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AFPTEF REPORT NO. 97-R-02
AFPTEF PROJECT NO. 96-P-105

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Design, Fabrication and Testing of the MICOM-ISU Shipping and Storage Container

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June 1997

AFPTEF PROJECT NO.: 96-P-105
TITLE: MICOM-ISU Shipping Container

ABSTRACT

This project was initiated to design, fabricate, test and provide a production drawing package for the MICOM-ISU container. The objective of the test series was to qualify the container for production release by AFMC LSO/LOP. The container is designed to hold one of three items: the Integrated Sight Unit (ISU), the ISU with BELRF, or the IBAS Target Acquisition System (TAS)

The container utilizes standard AFPTEF extrusion designs and is completely designed using PTC's Pro/Engineer three dimensional solids modeling software. This is an unpainted, welded, controlled breathing, aluminum container. It is a low base design with an internal cradle system that is mounted to the base via four stainless steel cable or flex mounts. Some of the design features are humidity indicator, pressure relief valve, desiccant port, stacking capability, tiedown rings, quick release latches, air filling valve, four way forklift entry and an integral base-skid design.

The test plan referenced MIL-STD-648A, FED-STD-101C and MIL-STD-810E. The tests were performed both at the AFPTEF and Redstone Technical Test Center (RTTC), Redstone Arsenal, Alabama.

PROJECT ENGINEER MAN-HOURS: 1005

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INTRODUCTION:

BACKGROUND:
This project was initiated to design, fabricate, test and provide a production drawing package for the MICOM-ISU container for the US Army Missile Command (MICOM) CCAWS Project Office (SFAE-MSL-CC-LO) located at Redstone Arsenal, Alabama. The container is designed to hold one of three items: the Integrated Sight Unit (ISU) (see Figure 1), the ISU with BELRF, or the IBAS Target Acquisition System (TAS). The ISU is an item that has been in the field for many years. The BELRF is a new attachment for the ISU, and the TAS is a completely new item designed to replace the ISU.

The container utilizes standard AFPTEF extrusion designs and is completely designed using Parametric Technology Corporation's (PTC) Pro/Engineer three dimensional solids modeling software. This is an unpainted, welded, controlled breathing, aluminum container. It is a low base design with an internal cradle system that is mounted to the base via four stainless steel cable or flex mounts (see Figure 2). Some of the design features are humidity indicator, pressure relief valve, desiccant port, stacking capability, tiedown rings, quick release latches, air filling valve, four way forklift entry and an integral base-skid design.

The present container for the ISU is a round steel drum-type engine container. Justification by the program office for this project was a lighter, more economical container with less maintenance requirements and better protection for the items.

REQUIREMENTS:
AFPTEF in conjunction with SFAE-MSL-CC-LO developed a Statement of Work (SOW) for the design of the container. This was a tailoring of SAE ARP1967. See Appendix 5 for Statement of Work. The vibration test requirements were specified in the Critical Item Development Specification for the IBAS TAS (MIS-50318, CAGE Code Ident 18876)

DEVELOPMENT:

DESIGN OF THE CONTAINER:
This is a welded aluminum, controlled breathing, reusable container (see Figure 3). The base is a one piece skid/double walled base extrusion with integral forklift openings, humidity indicator, pressure relief valve, air filling valve and desiccant port for easy replacement of desiccant (the desiccant controls dehumidification). A silicone rubber gasket and quick release latches create a seal at the base/lid interface. The lid is a single sheet of aluminum fit into channels in the corner post and lid extrusions. Stacking pads on the lid provide for stacking of like containers up to 16 feet high. The container is unpainted which reduces the containers original cost, environmental hazardous waste, and the life-cycle cost of the container.

The interior cradle of the container is an aluminum plate and channel structure. Stainless steel pins locate the item in the cradle and steel bar clamps secure the item (see Figure 4). A second item, named the Commander's Relay, is included with the ISU and ISU with BELRF. It is mounted in the cradle on a contoured saddle and clamped in place by two nylon webbing straps (see Figure 5).

TESTING:

CONTAINER DESCRIPTION

The ISU container is a sealed, reusable, aluminum container engineered for physical and environmental protection for selected ISU assemblies during transportation and storage. Each container consists of a cover and base equipped with the special features listed below.

ISU CONTAINER FEATURES	
PRESSURE RELIEF VALVE	1.5 PSI
HUMIDITY INDICATOR	YES
DESICCANT PORT	YES
FORKLIFTABLE	YES
COVER LATCHES	8
COVER LIFT HANDLES	4
COVER LIFT RINGS	NONE
BASE LIFT HANDLES	NONE
BASE TIE DOWN RINGS	4

TEST SPECIMEN

The test specimen was a container fabricated at AFPTEF in accordance with the container drawing package for this project (13566198 - 13566242, CAGE code ident 18876).

TEST LOAD

The test load was an unserviceable ISU on loan from the item manager at Redstone Arsenal. Some of the interior components of the ISU were replaced with lead and steel weights to simulate the weight of the new IBAS TAS item.

TEST PROCEDURES

The ISU container was tested in accordance with the Air Force Packaging Technology & Engineering Facility (AFPTEF) standard long life container test plan. The test plan referenced MIL-STD-648A, FED-STD-101C and MIL-STD-810E. See Appendix 1 for test plan.

The test methods specified in the container test plan constitute the procedure for performing the tests on that container. The performance criteria for evaluation of container acceptability was specified at 30 G's maximum and an initial and final leak rate of 0.0035 kg/cm²/hr (0.05 psi/hr) at 0.1 kg/cm² (1.5 psi). These tests are commonly applied to special shipping containers providing rough handling protection to sensitive items. The tests were performed at AFPTEF, AFMC LSO/LO?, 5215 Thurlow St, Wright-Patterson AFB, OH 45433-5540 and at Redstone Technical Test Center, Test Area 2, Redstone Arsenal, Alabama.

TEST SEQUENCES

CONTAINER FACE IDENTIFICATION

The correlation between numbered and designated container sides was as follows:

NUMBERED SIDE	DESIGNATED SIDE ISU
1	Top
2	Forward (Desiccant Port)
3	Bottom
4	Aft
5	Left
6	Right

INSTRUMENTATION

The test load was instrumented with a piezoelectric triaxial accelerometer mounted to the top of the extra weight added internally to the load. Accelerometer positive axis orientations were as follows:

X Axis - Directed through container Side 4 (Longitudinal motion).
Y Axis - Directed through container Side 6 (Transverse motion).
Z Axis - Directed through container Side 1 (Vertical motion).

Since random vibration was performed at Redstone Arsenal two sets of instrumentation were used. The following is a list of AFPTEF instrumentation.

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DATE
Shock Amplifier	Endevco	2740BT	FY49	Jan 97
Shock Amplifier	Endevco	2740BT	FW23	Jan 97
Shock Amplifier	Endevco	2740BT	FV07	Jan 97
Item Accelerometer	Endevco	2223D	FF54	Dec 95
Data Acquisition	GHI Systems	CAT	Ver. 2.11a	N/A

LEAK TESTING - Test Sequences 1 and 10

The following equipment was used for leak testing:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DATE
Digital Manometer	Yokogawa	2655-22	85DJ6001	Jan 95
Data Acquisition Board	Data Translations	2801A		N/A
Data Acq. Software	Laboratory Technologies	Labtech Notebook		N/A
Vacuum/Pressure Pump	Thomas Industries	TA-0040-V	21663	N/A

TEST SEQUENCE 1 - FED-STD-101C

Method 5009.3, Leaks in Containers, Pressure Test.

The container pressure relief valve in the desiccant port was removed and the relief valve hole used for attachment of the digital manometer and vacuum/pressure pump lines, and an internal temperature probe. The container was closed and sealed. The leak tests were conducted in accordance with FED-STD-101C, Method 5009.3, at ambient temperature and pressure. The pneumatic pressure leak technique was used and the container was pressurized to 0.1 kg/cm^2 (1.5 psi). A leak rate of less than 0.0035 $kg/cm^2/hr$ (0.05 psi/hr) sustained for a period of at least one half hour was required to pass the test.

ROUGH HANDLING TESTING - Test sequences 2 through 5.

The following equipment was used for the rough handling tests:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DATE
Environmental Chamber	Tenney Engineering	12791	N/A	N/A
Pendulum Impact	AFPTEF	N/A	N/A	N/A

TEST SEQUENCE 2 - FED-STD-101C

Method 5005.1 Cornerwise-Drop (Rotational) Test

Method 5008.1 Edgewise-Drop (Rotational) Test

The container was conditioned at 60°C. The cornerwise-drop tests were conducted in accordance with FED-STD-101C, Method 5005.1 and the edgewise drops in accordance with Method 5008.1. The required Level A drop height was 812.8 mm (32 in). The tip over balance point was used as this drop height could not be reached. The container was dropped onto a one-inch thick steel plate inside the environmental chamber. One drop was made on each of two opposite corners and two adjacent sides.

TEST SEQUENCE 3 - FED-STD-101C

Method 5012, Pendulum-Impact Test

The container was conditioned at 74°C. The pendulum-impact tests were conducted in accordance with FED-STD-101C, Method 5012. The required container impact velocity of 2.1 m/sec attained by raising the pendulum 22.5 cm. The container was removed from the conditioning chamber and moved quickly to the pendulum for two impacts. One impact was made on each of two adjacent sides.

TEST SEQUENCE 4 - Test Sequence 2 (Rotational Drop) was repeated at low temperature. The container was conditioned at -29°C. One drop was made on each of two opposite corners and two adjacent edges not used in Sequence 2.

TEST SEQUENCE 5 - Test Sequence 3 (Pendulum Impact) was repeated at low temperature. The container was conditioned at -54°C. One impact was made on each of two adjacent sides not used in Sequence 3.

STANDARD VIBRATION TESTING - Test sequences 6 and 7.
These test sequences were performed at AFPTEF using the following equipment:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DATE
Servohydraulic Vibration Machine	Team Corp.	Special	1988	N/A
Feedback Hardware Controller	Data Physics Corp.	DP540		N/A
Feedback Software Controller	Data Physics Corp.	Ver. 1.22 7 CH.DWL		N/A
Feedback Amplifier	Endevco	2740BT	FW26	Dec 96

TEST SEQUENCE 6 - FED-STD-101C
Method 5019.1, Vibration (Repetitive Shock Test)
A sheet of 3/4-inch plywood was bolted to the top of the vibration table, and the container was placed on the plywood. Restraints were used to prevent the container from sliding off the table. The container was allowed about 1/2-inch unrestricted movement in any direction in the horizontal table plane. The test was conducted in accordance with FED-STD-101C, Method 5019.1, at ambient temperature. Using a constant one inch double amplitude table motion the table frequency was increased from 3.5 Hertz (Hz) until the container left the table surface (approximately 4.5 Hz). When a 1/16 inch thick metal bar could be inserted between table and the container the frequency sweep was halted and the container was allowed to bounce for a 2 hour period.

TEST SEQUENCE 7 - FED-STD-101C
Paragraph 5.3.2, Resonance Strength
The test plan did not require this test. However, the resonant frequency and associated transmissibility were of interest. Therefore, the resonance strength portion of the test was run. The container was rigidly attached to the vibration platform. The test was conducted in accordance with MIL-STD-648A, Paragraph 5.3.2, at ambient temperature. A sinusoidal vibration excitation was applied in the vertical direction and cyclically swept for 7.5 minutes at 2 minutes per octave to locate the resonant frequency. Input vibration from 5 to 12.5 Hz was at 0.125 inch double amplitude. Input vibration from 12.5 to 50.0 Hz was at 1.0 G (0 to peak). Transmissibility values during the frequency sweeps were calculated and recorded using the Data Physics software (Appendix 2 for test data).

RANDOM VIBRATION TESTING - Test sequences 8 through 9
The following test sequences were performed at the Army Redstone Arsenal test facility because AFPTEF does not have the necessary equipment to perform the required horizontal random vibration or vibration at temperature extremes. Except for the AFPTEF triaxial item accelerometer the instrumentation and equipment were furnished by Redstone Arsenal. A total of 6 test sequences were run: Two test types according to tables 514.4-AI (32 minutes) and AII (40 minutes), on each of three mutually perpendicular axes (vertical, longitudinal, and transverse) at a temperature extreme of 71°C. For the vertical tests the container bottom was fastened rigidly to a vibration table surface oriented to vibrate vertically. For the longitudinal and transverse tests the container bottom was placed on a slip table and the appropriate side fastened rigidly to a vibration table oriented to vibrate horizontally (see Figure 6). Full test descriptions, data and conclusions are available in Special Report SR-RD-TE-97-42 from Redstone Technical Test Center, STERT-TE-P, attn: Leah Green, Redstone Arsenal, Alabama 35898.

TEST SEQUENCE 8 - MIL-STD-810E
Method 514.4, Procedure 1, Condition I-3.3.1, in accordance with tables AI and AII Mission/Field Vibration
The container's vertical axis was randomly vibrated at a temperature of 71°C for 32 minutes in accordance with Table 514.4-AI and for 40 minutes in accordance with Table 514.4-AII.

TEST SEQUENCE 9 - MIL-STD-810E
Method 514.4, Procedure 1, Condition I-3.3.1, in accordance with tables AI and AII Mission/Field Vibration
The container's longitudinal axis was randomly vibrated at a temperature of 71°C for 32 minutes in accordance with Table 514.4-AI and for 40 minutes in accordance with Table 514.4-AII.

TEST SEQUENCE 10 - Test Sequence 1 (Leaks in Containers, Pressure Test) was repeated to determine if previous test sequences had caused any container leaks.

Test Sequences 1 and 10 - Container Leak Test
The container passed both the initial and final leak tests with a rate less than the maximum allowed leak rate of 0.0035 $kg/cm^2/hr$ (0.05 psi/hr).

RESULTS:

Test Sequences 2 and 4 - High and Low Temperature Rotational Drop Tests
Impact shock values (Gs) for all drops were below the specified fragility level (30 Gs). No damage to the load suspension system or simulated item was visible after any of the tests. See Appendix 2.

Test Sequences 3 and 5 - Pendulum Impact Tests
Impact shock values (Gs) for all impacts were below the specified fragility level (30 Gs). No damage to the load suspension system, simulated item or container was visible after the tests. See Appendix 2.

Test Sequence 6 - Repetitive Vibration Shock Test
No damage was visible to either the container, the load suspension system or the modified test load at the end of the 2 hours of testing.

Test Sequence 7 - Resonance Strength Test
The initial resonant frequency of the container system was 14.9 Hz with a transmissibility of 3.1.

Test Sequences 8 through 9 - Random Vibration
No damage was visible to either the container, the load suspension system or the modified test load as a result of these test sequences.

TEST CONCLUSIONS

Vibration and leak test results met the quantitative requirements of the test plan for all the container. No damage occurred to the container or test load. Therefore, this container is considered to have met all test requirements.

PROJECT CONCLUSIONS:

Elastomeric shock mounts were tested for this application, but due to the weight of the suspended item and the severity of the vibration tests, the steel flex mounts were chosen. Also, due to the severe vibration requirements, the support structure for the cradle was extraordinarily strengthened (see Figures 7 and 8). These design requirements became evident following several failures during the vibration testing at RTTC.

APPENDIX 1

TEST PLAN

AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY (Container Test Plan)	AFPEA PROJECT NUMBER: 96-P-105

CONTAINER SIZE (L x W x D) (MILLIMETERS) INTERIOR:	EXTERIOR:	WEIGHT (Kgs) GROSS:	ITEM:	CUBE (CU. M)	QUANTITY:	DATE:
785.0 X 785 X 942.8	875.0 X 875.0 X 1054.8	178.2	104.5	0.8	1	30 May 96

ITEM NAME:	MANUFACTURER:
Integrated Sight Unit (ISU)	AFPTEF

CONTAINER NAME:	CONTAINER COST:
ISU/TAS Container	

PACK DESCRIPTION: Aluminum Container, Test Load of ISU or simulated load with identical center of gravity and tie down points.

CONDITIONING:
As noted below

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
1.	EXAMINATION OF PRODUCT			
	MIL-C-4150 Para. 4.5.3 Table II	The container shall be examined to determine conformance with material, workmanship, and requirements as specified in Table II of MIL-C-4150.	Ambient temp.	Visual Inspection (VI)
2.	QUALITY CONFORMANCE TESTS. WEIGHT TEST	Container tare weight shall not be greater than 150 kg. Gross weight to be 260 kg.	Ambient Temp.	Scale
	MIL-C-4150 Para. 4.5.4 Para. 4.6.3.6			
	Performance Tests.			
3.	Reusability MIL-C-4150	The case shall be opened and closed five times to demonstrate reusability without degradation. Ease of operation and freedom from interference shall constitute acceptance.	Ambient Temp.	VI
4.	LEAK TEST FED-STD-101 Method 5009.2 (4.7.2)	Pneumatic pressure at 10.34 kPa. 0.3 Pa/hr leakage allowed after temperature stabilization. Test duration to be a minimum of 30 minutes.	Test performed in ambient condition from compressed air supply.	Pressure Transducer or Water Manometer

COMMENTS:

PREPARED BY:	APPROVED BY:
Jason Gilreath, Mechanical Engineer	Ted Hinds, Chief, Container Engineering & Design Branch

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AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY (Container Test Plan)					AFPEA PROJECT NUMBER: 96-P-105	
CONTAINER SIZE (L x W x D) (INCHES) INTERIOR: 785.0 X 785 X 942.8	EXTERIOR: 875.0 X 875 0 X 1054.8	WEIGHT (Kgs) GROSS: 178.2	ITEM: 104.5	CUBE (CU. FT) 0.8	QUANTITY: 1	DATE: 30 May 96
ITEM NAME: Integrated Sight Unit (ISU)				MANUFACTURER: AFPTEF		
CONTAINER NAME: ISU/TAS Container					CONTAINER COST:	
PACK DESCRIPTION: Aluminum Container, Test Load of ISU or simulated load with identical center of gravity and tie down points.						
CONDITIONING: As noted below						

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRU-MENTATION
5.	Vibration Test.			
a.	MIL-STD-810E Method 514.4 Procedure 1 Condition I-3.3.1	Mission/Field vibration according to Tables 514.4-AI through 514.4-AIII and Figures 514.4-4 through 514.4-5. Test duration shall be as follows: Table 514.4-AI 32 minutes per axis Table 514.4-AII 40 minutes per axis	71°C Accelerometer located in back, bottom, lefthand side of case. Normal shipping position	(VI) Tri-axial accelerometer to measure G-forces
b.	FED-STD-101 Method 5019	Test for not less than 2 hours at 3 to 5 Hz and 25.4 mm double amplitude. A 3.25 mm feeler guage shall be able to move freely under the container during the downstroke of the cycle.	Ambient temp. Accelerometer located in back, bottom, lefthand side of case. Normal shipping position	(VI) Tri-axial accelerometer to measure G-forces

COMMENTS:	
PREPARED BY: Jason Gilreath, Mechanical Engineer	APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch

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AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY (Container Test Plan)				AFPEA PROJECT NUMBER: 96-P-105	
CONTIANER SIZE (L x W x D) (INCHES) INTERIOR: 785.0 X 785 X 942.8 EXTERIOR: 875.0 X 875.0 X 1054.8	WEIGHT (Kgs) GROSS: 178.2	ITEM: 104.5	CUBE (CU. FT) 0.3	QUANTITY: 1	DATE: 30 May 96
ITEM NAME: Integrated Sight Unit (ISU)			MANUFACTURER: AFPTEF		
CONTAINER NAME: ISU/TAS Container				CONTAINER COST:	
PACK DESCRIPTION: Aluminum Container, Test Load of ISU or simulated load with identical center of gravity and tie down points.					
CONDITIONING: As noted below					

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
6.	ROUGH HANDLING TESTS (High temperature 60 deg C.			
a.	FED-STD-101 Method 5005.1 Level A	Cornerwise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm.	Drop on diagonally opposite bottom corners. Total of 2 drops.	(VI) Tri-axial accelerometer to measure G-forces
b.	FED-STD-101 Method 5008.1 Level A	Edgewise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm.	Drop on adjacent sides. Total of 2 drops.	(VI) Tri-axial accelerometer to measure G-forces
c.	FED-STD-101 Method 5012	Pendulum Impact test Condition at 73.9 C for not less than 24 hours. Impact velocity 2.13 m/sec.	One impact on a side and an adjacent end. Total of two impacts.	(VI) Tri-axial accelerometer to measure G-forces

COMMENTS:	
PREPARED BY: Jason Gilreath, Mechanical Engineer	APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch

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AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY (Container Test Plan)				AFPTEA PROJECT NUMBER: 96-P-105	
CONTIANER SIZE (L x W x D) (INCHES) INTERIOR: 785 0 X 785 X 942.8	EXTERIOR: 875 0 X 875 0 X 1054 8	WEIGHT (Kgs) GROSS: 178.2 / ITEM: 104.5	CUBE (CU. FT) 0.8	QUANTITY: 1	DATE: 30 May 96
ITEM NAME: ntegrated Sight Unit (ISU)			MANUFACTURER: AFPTEF		
CONTAINER NAME: ISU/TAS Container				CONTAINER COST:	
PACK DESCRIPTION: Aluminum Container, Test Load of ISU or simulated load with identical center of gravity and tie down points.					
CONDITIONING: As noted below					

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
7.	ROUGH HANDLING TESTS (Low temperature -28.8 deg C.			
a.	FED-STD-101 Method 5005.1 Level A	Cornerwise-drop (rotational) test. Condition to -28.8°C (+0/-5.6) for not less than 24 hours. Drop height 812.8 mm.	Drop on diagonally opposite bottom corners. Total of 2 drops. Drop on corners not tested in 6a.	(VI) Tri-axial accelerometer to measure G-forces
b.	FED-STD-101 Method 5008 1 Level A	Edgewise-drop (rotational) test. Condition to -28.8°C (+0/-5.6) for not less than 24 hours. Drop height 812.8 mm.	Drop on adjacent sides. Drop on sides not tested in 6b. Total of 2 drops.	(VI) Tri-axial accelerometer to measure G-forces
c.	FED-STD-101 Method 5012	Pendulum Impact test. Condition at -53.9C for not less than 24 hours. Impact velocity 2.13 m/sec.	One impact on a side and an adjacent end. Impact sides not tested in 6c. Total of 2 impacts.	(VI) Tri-axial accelerometer to measure G-forces
10.	LEAK TEST FED-STD-101 Method 5009.2 (4.7.2)	Pneumatic pressure at 10.34 kPa. 0.3 Pa/hr leakage allowed after temperature stabilization. Test duration to be a minimum of 30 minutes.	Test performed in ambient condition from compressed air supply.	Pressure Transducer or Water Manometer

COMMENTS:	
PREPARED BY: Jason Gilreath, Mechanical Engineer	APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch

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APPENDIX 2

TEST DATA

TABLE 1. Cornerwise and Edgewise Rotational Drops

	+60°C		-29°C	
CONTAINER	IMPACT LOCATION	PEAK G	IMPACT LOCATION	PEAK G
ISU	3-2-6	13	3-2-5	13
	3-4-5	12	3-4-6	13
	3-4	16	3-2	19
	3-5	11	3-6	19

TABLE 2. Pendulum Impacts

	+74°C		-54°C	
CONTAINER	IMPACT FACE	PEAK G	IMPACT FACE	PEAK G
ISU	6	11	5	11
	2	10	4	11

TABLE 3. Container Resonant Frequency and Transmissibility Values.

CONTAINER	FREQUENCY	TRANSMISSIBILITY
ISU	14.9 Hz	3.1

APPENDIX 3

TEST WAVEFORMS

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Wed Feb 05 97 09:53
ROTATIONAL DRP: 60 DEG C (140 DEG F)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT POINT : 326
DROP HEIGHT : 622mm (24.5in)

Sensitivity:

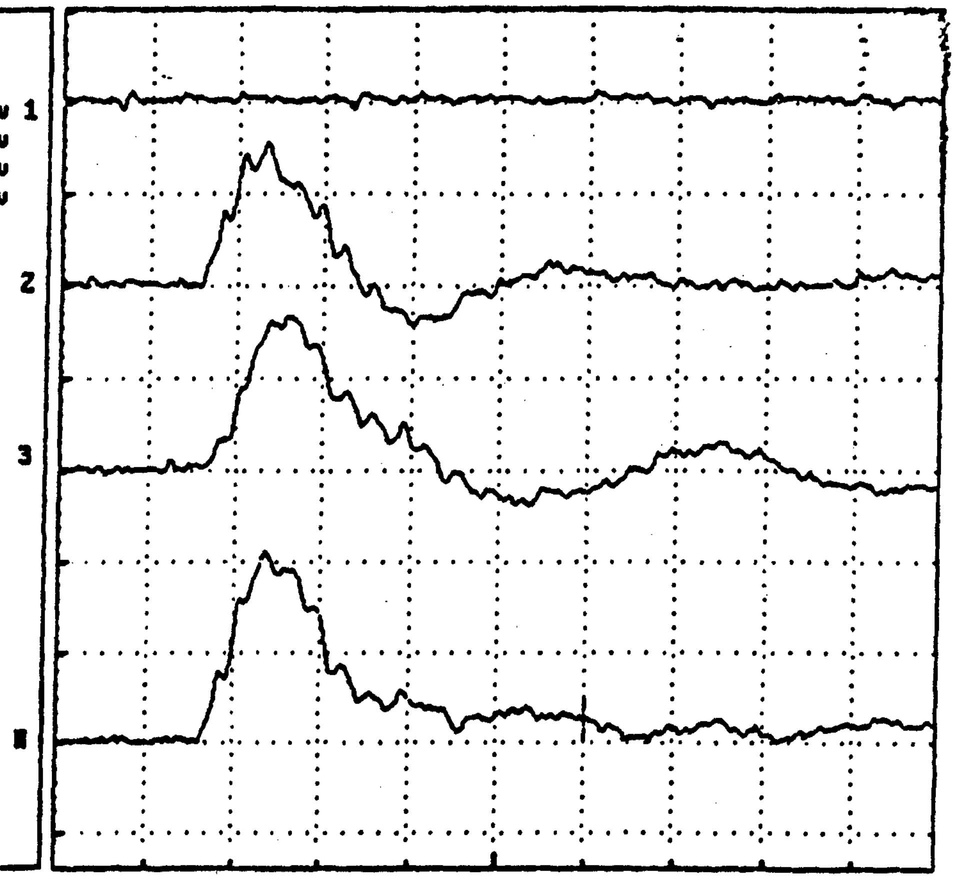
Ch. 1: 6.25 g's/Div
Ch. 2: 6.25 g's/Div
Ch. 3: 6.25 g's/Div
Ch. R: 6.25 g's/Div

Filter:

Ch. 1: 300 Hz
Ch. 2: 300 Hz
Ch. 3: 300 Hz
Ch. 4: 300 Hz

Vert. Angle = 84.8
Horiz. Angle =287.5

Trig. Ch. : ALL
Polarity : Window
Level : 7.93 g's
Mode : Single Event
Pretrigger : 20 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.80 mS	0.17 g's	0.60 g's	3.71 In/s		12.8 mS
2	76.80 mS	0.56 g's	9.41 g's	35.58 In/s		12.8 mS
3	76.80 mS	-1.76 g's	10.26 g's	49.23 In/s		12.8 mS
* R	76.80 mS	1.05 g's	13.31 g's	60.86 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Wed Feb 05 97 10:05
ROTATIONAL DRP: 60 DEG C (140 DEG F)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT POINT : 345
DROP HEIGHT : 622mm (24.5in)

Sensitivity:

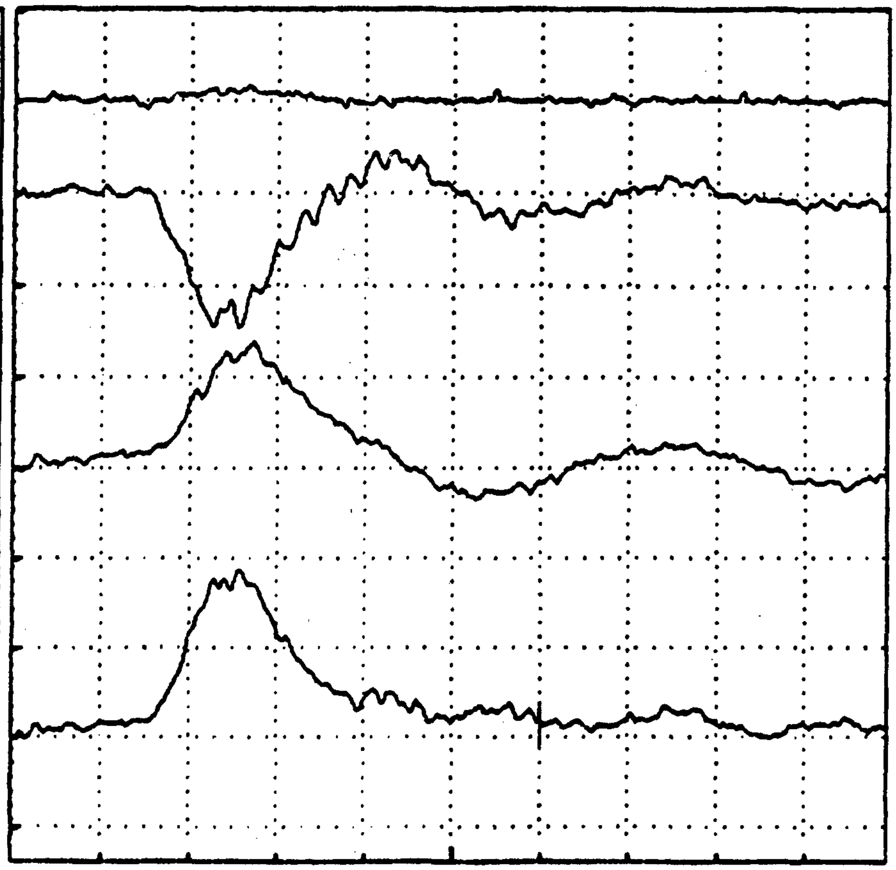
Ch. 1: 6.25 g's/Div
Ch. 2: 6.25 g's/Div
Ch. 3: 6.25 g's/Div
Ch. R: 6.25 g's/Div

Filter:

Ch. 1: 300 Hz
Ch. 2: 300 Hz
Ch. 3: 300 Hz
Ch. 4: 300 Hz

Vert. Angle = 90.0
Horiz. Angle =243.1

Trig. Ch. : ALL
Polarity : Window
Level : 7.93 g's
Mode : Single Event
Pretrigger : 20 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.80 mS	0.00 g's	1.10 g's	6.81 In/s		12.8 mS
2	76.80 mS	-0.47 g's	-8.71 g's	-34.77 In/s		12.8 mS
3	76.80 mS	-0.92 g's	8.85 g's	60.31 In/s		12.8 mS
* R	76.80 mS	1.02 g's	11.76 g's	69.95 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Wed Feb 05 97 10:09
ROTATIONAL DRP: 60 DEG C (140 DEG F)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT POINT : 34
DROP HEIGHT : 648mm (25.5in)

Sensitivity:

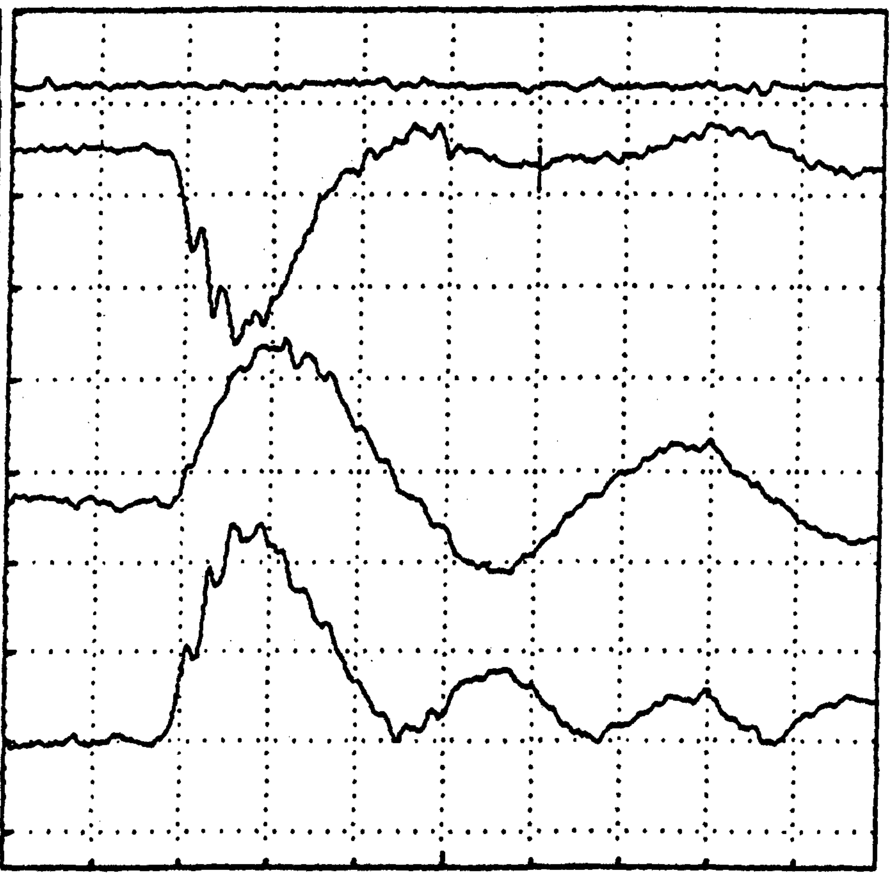
Ch. 1: 6.25 g's/Div
Ch. 2: 6.25 g's/Div
Ch. 3. 6.25 g's/Div
Ch. R: 6.25 g's/Div

Filter:

Ch. 1: 300 Hz
Ch. 2: 300 Hz
Ch. 3: 300 Hz
Ch. 4: 300 Hz

Vert. Angle = 91.3
Horiz. Angle =251.0

Trig. Ch. : ALL
Polarity : Window
Level : 5.90 g's
Mode : Single Event
Pretrigger : 20 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.80 mS	-0.10 g's	8.57 g's	1.34 In/s		12.8 mS
* 2	76.80 mS	-1.40 g's	-13.10 g's	-74.63 In/s		12.8 mS
3	76.80 mS	-4.04 g's	10.60 g's	58.07 In/s		12.8 mS
R	76.80 mS	4.27 g's	15.66 g's	89.80 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Wed Feb 05 97 10:13
ROTATIONAL DRP: 60 DEG C (140 DEG F)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT POINT : 35
DROP HEIGHT : 648mm (25.5in)

Sensitivity:

Ch. 1: 6.25 g's/Div 1
Ch. 2: 6.25 g's/Div
Ch. 3: 6.25 g's/Div
Ch. R: 6.25 g's/Div 2

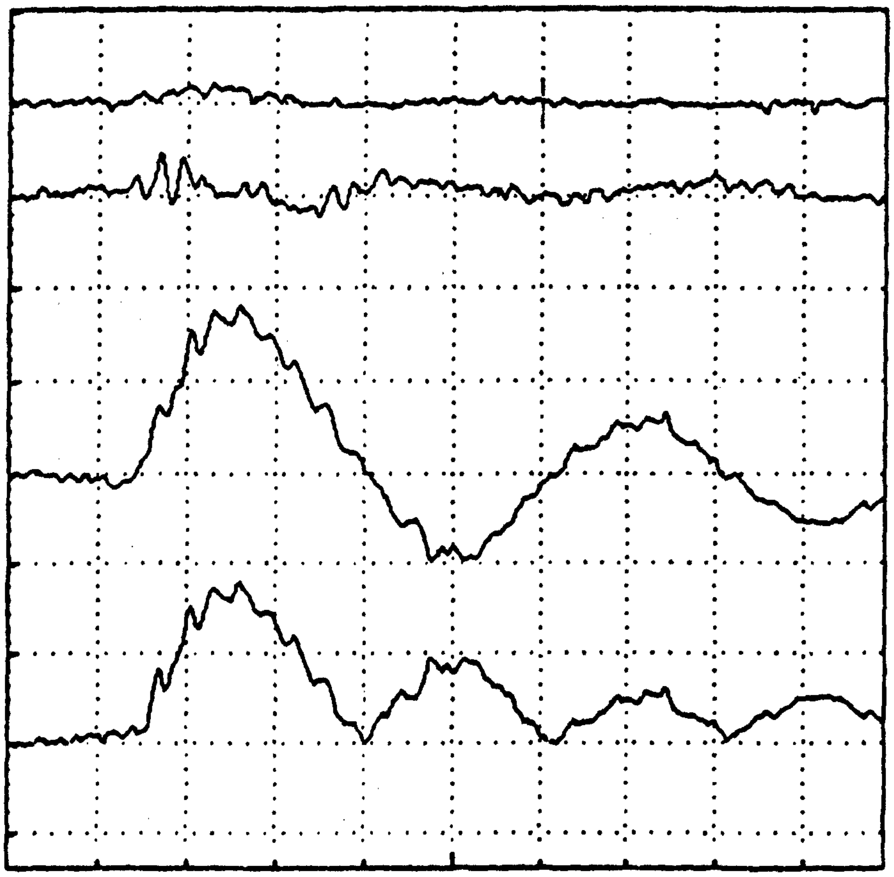
Filter:

Ch. 1: 300 Hz
Ch. 2: 300 Hz
Ch. 3: 300 Hz
Ch. 4: 300 Hz

3

Vert. Angle = 85.2
Horiz. Angle =273.2

Trig. Ch. : ALL R
Polarity : Window
Level : 5.98 g's
Mode : Single Event
Pretrigger : 20 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
* 1	76.80 mS	0.07 g's	1.23 g's	4.51 In/s		12.8 mS
2	76.80 mS	0.05 g's	2.91 g's	12.99 In/s		12.8 mS
3	76.80 mS	-0.01 g's	11.34 g's	43.20 In/s		12.8 mS
R	76.80 mS	0.01 g's	11.40 g's	45.41 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Fri Feb 07 97 09:27
ROTATIONAL DRP: -28.9DegC (-20DegF)
TEST ITEM : ISU-2

TEST ENGINEER : PILSINGER
IMPACT POINT : 325
DROP HEIGHT : 622mm (24.5in)

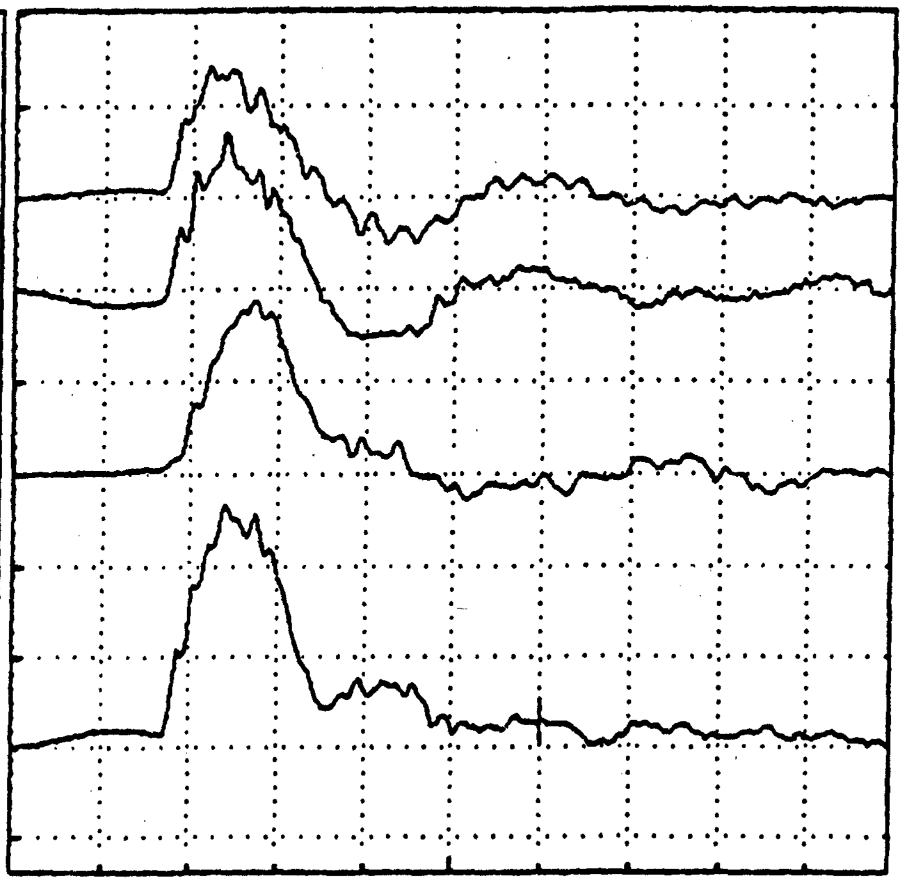
Sensitivity:

Ch. 1: 5.88 g's/Div
Ch. 2: 5.88 g's/Div
Ch. 3: 5.88 g's/Div
Ch. R: 5.88 g's/Div

Filter:

Vert. Angle = 47.3
Horiz. Angle =356.4

Trig. Ch. : ALL
Polarity : Window
Level : 5.99 g's
Mode : Single Event
Pretrigger : 28 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.88 mS	1.83 g's	7.26 g's	32.38 In/s		12.8 mS
2	76.88 mS	1.12 g's	8.72 g's	23.31 In/s		12.8 mS
3	76.88 mS	-8.87 g's	9.55 g's	52.94 In/s		12.8 mS
■ R	76.88 mS	1.52 g's	13.31 g's	66.29 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME	: Fri Feb 07 97 09:32	TEST ENGINEER	: FILSINGER
ROTATIONAL DRP:	-28.9DegC (-20DegF)	IMPACT POINT	: 346
TEST ITEM	: ISU-2	DROP HEIGHT	: 622mm (24.5in)

Sensitivity:

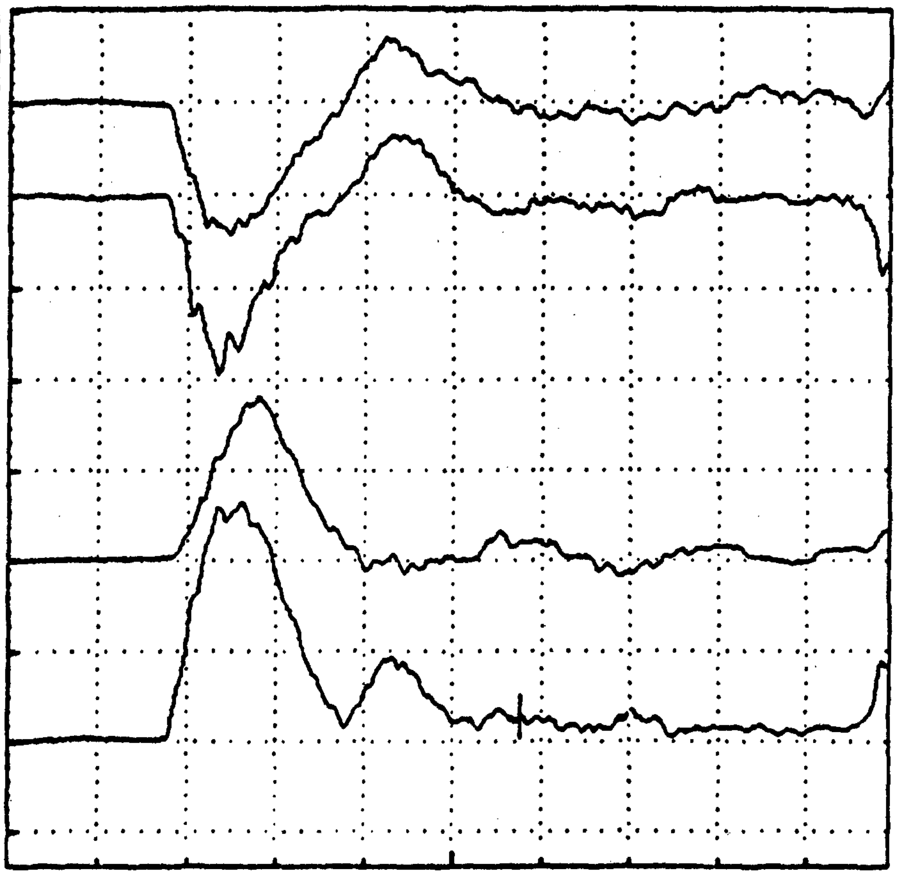
Ch. 1: 5.00 g's/Div 1
Ch. 2: 5.00 g's/Div
Ch. 3: 5.00 g's/Div
Ch. R: 5.00 g's/Div 2

Filter:

3

Vert. Angle = 97.7
Horiz. Angle =129.8

Trig. Ch. : ALL R
Polarity : Window
Level : 5.99 g's
Mode : Single Event
Pretrigger : 20 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	73.73 mS	-0.19 g's	-7.11 g's	-22.93 In/s		12.8 mS
2	73.73 mS	-0.89 g's	-9.81 g's	-32.46 In/s		12.8 mS
3	73.73 mS	1.07 g's	9.21 g's	49.84 In/s		12.8 mS
• R	73.73 mS	1.40 g's	13.16 g's	63.75 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME	: Fri Feb 07 97 09:36	TEST ENGINEER	: FILSINGER
ROTATIONAL DRP:	-28.9DegC (-20DegF)	IMPACT POINT	: 32
TEST ITEM	: ISU-2	DROP HEIGHT	: 648mm (25.5in)

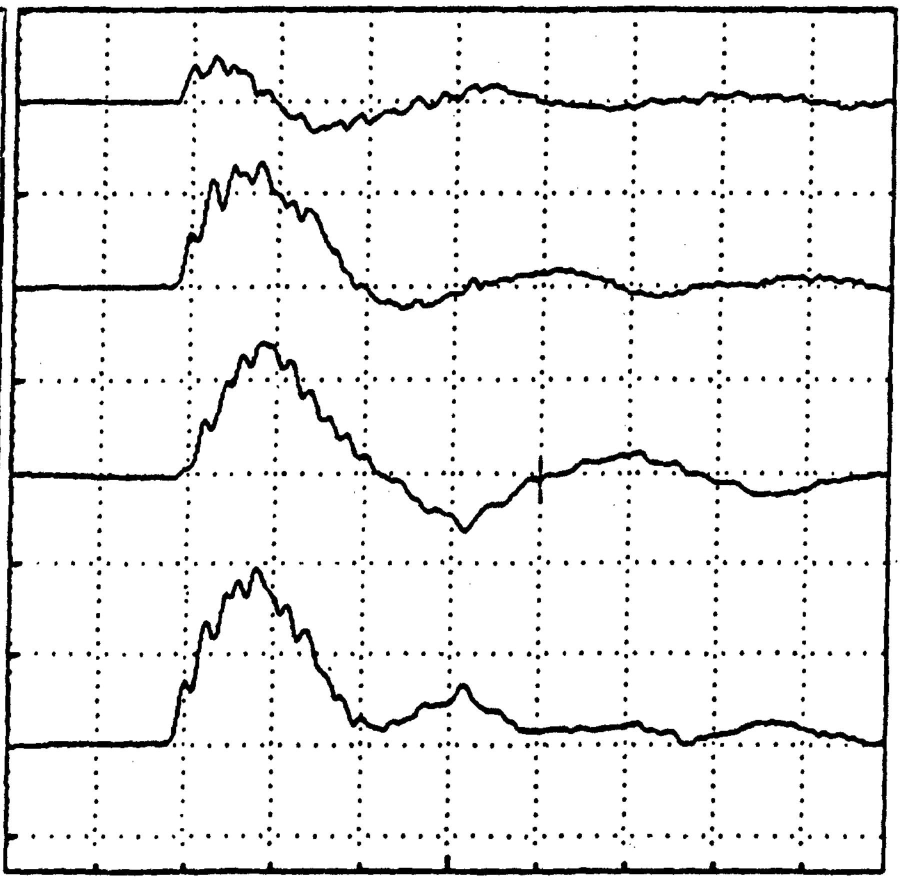
Sensitivity:

Ch. 1: 10.00 g's/Div
Ch. 2: 10.00 g's/Div
Ch. 3: 10.00 g's/Div
Ch. R: 10.00 g's/Div

Filter:

Vert. Angle = 90.0
Horiz. Angle =341.1

Trig. Ch. : ALL
Polarity : Window
Level : 5.99 g's
Mode : Single Event
Pretrigger : 20 %



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.80 mS	0.00 g's	5.13 g's	8.34 In/s		12.8 mS
2	76.80 mS	1.41 g's	13.62 g's	76.55 In/s		12.8 mS
* 3	76.80 mS	-0.48 g's	14.25 g's	53.25 In/s		12.8 mS
R	76.80 mS	1.49 g's	19.42 g's	93.63 In/s		12.8 mS

Remarks:

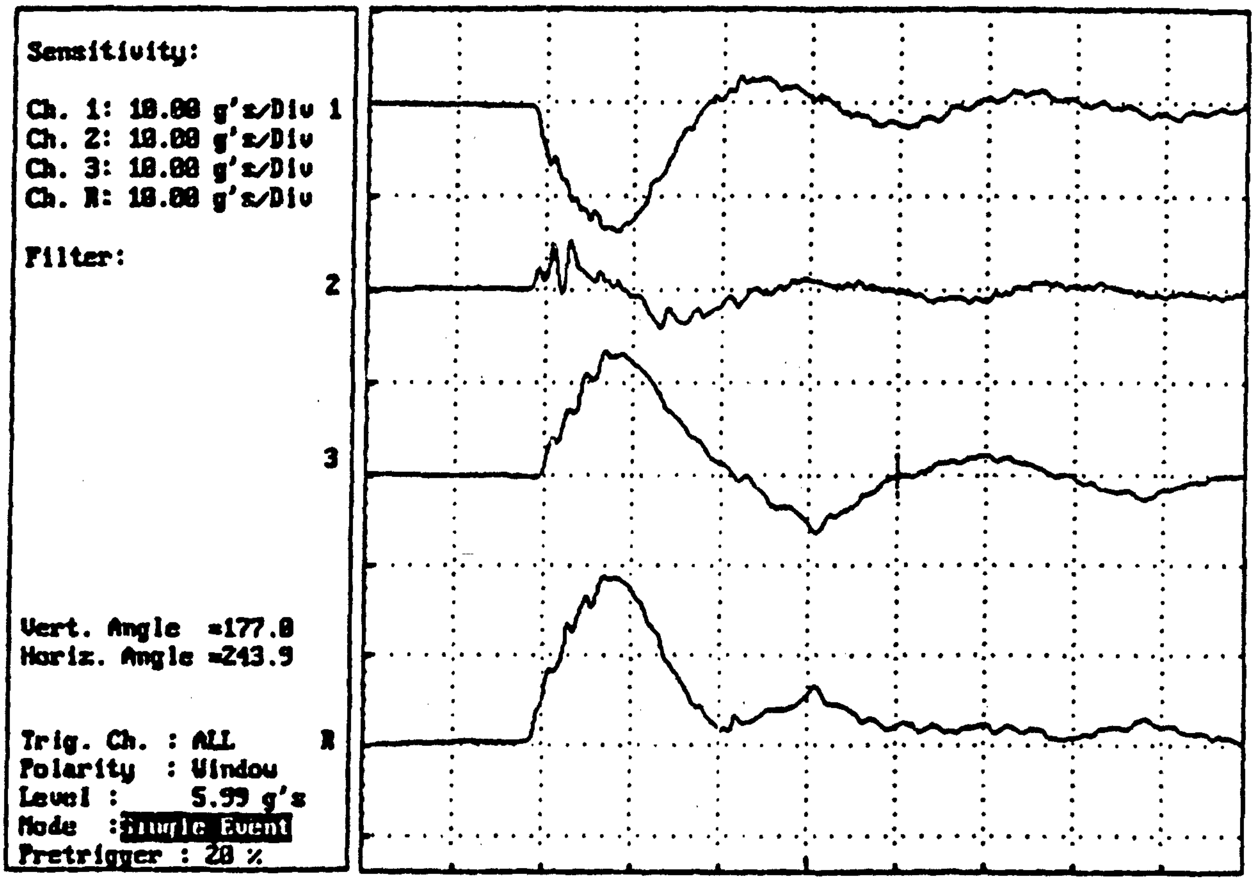
CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Fri Feb 07 97 09:42
ROTATIONAL DRP: -28.9DegC (-20DegF)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT POINT : 36
DROP HEIGHT : 648mm (25.5in)



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.80 mS	-2.25 g's	-13.75 g's	-74.68 In/s		12.8 mS
2	76.80 mS	-0.05 g's	5.34 g's	3.02 In/s		12.8 mS
* 3	76.80 mS	-0.11 g's	13.58 g's	49.41 In/s		12.8 mS
R	76.80 mS	2.25 g's	18.79 g's	89.68 In/s		12.8 mS

Remarks:

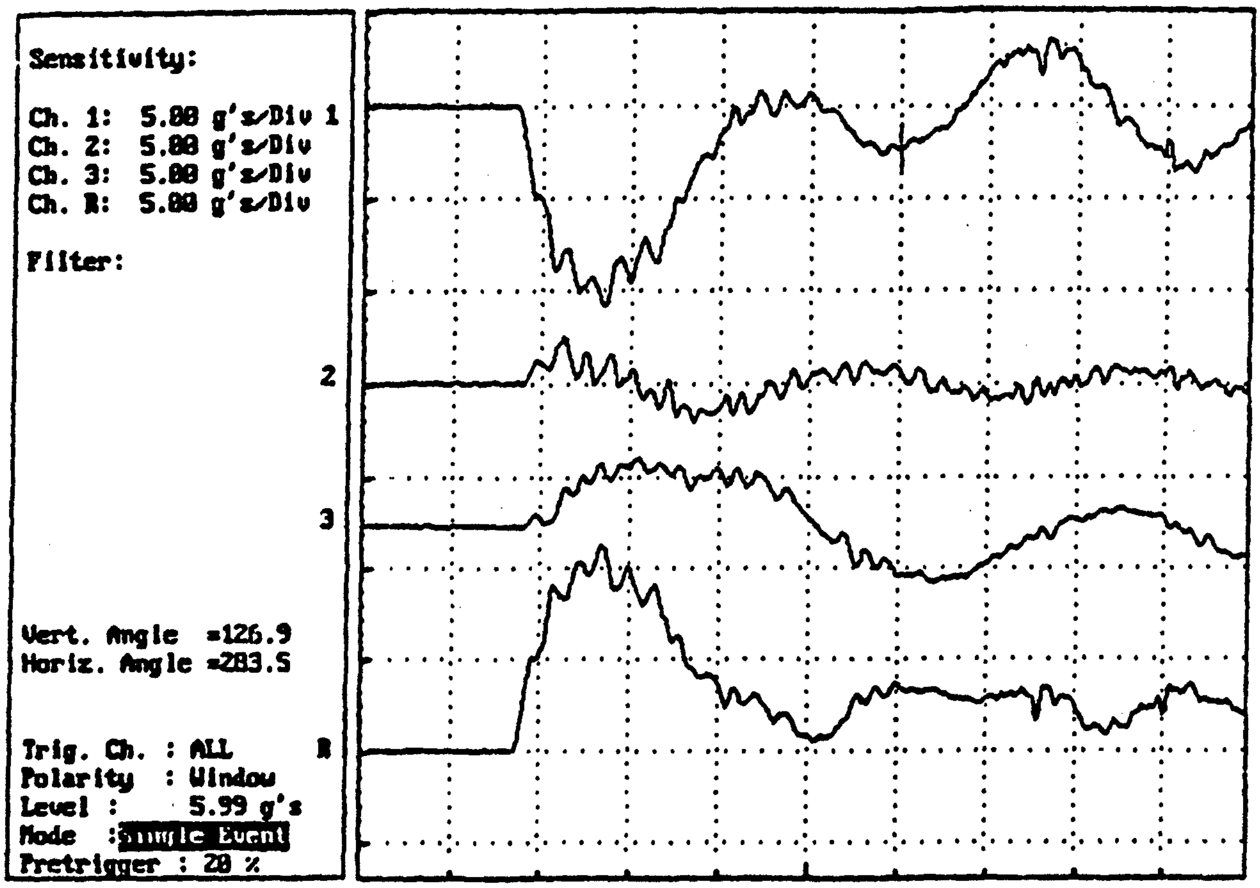
CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Wed Feb 05 97 16:00
PENDULUM IMPAC: 73.9DEG C (160DEG F)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT FACE : 6
IMPACT VELOCITY 2.13m/sec (7ft/sec



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIU
* 1	76.80 mS	-2.19 g's	-10.86 g's	-82.41 In/s		12.8 mS
2	76.80 mS	0.68 g's	2.59 g's	1.45 In/s		12.8 mS
3	76.80 mS	-2.04 g's	3.06 g's	29.34 In/s		12.8 mS
R	76.80 mS	3.65 g's	11.29 g's	87.50 In/s		12.8 mS

Remarks:

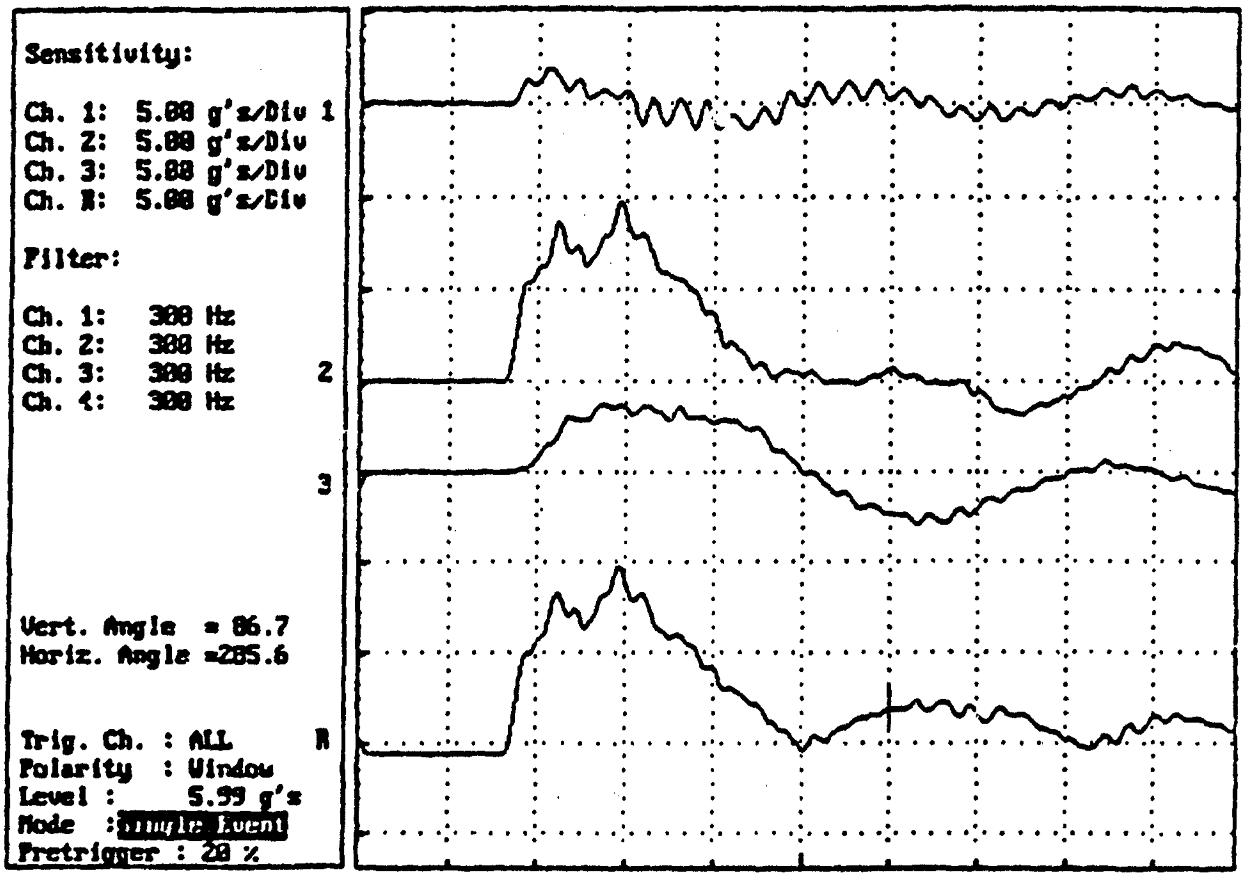
CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Wed Feb 05 97 16:06
PENDULUM IMPAC: 73.9DEG C (160DEG F)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT FACE : 2
IMPACT VELOCITY 2.13m/sec (7ft/sec



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.80 mS	0.14 g's	1.82 g's	1.37 In/s		12.8 mS
2	76.80 mS	0.66 g's	9.64 g's	79.16 In/s		12.8 mS
3	76.80 mS	-2.36 g's	3.78 g's	33.63 In/s		12.8 mS
* R	76.80 mS	2.45 g's	10.33 g's	86.01 In/s		12.8 mS

Remarks:

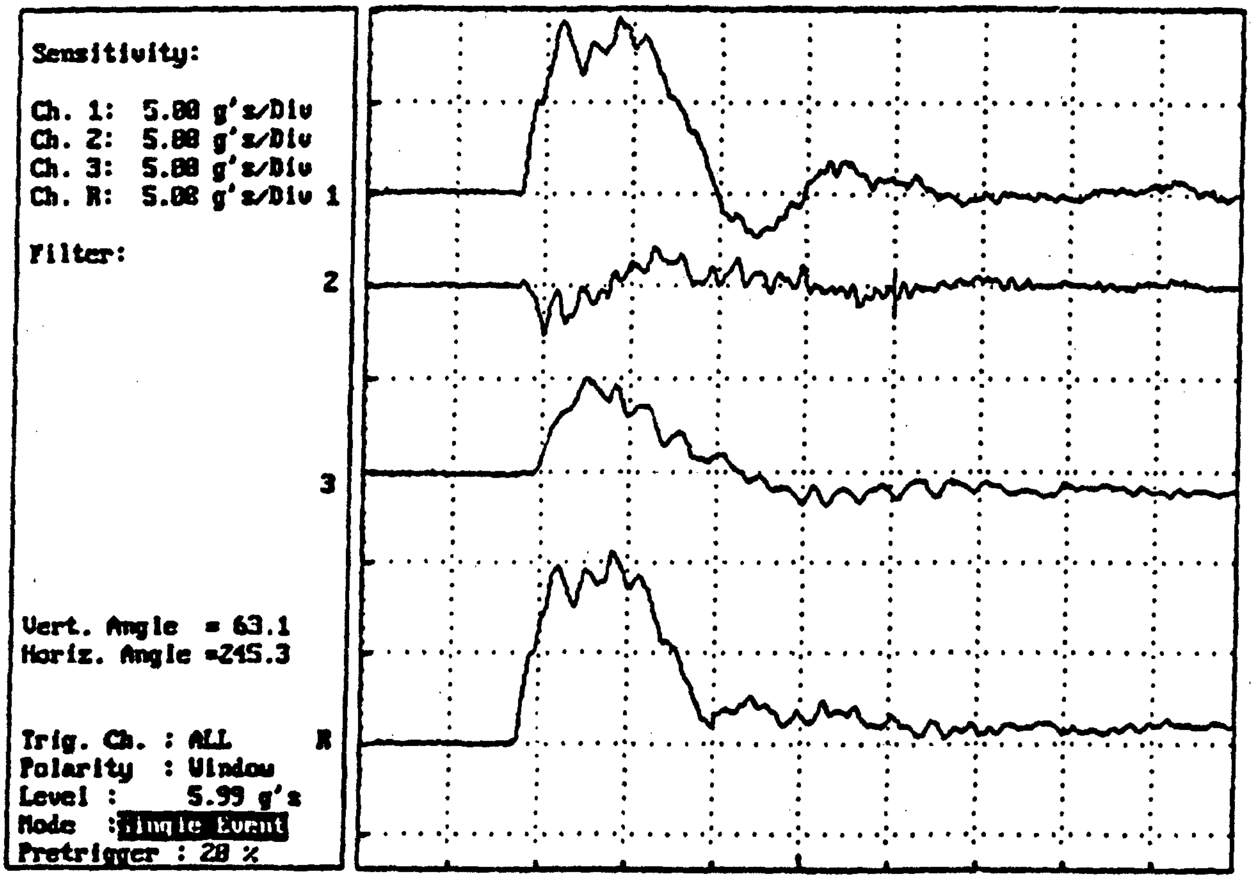
CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GHI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Fri Feb 07 97 16:00
PENDULUM IMPAC: -53.9DegC (-65DegF)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT FACE : 5
IMPACT VELOCITY 2.13m/sec (7ft/sec)



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	76.88 mS	8.68 g's	9.56 g's	64.69 In/s		12.8 mS
* 2	76.88 mS	-8.58 g's	-2.78 g's	1.74 In/s		12.8 mS
3	76.88 mS	-1.88 g's	5.35 g's	22.91 In/s		12.8 mS
R	76.88 mS	1.34 g's	18.55 g's	68.65 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

Waveform Test Report

GMI SYSTEMS, INC. CAT SYSTEM

DATE / TIME : Fri Feb 07 97 16:05
PENDULUM IMPAC: -53.9DegC (-65DegF)
TEST ITEM : ISU-2

TEST ENGINEER : FILSINGER
IMPACT FACE : 4
IMPACT VELOCITY 2.13m/sec (7ft/sec

Sensitivity:

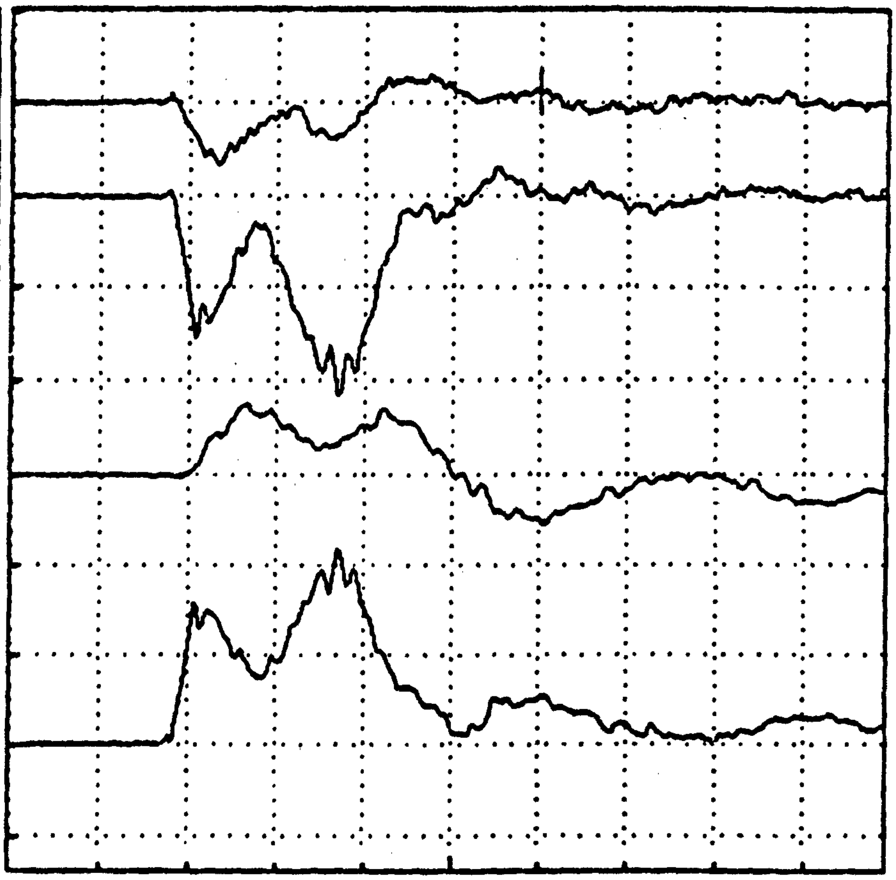
Ch. 1: 5.00 g's/Div 1
Ch. 2: 5.00 g's/Div
Ch. 3: 5.00 g's/Div
Ch. R: 5.00 g's/Div 2

Filter:

3

Vert. Angle = 75.8
Horiz. Angle =279.1

Trig. Ch. : ALL R
Polarity : Window
Level : 5.99 g's
Mode : Single Event
Pretrigger : 20 %

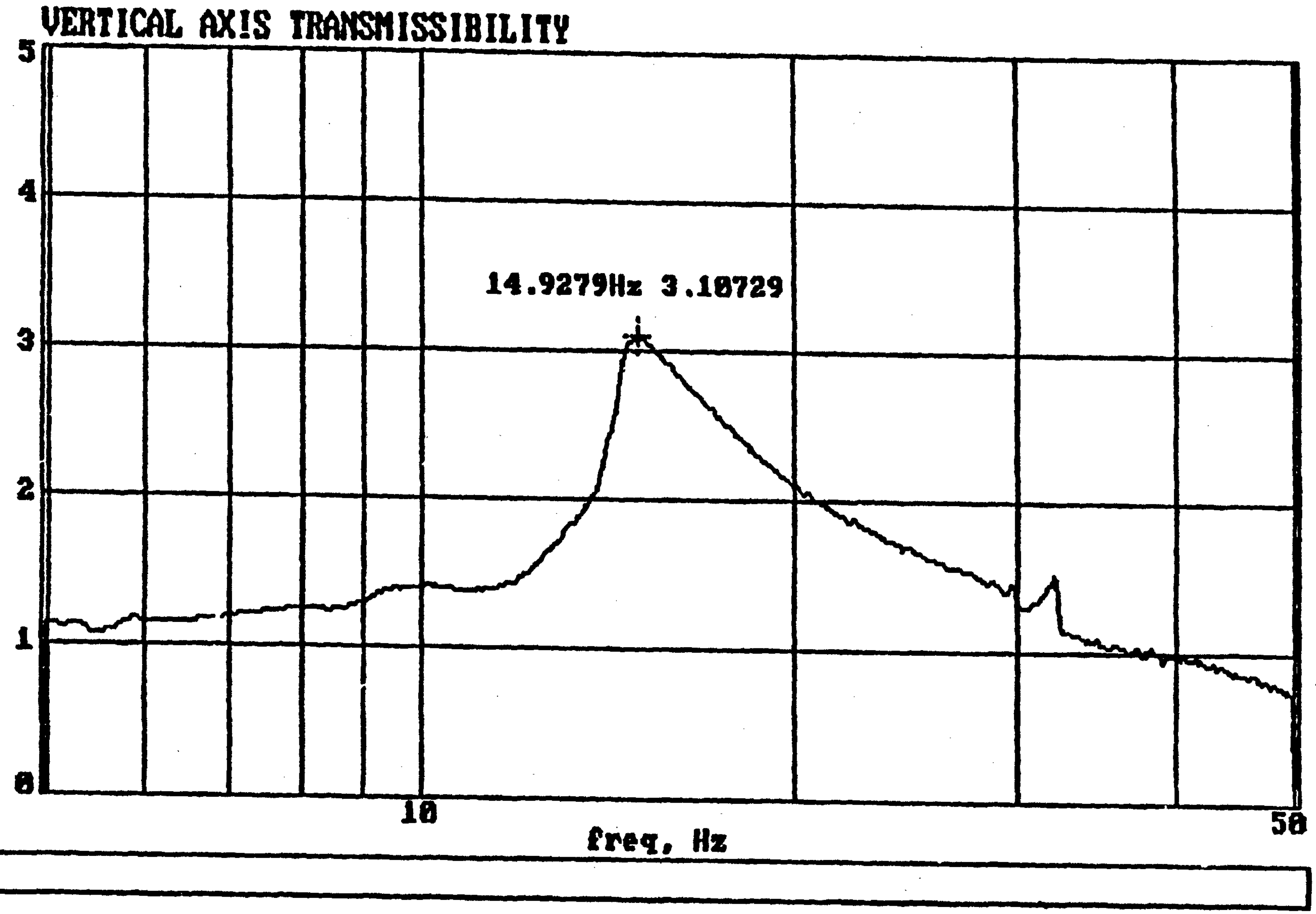


CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
* 1	76.80 mS	0.63 g's	-3.46 g's	-0.92 In/s		12.8 mS
2	76.80 mS	0.39 g's	-10.78 g's	-68.66 In/s		12.8 mS
3	76.80 mS	-2.45 g's	3.57 g's	27.81 In/s		12.8 mS
R	76.80 mS	2.56 g's	10.93 g's	74.32 In/s		12.8 mS

Remarks:

CH1 X-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)
CH2 Y-AXIS (LONGITUDINAL MOTION)
CH3 Z-AXIS (VERTICAL MOTION)
CH4 RESULTANT

FREQUENCY SWEEP
ISU CONTAINER WITH SPRING MOUNTS
3 APR 97



10:42:50

APPENDIX 4

PHOTOGRAPHS

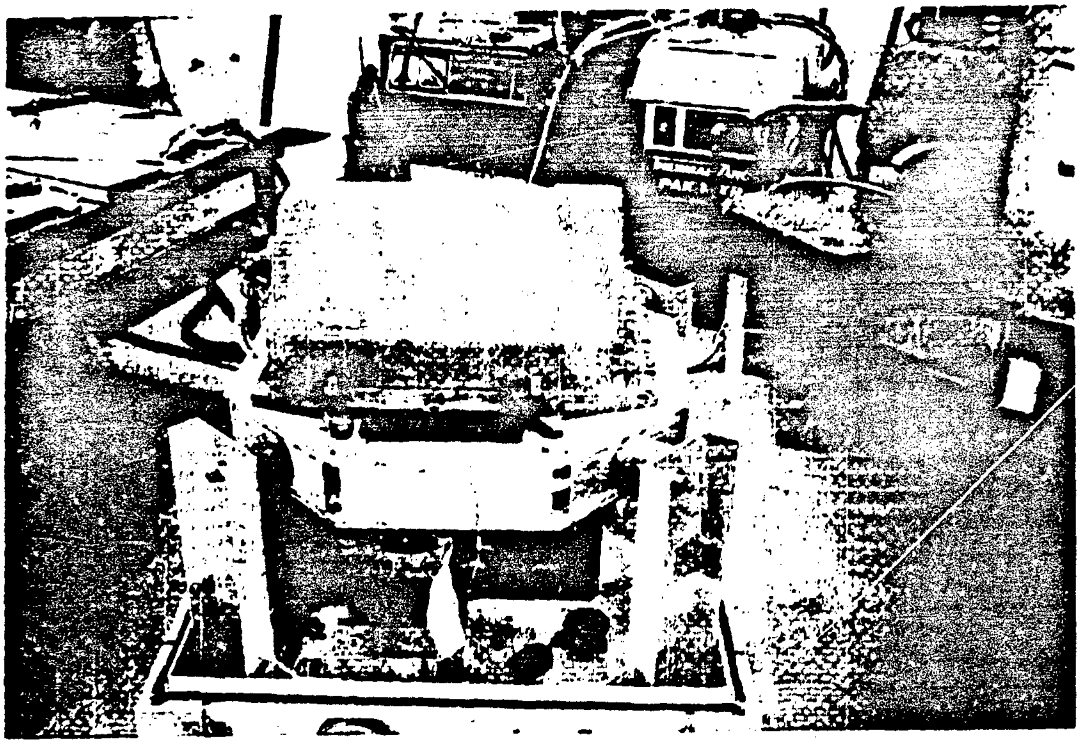


Figure 1: Container base with ISU test load.

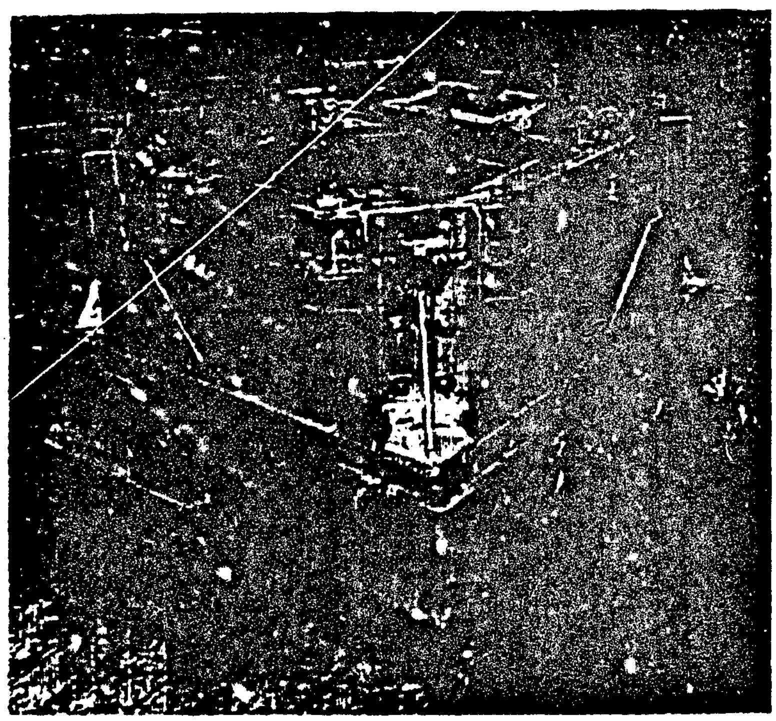


Figure 2: Container base and cradle mounting configuration.

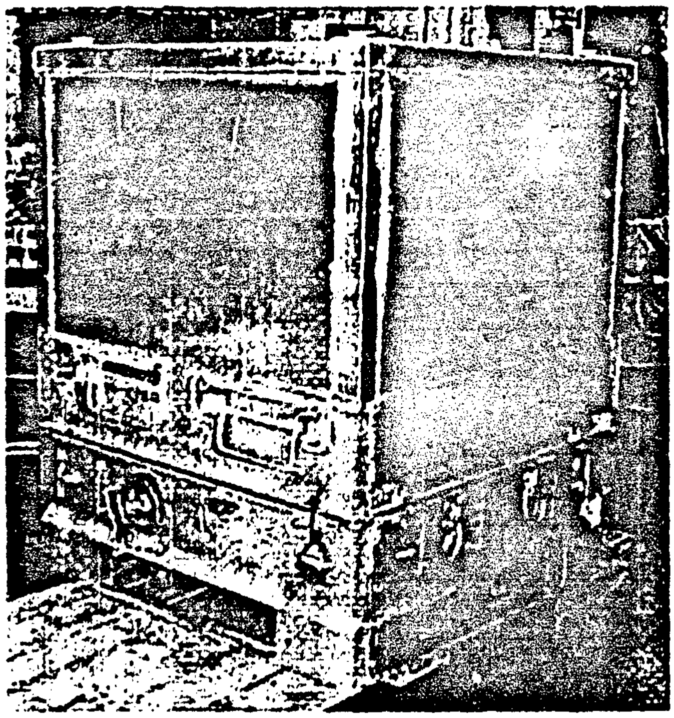


Figure 3: Container showing standard hardware.

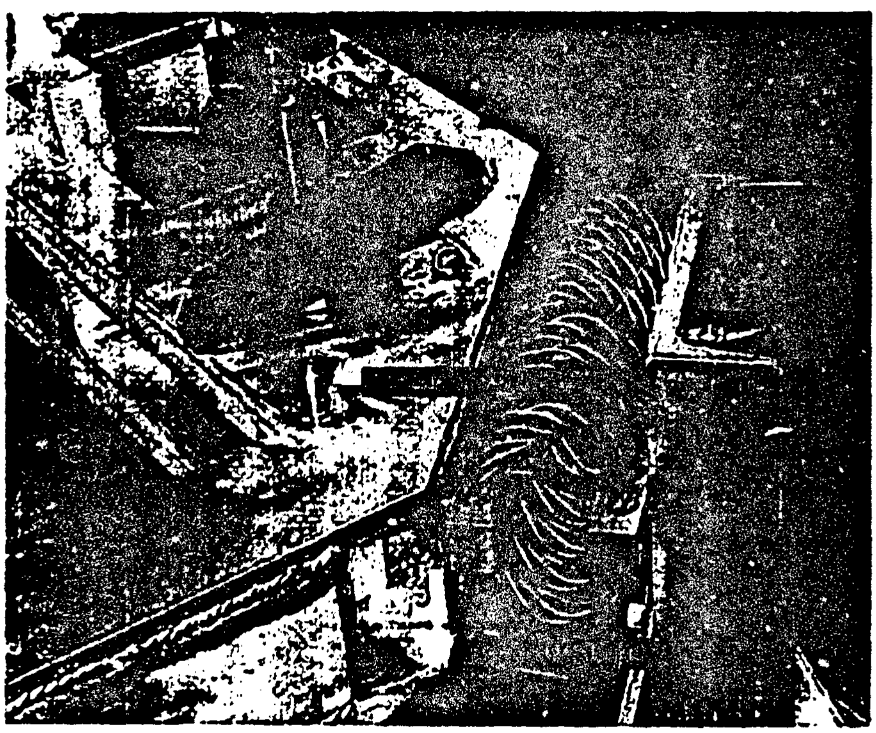


Figure 4: Bar clamp and locating pin.

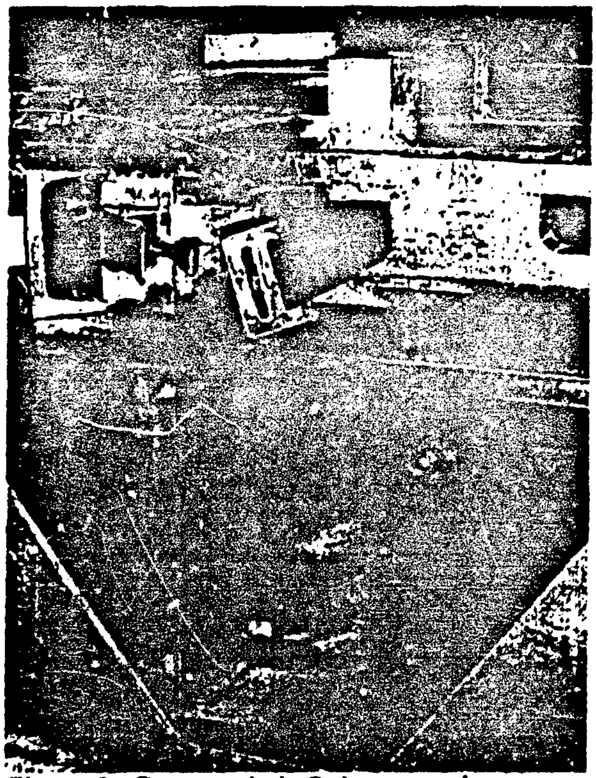


Figure 5: Commander's Relay mounting straps.

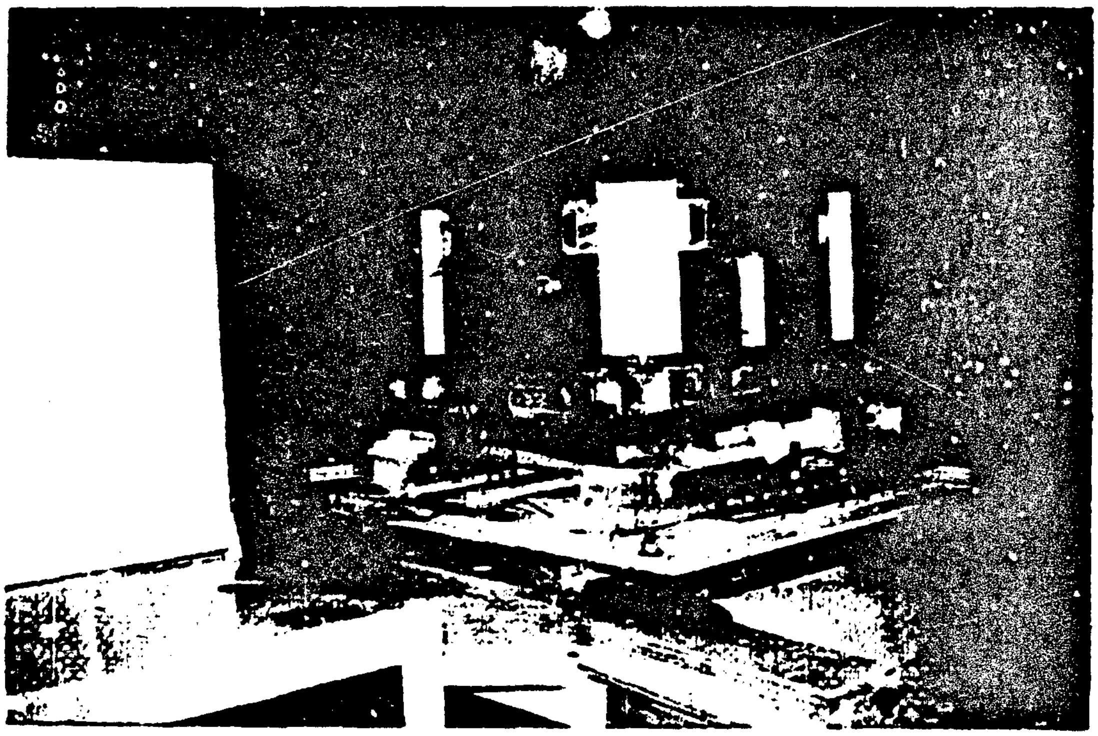


Figure 6: Horizontal random vibration test.

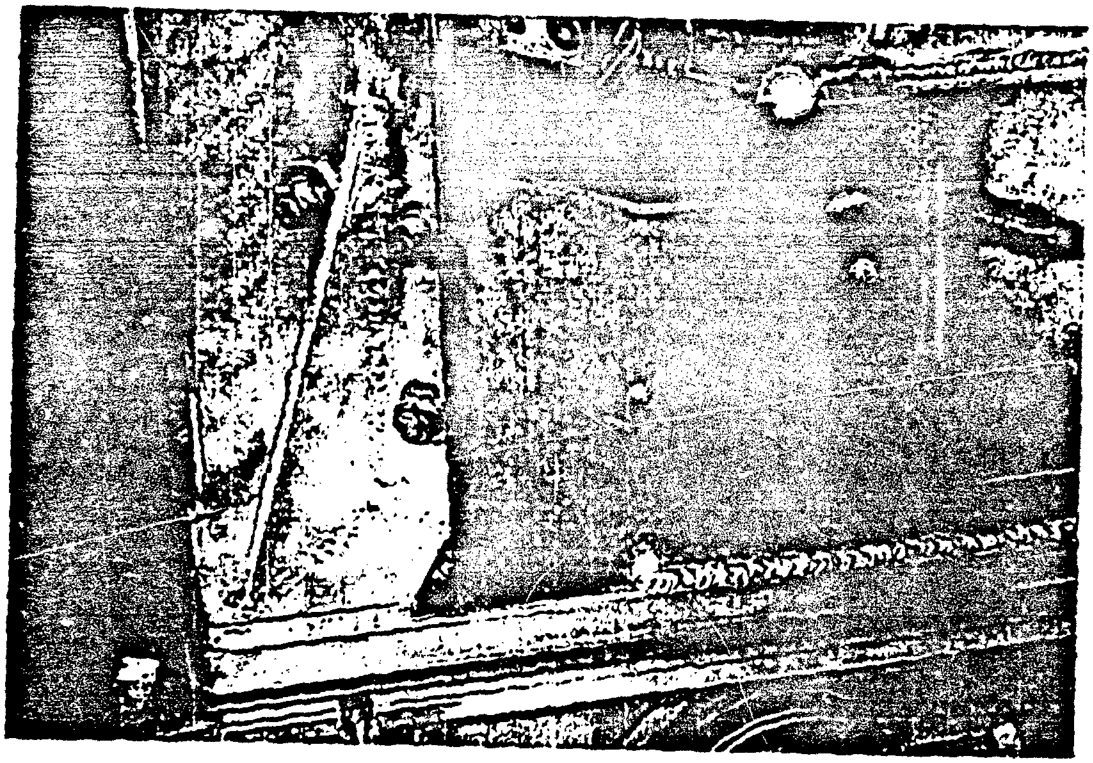


Figure 7: Cradle support structure (exterior view).

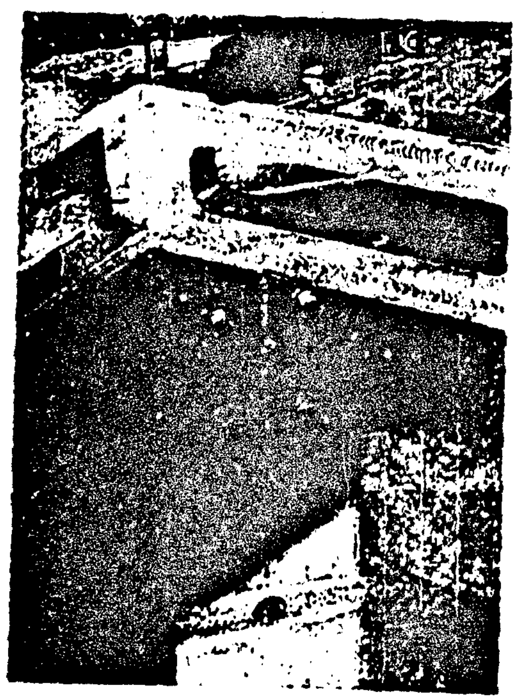


Figure 8: Cradle support structure (interior view).

APPENDIX 5

STATEMENT OF WORK

Statement of Work
For
Integrated Sight Unit Container
18 March 1996

1. Introduction. The Air Force Packaging Technology and Engineering Facility will design an aluminum, reusable, long-life, container for the storage and transportation of one Integrated Sight Unit (ISU). The container configuration will also house the ISU with Bradley Eye-safe Laser Range Finder (BELRF) and IBAS Target Acquisition Subsystem (TAS) units as well. This common container will protect the items during world-wide transportation and storage.

2. Scope.

2.1 The proposed internal/external size (in inches) of the container is:

ID 30.9" L X 30.9" W X 36.0" H
OD 34.5" L X 34.5" W X 41.5" H

3. Specification of Design. The ISU Container will be designed in accordance with SAE ARP 1967, with the following modifications:

A. Par. 3.1 N/A
B. Par. 3.2.1 Cadmium plated parts shall not be used in the interior of the container.
C. Par. 3.3.2 Any container surface or cavity that may collect water will be either convex to allow run-off or have drainage holes in accordance with the provided drawing package.
D. Par. 3.3.3.2.1 Wide handle, cam-over-center latches requiring no use of tools to open or close and meeting arctic glove requirements shall be used.
E. Par. 3.3.3.2.2 Container will be designed and testing for a 1.5/1.5 PSIG pressure vacuum.
F. Par. 3.3.4.2 Tiedown provisions will be provided, no special towing provisions will be incorporated.
G. Par. 3.3.5.1 A desiccant port with cover shall be provided as well as a confined space using foam or aluminum for desiccant storage, a desiccant receptacle will not be used.
H. Par. 3.3.5.3 N/A
I. Par. 3.3.5.6 N/A
J. Par. 3.3.5.8 N/A
K. Par. 3.3.5.9 N/A
L. Par. 3.4.3 Interrupted or tack welds will be used when a continuous seal weld is not required. No caulking will be used on these types of welds.
M. Par. 3.7 N/A
N. Par. 3.9, Section a Text shall be 12.7mm high. No arrows will be included.
O. Par. 3.9, Section b "DO NOT DROP" and "CAUTION: RELEASE PRESSURE BEFORE OPENING CONTAINER" will not be included. Text shall be 25.4mm high.

P. Par. 3.9, Section c N/A
Q. Par. 3.9, Section d Text shall be 12.7mm high.
R. Par. 3.9, Section e "DO NOT DISTURB" and "CAUTION: RELEASE PRESSURE BEFORE OPENING CONTAINER" will not be included. Text shall be 12.7mm high.
S. Par. 3.9, Section f N/A
T. Par 3.9, Section g Text shall be 12.7mm high.
U. Par. 3.9, Section h N/A
V. Par. 3.9, Section i N/A
W. Par. 3.9, Section j N/A
X. Par. 3.9, Section k No arrows will be included.
Y. Par. 3.9, Section l Text shall be 12.7mm high.
Z. Par. 3.9, Section m N/A
AA. Par. 3.9, Section n N/A
BB. Par. 3.10 One name plate on cover with the following information:

    "Container, Shipping & Storage"
    NSN
    NSN Bar Code
    Part Number
    Contract Number
    Manufacturer
    Tare Weight, Dimensions, and Cube
    Design Activity
    "Property of the U.S. ARMY"

CC. Par. 3.10.1 N/A
DD. Par. 3.11 N/A
EE. Par. 4.5.2 A pressure transducer and data acquisition can be used in testing.
FF. Par. 4.5.2.1 and 4.5.2.2 Container will be designed and tested at 1.5/1.5 PSIG.
GG. Par. 4.5.2.3 N/A
HH. Par. 4.5.3 Corner-wise and Edge-wise drop tests will be performed according to container size and weight.
II. Par. 4.5.4 N/A
JJ. Par. 4.5.7 N/A, container design have passed these tests previously.
KK. Par. 4.5.8 N/A, container design have passed these tests previously.

APPENDIX 6
DISTRIBUTION LIST

DISTRIBUTION LIST

DTIC-OC 8725 JOHN J KINGMAN RD, SUITE 0944 FT BELVOIR VA 22060-6218	1
HQ AFMC/LG 4375 CHIDLAW ROAD SUITE 6 WRIGHT-PATTERSON AFB OH 45433-5006	1
HQ AFMC/LGT 4375 CHIDLAW ROAD SUITE 6 WRIGHT-PATTERSON AFB OH 45433-5006	1
AFMC LSO/LO 4375 CHIDLAW ROAD SUITE 6 WRIGHT-PATTERSON AFB OH 45433-5006	1
AFMC LSO/LOP (LIBRARY) 5215 THURLOW ST WRIGHT-PATTERSON AFB OH 45433-5540	3
HQ USAF/ILTT 1030 AIR FORCE PENTAGON RM 4B322 WASHINGTON DC 20330-1030	1
72 ABW/LGTP 7516 SENTRY BLVD SUITE 201 TINKER AFB OK 73145-8912	1
75 ABW/LGTP 7973 UTILITY DR HILL AFB UT 84056-5306	1
76 ABW/LGTP 410 NORTH LUCK RD SUITE 289 KELLY AFB TX 78241-5312	1
77 ABW/LGTP 1961 IDZOREK ST BLDG. 783A MCCLELLAN AFB CA 95652-1620	1

DISTRIBUTION LIST (Cont'd)

78 ABW/LGTP 455 BYRON ST BLDG 376 SUITE 1150 ROBINS AFB GA 31098-1860	1
ASC/SYLS 2475 K STREET BLDG 52 SUITE 1 WRIGHT-PATTERSON AFB OH 45433-7642	1
COMMANDER NAVAL INVENTORY CONTROL POINT ATTN: E. H. BRIGGS (CODE 0512) 700 ROBBINS AVENUE PHILADELPHIA PA 19111-5098	1
COMMANDER NAVAL INVENTORY CONTROL POINT ATTN: F SECHRIST (CODE 054X) 5450 CARLISLE PIKE MECHANICSBURG PA 17055-0788	1
DEFENSE LOGISTICS AGENCY ATTN: MMLSD MR. JOE MALONEY 8725 JOHN KINGMAN RD SUITE 2533 FORT BELVOIR VA 22060-6221	1
HQ PACAF/LGT 25 E. STREET BLDG 1102 STE 1326 HICKAM AFB HI 96853-5426	1
HQ USAFE/LGT UNIT 3050 BOX 105 APO AE 09094-0105	1
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APPENDIX 7

REPORT DOCUMENTATION

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	Jun 97	Final; Jan 96 - Jun 97

4. TITLE AND SUBTITLE
Design, Fabrication and Testing of the MICOM-ISU Shipping and Storage Container

5. FUNDING NUMBERS

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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8. PERFORMING ORGANIZATION REPORT NUMBER
97-R-02

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION AVAILABILITY STATEMENT
Approved for public release. Distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This project was initiated to design, fabricate, test and provide a production drawing package for the MICOM-ISU container. The objective of the test series was to qualify the container for production release by AFMC LSO/LOP. The container is designed to hold one of three items: the Integrated Sight Unit (ISU), the ISU with BELRF, or the IBAS Target Acquisition System (TAS)

The container utilizes standard AFPTEF extrusion designs and is completely designed using PTC's Pro/Engineer three dimensional solids modeling software. This is an unpainted, welded, controlled breathing, aluminum container. It is a low base design with an internal cradle system that is mounted to the base via four stainless steel cable or flex mounts. Some of the design features are humidity indicator, pressure relief valve, desiccant port, stacking capability, tiedown rings, quick release latches, air filling valve, four way forklift entry and an integral base-skid design.

The test plan referenced MIL-STD-648A, FED-STD-101C and MIL-STD-810E. The tests were performed both at the AFPTEF and Redstone Technical Test Center (RTTC), Redstone Arsenal, Alabama.

14. SUBJECT TERMS
Aluminum container, Reusable container, Design, Test, ISU, BELRF, IBAS-TAS, Cable mounts

15. NUMBER OF PAGES
44

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unl