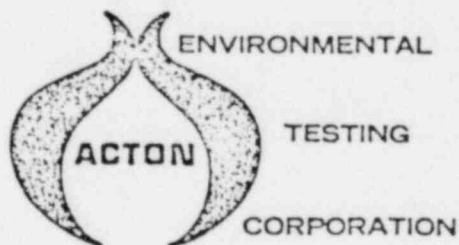


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## Report of Test on

SEISMIC VIBRATION OF  
ELECTRO P/N 20KB2210C8  
for  
ELECTRO SWITCH CORPORATION  
under  
PURCHASE ORDER NO. 71400



Date November 14, 1975

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

MLT:KM/hmf

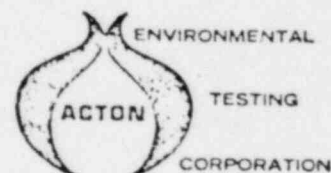
820430 6193

## 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 20KB2210C8  
Series 20K, 10 decks, 15 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.

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## 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

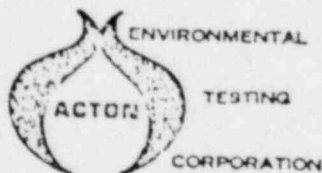
The electro switch was secured to a test fixture by its normal mounting means and the test fixture was securely bolted to the 45° biaxial moving table, with a biaxial seismic simulator, of the Acton Environmental Testing Corporation (AETC) seismic test facilities for seismic vibration testing in the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

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

<u>ACCELEROMETER NO.</u>	<u>LOCATION</u>
7 & 8	In a biaxial group at the rear of the switch: #7 vertical; #8 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.

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# 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	Matrix	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