Medium Weight Shock and Vibration Test Report on 3 x 2 x 8 Pump with 40 HP Motor for Sims Pump Valve Co., Inc. Hoboken, NJ

NU LABORATORIES, INC.

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06 December 2006

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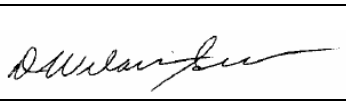	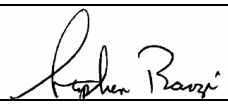	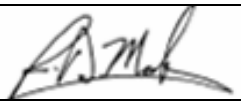
06 December 2006	06 December 2006	06 December 2006

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1. PURPOSE OF TEST

The purpose of this test was to demonstrate that the 3 x 2 x 8 Pump with 40 HP Motor, hereinafter referred to as the "Pump", complies with the requirements of MIL-S-901D for a nine (9) blow, medium weight, Grade A, Class 1, Type A, shock test, and with the requirements of MIL-STD-167-1 when subjected to vibration through the frequency range of 4 Hz through 50 Hz in each of the three (3) major axes.

2. MANUFACTURER

Sims Pump Valve Co., Inc.
1314 Park Avenue
Hoboken, NJ 07030

3. MANUFACTURER'S TYPE OR MODEL NO.

3 x 2 x 8 Pump with 40 HP Motor
Seawater service

4. SPECIFICATIONS

4.1 MILITARY

MIL-S-901D (NAVY) Military Specification, Shock Tests, H.I. (High Impact); Shipboard Machinery, Equipment and Systems, Requirements for, dated 17 March 1989

MIL-STD-167-1 (SHIPS) Military Standards Mechanical Vibrations of Shipboard Equipment, dated 1 May 1974

4.2 SIMS PUMP VALVE CO., INC.

Purchase Order No. 5433

5. NUMBER OF ITEMS TESTED

One (1) Pump

6. SECURITY CLASSIFICATION OF ITEM

Unclassified

7. DATES TESTS COMPLETED

28 November 2006

8. TEST CONDUCTED BY

NU Laboratories, Inc.
312 Old Allerton Road
Annandale, NJ 08801
(NAVY Certified Shock Test Facility by NAVSEAINST 9491.1C)

9. TEST WITNESSES

None

10. DISPOSITION OF TEST ITEM

The Pump was returned Sims Pump Valve Co., Inc.

11. ABSTRACT

The Pump was subjected to a total of nine (9) medium weight shock blows in accordance with the referenced test specifications. Visual inspections, performed after each shock blow, revealed minor physical damage. Refer to Section 12 for additional information.

The Pump was subjected to vibration in through the frequency range of 4 Hz through 50 Hz in each of the three (3) major axes in accordance with the referenced test specifications. Visual inspections, performed after each major axis, revealed no discrepancies. Refer to Section 13 for additional information.

12. SHOCK TEST DESCRIPTION

12.1 ACCEPTANCE CRITERIA

The Pump shall be considered to have failed the shock test if any portion of the equipment comes adrift or otherwise becomes a hazard to personnel, or equipment is not able to perform its Grade A specified function due to performance degradation in accordance with MIL-S-901D Section 3.1.10.1.

12.2 TEST SETUP

Upon receipt a visual inspection performed on the Pump revealed no obvious physical damage or discrepancy.

The Pump was weighed using a portable platform scale and the weight was recorded in the test log. The weight of the Pump was 744 pounds.

The Pump was attached to a 48″ x 48″ x 1½” steel plate using four (4) 7/8”-8 Grade 5 bolts torqued to 150 lbs-ft. The entire assembly was secured to fixture Figure 13 of MIL-S-901D on the medium weight shock machine oriented in the first major axis of test. A 54 pound dummy mass was attached to the suction side of the Pump and a 25.5 pound dummy mass was attached to the discharge side of the Pump. The total weight on the anvil table was 2486.5 pounds. Refer to Table 1 for the medium weight shock test weights and Figure 1 for photographs of the test setup.

Table 1: Medium Weight Shock Test Weights

Pump	**744 lbs.**
48″ x 48″ x 1½” Steel Plate	**935 lbs.**
Dummy Mass - Suction	**54 lbs.**
Dummy Mass - Discharge	**25.5 lbs.**
Mounting Bolts	**6 lbs.**
Three (3) Half Rails	**249 lbs.**
Twelve (12) Half Rail Shoes	**48 lbs.**
Nine (9) T-Blocks	**36 lbs.**
Nine (9) Spacers	**9 lbs.**
Figure 13	**380 lbs.**
Figure 16	**1470 lbs.**
Total Weight Fixture Figure 13	**2486.5 lbs.**
Total Weight Fixture Figure 16	**3576.5 lbs.**

12.3 TEST CONDITIONS

Throughout the shock test the Pump was monitored for any leaks or loss in pressure.

During blows marked as “**CONDITION A**” the Pump was flooded with water, energized with 440 VAC, three (3) phase, 60 Hz power and operating with the discharge pressure adjusted to 130 psig.

During blows marked as “**CONDITION B**” the Pump flooded with water and de-energized.

12.4 BLOW #1 – CONDITION A

12.4.1 Conditions: Vertical Axis, 1.25’ hammer height, Group #I, 3” anvil table travel, Figure 13 of the referenced specifications.

12.4.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.

12.4.3 Action: The mounting bolts were retorqued and testing was continued.

12.5 BLOW #2 – CONDITION B

12.5.1 Conditions: Vertical Axis, 2.25' hammer height, Group #II, 3" anvil table travel, Figure 13 of the referenced specifications.

12.5.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.

12.5.3 Action: Testing was continued.

12.6 BLOW #3 – CONDITION A

12.6.1 Conditions: Vertical Axis, 2.25' hammer height, Group #III, 1.5" anvil table travel, Figure 13 of the referenced specifications.

12.6.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.

12.6.3 Action: Testing was continued.

The entire assembly was then removed from fixture Figure 13 and attached to fixture Figure 16 of MIL-S-901D oriented with the side of the Pump facing down. The total weight on the anvil table was 3576.5 pounds. Refer to Table 1 for a breakdown of the test weights and Figure 1 for the photograph of the test setup.

12.7 BLOW #4 – CONDITION A

12.7.1 Conditions: 30° Side Down, 1.75' hammer height, Group #I, 3" anvil table travel, Figure 16 of the referenced specifications.

12.7.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.

12.7.3 Action: Testing was continued.

12.8 BLOW #5 – CONDITION B

12.8.1 Conditions: 30° Side Down, 2.75' hammer height, Group #II, 3" anvil table travel, Figure 16 of the referenced specifications.

12.8.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.

12.8.3 Action: Testing was continued.

12.9 BLOW #6 – CONDITION A

12.9.1 Conditions: 30° Side Down, 2.75' hammer height, Group #III, 1.5" anvil table travel, Figure 16 of the referenced specifications.

12.9.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.

12.9.3 Action: Testing was continued.

The entire assembly was removed from fixture Figure 16, rotated and reattached with the Pump down. The total weight on the anvil table remained 3576.5 pounds. Refer to Figure 1 for the photograph of the test setup.

12.10 BLOW #7 – CONDITION A

12.10.1 Conditions: 30° Pump Down, 1.75' hammer height, Group #I, 3" anvil table travel, Figure 16 of the referenced specifications.

12.10.2 Observations: A post-blow visual inspection revealed that two (2) of the fan cover bolts were loose. No leakage or loss in pressure was reported.

12.10.3 Action: Testing was continued.

12.11 BLOW #8 – CONDITION B

12.11.1 Conditions: 30° Pump Down, 2.75' hammer height, Group #II, 3" anvil table travel, Figure 16 of the referenced specifications.

12.11.2 Observations: A post-blow visual inspection revealed that the same two (2) fan cover bolts were loose. No leakage or loss in pressure was reported.

12.11.3 Action: Testing was continued.

12.12 BLOW #9 – CONDITION A

12.12.1 Conditions: 30° Pump Down, 2.75' hammer height, Group #III, 1.5" anvil table travel, Figure 16 of the referenced specifications.

12.12.2 Observations: A post-blow visual inspection revealed that the two (2) fan cover bolts were again loose. No leakage or loss in pressure was reported.

12.12.3 Action: Shock testing was completed.

Refer to the Factory Test Record, Figure 2, and the Shock Acceptance Form, Figure 3 for additional information.

13. VIBRATION TEST DESCRIPTION

The Pump was removed from the medium weight shock machine and attached to the vibration machine oriented in the first major axis of test. Refer to Figure 4 for photographs of the test setups.

One (1) accelerometer was attached to the plate and one (1) accelerometer was attached to the top of the Pump, oriented in the direction of vibration, to aid in the detection of response prominences.

The Pump was flooded with water, energized with 440 VAC, three (3) phase, 60 Hz power and operating with the discharge pressure adjusted to 130 psig throughout the vibration test.

13.1 FIRST MAJOR AXIS OF VIBRATION (END TO END)

13.1.1 Exploratory Vibration

The Pump was vibrated from 4 Hz through 33 Hz with a vibration input of 0.020 ± 0.004 inches (double amplitude) to determine response prominences and from 34 Hz through 50 Hz with a vibration input of 0.006 + 0.000/-0.002 (double amplitude) to determine response prominences. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for approximately 15 seconds. No response prominences were noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.1.2 Variable Frequency Vibration

The Pump was vibrated from 4 Hz to 50 Hz with input amplitudes as shown in Table 2. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for a period of five (5) minutes. No obvious physical damage, leakage or loss in pressure was noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

Table 2: Variable Frequency Test Amplitudes

FREQUENCY (Hz)	INPUT INCHES (DOUBLE AMPLITUDE)
4 – 15 Hz	0.060 ± 0.012
16 – 25 Hz	0.040 ± 0.008
26 – 33 Hz	0.020 ± 0.004
34 – 40 Hz	0.010 ± 0.002
41 – 50 Hz	0.006 + 0.000 -0.002

13.1.3 Endurance Vibration

The endurance vibration was performed at the frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an inspection was performed which revealed no obvious physical damage, leakage or loss in pressure.

The frequency, table input vibration levels, accelerometer output vibration levels and the duration of dwell were recorded on the Vibration Test Data Sheets.

13.2 SECOND MAJOR AXIS OF VIBRATION (VERTICAL)

13.2.1 Exploratory Vibration

The Pump was vibrated from 4 Hz through 33 Hz with a vibration input of 0.020 ± 0.004 inches (double amplitude) to determine response prominences and from 34 Hz through 50 Hz with a vibration input of 0.006 + 0.000/-0.002 (double amplitude) to determine response prominences. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for approximately 15 seconds. No response prominences were noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.2.2 Variable Frequency Vibration

The Pump was vibrated from 4 Hz to 50 Hz with input amplitudes as shown in Table 2. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for a period of five (5) minutes. No obvious physical damage, leakage or loss in pressure was noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.2.3 Endurance Vibration

The endurance vibration was performed at the frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an inspection was performed which revealed no obvious physical damage, leakage or loss in pressure.

The frequency, table input vibration levels, accelerometer output vibration levels and the duration of dwell were recorded on the Vibration Test Data Sheets.

13.3 THIRD MAJOR AXIS OF VIBRATION (SIDE TO SIDE)

13.3.1 Exploratory Vibration

The Pump was vibrated from 4 Hz through 33 Hz with a vibration input of 0.020 ± 0.004 inches (double amplitude) to determine response prominences and from 34 Hz through 50 Hz with a vibration input of 0.006 + 0.000/-0.002 (double amplitude) to determine response prominences. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for approximately 15 seconds. No response prominences were noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.3.2 Variable Frequency Vibration

The Pump was vibrated from 4 Hz to 50 Hz with input amplitudes as shown in Table 2. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for a period of five (5) minutes. No obvious physical damage, leakage or loss in pressure was noted.

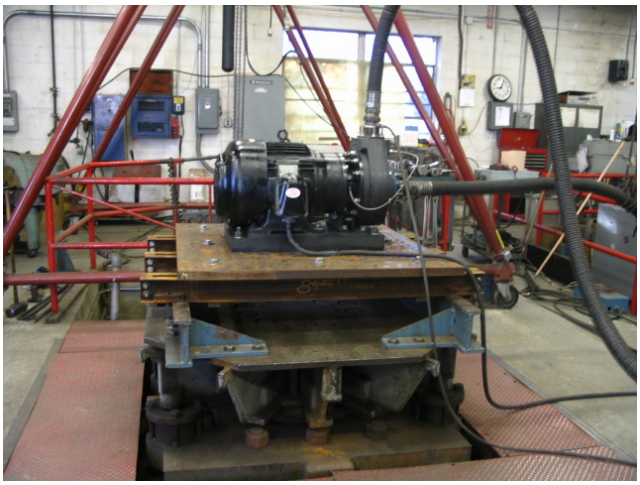
The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.3.3 Endurance Vibration

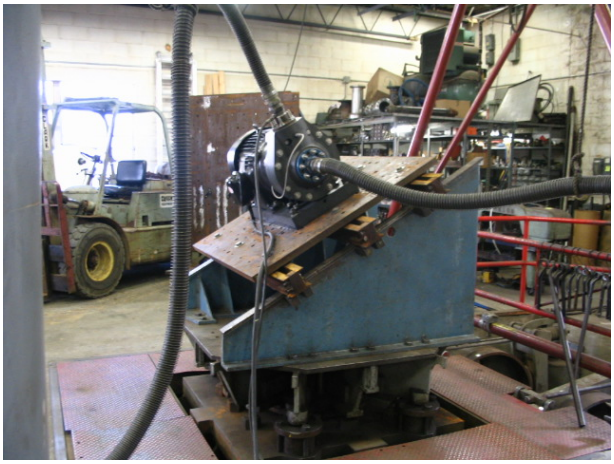
The endurance vibration was performed at the frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an inspection was performed which revealed no obvious physical damage, leakage or loss in pressure.

The frequency, table input vibration levels, accelerometer output vibration levels and the duration of dwell were recorded on the Vibration Test Data Sheets.

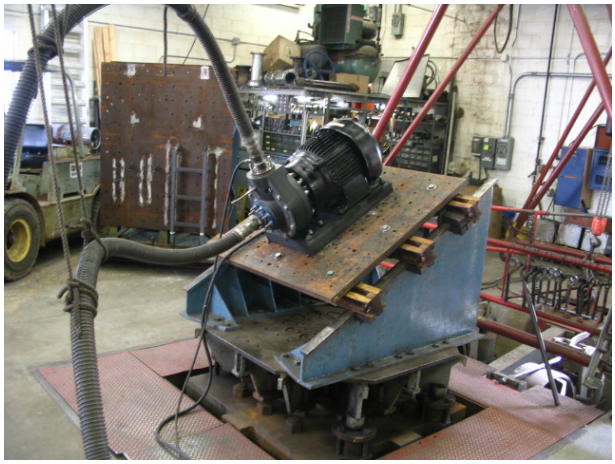
Refer to the Vibration Test Data Sheets, Figures 5 through 7, for additional information.



Vertical Axis



30° Side Down



30° Pump Down

Shock Test Setups
Figure 1

FACTORY TEST RECORD: CLASS HI SHOCK

DATE: 28 November 2006
TEST #: 10610.1

1. ITEM NAME OF EQUIPMENT SHOCK-TESTED: 3 x 2 x 8 Pump with 40 HP Motor

2. RATING (KW, VOLTS, GPM, CFM, ETC.):

3. MAJOR PARTS

PUMP, ETC.	TESTED FOR Sims Pump Valve Co., Inc.	ADDRESS 1314 Park Avenue Hoboken, NJ 07030	GOV DWG NO	IDENTIFYING #
MOTOR, ETC.	MANUFACTURER	ADDRESS	GOV DWG NO	IDENTIFYING #
STARTER, ETC.	MANUFACTURER	ADDRESS	GOV DWG NO	IDENTIFYING #
4. CONTRACT NO.	CONTRACTOR	ADDRESS		

5. TYPE OF SHOCK TEST ☒ ASSEMBLY ☐ SUB-ASSEMBLY ☐ PART

6. TOTAL WEIGHT OF ASSEMBLY TESTED	WEIGHT OF INDIVIDUAL MAJOR PARTS	MOTOR	STARTER
1206 lbs.	LBS.	LBS.	LBS.

7. WEIGHT CLASSIFICATION OF ITEM ☐ LIGHT ☒ MEDIUM

8. APPLICABLE MOUNTING FIGURE IN SPECIFICATION MIL-S-901 ☐ FIX 4A, FIG 5 ☐ FIX 4C, FIG 8 ☒ FIG 13 ☒ FIG 16 ☐ FIG 10-2 ☐ OTHER

9. FOR LIGHTWEIGHT ITEMS

FIRST CONDITION				SECOND CONDITION			
BLOW	DROP	AXIS	DAMAGE INCURRED	BLOW	DROP	AXIS	DAMAGE INCURRED

ITEMS SUBJECT TO ABOVE TWO CONDITIONS WERE SAME ☐ DIFFERENT☐

REMARKS:

10. FOR MEDIUM-WEIGHT ITEMS

Fig. 13 Fig. 16,				Fig. 16,			
BLOWS	GRP #	HAMMER DROP	DAMAGE INCURRED	BLOWS	GRP #	HAMMER DROP	DAMAGE INCURRED
1	I	1.25'	No damage noted	7	I	1.75'	Refer to report
2	II	2.25'	No damage noted	8	II	2.75'	Refer to report
3	III	2.25'	No damage noted	9	III	2.75'	Refer to report
4	I	1.75'	No damage noted				
5	II	2.75'	No damage noted				
6	III	2.75'	No damage noted				

TOTAL WEIGHT ON ANVIL TABLE: Figure 13- 2486.5 lbs./Figure 16 – 3576.5 lbs.

REMARKS:

TEST LABORATORY	ADDRESS	TEST ENGINEER
NU Laboratories, Inc.	312 Old Allerton Road, Annandale, NJ 08801	[signature]

Factory Test Record
Figure 2

MIL-S-901D: SHOCK ACCEPTANCE FORM

1. The item identified below has met the requirements of Military Specification MIL-S-901, based upon:

   ☒ Shock testing of the item identified below

   ❑ Previous shock testing of an item similar to the item identified below (shock test extension)

   ❑ Previous shock testing of an item identical to the item identified below (shock test extension)

2. Item (Nomenclature) Pump
3. Item (Description) 3 x 2 x 8 Pump with 40 HP Motor
4. Tested For Sims Pump Valve Co., Inc.
5. M/N: _____ 6. S/N: _____
7. Dwg. Number _____ 8. Revision and Date _____
9. Military Specification MIL-S-901D
10. Ship _____ 11. Service _____
12. Contract No. _____
13. Shock Test Facility NU Laboratories, Inc.
14. Report No. 10610.1
15. Previous Shock test approval reference (if this form conveys shock test Extension approval) _____

_____

16.	Test Category	☐ Lightweight	☒Medium weight	☐ Heavyweight	
17.	Shock Grade	☒ A	☐ B		
18.	Equipment Class	☒ I	☐ II	☐ III	
19.	Shock Test Type	☒ A	☐ B	☐ C	
20.	Mounting Location	☒ Deck	☐ Hull	☐ Shell	☐ Wetted-Surface

21. Shipboard mounting plane represented during shock test:

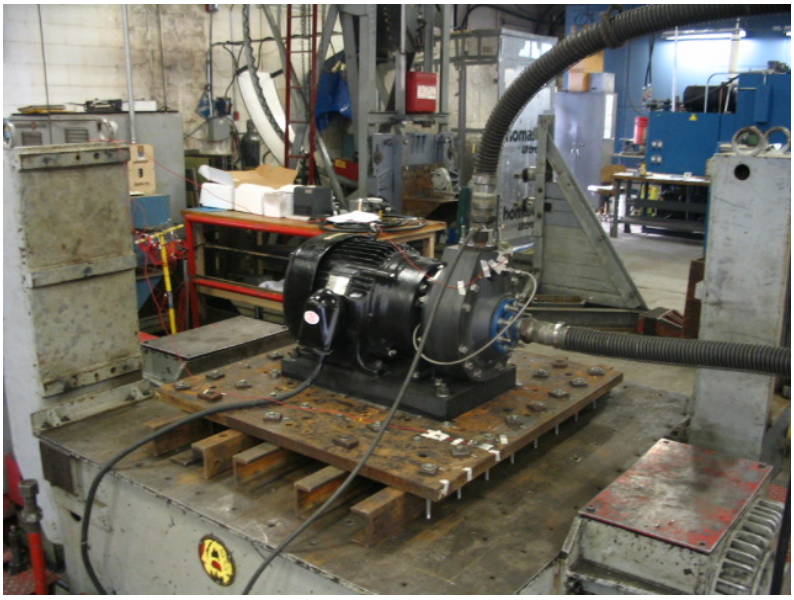
☒Base	☐ Front or Face	❑ Back
☐ Top	☐ Combination	☐ Other _____

22. Mounting orientation of item relative to ship's fore-and-aft axis (for medium weight and heavyweight test items only): Unrestricted
23. Approval Limitations: _____
24. Approved. _____

Authorized Signature	Approval Activity	Date
		28 November 2006

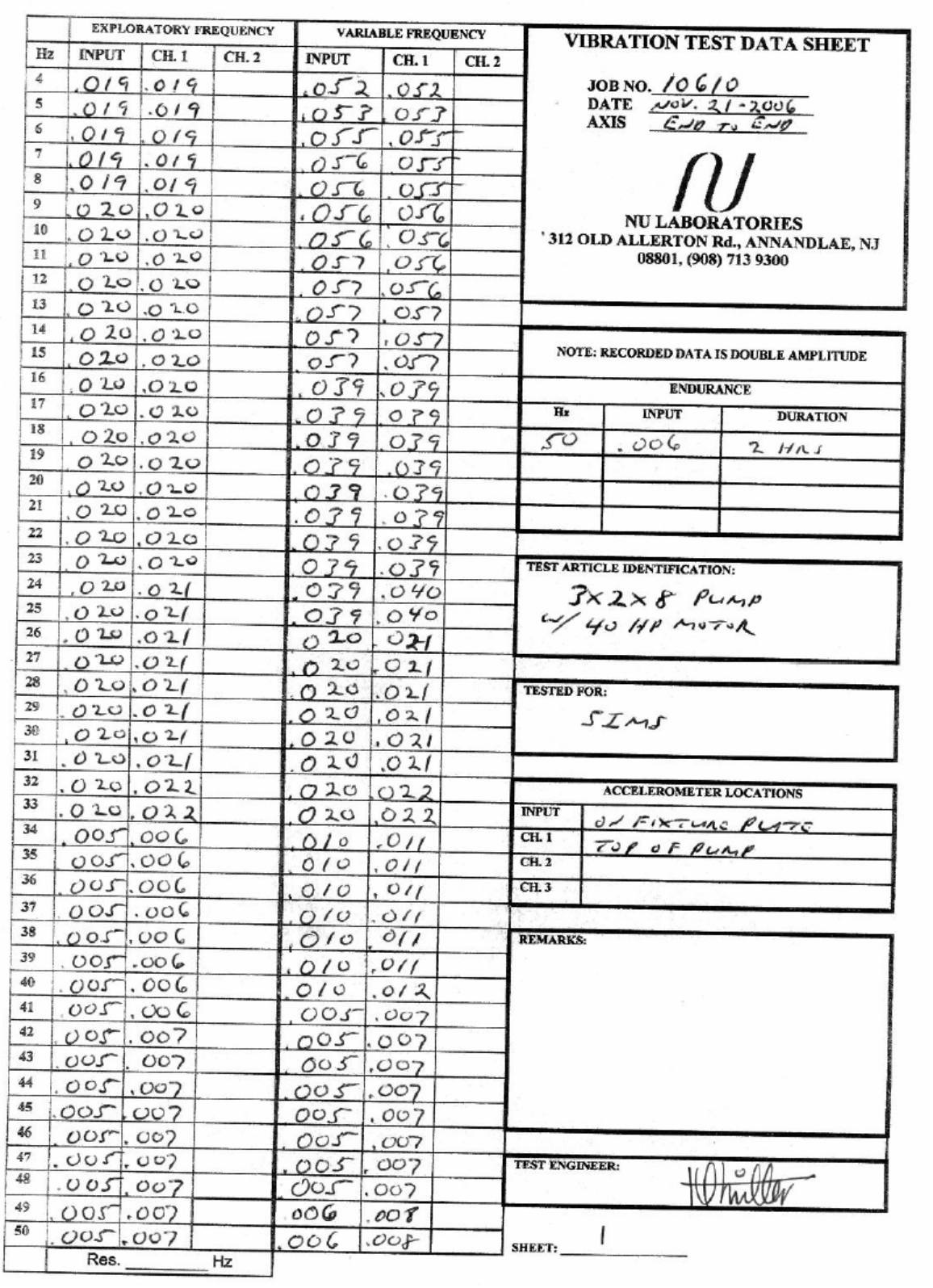
Shock Acceptance Form
Figure 3

End to End and Vertical Axes



Side to Side Axis

Vibration Test Setups
Figure 4



	EXPLORATORY FREQUENCY			VARIABLE FREQUENCY		
Hz	INPUT	CH. 1	CH. 2	INPUT	CH. 1	CH. 2
4	.019	.019		.052	.052	
5	.019	.019		.053	.053	
6	.019	.019		.055	.055	
7	.019	.019		.056	.055	
8	.019	.019		.056	.055	
9	.020	.020		.056	.056	
10	.020	.020		.056	.056	
11	.020	.020		.057	.056	
12	.020	.020		.057	.056	
13	.020	.020		.057	.057	
14	.020	.020		057	.057	
15	.020	.020		.057	.057	
16	.020	.020		.039	.039	
17	.020	.020		.039	.039	
18	.020	.020		.039	.039	
19	020	.020		.039	.039	
20	.020	.020		.039	.039	
21	.020	.020		.039	.039	
22	.020	.020		.039	.039	
23	.020	.020		.039	.039	
24	.020	.021		.039	.040	
25	.020	.021		.039	.040	
26	.020	.021		020	.021	
27	020	.021		.020	.021	
28	.020	.021		.020	.021	
29	.020	.021		.020	.021	
30	.020	.021		.020	.021	
31	.020	.021		020	.021	
32	.020	.022		.020	.022	
33	.020	.022		.020	.022	
34	.005	.006		.010	.011	
35	005	.006		.010	.011	
36	.005	.006		.010	.011	
37	005	.006		.010	.011	
38	.005	.006		.010	.011	
39	005	.006		.010	.011	
40	.005	.006		.010	.012	
41	005	.006		.005	.007	
42	005	.007		.005	.007	
43	.005	.007		.005	.007	
44	.005	.007		.005	.007	
45	.005	.007		005	.007	
46	005	.007		.005	.007	
47	.005	.007		.005	.007	
48	.005	.007		005	.007	
49	.005	.007		006	.008	
50	.005	.007		.006	.008	
	Res. _____ Hz					

VIBRATION TEST DATA SHEET

JOB NO. 10610
DATE NOV. 21-2006
AXIS END TO END

NU LABORATORIES
312 OLD ALLERTON Rd., ANNANDLAE, NJ
08801, (908) 713 9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE

ENDURANCE

Hz	INPUT	DURATION
50	.006	2 HRS

TEST ARTICLE IDENTIFICATION:
3X2X8 PUMP
W/ 40 HP MOTOR

TESTED FOR:
SIMS

ACCELEROMETER LOCATIONS

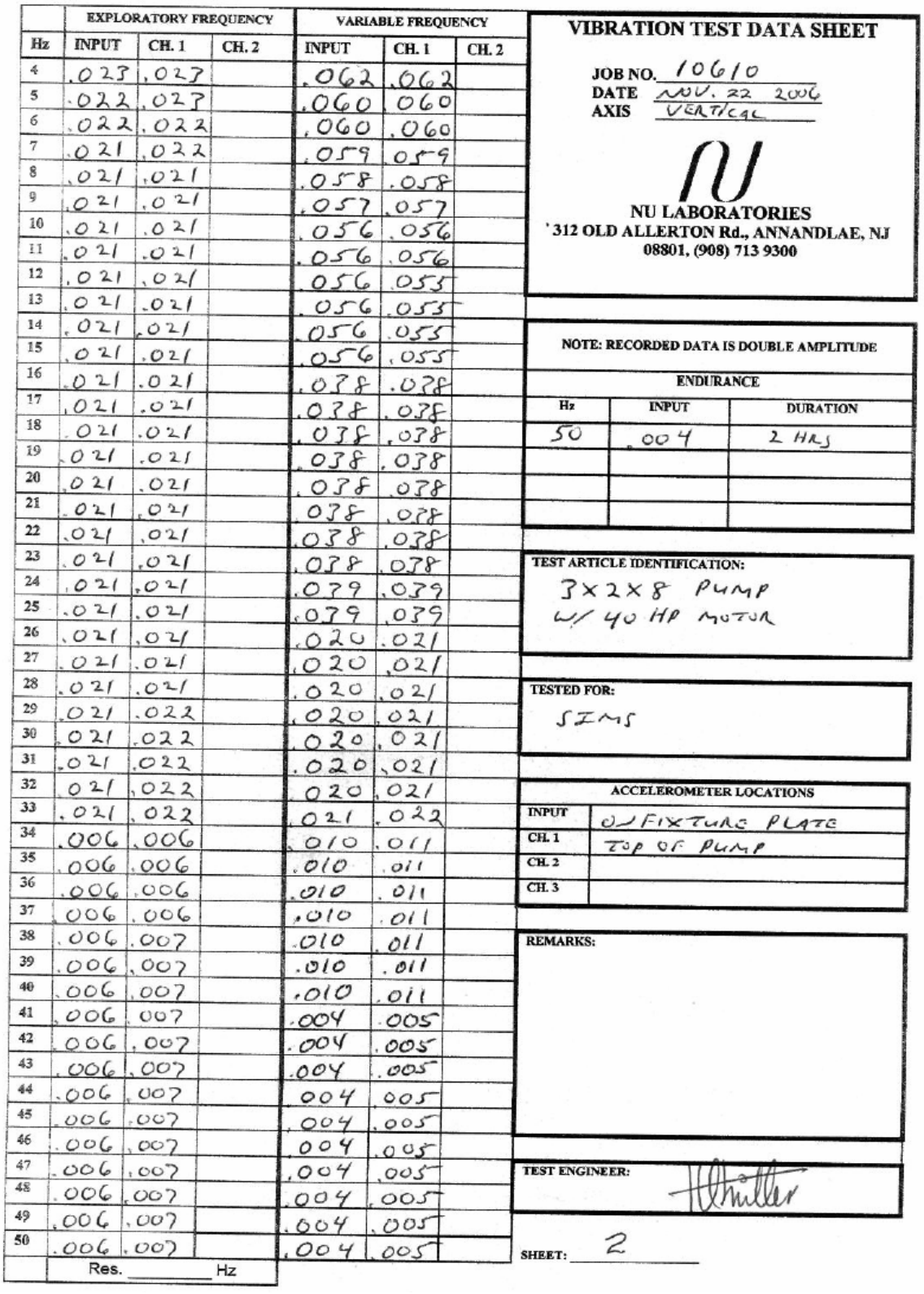
INPUT	ON FIXTURE PLATE
CH. 1	TOP OF PUMP
CH. 2	
CH. 3	

REMARKS:

TEST ENGINEER:

SHEET: 1

Vibration Test Data Sheet
Figure 5



	EXPLORATORY FREQUENCY			VARIABLE FREQUENCY		
Hz	INPUT	CH. 1	CH. 2	INPUT	CH. 1	CH. 2
4	.023	.027		.062	.062	
5	.022	.027		.060	.060	
6	.022	.022		.060	.060	
7	.021	.022		.059	.059	
8	.021	.021		.058	.058	
9	.021	.021		.057	.057	
10	.021	.021		.056	.056	
11	.021	.021		.056	.056	
12	.021	.021		.056	.055	
13	.021	.021		.056	.055	
14	.021	.021		.056	.055	
15	.021	.021		.056	.055	
16	.021	.021		.038	.038	
17	.021	.021		.038	.038	
18	.021	.021		.038	.038	
19	.021	.021		.038	.038	
20	.021	.021		.038	.038	
21	.021	.021		.038	.038	
22	.021	.021		.038	.038	
23	.021	.021		.038	.038	
24	.021	.021		.039	.039	
25	.021	.021		.039	.039	
26	.021	.021		.020	.021	
27	.021	.021		.020	.021	
28	.021	.021		.020	.021	
29	.021	.022		.020	.021	
30	.021	.022		.020	.021	
31	.021	.022		.020	.021	
32	.021	.022		.020	.021	
33	.021	.022		.021	.022	
34	.006	.006		.010	.011	
35	.006	.006		.010	.011	
36	.006	.006		.010	.011	
37	.006	.006		.010	.011	
38	.006	.007		.010	.011	
39	.006	.007		.010	.011	
40	.006	.007		.010	.011	
41	.006	.007		.004	.005	
42	.006	.007		.004	.005	
43	.006	.007		.004	.005	
44	.006	.007		.004	.005	
45	.006	.007		.004	.005	
46	.006	.007		.004	.005	
47	.006	.007		.004	.005	
48	.006	.007		.004	.005	
49	.006	.007		.004	.005	
50	.006	.007		.004	.005	
	Res. _____ Hz					

VIBRATION TEST DATA SHEET

JOB NO. 10610
DATE NOV. 22 2006
AXIS VERTICAL

NU LABORATORIES
312 OLD ALLERTON Rd., ANNANDLAE, NJ
08801, (908) 713 9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE

ENDURANCE

Hz	INPUT	DURATION
50	.004	2 HRS

TEST ARTICLE IDENTIFICATION:
3X2X8 PUMP
W/ 40 HP MOTOR

TESTED FOR:
SIMS

ACCELEROMETER LOCATIONS

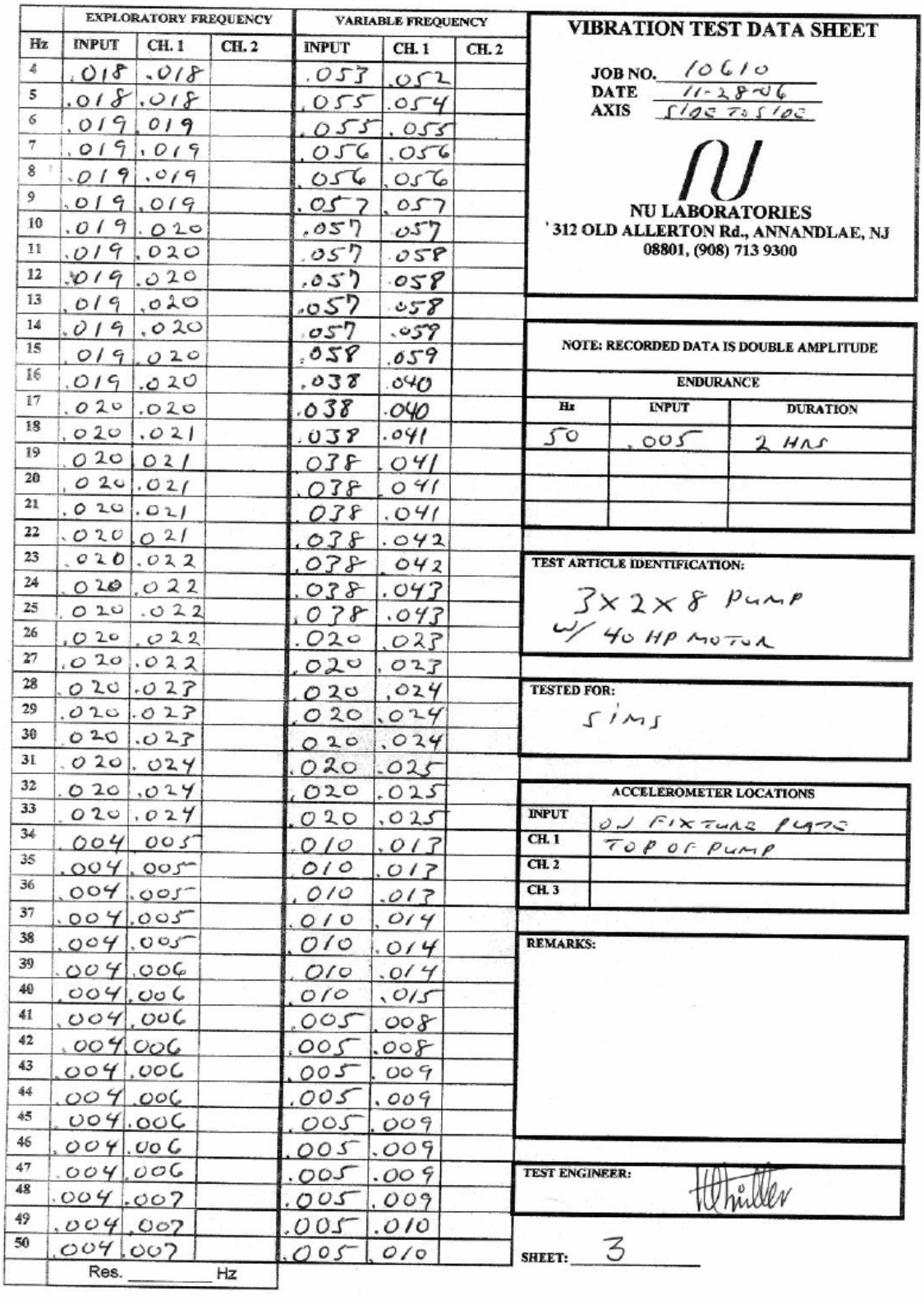
INPUT	ON FIXTURE PLATE
CH. 1	TOP OF PUMP
CH. 2	
CH. 3	

REMARKS:

TEST ENGINEER:

SHEET: 2

Vibration Test Data Sheet
Figure 6



	EXPLORATORY FREQUENCY			VARIABLE FREQUENCY		
Hz	INPUT	CH. 1	CH. 2	INPUT	CH. 1	CH. 2
4	.018	.018		.053	.052	
5	.018	.018		.055	.054	
6	.019	.019		.055	.055	
7	.019	.019		.056	.056	
8	.019	.019		.056	.056	
9	.019	.019		.057	.057	
10	.019	.020		.057	.057	
11	.019	.020		.057	.058	
12	.019	.020		.057	.058	
13	.019	.020		.057	.058	
14	.019	.020		.057	.059	
15	.019	.020		.058	.059	
16	.019	.020		.038	.040	
17	.020	.020		.038	.040	
18	.020	.021		.038	.041	
19	.020	.021		.038	.041	
20	.020	.021		.038	.041	
21	.020	.021		.038	.041	
22	.020	.021		.038	.042	
23	.020	.022		.038	.042	
24	.020	.022		.038	.043	
25	.020	.022		.038	.043	
26	.020	.022		.020	.023	
27	.020	.022		.020	.023	
28	.020	.023		.020	.024	
29	.020	.023		.020	.024	
30	.020	.023		.020	.024	
31	.020	.024		.020	.025	
32	.020	.024		.020	.025	
33	.020	.024		.020	.025	
34	.004	.005		.010	.013	
35	.004	.005		.010	.013	
36	.004	.005		.010	.013	
37	.004	.005		.010	.014	
38	.004	.005		.010	.014	
39	.004	.006		.010	.014	
40	.004	.006		.010	.015	
41	.004	.006		.005	.008	
42	.004	.006		.005	.008	
43	.004	.006		.005	.009	
44	.004	.006		.005	.009	
45	.004	.006		.005	.009	
46	.004	.006		.005	.009	
47	.004	.006		.005	.009	
48	.004	.007		.005	.009	
49	.004	.007		.005	.010	
50	.004	.007		.005	.010	
	Res. _____ Hz					

VIBRATION TEST DATA SHEET

JOB NO. 10610
DATE 11-28-06
AXIS S105 TO S106

NU LABORATORIES
312 OLD ALLERTON Rd., ANNANDLAE, NJ
08801, (908) 713 9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE

ENDURANCE

Hz	INPUT	DURATION
50	.005	2 HRS

TEST ARTICLE IDENTIFICATION:
3X2X8 PUMP
W/ 40 HP MOTOR

TESTED FOR:
SINS

ACCELEROMETER LOCATIONS

INPUT	ON FIXTURE PLATE
CH. 1	TOP OF PUMP
CH. 2	
CH. 3	

REMARKS:

TEST ENGINEER: HWhittler

SHEET: 3

Vibration Test Data Sheet
Figure 7

LIST OF APPARATUS

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DATE	DUE DATE
Platform Scale	Fairbanks Morse	1124A	6-511379	09/19/06	09/19/07
Balance Scale	Ohaus	1225	EL-330	09/19/06	09/19/07
Digital Scale	Industrial Commercial	TI500SSB-510	5D1901100001	09/19/06	09/19/07
Medium Weight Shock Machine	New England Trawler	10-T-3351-C	N/A	Functional	
Vibration Machine	LAB	RVH-72-5000	51401	Functional	
Torque Wrench	Utica	TCI-150-FRN	MD6973	09/11/06	09/11/07
0-300 psi Pressure Gauge	Span	4109566	MC001705	10/27/06	10/27/07
Multimeter	Fluke	87	48001437	01/04/06	01/04/07
1 Hour Timer	Gra Labs	300	300-87061543	04/25/06	04/25/07
Accelerometer	Endevco	2221D	EY57	02/28/06	02/28/07
Accelerometer	Endevco	2221D	EY62	01/31/06	01/31/07
Charge Amplifier	Trig Tek	203M	217	04/17/06	04/17/07
Charge Amplifier	Trig Tek	203M	223	08/25/05	08/25/06

All calibrations are traceable to the National Institute of Standards and Technology. Procedures satisfy the requirements set forth in MIL-STD-45662 and/or ANSI/NCSL Z540-1. Calibration records are on file at NU Laboratories, Inc.

All weights and scales are traceable to the State of NJ Office of Weights and Measures (NJSA 51:1-61; 75; NJAC 13:47E-1.2)