


REV	REVISIONS DESCRIPTION	DATE	APPROVED
1	ENG. REL PER ERZC #EO260L	1/3/84	<i>[Signature]</i>

ENVIRONMENTAL/RELIABILITY TEST REPORT NO. C024673-129

VIDEO GAME M/N 2100 (PAL I) ENVIRONMENTAL EVALUATION

ENGINEERING RELEASED

		DRAWN BY	DATE	 Atari, Inc. 30 E. Plumeria Drive San Jose, CA 95134 <small>© A Warner Communications Company</small>		
		Technician				
NEXT ASSY	USED ON	<i>Terry A. Minto</i> ENGINEER		TITLE 2100 PAL I, Environmental Stress Analysis		
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				SCALE	SHEET 1 OF 18	



ABSTRACT

ENVIRONMENTAL/RELIABILITY TEST REPORT NO. CO24673-129

AUTHORS: G. ONGMAN & T. MUSTO

DATE: DECEMBER 19, 1983

TITLE: VIDEO GAME M/N 2100 (PAL I) ENVIRONMENTAL EVALUATION

This report covers testing that was performed on the video game M/N 2100 (PAL I) preproduction units to evaluate its ability to withstand conditions that may occur during shipment or its normal service life.

The 2100 video game was subjected to the following tests: thermal mapping, high temperature, low temperature, temperature shock, temperature & humidity, vibration, electrostatic discharge, shock (impact), and software regression. The 2100 operated properly throughout all operating tests and during all post test check-outs. No package qualification tests were performed at this time due to the fact that no final packouts were available.

No physical or mechanical discrepancies were noted due to any testing that was performed. The 2100 units proved to be mechanically and electrically rugged and to have wide safety margins in its design and construction.

NOTE

This report contains Atari private data, and is for use only within the Atari technical community.



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ENVIRONMENTAL/RELIABILITY TEST REPORT NO. CO24673-129

VIDEO GAME M/N 2100(PAL I) ENVIRONMENTAL EVALUATION

PREPARED BY: G. ONGMAN & T. MUSTO

DATE: DECEMBER 19, 1983

1.0 INTRODUCTION

All the tests covered by this report were performed by Atari environmental engineers at the Atari San Jose plant except for the shock test which was performed by Viking Laboratories, an independent test laboratory. A copy of the test data for each test is included at the end of this report.

All of the tests covered by this report were performed in accordance with "Environmental/Reliability Engineering Test Plan" no. CO24673-109 and "Environmental Engineering Manual" no. CO61616

2.0 TEST PROCEDURES

2.1 THERMAL MAPPING

The product case was opened, and a thermal survey of the components was conducted with a temperature indicating device. Because of the low operating temperatures measured, it was determined that no thermal problem exists. Based on this, no formal thermal mapping test was performed.

2.2 HIGH TEMPERATURE

A test specimen was placed in a high temperature chamber. The ambient temperature within the chamber was increased, over a period of 1 1/2 hours, to 60 degrees C. Once the specimen temperature had stabilized, the specimen was soaked at this condition for a period of 4 hours. The chamber ambient temperature was then decreased, over a period of 1 1/4 hours, to 45 degrees C. Once the specimen temperature had stabilized, the specimen was soaked for a period of 1 hour. Upon completion of the soak, the specimen was operated. No discrepancies were noted due to this test.

2.3 LOW TEMPERATURE

A specimen was placed in a low temperature chamber. The



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ambient temperature within the chamber was decreased, over a period of 1 1/2 hours, to -30 degrees C. Once the specimen temperature had stabilized, the specimen was soaked for a period of 4 hours. The chamber ambient temperature was then increased, over a period 1-1/4 hours, to 10 degrees C. Once the specimen temperature had stabilized, the specimen was soaked for a period of 1 hour. Upon completion of the soak, the specimen was operated. No discrepancies were noted due to this test.

2.4 TEMPERATURE SHOCK

A test specimen was placed in a low temperature chamber that had been preconditioned to -30 degrees C. The specimen maintained at this condition for 1 hour. The specimen was then transferred, within 1 minute, to a high temperature chamber that had been preconditioned to a temperature of 60 degrees C. The specimen was maintained at this condition for 1 hour. The above cycle was repeated twice for a total of three cycles. No discrepancies were noted due to this test.

2.5 TEMPERATURE AND HUMIDITY (OPERATING)

An operating specimen was placed in a temperature and humidity chamber. The chamber temperature was increased, over a period of 50 minutes, to 45 degrees C. The chamber humidity was then increased, over a period of 35 minutes, to 95% relative humidity. The operating specimen was maintained at this condition for 96 hours. No discrepancies were noted due to this test.

2.6 VIBRATION

A test specimen was subjected to a vibration cycling test and a resonance dwell test. For the cycling test the specimen was attached to the table of the vibration machine in one of its three major axes. The specimen was subjected to 15 minutes of sine vibration cycling from 5Hz.-100Hz.-5Hz. at 0.015" DA. The above procedure was repeated twice with the specimen oriented in the two remaining axes for a total of 45 minutes of cycling. The specimen was monitored during the cycling for any indication of a resonance. For the resonance dwell test the specimen was to have been subjected to a 10 minute dwell at each resonant frequency. Since no resonances were noted, the specimen was subjected to a 10 minute dwell at 30Hz. at 0.015"DA. in each of the three axes. No discrepancies were noted due to this test.



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2.7 ELECTROSTATIC DISCHARGE

The exterior of the operating specimen was probed at any point it was likely for an operator to touch it in normal use. For this test a probe with a 100 pf capacitor and a 1500 ohm resistor was used at the following voltages: 10 KVDC, 15 KVDC, 20 KVDC, and 25 KVDC. Some minor program stoppage occurred, but there was no permanent damage due to this test.

2.8 SHOCK (IMPACT)

The shock machine was adjusted to deliver a 30 g, 11 ms half-sine shock pulse. The machine was dropped several times to verify the repeatability. The test specimen was attached to the table of the shock machine and subjected to three shocks. The specimen was then removed from the shock machine and functionally tested. The specimen was reoriented and the above procedure was repeated until the specimen had been subjected to shock in each direction of each axis for a total of 18 shocks. No discrepancies were noted due to this test.

2.9 SOFTWARE REGRESSION

Twenty-five of the most popular games from Atari and various other companies were played on a test specimen. The software regression data sheet gives a list of the games and an evaluation of the game play.

3.0 CONCLUSION

The video game M/N 2100 (PAL I) exhibits a rugged mechanical and structural design that is capable of withstanding normal home usage and shipping stresses. Substantial margins of safety in regard to mechanical stresses and thermal sensitivity have been proven to be present. Game play and graphics aren't quite as good as the M/N 2600 but are adequate for the average consumers needs.



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Date Started	Specimen Description
12-12-83	Video Game m/n 2100 (PAL I)
Date Completed	Type of Test
12-12-83	Thermal Mapping
Engineer (Signature)	Manufacturer
M. D. Dugman	ATARI
Technician (Signature)	Test Specification
M. D. Dugman	EEM C061616 (Rev 1A) Para 3.2.1

Test Point	Temp (°C)	Remarks
Lab amb.	22.3	
A-1	46.8	
A-2	44.5	
A-3	46	
A-4	25.9	
VR-1	46.6	

Note: The above test was performed on the PC board of specimen #3. Due to the low temperatures measured and the temperature ratings of the devices (70°C) no further testing will be conducted at this time.

Date Started	12-6-83	Specimen Description	Video Game M/N 2100 (PAL I)
Date Completed	12-6-83	Type of Test	High Temperature
Engineer (Signature)	J.D. Angeman	Manufacturer	ATARI
Technician (Signature)	M.D. Angeman	Test Specification	EEM C061616 (REV 1A) PARA 3.2.3.4.1

Time (OC)	Temp	Remarks
0715	amb	specimen #1 in the chamber - START Temperature increase
0845	59	START STABILIZATION
0850	59	
0855	59	
0900	60	START conditioning
1016	60	
1115	59	
1300	60	START Temp decrease
1415	43	START STABILIZATION
1420	43	
1425	43	
1430	44	START 1 hour conditioning
1450	44	
1520	44	
1530	44	specimen operates normal

Date Started	12-6-83	Specimen Description	Video Game n/c 2100 (PAL I)
Date Completed	12-6-83	Type of Test	Low Temperature
Engineer (Signature)	J. D. Ormman	Manufacturer	ATARI
Technician (Signature)	J. D. Ormman	Test Specification	EFM C061616 (REV 1A) Para 3.2.3.4.2

Time	Temp (oc)	Remarks
0715	Amb	Specimen #2 in the chamber - START Temperature decrease
0845	-28	START Stabilization
0850	-29	
0855	-30	
0900	-30	START Conditioning
1016	-30	
1115	-30	
1300	-30	START Temp Increase
1420	10	START Stabilization
1425	10	
1430	10	
1435	10	START 1 hour Conditioning
1450	10	
1520	10	
1535	10	Specimen operates normal

Date Started	Specimen Description
12-7-83	Video Game w/N 2100 (PAL I)
Date Completed	Type of Test
12-7-83	Temperature Shock
Engineer (Signature)	Manufacturer
J. D. Dugman	ATARI
Technician (Signature)	Test Specification
J. D. Dugman	EEM C061616 (REV 1A) Para 3.2.3.4.3

Time	Temp Cycle		Remarks
	(°C)	No.	
0715	-30	1	Specimen # 2 in the chamber - Start Test
0815	-30	1	
0815	60	1	
0915	60	1	
0915	-30	2	
1015	-30	1	
1015	60	1	
1115	60	2	
1115	-30	3	
1215	-30	1	
1215	60	1	
1500	60	3	No discrepancies noted

Date Started 12-8-83	Specimen Description Video Game M/N 2100 (PAL I)
Date Completed 12-12-83	Type of Test Temperature and Humidity (operating)
Engineer (Signature) H.D. Drumm	Manufacturer Atari
Technician (Signature) H.D. Drumm	Test Specification EEM C061616 (REV. 1A) PARA. 3.2.4

Date	Time	Temp (°C)	humidity (%RH)	Remarks
12-8-83	0905	amb	amb	Spec # 4 in the chamber - start Temp. increase
	0955	45	24	start humidity increase
	1630	45	95	start conditioning
	1630	45	95	
12-8-83	2230	45	95	
12-9-83	0430	45	95	
	1030	45	95	
	1630	45	95	
12-9-83	2230	45	95	
12-10-83	0430	45	95	
	1030	45	95	
	1630	45	95	
12-10-83	2230	45	95	
12-11-83	0430	45	95	
	1030	45	95	
	1630	45	95	
12-11-83	2230	45	95	
12-12-83	0430	45	95	
12-12-83	1630	45	95	specimen operates normal

Date Started 12-5-83	Specimen Description Video Game M10 2100 (PAL I)
Date Completed 12-5-83	Type of Test VIBRATION
Engineer (Signature) H.D. Anglin	Manufacturer ATARI
Technician (Signature) H.D. Anglin	Test Specification EEM C061616 (REV 1A) PARA 3.3.2.5.1 (PARTS B+C)

Cycling

Specimen Number	Axis	Time Start	Time Stop	Remarks
1	Y	1053	1108	No discrepancies noted
1	X	1126	1141	No discrepancies noted
1	Z	1203	1218	No discrepancies noted

Dwell

Specimen Number	Axis	Time Start	Time Stop	Freq (HZ)	Remarks
1	Y	1111	1121	30	No discrepancies noted
1	X	1143	1153	30	No discrepancies noted
1	Z	1219	1229	30	No discrepancies noted



TEST DATA

DATE STARTED <i>12-16-83</i>	CUSTOMER <i>ATARI</i>	TECHNICIAN (SIGNATURE) <i>[Signature]</i>
DATE COMPLETED <i>12-16-83</i>	SPECIMEN DESCRIPTION <i>ATARI 800, 800P.S., ATARI 2100</i>	ENGINEER (SIGNATURE) <i>[Signature]</i>
TEMPERATURE <i>72°F</i>	TYPE OF TEST <i>SHOCK-HALF SINE</i>	ENGINEER <i>B. Dover</i>
HUMIDITY <i>42% RH</i>	MANUFACTURER <i>ATARI</i>	JOB NUMBER <i>41412-7</i>
SPECIMEN NUMBER <i>SEA</i>	TEST SPECIFICATION <i>ATARI ETP No. C061616 PARA 3.3.3</i>	

SPECIMEN NUMBER	DATE	AXIS	LEVEL (g)	PULSE DURATION (MS)	NO. OF SHOCKS	REMARKS
<i>UK-4</i>	<i>12-16-83</i>	<i>Y1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SA</i>		<i>Y1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SWA</i>		<i>Y1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>UK</i>		<i>Y2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SA</i>		<i>Y2</i>	<i>31</i>	<i>11</i>	<i>3</i>	
<i>SWA</i>		<i>Y2</i>	<i>31</i>	<i>11</i>	<i>3</i>	
<i>UK</i>		<i>X1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SA</i>		<i>X1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SWA</i>		<i>X1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>UKH</i>		<i>X2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SA</i>		<i>X2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>SWA</i>		<i>X2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>2100</i>		<i>Y1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>2100</i>		<i>Y2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>800P.S.</i>		<i>Y1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>800P.S.</i>		<i>Y2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>2100</i>		<i>X1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>800P.S.</i>		<i>X1</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>8100</i>		<i>X2</i>	<i>30</i>	<i>11</i>	<i>3</i>	
<i>800 P.S.</i>	<i>12-16-83</i>	<i>X2</i>	<i>30</i>	<i>11</i>	<i>3</i>	

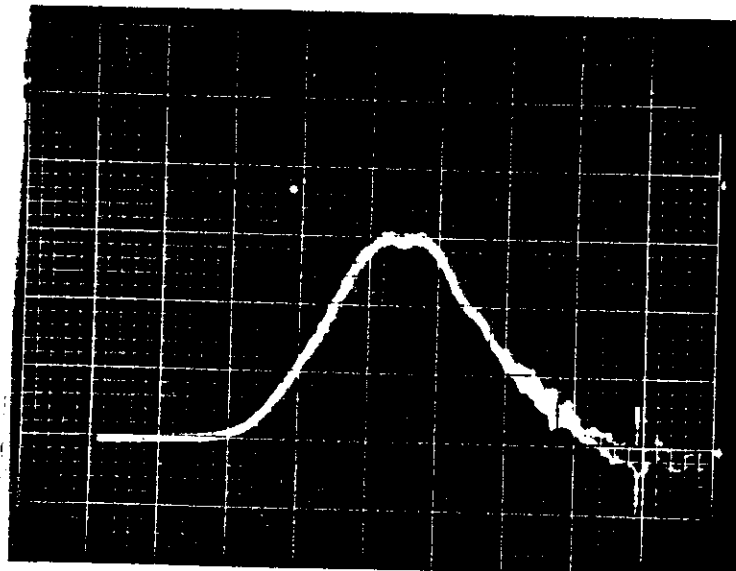
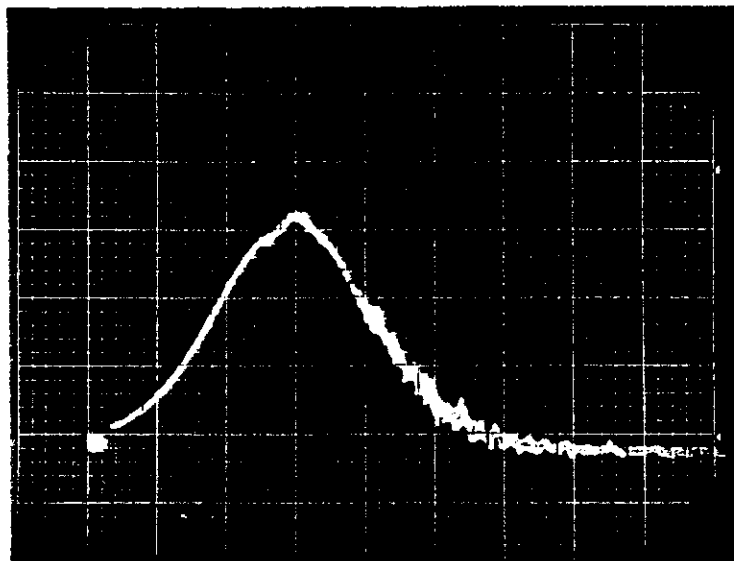
JOB NUMBER 4142-7

EQUIPMENT LIST



TEST DESCRIPTION: Shock-Half Sine

EQUIPMENT DESCRIPTION	MANUFACTURER	MODEL NUMBER	ASSET NUMBER	RANGE	ACCURACY	CALIB DATE	CALIB PERIOD
Shock Machine	RAYCO CORP	UP-400	6285	Table Size: 24x24" Max. Impact Vel: 36 ft/sec Max. Accel: 1500 g's Min. Duration: 1.0 m.s.	± 10%	12-16-83	7.07
Accelerometer Amplifier	Endevco Corp.	2740B	6501	Freq. Resp.: 5KHz Freq. Resp.: 0.1 Hz to 7KHz Max. Accel.: 5K g's	± 5%	7-14-83	6 mo.
Accelerometer	Endevco Corp.	2852	6502	Max. Accel.: 5K g's	± 5%	7-8-83	6 mo.
Oscilloscope	Tektronix Inc.	549	2041	Freq. Resp.: DC to 30MHz Rise Time: 22 ns 0.1u sec. to 5 sec/cm	± 3%	7-6-83	6 mo.
Oscilloscope	Tektronix Inc.	CA	2229	Freq. Resp.: DC to 15MHz Rise Time: 10 ns 0.05v to 20v/cm (AC-DC)	± 3%	9-9-83	6 mo.
Camera	Tektronix Inc.	C-12	2404	1.0:09 Object to figure	No Cal.	Required	



Date Started	Specimen Description
12-5-83	Video Game M/N 2100 (PAL I)
Date Completed	Type of Test
12-13-83	Software Regression
Engineer (Signature)	Manufacturer
H.D. Ongman	ATARI
Technician (Signature)	Test Specification
Terry A. Minto	Verbal Instructions

Game	Manufacturer	Remarks
DEFENDER	ATARI	Adequate
PACMAN	ATARI	Adequate
JUNGLE HUNT	ATARI	Good
FOOTBALL (SOCCER)	ATARI	Good
MISSILE COMMAND	ATARI	Adequate
SPACE INVADERS	ATARI	Good
VANGUARD	ATARI	Adequate
VOLLEYBALL	ATARI	Good
PHOENIX	ATARI	Excellent
DIG DUG	ATARI	Below 2600 Graphic capability
DONKEY KONG	ATARI	Adequate
Ms. PAC-MAN	ATARI	Adequate
MARIO BROS.	ATARI	Adequate
SNOOPY AND RED BARON	ATARI	Good
ASTERIX	ATARI	Good
JOYST	ATARI	Below 2600 Graphic capability
GALAXIAN	ATARI	Good
MOON PATROL	ATARI	Adequate
OBELIX	ATARI	Adequate
PIGS IN SPACE	ATARI	Adequate
DONKEY KONG	CBS	Adequate
ATLANTIS	IMAGIC	Adequate
STAMPEDE	ACTIVISION	Good
KEYSTONE KAPERS	ACTIVISION	Good
LASER BLAST	ACTIVISION	Adequate
		NOTE: All remarks based on technician's opinion.