MEMORANDUM

TO: Dave Kane

FROM: Holger Luther

SUBJECT: Vibe test of the first set of unmodified and modified (load shunted)Lucas flexures.

DATE: 08/29/97

DISTRIBUTION: M. Anapol, A. DeLuzio, G Szarek, Hap Acee (Lucas).

On Tuesday August 26th Dennis and I took the completed flexure test fixture to the National Technical Service (NTS) facility in Boxborough to shake the first set of flexures - unmodified and modified. The test fixture is seen in Figure 1. It is essentially composed of two aluminum "gimbal" arms bolted and pinned to an aluminum baseplate. The dummy mirror weighs 4.5 lbs (considerably more than the 3.6 lb HIRDLS mirror assembly) and has a rotational moment of inertia that is approximately 10 times that of the HIRDLS mirror. The latter was unintentional and due to an Auto-Cad error in the computation of the HIRDLS mirror moment.

The fixture containing the unmodified flexures was installed on the shaker and fastened by 8 1/2" bolts on an 8" dia. bolt circle. The baseplate was installed on eight matched spacers to prevent the plate from being bent. Four acceleraometers were attached to the fixture. The first, labelled "top" was placed on the top edge of the dummy mirror, the second, labelled "lateral" was placed on the rotation axis in the face of the dummy mirror, the third labelled "axial" was placed on the mirror edge inside the central mirror cavity such that the accelerometer measured accelerations along the mirror rotation axis, and the fourth labelled "gimbal" was located on one of the gimbal arms with its sensitive axis parallel with that of the "lateral" accelerometer. The control accelerometer was located on the baseplate close to one of the bolts. A 0.25g sine survey was conducted to locate resonances. These are seen in the first 4 graphs marked "TEST #1". The top accelerometer response is essentially as expected. The lateral response shows a great number of very low frequencies which are quite **unexpected** and troublesome. The same is true of the axial response. The gimbal sensor essentially echoes the lateral signature.

Load Shunt

It is useful to compare the above results with those obtained from the load shunted flexures which are seen in the series of graphs marked "TEST #3". While the top signature is essentially the same as that of the unmodified flexure, the lateral and axial responses are happily quite different in that they do **not** show the low frequency resonances. In fact, these vibrations appear to have shifted well above 400 Hz. Moreover, the axial response is remarkably free of strong resonant modes.

The random vibration of the unmodified flexures was marred by an unfortunate "cockpit" error which resulted in the expeditious destruction of the flexures before any data was taken. The NTS operator started the random vibration sequence using a PSD as seen in Figure 2. He did attenuate the level by 9 dB, and at the end of three minutes, he went on to the full PSD (0 dB attenuation). Within 5 seconds of the onset of the that vibration the flexures failed with a rather loud "click". Unfortunately the PC monitoring the response of the accelerometers was so slow that no data except for the control accelerometer was captured. This sensor showed that at the 0 dB shake, the servo system had essentially lost control of the shake table. This can be seen in the graph marked "TEST #2" which reveals a very high low frequency excursion of the base plate due to the fact that the 1/2" plate was buckling violently.

One random vibration run was then conducted on the load shunted flexures but at a 9 dB attenuation. The results are seen in the graphs marked "TEST #4" In these graphs it seen that the top sensor executes a very broad substantially amplified excursion quite unlike that of any high Q resonator. The other sensors more or less follow the input excitation.

On August 29th we returned to NTS with a fixture mounted on a 1" aluminum baseplate. The unit again was placed on the washers and bolted down. A sine survey revealed a very high resonance at 928 Hz. This mode turned out to be the fundamental bending mode of the baseplate. It was eliminated by removing the washers which brought the baseplate into contact with a great number of "bosses" on the shake table. The 0.25g sine survey of the fixture containing the load shunted (modified) flexures is seen in the graphs marked "TEST #5A W/O WASHERS". The top signature is the same as that of TEST #3, the axial response, however shows a 6g peak at 341 Hz which was not seen in TEST #3.

The random vibration sequence was conducted with a Sun Systems data logger which was able to record all accelerometer resonses simultaneously. Each sequence ran for one minute and started at an attenuation level of -9dB, then -6dB, -3 dB, and finished at the full PSD level. A great amount of data emerged which is not all reproduced in this report. The full level sequence is seen in the graphs marked "TEST #6". The first of these shows the control accelerometer response which recorded an input of 9.7g rms. The next graphs show the responses of the top, lateral, axial, and gimbal respectively. These all look similar to those obtained during TEST #4. The top sensor response, however shows that

Atten.	P'k ampl.	Freq.
dB	g^2/Hz	Hz
-9	8.59	450
-6	12.05	450
-3	27.29	495
0	41.95	535

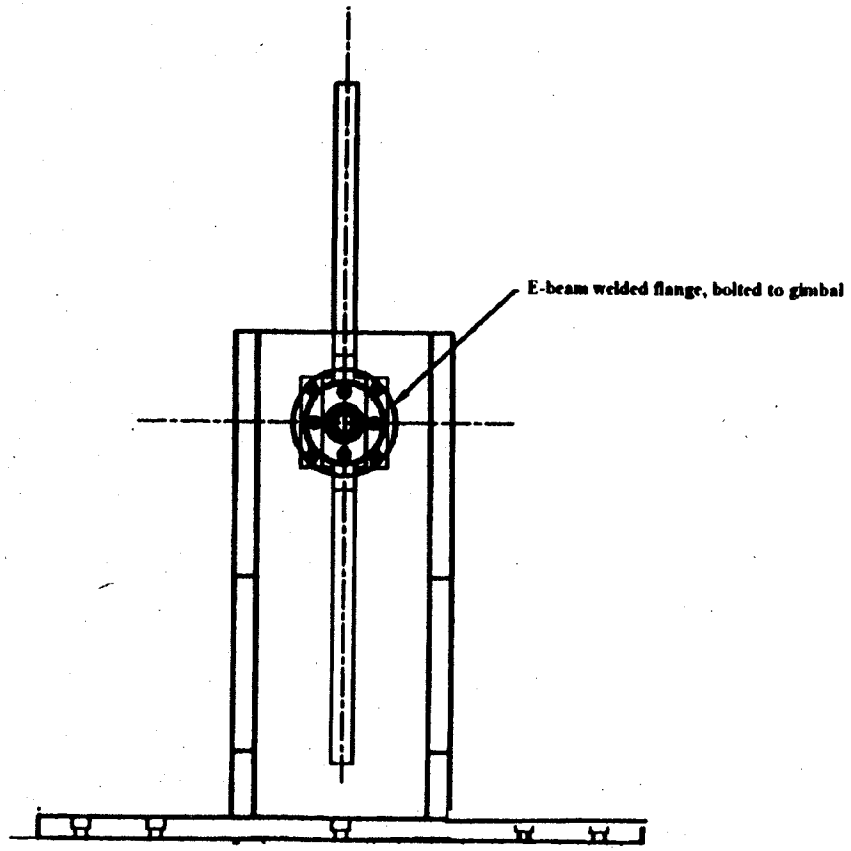
TABLE - 1 Top sensor response

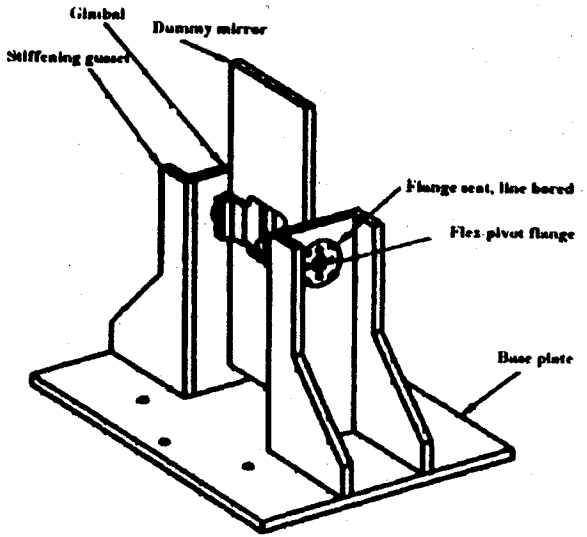
broad peak seen in TEST #3 which grows in amplitude and shifts in frequency as the attenuation level is reduced as seen in TABLE 1. This behaviour is attributed to the load shunt which causes the cantilevered end of the flexure to limit cycle over the allowed radial excursion of 1 mil at frequencies which are essentially harmonics of an ever sharpening square wave that leads to the gradual upward shift of the peak.

After the completion of the random vibration sequence, a 0.25g sine survey was conducted to ascertain that the flexure characteristics had not changed. The results are seen in the graphs marked "SINE SURVEY TEST #7". It is seen that these differ only very slightly from those seen in TEST #5A. This provides proof positive that the load shunted flexure is **alive and well!**

Since this is only a statistical sample of one (at most two) we expect to test the other 5 sets - modified and unmodified. These tests, however can be reduced to sine surveys before and after the random vibe tests at -3 dB and full PSD.

BENDIX FLEXURE TEST





ISOMETRIC VIEW
SCALE: 1/4

FIGURE 1.

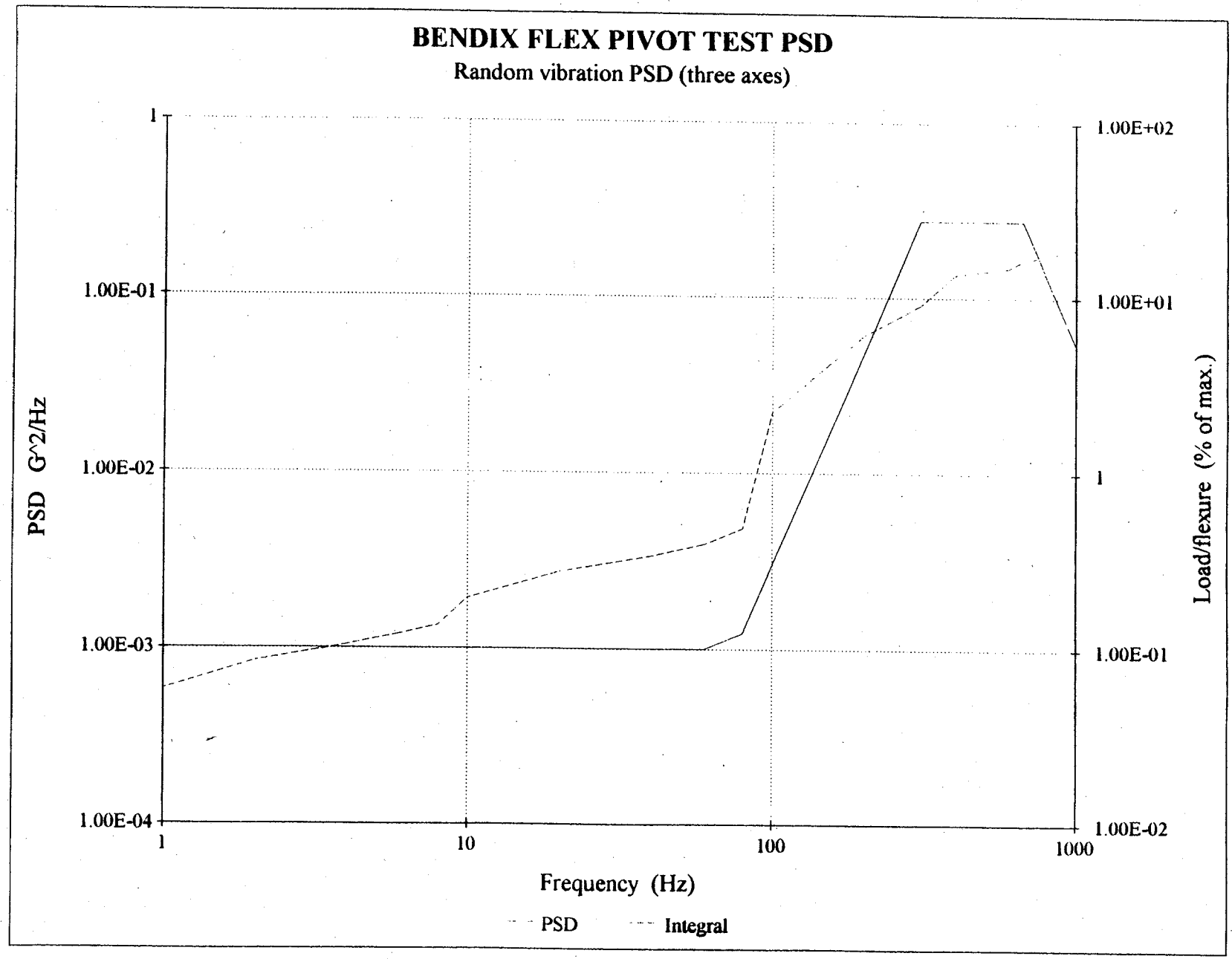
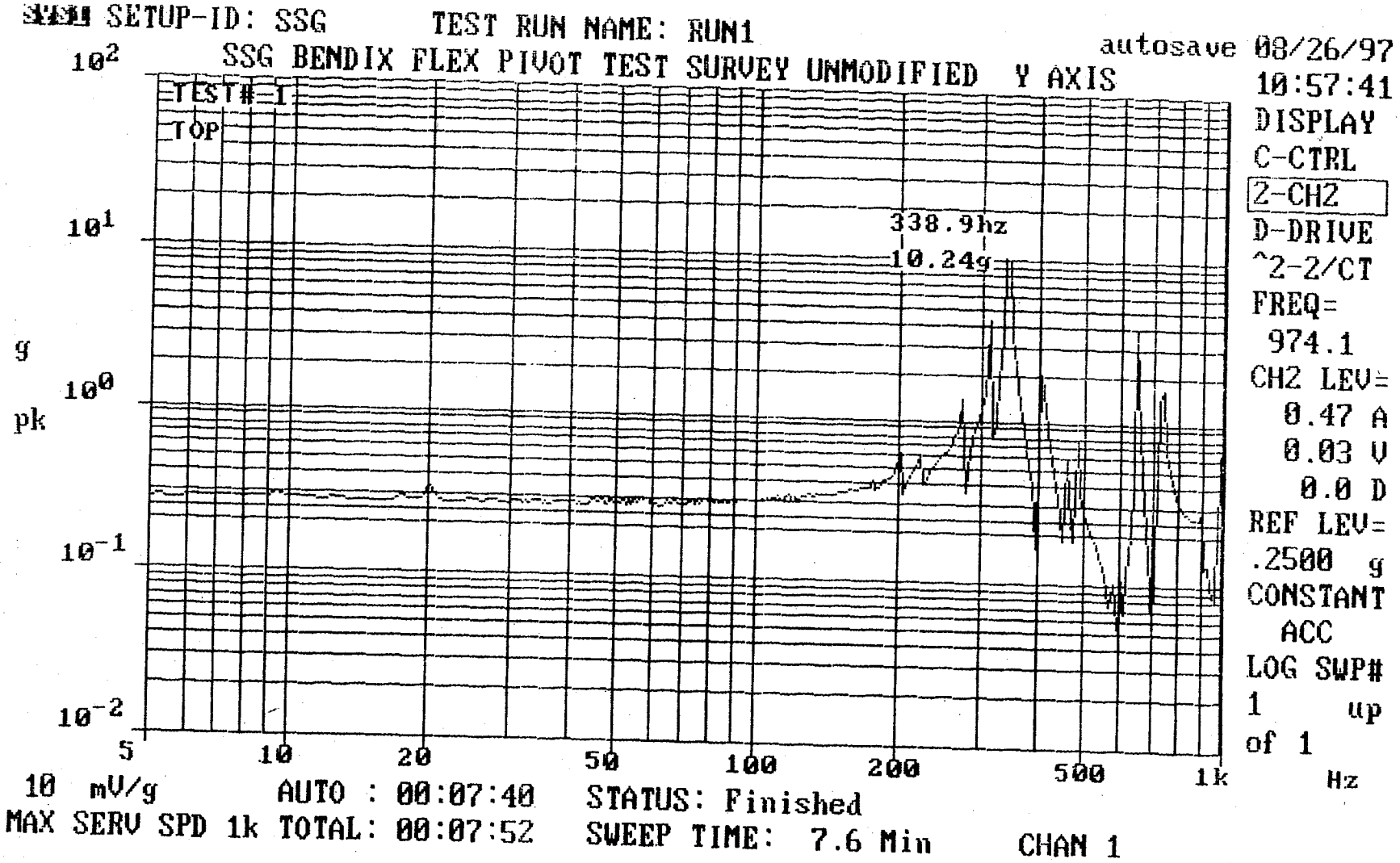
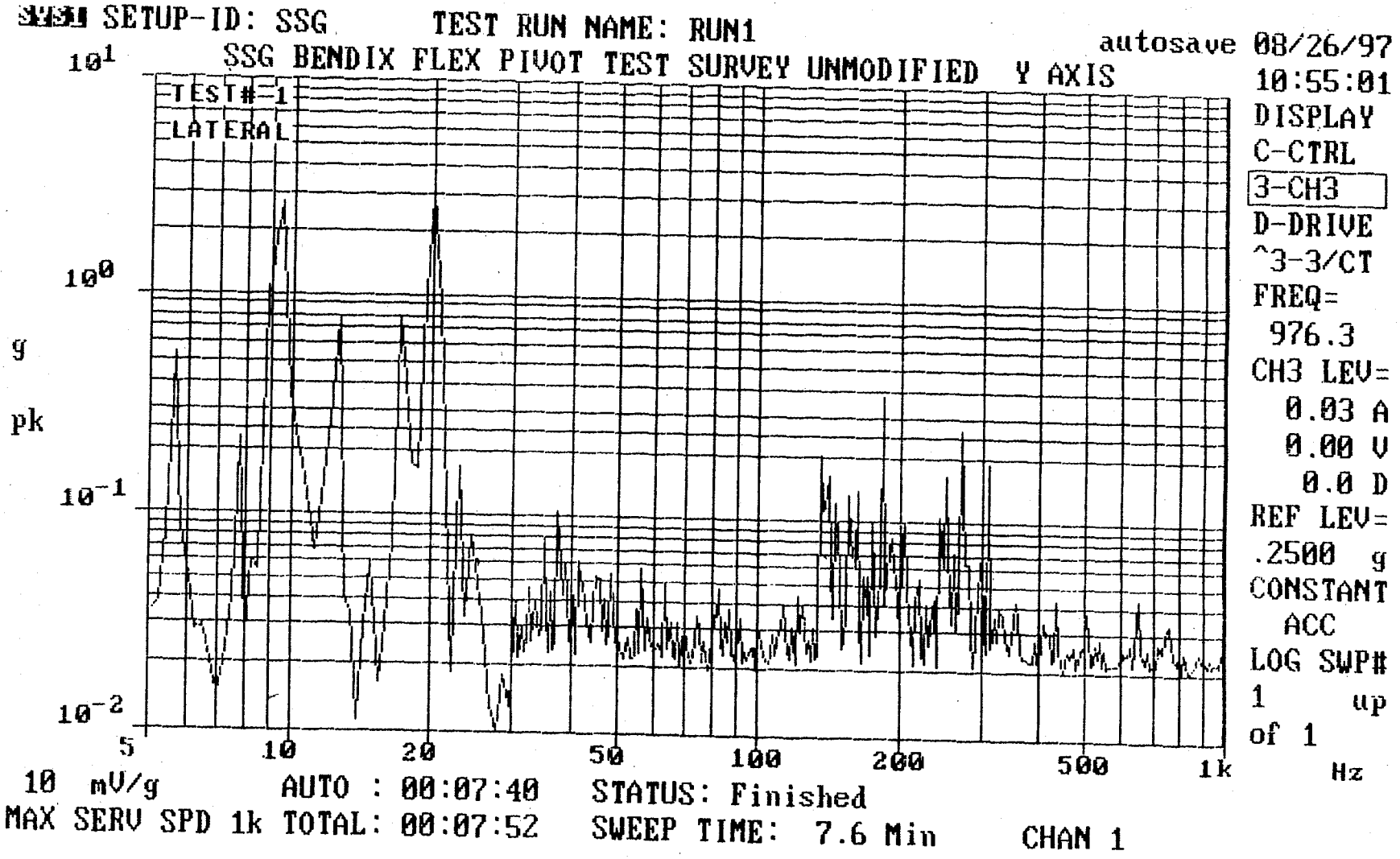
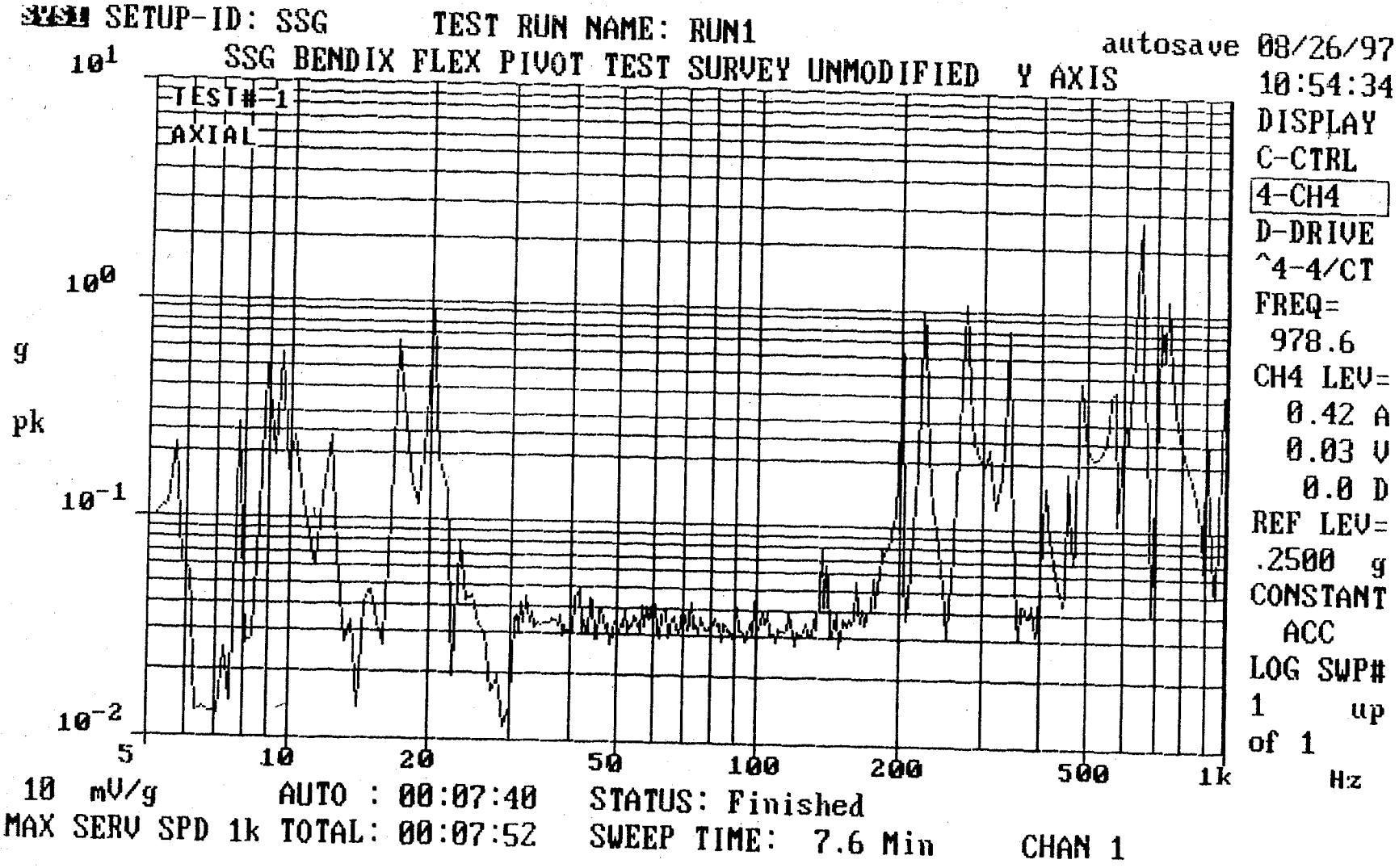
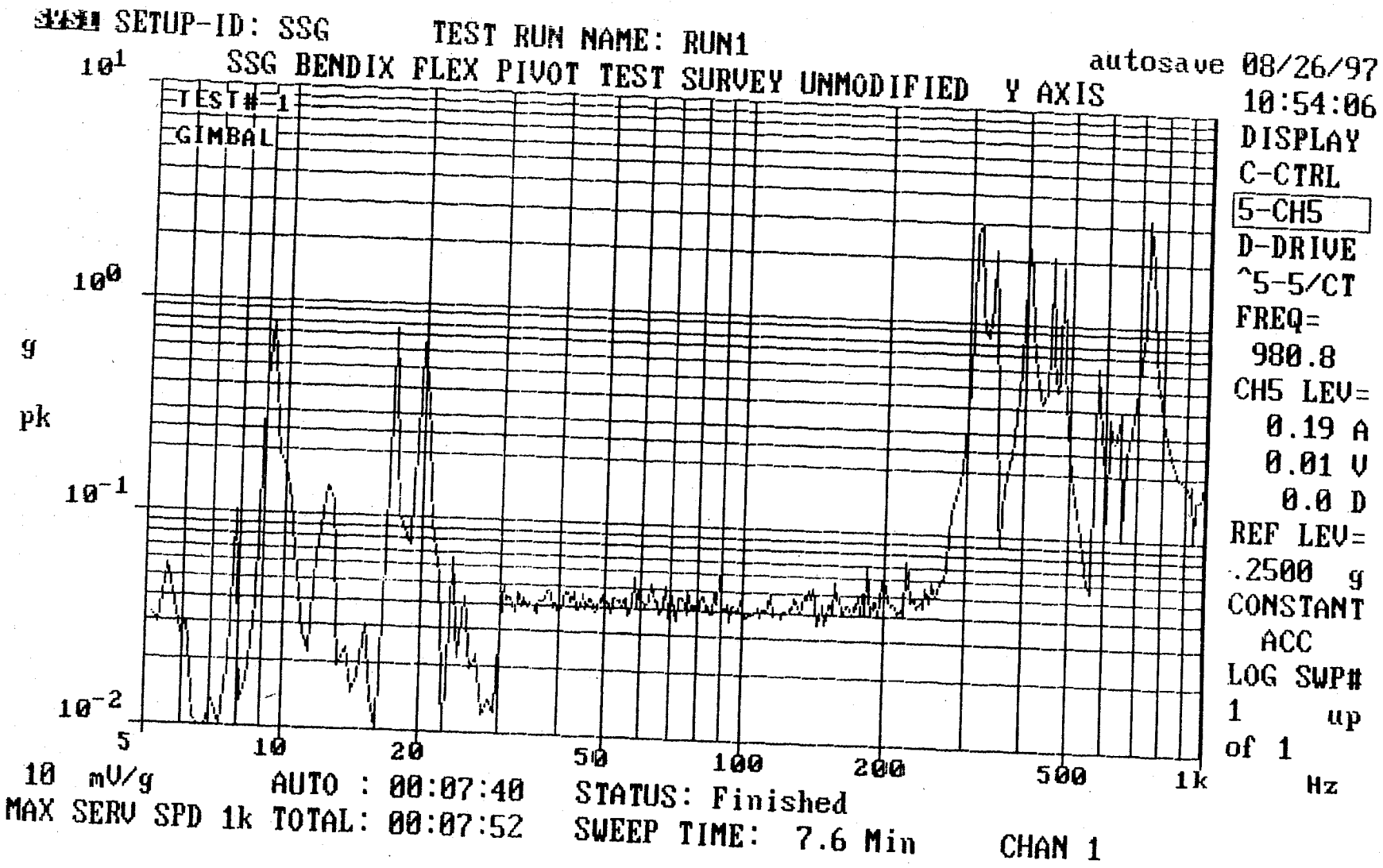

BENDIX FLEX PIVOT TEST PSD
Random vibration PSD (three axes)
PSD G^2/Hz
1
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1
10
100
1000
Frequency (Hz)
1.00E+02
1.00E+01
1
1.00E-01
1.00E-02
Load/flexure (% of max.)
PSD
Integral

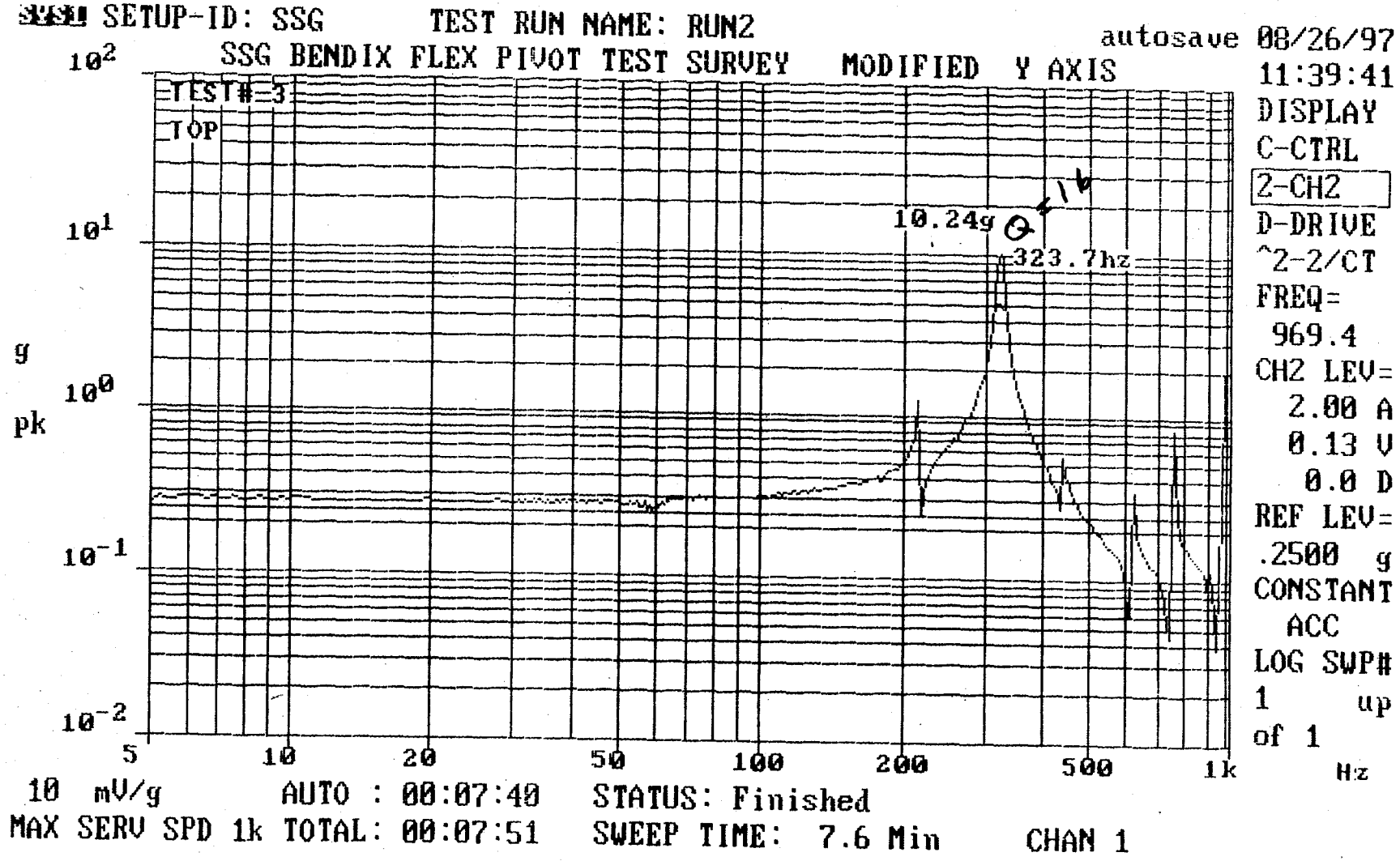
FIGURE 2.

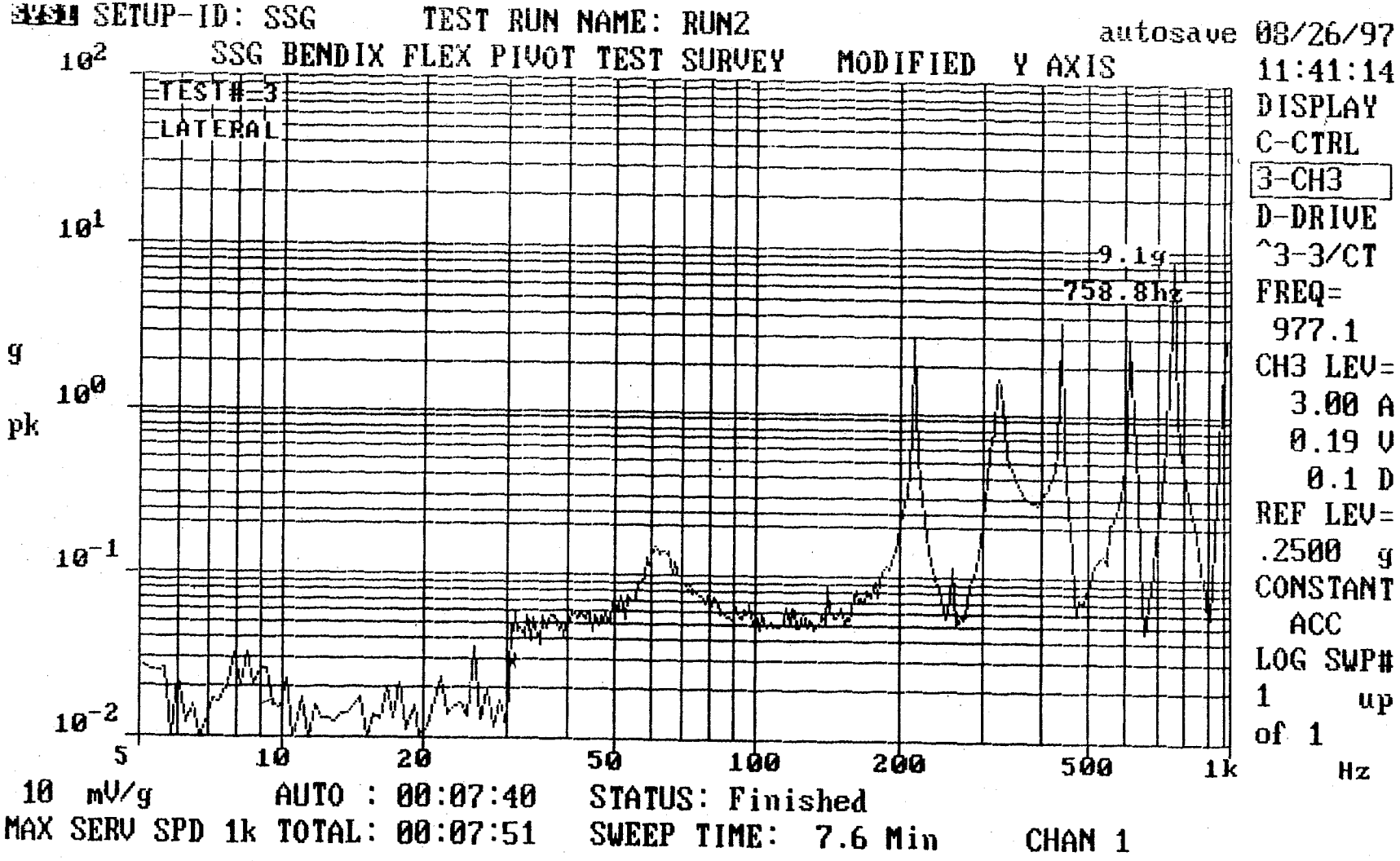

SETUP-ID: SSG
TEST RUN NAME: RUN1
autosave 08/26/97
10:57:41
SSG BENDIX FLEX PIVOT TEST SURVEY UNMODIFIED Y AXIS
TEST#=1
TOP
338.9hz
10.24g
g
pk
10^2
10^1
10^0
10^-1
10^-2
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
2-CH2
D-DRIVE
^2-2/CT
FREQ=
974.1
CH2 LEV=
0.47 A
0.03 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:52
SWEEP TIME: 7.6 Min
CHAN 1

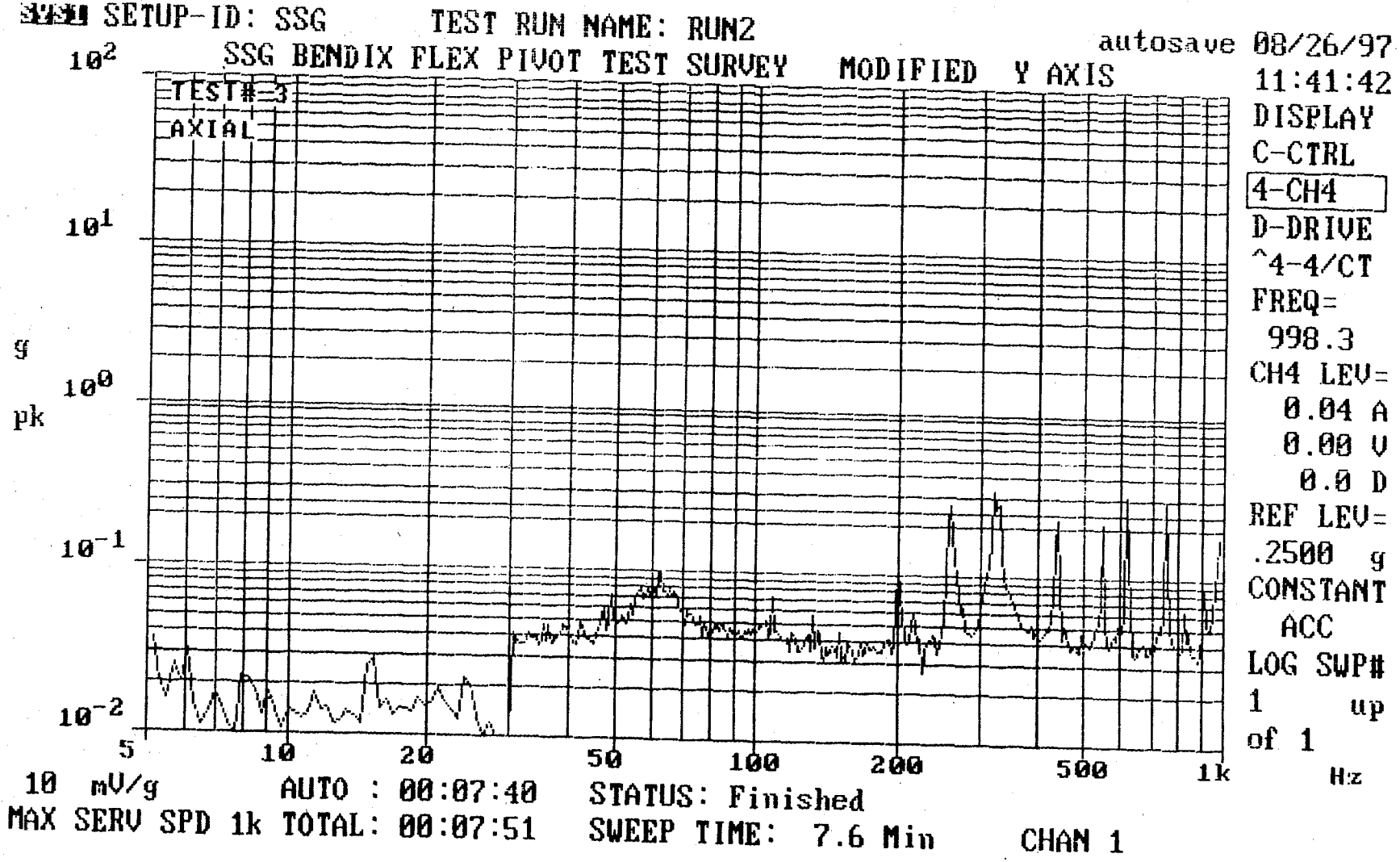

SETUP-ID: SSG
TEST RUN NAME: RUN1
autosave 08/26/97
10:55:01
SSG BENDIX FLEX PIVOT TEST SURVEY UNMODIFIED Y AXIS
TEST#=1
LATERAL
10^1
10^0
10^-1
10^-2
g
pk
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
3-CH3
D-DRIVE
^3-3/CT
FREQ=
976.3
CH3 LEV=
0.03 A
0.00 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:52
SWEEP TIME: 7.6 Min
CHAN 1

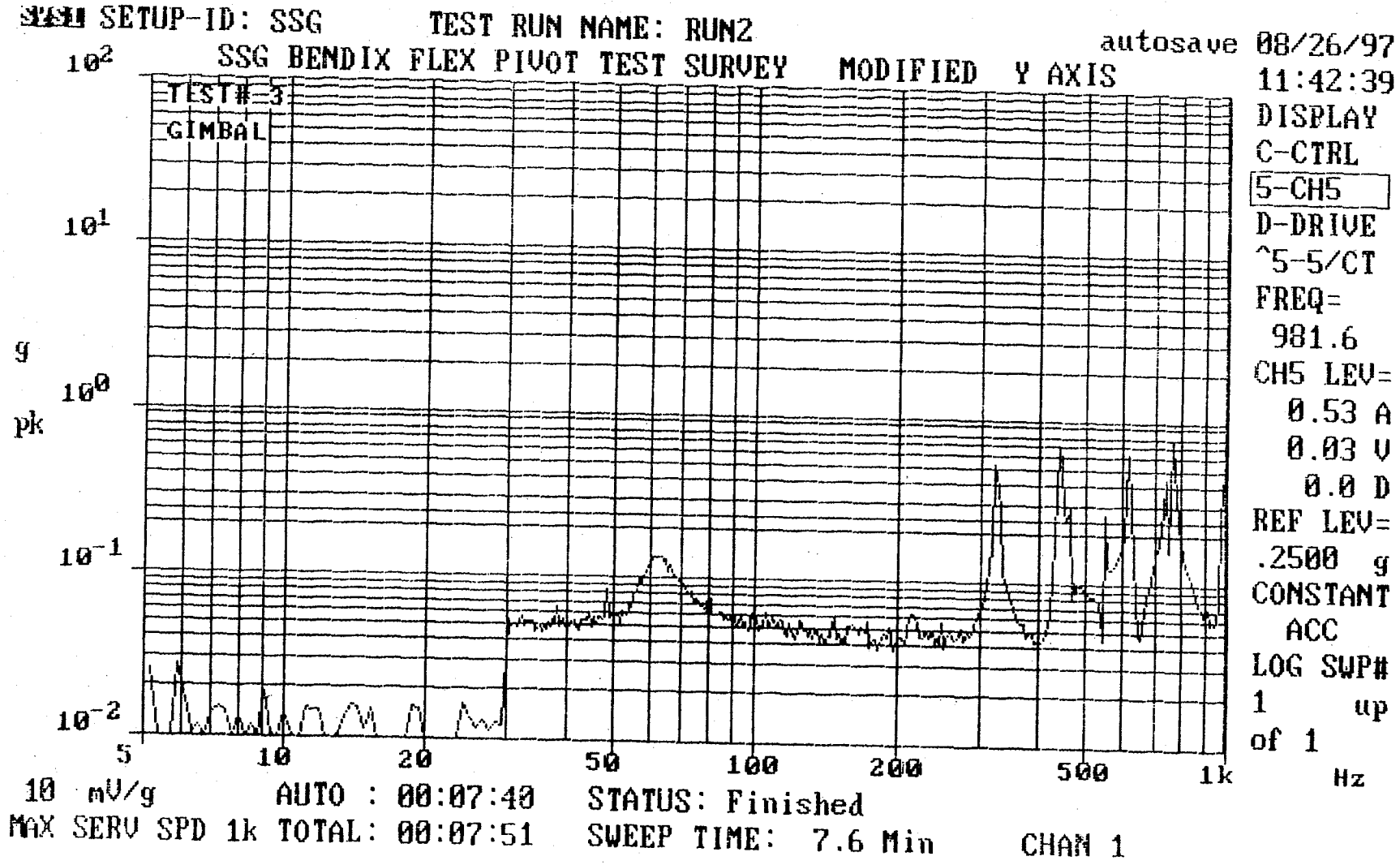

SETUP-ID: SSG
TEST RUN NAME: RUN1
autosave 08/26/97
10:54:34
SSG BENDIX FLEX PIVOT TEST SURVEY UNMODIFIED Y AXIS
TEST#-1
AXIAL
10^1
10^0
10^-1
10^-2
g
pk
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
4-CH4
D-DRIVE
^4-4/CT
FREQ=
978.6
CH4 LEV=
0.42 A
0.03 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:52
SWEEP TIME: 7.6 Min
CHAN 1

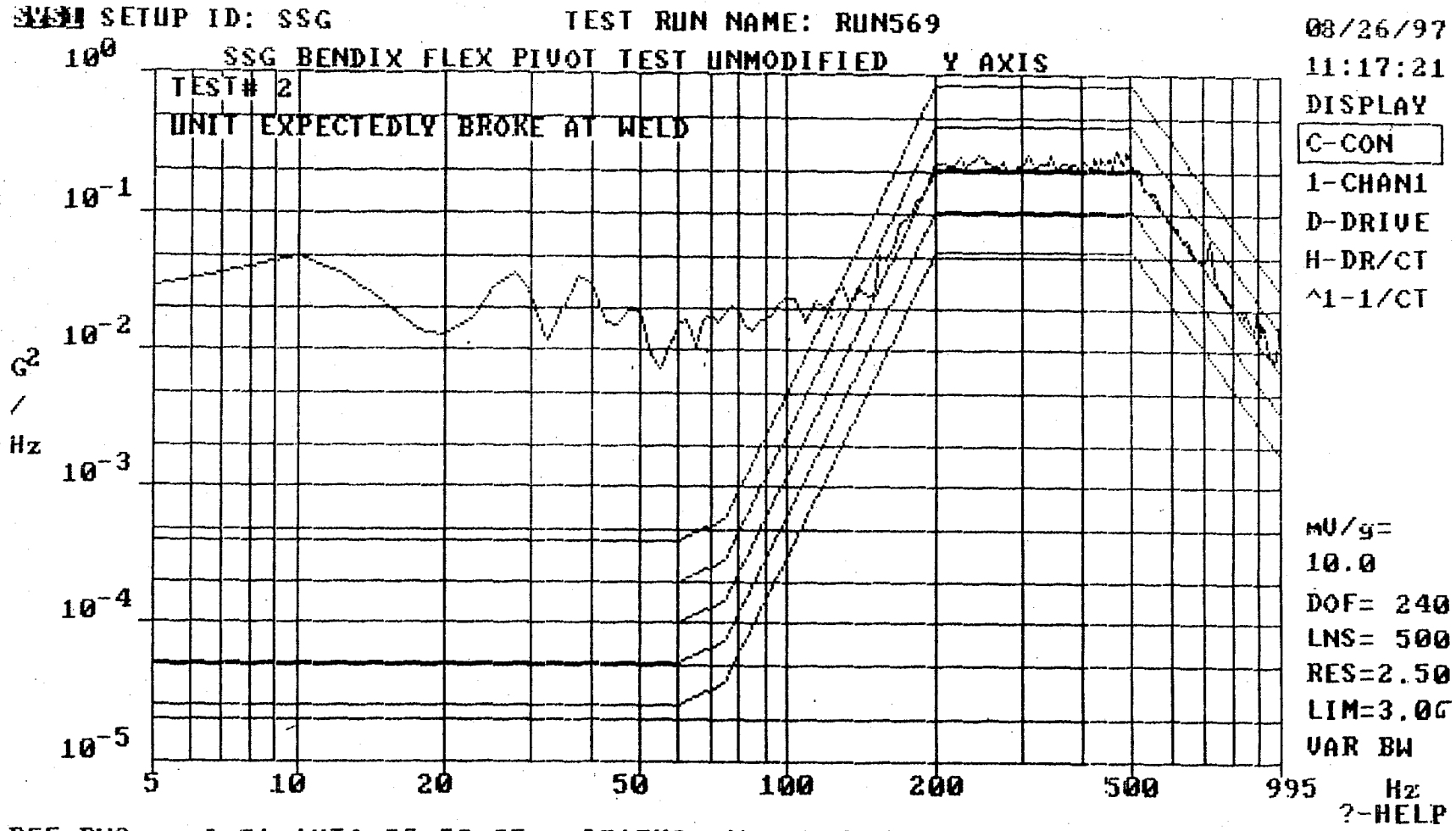

SETUP-ID: SSG
TEST RUN NAME: RUN1
SSG BENDIX FLEX PIVOT TEST SURVEY UNMODIFIED Y AXIS
autosave 08/26/97
10:54:06
TEST#=1
GIMBAL
DISPLAY
C-CTRL
5-CH5
D-DRIVE
^5-5/CT
FREQ=
980.8
CH5 LEV=
0.19 A
0.01 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
g
pk
10^1
10^0
10^-1
10^-2
5
10
20
50
100
200
500
1k
Hz
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:52
SWEEP TIME: 7.6 Min
CHAN 1

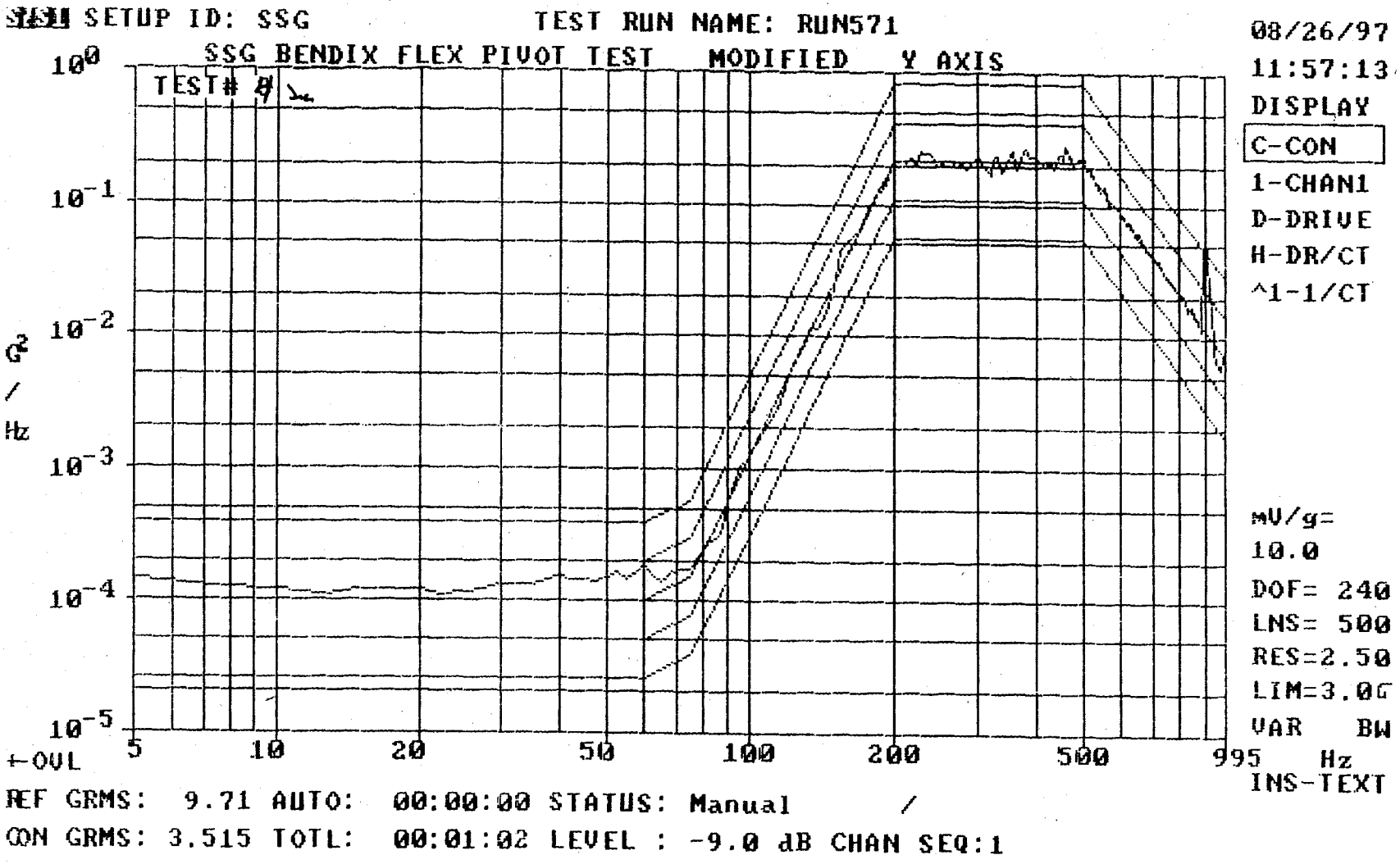

SETUP-ID: SSG
TEST RUN NAME: RUN2
autosave 08/26/97
11:39:41
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#=3
TOP
10.24g
323.7hz
DISPLAY
C-CTRL
2-CH2
D-DRIVE
^2-2/CT
FREQ=
969.4
CH2 LEV=
2.00 A
0.13 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
g
pk
10^2
10^1
10^0
10^-1
10^-2
5
10
20
50
100
200
500
1k
Hz
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:51
SWEEP TIME: 7.6 Min
CHAN 1

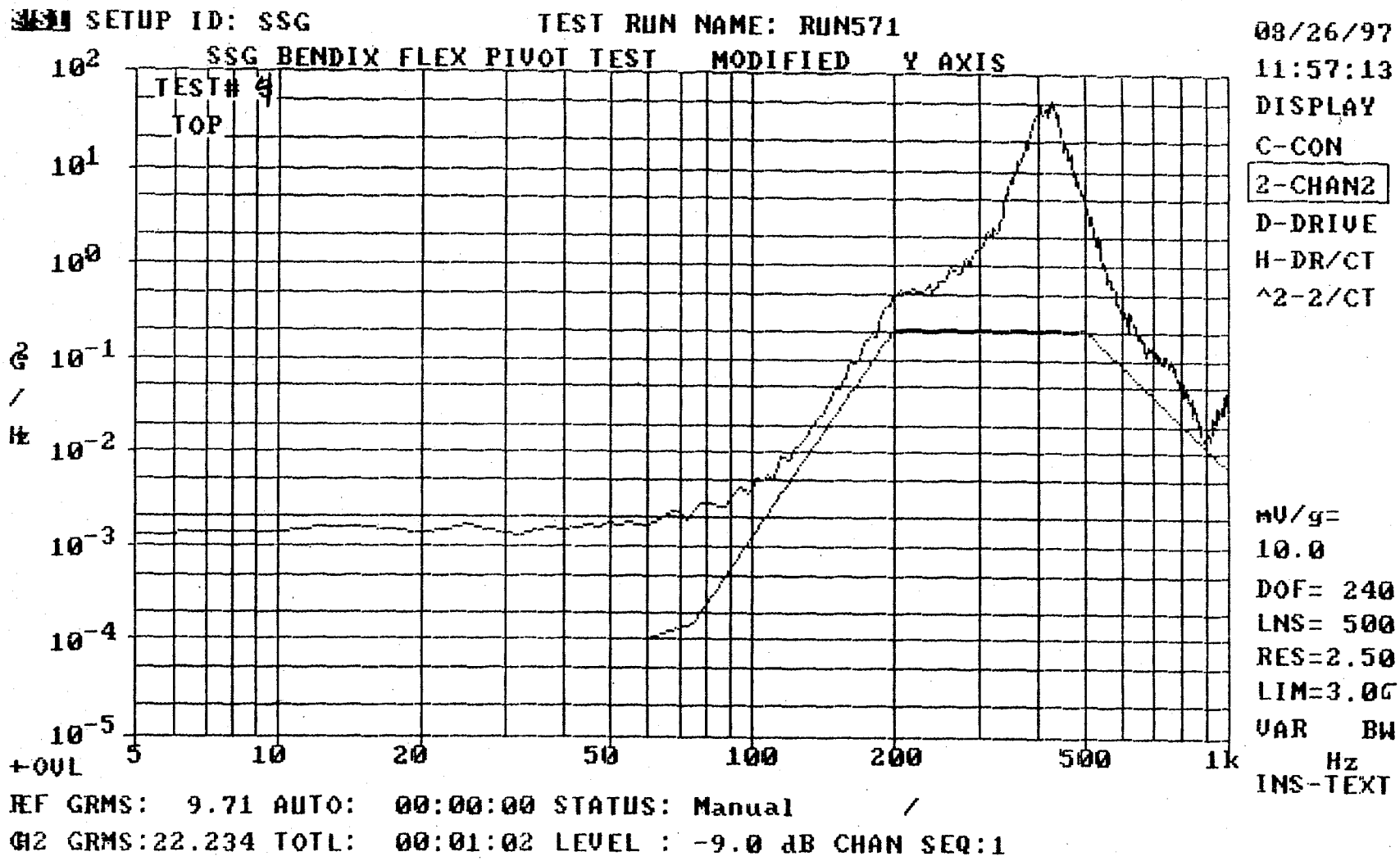

SETUP-ID: SSG
TEST RUN NAME: RUN2
autosave 08/26/97
11:41:14
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#-3
LATERAL
9.1g
758.8Hz
g
pk
10^2
10^1
10^0
10^-1
10^-2
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
3-CH3
D-DRIVE
^3-3/CT
FREQ=
977.1
CH3 LEV=
3.00 A
0.19 V
0.1 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:51
SWEEP TIME: 7.6 Min
CHAN 1

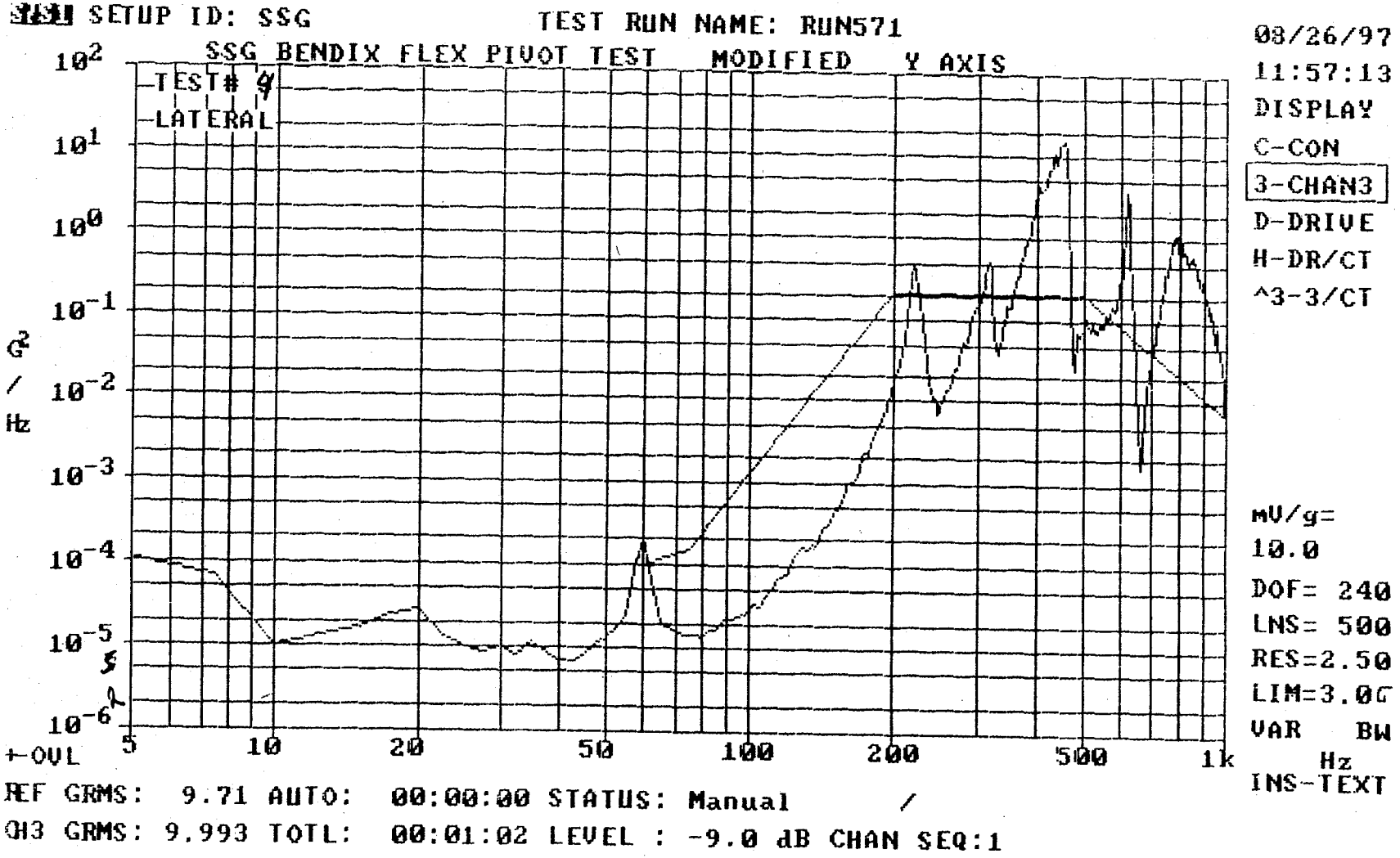

SETUP-ID: SSG
TEST RUN NAME: RUN2
autosave 08/26/97
11:41:42
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#-3
AXIAL
10^2
10^1
10^0
10^{-1}
10^{-2}
g
pk
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
4-CH4
D-DRIVE
^4-4/CT
FREQ=
998.3
CH4 LEV=
0.04 A
0.00 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:51
SWEEP TIME: 7.6 Min
CHAN 1

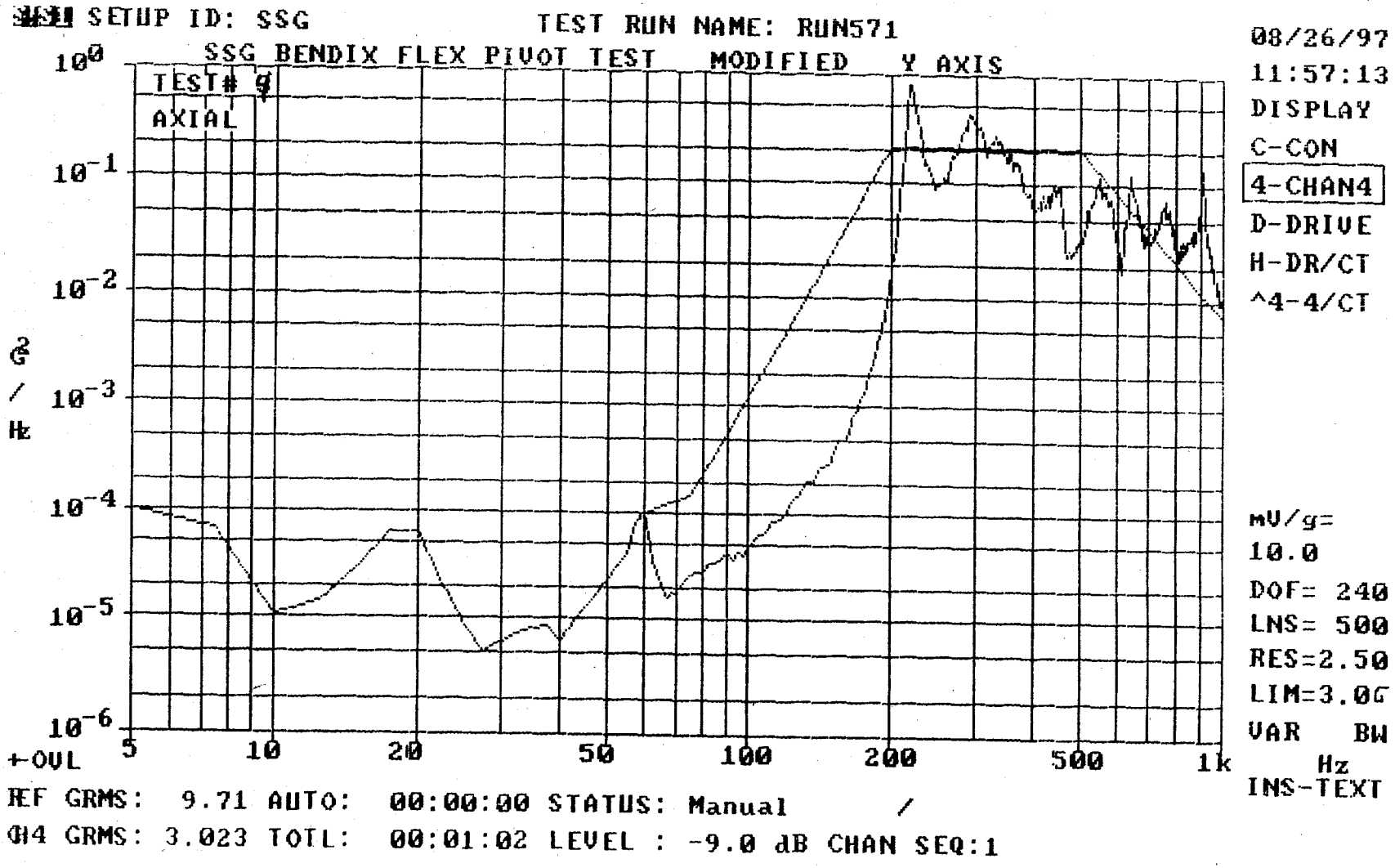

SETUP-ID: SSG
TEST RUN NAME: RUN2
autosave 08/26/97
11:42:39
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST# 3
GIMBAL
10^2
10^1
10^0
10^{-1}
10^{-2}
g
pk
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
5-CH5
D-DRIVE
^5-5/CT
FREQ=
981.6
CH5 LEV=
0.53 A
0.03 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:40
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:51
SWEEP TIME: 7.6 Min
CHAN 1

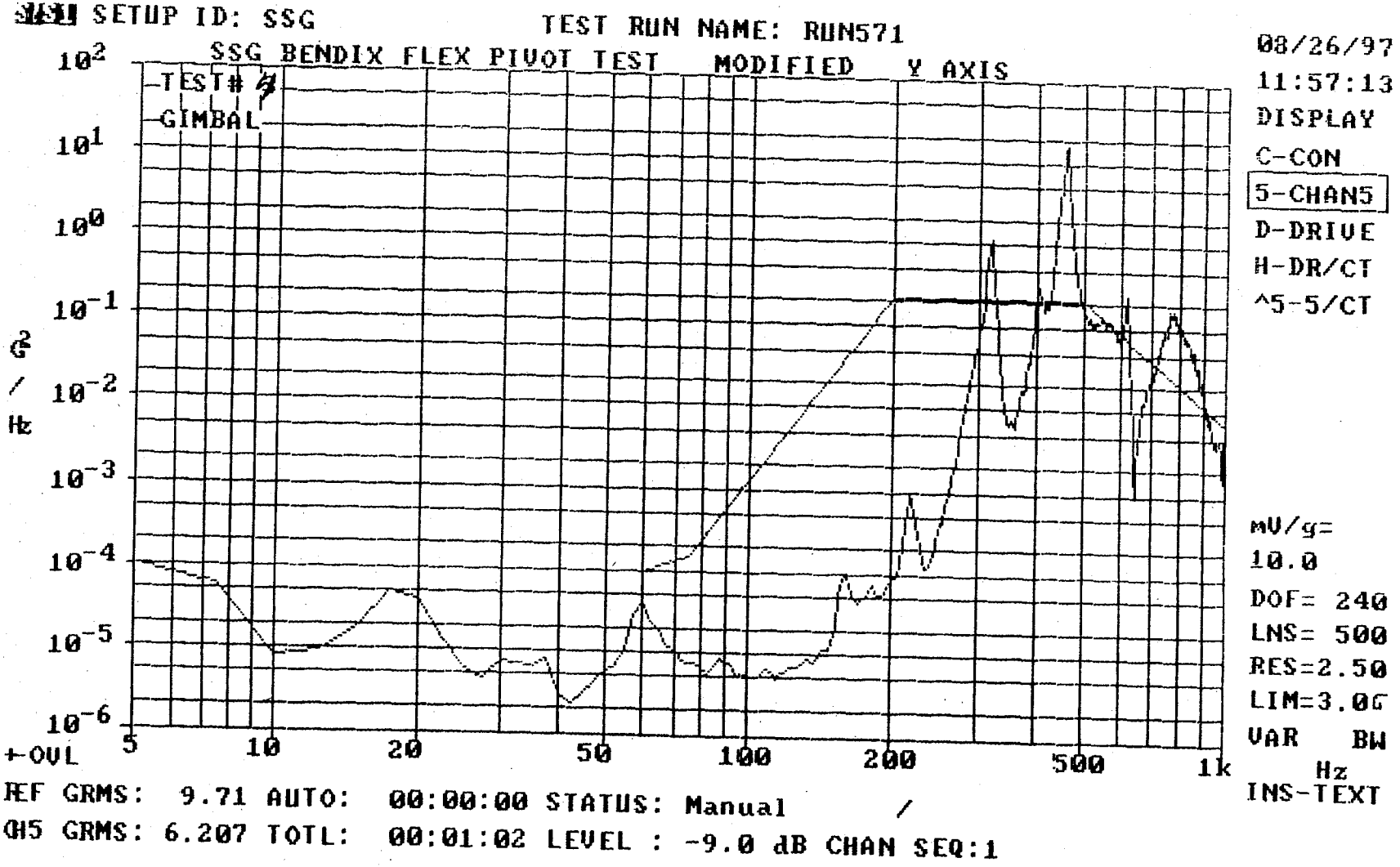

SETUP ID: SSG
TEST RUN NAME: RUN569
08/26/97
11:17:21
SSG BENDIX FLEX PIVOT TEST UNMODIFIED Y AXIS
TEST# 2
UNIT EXPECTEDLY BROKE AT WELD
DISPLAY
C-CON
1-CHAN1
D-DRIVE
H-DR/CT
^1-1/CT
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
G^2 / Hz
mV/g=
10.0
DOF= 240
LNS= 500
RES=2.50
LIM=3.0G
VAR BW
5
10
20
50
100
200
500
995
Hz
?-HELP
REF RMS: 9.71 AUTO:00:00:05
CON RMS: 10.08 TOTL:00:01:02
STATUS: Abort,Number of lines exceeding limit
LEVEL : 0.0dB CHAN SEQ:1

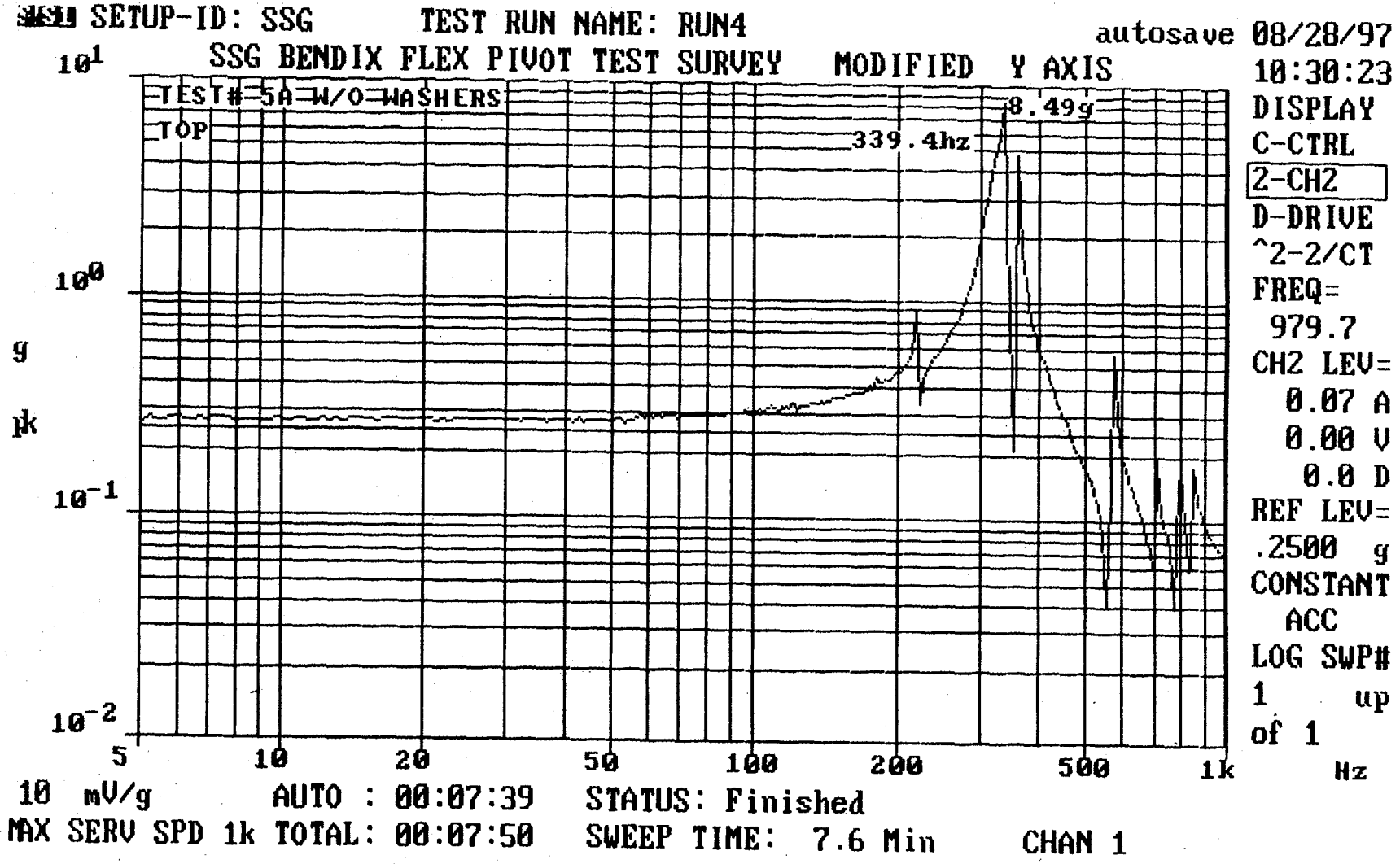

SETUP ID: SSG
TEST RUN NAME: RUN571
SSG BENDIX FLEX PIVOT TEST MODIFIED Y AXIS
TEST# 4
08/26/97
11:57:13
DISPLAY
C-CON
1-CHAN1
D-DRIVE
H-DR/CT
^1-1/CT
G²/Hz
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
5
10
20
50
100
200
500
995
Hz
←OVL
mV/g=
10.0
DOF= 240
LNS= 500
RES=2.50
LIM=3.0G
VAR BW
INS-TEXT
REF GRMS: 9.71 AUTO: 00:00:00 STATUS: Manual
CON GRMS: 3.515 TOTL: 00:01:02 LEVEL : -9.0 dB CHAN SEQ:1

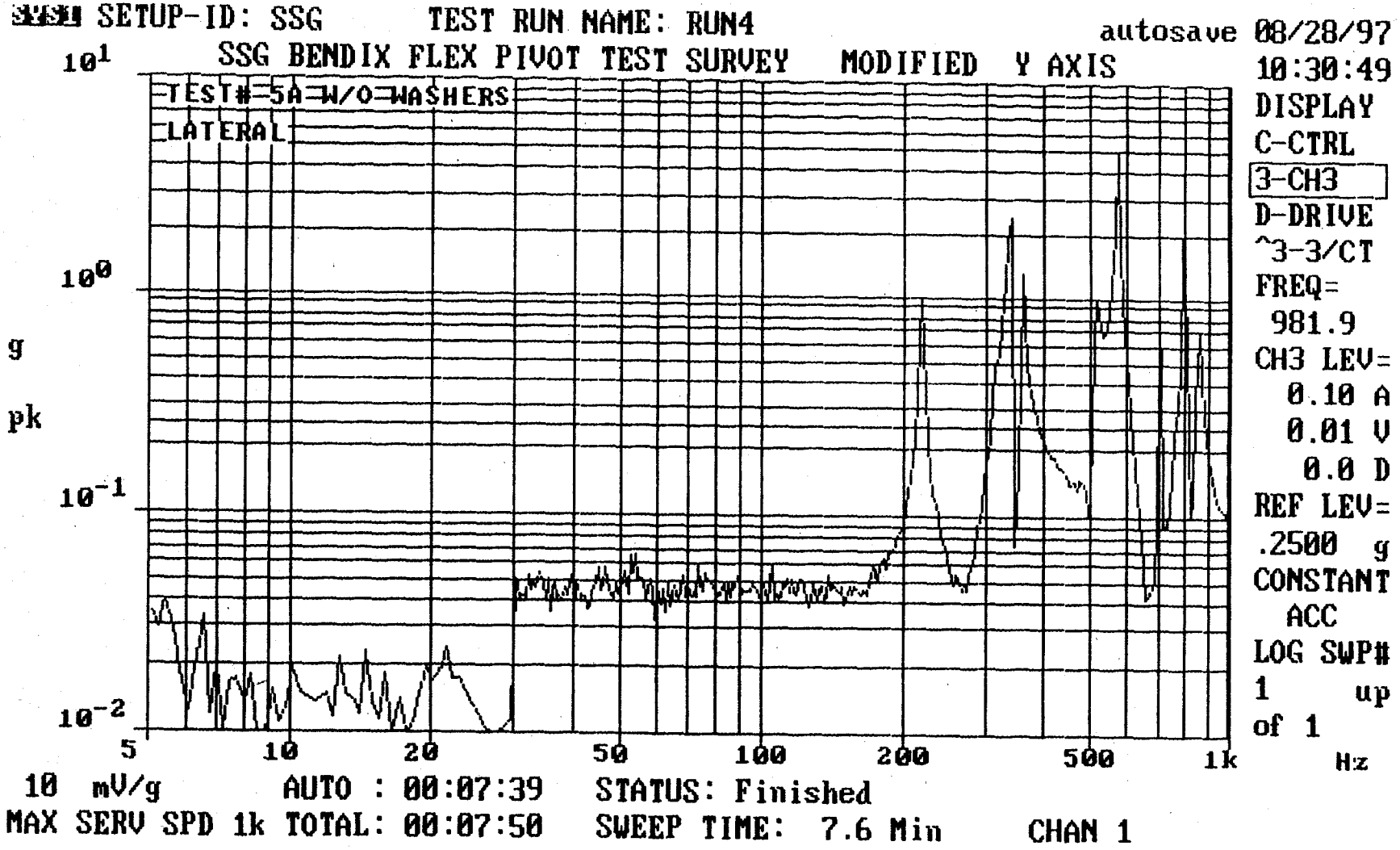

SETUP ID: SSG
TEST RUN NAME: RUN571
SSG BENDIX FLEX PIVOT TEST MODIFIED Y AXIS
TEST# 4
TOP
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
G^2/Hz
+OVL
5
10
20
50
100
200
500
1k
Hz
08/26/97
11:57:13
DISPLAY
C-CON
2-CHAN2
D-DRIVE
H-DR/CT
^2-2/CT
mV/g=
10.0
DOF= 240
LNS= 500
RES=2.50
LIM=3.0G
VAR BW
INS-TEXT
REF GRMS: 9.71 AUTO: 00:00:00 STATUS: Manual
CH2 GRMS:22.234 TOTL: 00:01:02 LEVEL : -9.0 dB CHAN SEQ:1

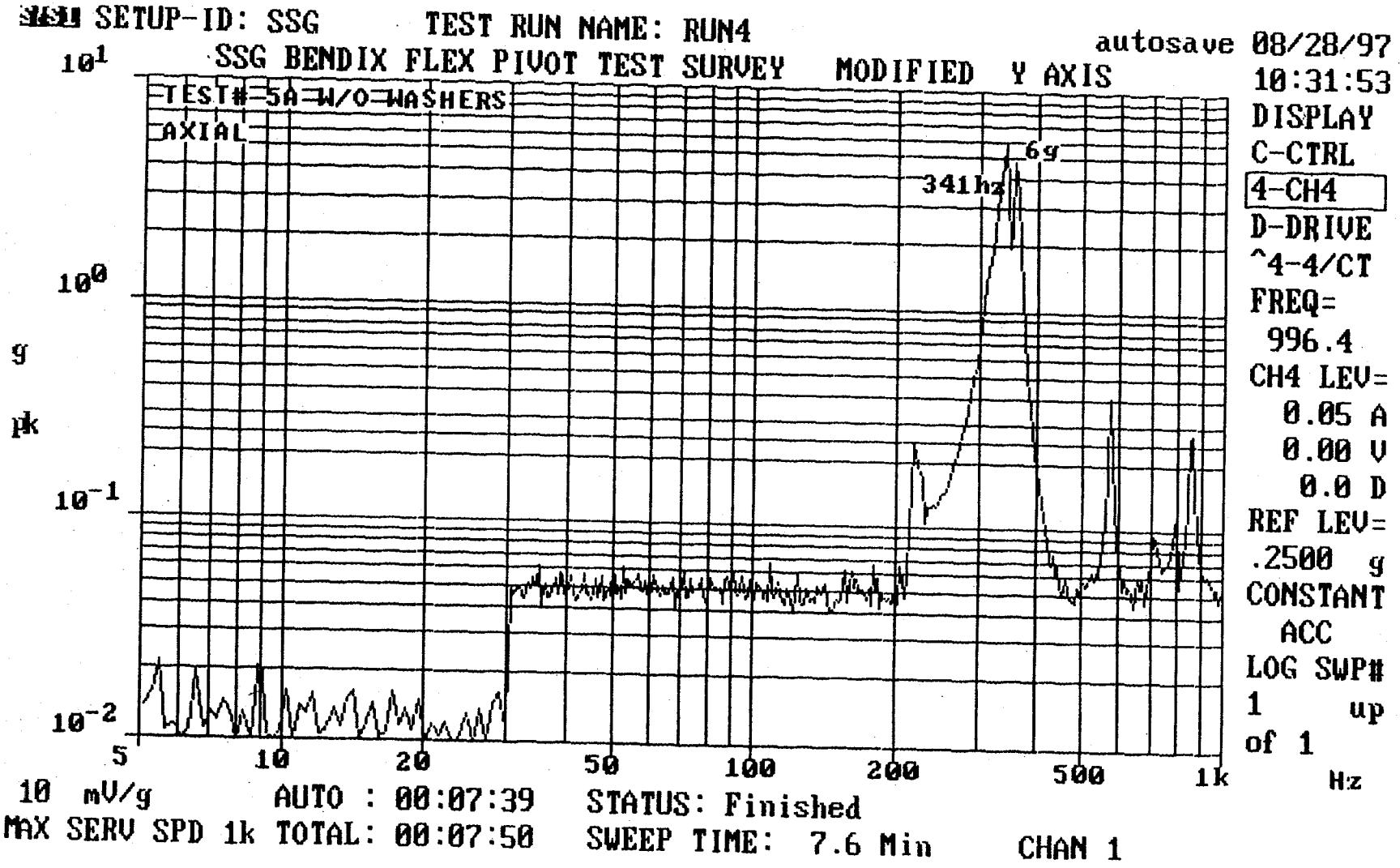

SETUP ID: SSG
TEST RUN NAME: RUN571
SSG BENDIX FLEX PIVOT TEST MODIFIED Y AXIS
TEST# 9
LATERAL
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
G^2 / Hz
5
10
20
50
100
200
500
1k
+-OVL
08/26/97
11:57:13
DISPLAY
C-CON
3-CHAN3
D-DRIVE
H-DR/CT
^3-3/CT
mV/g=
10.0
DOF= 240
LNS= 500
RES=2.50
LIM=3.0
VAR BW
Hz
INS-TEXT
REF GRMS: 9.71 AUTO: 00:00:00 STATUS: Manual
CH3 GRMS: 9.993 TOTL: 00:01:02 LEVEL : -9.0 dB CHAN SEQ:1

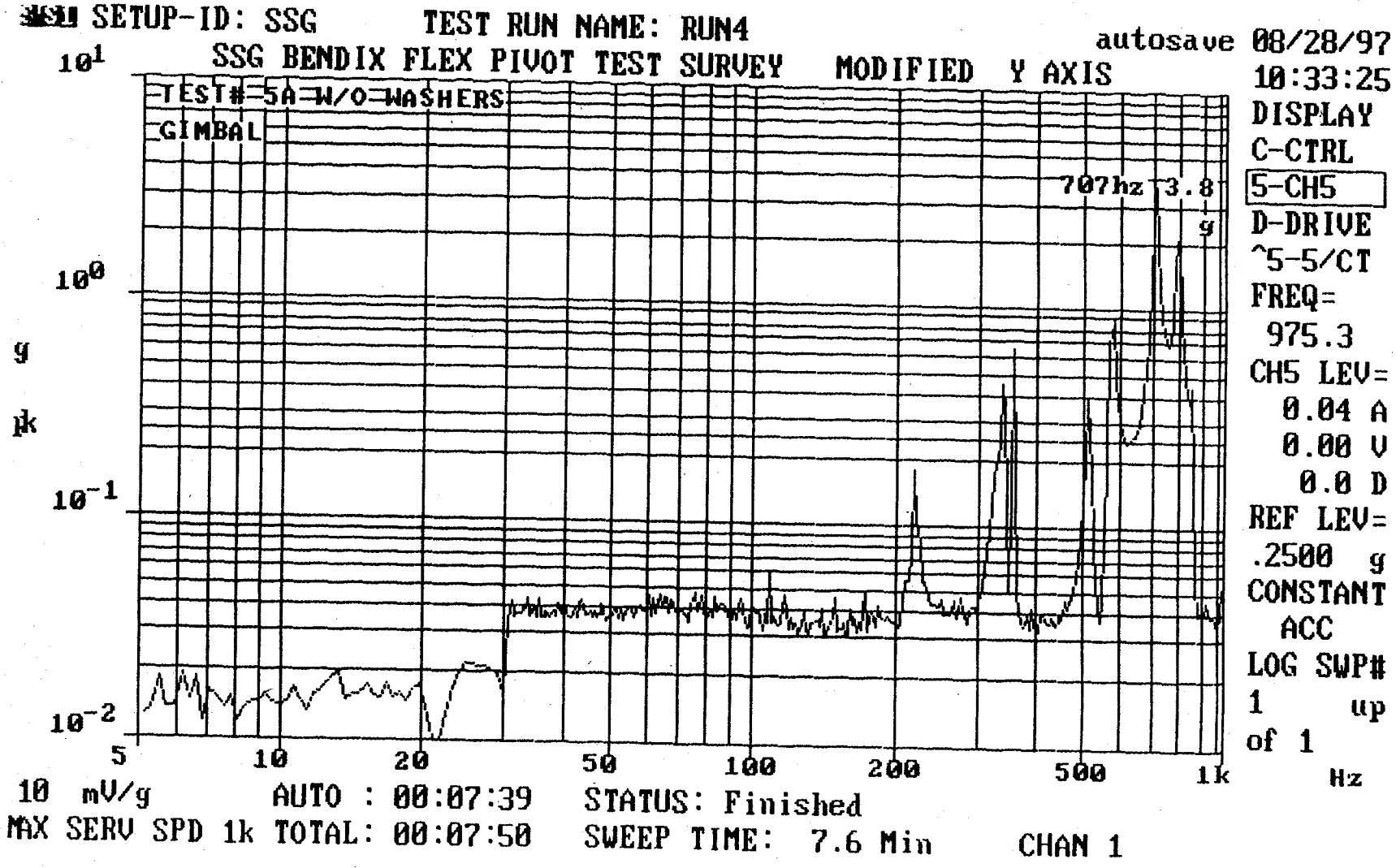

SETUP ID: SSG
TEST RUN NAME: RUN571
SSG BENDIX FLEX PIVOT TEST MODIFIED Y AXIS
TEST# 9
AXIAL
08/26/97
11:57:13
DISPLAY
C-CON
4-CHAN4
D-DRIVE
H-DR/CT
^4-4/CT
G²/Hz
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
5
10
20
50
100
200
500
1k
+OVL
mV/g=
10.0
DOF= 240
LNS= 500
RES=2.50
LIM=3.0G
VAR BW
Hz
INS-TEXT
REF GRMS: 9.71 AUTO: 00:00:00 STATUS: Manual
CH4 GRMS: 3.023 TOTL: 00:01:02 LEVEL : -9.0 dB CHAN SEQ:1

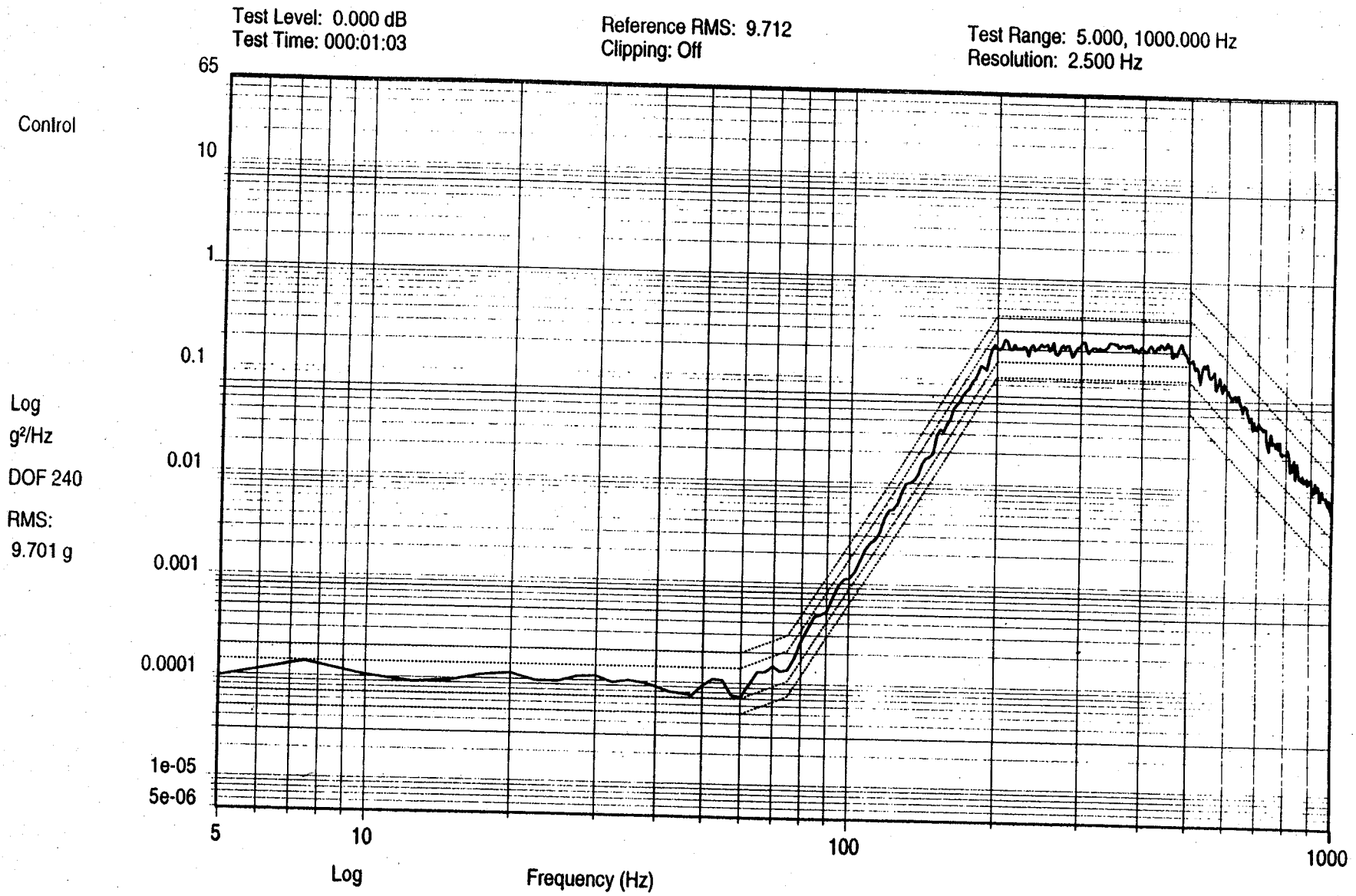

SETUP ID: SSG
TEST RUN NAME: RUN571
SSG BENDIX FLEX PIVOT TEST MODIFIED Y AXIS
TEST# 4
GIMBAL
08/26/97
11:57:13
DISPLAY
C-CON
5-CHAN5
D-DRIVE
H-DR/CT
^5-5/CT
G²/Hz
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
5
10
20
50
100
200
500
1k
Hz
+OVL
mV/g=
10.0
DOF= 240
LNS= 500
RES=2.50
LIM=3.0G
VAR BW
INS-TEXT
REF GRMS: 9.71 AUTO: 00:00:00 STATUS: Manual
CH5 GRMS: 6.207 TOTL: 00:01:02 LEVEL : -9.0 dB CHAN SEQ:1


SETUP-ID: SSG
TEST RUN NAME: RUN4
autosave 08/28/97
10:30:23
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#-5A-W/O-WASHERS
TOP
8.49g
339.4hz
DISPLAY
C-CTRL
2-CH2
D-DRIVE
^2-2/CT
FREQ=
979.7
CH2 LEV=
0.07 A
0.00 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
g
pk
10^1
10^0
10^-1
10^-2
5
10
20
50
100
200
500
1k
Hz
10 mV/g
AUTO : 00:07:39
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:50
SWEEP TIME: 7.6 Min
CHAN 1


SETUP-ID: SSG
TEST RUN NAME: RUN4
autosave 08/28/97
10:30:49
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#-5A-W/O-WASHERS
LATERAL
10^1
10^0
10^{-1}
10^{-2}
g
pk
5
10
20
50
100
200
500
1k
Hz
DISPLAY
C-CTRL
3-CH3
D-DRIVE
^3-3/CT
FREQ=
981.9
CH3 LEV=
0.10 A
0.01 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
10 mV/g
AUTO : 00:07:39
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:50
SWEEP TIME: 7.6 Min
CHAN 1


SETUP-ID: SSG
TEST RUN NAME: RUN4
autosave 08/28/97
10:31:53
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#-5A-W/O-WASHERS
AXIAL
6g
341hz
DISPLAY
C-CTRL
4-CH4
D-DRIVE
^4-4/CT
FREQ=
996.4
CH4 LEV=
0.05 A
0.00 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
g
pk
10^1
10^0
10^-1
10^-2
5
10
20
50
100
200
500
1k
Hz
10 mV/g
AUTO : 00:07:39
STATUS: Finished
MAX SERV SPD 1k
TOTAL: 00:07:50
SWEEP TIME: 7.6 Min
CHAN 1


SETUP-ID: SSG
TEST RUN NAME: RUN4
autosave 08/28/97
10:33:25
SSG BENDIX FLEX PIVOT TEST SURVEY MODIFIED Y AXIS
TEST#-5A-W/O-WASHERS
GIMBAL
707hz 3.8 g
DISPLAY
C-CTRL
5-CH5
D-DRIVE
^5-5/CT
FREQ=
975.3
CH5 LEV=
0.04 A
0.00 V
0.0 D
REF LEV=
.2500 g
CONSTANT
ACC
LOG SWP#
1 up
of 1
g pk
10^{1}
10^{0}
10^{-1}
10^{-2}
5
10
20
50
100
200
500
1k
Hz
10 mV/g
AUTO : 00:07:39
STATUS: Finished
MAX SERV SPD 1k TOTAL: 00:07:50
SWEEP TIME: 7.6 Min
CHAN 1



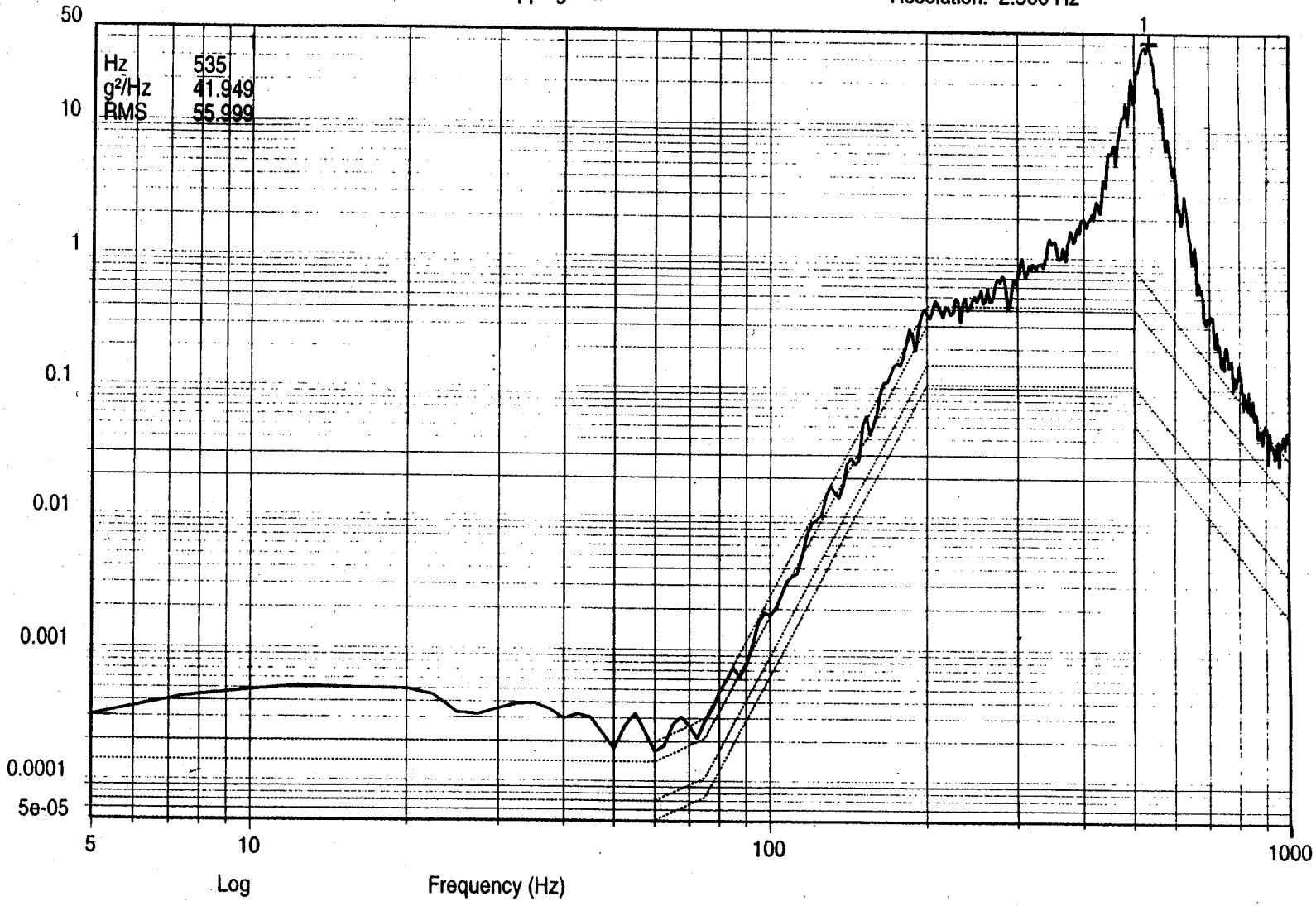
10:51:41
28-Aug-1997

SSG BENDIX FLEX PIVOT TEST W/O WASHERS
TEST#6 AXIS: Y MJO# 34080-98M
Test Name: SSG.001

Test Level: 0.000 dB
Test Time: 000:01:03

Reference RMS: 9.712
Clipping: Off

Test Range: 5.000, 1000.000 Hz
Resolution: 2.500 Hz



Auxiliary
Chan. 2

Log
g²/Hz

DOF 120

RMS:
55.999 g

10:52:07
28-Aug-1997

SSG BENDIX FLEX PIVOT TEST W/O WASHERS
TEST# 6 AXIS: Y MJO# 34080-98M

Test Name: SSG.001

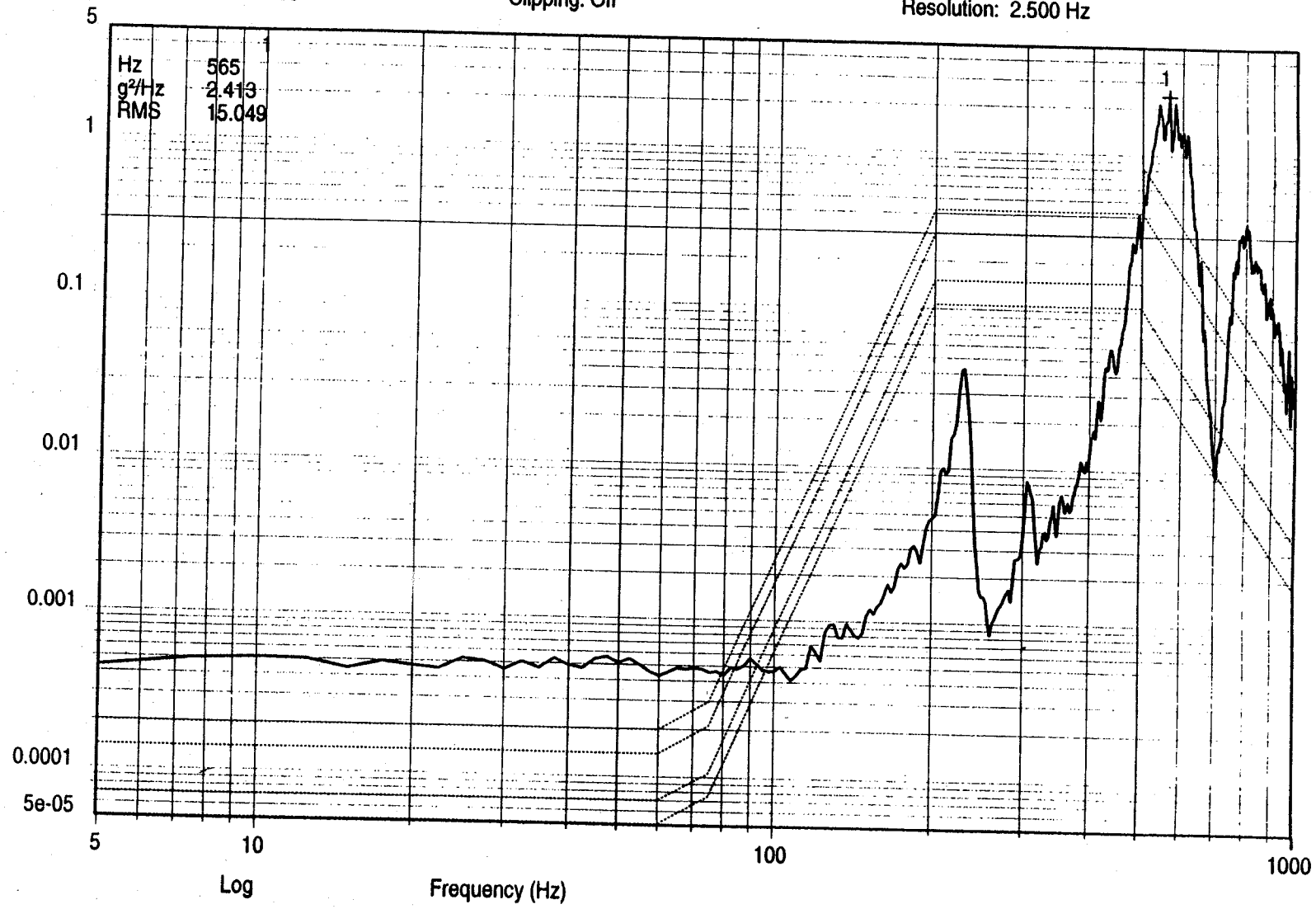
TOP

Test Level: 0.000 dB
Test Time: 000:01:03

Reference RMS: 9.712
Clipping: Off

Test Range: 5.000, 1000.000 Hz
Resolution: 2.500 Hz

Auxiliary
Chan. 3



Log
g²/Hz
DOF 120
RMS:
15.049 g

10:52:35
28-Aug-1997

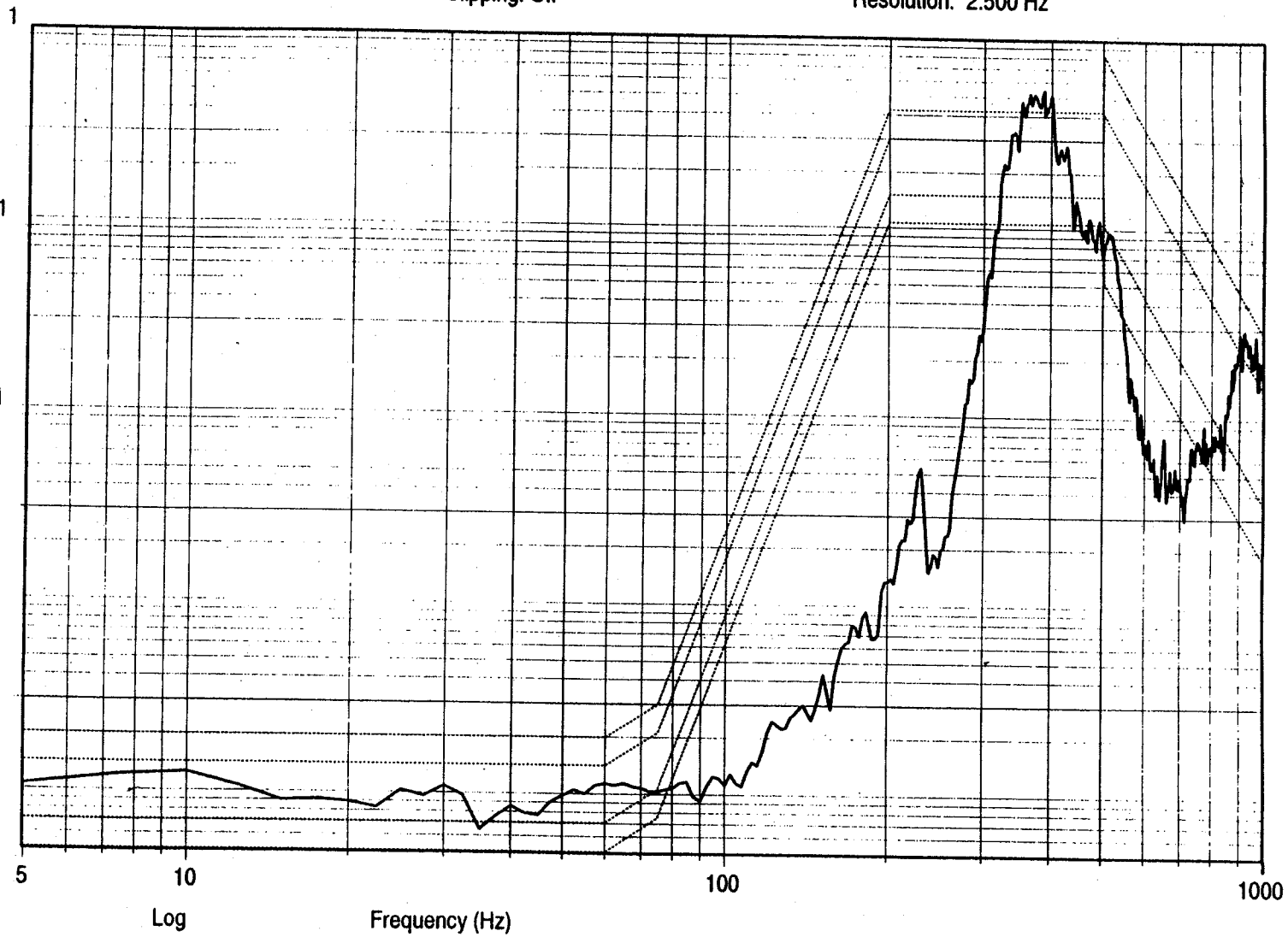
SSG BENDIX FLEX PIVOT TEST W/O WASHERS
TEST# 6 AXIS: Y MJO# 34080-98M
Test Name: SSG.001

LATERAL

Test Level: 0.000 dB
Test Time: 000:01:03

Reference RMS: 9.712
Clipping: Off

Test Range: 5.000, 1000.000 Hz
Resolution: 2.500 Hz



Auxiliary
Chan. 4

Log
g²/Hz

DOF 120

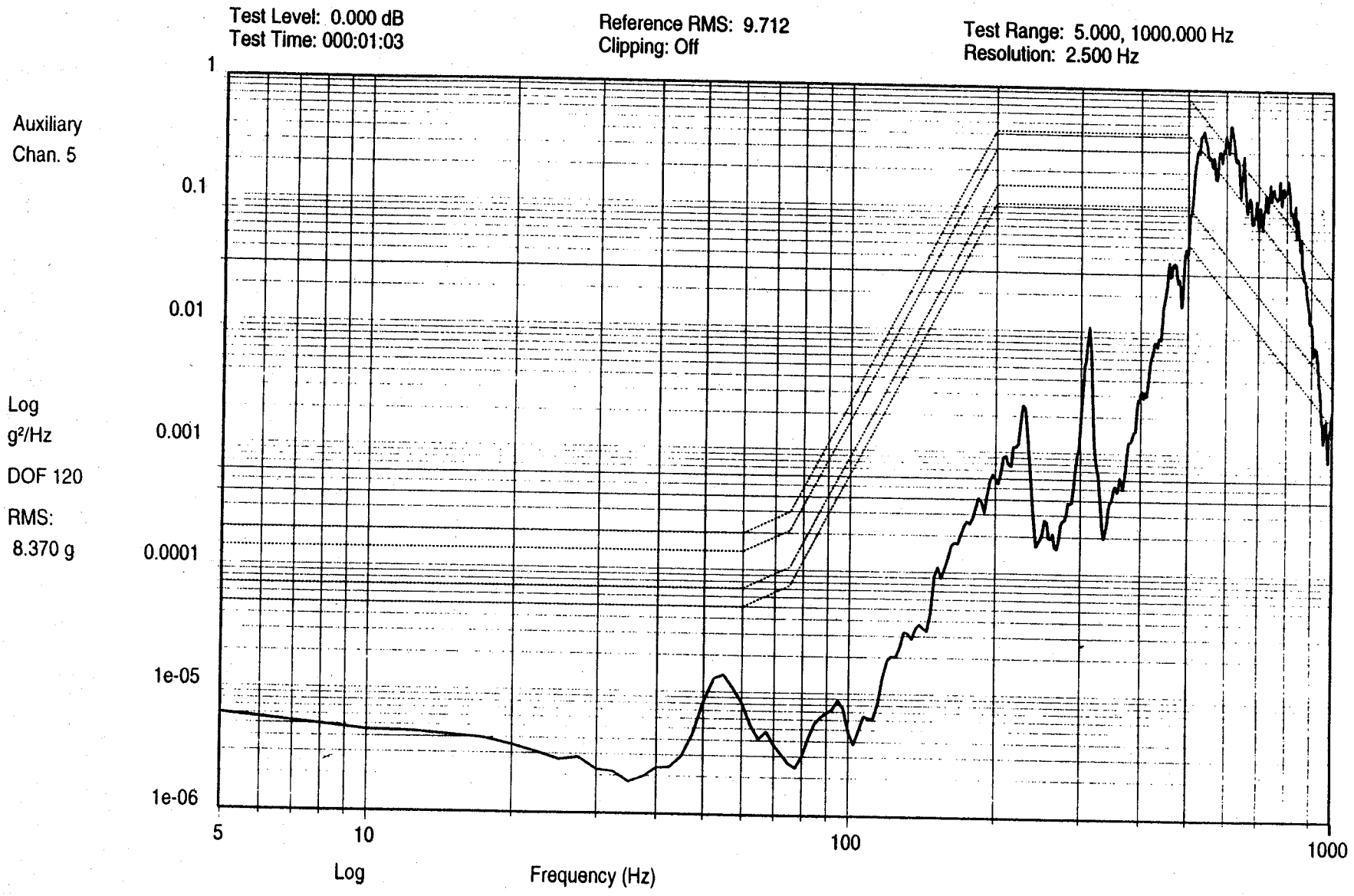
RMS:
7.653 g

10:52:44
28-Aug-1997

SSG BENDIX FLEX PIVOT TEST W/O WASHERS
TEST# 6 AXIS: Y MJO# 34080-98M

Test Name: SSG.001

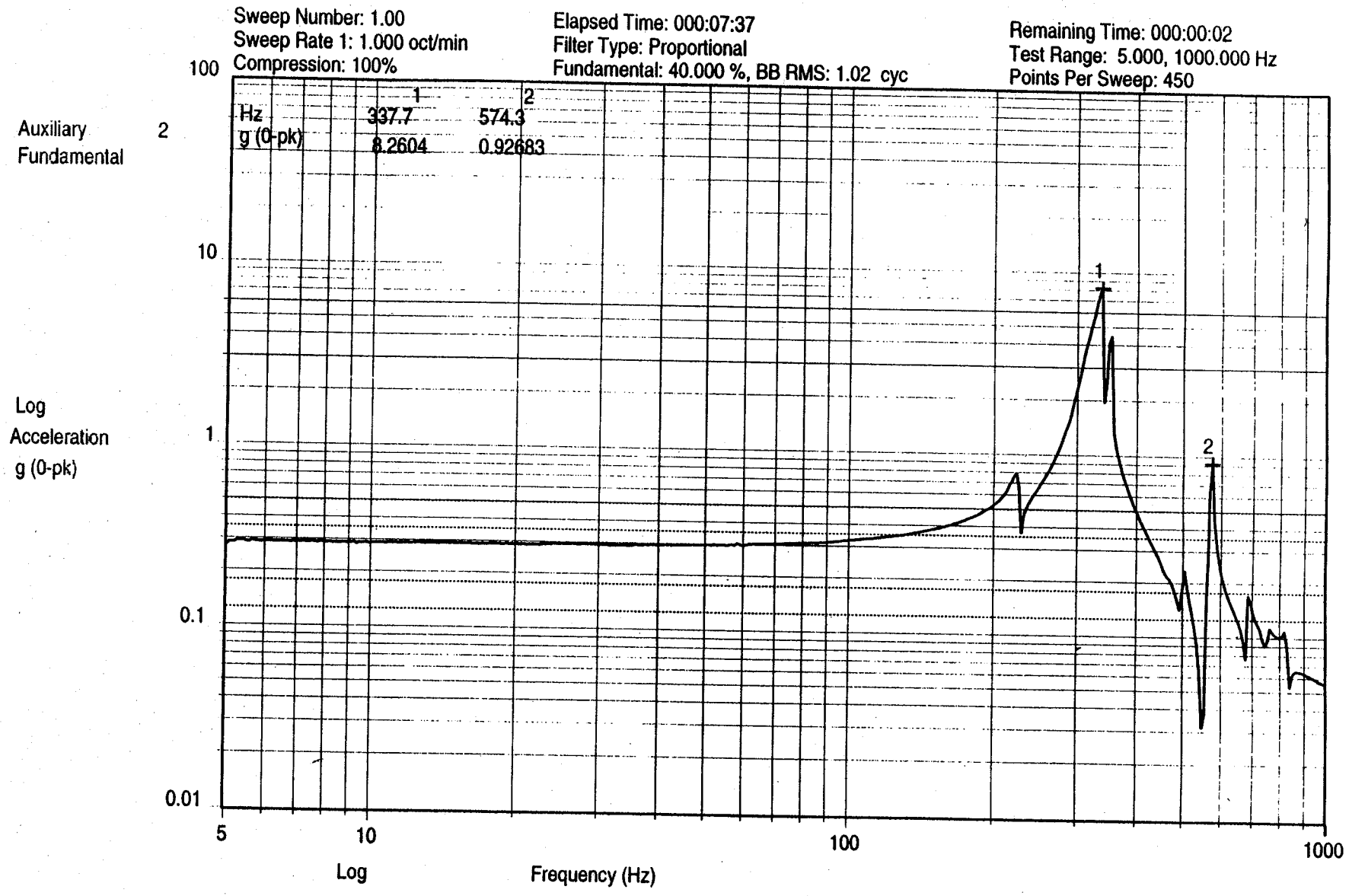
AXIAL



10:52:48
28-Aug-1997

SSG BENDIX FLEX PIVOT TEST W/O WASHERS
TEST#6 AXIS Y MJO# 34080 98M
Test Name SSG 001

GIMBAL

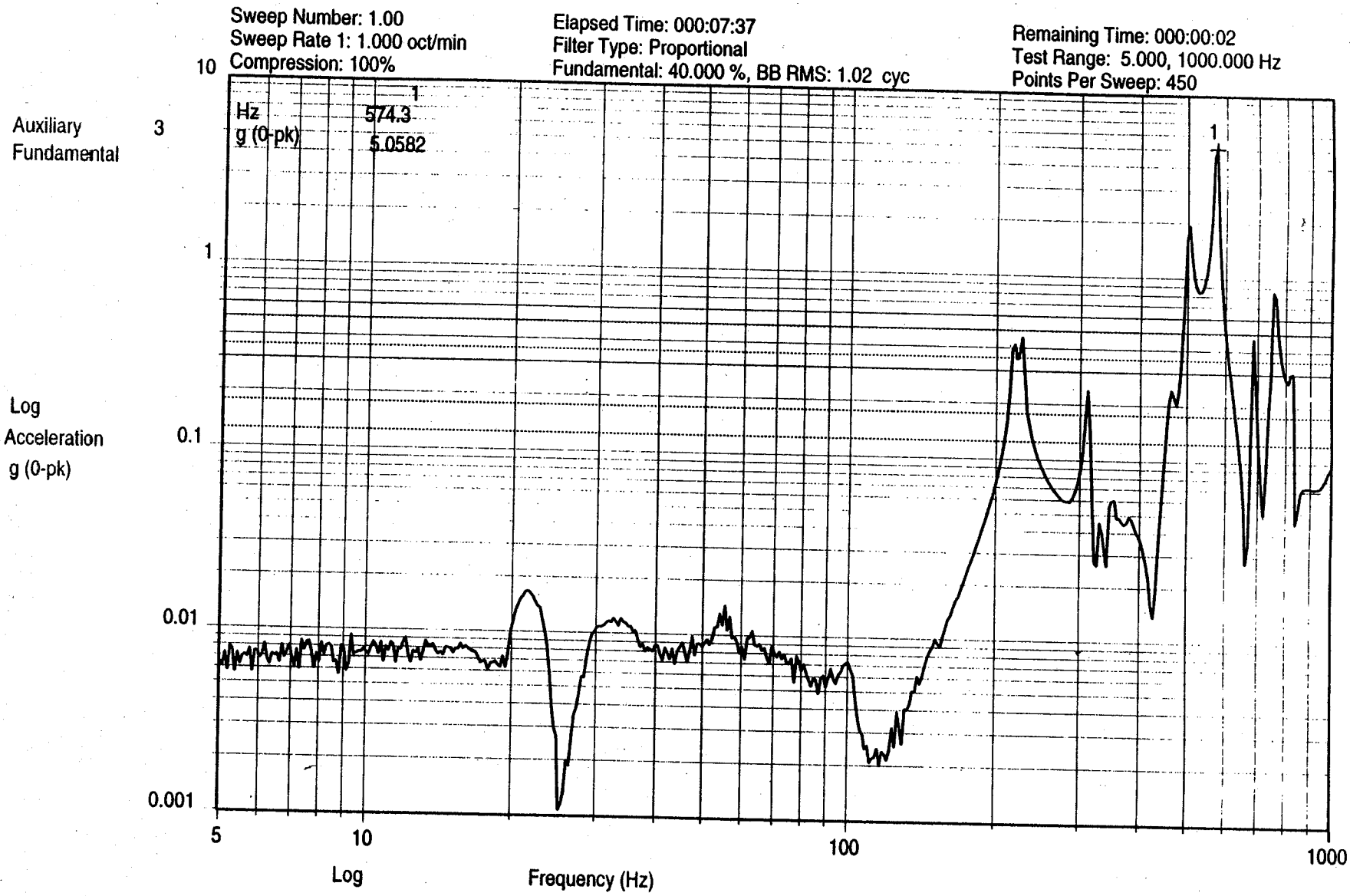


11:11:26
28-Aug-1997

SSG BENDIX PIVOT FLEX TEST W/O/ WASHERS
SINE SURVEY TEST# 7 AXIS: Y

Sine Test Name: SSG.001

TOP

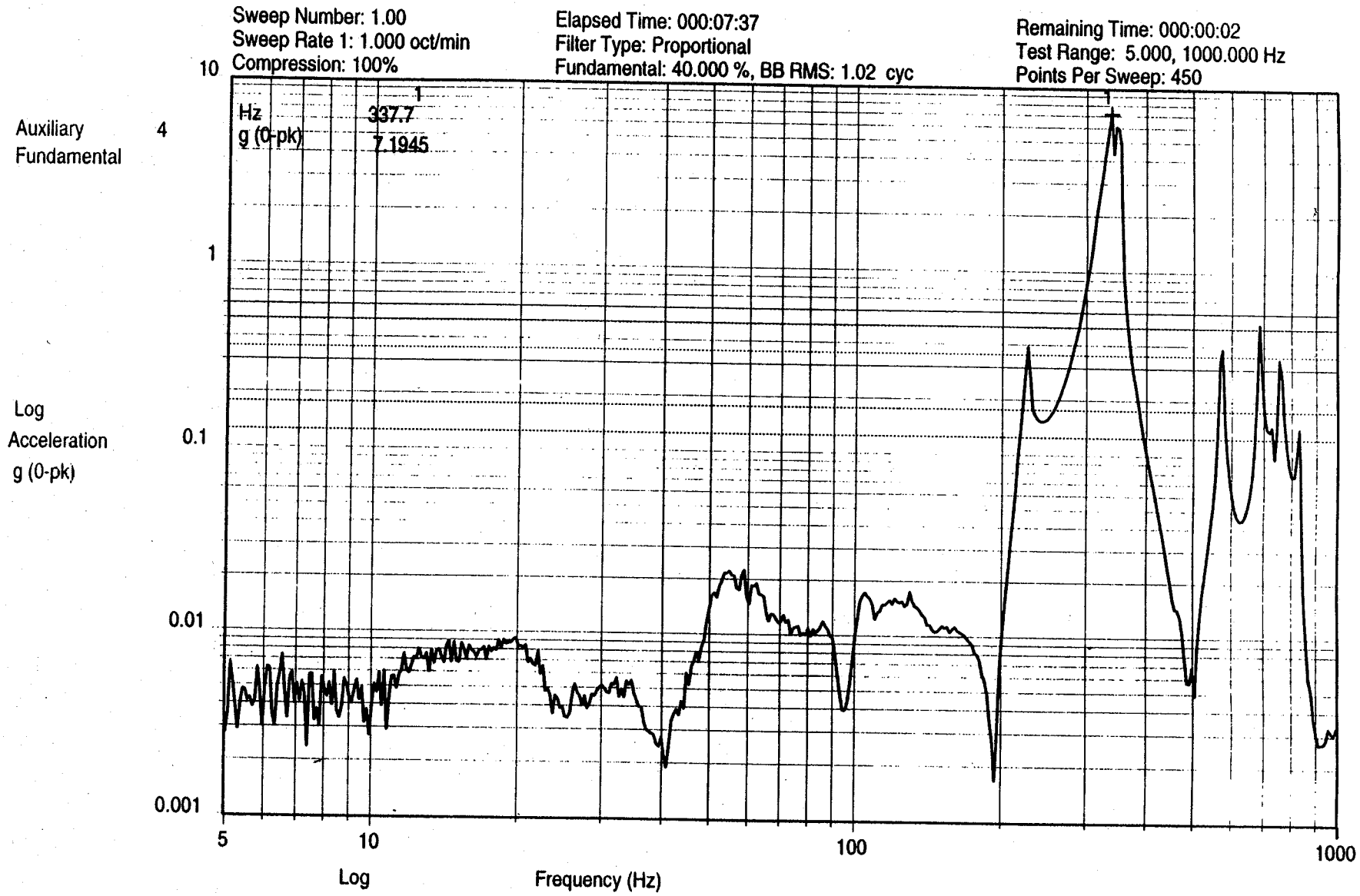


11:11:43
28-Aug-1997

SSG BENDIX PIVOT FLEX TEST W/O/ WASHERS
SINE SURVEY TEST# 7 AXIS: Y

Sine Test Name: SSG.001

LATERAL



11:11:54
28-Aug-1997

SSG BENDIX PIVOT FLEX TEST W/O/ WASHERS
SINE SURVEY TEST# 7 AXIS: Y

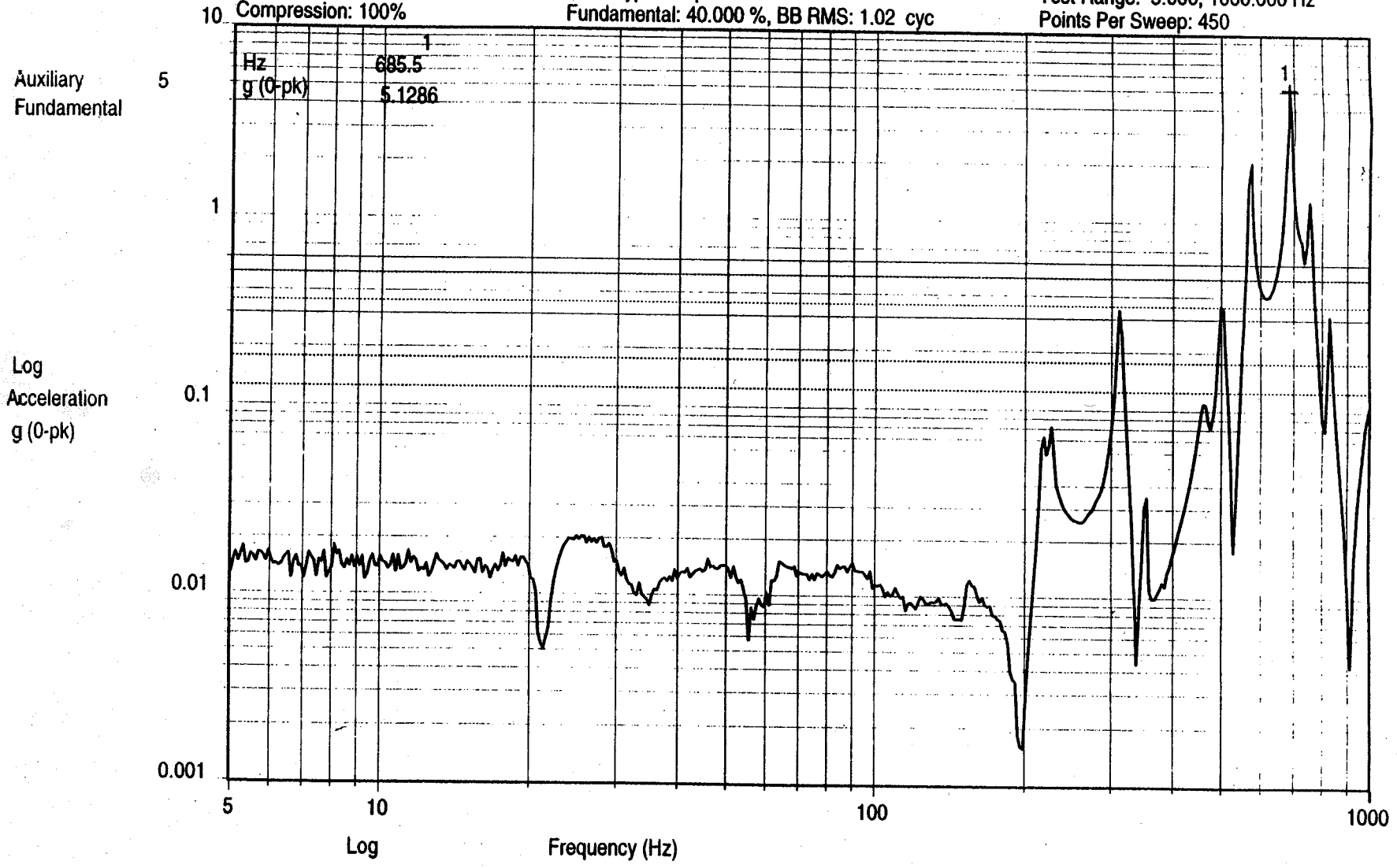
Sine Test Name: SSG.001

AXIAL

Sweep Number: 1.00
Sweep Rate 1: 1.000 oct/min
Compression: 100%

Elapsed Time: 000:07:37
Filter Type: Proportional
Fundamental: 40.000 %, BB RMS: 1.02 cyc

Remaining Time: 000:00:02
Test Range: 5.000, 1000.000 Hz
Points Per Sweep: 450



11:12:05
28-Aug-1997

SSG BENDIX PIVOT FLEX TEST W/O/ WASHERS
SINE SURVEY TEST# 7 AXIS: Y

Sine Test Name: SSG.001 .

GIMBAL