

DESCRIPTION

General

The Model 325 provides computer readable UTC time (universal coordinated time) and date information based on the United States Atomic Clock Standard maintained by the National Institute of Standards and Technology (NIST) and broadcast by Radio Station WWVB.

The system is designed for applications where accurate time is essential to system operation and data integrity.

Time information is via RS232 serial ASCII formatted message.

Functional

The M325 receiver module uses a sensitive loopstick antenna to receive WWVB signals. An integrated circuit receiver amplifies and demodulates the WWVB signal. A microcomputer processes WWVB signals, maintains an accurate real time clock and hosts the serial communication interface.

Physical

The Model 325 is housed in an enclosure for mounting in a convenient indoor reception location. Connection to the host computing device is via a "modular" cable with adapters available for both DB9 and DB25 RS232 connectors. The modular connection cable can be up to 100 feet in length.

FEATURES

- RS232 serial ASCII communication protocol
- Leap year, leap second and daylight savings flags
- 1 pulse per second output
- +/- 1 millisecond relative accuracy possible
- RS232 or AC/DC powered
- Internal clock for loss of signal periods
- Crystal filter for maximum selectivity
- Tuned loopstick antenna for maximum sensitivity



APPLICATIONS

- PC/Server time reference
- Time clocks
- Security/entry systems
- Data acquisition systems
- Timers/sequencers
- Telephone system time reference

OPERATION

Commands and Responses

All operation is by RS232 serial data port. Commands and data use computer industry standard ASCII communication characters.

Data is read by single ASCII character sent to the unit. A carriage return is not required after each command. Invalid commands are ignored.

Sending a "T" returns a 34 byte string beginning with (cr)(lf) followed by data as follows:

(cr)(lf)R 1 00 YEARL DAYUTCS HH:MM:SSP+C

The first character (**cr**) is the "mark" and is output within one millisecond of the time returned.

R - Indicates receiver synchronized (S) or reception noisy (N).

D - Indicates value of last second's data bit = **0, 1, 2** (mark) or **3** (unknown).

UP - Indicates time since last WWVB synchronization as follows:

Lk - Locked to WWVB

00 to 23 - hours since last update

1d to 7d - days since last update

YEAR - Indicates received year corrected to reflect proper century - valid from 2000 to 2099

L - Indicates + if leap year or space if not

DAY - Shows number of the current day in the year

UTC - indicates time shown is UTC

S - Indicates winter/summer time as follows:

S Indicates standard time (STD).

O Transition into DST from STD. Set at 0000Z on first DST day and changed to a **D** 24 hours later.

D Indicates daylight savings time (DST).

I Transition into STD from DST. Set at 0000Z on first STD day and changed to **S** 24 hours later.

HH:MM:SS - Current time in hours, minutes, seconds.

P - Leap second pending flag - Changes from (sp) to +/- during month preceding leap second adjustment.

+C - UT1 correction (+/- .1 second increments).

Sending an "I" returns the 10 byte ID string:

(cr)(lf)ULM325.A

Initialization

When powered up, the decoder initiates a reset cycle which lasts one second. RS232 commands sent during the reset cycle will be ignored. Once power is connected the Model 325 will become active and operation is commenced.

The Model 325 may be reset by removing power for a few seconds.

Time Synchronization

Upon initialization, time and flag fields are blank. The unit automatically verifies time, date and flag information. The time message progressively indicates validated time fields starting with seconds. Upon complete time/date correlation, time delimiters change to colons (:). Flag quality is shown after correlated flag values are received.

Once time and flags have been validated, time re-synchronization and flag validation is continuous.

INSTALLATION

Power

Power for the Model 325 may be derived from any of the following sources:

- +5 to +15 VDC or AC to the 2.5 mm dia. jack
- +5 to + 15 VDC or AC to the modular jack pin 1 RS232 from RTS(+) and RXD(-) signal lines

Serial (RS232) Interface

A 6-pin modular jack is used to connect to all operating signals. Signal pin connections are as follows:

<u>Pin</u>	<u>Signal</u>
1	Power (see above)
2	RXD (in)
3	GND
3	TXD (Out)
5	RTS
6	1 PPS (DCD)

Note: If RS232 powered and 1PPS signal not required, a 4-pin modular cable may be used.

Receiver Location

The antenna/receiver unit is designed to be used indoors in a wood frame structure. Operation inside metal buildings or buildings with metal reinforcements may be marginal.

The antenna/receiver should be mounted with the long side horizontal. It may be mounted flat (table/shelf) or vertical (wall mounted). The antenna/receiver is directional with best reception obtained with the long side perpendicular to Fort Collins, Colorado.

Avoid locating near suspected interference sources such as:

Lamp dimmers	Fluorescent lamps
Electronic igniters	CRT monitors
Battery chargers	Switching power supplies
Motors	Automobile ignition systems
Power lines	Nearby radio transmitters

Note: Interference is diminished by the square of the distance (i.e., doubling the distance from the source will reduce its effect by 4).

Orient the antenna/receiver for steady blinking of the power/signal LED. After final orientation secure receiver to prevent inadvertent movement (double sticky tape is OK).

In some areas of the country the signal may not be available 24 hours a day. In these cases setup and initial reception are usually best done at night. The unit is designed to keep accurate time during marginal reception periods after time is initially acquired.

SPECIFICATIONS

Operational

Transmitter received	WWVB
Receive frequency	60 kHz
Transmitter location	Ft. Collins, Colorado USA
Modulation type	10 dB carrier reduction
Receive bandwidth	7Hz @ 3dB points
S/N @ 50uV/meter	14 dB average daylight background
Reception	Est >23 hours/day @ 50 uV/meter signal strength with background noise only (electrically noise free environment)
Time acquisition	Approximately 10 minutes for complete time and flag validation under noise free signal reception conditions
Clock absolute accuracy	+/- 0.015 sec upon reception .015 sec/hour drift during loss of signal periods
Clock repeatability	+/- 2 milliseconds when "Lk" indicated
Date range	Indicates correct year from 2000 to 2099
Serial baud rate	9600
Serial protocol	8,1,N
Receiver enable	Continuous
1 PPS signal	50% duty cycle. Low to high transition indicates beginning of second

Physical

Data cable	4 or 6 wire modular (telephone) cable up to 250' maximum length.
Size	5.4" L X 3.6" W X 1" Tk
Weight	1.0 Lb
Construction	Polystyrene enclosure

Electrical

Power	+5 to + 12 V AC/DC - 3 mA or RS232
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Environmental

Operating temperature	+10 to +35 C
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ORDERING INFORMATION

Order Model 325 - Includes 14' modular cable and DB9 RS232 mating connector.

Options include:

- 5 VDC power supply with 2.5 mm jack
- 25, 50' modular cable
- Modular to DB25 connector

Special data formats and signal outputs available. Contact factory for information.

ULTRALINK

Phone 775 782 9758

Fax 775 782 2128

Email Info@ulio.com

Website www.ulio.com

Mail PO Box 1809, Minden, NV 89423

Ship 1547 Anthony Ct., Gardnerville NV 89410