



TECHNICAL DESCRIPTION

**Model 6115G
GPS SYNCHRONIZED IRIG B
TIME CODE GENERATOR**

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MODEL 6115G
GPS SYNCHRONIZED IRIG B TIME CODE GENERATOR

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MODEL 6115G
GPS SYNCHRONIZED IRIG B TIME CODE GENERATOR

1.0 GENERAL

The Model 6115G is a twelve channel GPS synchronized IRIG B time code generator designed to provide a precise IRIB B serial time code output as well as a 1PPS time pulse. The unit automatically acquires all in-view satellites upon power up and locks an internal IRIGB time code generator to the GPS time reference. If the GPS lock is lost the 6115G will automatically switch to an internal clock and continue generating the output IRIG B signal. No discernible change in the IRIG B output will occur due to this transition.

The 6115G may also be used as a stand-alone unit to generate an IRIG B signal. The time-of-year may be set by the user via front panel switches. An LCD readout displays the days, hours, minutes and seconds. In the event of a power failure the 6115G will no longer output a serial time code however the time will continue to advance by automatically switching to a battery backed-up internal clock. The IRIG output will resume, without resetting, upon reapplication of power.

2.0 CHARACTERISTICS

2.1 TIME CODE SYNCHRONIZATION

The 6115G internal clock is automatically synchronized to GPS upon receipt of a valid GPS signal. If the unit loses the GPS lock after initial synchronization, it will continue to operate on the internal clock which also generates a serial IRIG B signal output. No discernible change in the IRIG B output will occur when the GPS signal lock is lost after synchronization. The GPS presence and lock status are displayed on front panel indicators.

The GPS LOCKED indicator is lit when the unit is fixed to the GPS satellite(s). The TIME CODE SYNCHRONIZED indicator is lit one second after unit is locked and remains lit until either the time is changed via the front panel switches after the input GPS signal is removed or until power to the unit is turned OFF.

2.2 USER PROGRAMMING

Programming (time-of-year set) of the 6115G is performed by the user via front panel switches. The process is prompted by an LCD display. The user may select days, hours, minutes or seconds using the SELECT switch. The value can then be set using the SET switch. The LCD display shows the status at each stage of the process.

An onboard Dip Switch (S2) allows the user to set a ± 12 hour offset. If the offset is 0, then the time is UTC time and display will read UTC DDD:HH:MM:SS. If the offset is set to any value other than zero then the display will read LOC DDD:HH:MM:SS (see Time Offset Table).

TABLE 1
TIME OFFSET

Offset	1	2	3	4	5
-12	on	on	off	off	off
-11	off	off	on	off	off
-10	on	off	on	off	off
-9	off	on	on	off	off
-8	on	on	on	off	off
-7	off	off	off	on	off
-6	on	off	off	on	off
-5	off	on	off	on	off
-4	on	on	off	on	off
-3	off	off	on	on	off
-2	on	off	on	on	off
-1	off	on	on	on	off
0	on	on	on	on	on
1	off	on	on	on	on
2	on	off	on	on	on
3	off	off	on	on	on
4	on	on	off	on	on
5	off	on	off	on	on
6	on	off	off	on	on
7	off	off	off	on	on
8	on	on	on	off	on
9	off	on	on	off	on
10	on	off	on	off	on
11	off	off	on	off	on
12	on	on	off	off	on

2.3 RS-232C OUTPUT

The RS-232C interface provides ASCII data for external use on demand.

Upon receipt of ASCII code "DC3" (13 hexadecimal) also known as "CTL-S", the unit shall return a 2 byte status string defined as follows:

⟨SOH⟩⟨STATUS⟩

Upon receipt of ASCII code "DC4" (14 hexadecimal) also known as "CTL-T", the unit shall return the current time of year (14 bytes) as follows:

⟨STX⟩⟨STATUS⟩⟨TIME⟩

Time data output begins at the next 1 second time interval (after receipt of the "DC4").

⟨SOH⟩ = (01 Hexadecimal)

⟨STX⟩ = (02H Hexadecimal)

⟨TIME⟩ = ASCII string "DDD:HH:MM:SS."

⟨STATUS⟩ = ASCII "0" (30h) - GPS not locked, TC sync not locked.

ASCII "1" (31H) - GPS locked, TC sync not locked.

ASCII "2" (32H) - GPS not locked, TC sync locked.

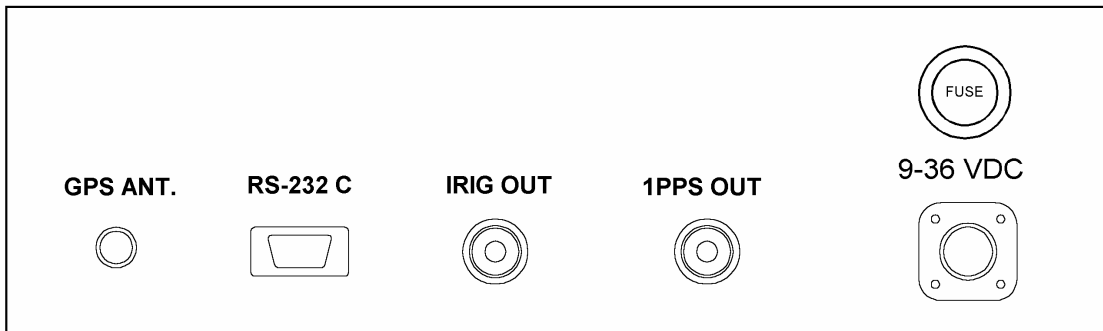
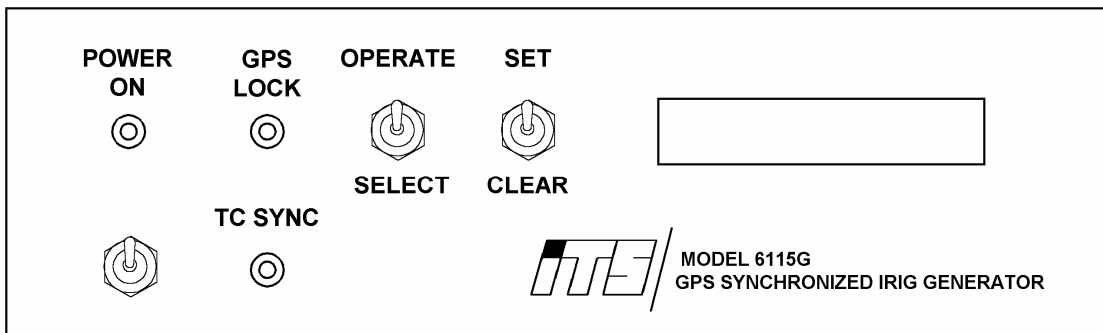
ASCII "3" (33H) - GPS locked, TC sync locked.

3.0 MECHANICAL CONFIGURATION

The 6115G is housed in a ruggedized aluminum case, 8.5" wide x 8.5" deep x 2.5" high. (See fig 1). All circuitry is on a two printed wiring boards. All connections are via mating connectors, no edge connectors are used.

All connectors are on the rear of the enclosure and all controls are on the front panel.

Figure 1
6115G Enclosure



4.0 CONTROLS AND INDICATORS (See Figure 1)

- | | | |
|-----|----------------|---|
| 4.1 | Power | 2 Position Toggle Switch -
Selects power ON/OFF. LED illuminates when external power is applied. |
| 4.2 | Select | ON/Momentary Toggle Switch -
Selects operate or program mode. |
| 4.3 | Set | Momentary Toggle Switch -
Provides means to set internal clock in absence of IRIG time input. |
| 4.4 | GPS Lock | Green LED Indicator -
Illuminates when GPS signal is present and satellite acquisition is accomplished. |
| 4.5 | TC Sync | Yellow LED Indicator -
Illuminates when 6115G is or has been Synchronized to the GPS receiver. Resets to off condition when power is turned off or time is reset manually. |
| 4.6 | GPS antenna | SMA Connector -
Receives serial from GPS antenna. |
| 4.7 | IRIG B Output | BNC Connector -
Outputs serial IRIG B signal |
| 4.8 | 1 PPS Out | BNC Connector -
Outputs 1PPS TTL signal, Synchronized with UTC Time Mark |
| 4.9 | RS-232C Output | 9 Pin D (Male)
Outputs time and lock status messages. |

	<u>Function</u>	<u>Notes</u>
Pin 1	NC	
Pin 2	RXD	Received data
Pin 3	TXD	Transmit data
Pin 4	NC	
Pin 5	GND	
Pin 6	NC	
Pin 7	RTS	Set high
Pin 8	CTS	Not implemented
Pin 9	NC	

4.0 CONTROLS AND INDICATORS (Continued)

- 4.10 Baud Rate Select Internal DIP Switch –
See Table 2.
- 4.11 Power KPT02A8-4P Connector -
28VDC external power.
Pinout is as follows:
A - 28VDC
B - 28VDC return
C - Chassis ground
D - n/u

TABLE 2
BAUD RATE - S1 SETTINGS

	S1=3	S1-2	S1-1
300	on	on	on
600	on	on	off
1200	on	off	on
2400	on	off	off
4800	off	on	on
9600	off	on	off
19.2K	off	off	on
38.4K	off	off	off

S1-4 LCD = ON if LCD Display installed.
OFF if LCD Display not installed.

5.0 SPECIFICATIONS

5.1 Frequency Stability

When powered 1 part in 10^6 .

On Battery backup 1 part in 10^4 .

5.2 Clock backup life (un-powered) 1 year minimum

5.3 GPS Performance

Channels: 12 Parallel channels, tracks all satellites in view

Time-to-first-fix <15 seconds typical (warm start), <90 seconds typical (cold start)

UTC Time Mark Synchronized with Global Reference Standard

Reacquisition: 2 seconds typical

5.4 IRIG B Output Standard IRIG B serial time code IAW OSG IRIG Document 104-70.

5.5 RS-232 Port EIA RS-232C, 8 bit, no parity 1 stop bit. Baud Rate selectable from 300 to 38400.

5.6 Power 9 to 36VDC, 3.5 Watts
Note: 115VAC power optional

5.7 Temperature
Operating 0°C to +55°C
Nonoperating -20 to +70

5.8 Humidity 95% non-condensing

5.9 Package
Size 8.5" wide x 8.5" deep x 2.5" high
Weight 2.5 lbs.

6.0 OPERATION

The Model 6115G generates an IRIG time code automatically upon turn on from the time saved in its internal battery backed up real time clock. The system will automatically correct its internal clock when the GPS antenna is connected and a GPS satellite signal is acquired and locked. The lockup time for GPS acquisition varies depending on how long the unit has been OFF and how far the unit is from the site at which it was operated last. These times can vary from about 15 seconds to several minutes (warm start to cold start respectively). The user must provide a GPS antenna connected to the 6115G with an appropriate length of low-loss coaxial cable for proper operation of the system. The 6115G is factory shipped to operate with a 5 volt powered antenna.

The internal 6115G time is continuously displayed on the front panel Liquid Crystal Display. If the unit is not locked to a GPS signal, the front panel GPS LOCKED LED will be off. If a GPS signal is received, the time code output will automatically lock to it and the internal time clock will be reset to match it. When locked to GPS, the front panel GPS LOCK and TC SYNC LED's will light. The SYNC LED indicates that the unit has been synchronized to a time reference. The SYNC LED will go out if the power is turned off or if the time is changed manually.

The manual time set mode will not operate if the system is currently locked to an external GPS signal, however, if there is no GPS signal applied, the user may set the time via the front panel switches.

To set the time, press the OPERATE/SELECT switch DOWN. The display will first indicate the year (LS two digits only) which is currently set preceded by the words SET YEAR.

6.0 OPERATION (continued)

The cursor indicates the current digit to be set (10's of years). The indicated digit may be cleared by pressing the SET/CLEAR switch DOWN or incremented by pressing the SET/CLEAR switch UP. To advance to the next digit, press the OPERATE/SELECT switch DOWN. When completed with the year, press the OPERATE/SELECT switch UP. The display will next indicate the time when the switch was pressed preceded by the word SET, and a cursor indicating the first digit to be set (100's of days). Pressing the SET/CLEAR switch UP will advance the selected digit. Pressing the SET/CLEAR switch DOWN will clear the selected digit. Pressing the OPERATE/SELECT switch DOWN will advance to the next digit to the right. Pressing the OPERATE/SELECT switch UP will accept the time set on the display and return to the Operate mode and output the corrected time.

NOTE: Although the year is not required in the IRIG B data format, it is required in the system to calculate the Julian day due to leap year. This is the only purpose for the year set, so the year 2000 poses no problems.