QUARTZ OSCILLATORS

State-of-the-Art frequency stability

Models 106A, B and 107AR, BR Plus 100E, 101A Oscillators

Advantages:

High Spectral Purity
Solid-State Reliability

Uses:

In-house frequency and time standards
Microwave spectroscopy
Comparisons with atomic standards
Advanced navigation, communication systems

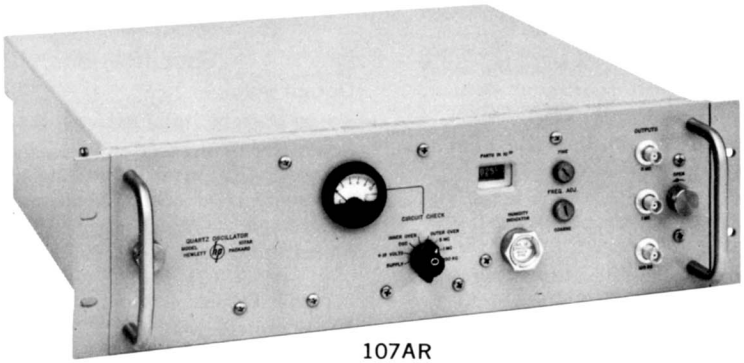
Models 106A,B and 107AR,BR Quartz Oscillators provide state-of-the-art application in precision frequency and time standard systems because of their excellent long- and short-term stability characteristics, spectrally pure outputs, unexcelled reliability and ability to operate under a wide range of environmental conditions.

Models 107AR,BR are rugged, hermetically sealed oscillators, employing 5 MHz quartz crystal resonators. The 107 has been designed and tested to meet the stringent shock and vibration requirements of MIL-E-16400E. The oscillators are totally impervious to moisture and will remain stable within ± 1 part in 10^{10} between 0°C and 50°C.

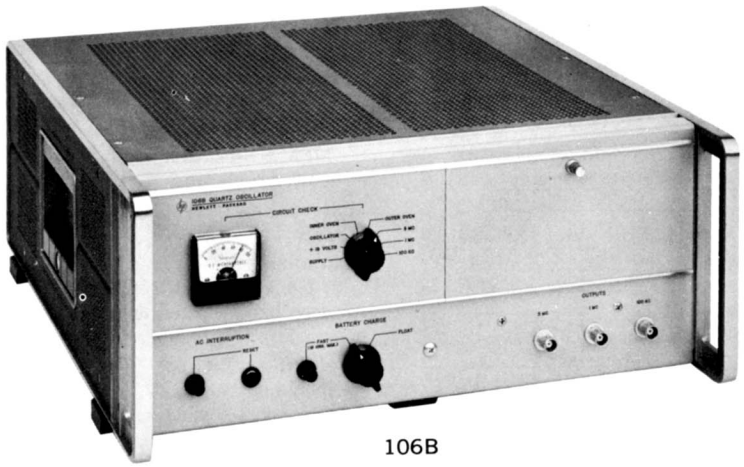
The heart of the 106A,B is an extremely stable 2.5 MHz quartz crystal. The 106 is distinguished by its long-term stability of ± 5 parts in 10^{11} per day (24 hours) and excellent short-term stability over a wide range of environmental conditions.

Models 106A and B are identical in every respect except for their power requirements. The 106B operates from 115 or 230 volts ac line or from an external dc power supply HP 724BR or 5085A recommended) and contains an emergency standby power supply capable of sustaining operation for 8 hours. The 106A requires an external supply voltage of 22 to 30 V dc, such as the HP 724BR, 725AR, or 5085A.

100E, 101A Quartz Oscillators—These instruments are very stable oscillators for applications requiring something less than the stability provided by highly sophisticated frequency standards such as the 106A,B or the 107AR,BR. The 100E has short-term stability of 3 parts in 10^8 and is ideal for test, production and lab use. Output frequencies are 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz sinusoidal and 10 Hz, 100 Hz, 1 kHz, 10 kHz pulse. Output pips from the timing comb are at 100, 1000 and 10,000 μsec intervals. Price: HP 100E, $1100 (cabinet); HP 100ER, $1100 (rack mount). The HP 101A One MHz Oscillator is designed as a time base for the HP 5275 Time Interval Counter. Stability is 5 parts in 10^8 per week. Price: HP 101A, $600 (cabinet with rack hardware).



107AR



106B

Specifications

Models	107AR,BR	106A,B
Output frequencies	5 MHz, 1 MHz, 100 kHz sinusoidal; 100 kHz clock drive	
Output voltages	5MHz , 1 MHz, and 100 kHz, 1 V rms into 50 ohms; 100 kHz for driving HP frequency divider and clocks, 0.5 V rms into 1000 ohms	
Stability (long term)	$<\pm 5 \times 10^{-10}$ per 24 hrs	$<\pm 5 \times 10^{-11}$ per 24 hrs
As a function of ambient temperature	$<\pm 1 \times 10^{-10}$ from 0° to +50°C	$<\pm 1 \times 10^{-10}$ from 0° to +40°C
As a function of humidity	instruments are hermetically sealed	basic oscillators are sealed
As a function of load	$<\pm 2 \times 10^{-11}$ for any resistive load change	
As a function of supply voltage	(107AR) $<\pm 5 \times 10^{-11}$ for 22 to 30 V dc	(106A) $<\pm 3 \times 10^{-11}$ for 22 to 30 V dc
As a function of line voltage	(107BR) $<\pm 1 \times 10^{-11}$ for 10% change from 115 or 230 V ac	(106B) $<\pm 1 \times 10^{-11}$ for ±10% change from 115 or 230 V ac
RMS deviation of 5 MHz (short-term stability)	averaging time / max. rms fractional-frequency deviation ($\triangle f/f$) / max. rms phase deviation (milliradians) 1 msec / 8×10^{-10} / 0.03 10 msec / 1.5×10^{-10} / 0.04 0.1 sec / 1.5×10^{-11} / 0.04 1 sec / 1.5×10^{-11} / 0.4 10 sec / 1.5×10^{-11} / 4	
Noise-to-signal ratio (5 MHz)	at least 87 dB below rated 5MHz output; output filter bandwidth is approximately 125 Hz	
Harmonic distortion (5 MHz, 1 MHz, and 100 kHz)	down more than 40 dB from rated output	
Non-harmonically related output (5 MHz, 1 MHz, and 100 kHz)	down more than 80 dB from rated output	
Output terminals	5 MHz, 1 MHz, 100 kHz, front and rear BNC connectors; 100 kHz clock drive, rear BNC connector	
Frequency adjustments		
Fine adjustment	5 parts in 10^8 total; 1 part in 10^9 per rev; 1 part in 10^{10} per division at 10 divisions per revolution	2 parts in 10^8 total; 1 part in 10^{10} per rev; 1 part in 10^{11} per division at 10 divisions per revolution
Coarse adjustment	1 part in 10^6 ($\pm 0.5 \times 10^{-6}$)	5 parts in 10^7 ($\pm 2.5 \times 10^{-7}$)
Environmental		
Storage temperature	−65°C to +85°C (mfr. specifies −40°C to +50°C limit for 107BR battery storage)	−40°C to +75°C (mfr. specifies −40°C to +50°C limit for 106B battery storage)
Operating temperature	0°C to +50°C	0°C to +40°C
Humidity	instrument is hermetically sealed, will operate under water without degradation of performance	
Vibration and shock	completely passes vibration and shock requirements of MIL-E-16400E	
Weight	107AR: net 20 lbs (9 kg), shipping 38 lbs (17 kg); 107BR: net 35 lbs (16 kg), shipping 53 lbs (24 kg)	106A: net 25 lbs (11,3 kg), shipping 33 lbs (15 kg); 106B: net 39 lbs (17.6 kg), shipping 47 lbs (21.3kg)
Dimensions		
Height	5-7/32″ (133 mm)	6-31/32″ (177 mm)
Width	19″ (483 mm)	16¾″ (425 mm)
Depth	16⅜″ (416 mm)	16⅜″ (416 mm)
Power	107AR: 22 to 30 V dc, approx. 12 w operating, 15 w during warm-up; 107BR: 115 or 230 V ac ±10%, 50 to 1000 Hz, approx. 25 w operating with battery on trickle charge (30 w on fast charge), 33 w during warm-up (38 w on fast charge)	106A: 22 to 30 V dc, negative ground, approx. 8 w operating, 13 w during warm-up; 106B: 115 or 230 V ac ±10%, 50 to 1000 Hz, negative ground approx. 17 w operating with battery on trickle charge (27 w on fast charge), 33 w during warm-up (43 w on fast charge)
Price	HP 107AR, $2400 HP 107BR, $2750	HP 106A, $3450 HP 106B, $3900