPONSE	C (THRUST)
INPUT ACCELERATION PER PAGE	—
RMS VALUE	5.1



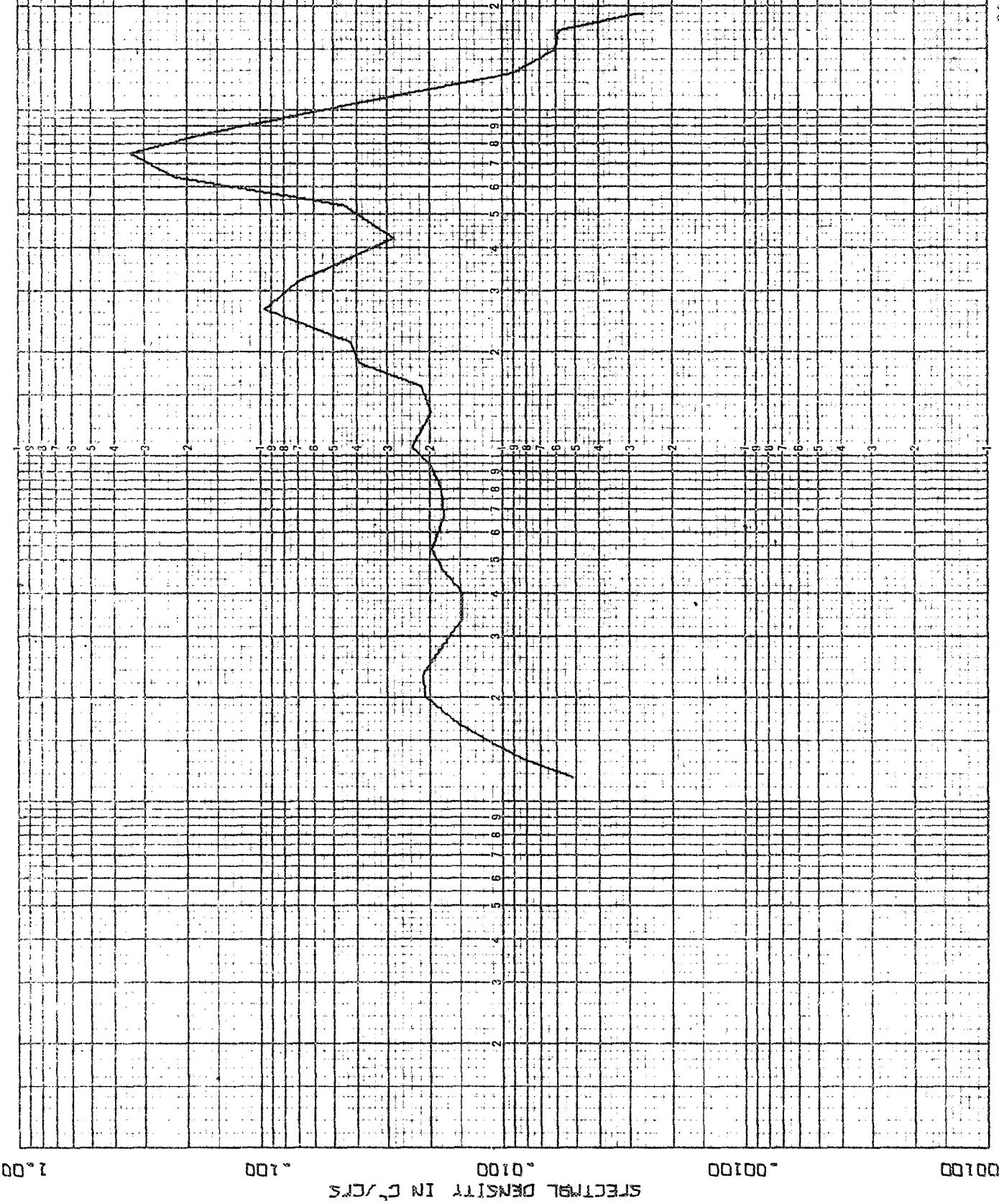
DSV-46 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A499B8-501
S/N 0032

NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION C
PICK-UP NUMBER 2
PICK-UP RESPONSE C (THRUST)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 11.3

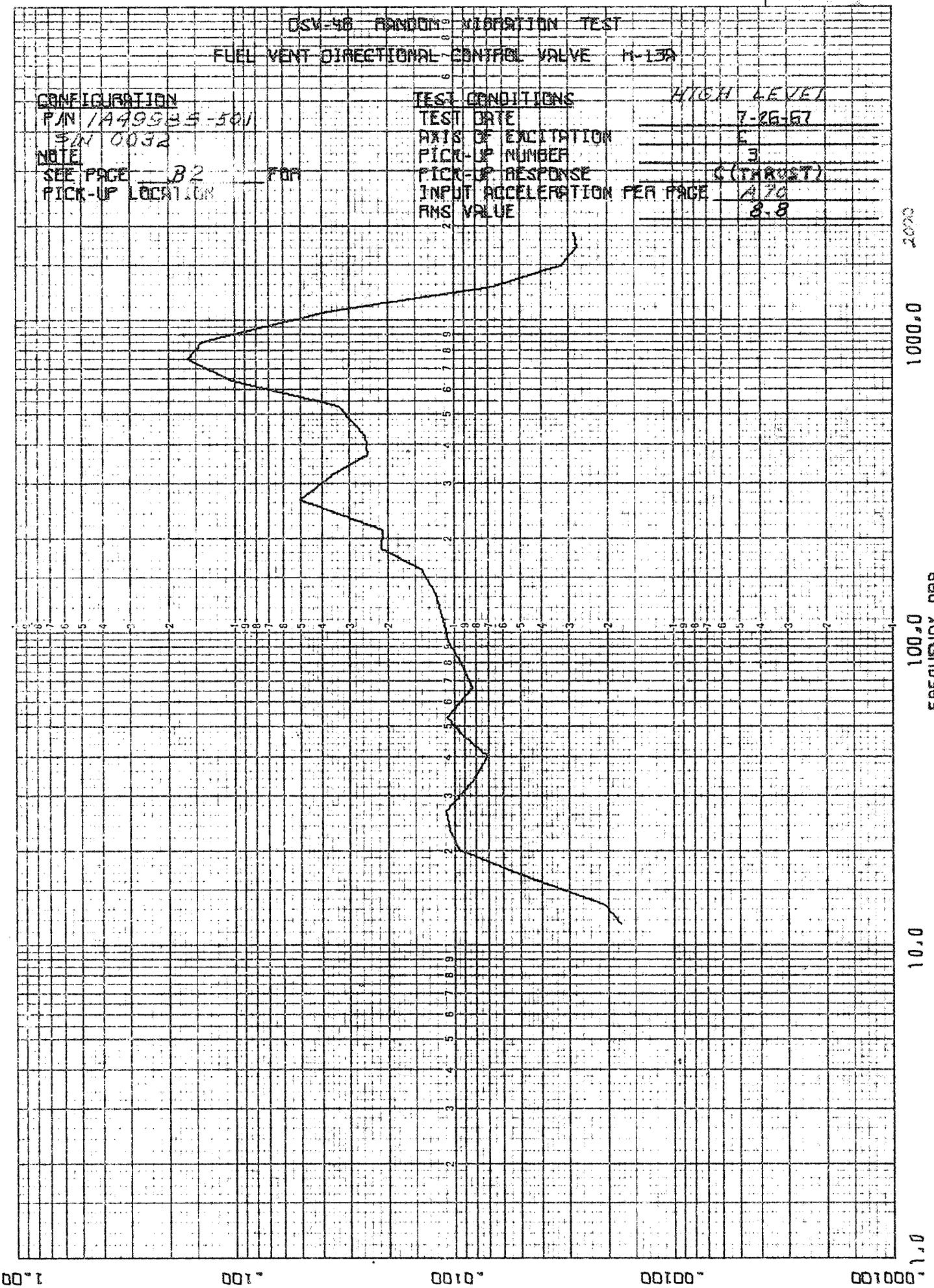


DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1449985-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION E
PICK-UP NUMBER 3
PICK-UP RESPONSE C (THRUST)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 8.8

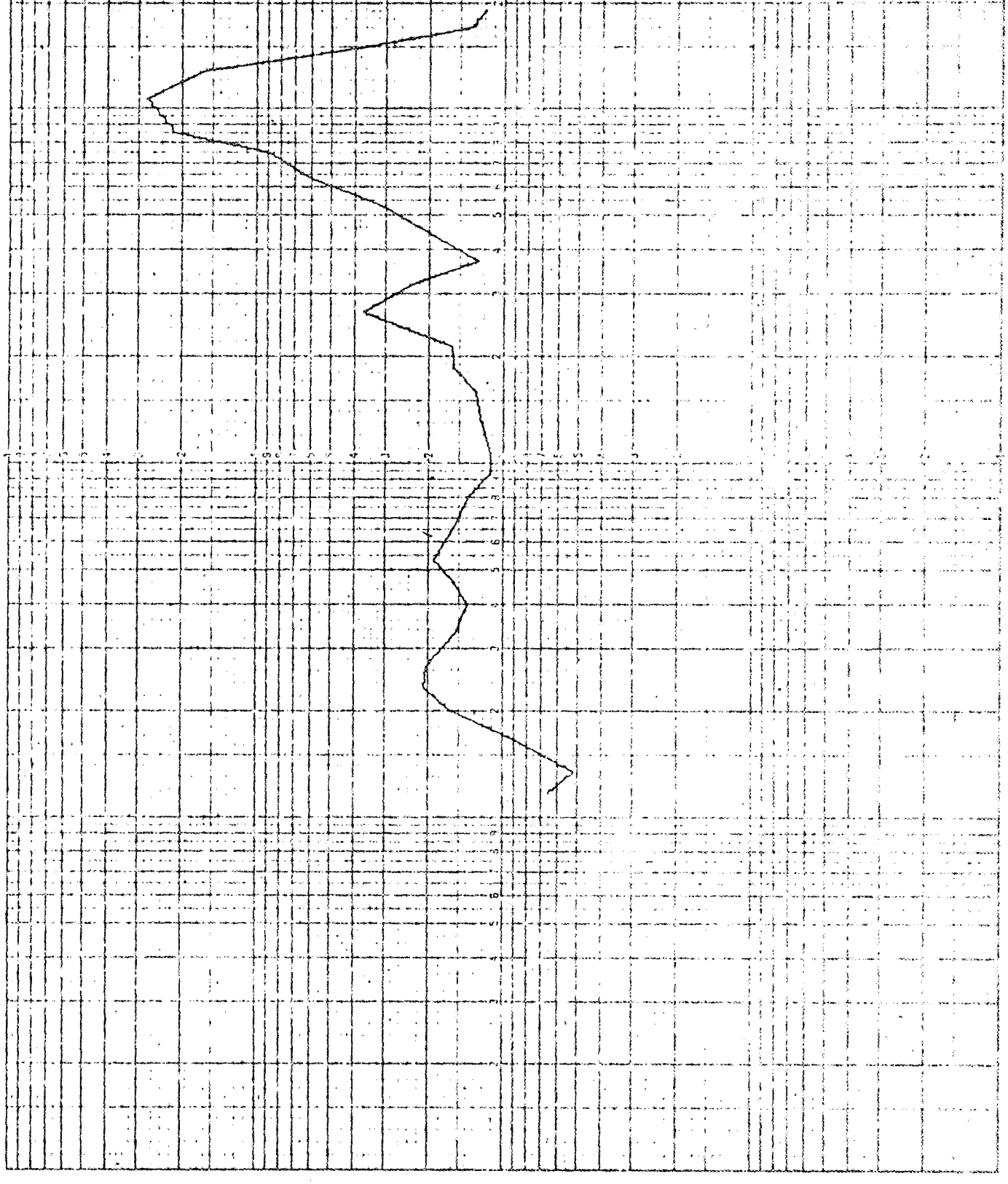


OSV-40 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-139

CONFIGURATION
P/N 1A49989-501
S/N 0032
NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION C
PICK-UP NUMBER
PICK-UP RESPONSE C (TARGET)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 13.6

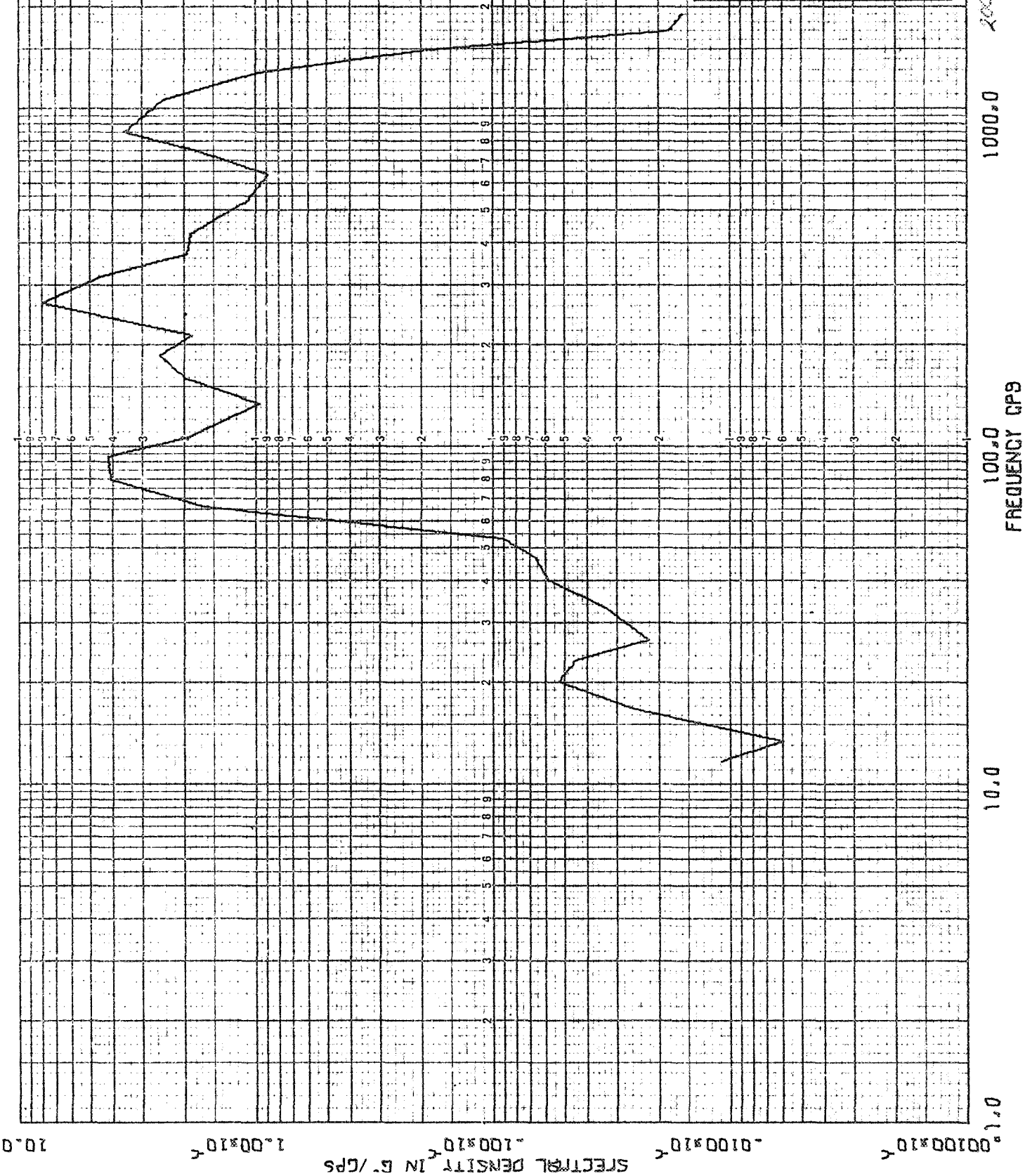


CSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL-CONTROL VALVE H-13A

CONFIGURATION
P/N 1A499558-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-25-67
AXIS OF EXCITATION C
PICK-UP NUMBER 5
PICK-UP RESPONSE A (RADIAL)
INPUT ACCELERATION PER PAGE A20
RMS VALUE 5.6



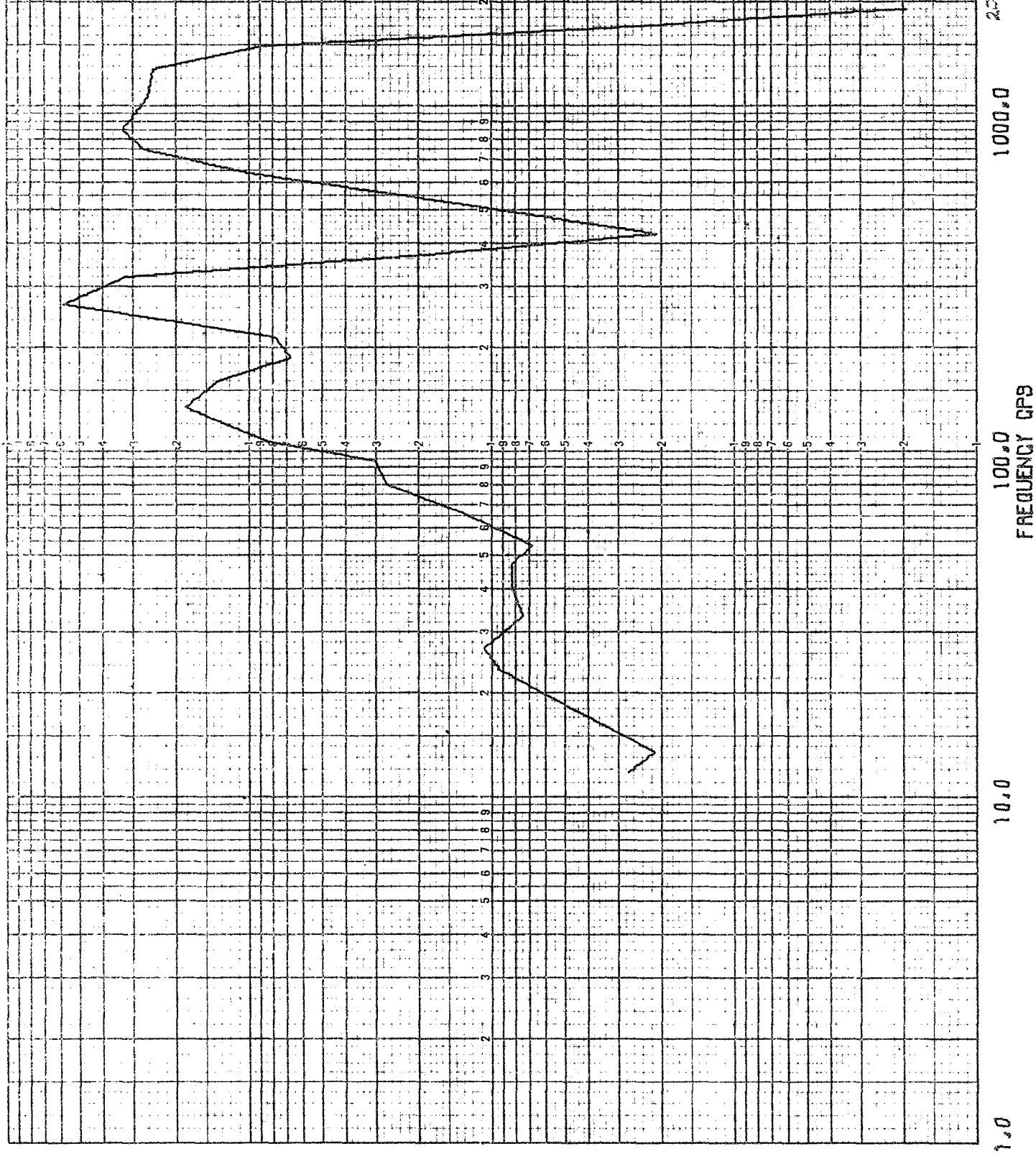
OSV-40 RANDOM VIBRATION TEST

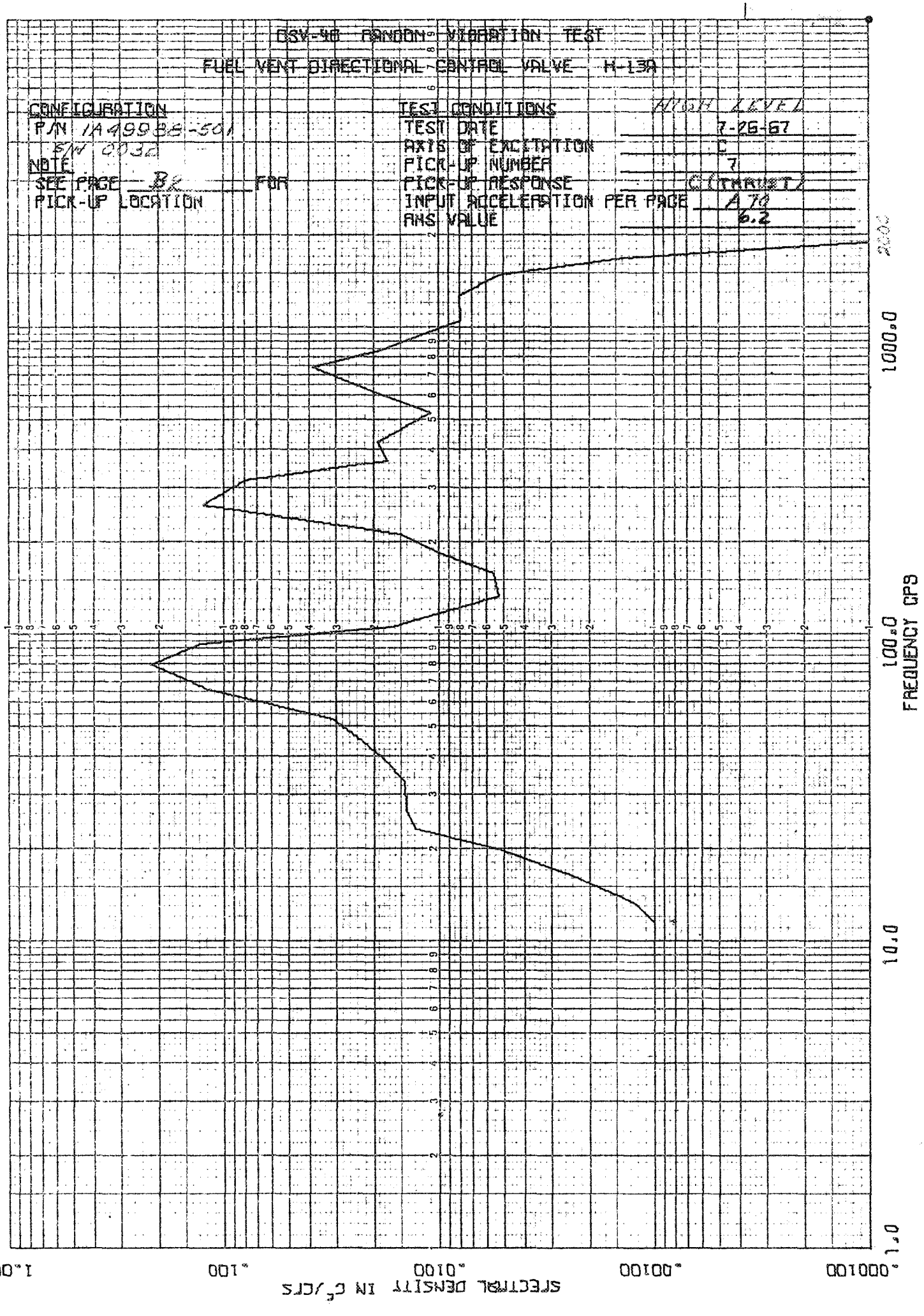
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A959988-501
S/N 0032

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION C
PICK-UP NUMBER 6
PICK-UP RESPONSE B (TAN 6.2)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 5.5




DSV-40 RANDOM VIBRATION TEST
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A
CONFIGURATION
P/N 1A49938-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION
TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION C
PICK-UP NUMBER 7
PICK-UP RESPONSE C (THRUST)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 6.2
FREQUENCY CPS
1.0
10.0
100.0
1000.0
SPECTRAL DENSITY IN G²/CPS
.0001
.0010
.0100
.100
1.00

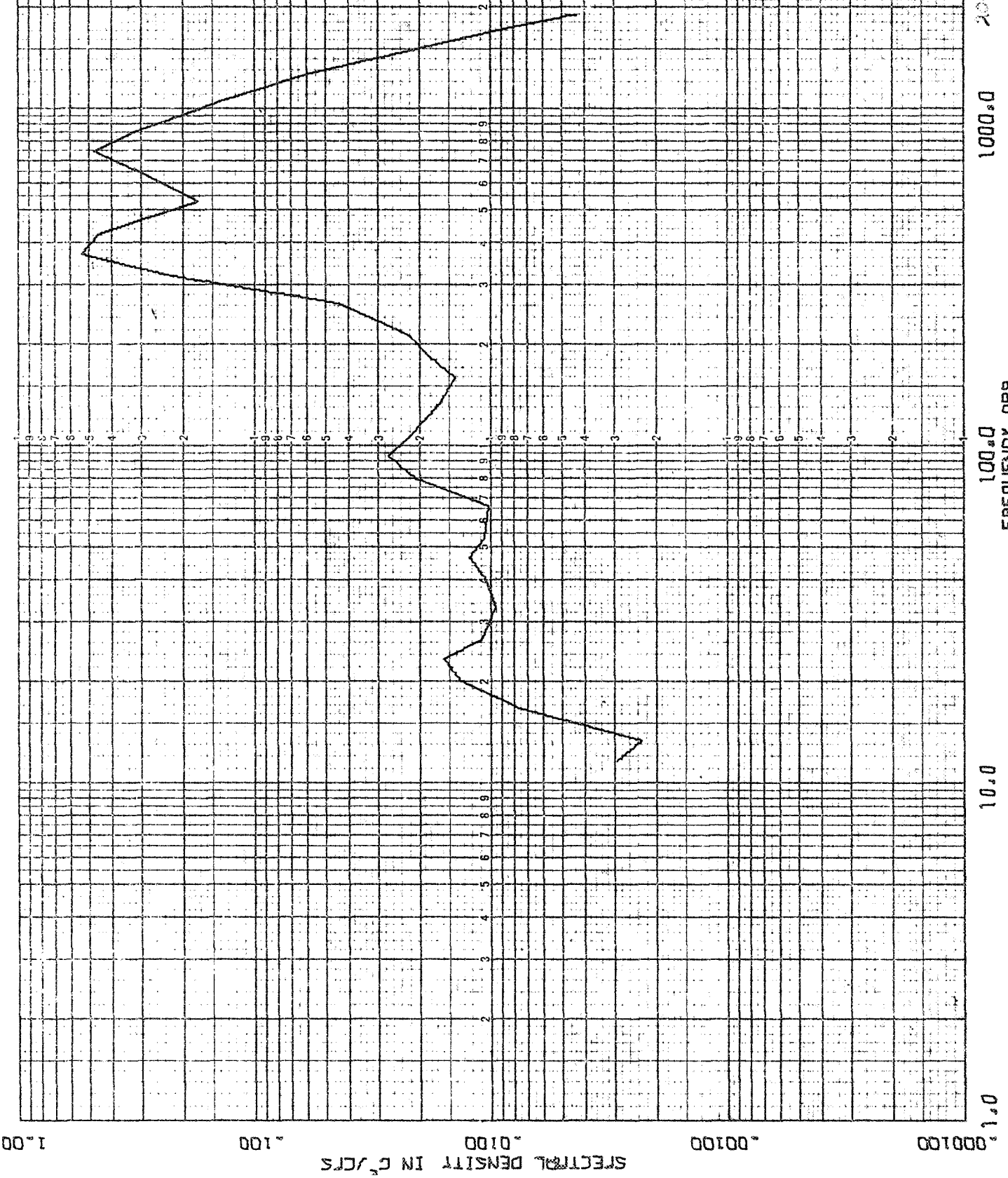
DSV-4B RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N 1A49988-501
S/N 0032

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION C
PICK-UP NUMBER 8
PICK-UP RESPONSE C (THRUST)
INPUT ACCELERATION PER PAGE A71
RMS VALUE 16.9

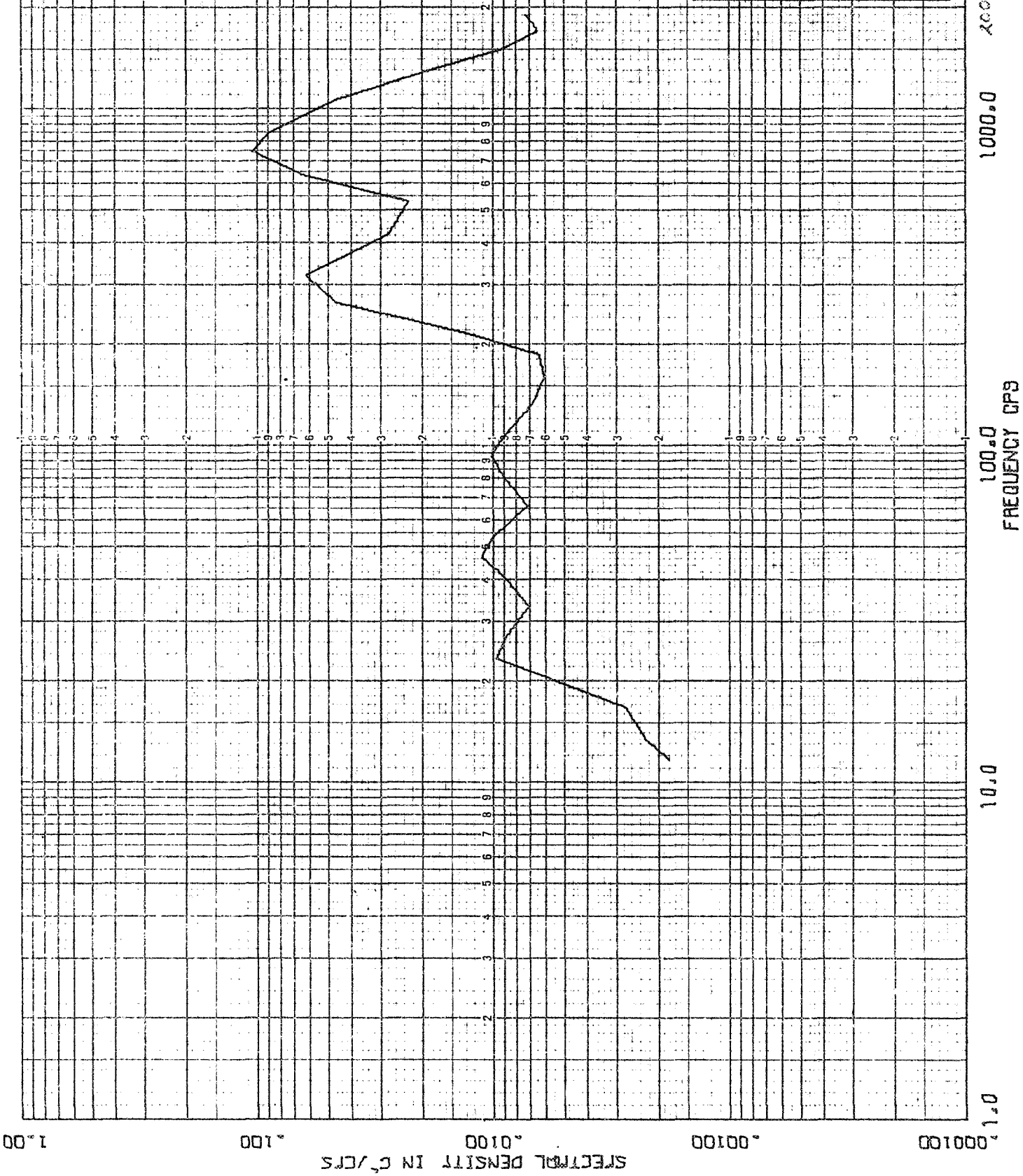


DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N 1A499885-501
S/N 0032
NOTE
SEE PAGE B3 FOR
PICK-UP LOCATION

TEST CONDITIONS
HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION F
PICK-UP NUMBER 9
PICK-UP RESPONSE C (THRUST)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 8.2

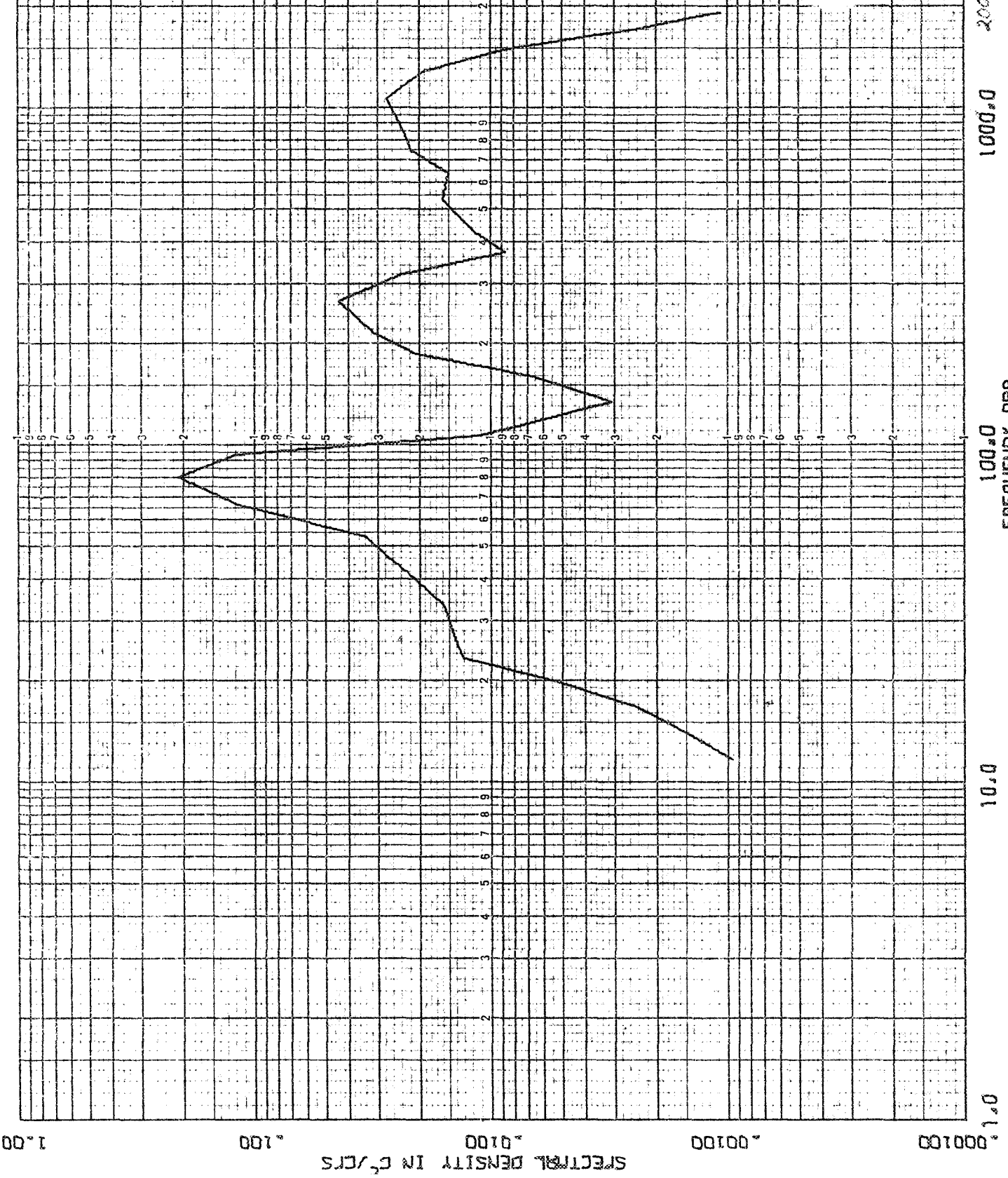


DSV-48 RANDOM VIBRATION TEST

FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N 1A49988-501
S/N 0032
NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL
TEST DATE 7-26-67
AXIS OF EXCITATION C
PICK-UP NUMBER 10
PICK-UP RESPONSE C (THRUST)
INPUT ACCELERATION PER PAGE A70
RMS VALUE 6.1



DSV-48 RANDOM VIBRATION TEST

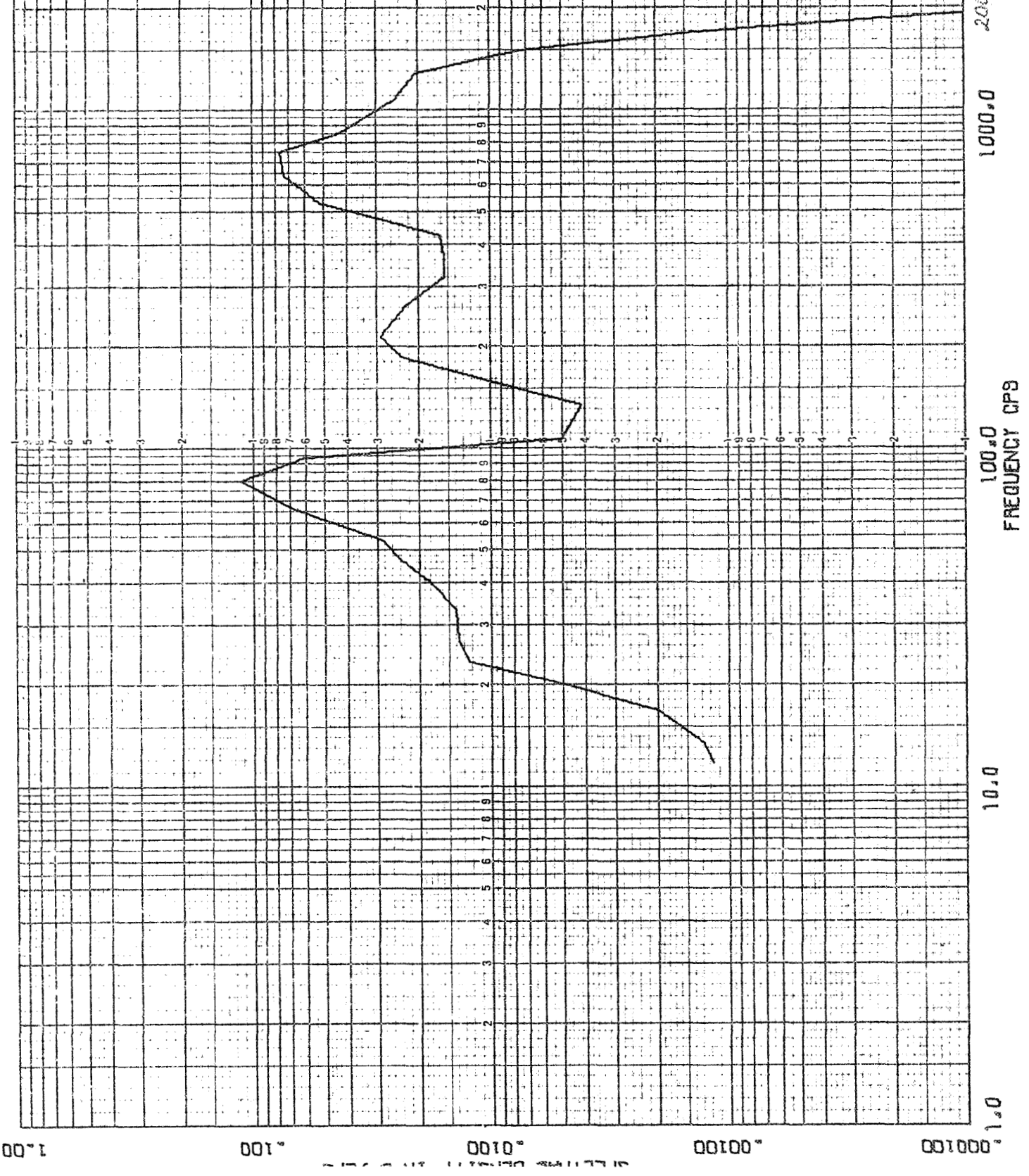
FUEL VENT DIRECTIONAL CONTROL VALVE H-13A

CONFIGURATION
P/N 1A49938-501
S/N 0032

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

TEST CONDITIONS HIGH LEVEL

TEST DATE	7-26-67
AXIS OF EXCITATION	C
PICK-UP NUMBER	11
PICK-UP RESPONSE	C (THRUST)
INPUT ACCELERATION PER PAGE	A70
RMS VALUE	7.2



DSV-4B RANDOM VIBRATION TEST

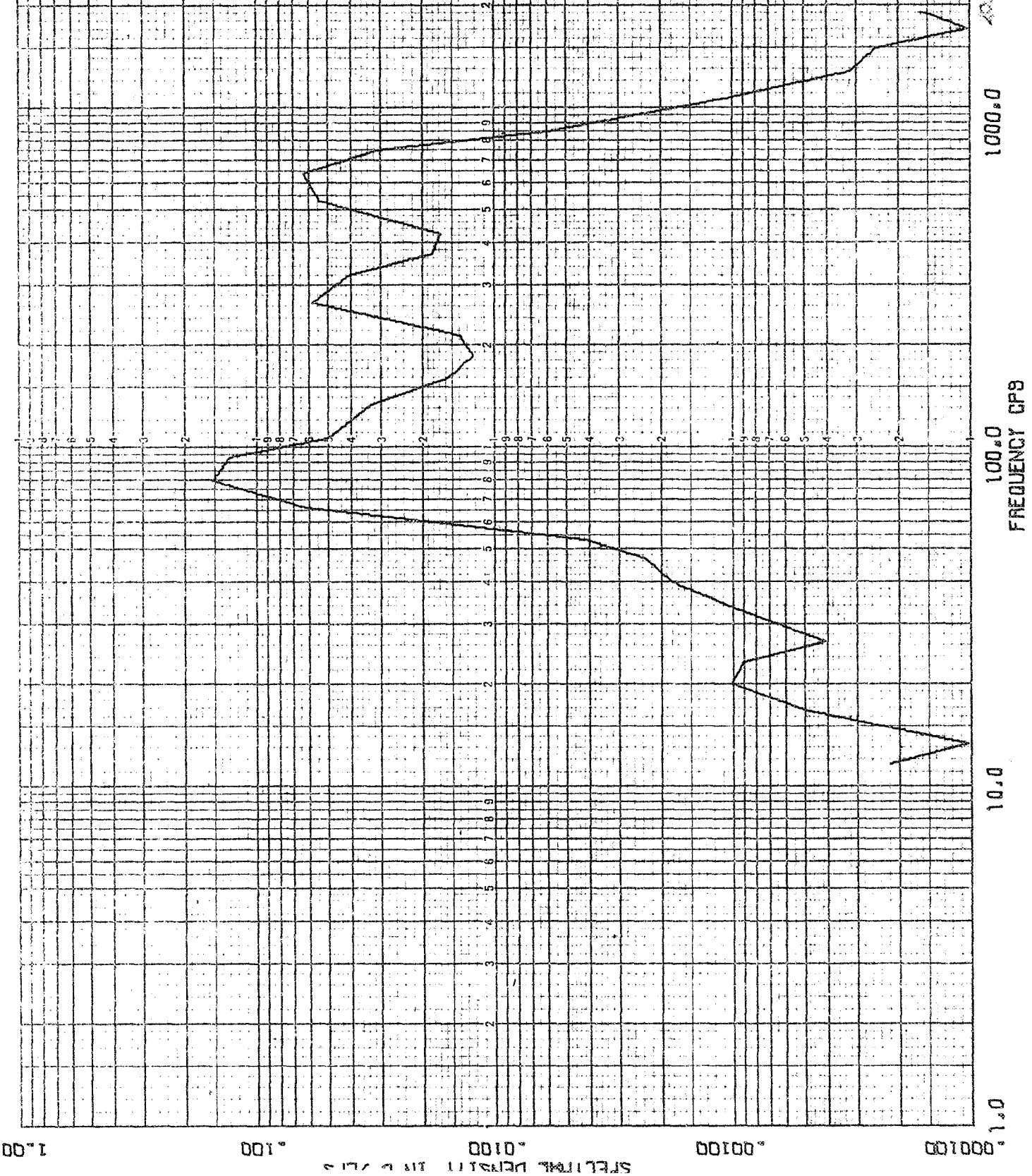
FUEL VENT DIRECTIONAL CONTROL VALVE M-13A

CONFIGURATION
P/N 1A49985-501
S/N 0032

NOTE
SEE PAGE B2 FOR
PICK-UP LOCATION

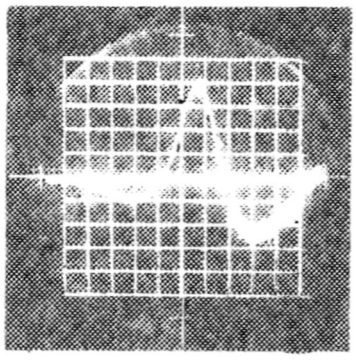
TEST CONDITIONS HIGH LEVEL

TEST DATE	7-26-67
AXIS OF EXCITATION	C
PICK-UP NUMBER	12
PICK-UP RESPONSE	A (RADIAL)
INPUT ACCELERATION PER PAGE	A70
RMS VALUE	5.8

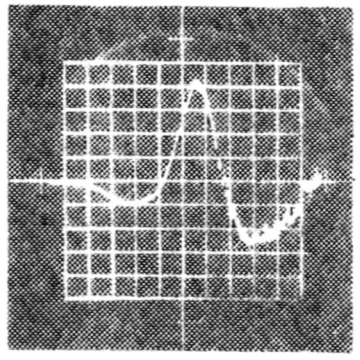


SHOCK PULSE

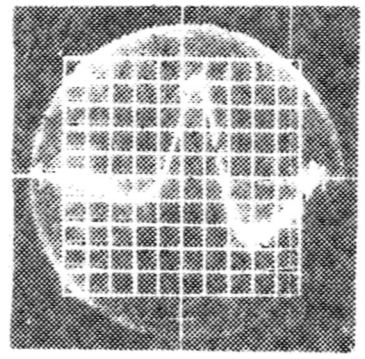
[illegible]9988-[illegible]1 [illegible]

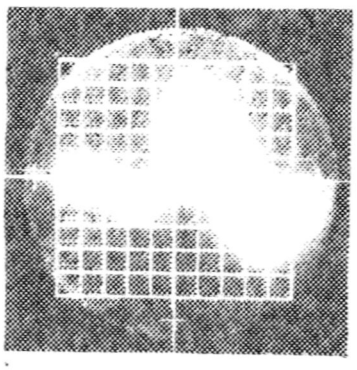


[illegible]



RADIAL AXIS





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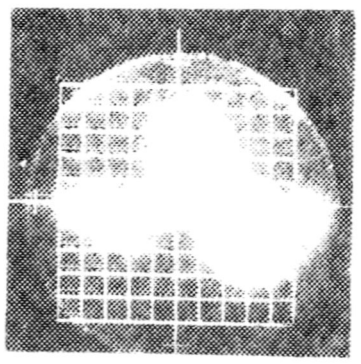
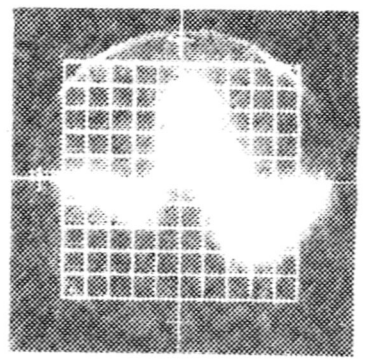
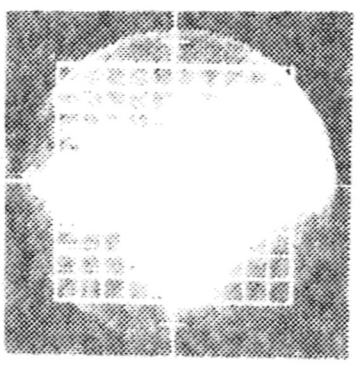
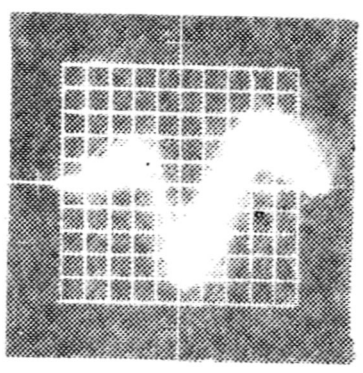


TANGENTIAL AXIS

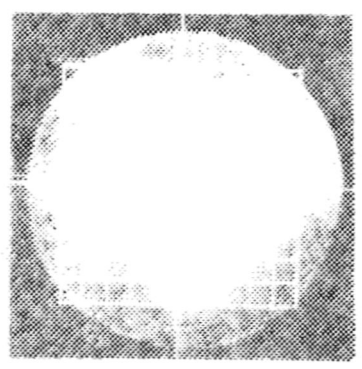


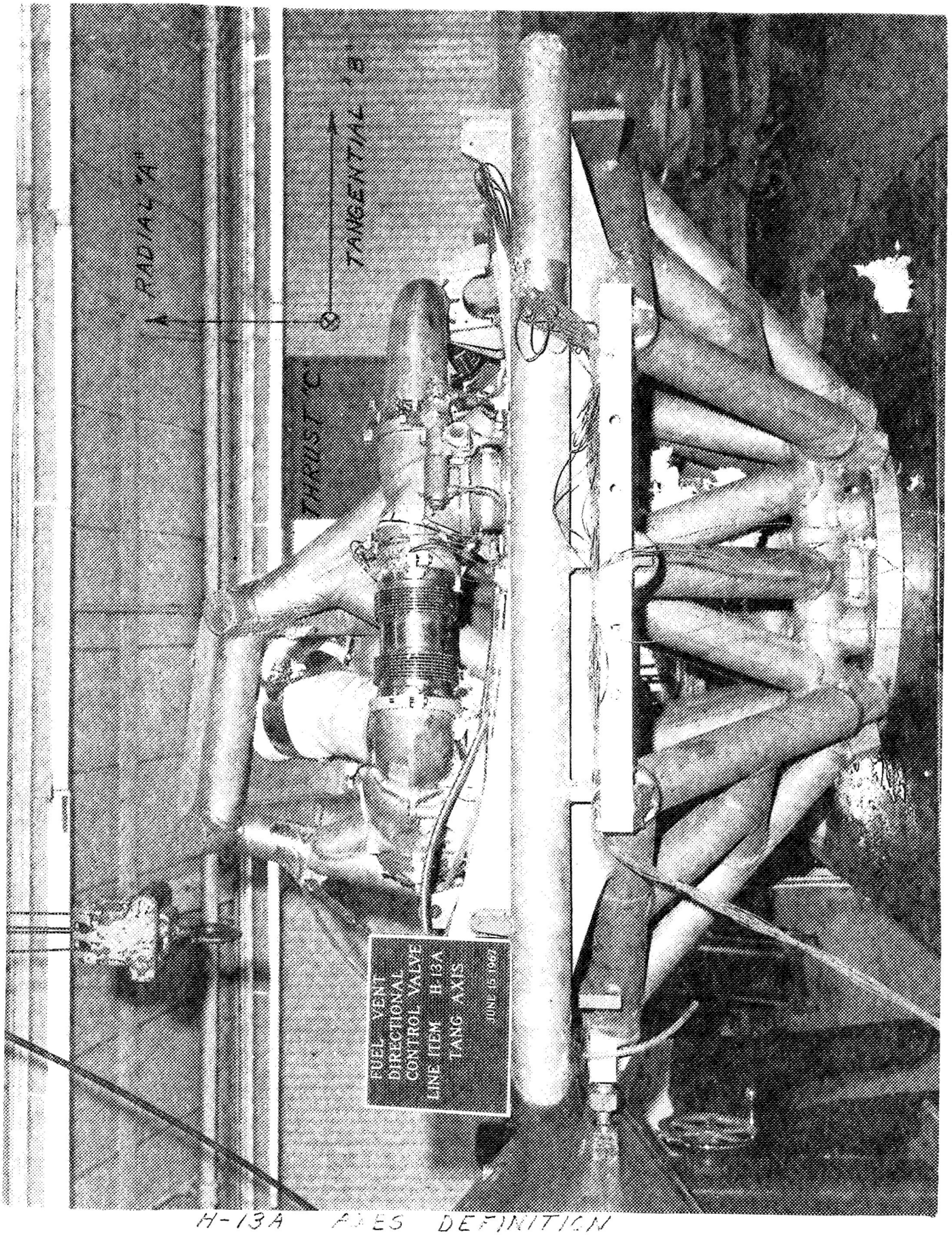


[illegible]

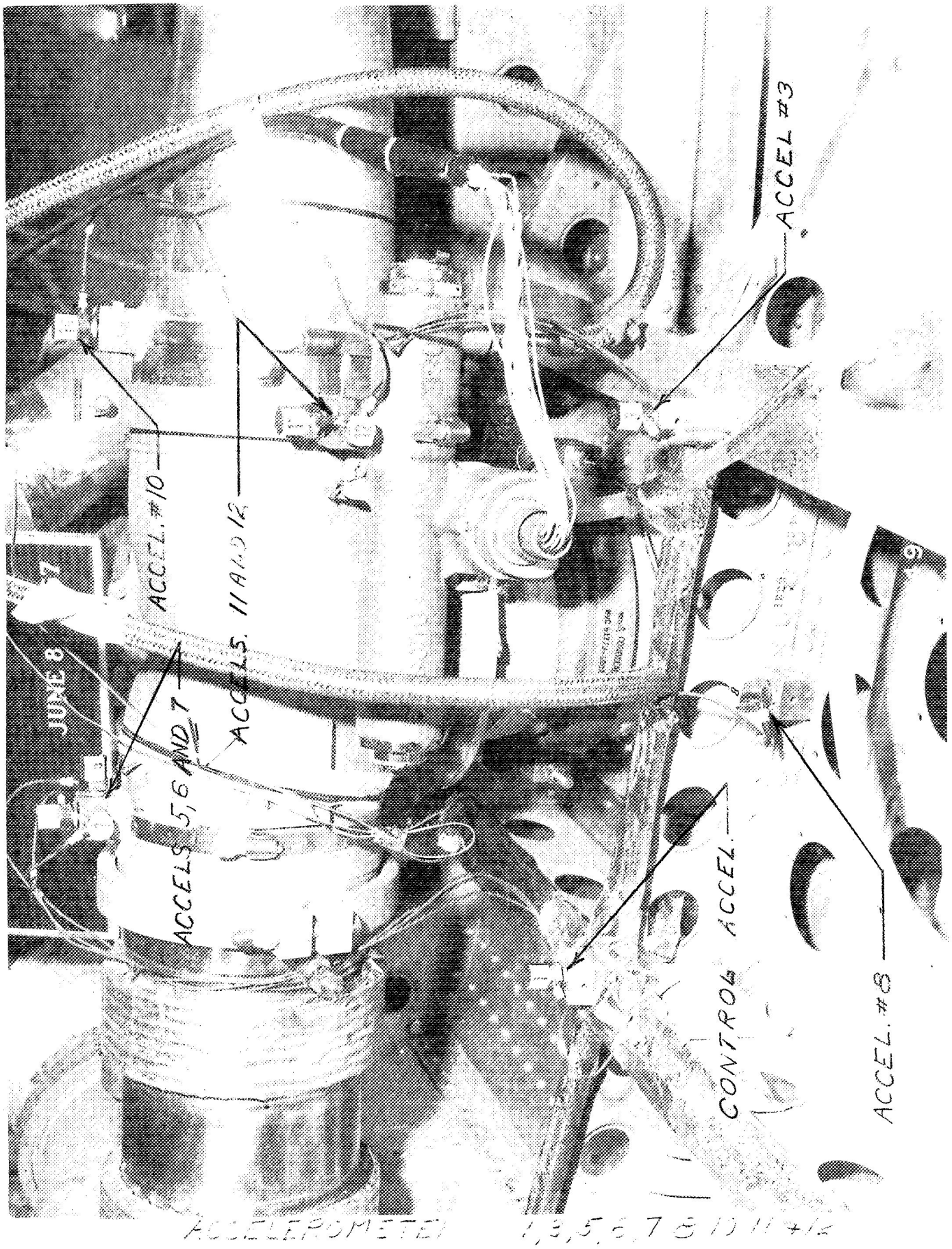


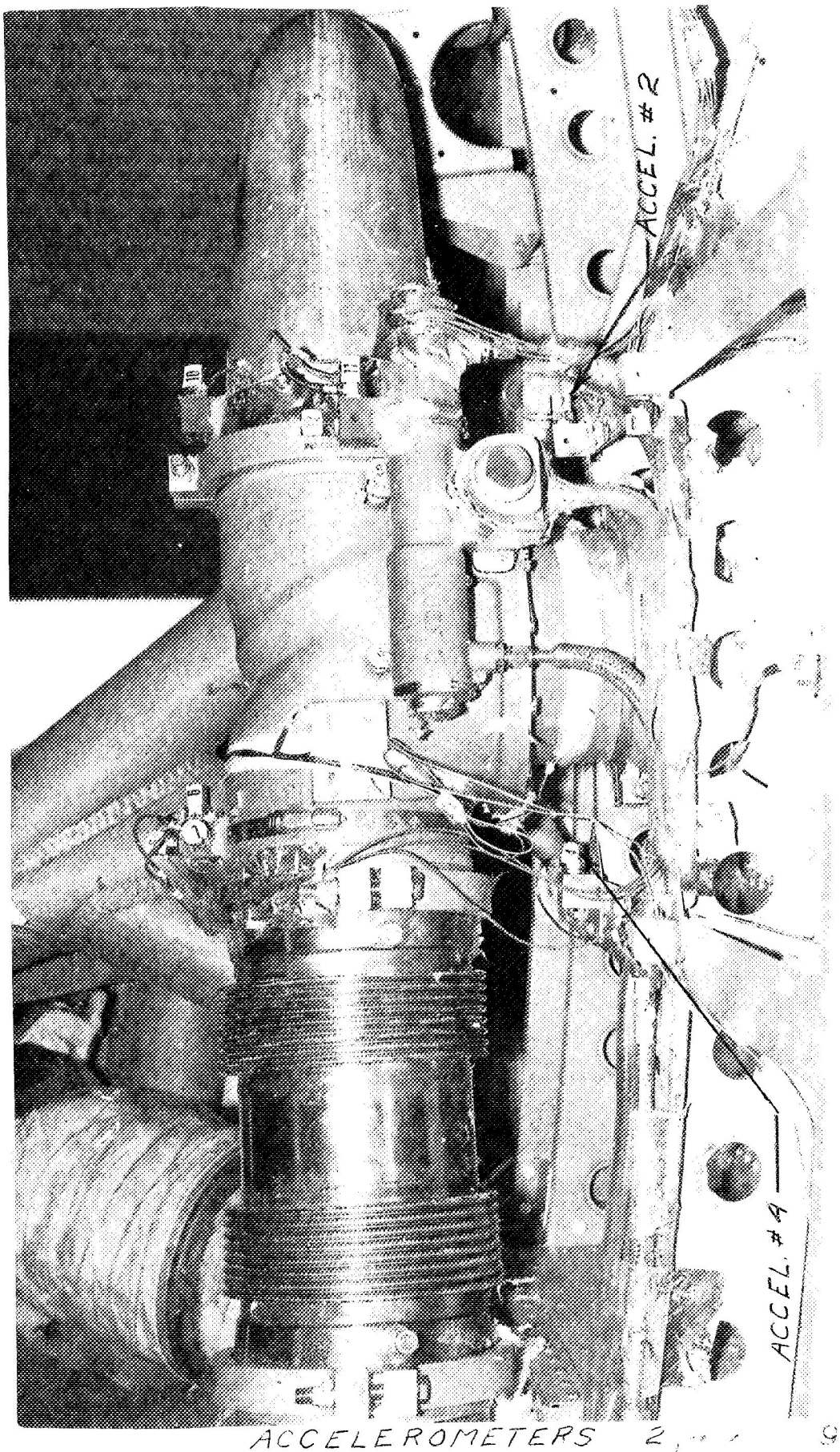
[illegible]





H-13A AXES DEFINITION


ACCEL. #3
ACCEL. #10
ACCELS. 11 AND 12
JUNE 8
ACCELS. 5, 6 AND 7
CONTROL ACCEL.
ACCEL. #8
ACCELEROMETER 1, 3, 5, 6, 7, 8, 10, 11 + 12



ACCELEROMETERS 2, ... 9