PERFORMANCE SPECIFICATION
ACCELEROMETER
(7270AM7-XXX-YY-ZZZ)

Document Number	Rev	Date	Entered by	Description of Change	Change Accountable Engineer	ECO
76278	A	10/18/22	NAD	Updated Performance Aspect of Performance Spec	JKN	53279

1.0 DESCRIPTION

The ENDEVCO® Model 7270AM7 is a family of rugged undamped piezoresistive accelerometers designed for shock measurements. The highly efficient sensing system of the 7270AM7 is sculptured from a single chip of silicon, which includes the inertial mass and strain gages arranged in a four-active-arm Wheatstone bridge circuit (patent numbers 4,498,229; 4,605,919 and 4,689,600). The extremely small size and unique construction of the element allows exceptionally high resonant frequency. On-chip balance resistors provide low zero measured output and low thermal zero drift. The light weight flat case is designed to reduce the effect of case resonance's for optimum frequency response. The M7 modification features a low-noise cable with protective shrink tubing for superior performance on high-shock environments.

2.0 PERFORMANCE

(See Figure 1 and Note 1 for the relations between sensitivity, resonant frequency and range limitations)

	Sensitivity (microvolts/Volt/g)			Resonant Frequency (Kilohertz)		Range (g's)	Overrange Limit (g's)
MODEL	Min	Typ	Max	Min	Typ		
7270AM7-60K	0.15	0.3	0.5	400	700	60 000	180 000
7270AM7-20K	0.5	1	1.5	220	350	20 000	60 000
7270AM7-6K	1.5	3	5	120	180	6 000	18 000
7270AM7-2K	5	10	15	60	90	2 000	10 000

All specifications below assume +75°F (+24°C) and 10 volts excitation.

2.1	AMPLITUDE LINEARITY	±2% of reading up to acceleration corresponding to the recommended range. Measurement uncertainties prevent stating this as a specification limit at accelerations above 10 000 g.
2.2	ZERO SHIFT DUE TO HALF SINE ACCELERATION CAUSING 200 mV AT FULL SCALE RANGE	0.5 mV maximum
2.3	MOUNTED FREQUENCY RESPONSE	MODEL / ±5% Deviation at [2] -60K / 100 kHz -20 K / 50 kHz -6 K / 20 kHz -2 K / 10 kHz
2.4	TRANSVERSE SENSITIVITY	5% maximum
2.5	SENSITIVITY DEVIATION DUE TEMPERATURE	Typical deviation is -1.2% change in sensitivity per +18°F (+10°C) change in case temperature.
2.6	ZERO MEASURAND OUTPUT	±100 mV maximum at +75°F (+24°C)
2.7	THERMAL ZERO SHIFT [8]	±10 mV typical, ±50 mV maximum, -30°F to +150°F (-34°C to +66°C) relative to +75°F (+24°C)

2.8	ZERO SHIFTDUE TO MOUNTING TORQUE	±2 mV maximum, 0 to 8 lbf-in
3.0	**ELECTRICAL**	
3.1	EXCITATION [9] [10]	10.00 Vdc, 12 Vdc maximum
3.2	RESISTANCE INPUT OUTPUT	 650 ±300 ohms 650 ±300 ohms
3.3	INSULATION RESISTANCE	100 MΩ minimum at 100 Vdc between the sensor (all leads tied together) and cable shield or case.
3.4	WARM-UP TIME REQUIRED TO MEET THE ABOVE SPECIFICATIONS	2 minutes maximum, 15 seconds typical
4.0	**PHYSICAL**	
4.1	CASE MATERIAL	17-4 PH CRES
4.2	WEIGHT EXCLUDING CABLE	4.0 grams
4.3	IDENTIFICATION	Serial Number on side of unit; "ENDEVCO 7270AM7" and Model (dash number) on lid. Patent label on end of cable.
4.4	MOUNTING [3]	4-40 high strength screws (supplied), 2X No. 4 washers (supplied), 2X Recommended mounting torque, 8 ±2 lbf-in (0.9 N-m)
5.0	**ENVIRONMENTAL**	
5.1	TEMPERATURE [8] [9] Operating: Non-operating:	 -67°F to +250°F (-55°C to +121°C) -67°F to +250°F (-55°C to +121°C)
5.2	SHOCK LIMITS (In any direction) [3]	Half-sine pulse at full scale range. Pulse duration should be the greater of 20 microseconds or five periods of the resonant frequency.
5.3	HUMIDITY	Epoxy sealed IP67 rating
5.4	BASE STRAIN SENSITIVITY	Typically less than 0.5 mV for 250 microstrain when tested per ISA 37.2, para 6.5.
6.0	**CALIBRATION DATA SUPPLIED**	(Taken at room temperature and 10.00 Vdc)
6.1	SENSITIVITY [4] [5]	Sensitivity per g taken at recommended range or 5000 g, whichever is smaller; Time history using Shock Calibrator at respective g level.

6.2	ZERO MEASURAND OUTPUT	Measured at 10.00 Vdc, unless customer has specified a lower excitation voltage.
6.3	INPUT RESISTANCE	
6.4	OUTPUT RESISTANCE	

7.0 **ACCESSORIES (Supplied)**

7.1	EHW265 EH853	washers, 2X screws, 4-40 Allenoy Steel, 2X or equivalent Socket Head Cap 5/16" long, 2X.
7.2	APPLICATION NOTES	
7.3	ACCESSORIES (Optional) Model 7980	 Triaxial Mounting Block

8.0 **NOTES:**

[1] The overrange limit is a design safety margin. Operating the unit above its rated range is not recommended.

IMPORTANT: Frequency content of shocks which exceed the overrange limits of the 7270AM7 often contain significant amplitudes well above 100 kHz. Signal conditioning with insufficient bandwidth may attenuate the signal and give significantly lower indicated peak accelerations.

[2] Frequency response should deviate by less than ±5% from dc to indicated frequency, based on predicted response of single degree of freedom system. Acceleration levels of conventional techniques are too low for accurate analysis of the frequency response for the 6K and higher ranges.

NOTE: The sensor chip includes two masses, each with a separate resonant frequency. Both resonance's satisfy the specified minimum resonant frequency. If these resonance's are excited, the transducer output will exhibit a "beat" frequency.

[3] Use 8 ±2 lbf-in mounting torque, acoustic couplant and high strength steel screws to (1) insure intimate contact between accelerometer and mounting surface and (2) to prevent yielding of the screw and loss of preload force due to shocks, particularly those above 20 000 g. Loss of meaningful data and possible damage to the accelerometer due to rattling on its mounting surface can result from using either too high or too low a value of mounting torque.

The use of low strength mounting material (such as aluminum) is not recommended. However, if such is The case, epoxy should be used between the transducer and mounting surface to supplement the strength of the threads.

If large transverse shocks are anticipated, the use of liquid thread locking compounds is recommended to reduce loss of screw preload.

[4] Prior to final calibration, each accelerometer is given a shock in its sensitive axis approximately equal to its rated range.

[5] Calibrations are performed on a Shock Calibrator.

[6] Model Number Definition:

```
7270A   M7  -  XXX  -  YY  - ZZZ
|       |      |       |     |
|       |      |       |     |___Cable length in inches (i.e. 7270AM7-XXX-120 has a length of 120 inches).
|       |      |       |         If no dash number is specified the default length is 48 inches.
|       |      |       |
|       |      |       |_______ Excitation voltage (omit for default voltage of 10 Vdc)
|       |      |                Example: 7270AM7-20K-5-ZZZ has an excitation voltage of 5 Vdc
|       |      |
|       |      |_______________ Range in g's
|       |                       -2K
|       |                       -6K
|       |                       -20K
|       |                       -60K
|       |
|       |____________________ Modifier
|
|_____________________________Basic Model Number
```

[7] Operating temperatures above 200°F result in highly variable and unpredictable thermal zero shift. TZS should be monitored and/or managed by auto-zeroing to insure no loss in data due to signal saturation.

[8] 150°F is the maximum recommended operating temperature with 10 Vdc excitation. In applications requiring higher operating temperatures, lower excitation voltage is recommended.

[9] Although this circuit is a simple 4 active-arm Wheatstone bridge, the sensitivity vs. excitation is not perfectly linear due to the self-heating of the strain gages. To obtain maximum accuracy from the calibration of the unit at Endevco, the excitation voltage to be used in the application should be specified at time of order.

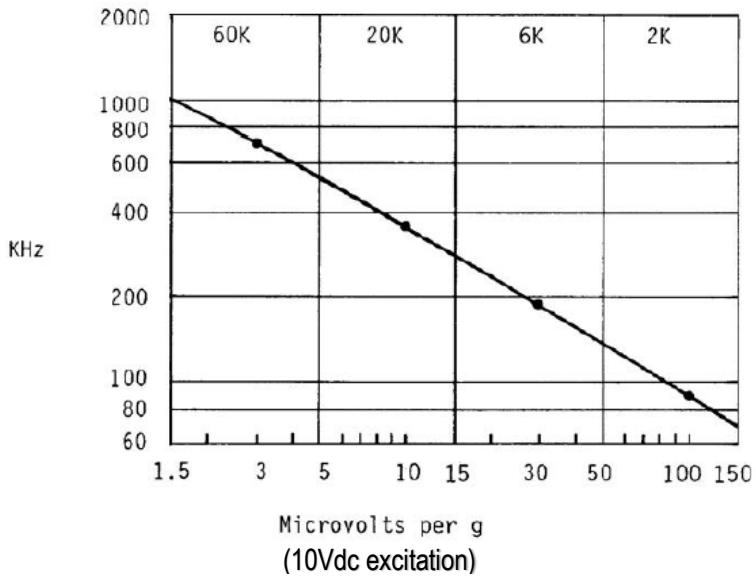

Figure 1
Typical Resonant Frequency vs Sensitivity