GPS-Disciplined-Rubidium Clock

AR70A-00

Miniature GPS-Rubidium

Main Features

- **Rubidium clock disciplined to GPS**
- **Outputs: 10MHz, 1PPS**
- **Inputs: External 1PPS, GPS antenna**
- **Time Accuracy: 100ns relative to GPS**
- **Frequency Accuracy: 5E-12**
- **Holdover (no GPS): 1µs/24hours, 5E-11/month**
- **Compact: 114 x 41 x 81 mm < 0.55 Kg**
- **Time & Navigation Data – RS232**
- **Supply Voltage: 15 VDC**

Description:

The compact AR70A-00 products offer **Rubidium Atomic Standards** which are disciplined to the **Global Positioning System (GPS)**, thereby providing extremely accurate and stable time & frequency. The AR70A-00 model includes a Rubidium Standard, a GPS receiver, an external 1PPS input and a Rubidium-GPS disciplining circuit (Digital PLL). The Rubidium Standard is phase locked to the GPS or to the external 1PPS. All outputs are derived from the Rubidium Standard, which maintains the 10MHz and the 1PPS when GPS or external 1PPS inputs are interrupted.

Special Note: AccuBeat specializes in customized solutions based on the customer's distinctive requirements.

Applications

▪ Test Equipment	▪ Military Applications	▪ Cellular Phones Base Stations
▪ Scientific Equipment	▪ Secure Communication	▪ Mobile Radio Base Stations
▪ Calibration	▪ TV Stations	▪ Telecommunication

Specifications - AR70A-00

Specifications				
Accuracy	**Disciplined to GPS or to Ext. 1PPS**	Frequency	5E-12 (typ.)	24 hour average, 25℃
		Time	±100ns RMS (typ.)	relative to GPS or Ext. input @ 25℃ without S/A
	Holdover (no GPS)	Frequency	5E-11 / month drift (typ.)	
		Time	1 µs/ 24 hours (typ.)	
Short Term Stability	3E-11 @ 1sec,			
Phase Noise (Quiescent)	<-100dBc/Hz @ 10Hz <-127dBc/Hz @ 100Hz <-138dBc/Hz @ 1KHz <-141dBc/Hz @ 10KHz			
Harmonics	-40dBc			
Spurious	-75dBc ±100KHz			
Temperature Stability	±2E-10 over -20℃ to +65℃			
Warm-Up Stability	5E-10 within <7 min 5E-11 within < 60 min 1E-11 within <4hrs 5E-12 within <24hrs			
Output & Input				
Output	1 x 10MHz Sine wave (10±2) dbm / 50Ω SMA			
	1 x 1PPS TTL / 50Ω SMA			
	PC channel (RS232) for Time & Navigation Data and Remote Control			
Input	GPS Antenna / 50Ω SMA			
	Ext. 1PPS / 50Ω D-Type			
Mode of operations	A. Disciplined to GPS			
	B. Disciplined to external 1 PPS			
	C. Auto Select : First Priority to External 1 PPS and Second to Internal GPS Receiver			
Remote Setting				
Via Graphic User Interface Software for PC	Includes: o Time/date display o Time source o Time Zone o Satellites Use o Navigation data from GPS o Leap seconds (from UTC to GPS) o BIT (Built in test) o Antenna Cable Delay o Ext Input Delay o Daylight Saving/ STD o Time Setting GPS/UTC/LOCAL o Additional parameters			

Specifications - AR70A-00

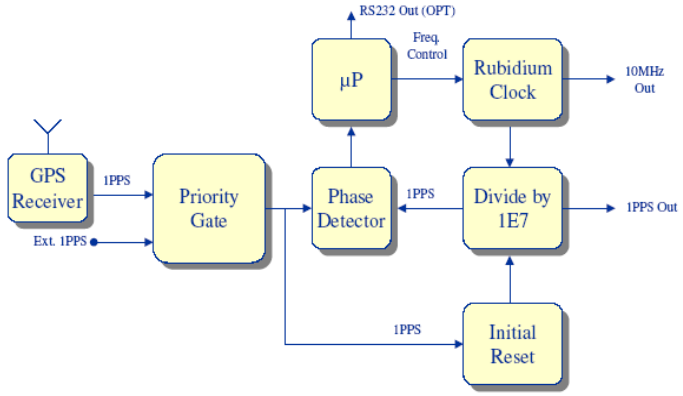
Specifications (Continue)	
GPS Receiver	
GPS Tracking	L1 frequency 1575 MHz C/A code (SPS) 8 parallel tracking channels
Acquisition Time	5 minutes (12.5 min cold start)
GPS Position	Latitude, Altitude, longitude
Position Accuracy	25m CEP (50%) w/o SA
GPS Antenna DC Voltage	5VDC
Power Supply	
Input Voltage	15 VDC±5% / 1.3A @ warm-up, 0.6A @ steady state
Dimensions & weight	
Dimensions & Weight	114 x 41 x 81 mm ; <0.55kg
Environmental	
Operating Temperature	-20℃ to +65 ℃ (base plate) / Operable up to 75 ℃ (base plate)
Storage Temperature	-40℃ to +85℃
Humidity	Up to 95% at 35℃, non-condensed
Vibration	MIL-STD-810D, Method 514.3 (3 grms)
Shock	MIL-STD-810C, Method 516.2, Proc. I (15g / 11mSec / Half sine)
Altitude	< 45,000 feet
MTBF	
	@GB 30ºC: 100,000 Hours. @AIC 30ºC: 30,000 Hours

- All specifications are at 25℃ at quiescent conditions unless specified otherwise.

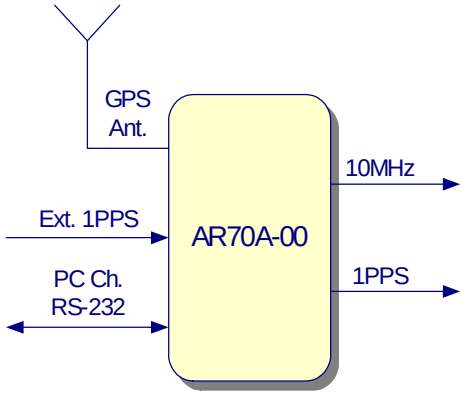
Specifications - AR70A-00

Principles of Operation

The following block diagrams describe the operation of the AR70A-00. The unit includes Rubidium Standard and accepts Input from either internal GPS receiver, or external GPS, or external 1PPS or external IRIG B. All outputs are derived from the internal Rubidium Clock, which is phase locked via a digital PLL to the internal GPS receiver or to one of the external inputs. Thus, the Rubidium Clock - frequency and time - follows the GPS on average. If GPS reception is lost for short or long periods of time the Rubidium Clock continues to maintain accurate time and frequency.

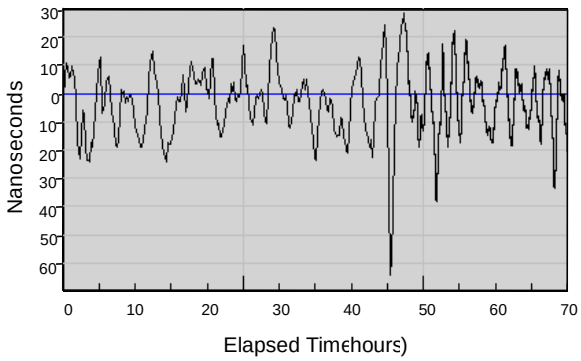


Rubidium-GPS D-PLL and Inputs

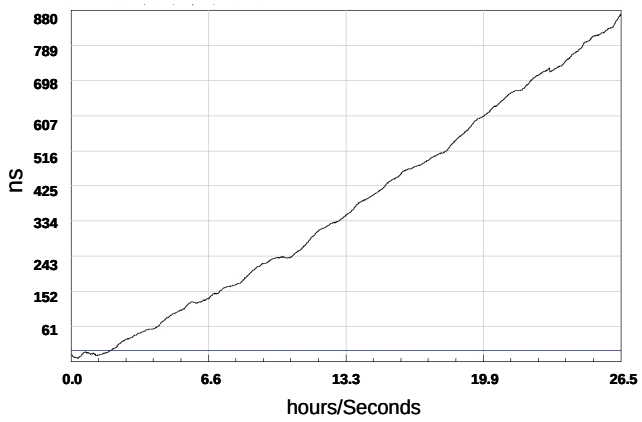


AR70A Inputs/Outputs

Typical Performance Plots

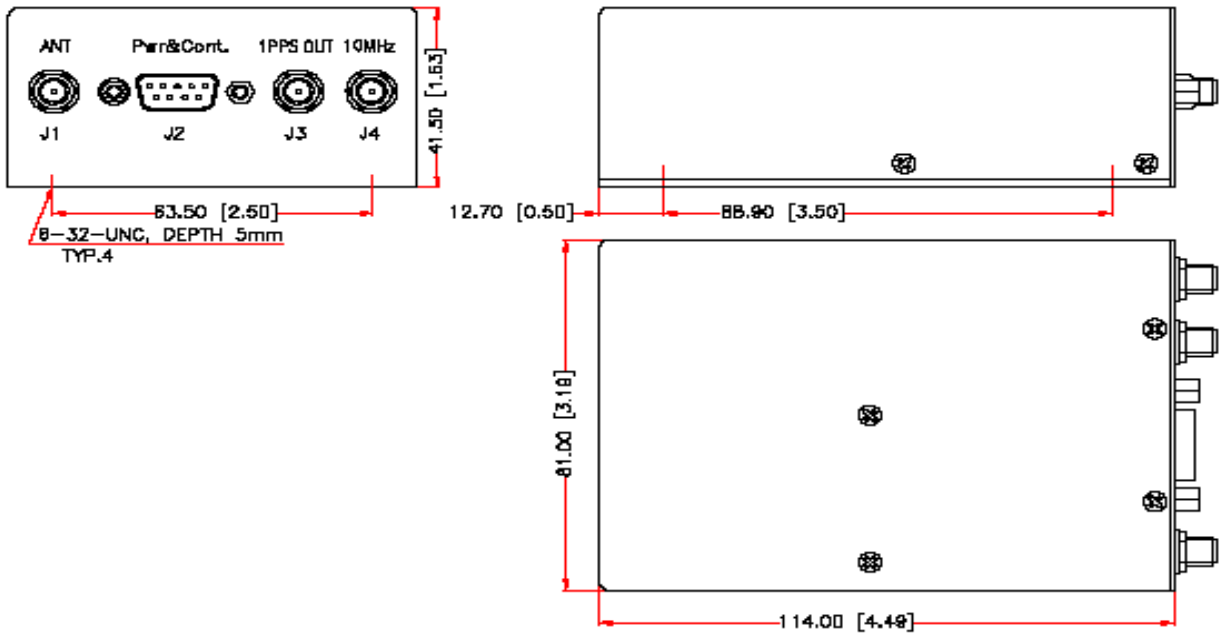


Typical Time Error & Stability under Lock Condition (17nSec RMS)



Typical Time Error In Hold-Over Mode (without GPS)

Mechanical and Electrical ICD



SMA J1 GPS ANTENNA

D-Type J2 POWER & CONTR

1	POWER IN
2	GND
3	LOCK SIGNAL
4	1PPS EXT IN
5	GND
6	Tx_pc (option)
7	Factory Used
8	N.C.
9	Rx_PC(option)

SMA J3 1PPS OUT

SMA J4 10MHz OUT

Accessories

AccuBeat P/N	Description
EM30039	GPS Antenna 36 dB ,5VDC
AC50513	Antenna Cable SMA to TNC RG-142 10m
AC50513-01	Antenna Cable SMA to TNC RG-142 5m
SW50010	GUI Software for PC for Monitoring & Remote Control

How To Order

Product Name	Description
AR70A-00	Above Specifications
AR70A-00/ With Additional Frequency Example: AR70A-00/5MHz	Above Specifications with different frequency in J3 instead of the 1PPS o 1MHz (50% Duty cycle) o 2MHz (20% Duty cycle) o 5MHz (50% Duty cycle)