HEAVYWEIGHT HIGH IMPACT (H.I.)

SHOCK TEST REPORT

July, 2003

Dynamic Testing • A Division of DTI Holdings, LLC • P.O. Box 494, 3915 Sunnymeade Rd., Rustburg, VA 24588 • 434-846-0244 • dti@dynatest.net

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MIL-S-901D (U.S. Navy)

3.2 Shock Grade

Grade A

3.3 Equipment Class

Class II

3.4 Mounting Location

Deck

3.5 Mounting Plane Aboard Ship

1) HF Receive – Back and Base
2) System Control – Back and Base
3) V/UHF Receive – Back and Base
4) CCOP – Back and Base

3.6 Mounting Orientation Aboard Ship

1) HF Receive – Unrestricted
2) System Control – Unrestricted
3) V/UHF Receive – Unrestricted
4) CCOP – Unrestricted

3.7 Number of Articles

4

3.8 Items Tested

1) HF Receive Cabinet Configuration

Manufacturer:
Part No:

Shock Isolators: Base – (6) 901D Part No. 70512-1
Sway – (2) 901D Part No. 70526-1

Qty.	Hardware Item
1	AN/SSQ-137 (V) 1 Rack
1	Patch Panel HF
1	Distribution Unit, RF
1	Printer Unit, Laser
1	Tuner, HF
1	Workstation, Intel (Jots3)
1	Keyboard/Display Unit
1	Digital Processing Unit
1	Uninterruptible Power Supply

2) System Control Cabinet Configuration

Manufacturer:
Part No:

Shock Isolators: Base – (6) 901D Part No. 70512-1
Sway – (2) 901D Part No. 70526-1

Qty.	Hardware Item
1	AN/SSQ-137 (V) 1 Rack
1	Time Unit, Precision
1	Distribution Unit, Time Frequency
1	Filter Unit, HF, V/UHF
1	Interface Unit, INT/EXT
1	Patch Panel Audio
1	Receiver, R-2411
1	Up Converter
1	Workstation, Intel (Jots4)
1	Keyboard, Display Unit
1	Server, Unix (CUB)
1	Server Unix (LH)
1	Uninterruptible Power Supply

3) V/UHF Receive Cabinet Configuration

Manufacturer:
Part No:

Shock Isolators: Base – (6) 901D Part No. 70512-1
Sway – (2) 901D Part No. 70526-1

Qty.	Hardware Item
1	AN/SSQ-137 (V) 1 Rack
1	Patch Panel, V/UHF
1	Distribution Unit, RF, V/UHF
1	Receiver, R-2412
1	Receiver, V/UHF
1	Workstation, Intel (Jots5)
1	Keyboard/Display Unit
1	Digital Processing Unit
1	Uninterruptible Power Supply

4) CCOP Cabinet Configuration

Manufacturer:
Part No:

Shock Isolators: Base – (6) 901D Part No. 70512-1
Sway – (2) 901D Part No. 70526-1

Qty.	Hardware Item
1	AN/SSQ-137 (V) 1 Rack
1	Uninterruptible Power Supply

3.9 Overall Equipment Dimensions/Weight/Center of Gravity

1) HF Receive Cabinet

Dimensions: 71.97” H x 22.0” W x 34.62” D (with isolators)
Weight: 724 pounds
Vertical CG: 34” from mounting base

2) System Control Cabinet

Dimensions: 71.97” H x 22.0” W x 34.62” D (with isolators)
Weight: 820 pounds
Vertical CG: 34” from mounting base

3) V/UHF Receive Cabinet

Dimensions:	71.97" H x 22.0" W x 34.62" D (with isolators)
Weight:	824 pounds
Vertical CG:	34" from mounting base

4) CCOP Cabinet

Dimensions:	71.97" H x 22.0" W x 34.62" D (with isolators)
Weight:	297 pounds (dummy loaded to 800 lbs. for testing)
Vertical CG:	34" from mounting base

3.10 Mode of Operation

The test units were powered and operating for all detonations. The equipment under test (EUT) was powered with 110 VAC.

3.11 Shock Test Acceptance Criteria

In addition to the acceptance criteria presented in Section 3.1.10 of MIL-S-901D (Navy), the following was also considered as acceptance criteria for meeting the shock test requirements:

1. The test item continues to perform its intended functions following the test series.

2. A momentary malfunction shall be considered acceptable if it is automatically self-correcting.

3. No part of the test item that may be considered a hazard to personnel or Grade A equipment shall break or come adrift.

4. The test item shall not demonstrate a potential for fire hazards. Any evidence of electrical shorts, release of flame, smoke, or sparks shall be cause for rejection unless otherwise approved by the acceptance authority.

5. Minor physical damage to the test item, such as small cracks, minor yielding of structure, out-of-tolerance clearances, and similar damage shall not be cause for shock test disapproval unless such damage causes unacceptable impairment of equipment performance, results in a hazard, or results in a substantially shortened equipment useful life.

3.12 FSP-Borne Weight

Test Items	3,168 pounds
Test Fixtures for Class II Items	3,573 pounds
Other Items on DSF	3,386 pounds
DSF	11,000 pounds
Instrumentation and Rack	1,200 pounds
Canopy	7,000 pounds
Total Weight Borne by FSP	**29,327 pounds**

4.0 TEST METHOD

4.1 Test Facility

The test series was conducted at the facilities of Dynamic Testing (DTI). This test facility is approved for testing in accordance with NAVSEAINST 9491.1B and by NAVSEA Letter 55X11/SH, Serial 87, dated 17 February 1984.

4.2 Test Series

The test series was conducted in accordance with MIL-S-901D and 901D Document No. D00231-QTP-001, using the FSP, constructed in accordance with BUSHIPS Drawing No 645-1973904, utilizing standard, 60-pound HBX charges suspended at a depth of 24 feet below the surface of the water. Standoff distances were measured from the center of the charge to the FSP vertical hull plating.

After Shot No. 3, the test items were rotated 90 degrees in order to meet requirements for unlimited orientation.

Table 1. Test Series

Shot/MIL-S-901DTest Number	Standoff Distance	Deck Frequency	Charge Location
1/2	30 feet	14 ± 2 Hz.	Along the athwartship centerline of the FSP
2/3	25 feet	14 ± 2 Hz.	Along the athwartship centerline of the FSP
3/4	20 feet	14 ± 2 Hz.	Along the athwartship centerline of the FSP
4/4 Rotated	20 feet	14 ± 2 Hz.	Along the athwartship centerline of the FSP

The fundamental vertical response of the DSF was determined from the peak response on a fast fourier transform (FFT) generated from acceleration time-history data measured at Sensor A1V (see Photograph No.3). Deck frequency and support locations are summarized in Table 2.

Table 2. DSF Frequency and Pin Support Locations

Shot/Test No.	Sensor No.	Frequency (Hz.)	DSF Pin Support Locations
1/2	A1V	13.1	A5/D5
2/3	A1V	13.1	A5/D5
3/4	A1V	13.1	A5/D5
4/4	A1V	13.1	A5/D5

4.3 Exceptions to MIL-S-901D

Instead of the normal sequence of shots specified in MIL-S-901D, the shot sequence listed in Table 3 was conducted in order to meet requirements for unrestricted orientation.

Table 3. Planned Shot Sequence

Shot No.	MIL-S-901D Test No.	Charge Standoff (feet)
1	2	30
2	3	25
3	4	20
4	4 (rotated)	20

5.0 TEST INSTALLATION/CONFIGURATION

5.1 Equipment Installation

Photograph No. 1 shows the installation for Shots 1 through 3.

Photograph No. 2 shows the installation for Shot 4.

Photograph No. 1. Overhead View of Initial Installation, Shots 1-3

Photograph No. 2. Overhead View of Initial Installation, Shot 4

5.2 Test Instrumentation

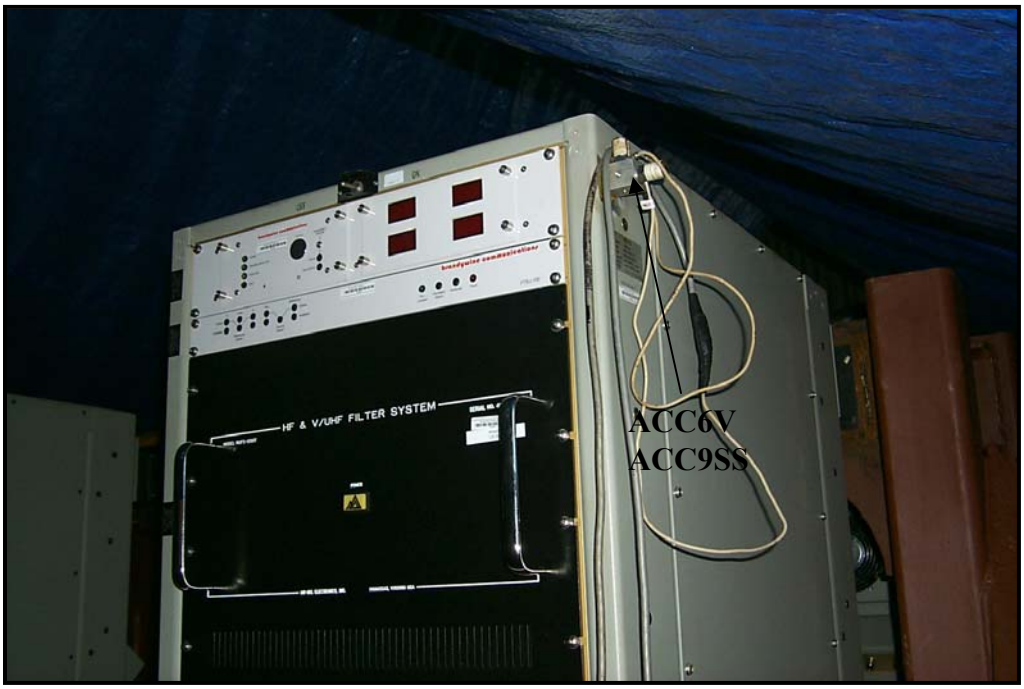
One velocity meter (VM), and nine accelerometers (ACC) were installed on the equipment and FSP during the test series to verify proper test geometries. One digital recording in Windows Media Player format was taken of each shot. Location of instrumentation listed in Table 4 can be seen in Photograph Nos. 3 through 7.

Table 4. Test Instrumentation

Item	Orientation	Location
VM1	Vertical	FSP Innerbottom, Blast Side
A1V	Vertical	Center DSF
A2A	Athwartship	Center DSF
A5V	Vertical	Top Right Front of HF Receive Rack
A6V	Vertical	Top Right Front of System Control Rack
A7SS	Side – Side	Top Right Front of System Control Rack
A8V	Vertical	Bottom Left Front of System Control Rack
A9SS	Side - Side	Bottom Left Front of System Control Rack
A10V	Vertical	Top Right Front of V/UHF Receive Rack
A11V	Vertical	Top Right Front of CCOP Rack

Photograph No. 3. Instrumentation Locations

Photograph No. 4. Instrumentation Location



Photograph No. 5. Instrumentation Location

Photograph No 6. Instrumentation Location

Photograph No. 7. Instrumentation Location

6.0 TEST RESULTS

6.1 Test Schedule

Table 5. Test Schedule Data

Shot No./Test No.	Standoff	Date	Time (EST)
1/2	30’ Athwartship	7-July-03	1222
2/3	25’ Athwartship	8-July-03	1159
3/4	20’ Athwartship	10-July-03	1231
4/4	20’ Athwartship	11-July-03	1546

6.2 Survey Findings

Pre- and post-test inspections and operational verifications were conducted before and after each shock test in accordance.

6.2.1 Survey Findings Prior to Testing

6.2.1.1 **Action:** The equipment under test (EUT) was inspected for proper installation and visual deficiencies.

Observation 1: No issues.

Resolution 1: N/A

6.2.1.2 **Action:** The EUT had operational tests performed

Observation 1: No issues.

Resolution 1: N/A

6.2.2 Survey Findings after Shot 1, MIL-S-901D, 30-foot Standoff

6.2.2.1 **Action:** The EUT was inspected for proper installation and visual deficiencies.

Observation 1: No issues.

Resolution 1: N/A

6.2.2.2 **Action:** The EUT had operational tests performed

Observation 1: The KVM and keyboard were not operational in the System Control Rack.

Resolution 1: The front cover was removed and power cycled to the KVM and keyboard. This corrected the KVM and keyboard issues.

Observation 2: The HF Receive, V/UHF Receive, and System Control Racks were not operational after the shock event.

Resolution 2: The reset button on the System Control Rack was pushed to cycle power. This did not correct any of the system failures. The AC power was cycled on both servers and full operation was restored in approximately 9 minutes 45 seconds.

Observation 3: No further issues.

Resolution 3: N/A

6.2.3 Survey Findings after Shot 2, MIL-S-901D, 25-foot Standoff

6.2.3.1 **Action:** The EUT was inspected for proper installation and visual deficiencies.

Observation 1: No issues.

Resolution 1: N/A

6.2.3.2 **Action:** The EUT had operational tests performed

Observation 1: The KVM and keyboard was not operational in the System Control Rack.

Resolution 1: The front cover was removed and power cycled to the KVM and keyboard. This corrected the KVM and keyboard issues.

Observation 2: The HF Receive, V/UHF Receive, and System Control Racks were not operational after the shock event.

Resolution 2: The reset button on the System Control Rack was pushed to cycle power. This did not correct any of the system failures. The AC power was cycled on both servers and full operation was restored in approximately 9 minutes 45 seconds.

Observation 3: No further issues.

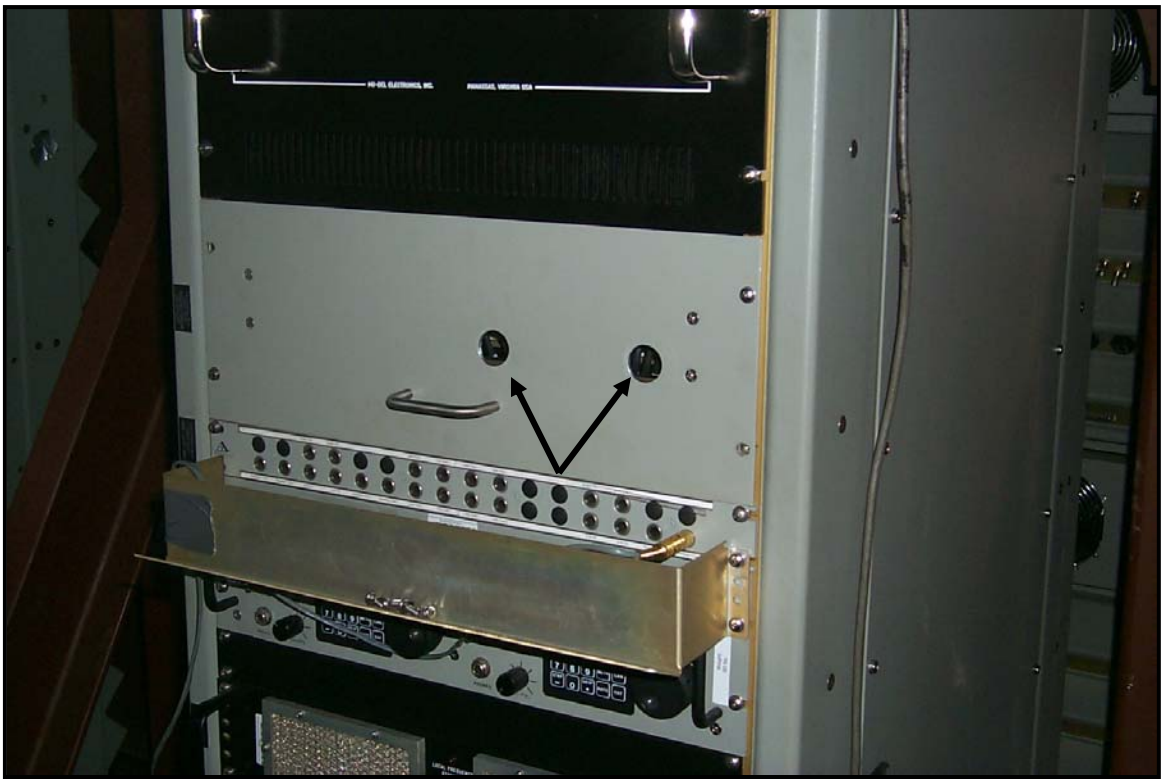
Resolution 3: N/A

NOTE 1: The UPSs on only two of the four cabinets were operational during the first two shots.

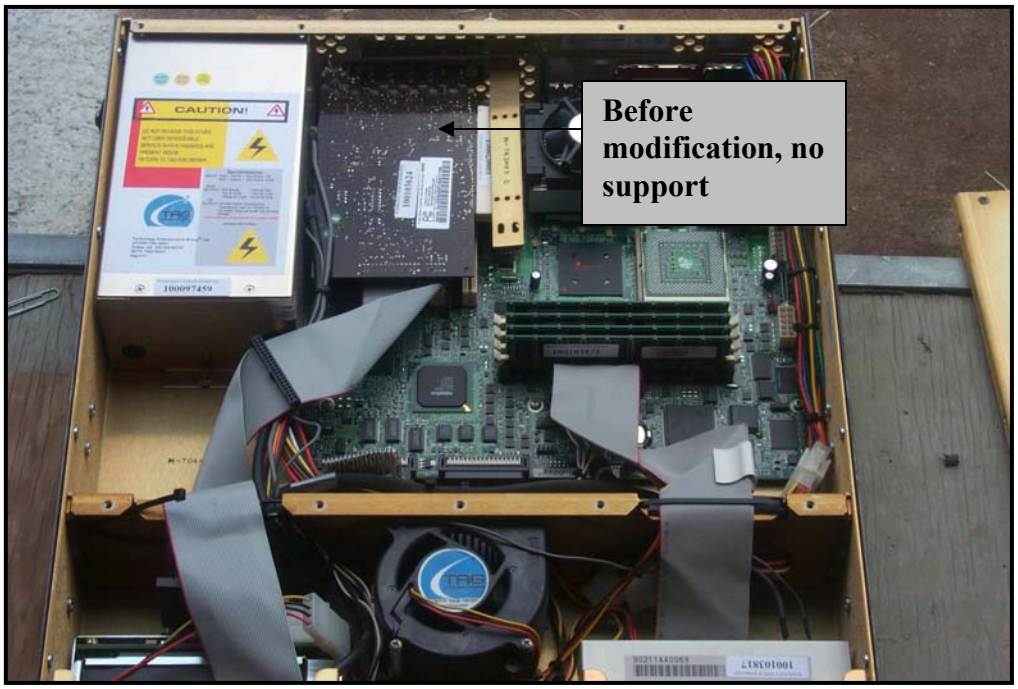
Photograph No. 8. New UPS

Photograph No. 9. Location of New UPS in Racks

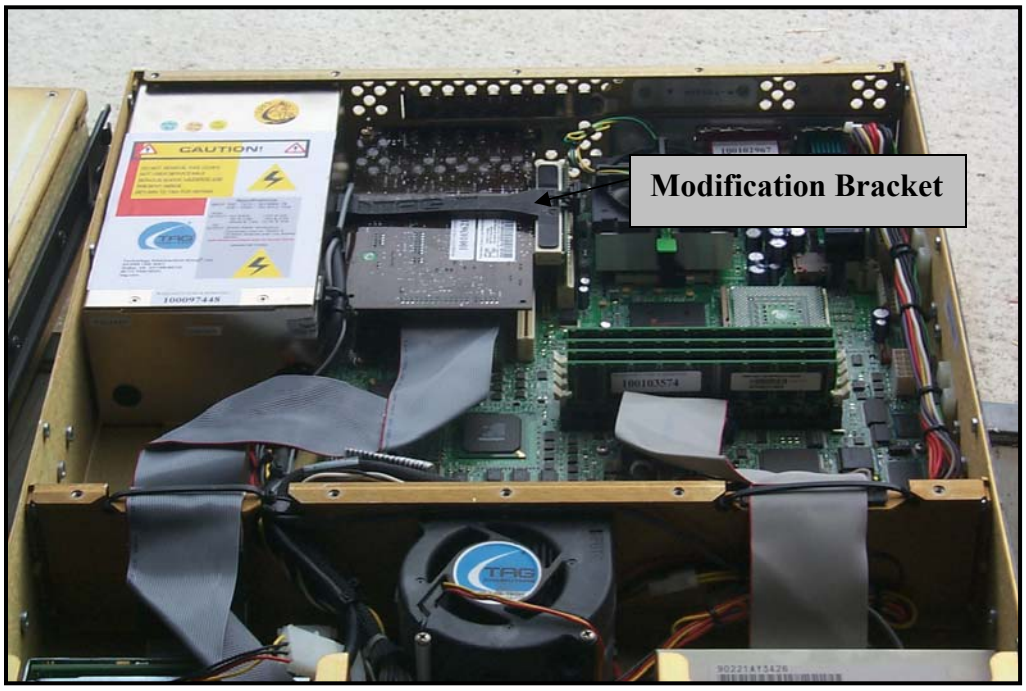
NOTE 2: To enable the operator of the rack to reset the KVM, the cover was removed and modified, as seen in Photograph No. 10. Two 1-inch holes were drilled into the cover to allow for operator reset.



Photograph No. 10. Modification to KVM Cover



Photograph No. 11. Before Modification



Photograph No. 12. After Modification

6.2.4 Survey Findings after Shot 3, MIL-S-901D, 20-foot Standoff,

6.2.4.1 **Action:** The EUT was inspected for proper installation and visual deficiencies.

Observation 1: No issues

Resolution 1: N/A

6.2.4.2 **Action:** The EUT had operational tests performed

Observation 1: The R-2412 Circuit Breaker in the V/UHF Receive Rack had tripped.

Resolution 1: The circuit breaker was reset.

Observation 2: The V/UHF Receive and System Control Racks were not operational after the shock event.

Resolution 2: The racks were not operational because the UPS in the V/UHF Rack was off-line. The UPS was reset but did not operate. The UPS was by-passed and all EUT were operational.

Observation 3: No further issues.

Resolution 3: N/A

NOTE: The EUT was rotated 90° after completion of the post-shot inspection. Photograph No. 4 shows the rotated test setup.

6.2.5 Survey Findings after Shot 4, MIL-S-901D, 20-foot Standoff,

6.2.5.1 **Action:** The EUT was inspected for proper installation and visual deficiencies.

Observation 1: No issues.

Resolution 1: N/A

6.2.5.2 **Action:** The EUT had operational tests performed

Observation 1: The HF Receive Rack was not operating correctly.

Resolution 1: Rack was rebooted and operated correctly.

Observation 2: The V/UHF Receive Rack was not powered properly. UPS was not working.

Resolution 2: The on-site representative advised that a complete post-teardown inspection was required to troubleshoot the problems.

Observation 3: The System Control Rack Servers were not operating correctly.

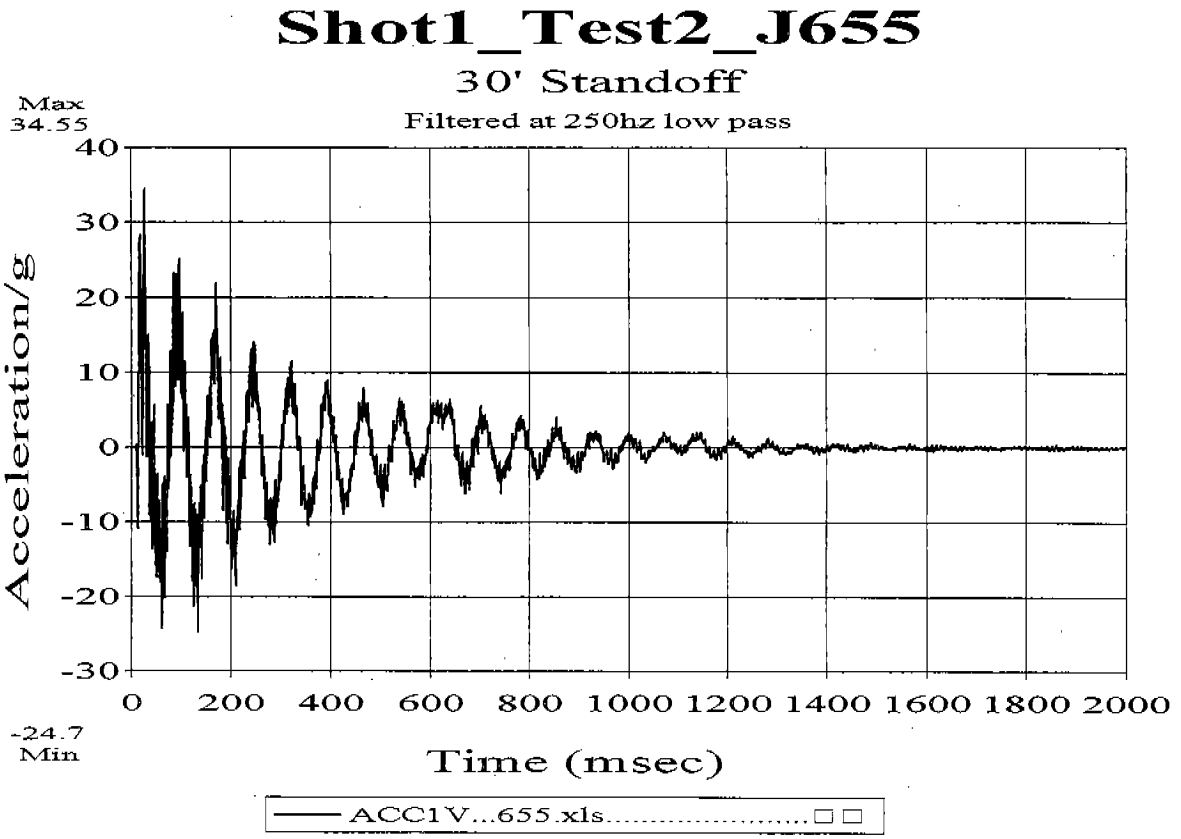
Resolution 3: Servers were re-booted and operated correctly.

Observation 4: No further issues.

Resolution 4: This completed the test series.

Appendix A

Test Instrumentation Data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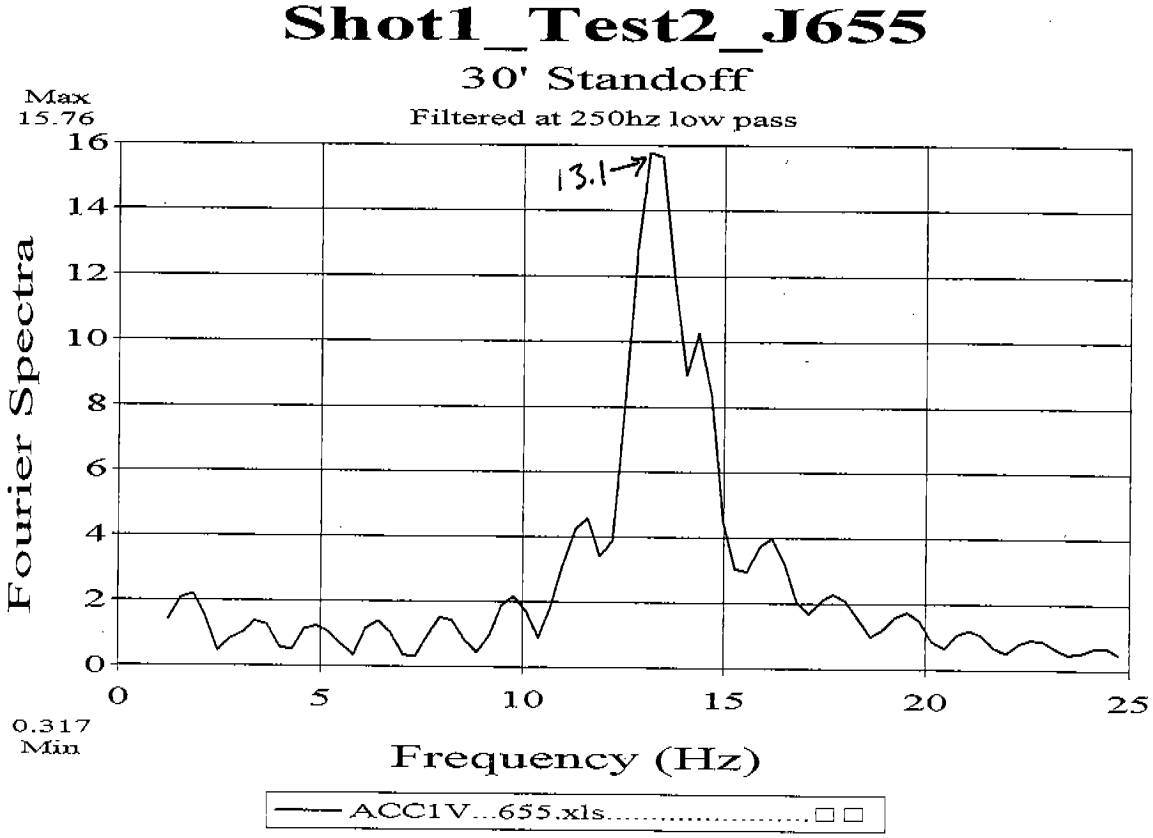
30' Standoff
Filtered at 250hz low pass
Max
34.55
Acceleration/g
40
30
20
10
0
-10
-20
-30
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-24.7
Min
Time (msec)
ACC1V...655.xls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30' Standoff
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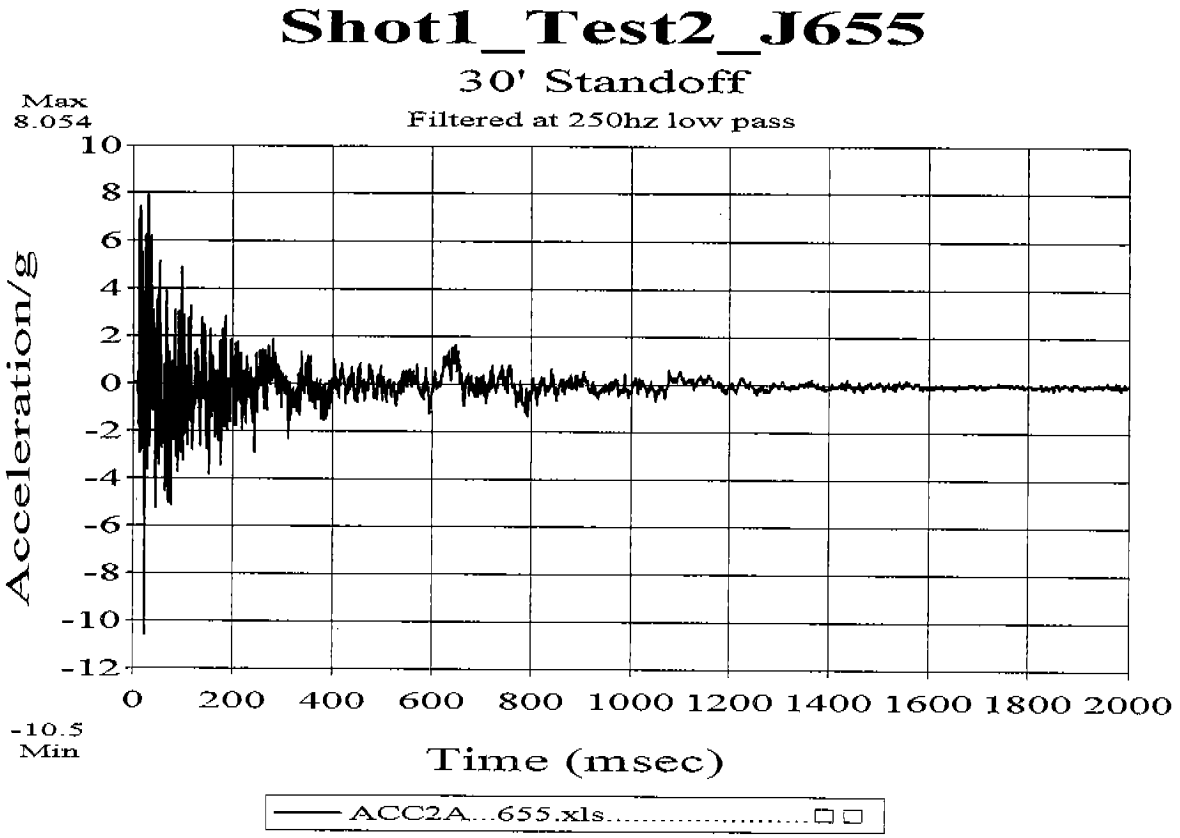
15.76
0.317
Min
Fourier Spectra
Frequency (Hz)
13.1
0
2
4
6
8
10
12
14
16
0
5
10
15
20
25
ACC1V...655.xls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30' Standoff
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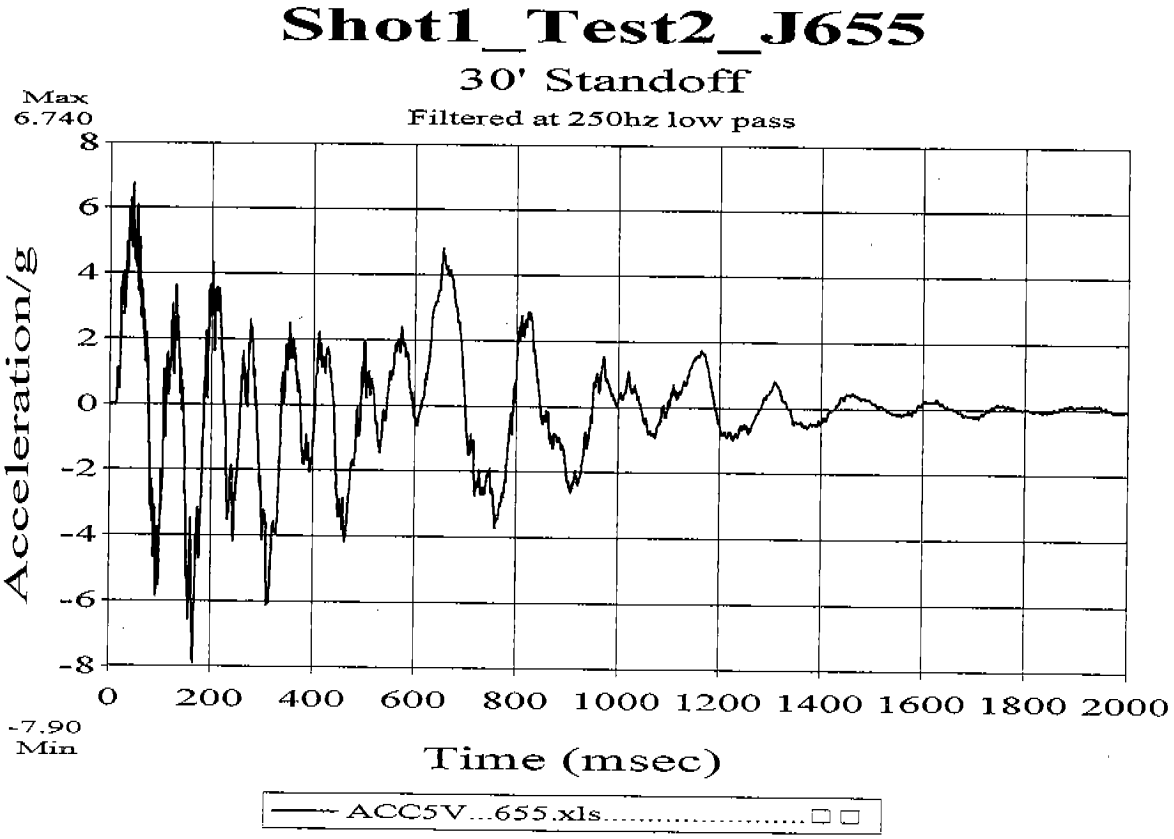
Max
8.054
Acceleration/g
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-10.5
Min
Time (msec)
ACC2A...655.xls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30' Standoff
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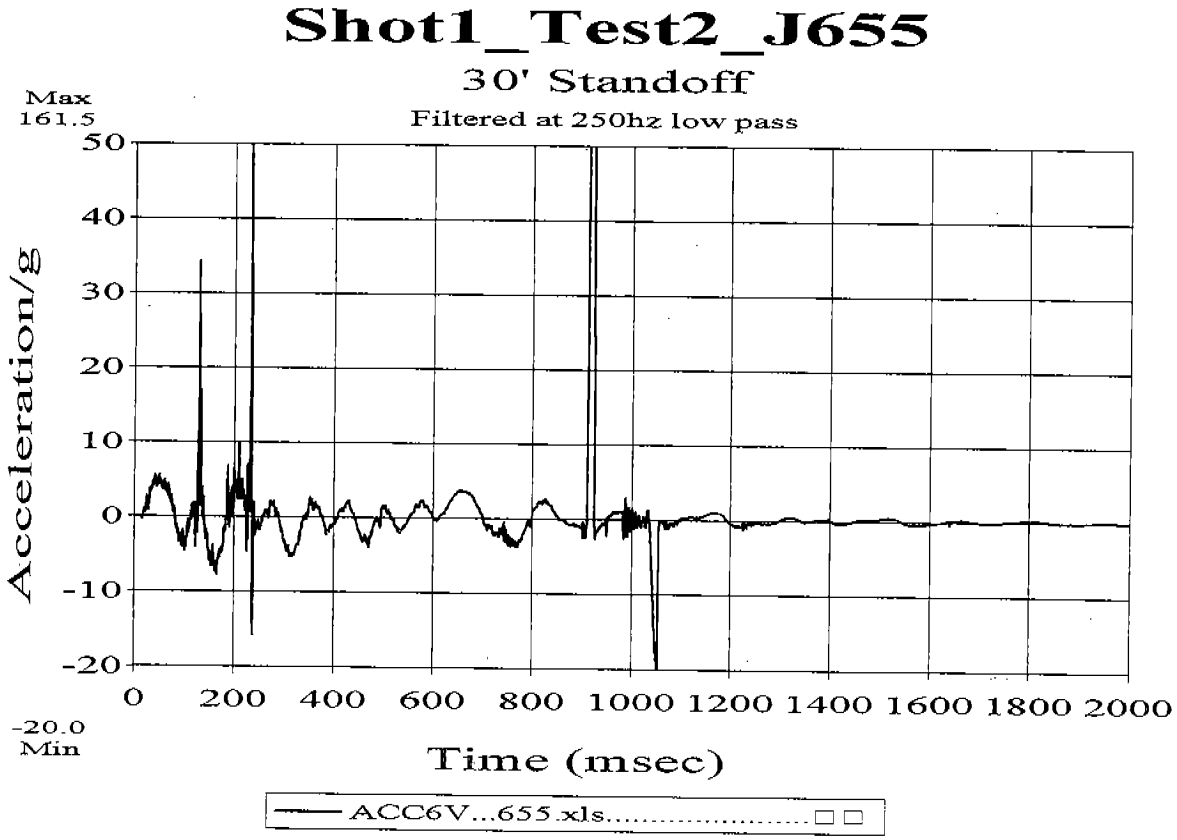
Max
6.740
Acceleration/g
8
6
4
2
0
-2
-4
-6
-8
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-7.90
Min
Time (msec)
ACC5V...655.xls


Shot1_Test2_J655
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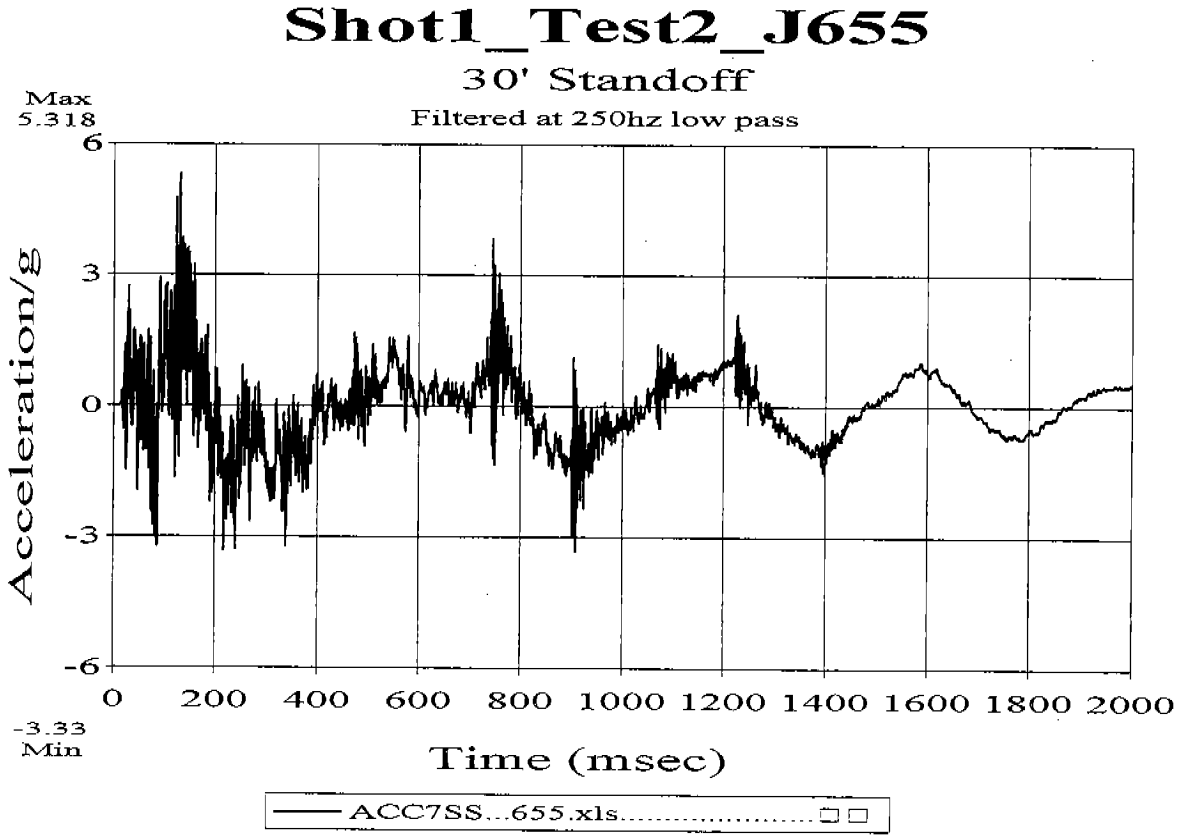
Max
161.5
Acceleration/g
50
40
30
20
10
0
-10
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-20.0
Min
Time (msec)
ACC6V...655.xls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5.318
-3.33
Min
Acceleration/g
6
3
0
-3
-6
0
200
400
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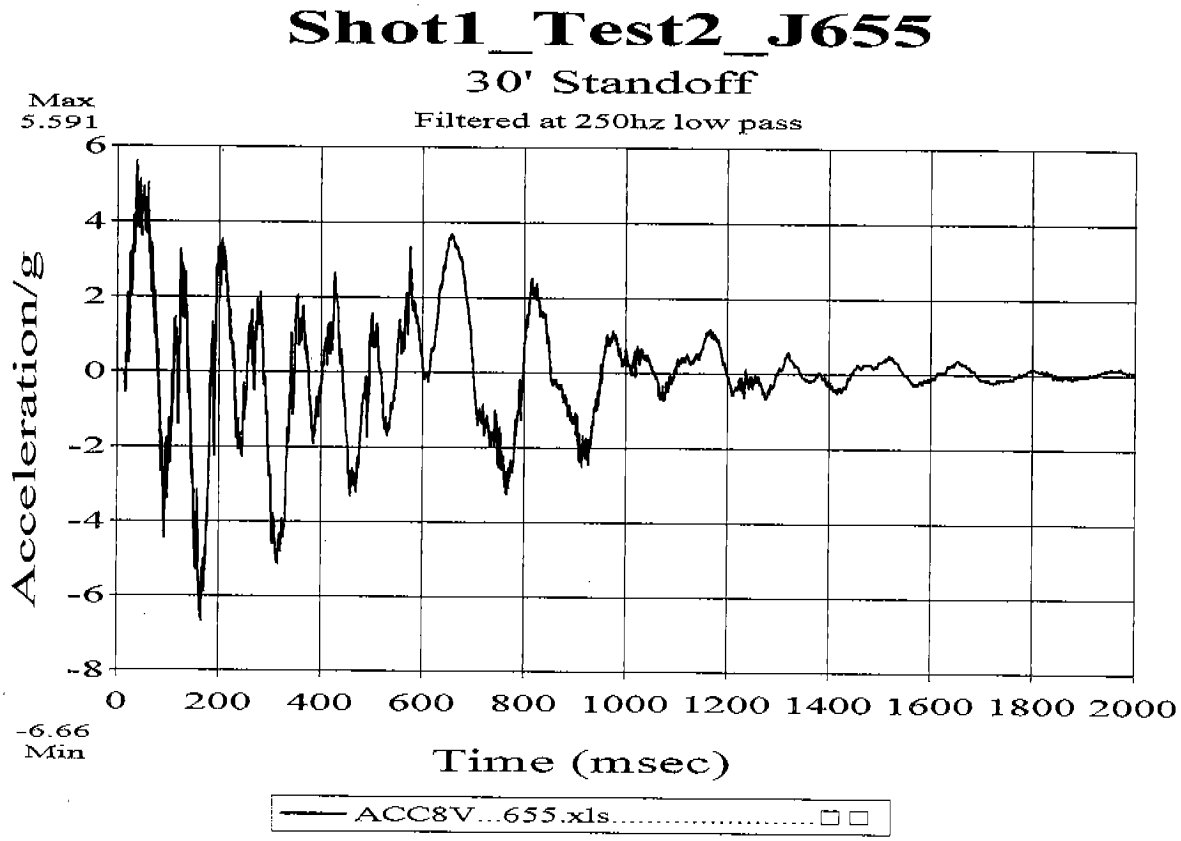
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC7SS...655.xls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Filtered at 250hz low pass
Max
5.591
Acceleration/g
6
4
2
0
-2
-4
-6
-8
0
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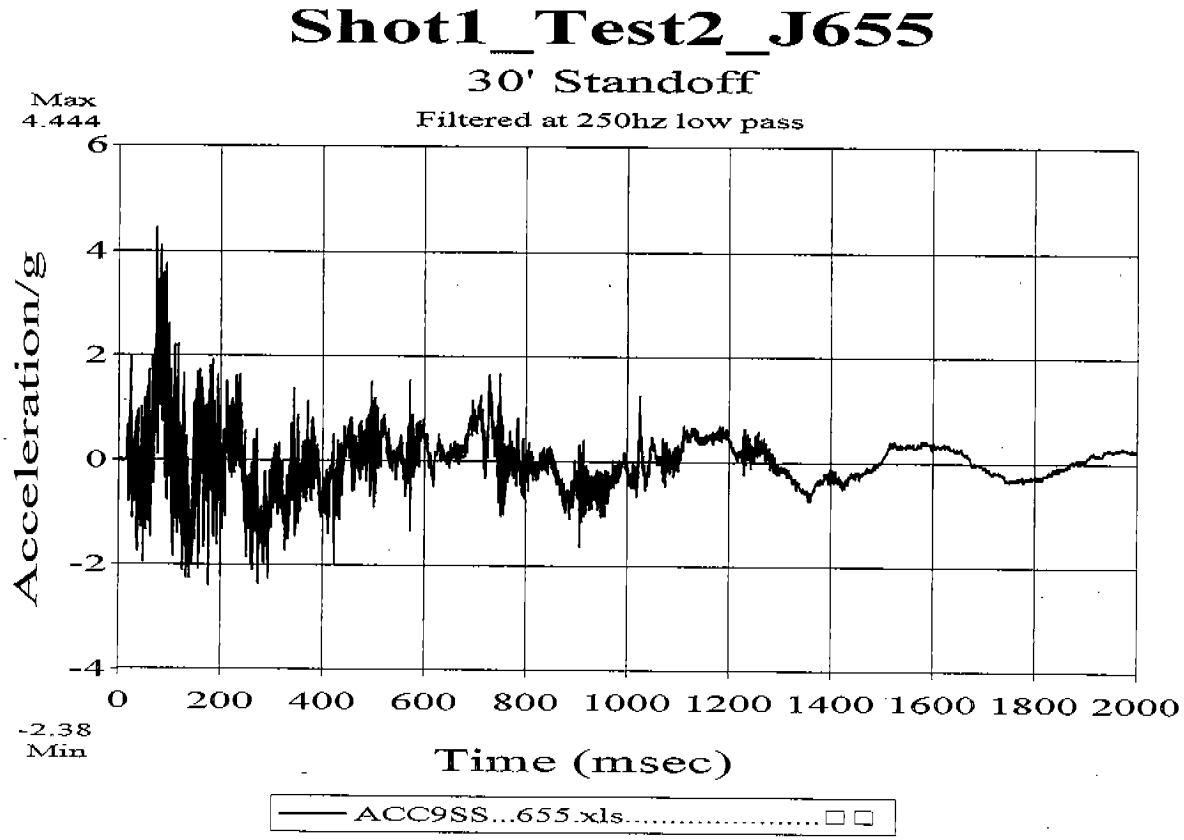
400
600
800
1000
1200
1400
1600
1800
2000
-6.66
Min
Time (msec)
ACC8V...655.xls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-2.38
Min
Acceleration/g
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4
2
0
-4
0
200
400
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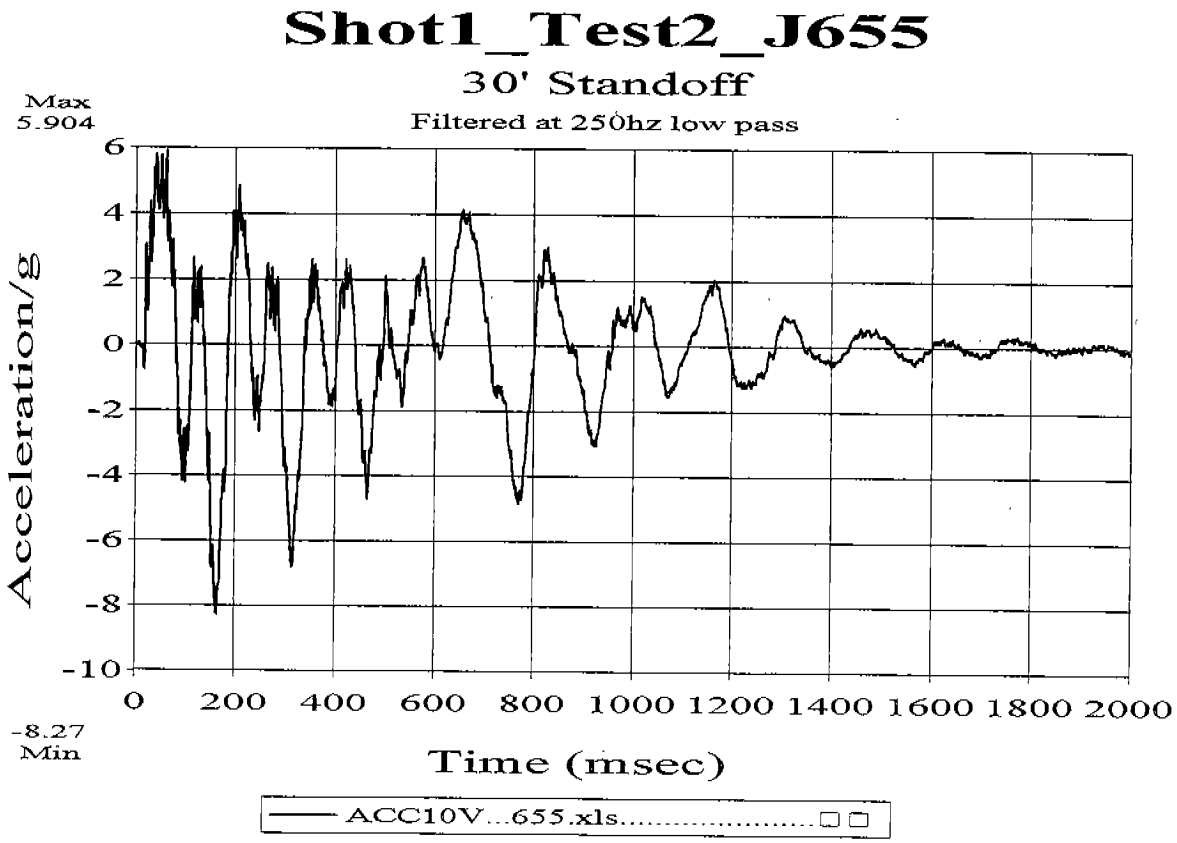
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC9SS...655.xls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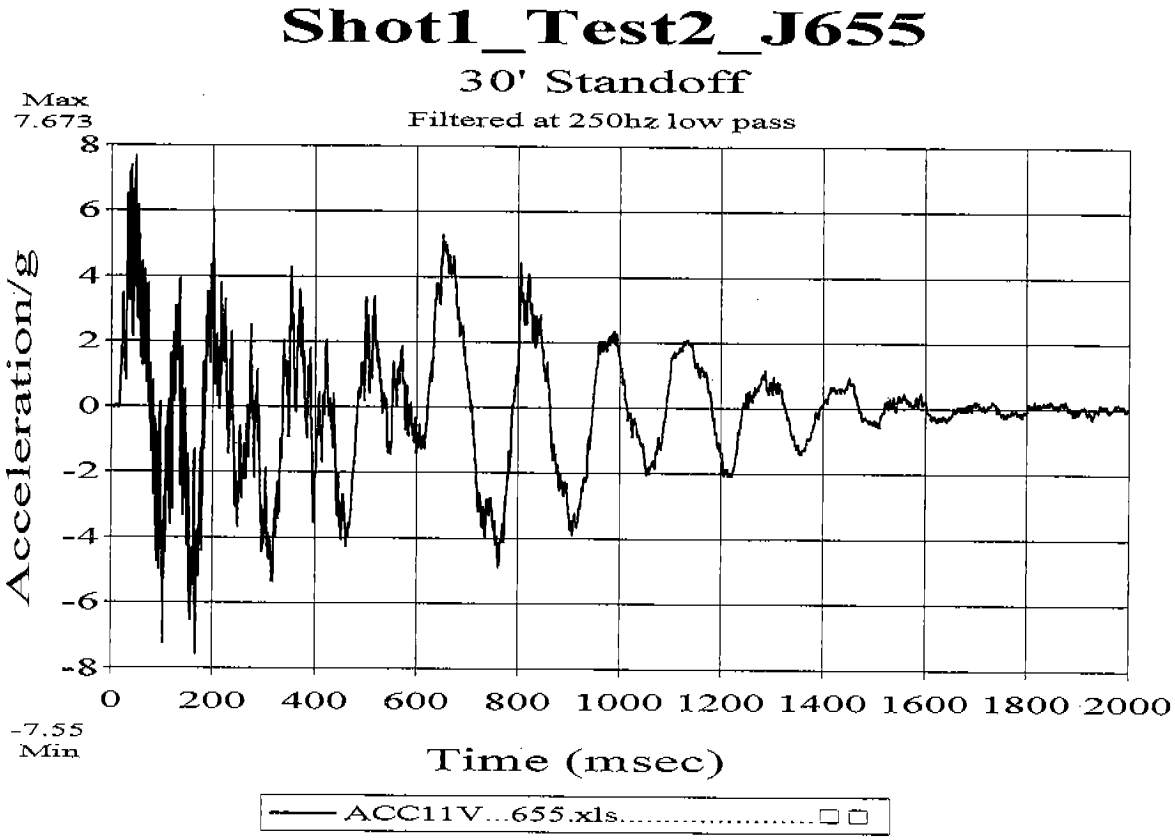
30' Standoff
Filtered at 250hz low pass
Max
5.904
-8.27
Min
Acceleration/g
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC10V...655.xls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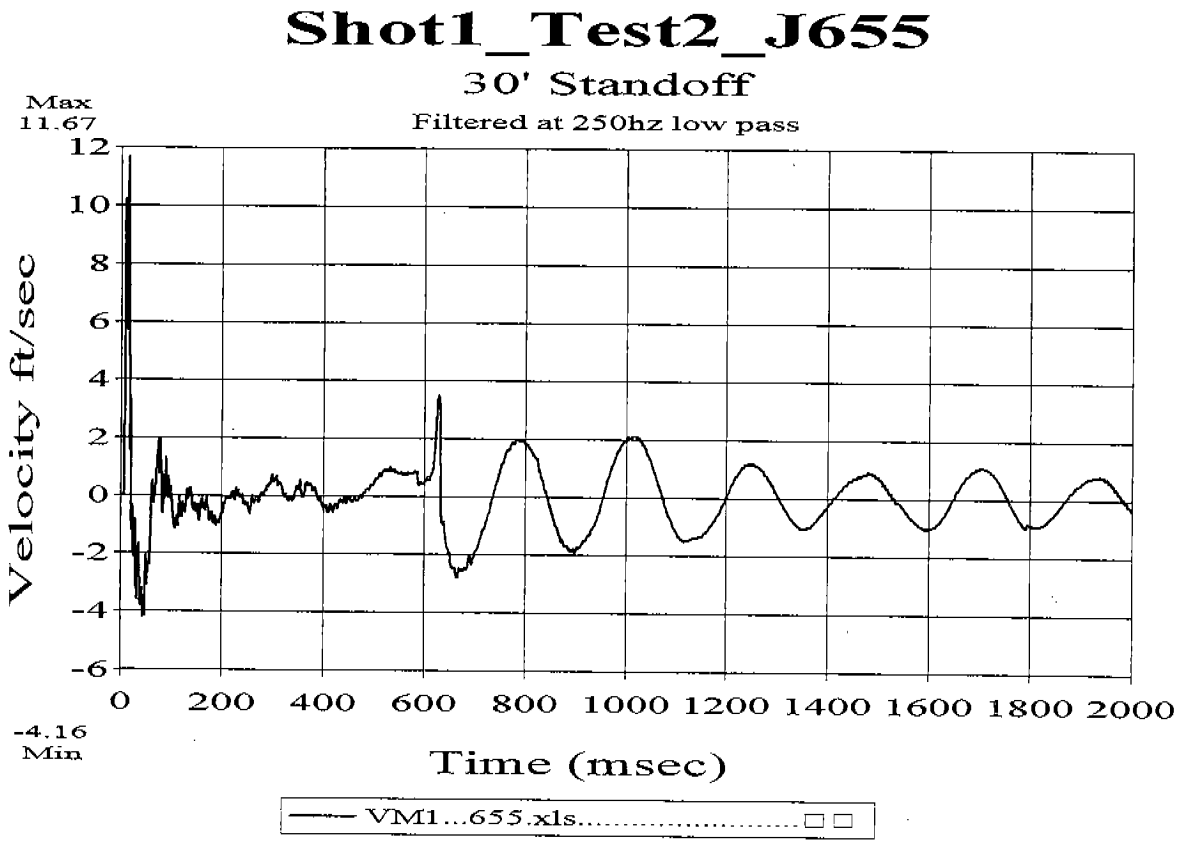
30' Standoff
Filtered at 250hz low pass
Max
7.673
Acceleration/g
8
6
4
2
0
-2
-4
-6
-8
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-7.55
Min
Time (msec)
ACC11V...655.xls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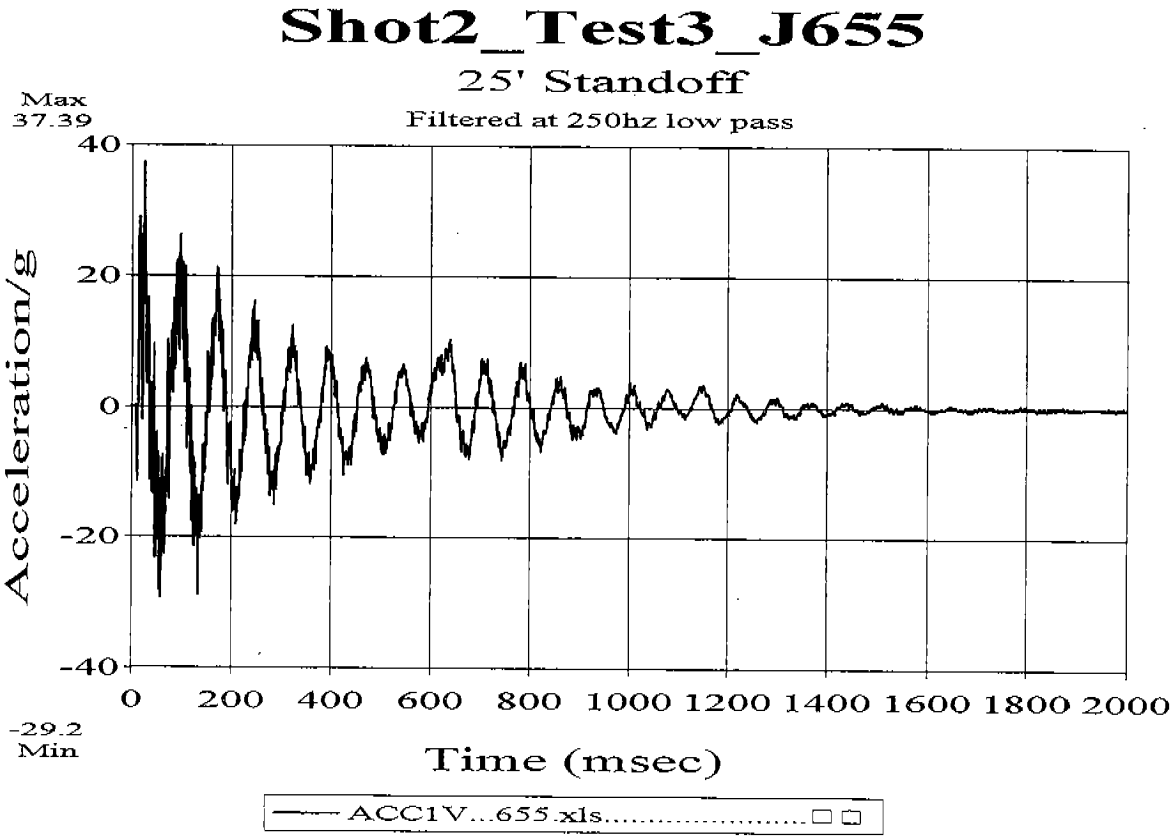
30' Standoff
Filtered at 250hz low pass
Max
11.67
-4.16
Min
Velocity ft/sec
12
10
8
6
4
2
0
-2
-4
-6
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
VM1...655.xls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25' Standoff
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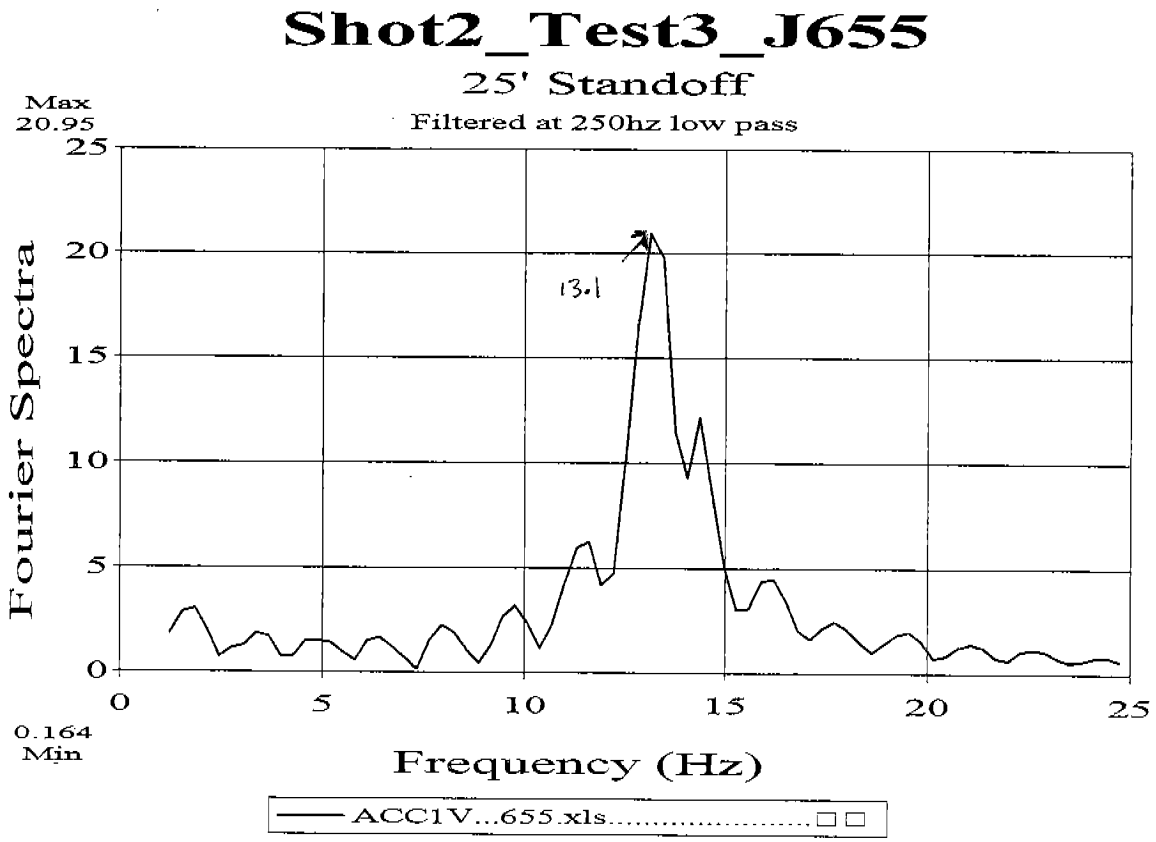
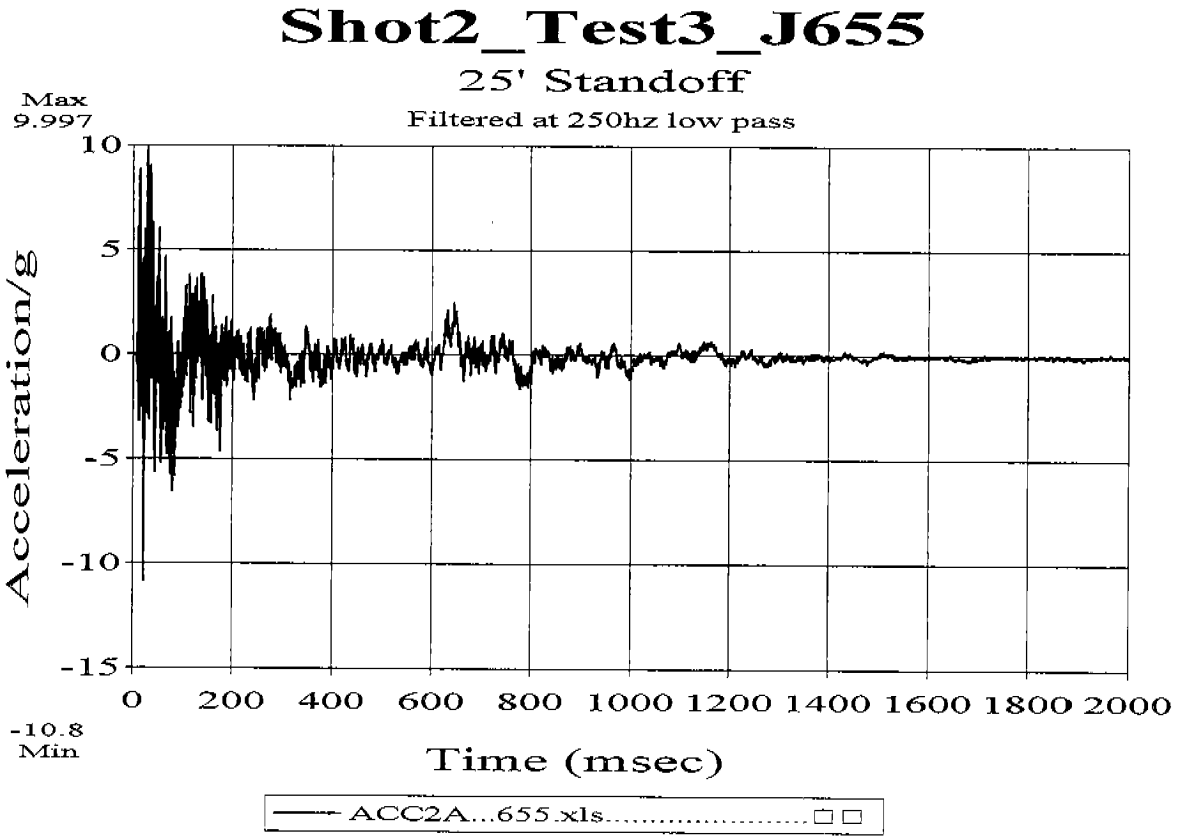
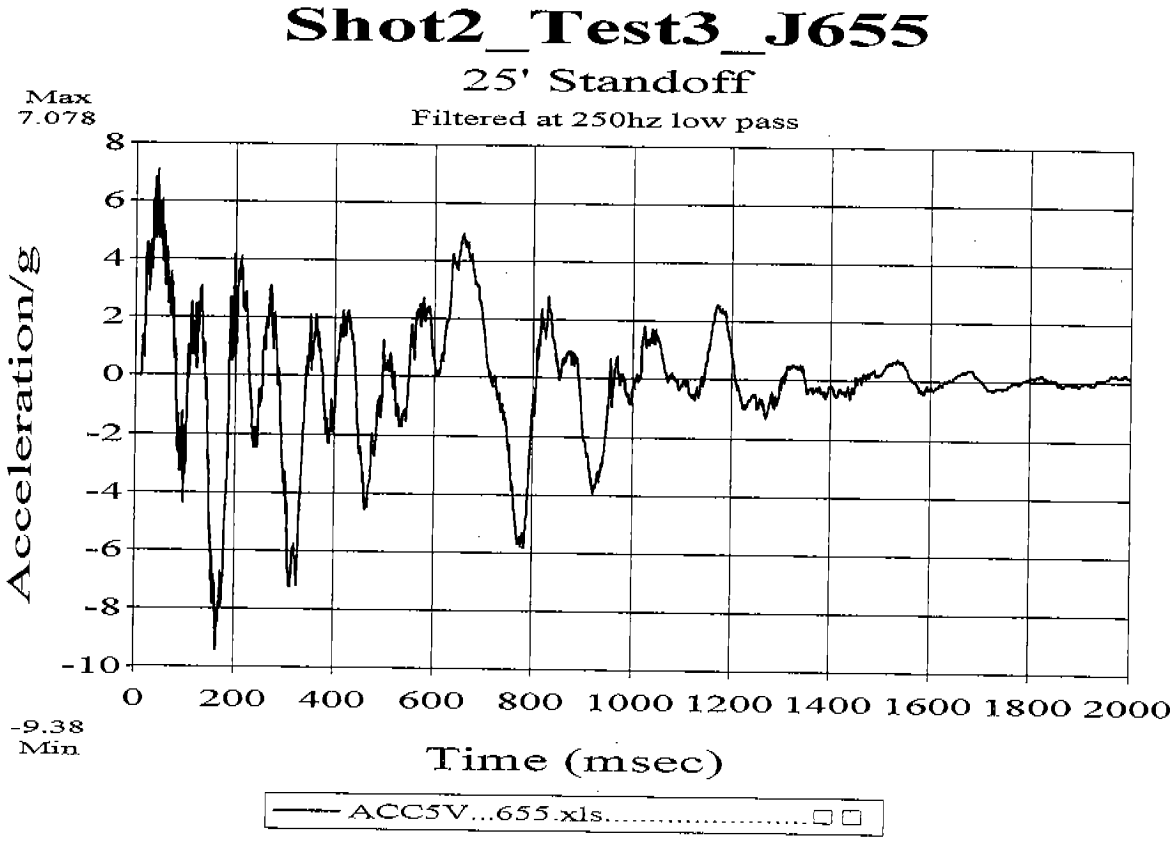
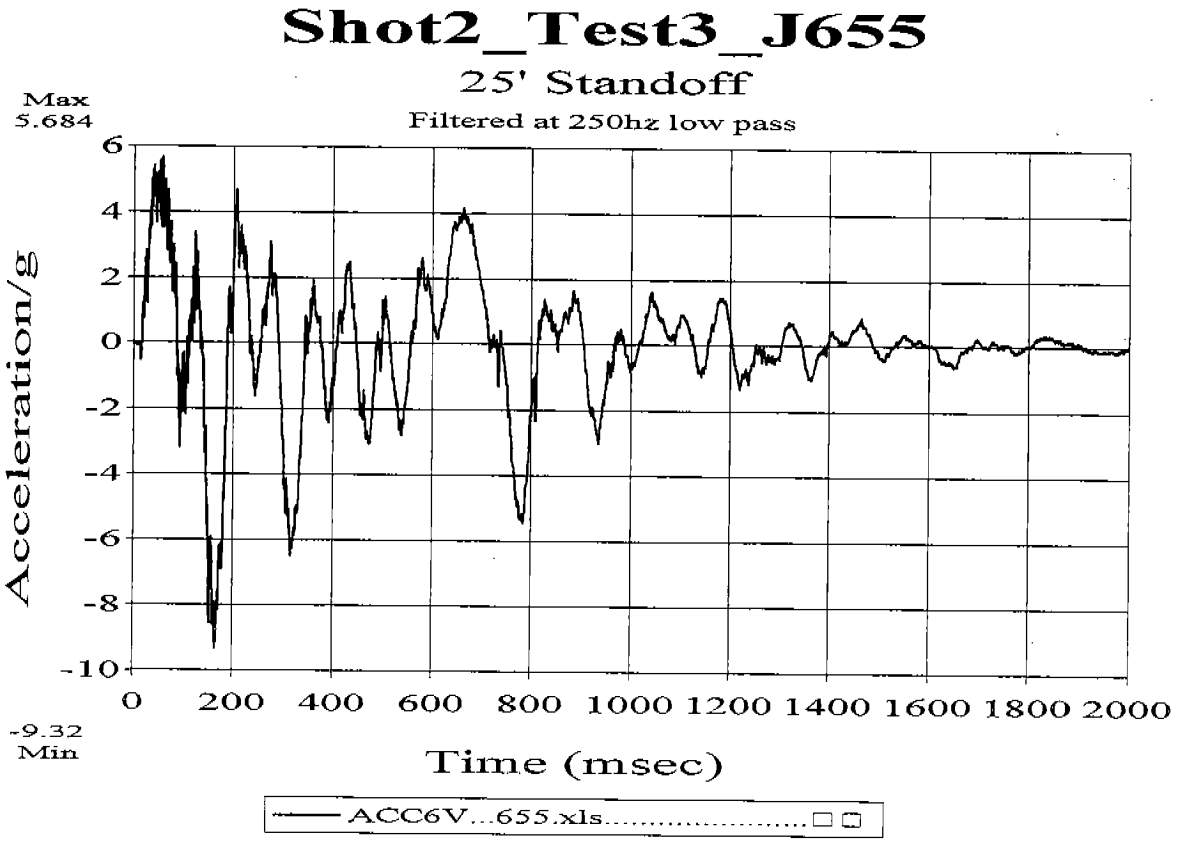
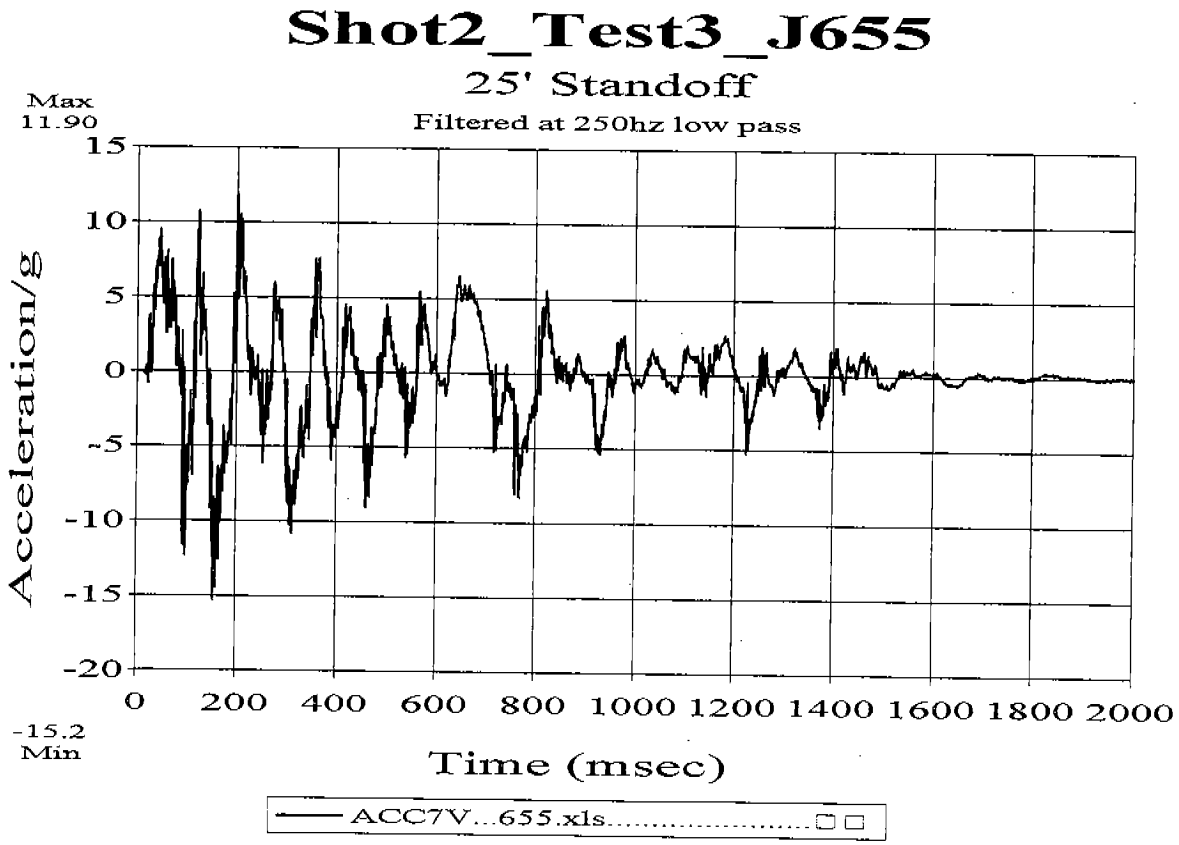
Max
37.39
-29.2
Min
Acceleration/g
40
20
0
-20
-40
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC1V...655.xls

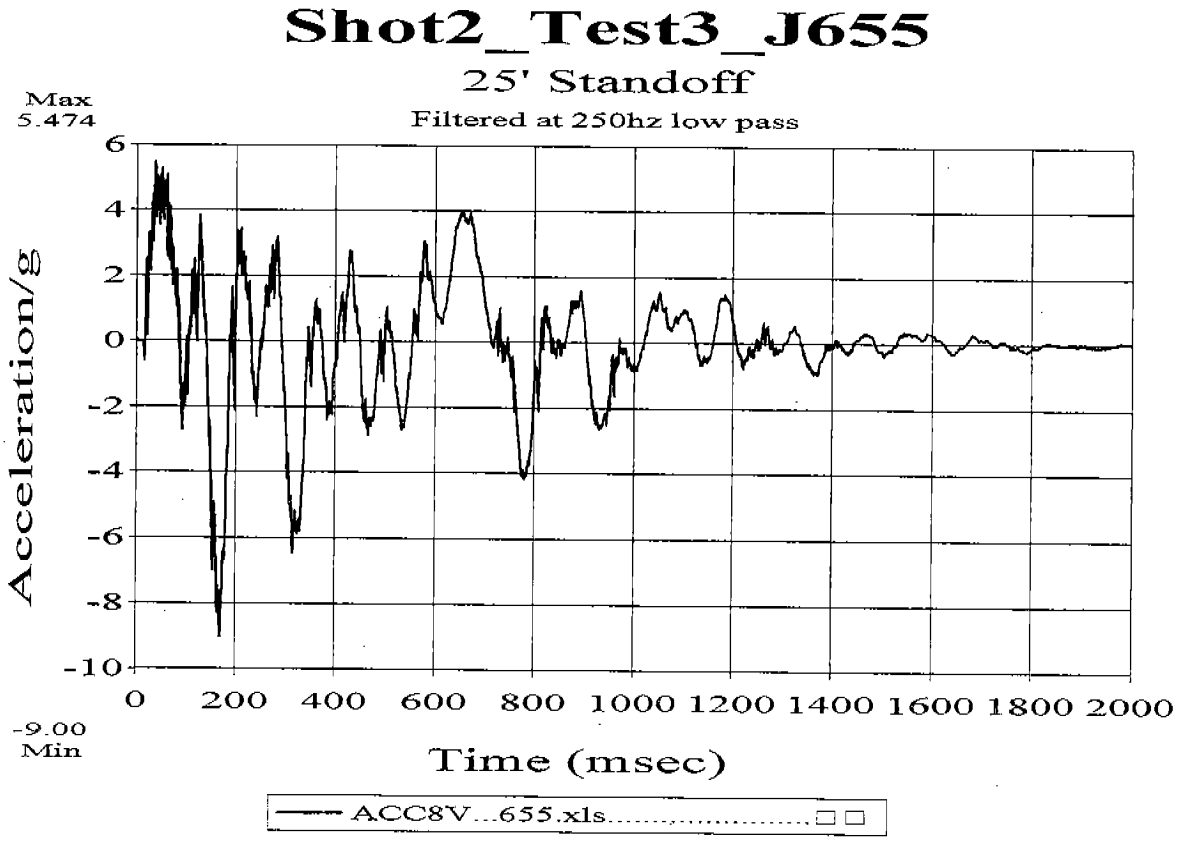

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
20.95
Min
0.164
Fourier Spectra
Frequency (Hz)
13.1
0
5
10
15
20
25
ACC1V...655.xls

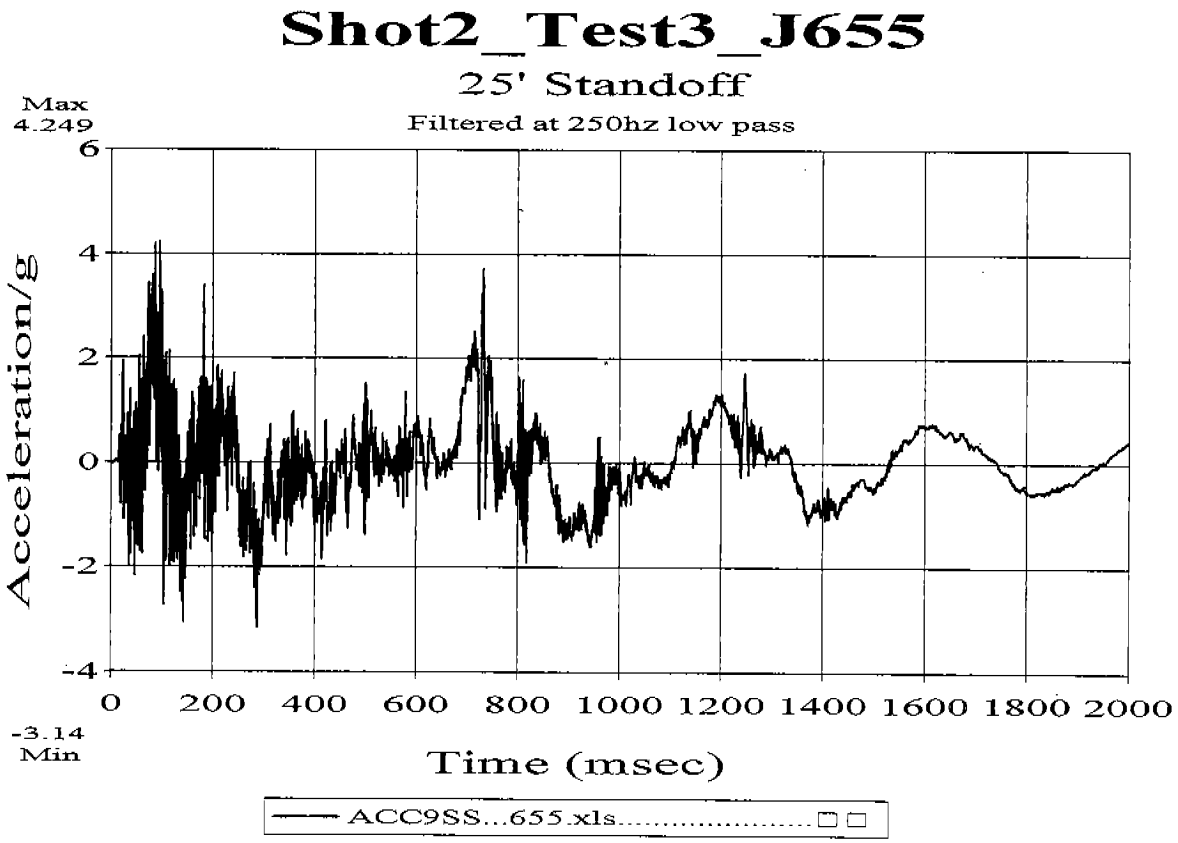

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
9.997
-10.8
Min
Acceleration/g
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC2A...655.xls

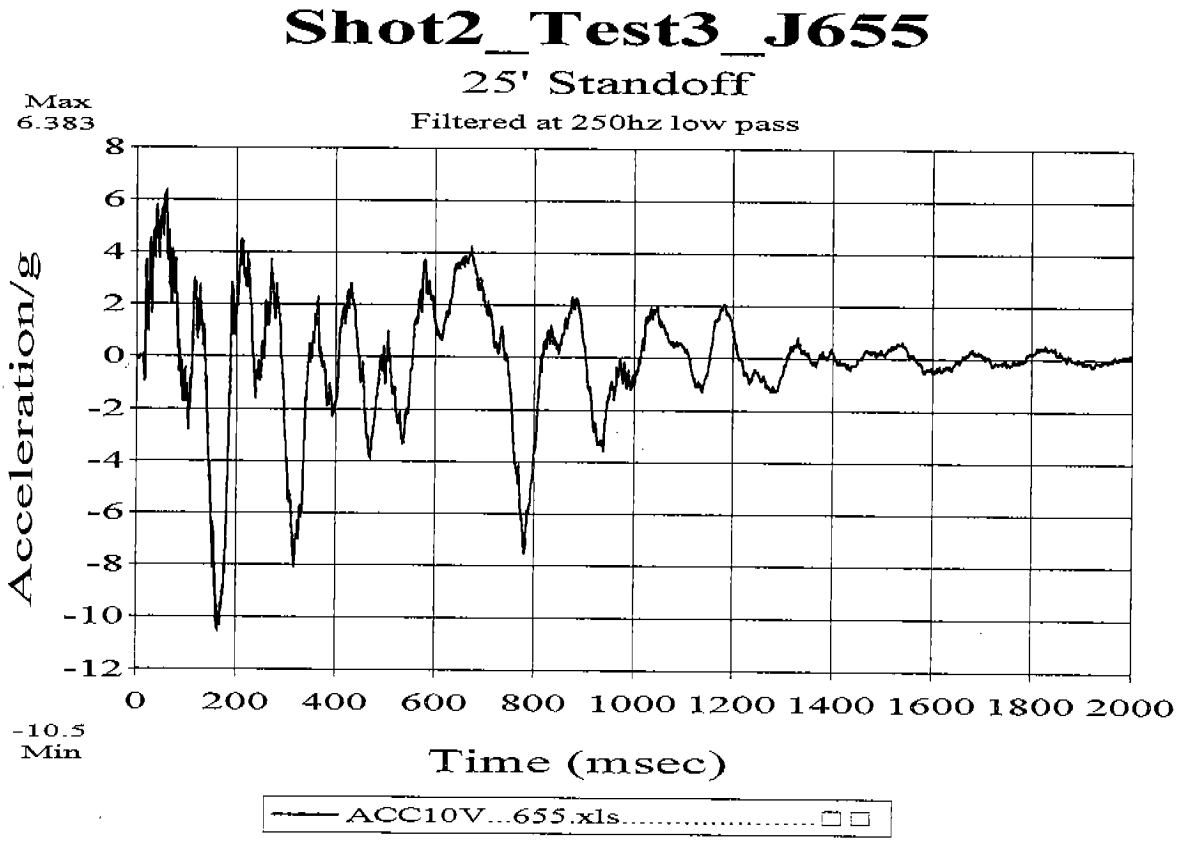

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
7.078
-9.38
Min
Acceleration/g
8
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC5V...655.xls

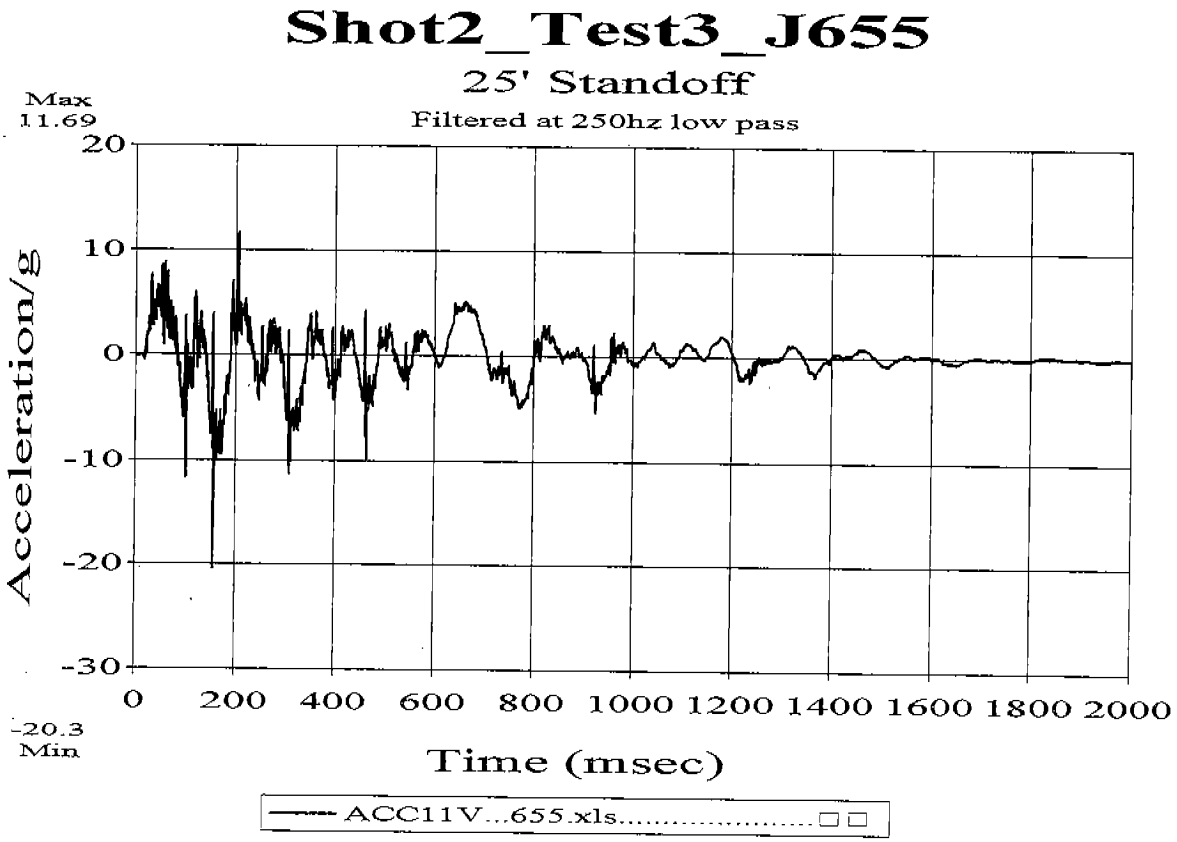

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
5.684
-9.32
Min
Acceleration/g
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC6V...655.xls

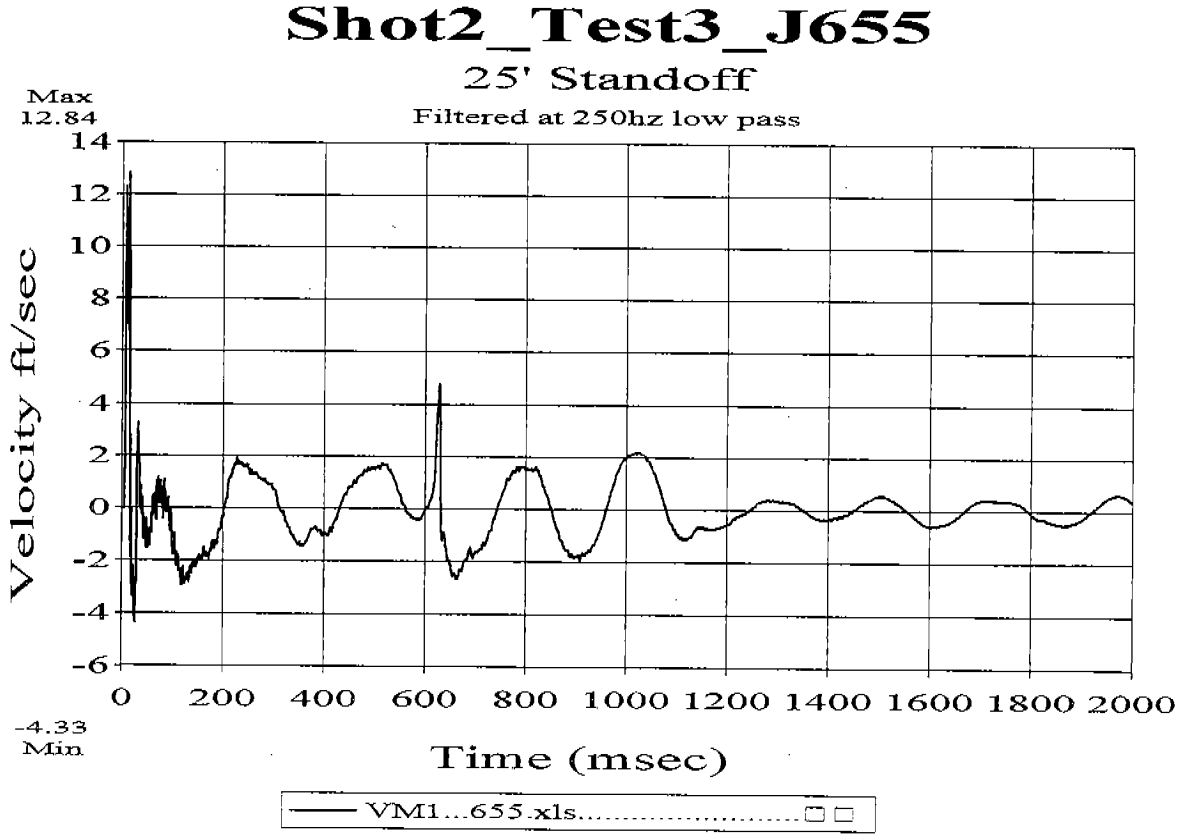

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
11.90
-15.2
Min
Acceleration/g
15
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC7V...655.xls

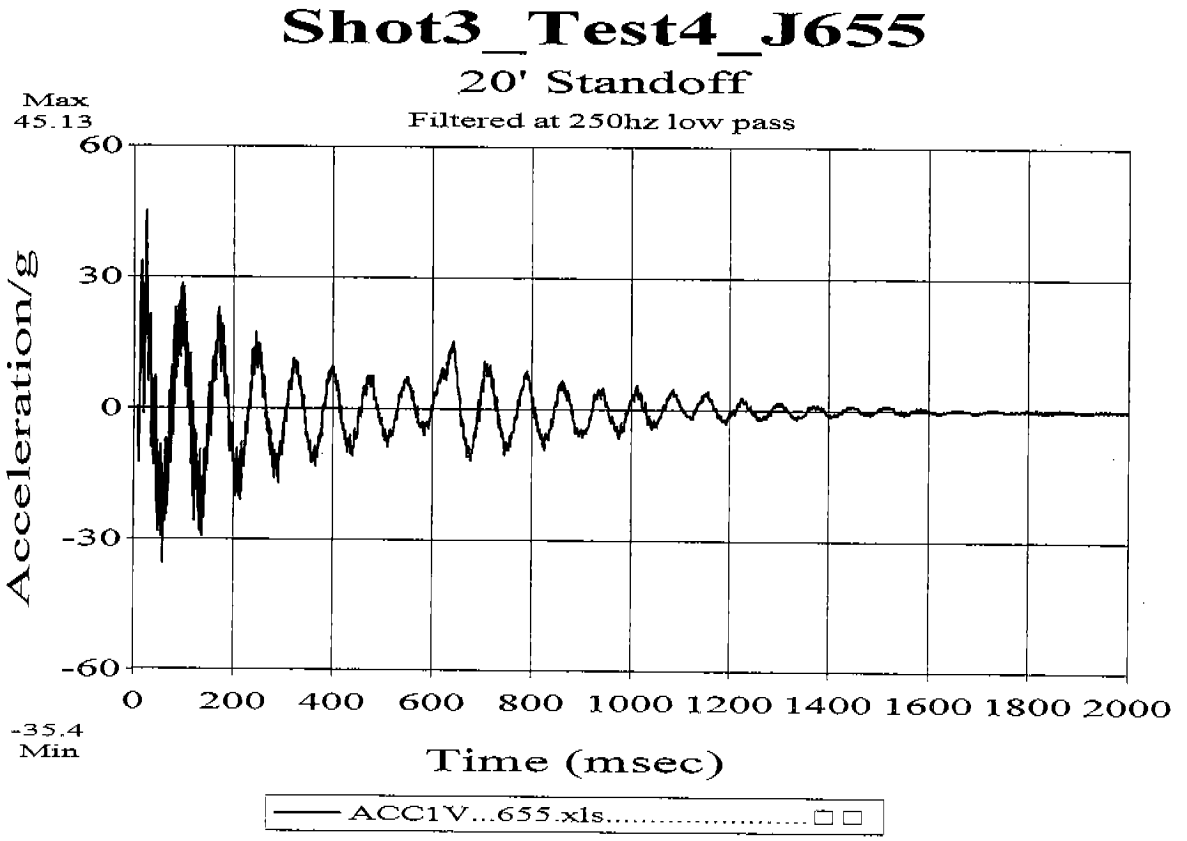

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
5.474
-9.00
Min
Acceleration/g
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC8V...655.xls

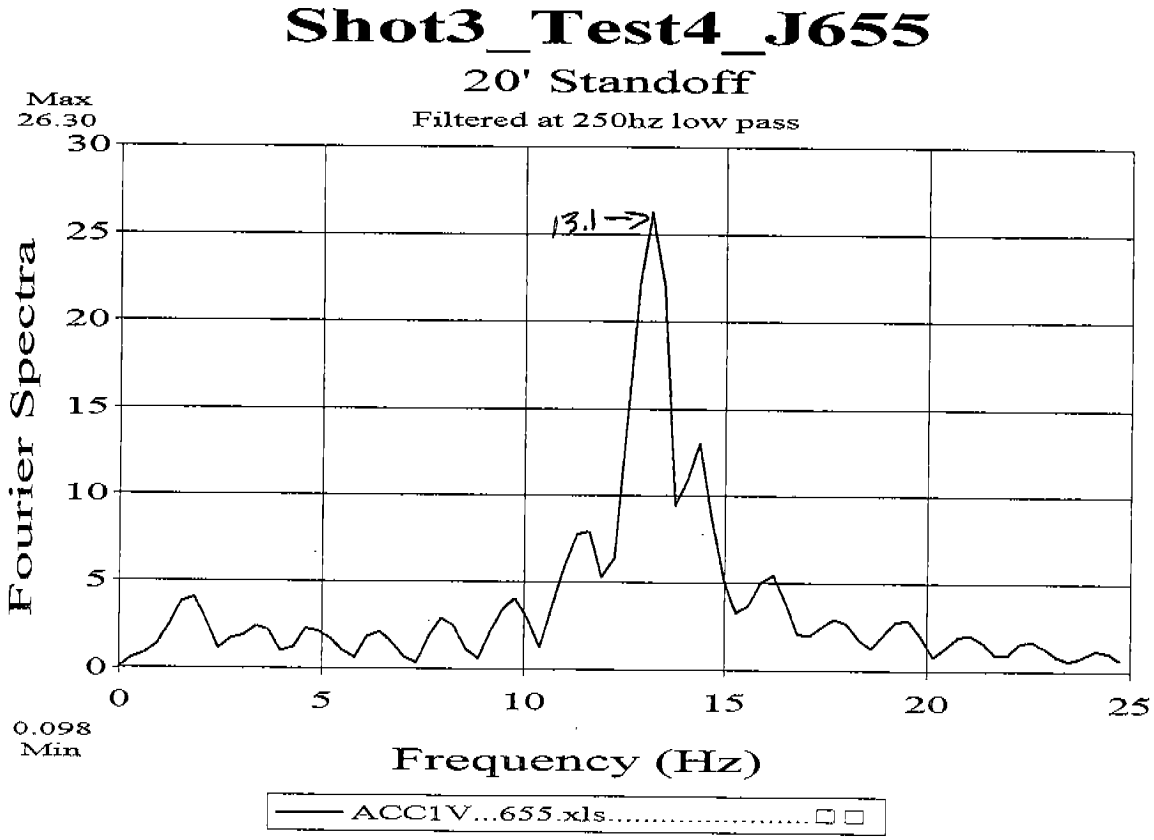

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
4.249
-3.14
Min
Acceleration/g
6
4
2
0
-2
-4
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC9SS...655.xls

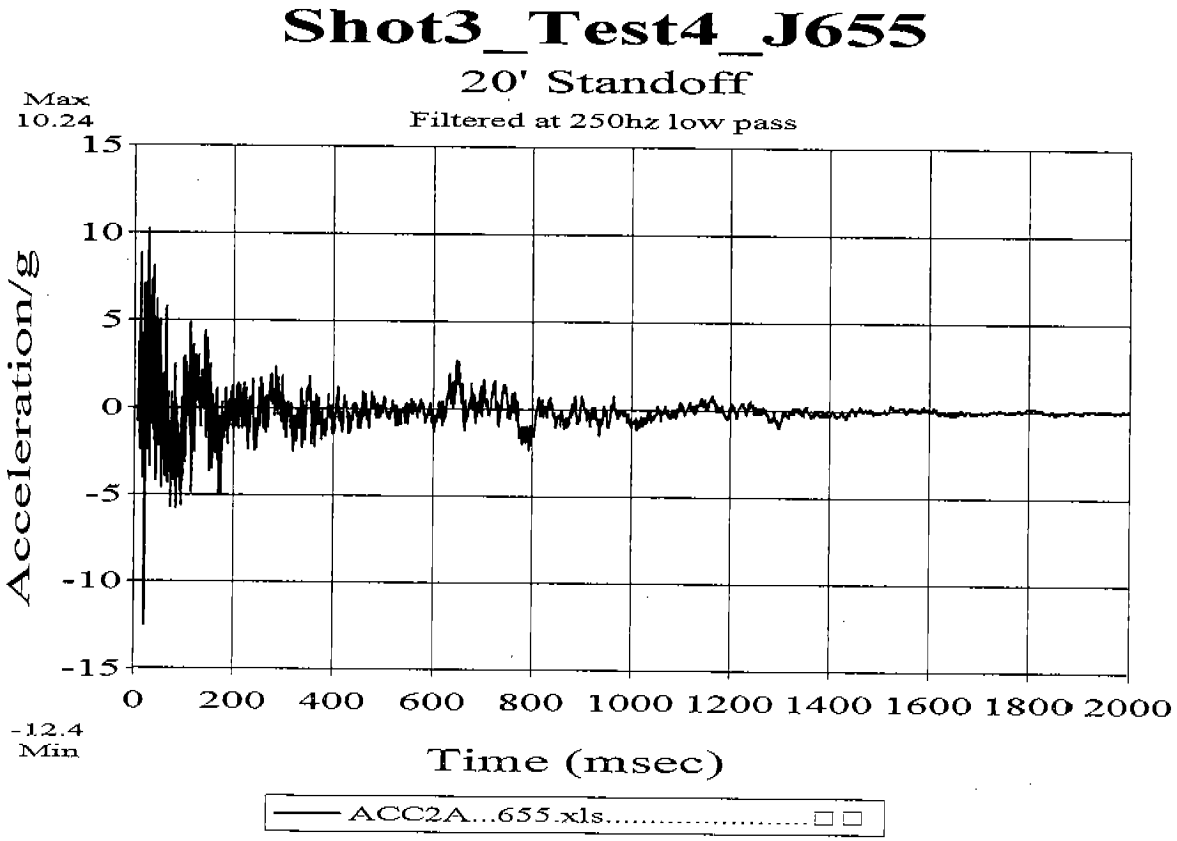

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
6.383
Min
-10.5
Acceleration/g
8
6
4
2
0
-2
-4
-6
-8
-10
-12
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC10V...655.xls

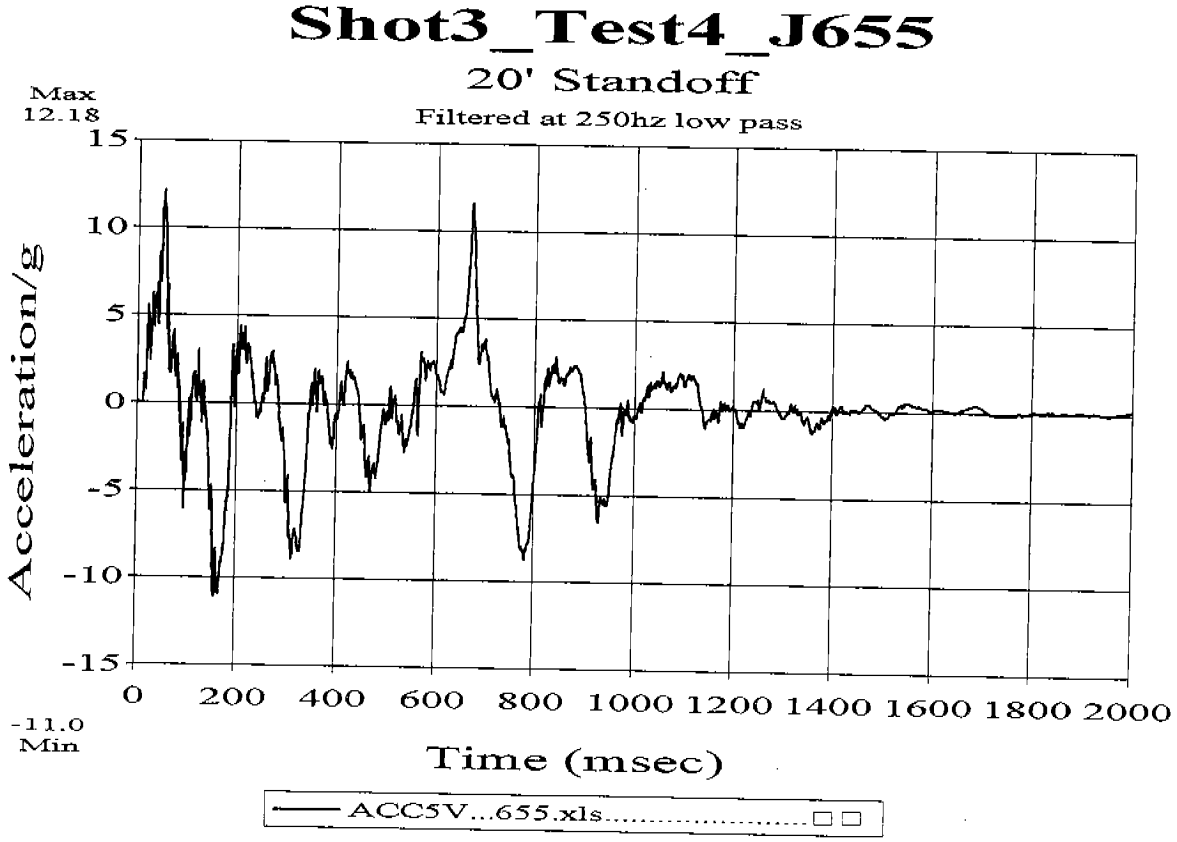

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
11.69
Min
-20.3
Acceleration/g
20
10
0
-10
-20
-30
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC11V...655.xls

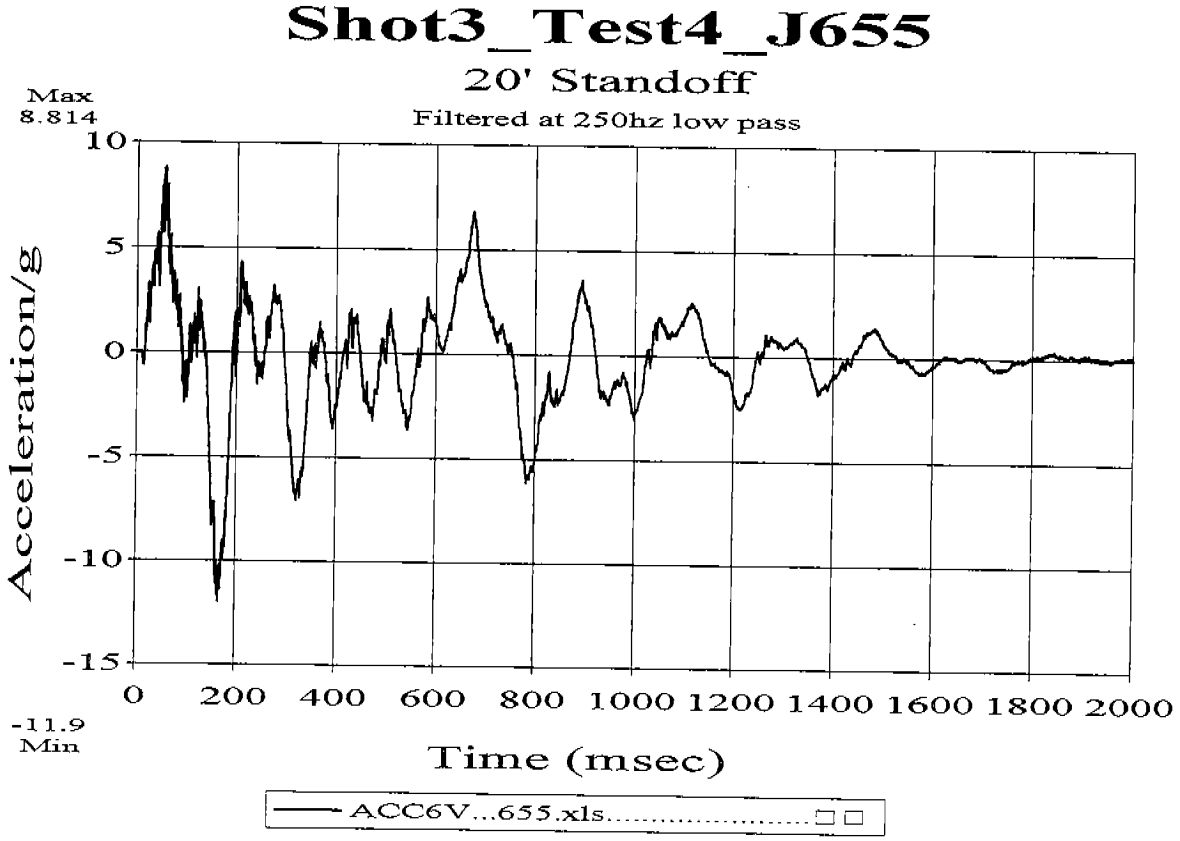

Shot2_Test3_J655
25' Standoff
Filtered at 250hz low pass
Max
12.84
Velocity ft/sec
14
12
10
8
6
4
2
0
-2
-4
-6
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-4.33
Min
Time (msec)
VM1...655.xls

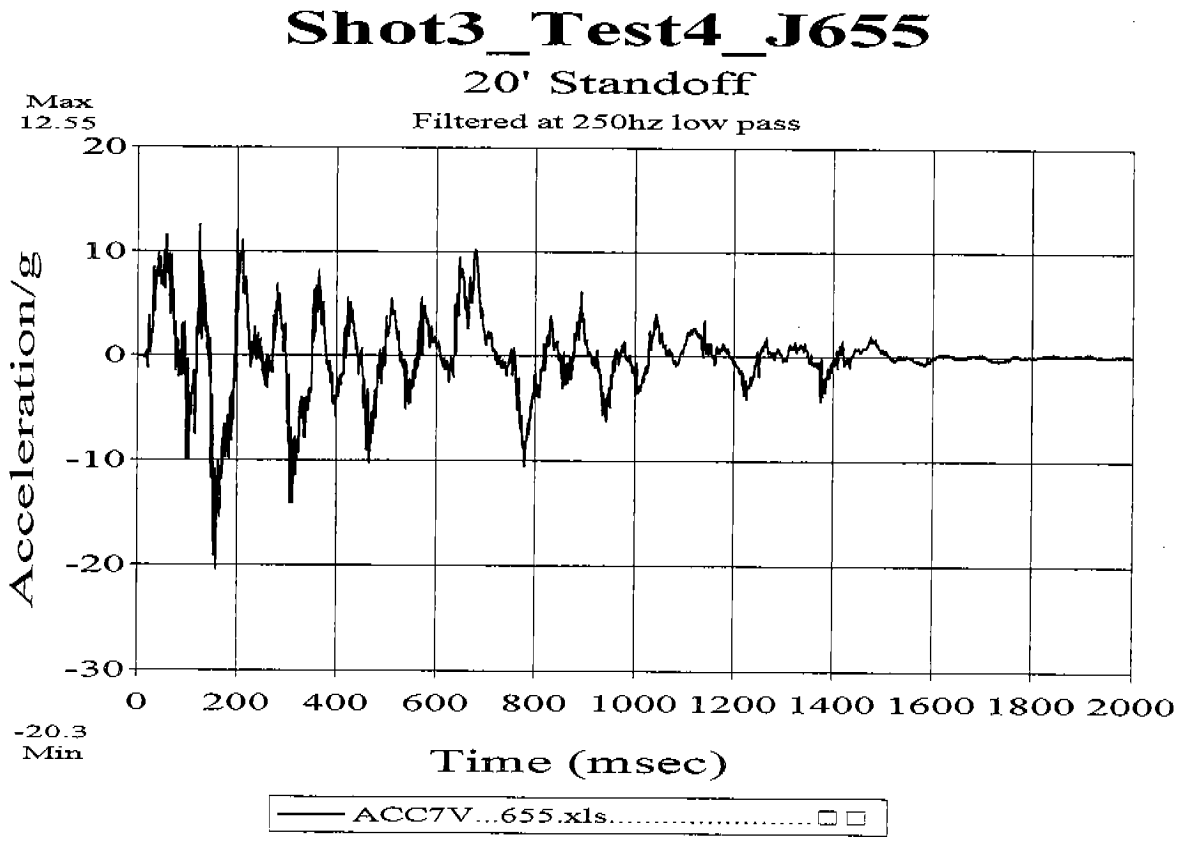

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
45.13
60
30
0
-30
-60
Acceleration/g
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-35.4
Min
Time (msec)
ACC1V...655.xls

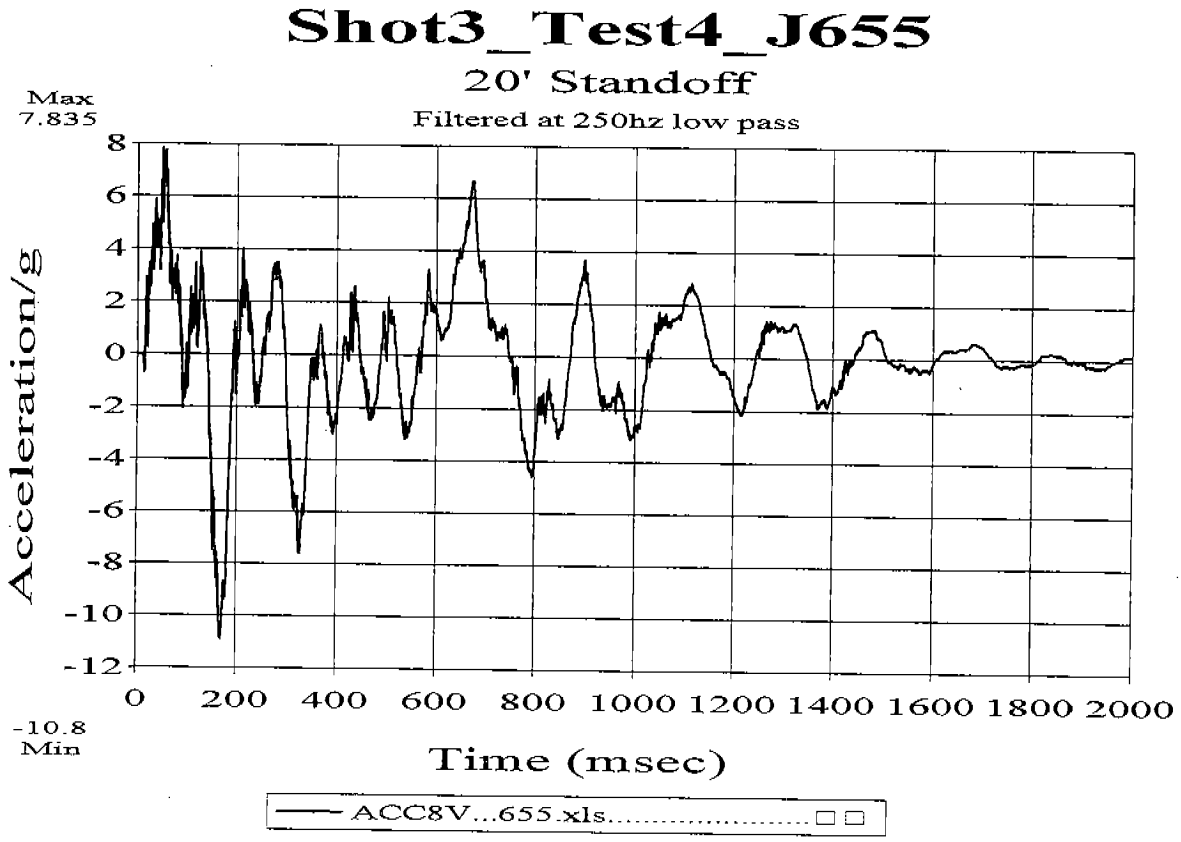

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
26.30
0.098
Min
Fourier Spectra
Frequency (Hz)
13.1
0
5
10
15
20
25
30
ACC1V...655.xls

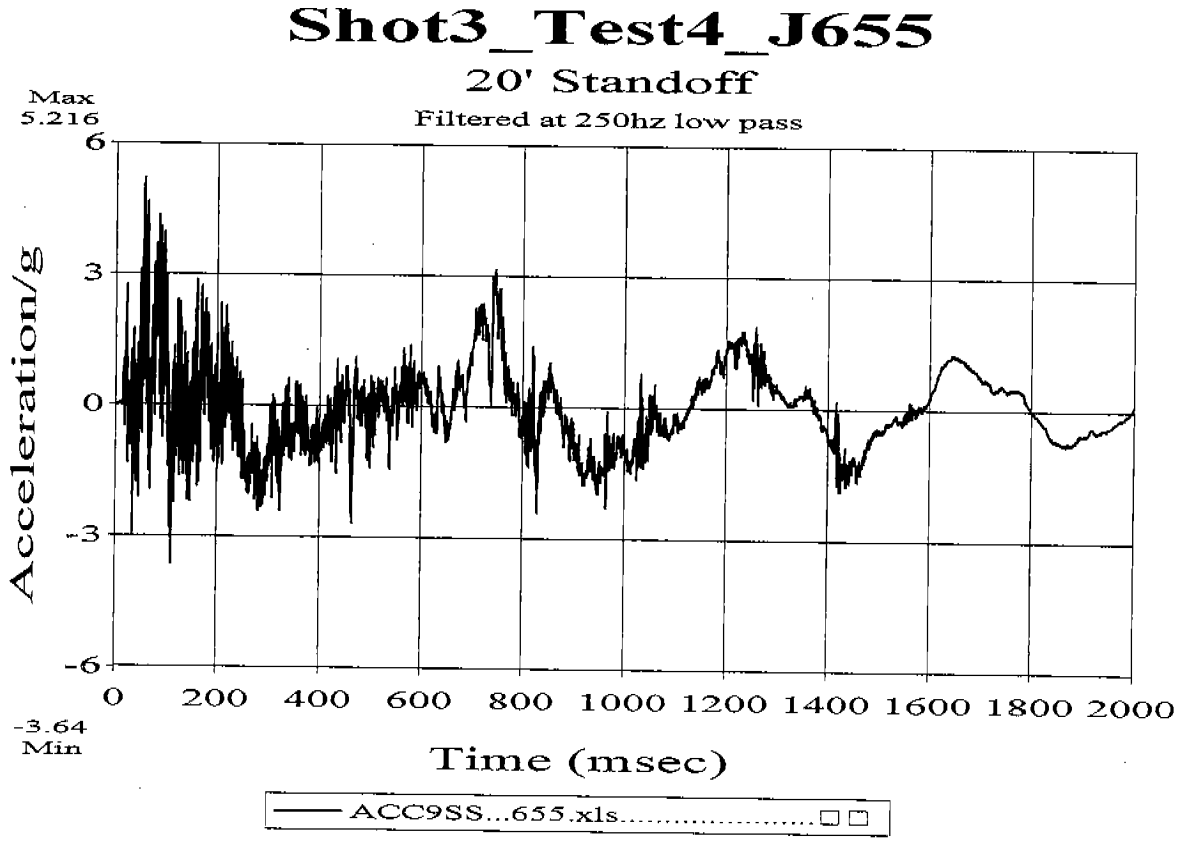

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
10.24
Acceleration/g
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-12.4
Min
Time (msec)
ACC2A...655.xls

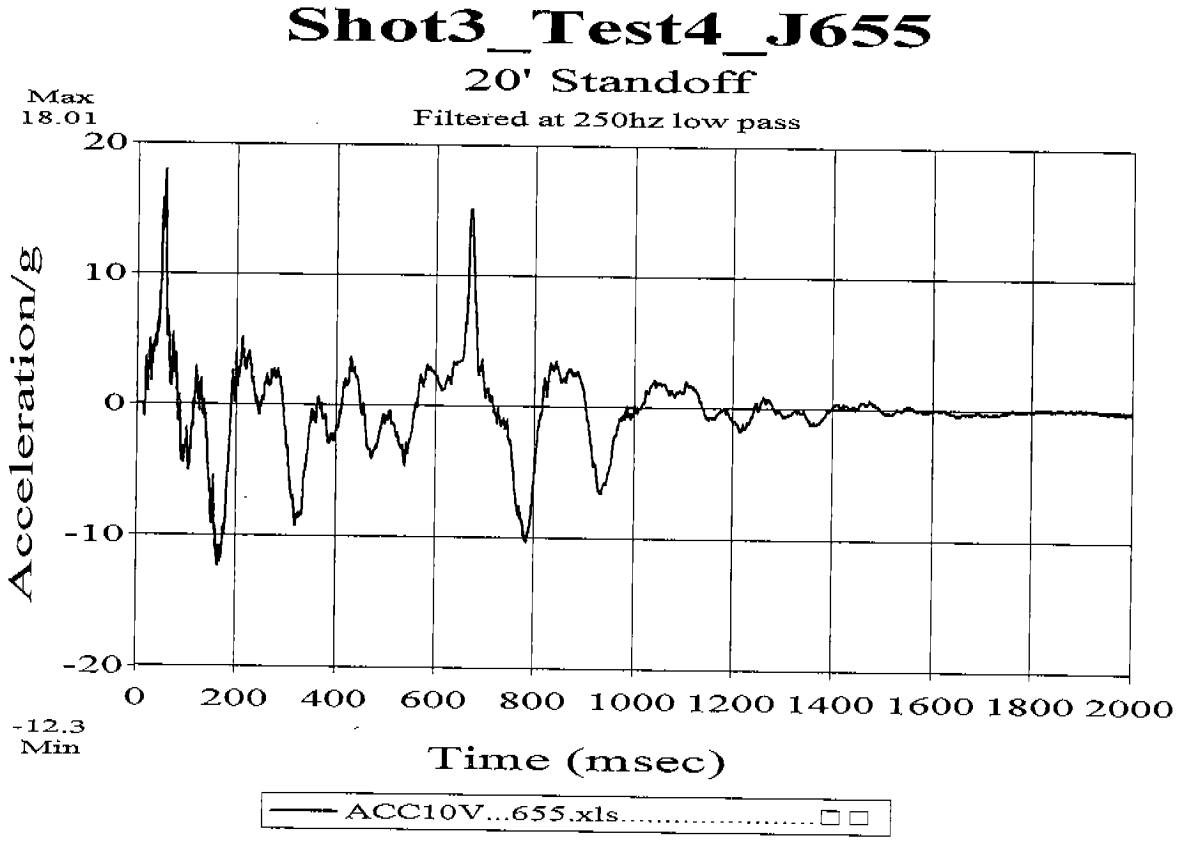

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
12.18
Min
-11.0
Acceleration/g
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC5V...655.xls

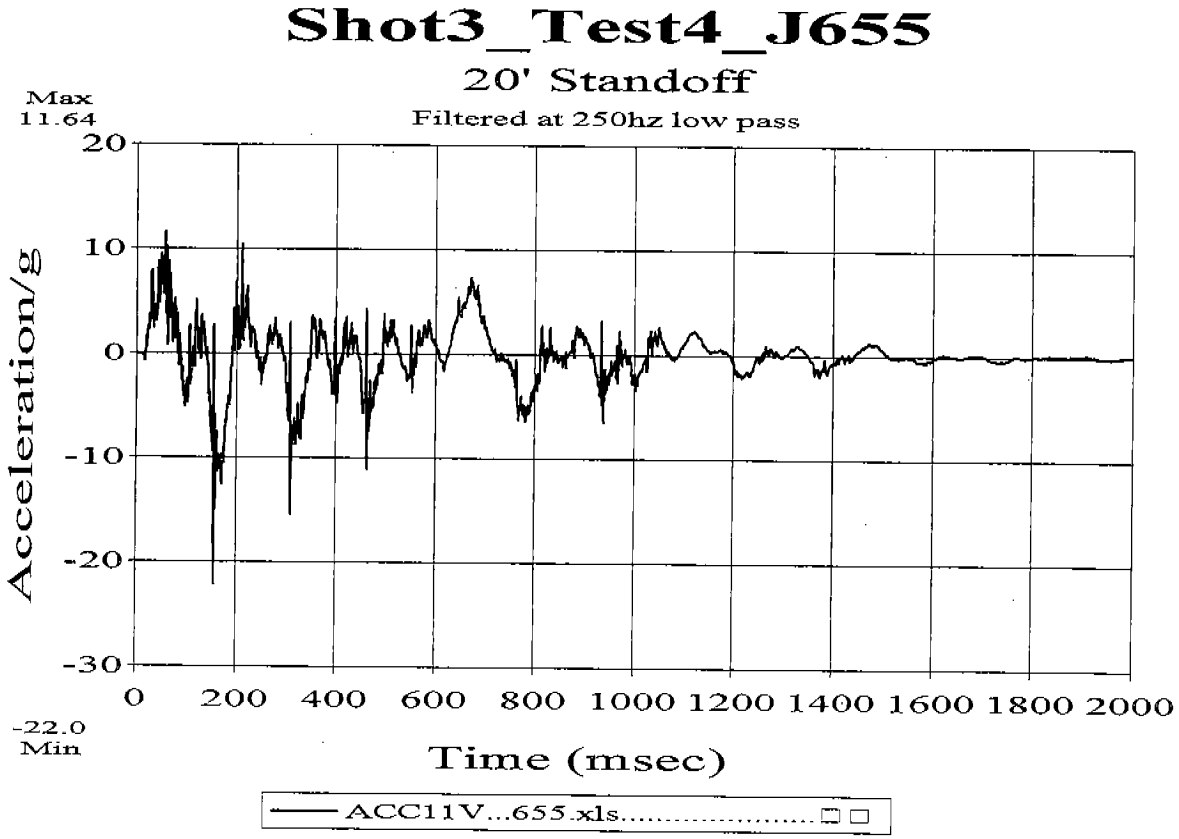

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
8.814
-11.9
Min
Acceleration/g
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC6V...655.xls

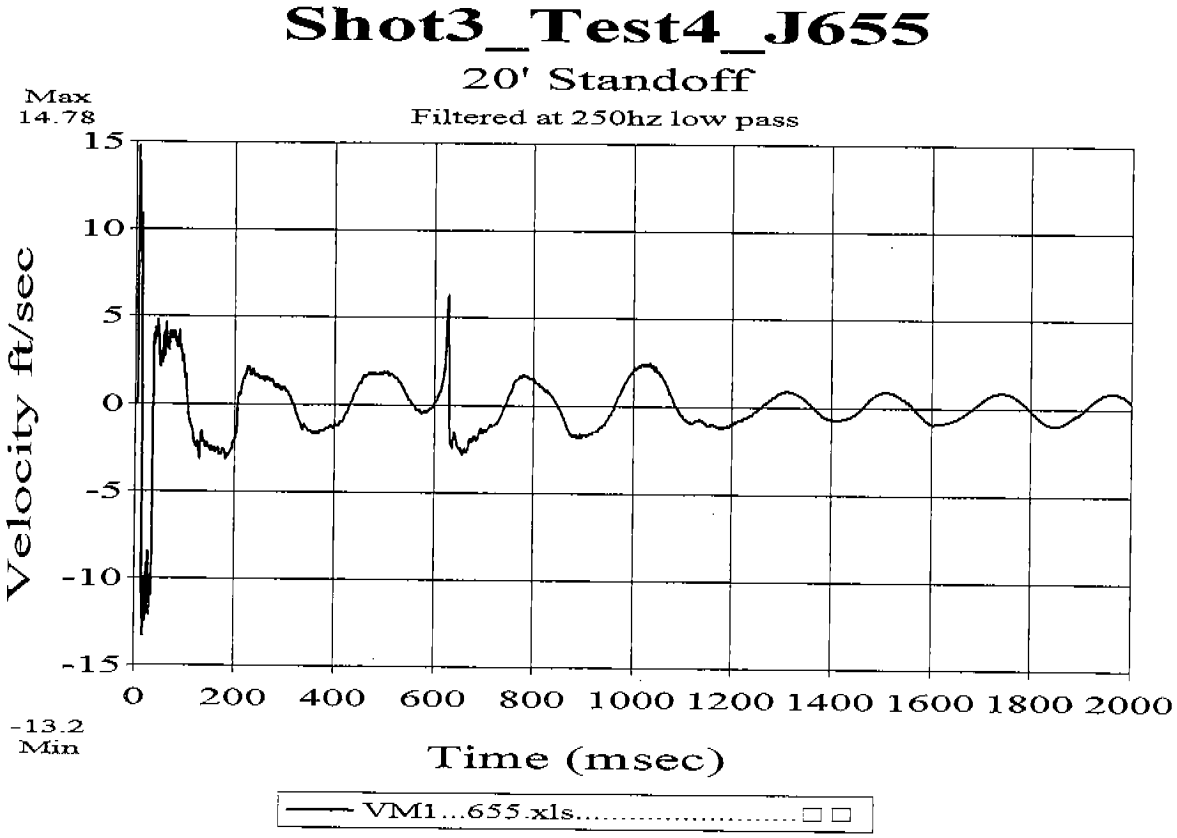

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
12.55
-20.3
Min
Acceleration/g
20
10
0
-10
-20
-30
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC7V...655.xls

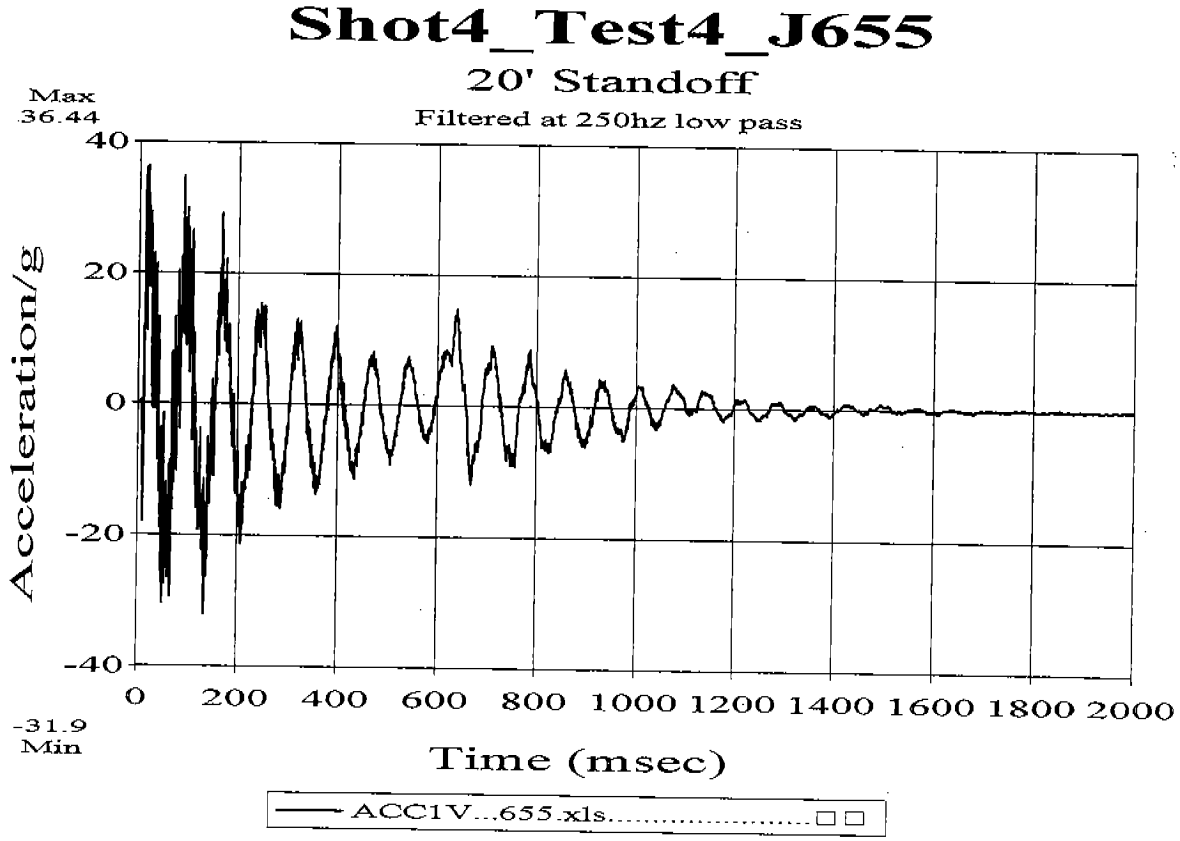

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
7.835
Acceleration/g
8
6
4
2
0
-2
-4
-6
-8
-10
-12
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-10.8
Min
Time (msec)
ACC8V...655.xls

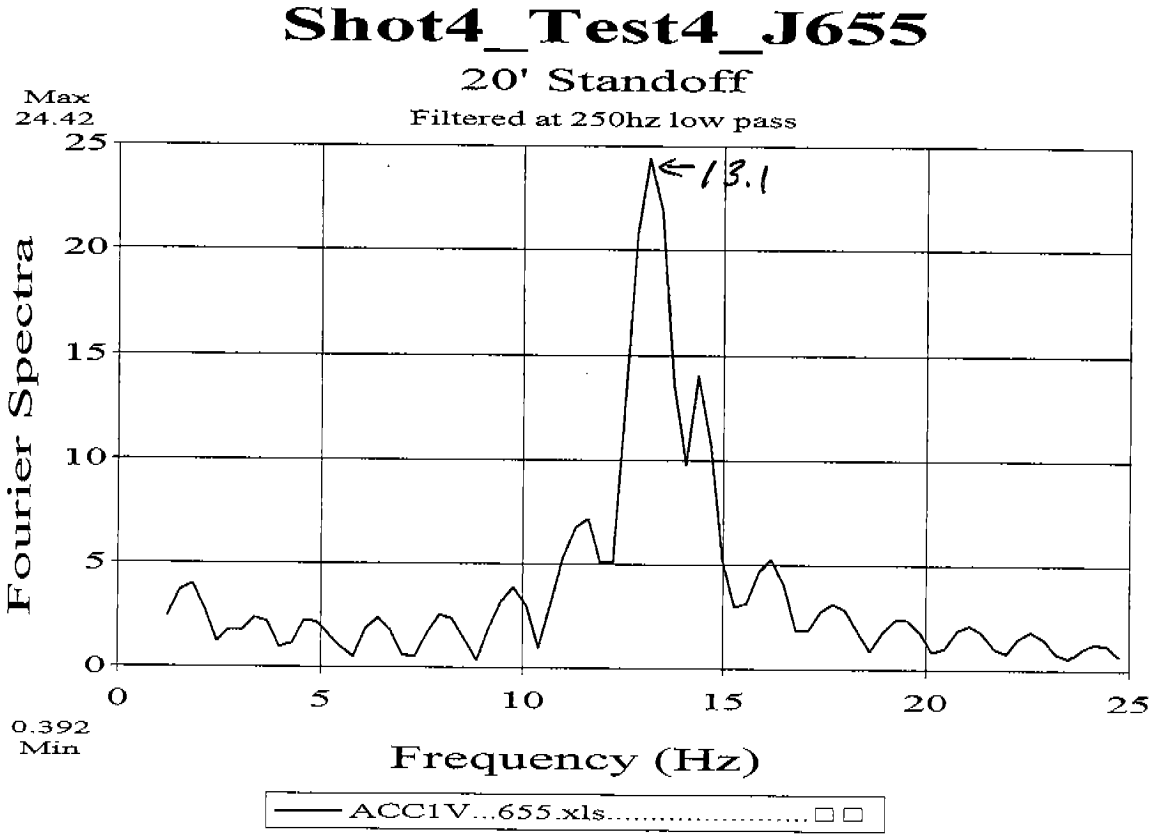

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
5.216
Acceleration/g
6
3
0
-3
-6
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-3.64
Min
Time (msec)
ACC9SS...655.xls

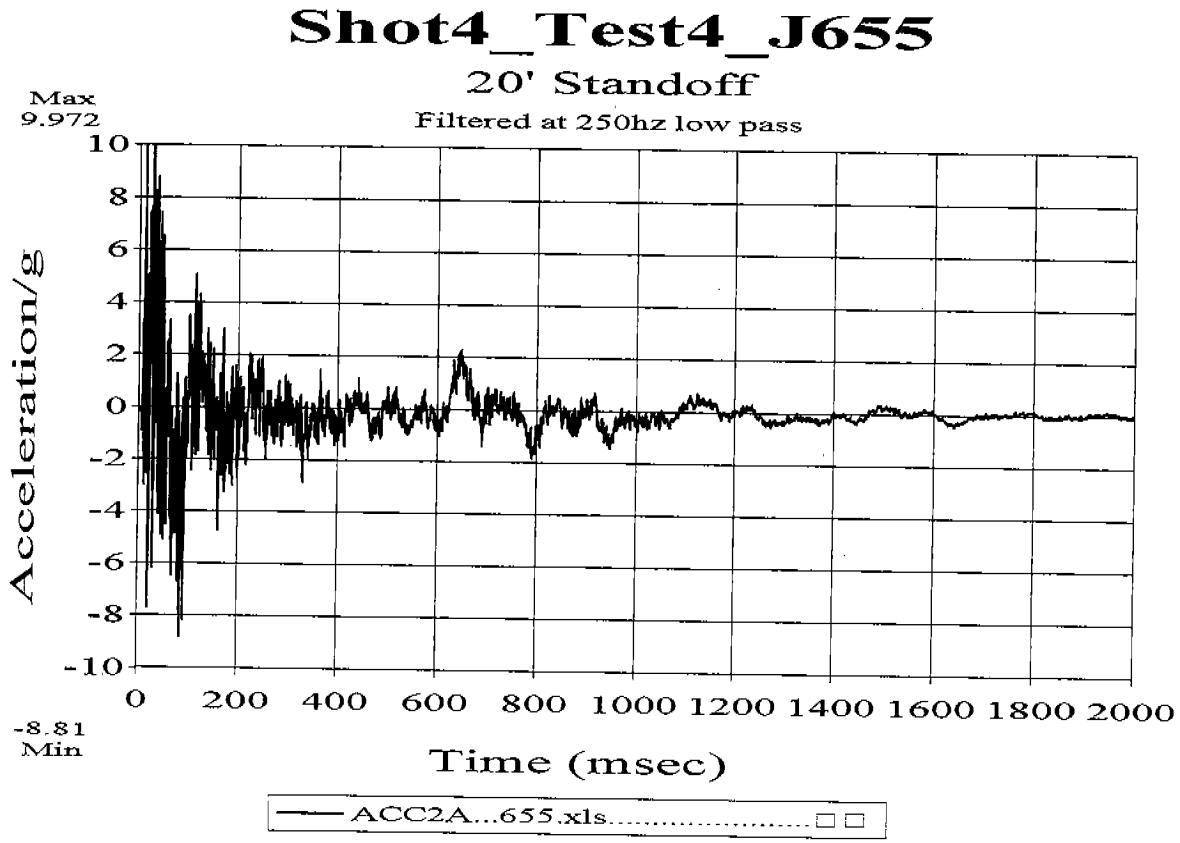

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
18.01
Acceleration/g
20
10
0
-10
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-12.3
Min
Time (msec)
ACC10V...655.xls

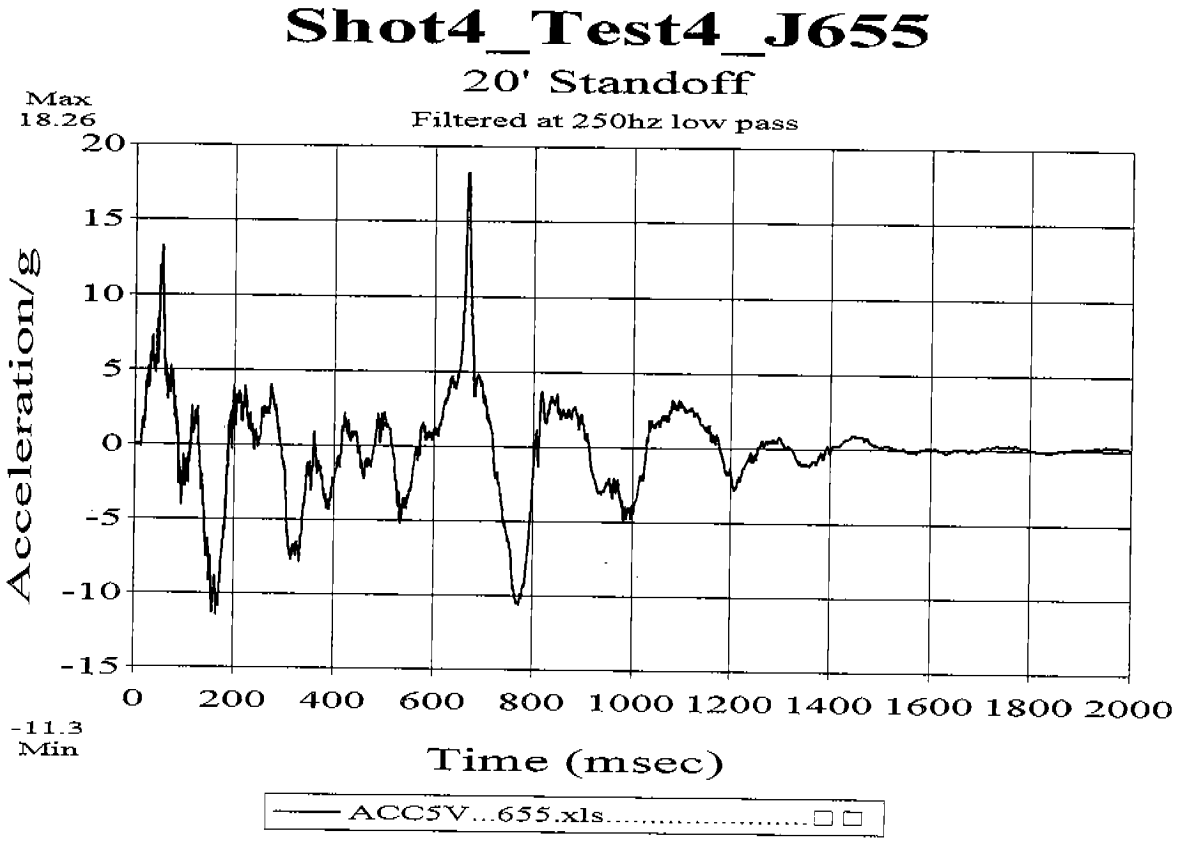

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
11.64
Min
-22.0
Acceleration/g
20
10
0
-10
-20
-30
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC11V...655.xls

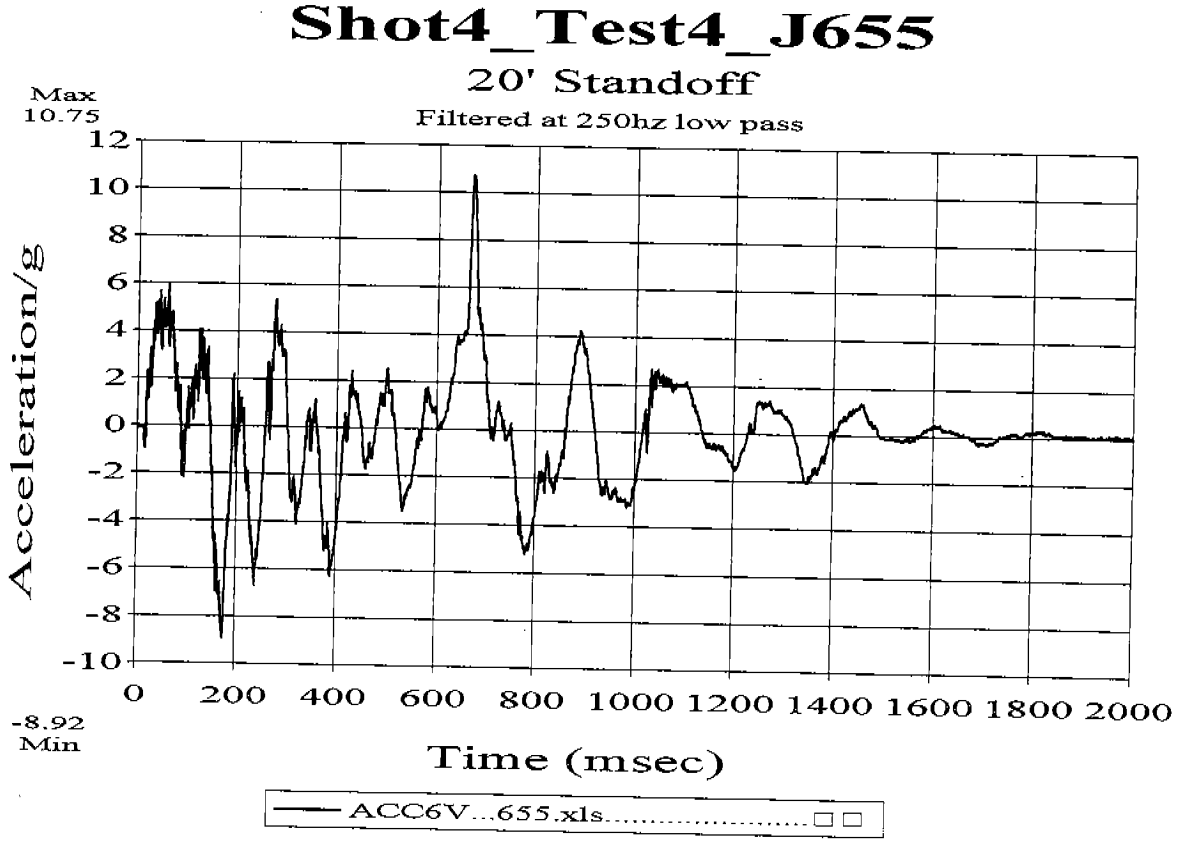

Shot3_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
14.78
Min
-13.2
Velocity ft/sec
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
VM1...655.xls

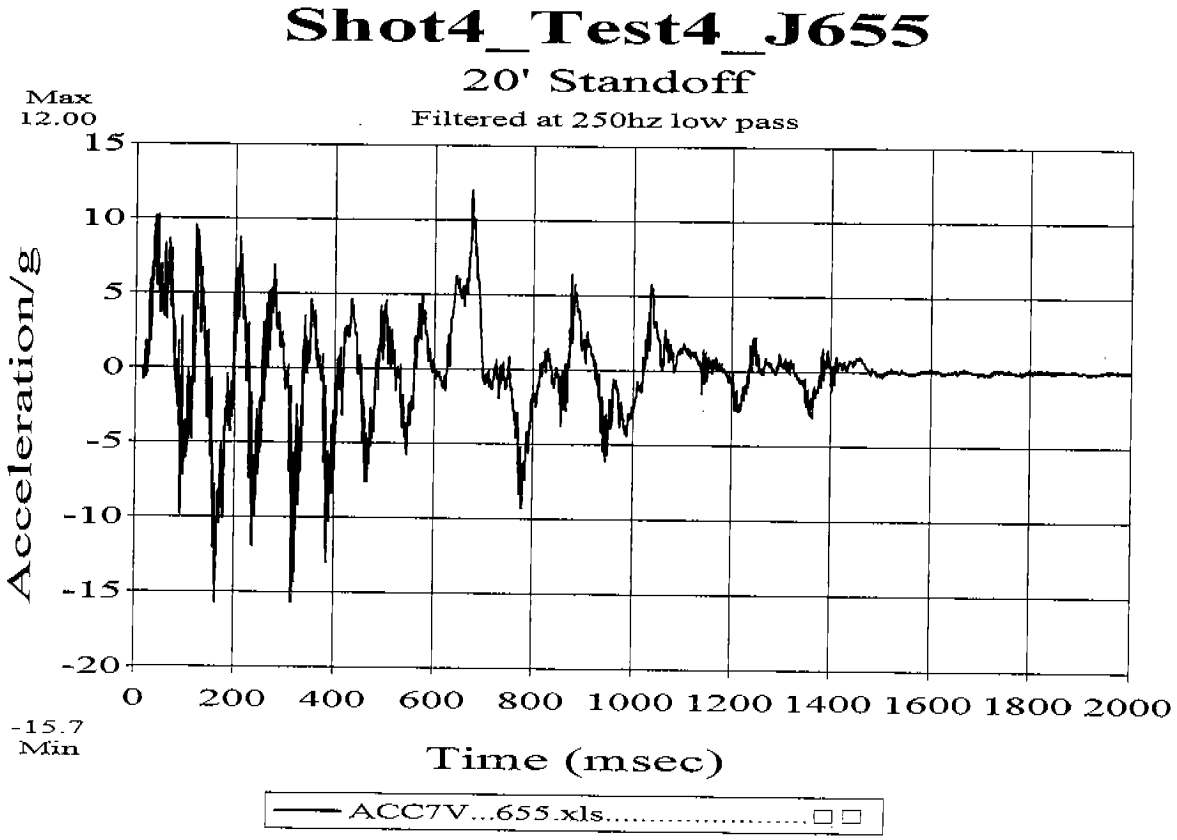

Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
36.44
-31.9
Min
Acceleration/g
40
20
0
-20
-40
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC1V...655.xls

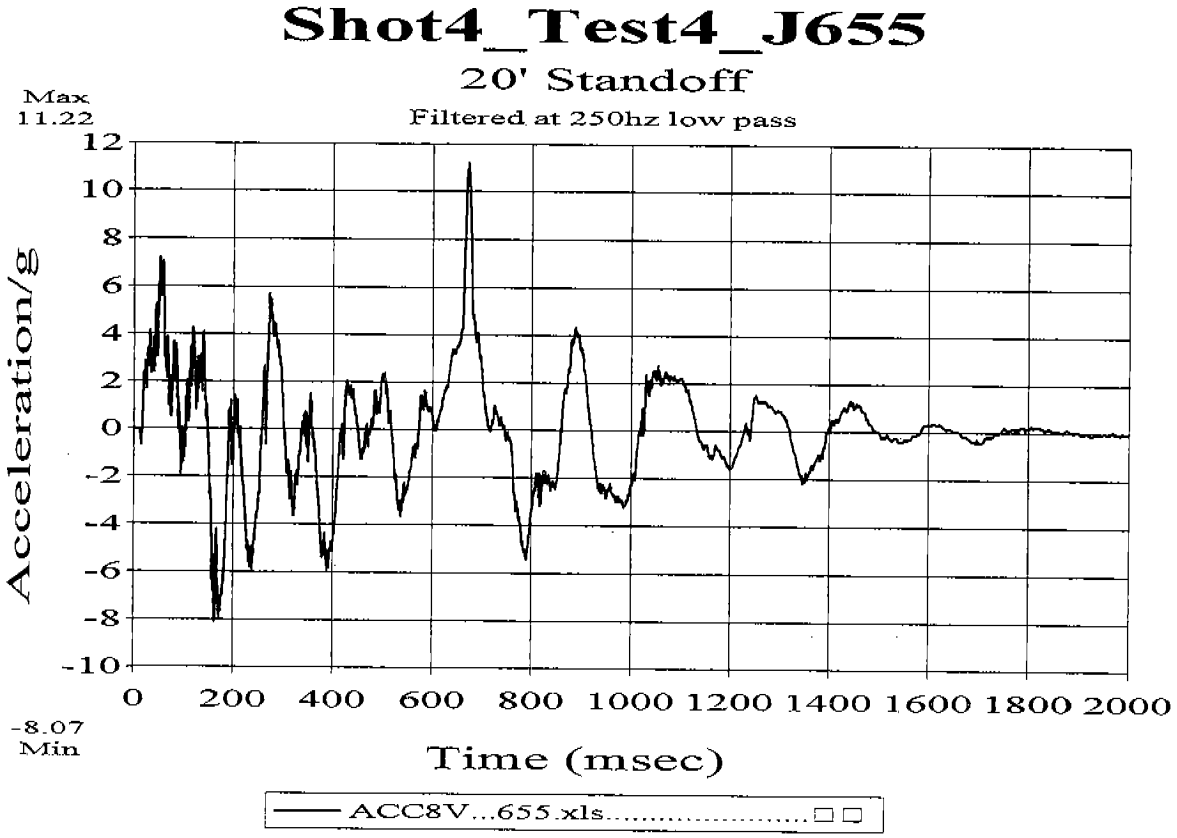

Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
24.42
0.392
Min
Fourier Spectra
Frequency (Hz)
13.1
0
5
10
15
20
25
ACC1V...655.xls

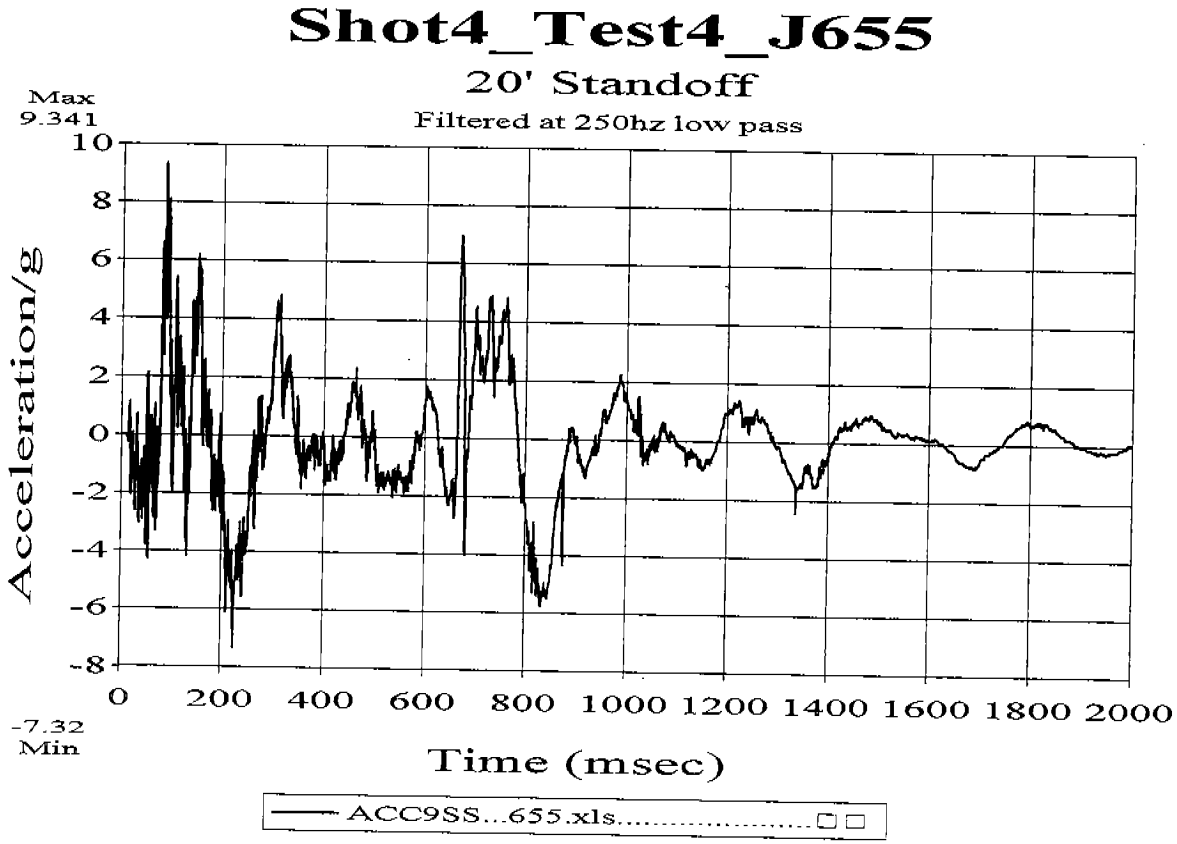

Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
9.972
-8.81
Min
Acceleration/g
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC2A...655.xls

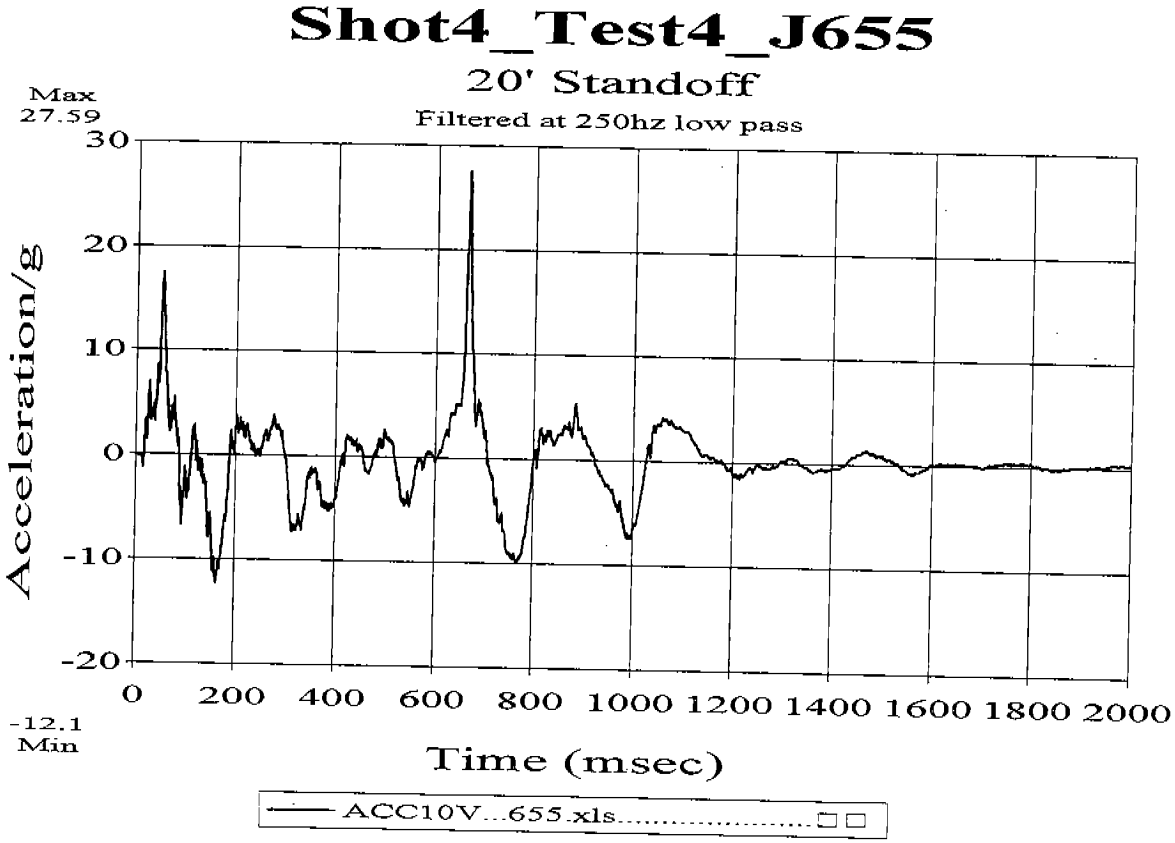

Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
18.26
Acceleration/g
20
15
10
5
0
-5
-10
-15
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-11.3
Min
Time (msec)
ACC5V...655.xls

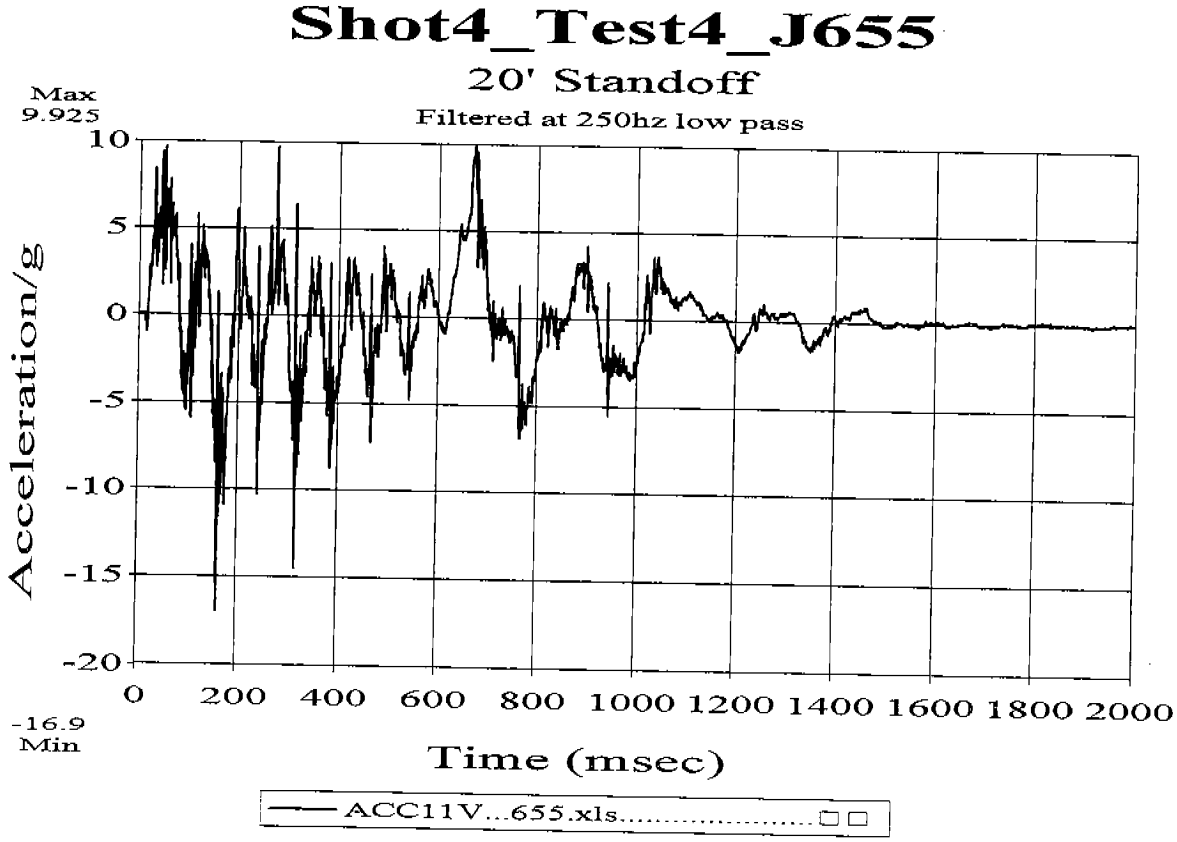

Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
10.75
-8.92
Min
Acceleration/g
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC6V...655.xls

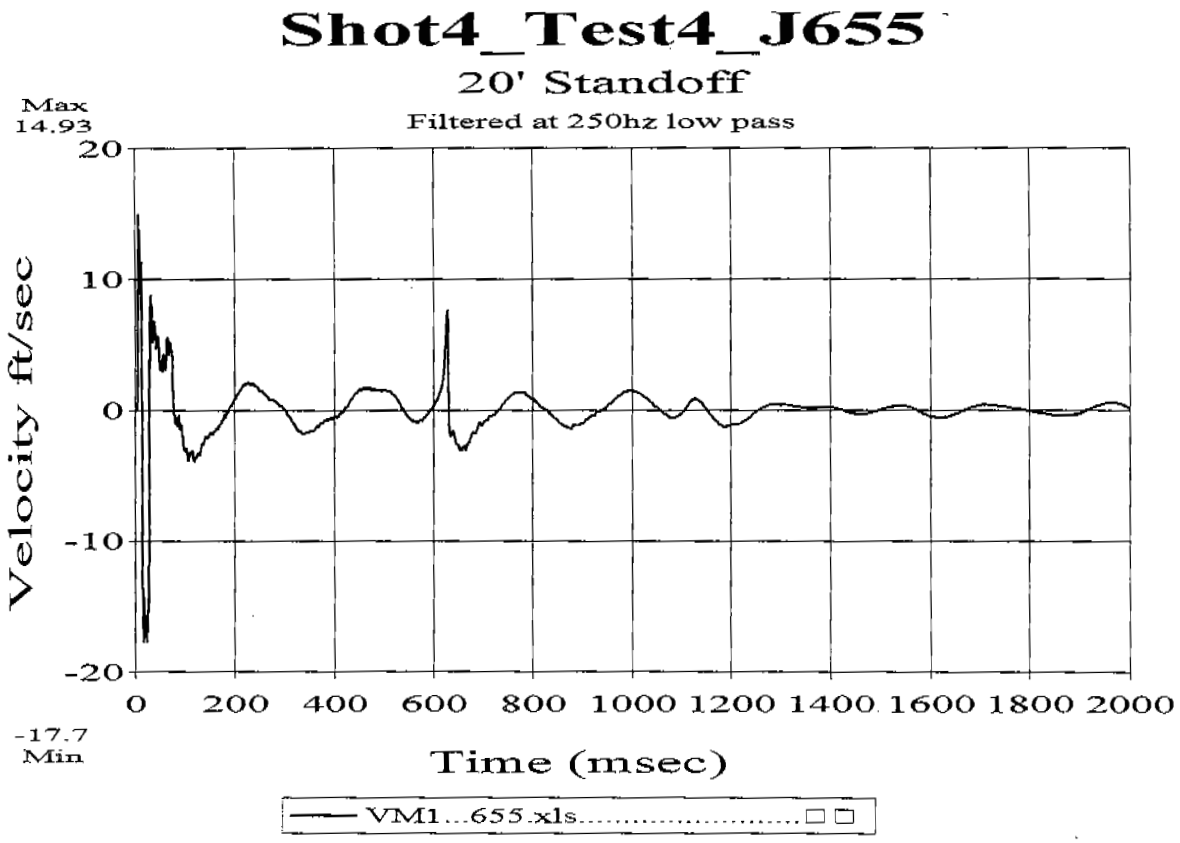

Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
12.00
-15.7
Min
Acceleration/g
15
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC7V...655.xls


Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
11.22
-8.07
Min
Acceleration/g
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC8V...655.xls


Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
9.341
-7.32
Min
Acceleration/g
10
8
6
4
2
0
-2
-4
-6
-8
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC9SS...655.xls


Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
27.59
-12.1
Min
Acceleration/g
30
20
10
0
-10
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC10V...655.xls


Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
9.925
-16.9
Min
Acceleration/g
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time (msec)
ACC11V...655.xls


Shot4_Test4_J655
20' Standoff
Filtered at 250hz low pass
Max
14.93
Velocity ft/sec
20
10
0
-10
-20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-17.7
Min
Time (msec)
VM1...655.xls