MODEL 940A
TIMING SYSTEM ANALYZER
OPERATION MANUAL

Arbiter Systems, Inc.
Paso Robles, CA 93446
U.S.A.

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Arbiter Systems, Inc.
Model 940A
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Operation Manual

PD0054700G

The PDF version is available as a free download at www.arbiter.com. The printed version is available to order, part no. AS0106800 - contact Arbiter Sales.

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Overview

The Model 940A is a powerful diagnostic tool designed to provide both a graphic view and a descriptive view for analyzing timecodes. It features two timing input ports (may be used independently or as a method to compare two timecode signals), one timing output port, a micro USB charging port, a variable output flashlight, a speaker, and an auxiliary port.

Input signals:

- Unmodulated IRIG-B
- Modulated IRIG-B
- IRIG-B Manchester
- 1 Pulse Per Second (PPS)
- DCF77

Output signals:

- Unmodulated IRIG-B
- Modulated IRIG-B
- 1 PPS
- DCF77

Included accessories:

Soft Carrying Case	HD0086000
USB Wall Charger	AP0015300
Micro USB Cable	CA0033700
BNC Coax Cable M/M (8 ft)	CA0033808
Quick Setup Guide	PD0055400
BNC Breakout F to Wires	AP0008900
BNC Adaptor M to Terminal Block	AP0014900
BNC “T” Conn F-M-F	CN0003500
Terminal Block, Plug, 2 Pin	CN0019202

Available accessory:

RJ45F to DB9F Broadcast Cable (5 ft)	AS0112300

Multi-View Display

The time signal displays are split into two parts: descriptive and graphical. The descriptive view provides a text display of the decoded input signal, such as time, date, day of year, time offset, etc. The graphic view provides a time domain display much like an oscilloscope. Each bit of the time code is identified and decoded for easy verification.

Construction

The 940A is housed in a tough polycarbonate/polyester alloy, designed for durability and easy handling. The 5-inch diagonal, color graphic, touch screen display is made of tempered, scratch-resistant glass. A bail assembly is provided for propping up the instrument.

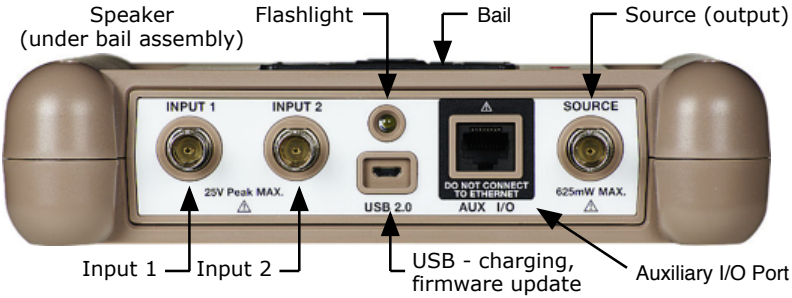

Figure 1: 940A Connections and Features

Input Connectors

Two female BNC connectors to connecting two different timing signals.

Output Connector

One female BNC connector to source a timing signal.

AUX I/O Port

The RJ-45 port. Serial broadcast and future features and accessories.

Micro USB Port

The micro USB port provides communication, power, and charging for the batteries.

Flashlight

An LED flashlight helps brighten the work area.

Powering ON or OFF

Press  (ON/OFF button) at the bottom of the front panel to energize and de-energize the 940A. **NOTE:** If charging, then press  again to energize.

Power Supply and Batteries

The Model 940A operates from the internal batteries or the battery charger. **NOTE:** The backlight uses the most power. Reducing the backlight intensity from 80 % to 20 % will double the battery life, up to 24 hours.

Power Supply/Charger

The included high quality module and heavy duty micro USB cable provide the highest charging rate. The 940A is compatible with other modules and cables, however, the charging rate may not be optimal.

Battery charging

Typical charging time is less than 8 hours but may be longer if the batteries are completely depleted.

Checking Battery Status

Check the battery status while the unit is turned off and being charged by pressing  (ON/OFF button).

Battery Indication

Charged, not connected to charger

Battery very low, connect to charger!

Charging High, connected to charger[1]

[1]A letter below the battery symbol indicates the charge rate.

- L for low (100 mA)
- M for medium (500 mA)
- H for high (1000 mA)

Connecting Cables

Coaxial Cables (BNC)

Input and output timing connectors on the Model 940A are female BNC. Coaxial cables are usually fitted with *male* BNC connectors, which connect directly to the 940A.

Twisted Pair Cables

Use male BNC breakouts, see Figure 2, to adapt twisted pairs of wire to the female BNC input connector on the Model 940A. TIP: observe the polarity marking on the breakout. *Do not tin stranded wire with solder.*

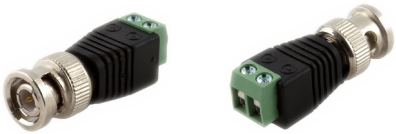

Figure 2: Male BNC Breakout with Terminals

Home Screen

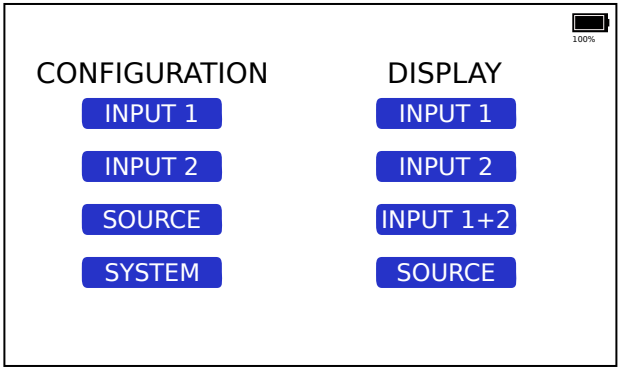

Figure 3: Home Screen

The Home Screen is the first screen after the start-up message. It shows two Home menu categoriess – CONFIGURATION and DISPLAY.

CONFIGURATION
INPUT 1 – See page 7.
INPUT 2 – See page 8.
SOURCE – See page 8.
SYSTEM – See page 20.

DISPLAY
INPUT 1 – See page 23.
INPUT 2 – See page 27.
INPUT 1+2 – See page 28.
SOURCE – See page 29.

Navigating the Menus

Touch activated areas are blue.

The Home Button

 return to the Home Screen.

Gear Button

 appears when further configuration is possible.

Return Button

 return to the previous menu.

Pause Button

 freeze the display.

Play Button

 resume pausing.

Slider Bar

 allows scanning through the entire signal range to view other elements not in the current display.

Zoom In

 zoom in.

Zoom Out

 zoom out.

Toggle

 Configuration: adjust the values.
Display: toggle between enlarging the upper text information and the split screen.

Configuration Screens

Configuring Input 1

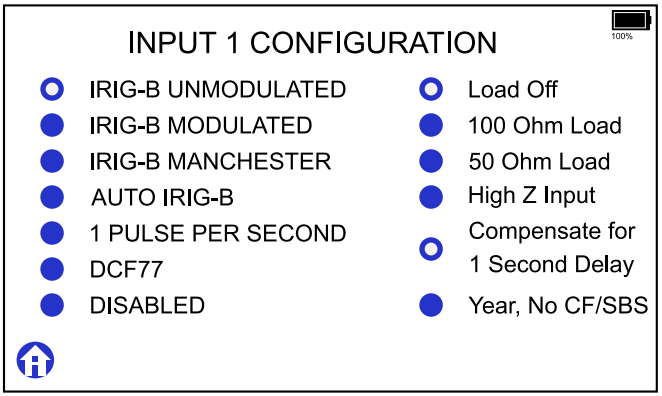

Figure 4: Input 1 Configuration Screen

1. Touch CONFIGURATION INPUT 1 (see Figure 3) to enter the Input 1 CONFIGURATION screen (see Figure 4).
2. Touch signal type or AUTO IRIG-B. AUTO IRIG-B will determine which IRIG-B type is connected.
3. Touch the desired Load configuration buttons. High Z Input improves performance for FET sourced signals by removing the optocoupler and providing approximately 410 kΩ impedance.
4. Touch Compensate for 1 Second Delay to add one second to the measured time and exactly matching the source time.
5. Touch BCD Year to limit the control function decoding to two-digit year (IRIG-Bxx6)
6. Touch when finished.

Configuring Input 2

From the Home screen CONFIGURATION menu, touch INPUT 2 and follow the same steps described for Input 1.

Configuring Source

Configuring the source is very similar to configuring either Input 1 or Input 2.

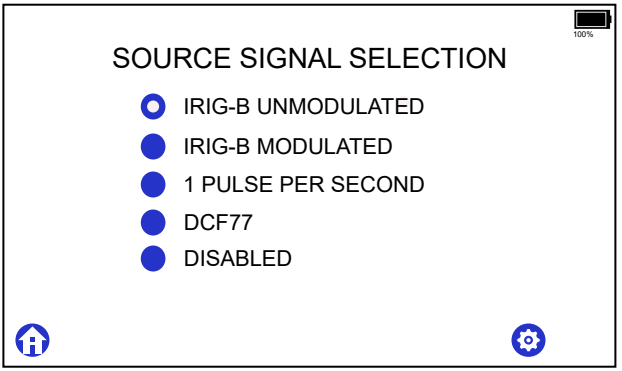

Figure 5: Source Configuration Screen

1. In the Home screen CONFIGURATION menu, touch SOURCE.
2. In SOURCE SIGNAL SELECTION menu, touch desired signal – for example, IRIG-B UNMODULATED.
3. Touch to configure other time settings, then touch to return to the SOURCE SIGNAL SELECTION menu.
4. Touch to return to the Home screen.

Once a signal is selected, the 940A produces the timing signal at source connector. When DISABLED, the 940A will not display the gear symbol.

IRIG Source Configuration

The source signal can come from Input 1, Input 2, or Custom.

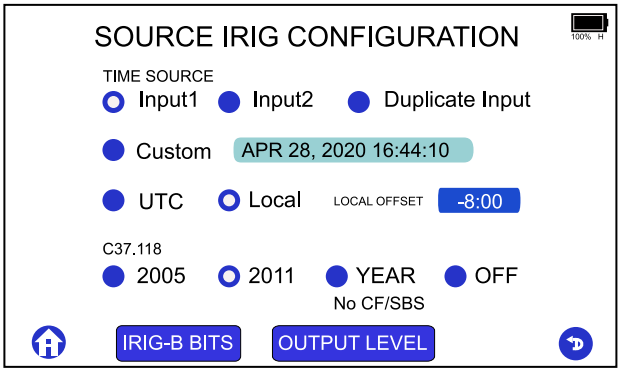

Figure 6: IRIG-B Source Configuration Screen

Use for either modulated or unmodulated IRIG-B.

1. Touch Input 1, Input 2, or Custom to select the signal source.
2. Touch Duplicate Input to exactly reproduce at the source the signal connected to Input 1 or 2. This removes any custom code changes but does allow changing the output level.
3. Touch Custom and then touch the Time/Date bar to manually set the date and time – see page 10.
4. Touch UTC or Local to set the time zone. If Local, touch the Local Offset value to adjust.
5. Touch 2005, 2011, YEAR No CF/SBS, or OFF to set which revision of the C37.118 values to follow. YEAR No CF/SBS limits the control functions to two-digit year (IRIG-Bxx6).
6. Touch IRIG BITS to open the CONFIGURE SOURCE IRIG BITS menu as seen on page 11.
7. Touch OUTPUT LEVEL to open the SOURCE OUTPUT LEVEL menu as seen on page 11.

Custom Date and Time

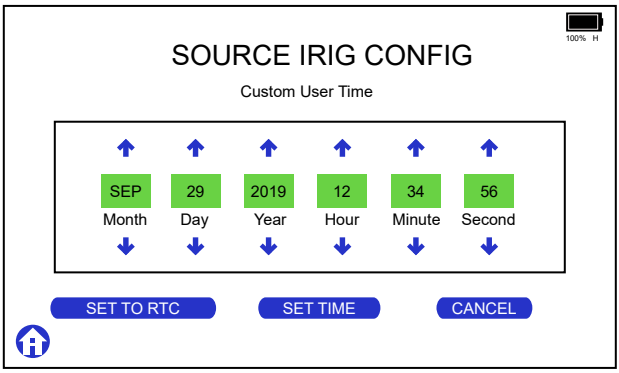

Figure 7: IRIG-B Source Custom Time Configuration Screen

Custom Time window provides a method to manually set the *source date and time*.

1. Touch ↓ or ↑ to adjust each box.
2. Touch SET TIME after making changes.
3. Touch SET TO RTC to set the time to the Real Time Clock.
4. Touch CANCEL to return without applying anything.

Source IRIG-B Bits

IRIG-B Bits allows you to manipulate the IRIG bits to test time quality and a time change, such as Leap Seconds and Daylight Saving changes. One of the C37.118 values (i.e. 2005 or 2011 from Figure 6) must be enabled for this menu to appear.

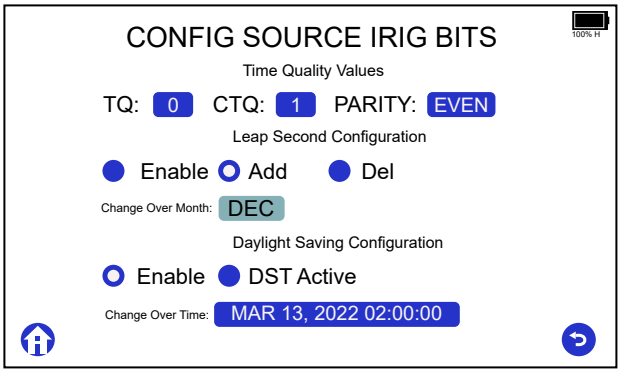

Figure 8: IRIG-B Source Bits Configuration Screen

1. Start from the configuration steps on page 9.
2. Touch IRIG BITS to open the CONFIGURE SOURCE IRIG BITS menu as seen in Figure 8.
3. Make any changes to Time Quality, Leap Seconds, and Daylight Saving Time selections.
4. Touch to return to the SOURCE IRIG CONFIGURATION menu.

NOTE: Changing any of these bits does NOT change the time in the IRIG-B string. It only changes the specific Control Function bits for diagnostic purposes.

Setting the DST Clock

Manually sets the DST clock for a Daylight Saving Time.

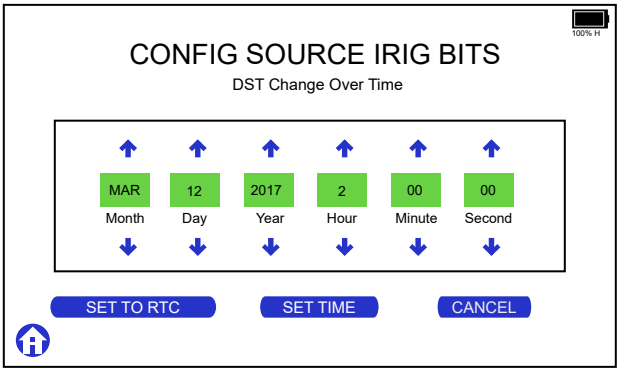

Figure 9: IRIG-B Source DST Configuration Screen

1. Touch the Change Over Time bar as seen at the bottom of Figure 8.
2. Touch ⬇ or ⬆ to adjust the Month, Day, Year, Hour, Minute, and/or Second.
3. Touch SET TIME after making changes.
4. Touch SET TO RTC to set the time to the Real Time Clock.
5. Touch CANCEL to return without applying anything.

Unmodulated IRIG-B Source Level

Sets the drive level for the specific timing output source impedance or voltage.

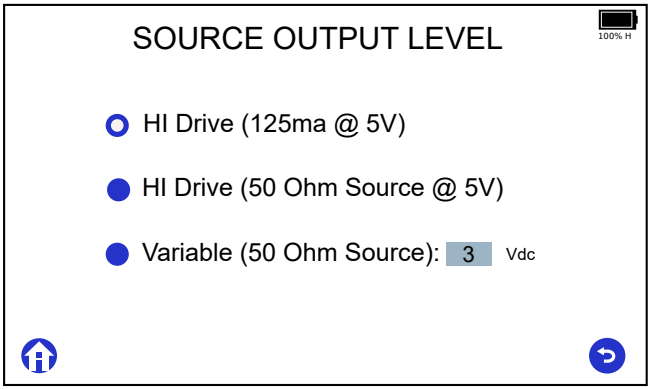

Figure 10: IRIG-B Source Output Level Configuration Screen

1. From the SOURCE IRIG CONFIGURATION menu screen, touch OUTPUT LEVEL to open the SOURCE OUTPUT LEVEL menu.
2. Touch one of the three selection buttons.
3. If selecting Variable, touch the voltage to open the voltage adjustment screen – see Figure 11.
4. Touch to go back to the SOURCE IRIG CONFIGURATION menu.

Source DC Voltage Adjustment

Use this menu to adjust the 940A source output voltage; works with unmodulated IRIG-B and 1 PPS.

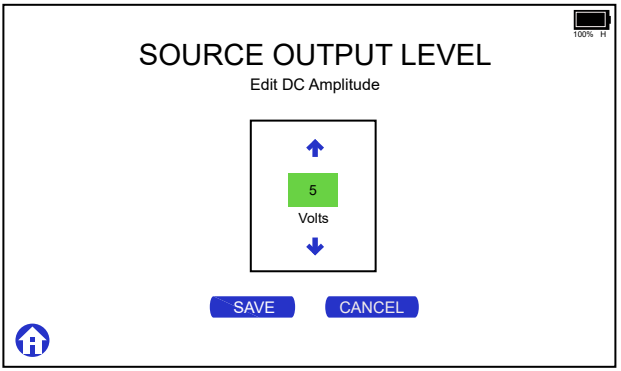

Figure 11: IRIG-B Source Voltage Level Configuration Screen

1. Touch ↓ or ↑ to adjust the IRIG-B unmodulated voltage level to your desired level. *Voltage range is from 1 Vdc to 15 Vdc, with 50 ohm source impedance*.
2. Touch SAVE to save the selected output voltage.
3. Touch CANCEL to return without applying anything.

Modulated IRIG-B Source Level

Sets the modulated IRIG-B peak voltage and the modulation ratio.

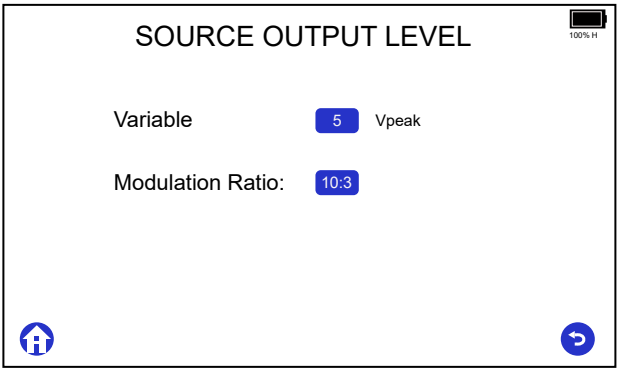

Figure 12: IRIG-B Mod. Source Output Level Configuration Screen

1. From the SOURCE IRIG CONFIGURATION menu, touch OUTPUT LEVEL to open the SOURCE OUTPUT LEVEL menu.
2. Touch Variable button to open the Edit AC Amplitude menu – see Figure 13. Voltage range is 1 Vac to 10 Vac.
3. Touch ↓ or ↑ to select the modulation ratio.
4. Touch SAVE to store the new value and return to the previous menu.
5. Touch CANCEL to return without applying anything.

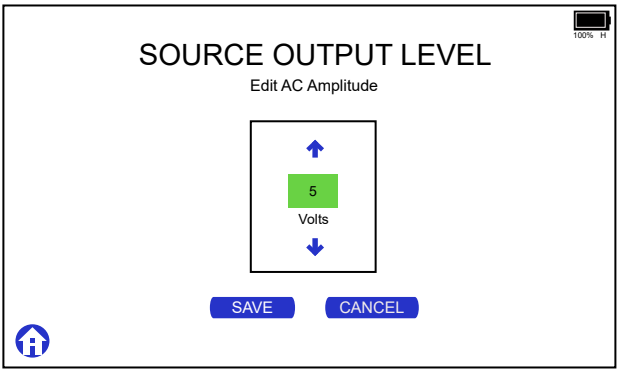

Figure 13: IRIG-B Mod. Source Voltage Level Configuration Screen

Source Modulation Ratio

Sets the modulation ratio for modulated IRIG (B12x).

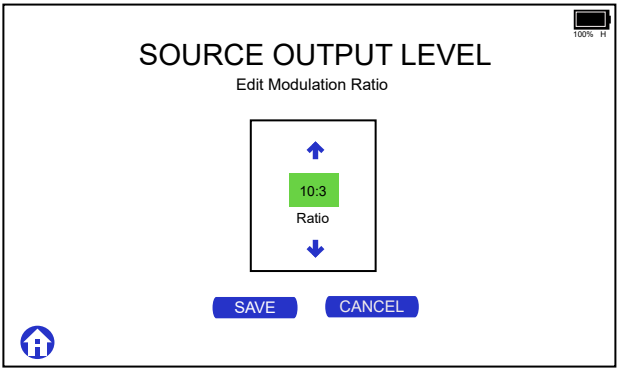

Figure 14: IRIG-B Mod. Source Modulation Ratio Configuration Screen

1. From the SOURCE IRIG CONFIGURATION menu, touch OUTPUT LEVEL to open the SOURCE OUTPUT LEVEL menu.
2. Touch the Modulation Ratio button to select the desired ratio – includes 2:1, 3:1, 10:3, 4:1, 5:1, 6:1, and 7:1. **NOTE:** for higher modulation ratios (e.g. 4:1 and higher), the Source Output Level may need to be adjusted higher.
3. In the SOURCE OUTPUT LEVEL, Edit Modulation Ratio screen, touch ↓ or ↑ to set the modulation ratio.
4. Touch SAVE to store the new value and return to the previous menu.
5. Touch CANCEL to return without applying anything.

1 PPS Source Configuration

Sets the time signal source from either Input 1, Input 2, or RTC.

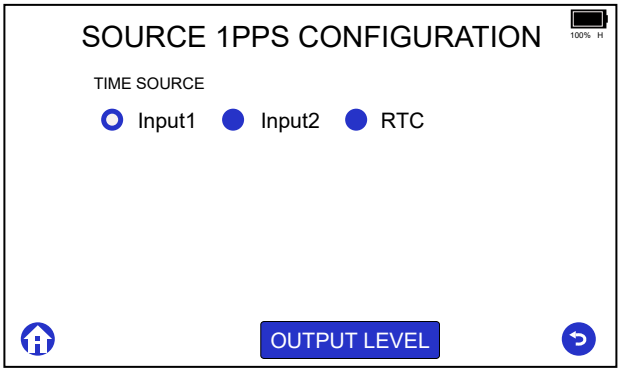

Figure 15: 1 PPS Source Configuration Screen

1. Touch Input 1, Input 2, or RTC to select the time source.
2. Touch OUTPUT LEVEL to set the output voltage – see Figure 16.

1 PPS Source Output Level

Sets the 1 PPS source output impedance and voltage.

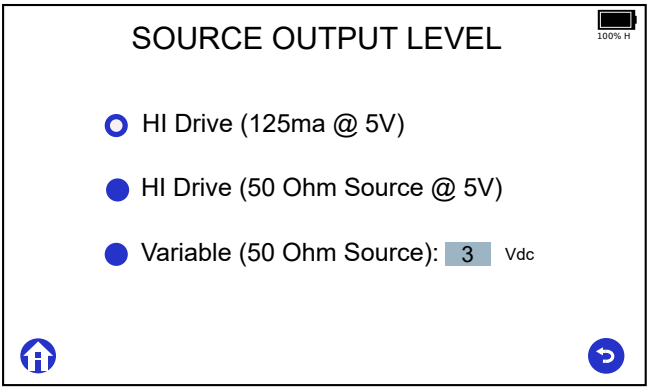

Figure 16: 1 PPS Source Output Level Configuration Screen

1. Touch the Variable (50 Ohm Source) to open the SOURCE OUTPUT LEVEL adjustment screen – see Figure 17.
2. Touch ↓ or ↑ to choose the desired voltage level (1 Vdc to 15 Vdc).
3. Touch SAVE or CANCEL when finished.

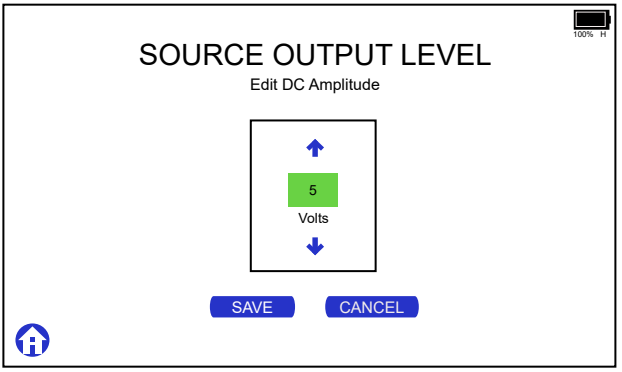

Figure 17: 1 PPS Source Voltage Level Configuration Screen

DCF77 Source Configuration

Configures the DCF77 output for this one-minute time code.

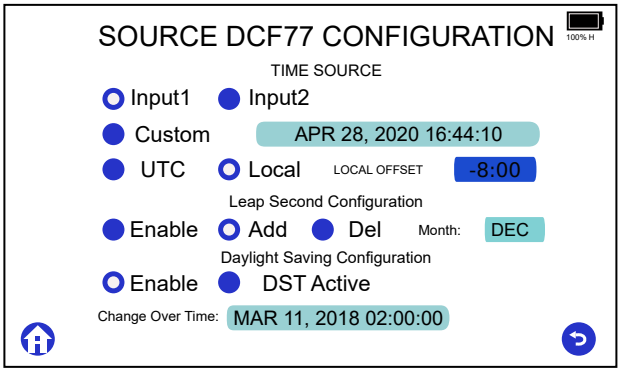

Figure 18: DCF77 Source Configuration Screen

1. Touch Input 1 or Input 2 to select the signal source.
2. Touch CUSTOM and then touch the Time/Date bar to manually set the date and time. Similar to figure 7 on page 10.
3. Touch UTC or Local to set the time zone. If Local, touch the Local Offset value to adjust.
4. Configure leap seconds, if required. The Leap Second Pending bit (LSP) will change one hour prior to the addition or subtraction of a leap second.
5. Configure DST as needed. See page 12 for additional details.

For more information on the DCF77 time code, see page 26.

Configuring System

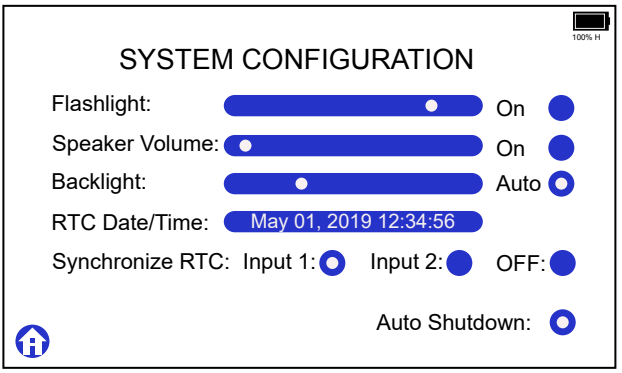

Figure 19: System Configuration Screen

1. **Flashlight** When ON, the slider controls the LED brightness.
2. **Speaker** When ON the slider controls the volume.
3. **Backlight** When AUTO, the backlight is automatically adjusted for the ambient light. When AUTO is not selected, the slider controls the backlight. *The backlight is the largest drain on the batteries.*
4. **RTC Date/Time** Shows the current time of the Real Time Clock. Tap the blue area to manually change the time. See page 21 for detailed instructions.
5. **Synchronize RTC** When Input 1 or Input 2, the Real Time Clock will synchronize automatically when a valid IRIG-B signal with C37.118 enabled is connected to the corresponding input. When OFF, the RTC will follow the manual setting.
6. **Auto Shutdown** When AUTO, unit will power off in 15 minutes unless buttons are pressed, inputs are active, or source is active.

Manually Setting the Real Time Clock (RTC)

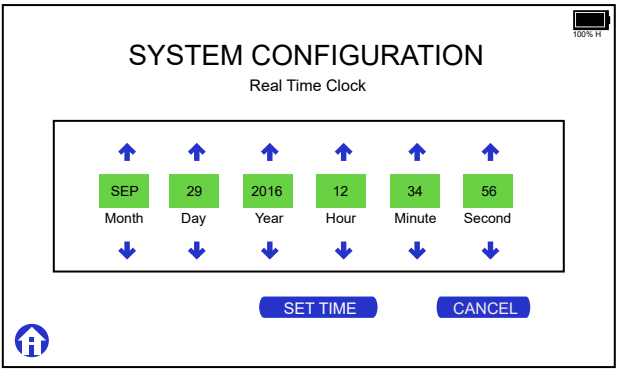

Figure 20: Real Time Clock Configuration Screen

1. Touch ↓ or ↑ to adjust each box.
2. Touch SET TIME after making changes.
3. Touch CANCEL to return without applying anything.

Display Screens

From the Home screen there are two categories: CONFIGURATION and DISPLAY. DISPLAY allows you to view the incoming signals from INPUT 1, INPUT 2, both INPUT 1 and INPUT 2, or the outgoing signal using SOURCE.

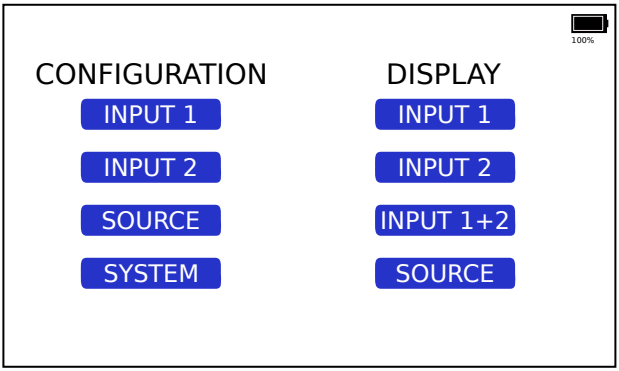

Figure 21: Home Screen

Display Input 1

1. In the Home screen DISPLAY menu, touch INPUT 1.
2. See page 6 for a review of the button controls.

Unmodulated IRIG-B

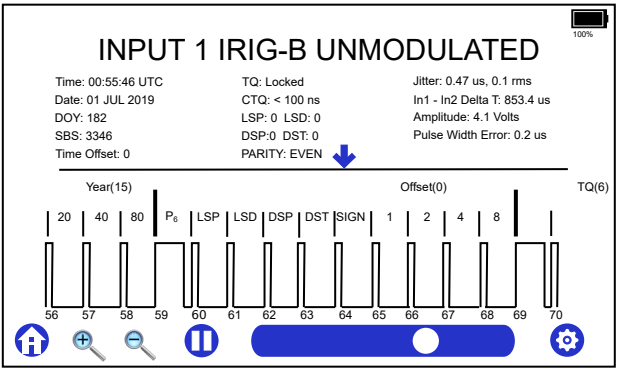

Figure 22: IRIG-B Unmodulated Display Screen

The lower portion of Figure 22 graphically illustrates a part of the unmodulated IRIG-B signal: view adjusted using the slider.

- **Time/Date:** UTC time; date; Day of Year; Straight Binary Seconds (SBS); Time offset. If the IRIG-B input signal does not have the control functions enabled, the year shown will be from the RTC, and indicated by "(RTC year)".
- **Time quality (TQ):** Continuous Time Quality (CTQ); Leap Second Pending (LSP); Daylight Saving change Pending (DSP).
- **Jitter, or Pulse Jitter:** Two values measured and displayed: average jitter and rms jitter. Acceptable jitter depends on your requirement. See Figure 23.
- **In1 - In2 Delta T:** Time difference between the 1 PPS signals at Input 1 and Input 2.
- **Amplitude:** Signal amplitude shown in volts.
- **Pulse Width Error:** Average of the variance in each pulse width.

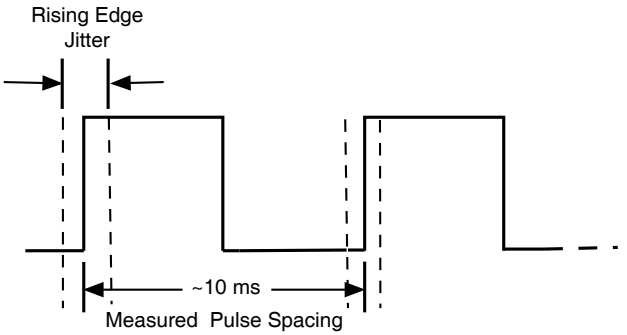

Figure 23: Average pulse jitter is the average difference between the 10 ms reference and measured spacing for all 100 pulses; RMS jitter is the calculated RMS of the difference between the 10 ms and measured spacing for all 100 pulses.

Modulated IRIG-B

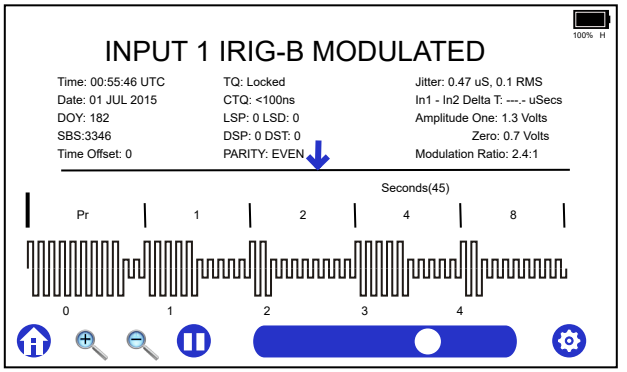

Figure 24: IRIG-B Modulated Display Screen

Modulated IRIG-B carries the same time and date information as the unmodulated, see Figure 37 for a comparison.

Figure 24 shows that the representative modulated IRIG-B waveform is not a perfect sine wave in all magnifications. The 940A display is not able to reproduce it with resolution. For clarity, the individual bits in the IRIG string are shown as a modified square wave. The analog waveform will appear more correctly when zoomed in.

PPS: Pulse-Per-Second

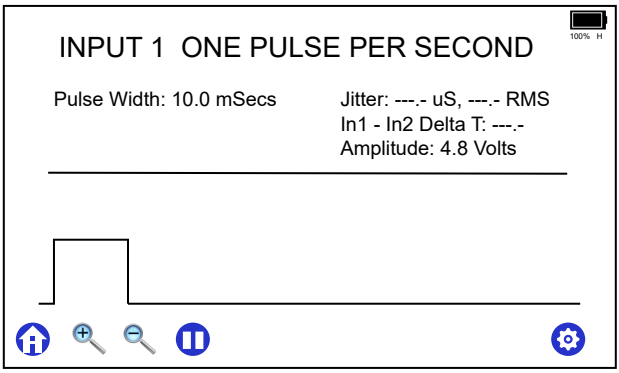

Figure 25: 1 PPS Display Screen

The 1 PPS signal is generally a 10 millisecond pulse that occurs every second, with the rising edge on time. Synchronization between the 1 PPS and IRIG-B time code can be seen in Figure 37. A 1 PPS signal connected to Input 1 would display as illustrated in Figure 25.

TIME SOURCE INVALID

Figure 31 illustrates an input signal originally connected to Input 1 that was disconnected and the accuracy is not known. Therefore, the Time Sync message states that it has been unlocked for 99 minutes – the maximum unlock time.

DCF77

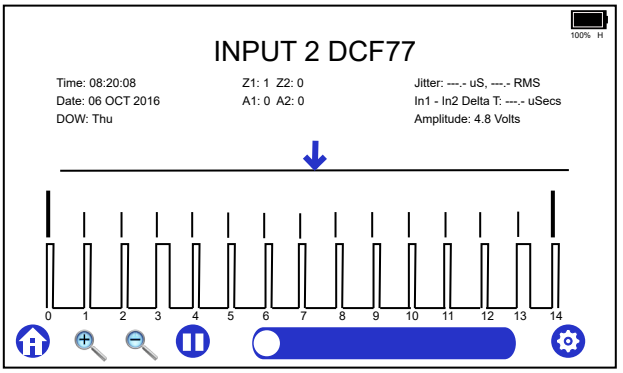

Figure 26: DCF77 Display Screen

DCF77 is a one minute time code with 58 bits of time information. The 59th second bit is missing, which is normal for standard DCF77. It can be illustrated as an analog clock as seen in Figure 27.

DCF77 Marker Details – Figure 27

M: minute marker (second marker No. 0): 0.1 s
R: second marker No. 15 indicates service request to the DCF77 signal generation system
A1: announcement of a forthcoming change from CET to CEST or vice versa
Z1, Z2: time zone indication: CET: Z1, 0.1 s, Z2 0.2 s; CEST: Z1 0.2 s, Z2 0.1 s
A2: announcement of a leap second, 0.2 s
S: Start of encoded time. Always 1.
P1, P2, P3: parity check bits

DCF77 Time Zone Arrangement

- CET is Central European Time, UTC + 1:00
- CEST is Central European Summer Time, UTC + 2:00.

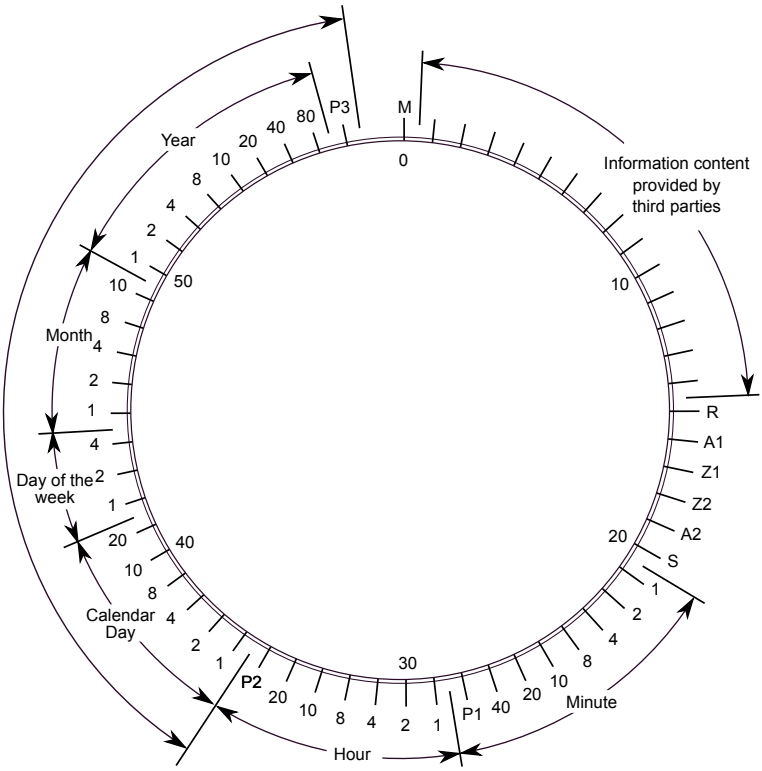

Figure 27: DCF77 Signal Elements show as a 60 second clock. Time and marker details are seen around the circumference of the circle. The 59th second bit is missing for Standard DCF77.

Display Input 2

From the Home screen DISPLAY menu, touch INPUT 2 and follow the same steps described for Input 1.

Display Input 1+2

1. In the Home screen DISPLAY menu, touch INPUT 1+2. Figure 28 shows an example of the text mode.
2. Touch ⬆ to toggle between the text display and the waveform display. Figure 29 shows an example of the waveform mode.
3. See page 6 for a review of the button controls.

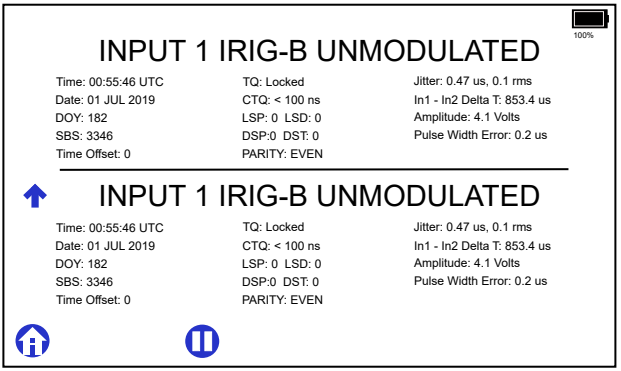

Figure 28: Input 1+2 Text Display Screen

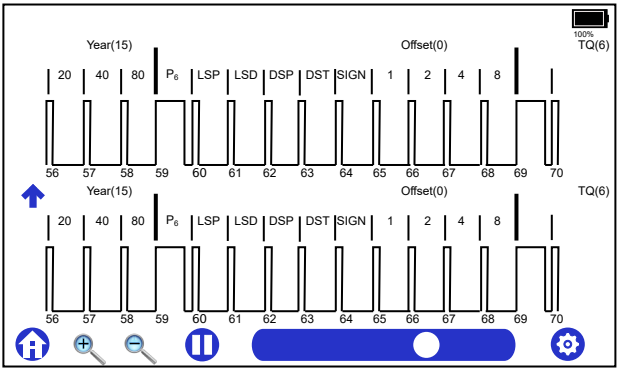

Figure 29: Input 1+2 Waveform Display Screen

Display Source

You can view the signal being produced at the source connector, similar to viewing a timing signal at Input 1 or Input 2. In addition the 940A can supply its own signal from the Real Time Clock.

Source Field Values

Five values are provided in the source viewing screen, the actual number dependent on the signal type.

- **Timing Source** – where the signal originates
- **Time Sync** – quality of the timing signal
- **Amplitude** – voltage of the output signal
- **Load** – a detected load current in milliamperes
- **Modulation Ratio** – only valid when the source is set for modulated IRIG-B

Timing Source Types

Three possibilities exist for a timing source: a signal at **Input 1**, **Input 2**, or the **Real Time Clock** (RTC).

Field Values available per Signal Type

- **Unmodulated IRIG-B** – Timing Source, Time Sync, Amplitude, Load
- **Modulated IRIG-B** – Timing Source, Time Sync, Amplitude, Load, Modulation Ratio
- **1 PPS** – Timing Source, Time Sync Amplitude, Load
- **DCF77** – Timing Source, Time Sync

Time Sync Messages

Values for Time Sync, in the illustration above, can be as follows:

- **NA** – using RTC as Time Source; accuracy not known
- **Unlocked** – if a signal was connected to to either Input 1 or Input 2 and was removed
- **Syncing** – if the source is synchronizing to one of the inputs
- **Stabilizing** – if the source is stabilizing to one of the inputs
- **Locked** – if the source is synchronized to one of the inputs.

Amplitude

Provides the measured voltage at the source output.

Load

Provides the load current produced at the source output. An OVER-LOAD message may appear if the source cannot produce the configured voltage.

Modulation Ratio

Indicates the configured modulation ratio set up in the modulated IRIG-B SOURCE OUTPUT LEVEL menu.

Example: Source Unmodulated IRIG-B

In this example an unmodulated IRIG-B signal is being produced at the source using the Real Time Clock (RTC).

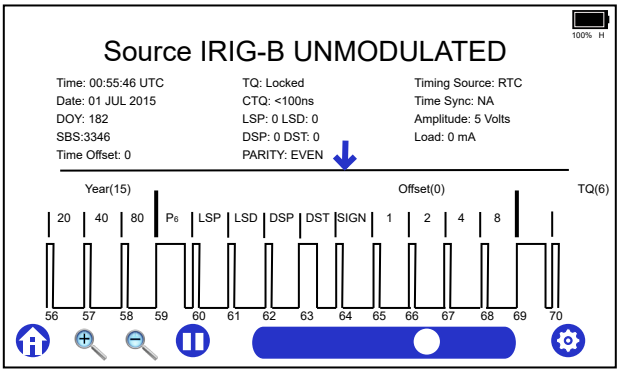

Figure 30: IRIG-B Source Display Screen

1. Under CONFIGURATION, set up the Source for unmodulated IRIG-B configuration. Use submenus as required.
2. Under DISPLAY, select to view the source output.

Time Sync does not apply (NA) when the source sync originates from the RTC, as the accuracy of the RTC is not known.

Source 1 PPS

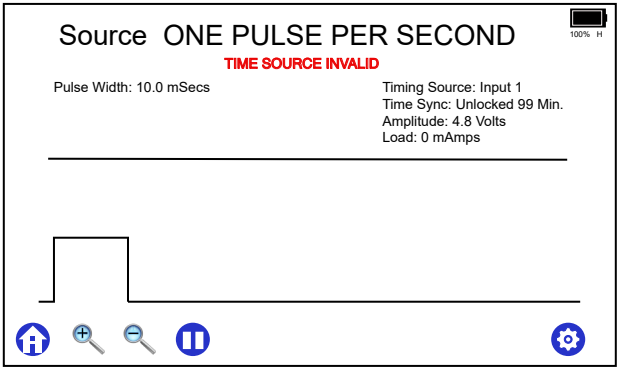

Figure 31: 1 PPS Source Display Screen

The 1 PPS signal is generally a 10 millisecond pulse that occurs every second, with the rising edge on time. Synchronization between the 1 PPS and IRIG-B time code can be seen in Figure 37. A 1 PPS signal transmitted from the source connector would display as illustrated in Figure 31.

Specifications

INPUTS	
Connectors	Two, BNC
Signals	IRIG-B (modulated, unmodulated, modified Manchester), DCF77, 1 PPS
Levels	25 Vpk, maximum
Impedance	Selectable: High Z (410 kΩ), 50 Ω, 100 Ω
In1 - In2 delta t	100 ns resolution, 100 ns accuracy
OUTPUT	
Connector	One, BNC
Signals	IRIG-B (modulated, unmodulated), DCF77, 1PPS
Levels	1 Vdc to 15 Vdc, 1 Vpk to 10 Vpk
Drive	125 mA @ 5 V
Time Ref.	Input 1, Input 2, Real Time Clock, Custom
SYSTEM	
Display	800 px x 480 px color TFT capacitive touch-screen, backlit Single or Dual Timing Signals Data and/or Waveform
Reference	Input 1, Input 2, Custom
FEATURES	
Flashlight	Built in LED
Audio	Indicator tone

POWER

Battery

Type	Li-ion (2250 mAh capacity)
Quantity	Four (4): 9000 mAh total capacity
Operation	24 hours, typical
Charge	8 hours to 12 hours with unit off

External

Voltage	+5 Vdc
Current	1 A
Cable	24 AWG Required for optimal charging
Connector	USB Micro-B

GENERAL

Physical

Size	204.7 mm × 166.5 mm × 48.5 mm (8.1 in × 6.6 in × 1.9 in) 381 mm × 305 mm × 229 mm, shipping (15 in × 12 in × 9 in), shipping
Weight	0.6 kg (1.4 lbs), maximum 2.5 kg (5.5 lbs), shipping

Environmental

Temperature	Operating: –10 °C to +50 °C Charging: 0 °C to +45 °C Nonoperating: –40 °C to +75 °C
Humidity	Noncondensing

The 940A Utility

Updating Firmware

This section describes how to update the firmware on your Model 940A. Check the Arbiter web site or contact Arbiter Systems technical support for information on firmware updates.

Firmware Package

Note that the new firmware will be in zipped format and does not need to be unzipped before uploading to the 940A.

Driver Software

The 940A Utility software package includes the driver.

Updating the 940A

1. Power on the 940A and start the 940A Utility. See Figure 32.

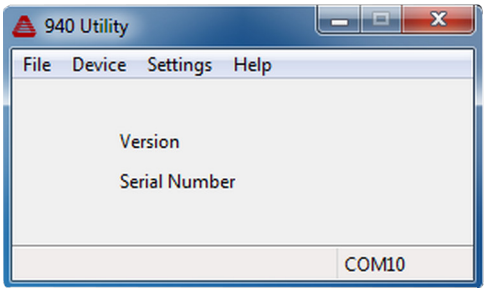

Figure 32: 940A Utility

2. Connect the supplied Micro USB cable between the USB 2.0 port on the 940A and the computer.

3. To select the COM port, click **Settings** then **Serial Port** in the Utility menu. Select the COM port of your computer, click OK. See Figure 33.

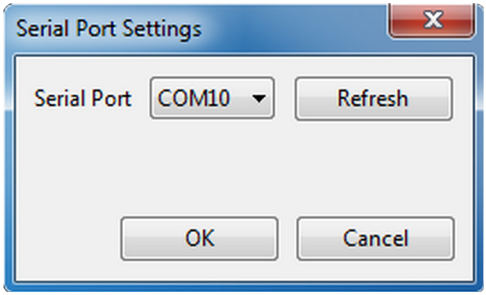

Figure 33: 940A Utility Serial Port Settings

4. The Utility should then read and display the current firmware version and the serial number. See Figure 34

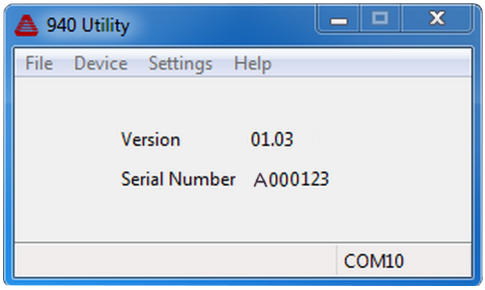

Figure 34: 940A Utility Reading Serial Number

5. In the 940A Utility main menu click **Device** then **Upload Firmware**; browse to the location of the new firmware, select the zipped file and click **Open**.

6. Click the **Upload To Device** button. A progress bar will appear that counts the number of blocks loaded and the total.

7. After the upload, the 940A will restart, pause on the startup screen, and display a message showing success and the new firmware version.

8. Touch the 940A display itself to leave the startup screen.

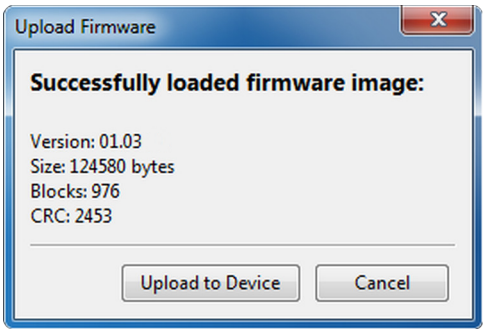

Figure 35: 940A Firmware Ready to Upload

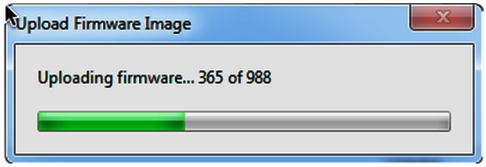

Figure 36: 940A Upload Progress

9. Verify success from the 940A Utility: select Device, Read to see the firmware version.

IRIG-B Information

Waveform Comparisons

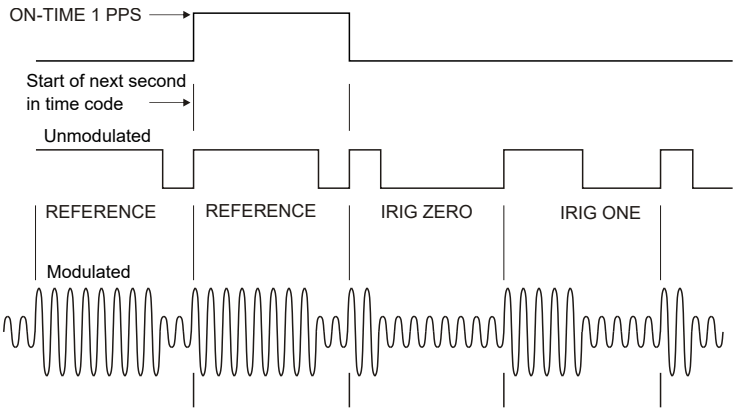

Figure 37: 1 PPS & IRIG-B Waveforms

Encoding

IRIG-B time code signals are either unmodulated or modulated. Unmodulated time codes are DC level shift with no carrier signal. Modulated time codes are amplitude-modulated, with a 1 kHz sine wave carrier.

IRIG-B consists of 100 bits produced every second. The bits have specific widths and meaning based upon their location in the string.

IRIG-B bit width definitions

- *Logic 0:* 2 ms pulse duration
- *Logic 1:* 5 ms pulse duration
- *Reference Bit:* 8 ms pulse duration

IRIG-B bit location definitions

- *BCD Time-of-Year Code* Contains time information: seconds, minutes, hours, days, and year. It reads zero (0) hours at 2400 hours each day. It reads day one (1) on day 365 at hour 2400.
- *Year and Control Functions (CF)* Contains year, leap second, Daylight Saving Time(DST), time offset, time quality, parity, and Continuous Time Quality (CTQ).
- *Straight Binary Seconds Time-of-Day Code (SBS)* Contains time-of-day in seconds, reading zero (0) at 2400 each day.

Serial Broadcast

The serial broadcast from the AUX I/O port contains delta T values between Input1 and Input2. The screen must be on an input display and both inputs must have signals for the broadcast to work. The time value is from Input2. Any terminal program may be used for the connection.

Connection

Use the available *940A RJ45F to DB9F Broadcast Cable*, part number AS0112300, to connect the AUX I/O port to a computer. The baud rate is 115,200 and is not configurable.

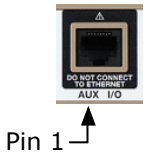

Figure 38: AUX I/O Port

RJ-45 pin	DB9 pin
5 Tx	2 Rx
7 Rx	3 Tx
8 GND	5 GND

Table 1: AUX I/O Cable Pinout

Commands

1B Start the broadcast. If Input1 and Input2 have valid signals then the output will appear in the terminal.

0B Stop the broadcast.

Output

The output contains the date, time, and offset in microseconds. The offset range is −999999.9 µs to 999999.9 µs.

Output sample:
10/25/2021 21:54:22 -2009.4 us
10/25/2021 21:54:23 -2009.4 us