

THE TIME LOGG-R

Precision Time from the GPS Satellite System

MODEL TL-7911

INSTALLATION AND OPERATION'S MANUAL

RAN Systems, Inc.

3902 Burns Road, Suite 15
Palm Beach Gardens, FL 33410
www.RANSystemsInc.com

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1 GENERAL

The Time Logg-R is a self contained GPS receiver equipped to extract time data signals received from one or more satellites and deliver it to external devices. The time output is available in most commonly used formats. The Time Logg-R features extremely high accuracy, excellent reliability, small size, and low power consumption.

2 FRONT PANEL

Refer to Figure 1. The display and indicators on the front panel are described below:

TIME DISPLAY: Indicates the time (Hour, Minute & Second). The time shown is the time being sent by the various time string outputs of the clock, except that the time strings are always in 24 hour format, while the display can be set to either 12 or 24 hour format. If the clock is not synchronized to a satellite, the seconds' digit will blink once per second. The display goes blank when the time string is not available at the clock output.

FAULT ANTENNA: Red if the antenna is not connected or is faulty. Not illuminated when antenna is connected and OK.

FAULT ALARM: Red if a fault has prevented the clock from synchronizing to the GPS satellites for more that one minute. Not illuminated when synchronization is OK.

TIME OK: Green if clock is synchronized. Blinks once per second when clock is not synchronized to a satellite. Does not light at power-up until the clock has achieved synchronization.

COLD START: Recessed push button. Used in conjunction with the RUN/PROGRAM DIP switch on the rear to force a reset/cold start of the clock. Used at installation only.

3 REAR PANEL

Refer to Fig 2. The rear panel has an array of DIP switches that are used to set the operating parameters of the unit, output connectors for the various signals, and a power connector for the separate power adapter transformer. Use of the DIP switches is described in Section 4.2 SETTING PARAMETERS. The connector signals and pin outs are defined in Section 6 OUTPUT CONNECTOR PINOUTS.

4 INSTALLATION

4.1 INITIAL PRECAUTIONS

Time Logg-R's are shipped from the factory with their internal clock set to produce EST (Eastern Standard Time, Time Zone 5) with DST (Daylight Savings Time) detection enabled. When installing the unit, it should first be set for the desired time zone, baud rate and other parameters. Also, when the unit is not powered a standard crystal oscillator times the internal clock. This clock will have a small error, the magnitude of which depends on the length of time the clock has been in storage and transit. For these reasons, it is not advisable to connect the Time Logg-R's output to the system until it has been programmed via the DIP switches, connected to an antenna, located the GPS satellites, recognized its position and synchronized its internal clock. Clock synchronization is indicated, on the front panel, by the presence of a solid green Time OK light.

4.2 SETTING PARAMETERS

4.2.1 FACTORY DEFAULTS

The Time Logg-R is shipped from the factory with the following default settings:

Time Zone:	5 - Eastern Standard Time
Baud Rate:	9600 baud
Local Clock Display:	24 hour mode
IRIG Signature:	OFF
Daylight Savings Time:	ON
IRIG Type:	IRIG B

4.2.2 DIP SWITCHES

All parameters except IRIG LEVEL are set via DIP switches located on the rear panel. Refer to Figure 2 REAR PANEL DIP SWITCHES. The rightmost DIP switch pole acts as an "ENTER" key for the setting of some of the switch poles. When it is in the RUN (down) position the clock functions normally. In the PROGRAM (up) position the clock's internal processor is halted. Returning the switch to RUN causes the processor to read all the DIP switches and proceed. Place this switch in the PROGRAM position when changing settings, and then place it in the RUN position to operate the clock.

Settable parameters that require the use of the "ENTER" switch are:

Time Zone:	0 - 23 (UTC)
Baud Rate:	1200, 2400, 4800, 9600
IRIG Signature:	on/off
Daylight Savings Time:	on/off

The following switches are treated differently:

PANEL DISPLAY (12Hr/24Hr): This is direct acting and can be set at any time. The setting does not affect the time string, which is always in 24-hour mode.

IRIG TYPE (B or E): After changing this setting, power must be removed from the clock briefly, to allow it to reboot.

Always leave the DIP switches as set, since the processor reads them on power-up. This ensures that, in the event of a power failure, the clock will restart with the proper settings.

4.2.2.1 IRIG LEVEL

Clocks are shipped with the "MARK" level of the modulated IRIG output set at 4.0V P-P (Peak to Peak). This is the most commonly used level, and should accommodate most devices. For the rare instance when a different level is required, a potentiometer is provided. The IRIG level adjustment can be accessed via a hole in the back panel of the clock with a small flathead screwdriver.

4.3 CLOCK INSTALLATION

4.3.1 MECHANICAL

The Time Logg-R may be placed on any suitable flat surface, or may be rack/bay mounted by installing the included mounting ears. These ears fit either 19 or 23-inch racks. To install the ears, remove the existing 4-40 machine screws from the side of the clock housing, place the ears against the housing and replace the screws through the holes in the ears.

4.3.2 ELECTIRCAL

If possible, power the clock from a UPS source. The connection(s) from the clock outputs should be pre-wired. **Do not** plug the output connector(s) into the clock until it has been powered up and is providing synchronized time. Clock synchronization is indicated, on the front panel, by the presence of an illuminated solid green Time OK light.

Connect the 6-32 threaded ground post, on the rear of the unit, to a good local ground. Use #16 gauge wire or larger.

4.4 ANTENNA INSTALLATION

4.4.1 LOCATION

Before attempting to install an antenna, give careful consideration to the location and placement of the antenna. This can significantly affect the overall performance of the Time Logg-R. The primary goal is to locate the antenna in a place where it has a clear view of the sky. A secondary goal is to locate the antenna away from radio transmitters, which could interfere with the reception of the satellite signals. If several locations are available, select the one with the best view of the sky. Unlike conventional antennas, height is no advantage. Therefore, the antenna can effectively be located on flat roofs or other horizontal surfaces.

4.4.2 MOUNTING OPTIONS

The mounting kit supplied with the antenna provides for a number of mounting alternatives.

For masthead mounting, feed one end of the cable up through the cone-shaped plastic adapter and mate the connector with the antenna. Next, mate the conical adapter to the antenna using the four SHORT self-tapping screws. The assembly can now be twisted directly onto a mast having a one-inch diameter and a 14 TPI (Threads Per Inch) thread. As an alternative, the metal adapter can be used to convert down to a 5/8" diameter and 11 TPI thread.

For flush mounting, feed the antenna cable up through a clearance hole in the flat mounting surface and up through the rubber-sealing gasket. Next, connect the cable to the antenna and place the antenna flat on the mounting surface. Finally, drop the plastic ring over the antenna and secure it with the four LONG self-tapping screws or other suitable hardware.

4.4.3 CABLE LENGTHS AND TYPES

The antenna cable supplied with the Time Logg-R is a 50 feet length of RG-59 (Belden 8221) with a TNC connector on the Time Logg-R side and an F-type connector on the antenna end.

You can use up to 100 feet of RG-59 cable without suffering any appreciable performance loss. Be sure the cable you are planning to use is of good quality, and that the connectors are attached correctly. Also, be sure that the center conductor is solid as opposed to stranded, as stranded types have much higher signal loss.

For longer cable runs, it will be necessary to convert all or part of the run to a cable with lower signal loss such as RG-213 or RG-8. The critical issue with cable length is the total cable loss at 1575 MHz. This loss must be kept less than 24 dB in order to avoid performance degradation. Consult the factory for help in configuring longer cable runs.

5 START-UP SEQUENCES

5.1 WARM START

Always try a warm start first. Make sure that the DIP switches are in their correct positions. **Do not** plug in the time output connector(s) until the Time Logg-R has synchronized time with the GPS satellites. Clock synchronization is indicated, on the front panel, by the presence of an illuminated solid green Time OK light. First connect the antenna and then connect the power adapter. Finally, plug in the adaptor. Both the TIME ALARM and the TIME OK indicators will illuminate briefly and then go out. In about 30 seconds the time display will come on. Allow the clock to obtain time synchronization as evidenced by the green TIME OK indicator becoming illuminated. Normally, this will take only a few minutes. If the clock is being started for the first time in this location this may take as long as 1 to 2 hours. Once the clock has obtained synchronization, plug in the time output connector(s).

If the clock has not achieved synchronization within the times indicated above, perform a cold start as described in the next paragraph.

5.2 COLD START

Cold start should only be used in extreme circumstances, such as when the clock has not been able to achieve time synch for a very long time (greater than 30 minutes). To initiate a cold start, first make sure that the DIP switches are in their correct positions. **Do not** plug into the time output connector(s). If the clock is not powered, power it and wait for the time display to come on (about 30 seconds).

Place the RUN/PROGRAM DIP switch in the PROGRAM position. Depress the front panel COLD START pushbutton switch using a small screwdriver or other suitable object. While holding the pushbutton switch in, transfer the RUN/PROGRAM switch back to the RUN position. After 5 seconds or more, release the COLD START switch. The clock will initialize itself, read the DIP switches and start over.

When the clock starts over, the time display may not read correctly until it has reached synchronization as evidenced by the green TIME OK indicator coming on. Once this happens, the clock is ready and the time output connector(s) may be plugged in.

6 OUTPUT CONNECTOR PINOUTS

6.1 IRIG

Two BNC female, one for modulated output, one for TTL level output.

6.2 SERIAL TIME PORT

Type: DB-9 female

PIN	SIGNAL
1	1 PULSE/SEC, 50 OHMS
2	Not Used
3	RS-485, +OUT
4	Not Used
5	RS-232, TIME STRING OUT
6	Not Used
7	Not Used
8	RS-485, -OUT
9	GROUND

6.3 TIME COMMAND PORT

Type: DB-9 female

PIN	SIGNAL
1	Not Used
2	RS-232, TIME STRING OUT
3	RS-232, "T" COMMAND IN
4	Not Used
5	GROUND
6	DSR OUT (+12V/1000 ohms)
7	RTS (connected to CTS)
8	CTS (connected to RTS)
9	GROUND

6.4 ALARMS, ETC.

Type: Removable Terminal Strip

PIN	SIGNAL
1	ALARM RELAY CONTACT
2	ALARM RELAY CONTACT
3	1 PULSE/SEC, 50 OHMS
4	RS-485, +OUT
5	RS-485, -OUT
6	GROUND

7 SPECIFICATIONS

7.1 OUTPUTS

Continuous Time String

Type: ASCII String (one per second)
 Format: Per NENA 04-002 PSAP Master Clock Spec.
 Accuracy: +/- 10 Milliseconds (when synchronized)
 Baud Rates: 1200, 2400, 4800, 9600 Baud
 Electrical: RS-232 and RS-485 simultaneously available
 Connector: DB-9 (RS-485 is also on the barrier strip)

Time String on Command

Mode: Replies to incoming command "T" with the next ASCII Time String (one per incoming command).
 Format: Same as Continuous Time String
 Accuracy: Same as Continuous Time String
 Baud Rates: Same as Continuous Time String
 Electrical: RS-232 only
 Connector: DB-9

IRIG outputs

Type: IRIB B000 and B120 or IRIG E001 and E111
Signature: ON or OFF, switch selectable
Accuracy: within .3msec
Connectors: BNC, two (2) (modulated and TTL)
Level:
Modulated: Settable, 2 to 7 volts p-p (mark) into 600 ohms.
TTL: >4 volts High and <0.6 volts Low into 600 ohms.

On-Time Pulse

Significance: synchronous with each second epoch
Pulse Width: 20 microseconds
Voltage: positive TTL level into 50 ohms

Alarm

SPST contacts close on:
Disconnected antenna
Loss of signal for >1 second
Loss of primary power

Connector: Barrier strip on rear

7.2 TIME ZONE

Can be set to any time zone, switch selectable

7.3 DAYLIGHT SAVINGS TIME

Automatic tracking of Daylight Savings Time can be turned ON or OFF, switch selectable.

7.4 ANTENNA

Mounting: Supplied with brackets for flush or mast mounting. Receives 1" mast with 14 TPI thread or 5/8" mast with 11 TPI thread.

Cable Lengths:

Up to 100 feet: RG-59
>100 feet: RG-213 or RG-8

Connector: F-type female

7.5 INTERNAL CLOCK:

Internal battery operated clock is automatically synchronized to valid received time. The internal clock then maintains time whenever power is removed (without display or outputs). This assures that the clock will restart with the correct time (at reduced accuracy).

7.6 DISPLAY:

Format: 12 or 24 hour, switch selectable
Type: Hour, Minute, Second
Size: 1" Hour/Minute, 0.56" seconds

7.7 POWER

AC Mains via a plug-in adapter, 12 watts max
(May also be powered by +12VDC @ 1 ampere max)

7.8 MECHANICAL

Size:

3.4" high x 10.1" wide x 6.1" deep exclusive of connectors.

Mounting:

May be mounted in 19" or 23" racks with optional ears.
Occupies 2 rack spaces RETMA or 4" WECO.
May be used free standing with supplied rubber feet.

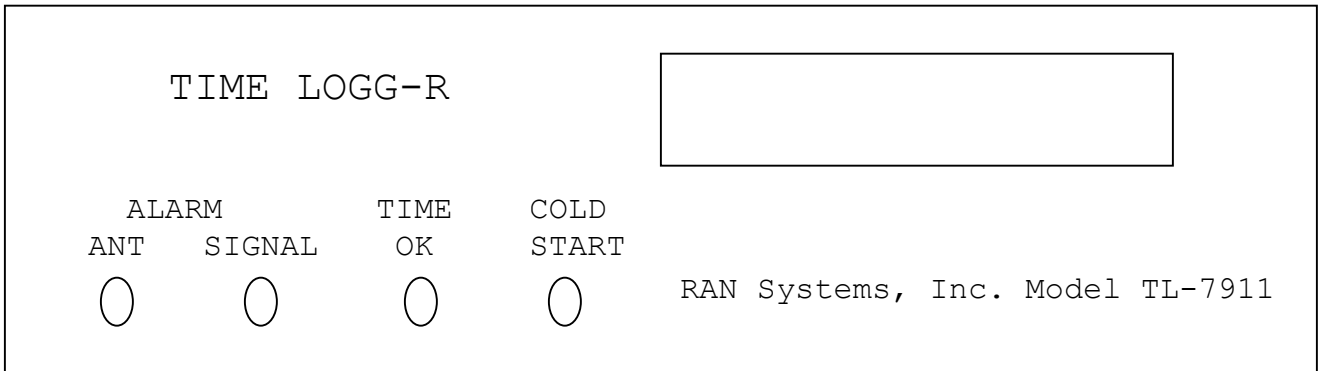


FIGURE 1: FRONT PANEL

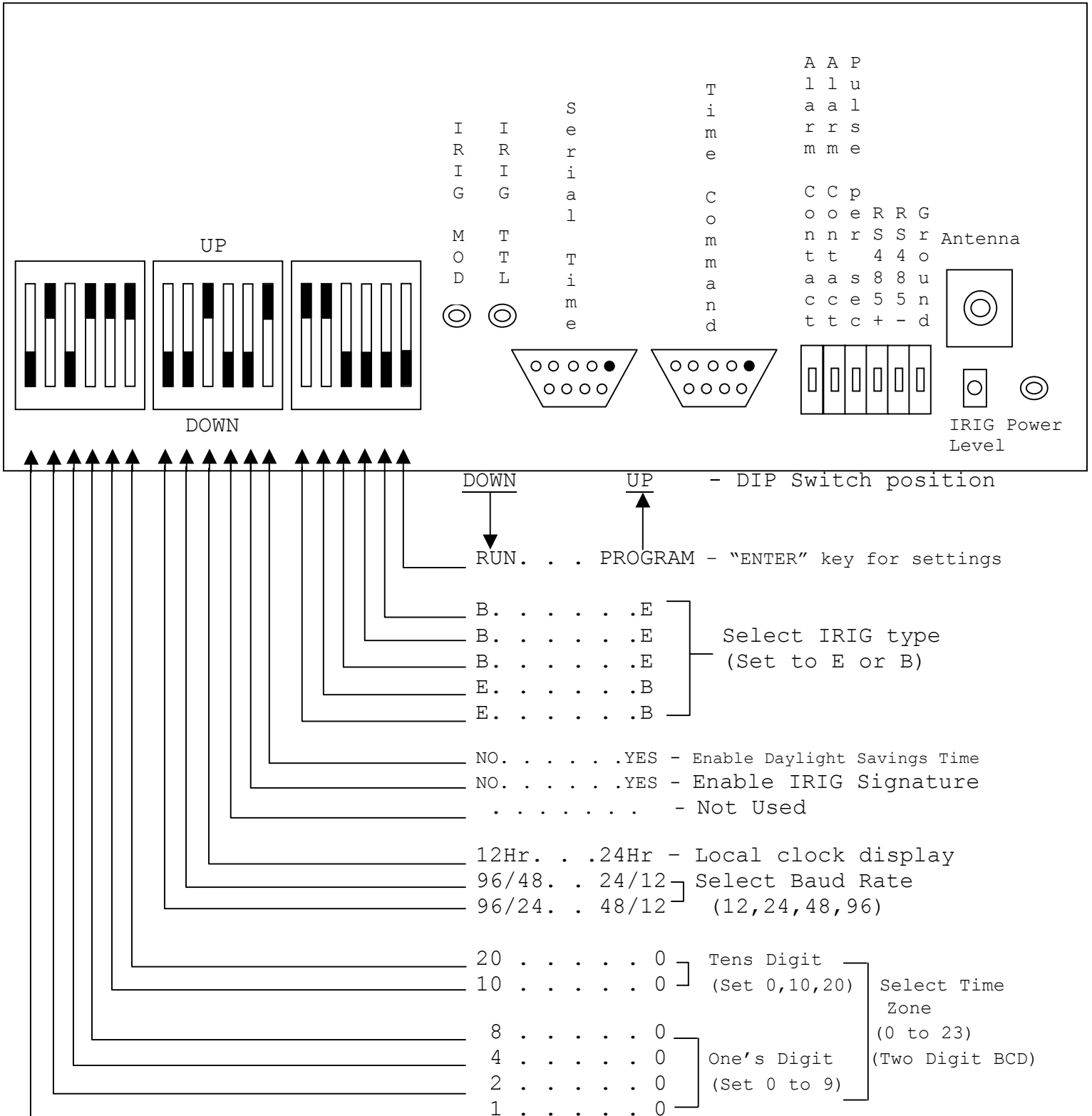


FIGURE 2: REAR PANEL DIP SWITCHES AND CONNECTORS