Test Report No. 11944-E

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Report of Test on

SEISMIC VIBRATION OF
ELECTRO P/N 20LB2206C8
for
ELECTRO SWITCH CORPORATION
under
PURCHASE ORDER NO. 71400

ACTON ENVIRONMENTAL TESTING CORPORATION

Date November 14, 1975

	Prepared	Checked	Approved
By	K.Martini	R.Gilfoy	M.L.Tolf
Signed	K Martini	R. Gilfoy	M.L. Tolf
Date	11/14/75	14 Nov. 75	11/14/75

MLT:KM/hmf

Administrative Data

1.0 Purpose of Test: Qualification seismic vibration of the Electro Switch Corporation electro switch specified below.

2.0 Manufacturer: Electro Switch Corporation

3.0 Manufacturer's Type or Model No: Electro P/N 20LB2206C8, Series 20L, 6 decks, 14 oz.

4.0 Drawing, Specification or Exhibit: The Electro Switch Corporation letter, dated September 8, 1975 to Acton Environmental Testing Corporation (AETC) from Mr. J.R.Qualey.

5.0 Quantity of Items Tested: One (1) electro switch

6.0 Security Classification of Items: None

7.0 Date Test Completed: October 29, 1975

8.0 Test Conducted By: R.Gilfoy/C.Pilotte/D.McLaughlin

9.0 Disposition of Specimens: Returned to Electro Switch Corporation

10.0 Abstract: There was no evidence of mechanical damage or deterioration to the Electro Switch Corp. electro switch as a result of the seismic vibration test specified in para. 2.0 below. Refer to para. 3.0 for specific test results.

ACTON ENVIRONMENTAL TESTING CORPORATION

1.0 TEST REQUIREMENTS

The Electro Switch Corporation electro switch is required to pass the seismic vibration test specified in paragraph 2.0 below, without evidence of mechanical damage or deterioration.

2.0 TEST PROCEDURES

The electro switch was secured to a test fixture by its normal mounting means and the test fixture was securely bolted to the 45° biaxial moving table, with a biaxial seismic simulator, of the Acton Environmental Testing Corporation (AETC) seismic test facilities for seismic vibration testing in the first front-to-back biaxial direction.

Switch contacts were monitored for momentary openings and closures throughout the subsequent seismic vibration test with the AETC/Matrix Chatter Box calibrated for 10 microseconds. The closed circuits of the switches have been wired in series and the open circuits have been wired in parallel for monitoring switch circuit change during test. The 28 VDC panel indicator lights of the switch shall be energized with rated voltage and observed for failure during test.

Two monitoring accelerometers and one control accelerometer were placed on the test item/test fixture in the following locations:

ACCELEROMETER NO.	LOCATION
9 & 10	In a biaxial group at the rear of the switch. #9 vertical; #10 in the horizontal direction of excitation.
12	Control at the base of the unit.

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The following resonance survey was performed first in the first front-to-back biaxial direction:

0.5 to 35 Hz, 0.28g's resultant, 1 octave/minute sweep

Following completion of the resonance survey in the first front-to-back biaxial direction, the unit was rotated 180° to the second front-to-back biaxial direction, and the above specified resonance survey was performed.

Following completion of the resonance survey in the second front-to-back biaxial direction, the unit was rotated 90° to the first side-to-side biaxial direction, and the above specified resonance survey was performed.

Following completion of the resonance survey in the first side-to-side biaxial direction, the unit was rotated 180° to the second side-to-side biaxial direction, and the above specified resonance survey was performed.

The AETC Seismic Simulator was then setup for biaxial seismic vibration with a random input. The equivalent random vibration level of the Electro Switch Corporation Specification Required Response Spectrum was computed. With the test item setup in the first front-to-back biaxial direction, five 1/2 SSE, 30-second random vibration exposures were performed.

Test Response Spectra at a Q of 20 were computed employing a Spectral Dynamic SD331 Shock Spectrum Analyzer fast fourier transform program. The spectra were compared to the Required Response Spectrum.

X-Y Plots of the TRS made with the SD331 are included with this report.

After performing five 1/2 SSE random vibration inputs in the first front-to-back biaxial direction, the test item was rotated 180° and the test was repeated in the second front-to-back biaxial direction. Again five 1/2 SSE 30-second random vibration exposures were performed.

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Following completion of the five 1/2 SSE in the second front-to-back biaxial direction, the test item was rotated 90° to the first side-to-side biaxial direction and five 1/2 SSE 30 seconds random vibration exposures were performed.

Following completion of the five 1/2 SSE in the first side-to-side biaxial direction, the test item was rotated 180° to the second side-to-side biaxial direction and five 1/2 SSE 30-second random vibration exposures were performed in the second side-to-side biaxial direction.

The test item/test fixture assembly was then rotated 90° to the first front-to-back biaxial direction and one full SSE 30-second random vibration exposure was performed.

Following completion of the one full SSE in the first front-to-back biaxial direction, the test item was rotated 180° to the second front-to-back axis and a full SSE 30 seconds random vibration exposure was performed.

The test item was then rotated 90° to the first side-to-side axis and a full SSE 30 seconds random vibration exposure was performed.

The test item was then rotated 180° to the second side-to-side axis and the full SSE 30 seconds random vibration exposure was performed.

This completed the testing of the electro switch.

During all the tests, outputs of all three accelerometers were displayed on oscillographic recorders.

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3.0 TEST RESULTS

No resonances of the electro switch were detected in the resonance survey in either the front-to-back biaxial direction or the side-to-side biaxial direction. No damage or deterioration occurred to the Electro Switch equipment as a result of resonance survey.

There was no evidence of mechanical damage or deterioration to the Electro Switch equipment as a result of the 1/2 SSE in any of the four biaxial directions.

No damage or deterioration occurred to the Electro Switch equipment as a result of the full SSE in any of the four biaxial directions.

No contact chatter occurred throughout the seismic vibration testing.

TEST EQUIPMENT LIST

NAME	MFGR.	MODEL	SER.NO.	RANGE	ACCURACY	INV.#	CAL.FREQ.
Accelerometer	PCB	302A	666	0.25 Hz - 5 KHz	±5%	AC375	3 months
"	"	"	667	" "	"	AC376	" "
"	"	"	668	" "	"	AC377	" "
"	"	"	669	" "	"	AC378	" "
"	"	"	670	" "	"	AC379	" "
"	"	"	671	" "	"	AC380	" "
"	"	"	672	" "	"	AC381	" "
"	"	"	673	" "	"	AC382	" "
"	"	"	565	" "	"	AC383	" "
"	"	"	694	" "	"	AC384	" "
"	"	"	697	" "	"	AC387	" "
VTVM	HP	403A		10 Hz-1 MHz, 0-300 volts 12 ranges	±3%	MV322	" "
Sweep Oscillator	SDY	SD-104-5	21A	0.005 Hz - 50 KHz	±1%	SG315	6 months
Random Noise Generator	GR	1381	927	2 Hz - 50 KHz	±1 db	SG337	" "
Hydraulic Actuator	MTS	204.63S		DC-300 Hz, 25K force lbs 25" DA max	±2%F ±5%A	PE367	3 months
Controller	MTS	443.115		DC-2000 Hz	±1%	PE367	" "
Charge Amplifier	UD	D11MGSV	910	1-1000G 2 Hz-20 KHz	±2%	PE361	" "
Chatter Monitor	Metrix	202D	310	10 & 100 usec	±2%	PE370	6 months
False Contact Monitor	Matrix	202D	310	10 & 100 usec	±2%	PE371	6 months
Power Unit Conditioner	PCB	483A	273	Output-22 VDC 12 MA(used w/302A Accelerometers)	N/A	PE374	3 months

TEST EQUIPMENT LIST

NAME	MFGR.	MODEL	SER.NO.	RANGE	ACCURACY	INV.#	CAL.FREQ.
Electronic Filter (dual)	SKL	302	498	20 Hz - 200 KHz	±5%	AM328	6 months
Power Supply	BUBR	506/16	322	±15 VDC, 1 ADC	0.5%	PD372	" "
Visicorder	Honeywell	906	9-5235	DC - 2 KHz 12 channel	±1 DB	RE332	3 months
Recorder	"	906C	99078	DC - 2 KHz 12 channel	±1 db	RE335	" "
X-Y Plotter	MFE	715	42167	RENTAL			in use
X-Y Display	Spec.Dyn	13116-2A	327	Display Indicator			in use
Shock Analyzer	" "	13231	17	.1 Hz - 10 KHz			in use
Transient Memory	" "	13192	18	Storage			in use

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SEE A.E.T.C. REPORT NO. 11944-A

ATTACHMENT NO. 5

Pressure Indicators
B21-R005/R009

JUSTIFICATION FOR INTERIM OPERATION

NAME: Pressure Indicator

MPL: B21-R009

SAFETY FUNCTION:

To maintain pressure integrity so as not to release radioactive steam outside of the primary containment building.

FAILURE MODES:

Fail Open	____
Fail Closed	____
Loss of Power	____
Loss of Air	____
Loss of Pressure Integrity	X
Loss of Structural Integrity	X
Distortion of Mounting	____

FAILURE EFFECT:

A. Effect on Primary Use

Loss of pressure integrity could release radioactive steam outside the primary containment. The result would be a small leak, which would be detected by the Leakage Detection System.

B. Secondary Effect

None

DISCUSSION AND CONCLUSION:

Since these instruments are used only for calibration, they can be valved out whenever readings from the pressure indicators are not necessary. This insures that no leakage could occur should these instruments fail. Additional measures, such as removal of the valve handle or complete instrument removal and capping of the lines, can be instituted as determined necessary by station staff to insure pressure boundary integrity.

However, should a failure occur during the time the instruments are pressurized, the result loss of function of the instrumentation on the racks would not result in the complete loss of any safety systems. ADS automatic initation would be lost, but manual initiation is still possible. The other safety systems would only be affected to the extent that redundant initiation capability would be lost. The resultant leakage from the failure of the instrumentation has already been considered as part of the instrument line break analysis for the plant. Therefore, interim operation with these pressure indicators poses no safety hazard.