AccuBeat Ltd.
Accurate Frequency & Time

Data Sheet - AR-73A-11

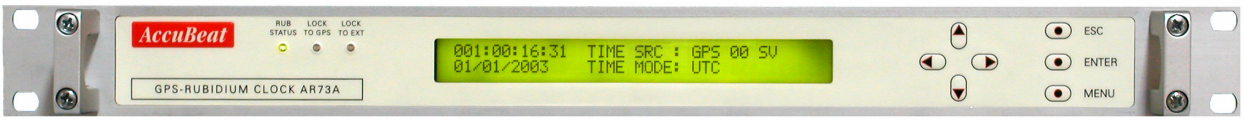
GPS-Disciplined-Rubidium Clock

AR-73A-11

Industrial/Semi Military

Main Features

- **Frequency Accuracy : 2E-12**
- **1PPS Accuracy: 100ns relative to GPS**
- **Holdover: 1µs/24 hours, 5E-11/month**
- **Outputs :3x10MHz, 3x1PPS, IRIG B, Have Quick, RS232**
- **Inputs: 1 PPS, IRIG-B**
- **UTC/GPS Time Source**
- **Delay Correction for Input & Output**
- **Network Time Server:** NTP Time Accuracy < 300 µs
- **Display of Time, Date, Status & BIT**
- **RS232 Remote control**
- **Supply Voltage: 22-32 VDC**



Description:

The AR-73A-11 is a **Rubidium Atomic Clock,** which is synchronized to the **Global Positioning System (GPS)**, thereby providing extremely accurate time & frequency.
The AR-73A-11incorporates numerous features into a single box, including a Rubidium Standard, an internal GPS receiver (or input from external 1PPS) and Rubidium-GPS DPLL (disciplining) circuit. Various options include a variety of different output frequencies, display options and several output Time Codes. The Rubidium Clock is phase-locked to the GPS or to other inputs. All outputs are derived from the Rubidium Clock, which maintains time and frequency when GPS or other inputs are interrupted.

The AR-73A-11 is based on a 19" x 1U rack-mountable encasement.
It is available as a basic standards version with various options denoted as Additional Options.

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

Applications

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

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Specifications (Continue)

Accuracy	**Disciplined to GPS**	Frequency	<2E-12	24 hour average, const temp
		Time	100ns RMS	relative to GPS or Ext. input @ 25℃ without S/A
	Holdover (no GPS)	Frequency	5E-11 / month drift	
		Time	1 µs/ 24 hours	
Short Term Stability	3E-11 @ 1sec, 3E-12 @ 100sec			
Phase Noise 10MHz Quiescent	Specification: <-95dBc/Hz @ 10Hz <-130dBc/Hz @ 100Hz <-140dBc/Hz @ 1KHz <-143dBc/Hz @ 10KHz		Typical Results: <-100dBc/Hz @ 10Hz <-130dBc/Hz @ 100Hz <-144dBc/Hz @ 1KHz <-148dBc/Hz @ 10KHz	
Harmonics	-48dBc			
Spurious	-75dBc ±100KHz			
Temperature Stability	±2E-10 over -10℃ to +60℃			
Warm-Up Stability (GPS Reciver)	5E-10 within <7 min 5E-11 within < 60 min 1E-11 within <4hrs 2E-12 within <24 hrs.			
Acquisition Time (Typical)	Warm Start	< 5 min		
	Cold Start	< 15 min		
Outputs & Inputs				
Outputs	3 x 10MHz sine wave, 5±2dBm/ 50Ω			
	3 x 1PPS (TTL/50Ω)			
	IRIG B (4Vptp/600Ω)			
	Have-Quick (ICD-GPS-060)			
	PC channel (RS232) for data remote control			
	LAN – NTP < 1msec Accuracy (300µs Typical)			
Inputs	GPS Antenna / 50Ω			
	1PPS / 50Ω			
	IRIG B			
	Manual setting of data via display keypad or via PC (RS232)			
	Inputs Priorities for synchronization: (1) 1 PPS, (2) IRIG B , (3) GPS			
Display & Setting				
	Includes: ○ Time/date display ○ Time source ○ Time Zone ○ Satellites Use ○ Navigation data from GPS ○ Leap seconds (from UTC to GPS)		○ BIT (Built in test) ○ Antenna Cable delay ○ Ext Input Delay ○ 1PPS output delay ○ Comm. Parameters ○ Daylight Saving/ STD ○ Additional parameters ○ Time Setting GPS/UTC/LOCAL	

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Specifications	
GPS Receiver	
GPS Tracking	L1 frequency 1575 MHz C/A code (SPS) 8 parallel tracking channels
GPS Position	Latitude, Altitude, longitude
Position Accuracy	25m CEP (50%) w/o SA
GPS Antenna DC Voltage	5VDC
Power Supply	
Input Voltage	22-32 VDC
Dimensions & weight	
Dimensions & Weight	19" X 1U (1.75") X 11" < 2.5kg
Environmental	
Operating Temperature	-10℃ to +60 ℃ for AR-73A-11unit -20℃ to +70℃ for antenna
Storage Temperature	-40℃ to +70℃
Humidity	Up to 95% at 35℃, non-condensed for AR-73A unit Up to 100% condensing, fully outdoor for antenna
Vibration	MIL-STD-810D, Method 514.3 & RTCA/D0 160D Section 8.7.2, Table 8-1, Figure 8-1, Curve B (2.3g RMS, 5-2000Hz)
Shock	MIL-STD-810C, Method 516.2, Proc. I (7.5g / 30mSec / Half sine) & RTCA/D0-160D Section 7, Paragraph 7.3.1 (15g/11mSec)
EMI	MIL-STD-461E CEO3, RE02, CS06, RS03
MTBF	
	> 52,000 hours @ mission profile (35℃, 20% GM, 80% GF)
	> 25,000 hours @ AIC 50℃

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

Accessories	
AccuBeat P/N	**Description**
EM30018	GPS Antenna 26 dB
EM30039	GPS Antenna 36 dB
AA50204	Antenna Cable RG-142 5m
AC50501	Antenna Cable RG-213 25m
SW50007	GUI Software for PC for Remote Control
EM30038	AC to DC Convertor (100/240 VAC Input to 24 VDC , 4A)

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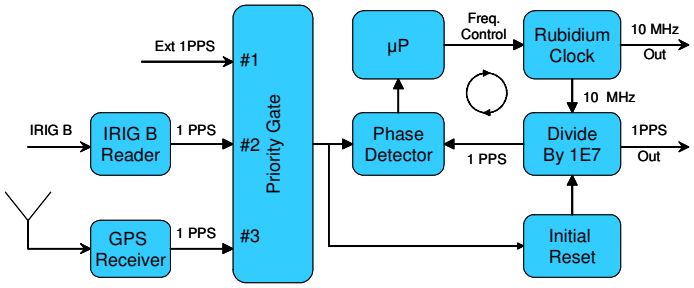
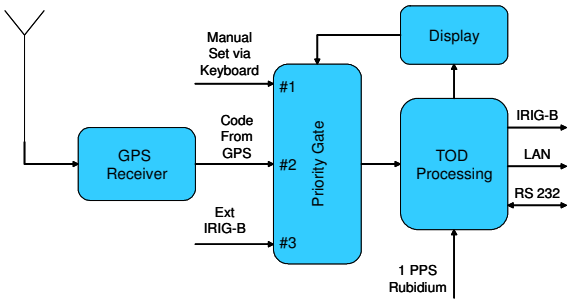
Principles of Operation

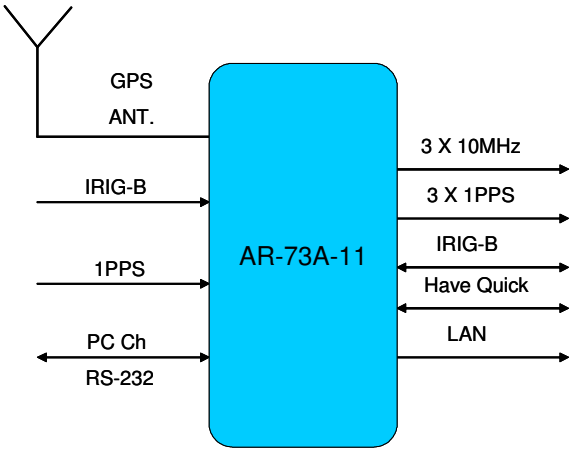
The following block diagrams describe the operation of the AR-73A-11. The unit includes Rubidium Standard and accepts Input from either internal GPS receiver, or external GPS, or external 1PPS or external IRIG B. All outputs are derived from the internal Rubidium Clock, which is phase locked via a digital PLL to the internal GPS receiver or to one of the external inputs. Thus, the Rubidium Clock - frequency and time - follows the GPS and clean it's gitter and noise. 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



Data flow & Inputs Selection



AR-73A-11 Inputs / Outputs

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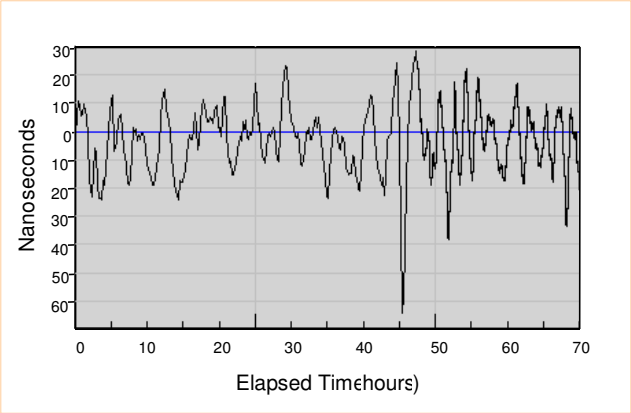
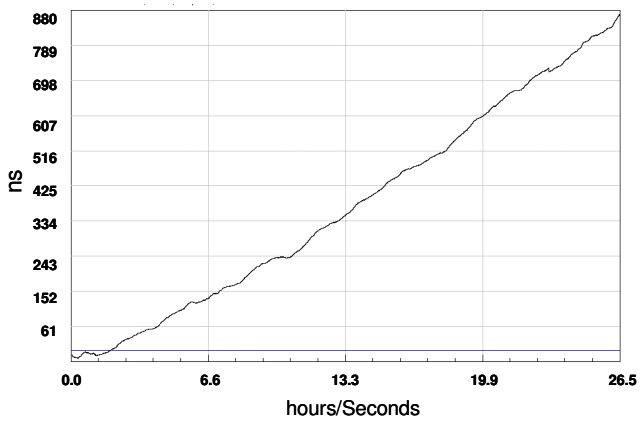
Typical Performance Plots

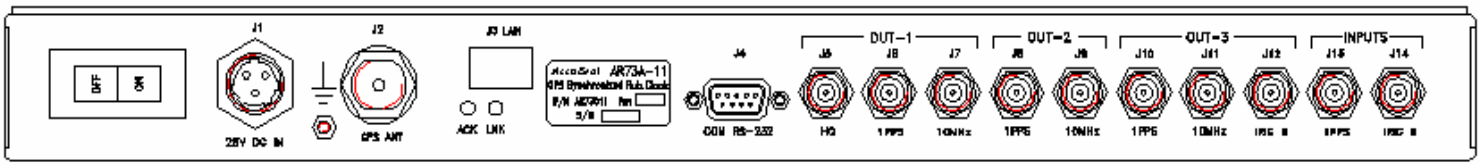


Typical Time Error & Stability under Lock Condition (17nSec RMS)



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

AR-73A-11 Rear Panel



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