RACE**A**MERICA

INNOVATION. TECHNOLOGY. RELIABILITY.

Model 3850C/CW/CZ Timer AC4

T-LiNK WIRELESS

dp DUAL PROCESSOR

Four Timer Autocross Timing System Owner's Manual

Rev G1

RaceAmerica Corporation
62 Bonaventura Drive
San Jose, CA 95134
(408) 988-6188
www.raceamerica.com
info@raceamerica.com

Table of Contents

RACEAMERICA

INNOVATION. TECHNOLOGY. RELIABILITY.

PRODUCT INFORMATION LINKS

RaceAmerica Website   www.raceamerica.com

RaceAmerica Online Store   store.raceamerica.com

Raceamerica Online Forum   www.raceamerica.com/forum

Product Warranty   www.raceamerica.com/legal.html

Service & Repairs   www.raceamerica.com/service.html

Technical Assistance   www.raceamerica.com/techcall.html

Owner's Manuals   www.raceamerica.com/prodpdf.html

Mounting Diagrams   www.raceamerica.com/mountpdf.html

Product Catalog   www.raceamerica.com/catalog.html

INTRODUCTION

T-Link Wireless replaces track cables normally used to connect track sensors to the timing system. The T-Link connects to an external track sensor using a short interconnect track cable.

NOTE: THIS PRODUCT OPERATES ON HIGH FREQUENCY RADIO WAVES. DO NOT POWER ON THE T-LINK WITHOUT ATTACHNG THE ANTENNA AND DO NOT OPERATE UNITS CLOSER TOGETHER THAN FOUR FEET. ADDITIONALLY, DO NOT PLUG ANY DEVICE IN THE CHARGER PLUG BUT THE CHARGER. PLUG ONLY DESIGNATED RACEAMERICA CABLES IN THE T-PORT CONNECTOR.

Power is supplied to the timer console and track sensor components of the 3850 Timer AC4 by the 12VDC automotive battery connected to the RED and BLACK alligator clips or regulated DC power source. Under normal conditions, a properly charged battery will operate for an entire day of racing without requiring a recharge.

The Beam Emitters and Track Sensors operate on invisible (to the unaided human eye) Infra Red (IR) light. The coded light frequencies are constantly received (aligned) by the Track Sensors until a car interrupts reception ('breaks' the beam).

The IR Beam Emitter to Track Sensor transmission operates on Line-of-Sight principles. This makes alignment of these units critical but simple. Tips are provided to aid alignment on surfaces that are other than ideal. These units will operate over a wide range of conditions but should not be operated beyond the specification parameters (less than 4 ft or more than 50 ft).

Each T-Link unit is configured with a unique ID code and a wireless optimizer code. These codes are listed on the identity label located on the bottom of the T-Link unit. Valid T-Link ID codes are A and B. The wireless optimizer code is also listed on the identity label for wireless

Model 5040/5050 - IR Beam Emitter

Picture shows top and bottom of units. Note removable USB Battery Pack
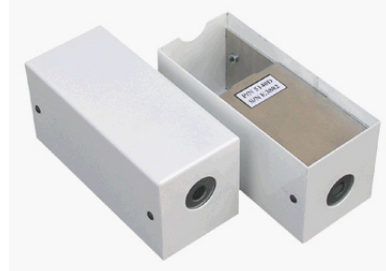
Model 5140 - IR Track Sensor

Note cable connector is located in the side facing away from the track. Track Sensors are interchangeable with one another. Track Sensor is pictured with both top and bottom sides up.

communications optimization and compatibility with other T-Link units.

SET-UP STEPS - TIMER AC4

The Timer AC4 can be set up in Single (laptimer) or dual sensor (autocross Solo 1) configurations and operated in either Manual, Hard-wired or Wireless modes. Different keypad functions are available with each mode; this manual will highlight the differences.

This manual will illustrate the console screen four line display with each line in a different set of brackets as follows - **[SEnSor] [ALiGn] [S0--0F].**

The console keypad utilizes dual function keys. All functions shown in white function when pressed; functions shown in yellow require the *** [SHIFT]** key to be pressed two seconds before the desired function key is pressed.

4

PACKAGE COMPONENTS

Each Hardwired Timer AC4 package includes:

1 - 3850B Timer AC4 Console Unit
2 - IR Beam Emitters (5040)
2 - IR Track Sensors (5140)
2 - Track Sensor Cables - 100ft each (05-3811)
1 - Power patch cord 6ft (6510B)
1 - Owners Manual

Each Wireless Timer AC4 package includes:

1 - 3850BW/BZ Timer AC4 Console Unit
2 - T-Link3 modules (IDs A/B)
   - 900Mhz Domestic USA (5840AW)
   - 2.4 Ghz Interntional (5840AZ)
2 - IR Beam Emitters (5040)
2 - IR Track Sensors (5140)
2 - Track Sensor Cables (05-5825)
1 - Power patch cord 6ft (6510B)
1 - Owners Manual

POWER REQUIREMENTS

You will need these additional items to operate your Timer AC4:

3850 Console   12.6VDC-3A reg.

PRODUCT SPECIFICATIONS

The following listing provides the designed performance specs for the 3850 Timer AC4:

Start/Finish Lane Width	4 to 50 Feet
Timer Capacity (m.ss.fff)	9:59.999
(sss.fff)	999.999 sec
Time Accuracy	0.001 seconds

Model 5840 T-Link3

Frequency	900MHz band
Battery (pn 55-E670)	USB Lithium-Ion Battery Pack

T-Port Connections	05-5825 to Sensor
Connection Type	RJ45 Modular
Identifier Codes	A-B to sensors
Max Operating Range	-20ºF to 120ºF

Model 5840 T-Link3

Frequency	2.4GHz band
Battery (pn 55-E670)	USB Lithium-Ion Battery Pack
T-Port Connections	05-5825 to Sensor
Connection Type	RJ-45 Modular
Identifier Codes	A-B to sensors
Max Operating Range	-20ºF to 120ºF

.

AVAILABLE OPTIONS

06-58AX Reconfigure kit for T-Links
6070B Carry/Storage Case
6502A AC Power Adapter (Timer ONLY)
5050 Extended range Beam Emitter - 75 ft
7540 Foam Stands (for sensors & emitters)
6860/6650 Digital Displays
4520/4620 Wireless Data Comm Links (for displays > 100ft from the console)
6033A Serial data 3850 to PC (9-Pin D-sub)
45232A Serial data 3850 to PC USB

THEORY OF OPERATION

The Model 3850 Timer AC4 is a completely self contained race timing system made with the latest technology CMOS circuit components to provide a highly accurate autocross timing solution. The system contains an internal quartz crystal clock to maintain time accuracy and display of race results to one thousandth of a second.

The AC4 can operate with a single sensor (lap timer) or with dual location Start/Finish sensors. The system can receive data from either wireless track sensors (T-Links), hard-wired track sensors or manually from the console keypad. Desired settings are selected in a configuration menu and retained until changed at a later time.

Keypad functions for each mode are described in this manual.

SET-UP STEPS - WIRELESS TIMER

Place the 'A' unit at the Start and the 'B' unit at the Finish per diagrams (Fig 4 or 5). Positioning the antenna(s) as high in the air as possible will optimize performance.

Power on a T-Link and observe the LED illuminates alternating between red and green, . If the battery charge is at minimum charge, the T-Link will power off even if the power switch is ON. When T-Links are powered on, the LED will flash green when a wireless signal is received. During normal operation, the LED on each T-Link will flash red during transmit and flash green each time signal is received from another T-Link.

The ***4 CONFIG** menu in Fig 11 is used to configure the timer for single/dual sensor operation, minutes/seconds display, sensor lockout times, printer configuration and timslip header printing. See the full **CONFIG** properly set up and aligned on the racing surface, the timer console will continue to 'monitor' the track sensor at the start line to start the next timer or at the finish line to stop the next timer (lap-timer uses only the start beam).

NOTE: once the start or finish line beam is interrupted, the system imposes a two to nine second lockout (see CONFIG menu) of that sensor to allow blowing debris to settle. During the last second of the lockout, the system performs alignment testing of the triggered sensor to determine if the alignment has changed. Failure of the starting line beam alignment is indicated by flashing **[StArt] [SEnSor] [test] [fAiLEd]**. **[Finish] [SEnSor] [tESt] [FAiLEd]** would indicate the finish line alignment has failed testing. These messages are displayed until another message updates the Status Display. This feature helps in early detection and resolution of a low battery in the Beam Emitters, someone tripped over a cable, or a sensor has been bumped out of

alignment.

NOTE: Once all four timers are actively counting, any additional interruption of the start line beam will not start a new timer until one of the current timers is stopped by a finish line crossing or manually stopped via the keypad (Wired only).

Install the antennas on all T-Link units. If the antenna has been bent down for transport, loosen the antenna slightly and rotate the upper portion of the antenna into position. Hold the upper portion of the antenna while tightening the knurled area on the bottom portion of the antenna. The antenna should point in the vertical direction and be off the ground by eight to ten feet for optimal performance.

STEP 1 -
Familiarize yourself with the Components pictured in this manual and how they interconnect. Track Sensor Cables are used to connect the starting line and finish line to the timer console or T-Link Wireless units (Fig. 1 thru 6).

All connectors are keyed for proper orientation. The 12VDC battery is connected with the RED alligator clip to plus (+) terminal of the battery and the BLACK alligator clip to (-) terminal of the battery. Do not connect to an operating motor vehicle! Optional 110/230VAC adapters can also be used instead of a battery.

The free standing, battery powered Model 5040/5050 IR Beam Emitters are placed on the end of the start line and finish line away from the timer console and the Model 5140 IR Track Sensors are placed on the console side of the start line and finish line. Each of the Beam Emitter and Track Sensor units are fully interchangeable with each other. The Track Sensor cables plug into their respective start and finish connectors on the underside of the console.

If the T-Link Wireless option is used to connect the track sensors, follow set-up per the diagrams (Fig 3 or 5).

6

STEP 2 -

Identify the emitter/sensor placement at the common start/finish line (laptimer) or the start line and finish line (autocross Solo II). The lane width should be set between four (4) and fifty (50) feet for 5040 and eight (8) and seventy-five feet for 5050 emitters. To help in determining initial Beam Emitter to Track Sensor alignment in larger track widths, use a string stretched between the beam emitter and track sensor or eyeball a straight line between units.

STEP 3 -

Layout the wireless links or cables on the track site. The large connector (RJ45) connects to the console or T-Link Wireless unit and the smaller connectors (RJ11) connect to the Track Sensors at the start line or the finish line.. Connect the Cable(s) to the Timer Console and the Track Sensors. Single sensor laptimers use only the start sensor position.

Once the system is properly set up and aligned on the racing surface, the timer console will continue to 'monitor' the track sensor at the start line to start the next timer or at the finish line to stop the next timer (lap-timer uses only the start beam).

NOTE: once the start or finish line beam is interrupted, the system imposes a two to nine second lockout (see CONFIG menu) of that sensor to allow blowing debris to settle. During the last second of the lockout, the system performs alignment testing of the triggered sensor to determine if the alignment has changed. Failure of the starting line beam alignment is indicated by flashing **[StArt] [SEnSor] [test] [fAiLEd]**. **[Finish] [SEnSor] [tESt] [FAiLEd]** would indicate the finish line alignment has failed testing. These messages are displayed until another message updates the Status Display. This feature helps in early detection and resolution of a low battery in the Beam Emitters, someone tripped over a cable, or a sensor has been bumped out of alignment.

STEP 4 -

Connect any optional scoreboards, displays or PCs per owner manuals at this time. The drawings in Figs 6 thru 8 show some of the connection options. The Printer RS232 port can be reconfigured to a RS232 Display port in the Configuration menu.

Connections are for RS232 serial data at 9600 baud. When the option is located more than 100ft from the console, using wireless or RS422 communication PODs will accomplish the task.

STEP 5 -

Connect the RED and BLACK alligator clips to the 12VDC battery or 110/230 VAC AC Adapter and you're ready to begin.

POWER ON/SELF-TEST

Connecting the 12VDC power source places the RaceAmerica Timer AC4 into a self-test of the microprocessor circuitry and LED displays (Light Emitting Diode). This is an internal test as well as a visual check of each display. The four line display sequences an [8] digit through each segment of all lines. The four line display then sequences through the product number and the code revision level coned within the timer.

At the end of the power-up sequence, the system automatically detects which mode is selected making the available displays and functions available.

When the sensor(s) are hard wired and ON, one column of dots at the right edge of each display line will flash periodically if they are properly aligned.

When the AC4 unit is ON and an antenna is connected to the timer, one column of dots at the right edge of each display line will double flash periodically.

SYSTEM SETTINGS

Press ***1 REPORT** to print the current systems setup to a connected printer. This is very helpful to quickly see if the system is configured as desired.

WARNING: To avoid damage to wireless units, do not operate any wireless device without the antenna installed. Do not operate wireless units within four feet of each other

The ***4 CONFIG** menu is used to configure the timer for single/dual sensor operation, minutes/seconds display, sensor lockout times, printer configuration and timslip header printing. See the full **CONFIG** menu in Fig. 10.

ID Code
e.g. 'C'

Optimizer Code
e.g. C305

LED Information

RF Receive Status
Blink GREEN - Receive
Blink RED - Transmit

Align Status
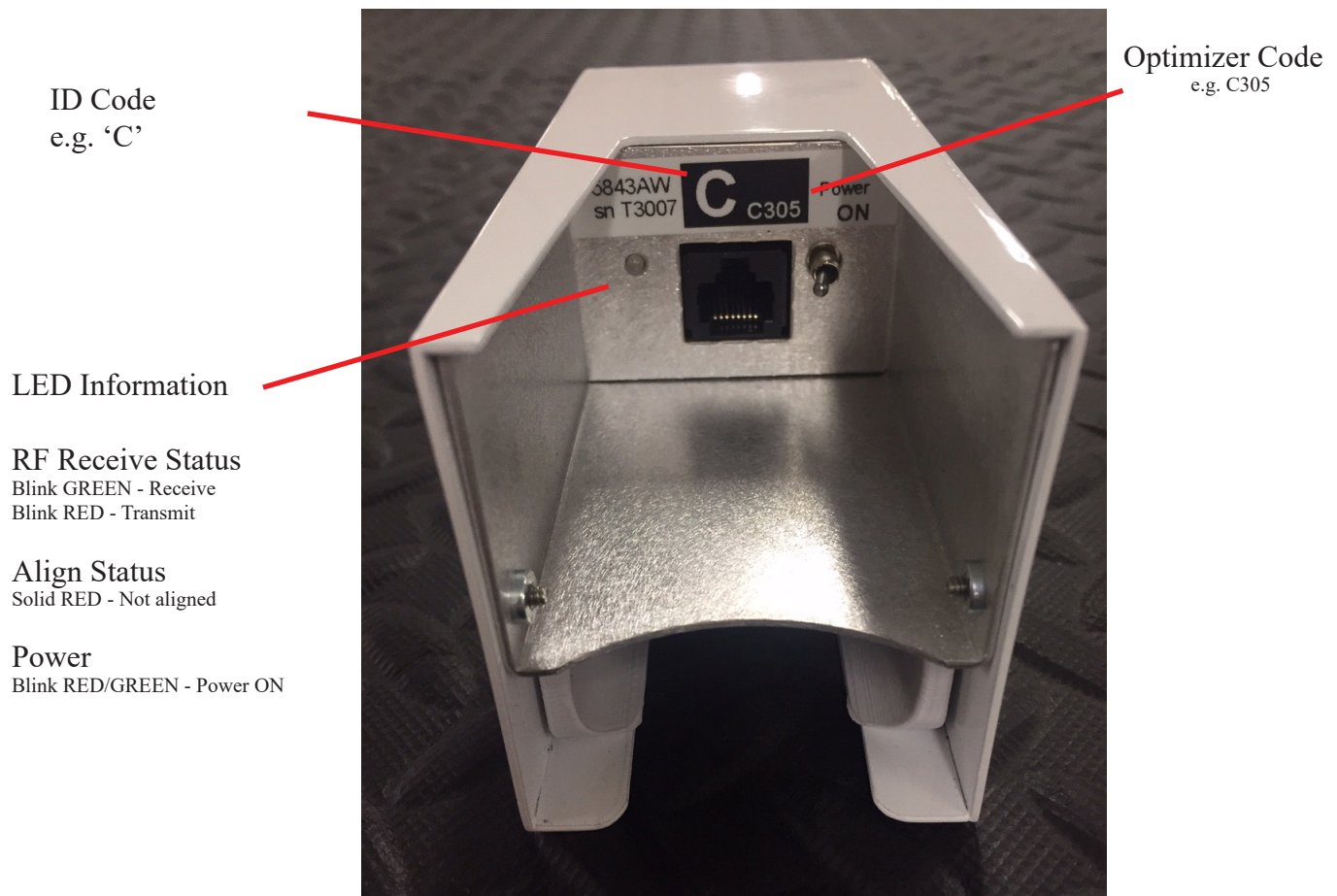Solid RED - Not aligned

Power
Blink RED/GREEN - Power ON

Figure 1 - T-Link3 power and external connections

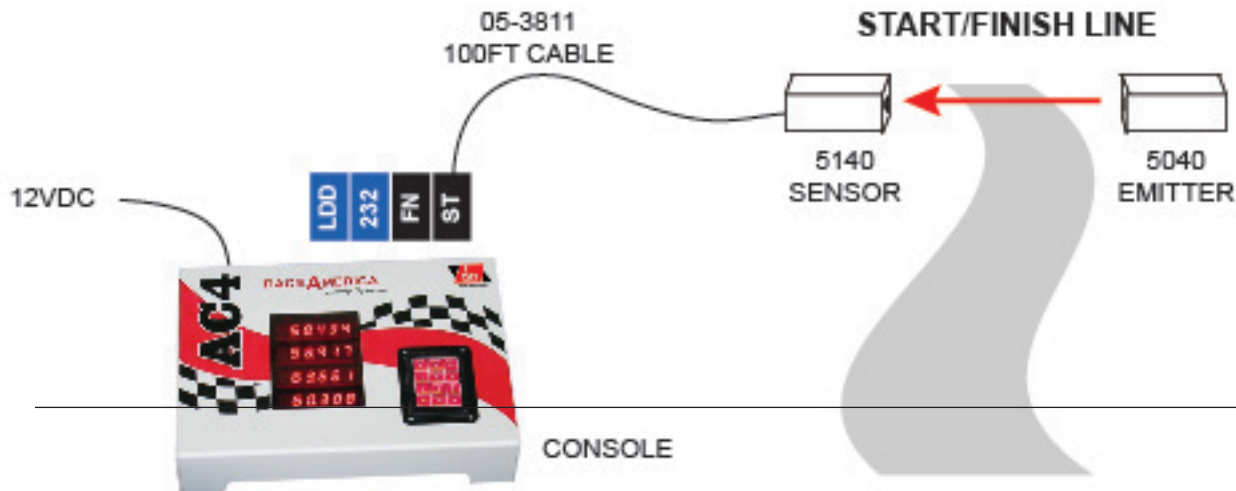# Laptimer Single Track Sensor Configuration

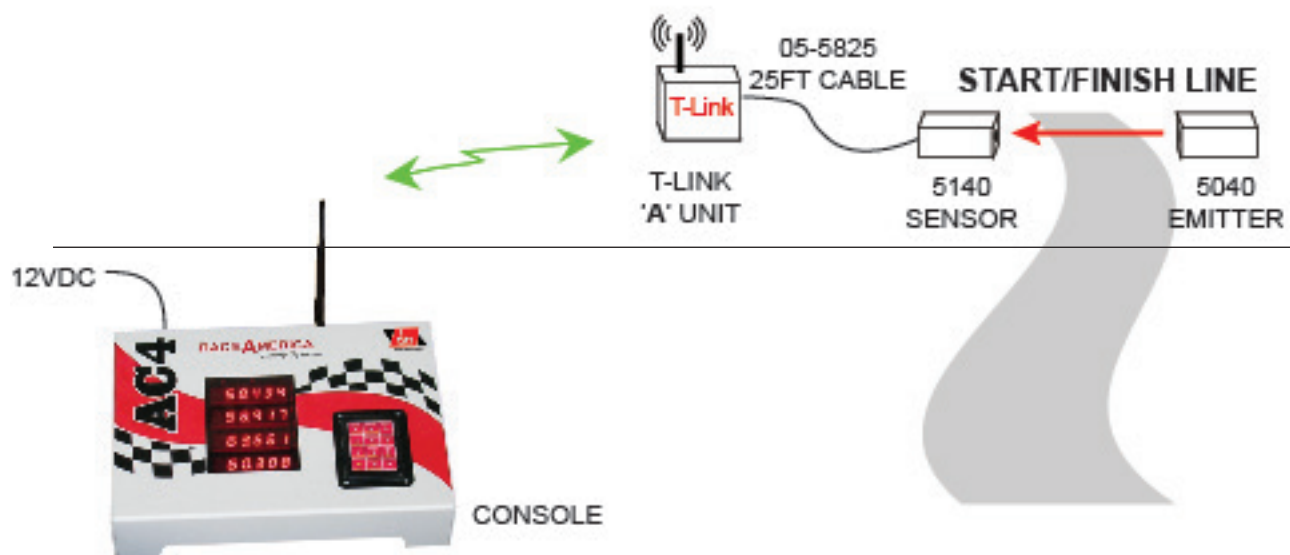Fig 2 - Laptimer hard-wired; plug into START

Fig 3 - T-Link wireless Laptimer Track Sensor

Dual Track Sensor Configuration
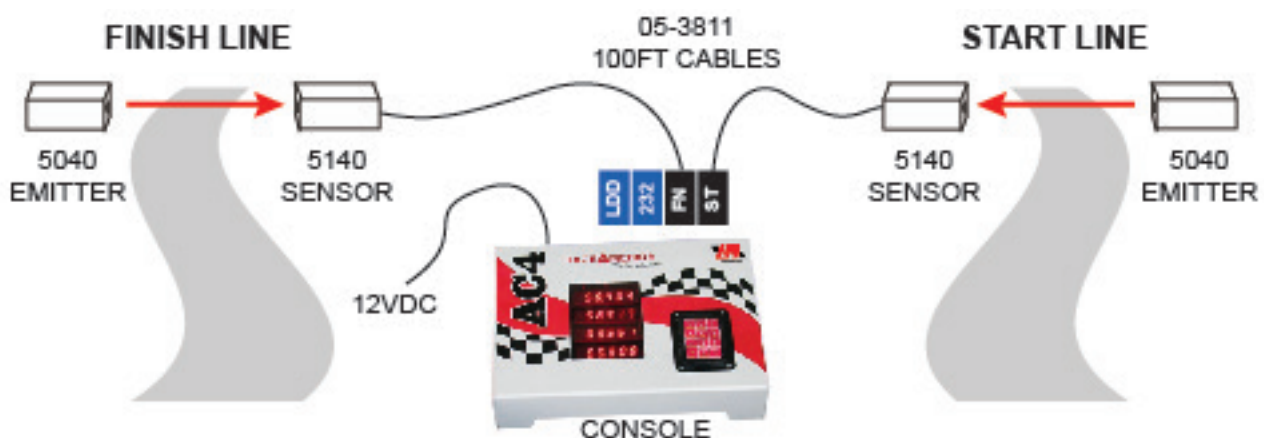
Fig 4 - Hardwired Track Sensors
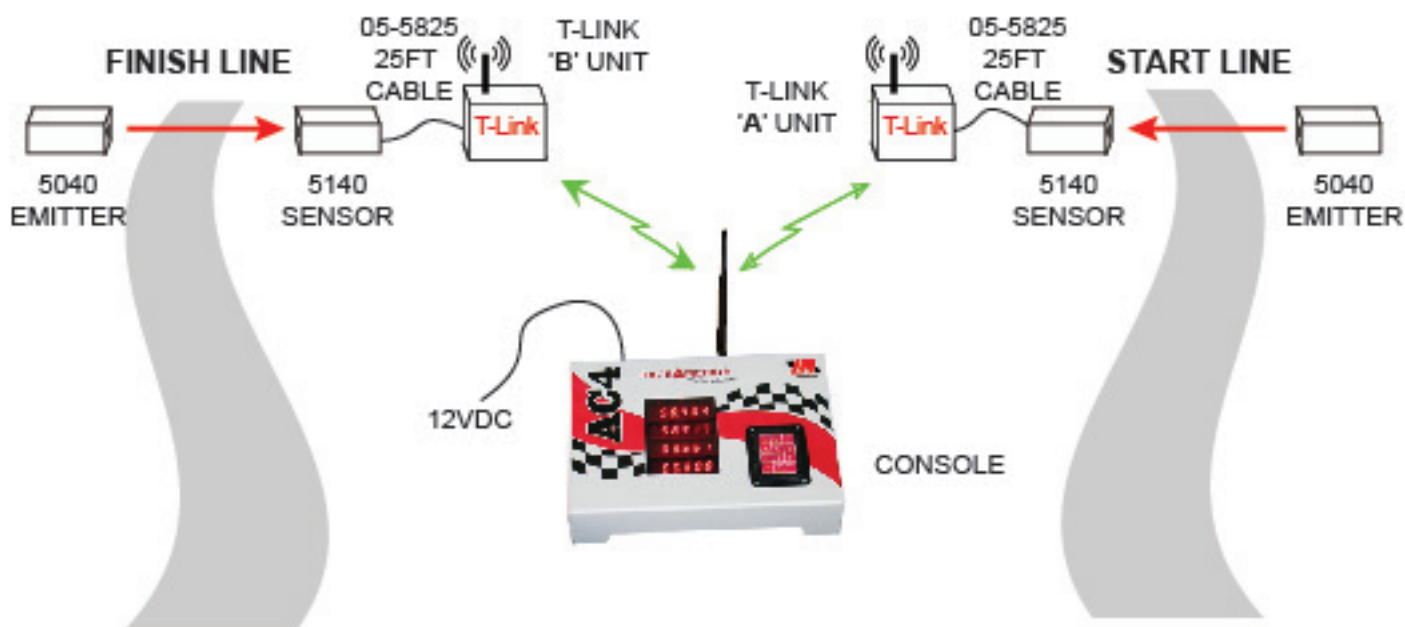
Fig 5 - T-Link wireless with external Track Sensors

Connecting System Options

12VDC

06-X100
100FT CABLE

6033A
PC CABLE

PC

DIGITAL DISPLAY

PRNT RS232 FN ST

DATA CAPTURE
SOFTWARE
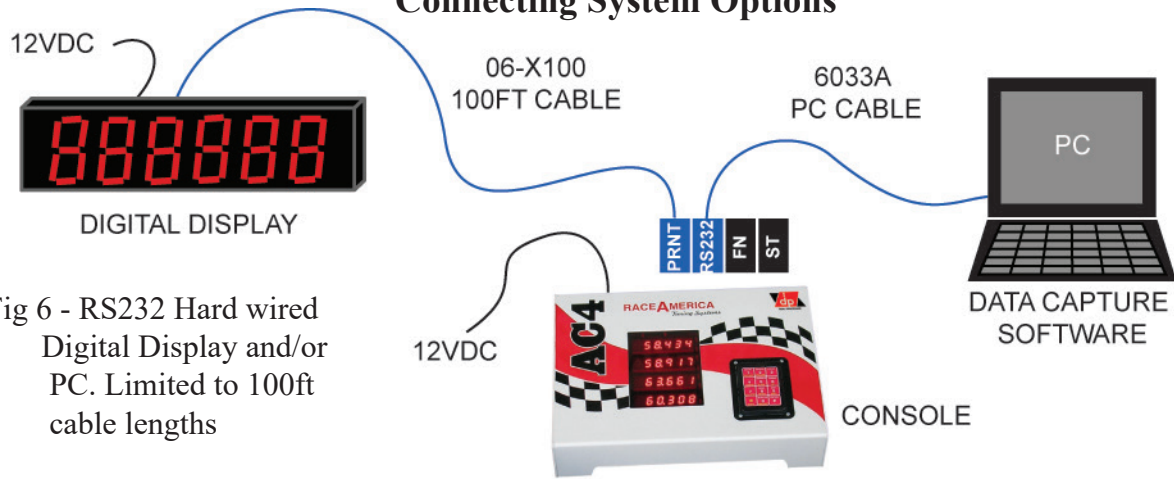
Fig 6 - RS232 Hard wired
Digital Display and/or
PC. Limited to 100ft
cable lengths

12VDC

CONSOLE

4500 COMM
POD

07-3434
CABLE

12VDC

07-4554
1FT CABLE

07-3434
CABLE

DIGITAL DISPLAY

4500 COMM
POD

12VDC

07-4554
1FT CABLE

4500 COMM
POD

9VDC

06-X010
10FT CABLE

PRNT TLNK FIN ST

DIGITAL DISPLAY

12VDC
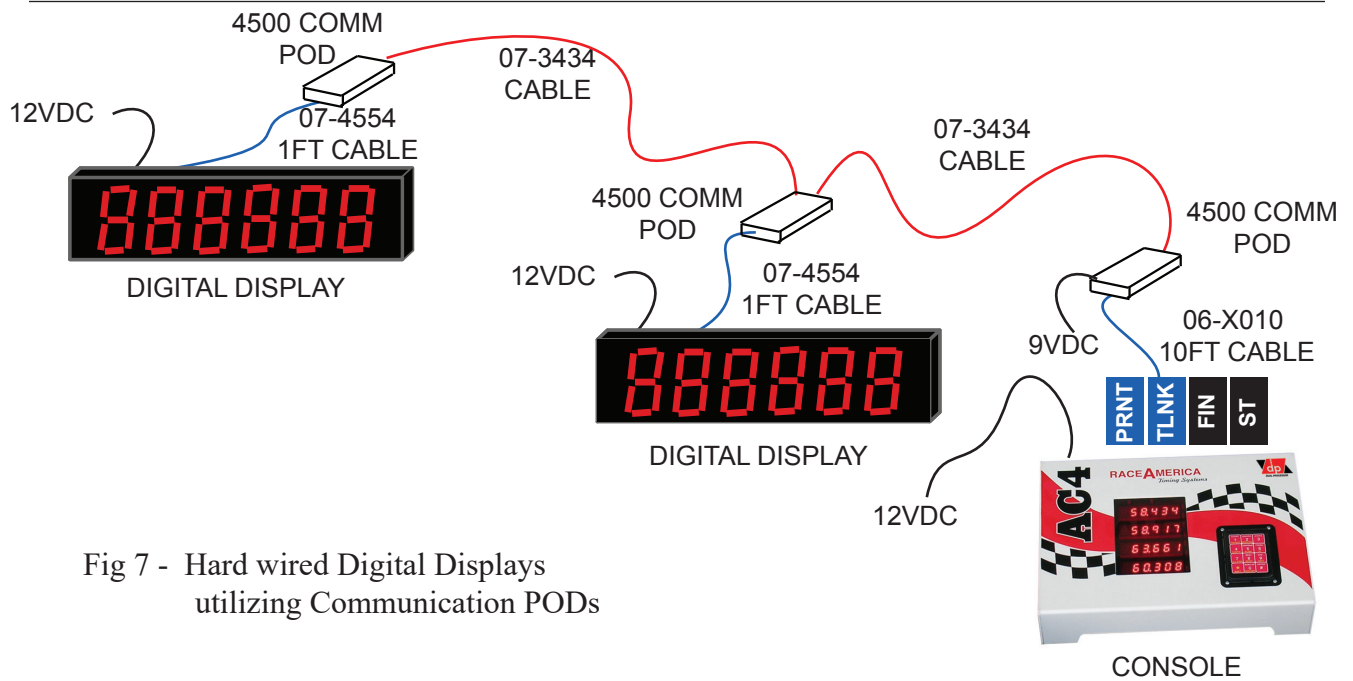
Fig 7 - Hard wired Digital Displays
utilizing Communication PODs

CONSOLE

12VDC

DIGITAL DISPLAY

4520 LINK

12VDC

06-X025
25FT CABLE

DIGITAL DISPLAY

12VDC

PRNT TLNK FIN ST
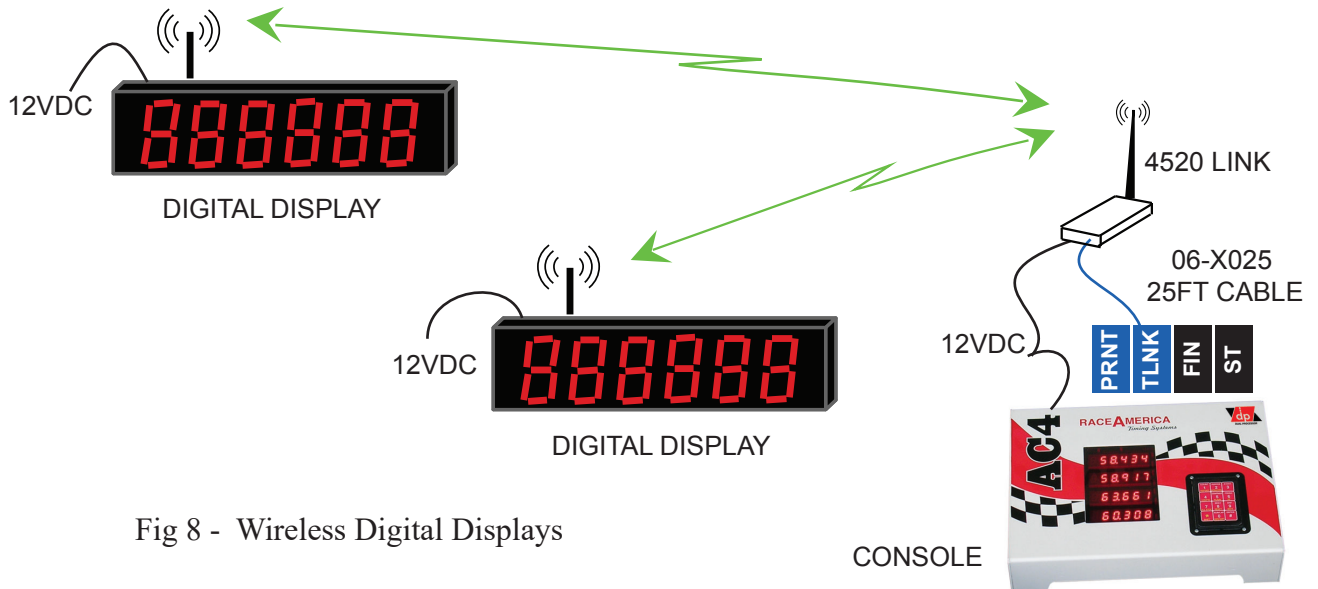
Fig 8 - Wireless Digital Displays

CONSOLE

11

CONSOLE FEATURES

Connectors on bottom

Keypad

Timer Displays

Fig 9 - The Timer AC4 Console contains a four line display for display of lap/run times, the current mode of operation of the timer, comfirms detection of a car by the Track Sensors, Emitter/ Sensor alignment and used for configuration menu promps and selections.

CONFIGURATION MENU

The Timer AC4 Model 3850 offers flexibility in configuration and setup retention. Use the [*4] CONFIG menu (Fig. 10) to select how the Printer Port will be used (it can be configured as a Printer port (Print) or RS232 Display port (diSP)). When configured as a display port, other print settings are ignored. To configure a printer to print timeslips and a report of the configuration (*1 REPORT), configure race parameters - single or dual sensor (Laptimer or Start/Finish layouts). Select time display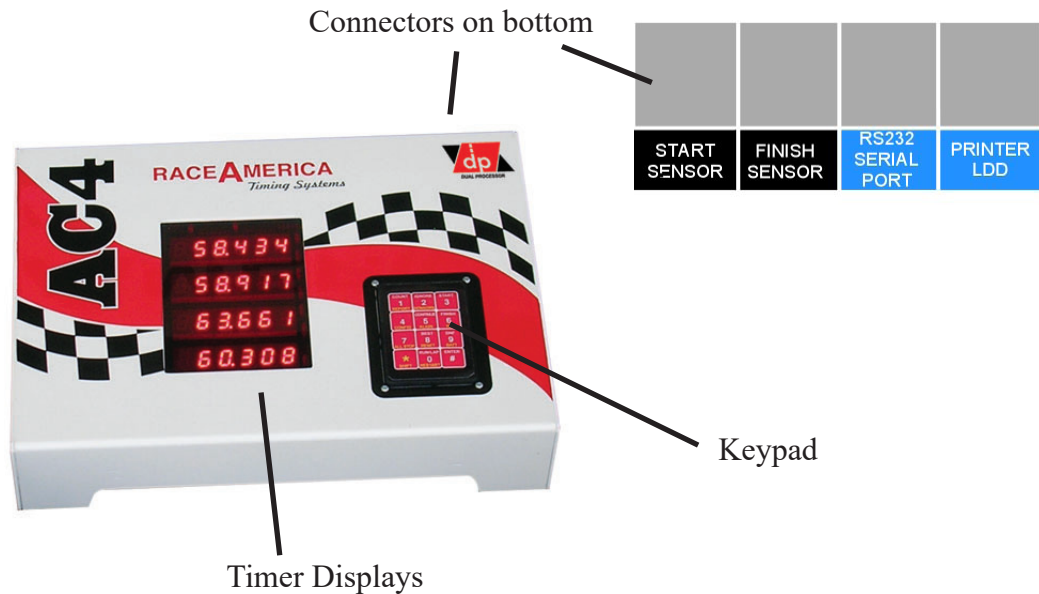 format as sss.fff (seconds and fractions or m:ss.fff (minutes, seconds and fractions); select a maximum time for cars not finishing or cars taking a longer time than allowed; select sensor lockout times for start and finish sensors. Lockout times can be two to nine seconds and represent the time until a sensor will not see another trip to allow for rear wheels and blowing dirt to settle. Use the CONFIG menu to create a timeslip header of up to 39 characters on four lines. Navigate the menu using the [4] and [#] keys as shown in Fig. 10 and described in the next section.

CONFIGURE PRINT HEADER

The AC4 allows a custom four line timeslip print header of up to 39 characters per line when a printer is connected. Input is accomplished using character codes for each desired character position (see work sheets). Press *444[CONFIG]. Press # [ENTER] to view the setup dialog as follows [L1 C01] [XXYY] indicating Line 1 Character 01; the XX is prompting for the character code for the desired character and theYY is the next chracter; refer to the worksheet for the correct code, press [#] to move to character 02 [L1 C02] [XXYYZZ] where XX is Character 01 and YY is prompting for character 02 and ZZ is character 03; continue for up to all 39 characters in the line. Press [*] to move to Line 2 [L2 C01] [XX00] and continue for all four lines. When done with all four lines, press [#] ENTER to exit the configuration menu.

12

ALIGNMENT MODE

Hard-Wired Sensor Alignment -

To verify hard-wired Track Sensor(s) are properly aligned with their Beam Emitter(s), make sure the sensor(s) are ON ([*2]). Enter the hard-wired Alignment Mode by pressing the **[*5]** key on the Keypad. The Status Display shows **[SenSor] [ALiGn] [S0--0F].** The **[S]** indicates the START emitter/sensor pair, the **[F]** indicates the FINISH line emitter/sensor pair. If the Beam Emitter and Track Sensor are operating properly and aligned, the 0 digit will not change. If the Beam Emitter and Track Sensor are not properly aligned, the 0 digit for each emitter/sensor pair will count slowly if slightly out of alignment or continuously if they are not functioning properly or way out of alignment. Once the emitter/sensor pair are aligned properly, the digit will stop counting. If the alignment is off a little or intermittent, the digit for that emitter/sensor pair will count when they float out of alignment. Remember, the Beam Emitters and Track Sensors operate on a 'Line-of-Sight' concept and may require shims if they are installed on a street with a crown. Leaves, people, and other debris will also break the beams and could give false signals, so keep everyone and everything clear of the Beam Emitters and Track Sensors during racing activity.

To optimize the alignment of the emitter/sensor pairs, it is suggested to rotate the Beam Emitter slowly left and right until the alignment for that pair begins to count. This technique will determine the maximum lateral detection angle. Rotating the Beam Emitter up and down until the alignment starts counting determines the maximum vertical detection angle. Once these extremes are established, position the Beam Emitter in the center of the left/right detection angle and up/down detection angle. Repeat this same process with the other Beam Emitter and both Track Sensors. This will maximize the alignment accuracy. Press the **[#]** pound sign key to exit Alignment Mode.

If the sensors are not ON, the display will show **[no] [ALiGn] [SEnSor] [OFF]**.

T-Link Sensor Alignment -

Proper alignment can be determined by observing the Left LED on the T-Link connected to the sensor. When the LED is blinking slowly, the emitter and sensor are aligned; when the LED is ON solid, the sensor is not properly aligned. Use the same alignment technique discussed for hard-wired sensors to attain correct alignment while monitoring the LED status. Do this for both the Start and Finish sensor if running in 'dual' sensor mode. When T-Link sensors are connected, one column of dots at the right edge of each display line will double flash periodically.

SERIAL PORT CONFIGURATIONS

The RS232 Serial Port can be configured for T-Link Wireless Track Sensors or to interface to a PC running race management software.

The Serial Port is enabled for two way communications (in for T-Link data, out for PCs and displays. The Printer port is also a serial port and can be reconfigured for a display..

NOTE: When connecting to the Serial Port, the PC or display must be configured at 9600 baud, 8 data bits, no parity, 1 stop bit, no handshake (9600/8/N/1).

RF INTEGRITY

When operating the Timer AC4 with T-Link wireless sensors, the Radio Frequency Signal integrity can be monitored. Pressing **[*6]** on the keypad will cause connected T-Link units to monitor the RF signal integrity indicated by **[--rF--] [A---X] [b---X]**. 'X' represents 0 for 0%, 1 for 10%, 2 for 20%, etc and a dash for 100%. 'A' sensor (Start), 'B' sensor (Finish) and 'Z' unit can be seen on the display. Any reading above 30% should be adequate for timer operation. This is an indication of the consistency of the RF integrity. If this number jumps around, there is a high level of interference in the area. If the number remains high, the RF signal strength is very good. If the number remains low, the RF integrity is somewhat

CONSOLE CONFIGUATION MENU

*4 CONFIG

ConFiG Print ──[4]──→ ConFiG rACE ──[4]──→ ConFiG HEAdEr

↓[#]

diSP ──[4]──→ Print

↓[#]   ↓[#]

Blank   LF ──[4]──→ XX

↓[#]

AutoPr ──[4]──→ X

↓[#]

LoG ──[4]──→ SLiP

↓[#]   ↓[#]

Blank   Blank

ConFiG rACE:
↓[#]

SEnSor ──[4]──→ SinGLE duAL

↓[#]

SSS.fff ──[4]──→ OFF on

↓[#]

End ET   xxx.xxx

↓[#]

out ET   xxx.xxx

↓[#]

StArt SEnSor LocOut SEC x

↓[#]

FiniSH SEnSor LocOut SEC x

↓[#]

Blank

ConFiG HEAdEr:
↓[#]

L1 ──[#]──→ C01 to C39 XXXX

↓*

L2 ──[#]──→ C01 to C39 XXXX

↓*

L3 ──[#]──→ C01 to C39 XXXX

↓*

L4 ──[#]──→ C01 to C39 XXXX

↓*

Blank
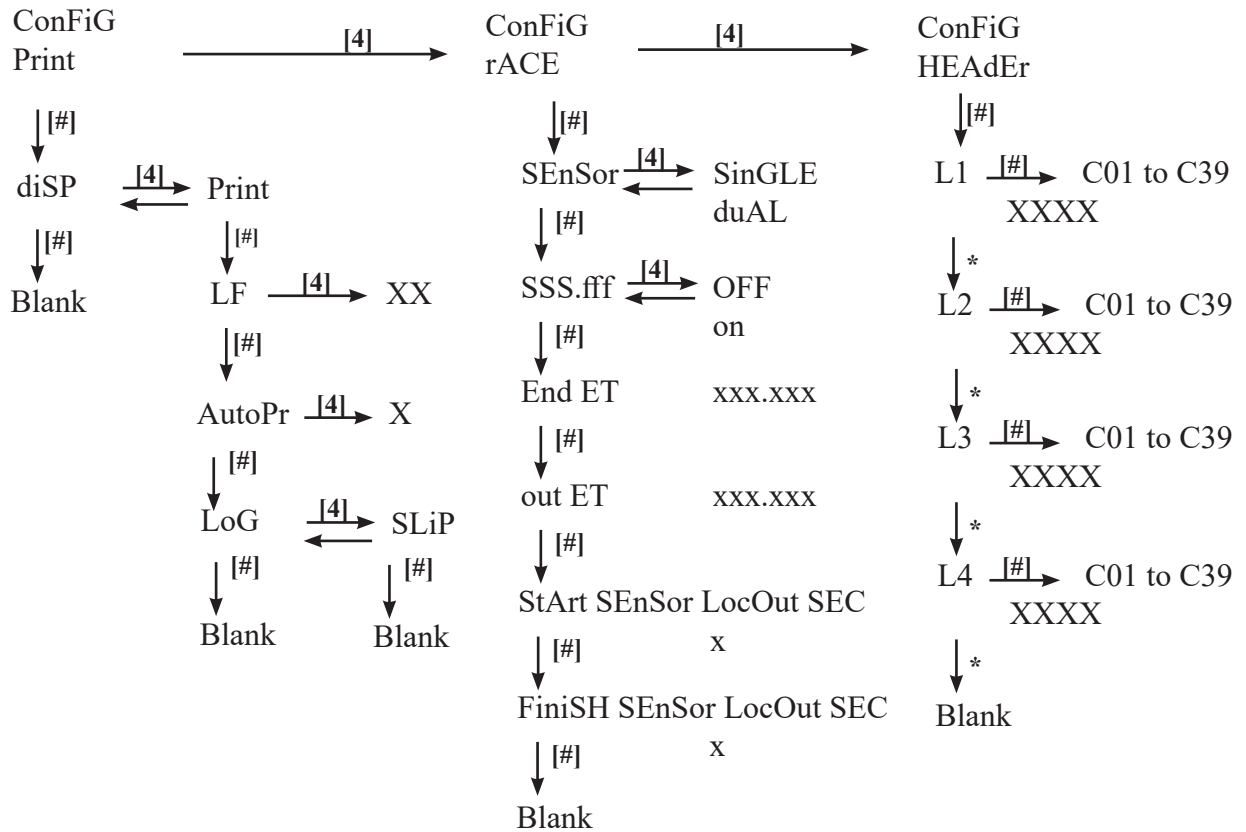
3850 rev H.10
Configuration Parameters

--- Printer Settings
Printer Port Use	Printer
Number of Line Feeds	10
Autoprint copies	1
Printed Format	Timeslip

--- Race Event Settings
Sensors Enabled	Start+Finish
Timing Format	SSS.FFF
Maximum Time (auto end)	999.999
Default Off Course Time	999.999
Start Sensor Lockout	5
Finish Sensor Lockout	5

--- Timeslip Header
3850 Timer AC4
4-timer Autocross Timing System

T-Link Wireless Enabled

Fig 10 - System Configuration Settings Menu, Press ***4 [CONFIG]**; settings are retained until changed at a later time.

Configuration Parameters printout - Press *1 (report) to send this summary of current settings to a connected and compatible printer.

14

weak and data reporting may be slowed by retries but will not alter the accuracy. The position of the T-Links and their antennas can be moved to optimize the RF Integrity level.

WIRELESS BATTERY LEVEL

When operating the Timer AC4 with T-Link Wireless sensors, The battery level of each wireless link unit can be monitored from the console. Press and release the **[*9]** key to monitor the Battery Level of the T-Links on the track indicated by **[-bAtt-] [A---X] [b---X] [Z---X]**. 'X' represents 0 for 0%, 1 for 10%, 2 for 20%, etc and a dash for 100%. 'A' sensor (Start), 'B' sensor (Finish) and 'Z' unit (internal) can be seen on the display. Any reading above 50% should be adequate for hours of operation.

TIMER OPERATION

Once set up, operation of the Timer AC4 is very straight forward. Select from below which setup matches your requirements:

Single Beam - Laptimer configuration Manual operation

This manual stop-watch type operation works with sensors ON as selected in SENSORS **[*2]**. and sensors aligned and connected or a fake sensor jumper set installed.

Press START [3] each time a vehicle crosses the Start/Finish line, any running timer will stop countiing and a new one will start counting. After each finish/start, a lap number is assigned to each start on the console (press/hold [0] to view lap number; press/hold [8] to view the 'Best' lap).

Each finish freezes the running timer and sends the time to the serial ports (PCs and displays).

If a car goes off course and cannot finish; press 'Did not Finish' DNF **[9]** when the car should finish and their time will be set to the time configured in [out Et] (*44####).

If a car reaches the maximum time allowed, its timer will automatically stop at that number. This time is configured in [End Et] (*44###).

Use 'All Stop' **[*7]** to stop all currently counting timers when something happens requiring a rerun of all cars on the track.

Single Beam - Laptimer configuration Hard-Wired

Run Single Beam hard-wired with Sensors [on] as configured in SENSORS [*2] and the cable in the START connector. Each time the beam is interrupted, a timer will stop countiing and a new one will start counting. After each finish/start, the beam is locked out for two to nine seconds (see *4 CONFIG) to allow the car to pass through and the dust to clear. A lap number is assigned to each start on the console (press/hold [0] to view lap number; press/hold [8] to view the 'Best' lap).

Each finish freezes the running timer and sends the time to the serial ports (PCs and displays).

The console operator can use the Manual Start **[3]** key to over-ride the track sensor or when the Status Display indicates the sensors are disabled **[*2]**.

If a car goes off course and cannot finish; press 'Did not Finish DNF **[9]** when the car should finish and their time will be set to the time configured in [out Et] (*44####).

If a car reaches the maximum time allowed, its timer will automatically stop at that number. This time is configured in [End Et] (*44###).

Use 'All Stop' **[*7]** to stop the currently counting timer to reset for another car.

During timing, alignment status can be checked.

Sensor status is monitored in the background. When the sensors are properly aligned, the decimal points by the rightmost character on each line will flash intermittently (about every three seconds). If the start sensor goes out of alignment, the display will show [StArt] [SenSor] [test] [FAiLEd] with 'test failed' flashing to get the operators attention. Unaligned sensors will cause a sensor trip and a sensor trip each lockout interval as set in the

CONFIG menu (*44#####). During an out of alignment situation, turn off the sensors and use the manual START (3)/FINISH (6) to continue the event.

Single Beam - Laptimer configuration T-Link Wireless

Run Single Beam Wireless with Sensors [OFF] as configured in SENSORS [*2]. Each time the beam (T-Link 'A') is interrupted, a timer will stop counting and a new one will start counting. After each finish/start, the beam is locked out for two to nine seconds (see *4 CONFIG) to allow the car to pass through and the dust to clear. A lap number is assigned to each start on the console (press/hold [0] to view lap number; press/hold [8] to view the 'Best' lap).

Each finish freezes the console and sends the time to the serial ports (PCs and displays).

If a car goes off course and cannot finish; press 'IGNORE [2] to not count the lap. Use 'All Stop' [*7] to stop the currently counting timer to reset for another car.

This mode only operates with 'SENSORS' OFF ([*2]).

During timing, status conditions can be checked. RF Integrity and Battery Level status are available. Alignment status is available on the 'A' T-Link Wireless unit.

Dual Beam - Autocross Solo II Manual

This manual stop watch type operation works with Sensors [OFF] as selected in SENSORS [*2]. and sensors aligned and connected or a fake sensor jumper set installed.

When a vehicle cosses the Start line, press 'Start' [3], a timer will start countiing. When a car crosses the Finish line, press 'Stop' [6] and the first running timer will stop. Up to four cars can start before the first car must finish. Once a car has finished, another car can start. A run number is assigned to each start on the console. Cars must start and stop without passing.

Each finish freezes the highest count running timer and sends the time to the serial ports (PCs and displays) until another run starts.

If a run is stopped in error, the operator can press Continue [5] which will restart the last run stopped. This feature can restart timers for all runs on the display without losing any time.

If a car goes off course and cannot finish; press 'Did not Finish DNF [9] when the car should finish and their time will be set to the time configured in [out Et] (*44####).

If a car reaches the maximum time allowed, its timer will automatically stop at that number. This time is configured in [End Et] (*44###).

Use 'ALL STOP' [*7] to stop all currently counting timers when something happens requiring a rerun of all cars on the track. Run numbers are not reset. Alternately, 'RESTART' [*0] will reset the timer to the initial power-up settings.

Dual Beam - Autocross Solo II Hard-Wired

Run Dual Beam hard-wired with Sensors [on] as configured in SENSORS [*2] and the sensor cables in the START and FINISH connectors. Each time the Start beam is interrupted, a timer will start countiing. After each start, the beam is locked out for two to nine seconds (see *4 CONFIG) to allow the car to pass through and the dust to clear. Up to four cars can start before the first car must finish. Once a car has finished, another car can start. A run number is assigned to each start on the console. Cars must start and stop without passing.

Each finish freezes the highest count running timer and sends the time to the serial ports (PCs and displays) until another run starts.

The console operator can use the Manual Start [3] and or Manual Stop [6] keys to over-ride the track sensors.

If a run is stopped in error, the operator can Continue [5] which will restart the last run stopped. This feature can restart timers for all runs on the display without losing any time.

16

If a car goes off course and cannot finish; press 'Did not Finish DNF **[9]** when the car should finish and their time will be set to the time configured in [out Et] (*44####).

If a car reaches the maximum time allowed, its timer will automatically stop at that number. This time is configured in [End Et] (*44###).

Use 'ALL STOP' **[*7]** to stop all currently counting timers when something happens requiring a rerun of all cars on the track. Run numbers are not reset. Alternately, 'RESTART' **[*0]** will reset the timer to the initial power-up settings.

While timing cars, Alignment status can be checked without losing a timed run.

Sensor status is monitored in the background. When the sensors are properly aligned, the decimal points by the sixth character on each line will flash intermittently (about every three seconds). If the start sensor goes out of alignment, the display will show [StArt] [SenSor] [test] [FAiLEd] with test failed flashing to get the operators attention. If the finish sensor goes out of alignment, the display will show [FiniSH] [SenSor] [test] [FAiLEd] with test failed flashing to get the operators attention. Unaligned sensors will cause a sensor trip and a sensor trip each lockout interval as set in the CONFIG menu (*44#####). During an out of alignment situation, turn on Sensors (*2) and use the manual FINISH (6), CONTINUE (5) and START (3) may be used with a fake sensor jumper set installed.

Dual Beam - Autocross Solo 1 Wireless

Run Dual Beam Wireless with Sensors [OFF] as configured in SENSORS [*2]. Each time the start beam (T-Link 'A') is interrupted, a timer will start countiing. After each start, the beam is locked out for two to nine seconds (see *4 CONFIG) to allow the car to pass through and the dust to clear. Up to four cars can start before the first car must finish (T-Link 'B'). Once a car has finished, another car can start. A run number is assigned to each start on the console. Cars must start and stop without passing.

Each finish freezes the running timer and sends the time to the serial ports (PCs and displays) until another run starts.

If a car goes off course and cannot finish; press 'Did not Finish DNF **[9]** when the car should finish and their time will be set to the maximum.

Use 'ALL STOP' **[*7]** to stop all currently counting timers when something happens requiring a rerun of all cars on the track. Run numbers are not reset. Alternately, 'RESTART' **[*0]** will reset the timer to the initial power-up settings.

While timing cars, status conditions can be checked. RF Integrity and Battery Level status are available. Alignment status is always available on the 'A' and 'B' T-Link Wireless units.

COUNTDOWN TIMER

The AC4 has a separate countdown timer to be used for timed breaks in the action. To activate, stop all timers [*7]. Press COUNT [1]; the display will show [EntEr] [StArt] [XX] displays; enter the number of minutes (01 to 99) and press # ENTER. The display will show [Count] [XX. XX] representing minutes and seconds remaining. Press [1] again to stop the count; [StoP] [Count] will briefly display and the screen will blank. The count is sent to any LED displays connected to the AC4.

KEYPAD FUNCTIONS

The 3850 timer utilizes a second function keypad; functions printed in white operate when pressed; functions printed in yellow require the 'SHIFT' button to be pressed two seconds before the desired second function yellow key is pressed.

The following defines the keypad key functionality:

Each function is coded for which modes it is available in as follows:

Manual mode ●

Hard wired mode ●

T-Link Wireless mode ●

KEY 1 ● ● ●

Pressing 1 COUNT will allow the timer to go into countdown mode: **[EntEr] [StArt] [XX]** displays; enter the number of minutes (01 to 99) and press # ENTER. The display will show [Count] [XX.XX] representing minutes and seconds remaining. Press [1] again to stop the count; **[StoP] [Count]** will briefly display and the screen will blank.

KEY 2 ● ● ●

The 2 IGNORE key will stop and give no time for the currently running timer.

KEY 3 ● ●

Pressing the **[3]** key will manually start a timer. This is the same function as breaking the start beam. This key is enabled when sensors (KEY 2) are **[ON]** and a timer is running. If all four timers are counting and the **[3]** key is pressed, the bottom timer will be lost and a new timer will be started at the top of the display. Since this is manual mode, the operator has full control of the timer starting function.

KEY 5 ● ● ●

If a timer is inadvertently stopped by a worker running through the finish line or manually stopped by pressing the Manual Stop or Off Course keys, the timer can be restored and counting with the correct elapsed time using the **[5]** Continue key. The most recently stopped timer is restarted and updated from a backup timer internally maintained by the Timer AC4. The timer is restarted and updated with the correct elapsed time. A timer can be stopped and restarted an unlimited number of times.

NOTE: All four timers also have a backup timer internally maintained by the Timer AC4. These free-running timers do not stop at the maximum elapsed time, instead, the timers roll over back to zero and continue to count. Care should be taken if a long period of time elapses between when the timer was stopped and restarted.
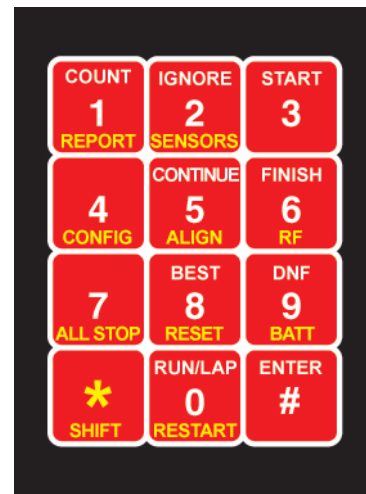
Fig. 11 Keypad

KEY 6

To manually stop the next timer, press the **[6]** FINISH key. This is the same function as a car crossing the finish line and blocking the beam. This key is enabled when sensors (KEY 2) are **[ON]** and a timer is running. Stoping a timer indicates **[FiniSh]** in the timer window..

KEY 8

To review the 'BEST' time or lap, press and hold [8].

KEY 9

If a car does not complete the course and their time is no longer valid, wait until their timer is the next timer to stop. Pressing the **[9] [DNF]** key will stop the next timer (same as the car crossing the finish line) and update the timer with the maximum elapsed time to indicate the car went Off Course and the time is invalid. The maximum value can be configured in [*4] CONFIG; 9:59.999 or 999.999 seconds dependent upon the Timer AC4 display format ordered are the maximum times.

KEY 0

To review the last four run or lap numbers, press and hold [0] RUN/LAP.

KEY

Use the [#] ENTER key to accept input data and navigate the CONFIG menu.

KEY *1

Pressing *1 will print the current configuration in he system to a connected serial printer. See sample. Use *5 CONFIG to make changes.

KEY *2

The **[*2]** key is used to toggle hard-wired track

sensors **[-on-]** (enabled) and **[OFF-]** (disabled).

NOTE: If the T-Link Wireless unit is connected and powered on, the **[0]** key is disabled.

NOTE: When the sensors are in either mode, they will not detect any cars crossing the start or finish line in the other mode.

KEY *4

Press [*4] to enter the CONFIG menu. See separate Fig. 11 to see all the details of the system configuration menu.

KEY *5

To enter alignment mode, for hard wired sensors, press the **[*5]** keys on the keypad; sensor alignment at the start and finish lines indicated by **[-SF-]** displayed. The left dash is the start line and the right dash is the finish line. The dashes will be replaced by a number. The sensors are checked continuously and the display is updated 4 times a second. If the sensor is aligned, the number will not change. If the sensor is intermittently out of alignment or on the edge of alignment, the corresponding number will count intermittently. If the sensor is out of alignment, the corresponding number will count 4 times a second.

KEY *6

Pressing **[*6]** on the keypad will cause connected T-Link units to monitor the RF signal integrity. The display will show [-rF-]. The left dash is the start line and the right dash is the finish line. The dashes on the display will begin to count up as signals are received from the T-Link units on the track. 0 displayed represents 0%, 1 represents 10%, 2 represents 20% etc. until a dash appears representing 100%. This is an indication of the consistency of the RF signal integrity. If this number jumps around, there is a high level of interference in the area. If the number remains high, the RF signal integrity is very good. If the number remains low, the RF signal is somewhat

weak. The position of the T-Links and their antennas can be moved to optimize the RF Integrity level.

KEY *7 ●

Pressing **[*7]** on the keypad will halt all currently counting timers. This is convenient when something happens on the track requiring a restart of all cars being actively timed. The next run will be assigned the next Run Number when the start beam is interrupted.

KEY *0 ●●●

Pressing the **[*0]** key halts all timers, resets all four timers back to **0.000** seconds, clears the run numbers, and resets the next run number to **01**. This function is used to completely reset the Timer AC4 back to its initial startup point.

KEY *8 ●●●

Pressing *8 will RESTART the timer and reset the run/lap numbers and best times.

KEY *9 ●

Pressing *9 will display T-Link battery levels as follows: **[-bAtt-] [A---X] [b---X] [Z---X]** where 'X' is the relative charge (1 to 9 plus - (100%)). If you press *9 when no T-Links are not connected, the display will show**[no rF] [SEnSor] [on]**.

STATUS DISPLAY MESSAGES

During normal operation, messages will appear in the Status Display. These messages indicate status, mode of operation, or events occurring on the race track. Many of these messages are covered elsewhere in this manual and are alphabetically summarized in the following section as a reference:

Align -SF-

When entering Alignment Mode, these messages will appear in sequence to indicate the alignment of the Track Sensors and Beam Emitters will be continuously monitored and the results displayed.

on

This display indicates the AC4 is operating in the hard wired mode and track sensors are enabled.

no ALiGn SEnSor on

This message appears if *5 is pressed when the sensor(s) are ON. Press *2 to turn the sensor(s) OFF so alignment can be checked.

FiniSh SEnSor tESt FAiLEd

This message appears during the power-up sequence and indicates the software code level running in the RaceAmerica timer.

iGnorE

Pressing the [2] Ignore key will ignore he last sensor trip; either Start or Finish.

OFF

This message will keep appearing if the sensors have been disabled by the operator. This message is a reminder to enable the sensors prior to the start of the race event in order to detect cars at the start and finish lines. This message will also appear if the T-Link Wireless is disconnected or powered off.

Out

This message will appear when the operator determines a car has strayed off course and the respective timer in the Timer Display is no longer valid. The timer in the Timer Display currently counting with the highest time elapsed is stopped, set to the maximum time value, and output is sent to the printer.

StArt SEnSor tESt FAiLEd

This message indicates the alignment of the Track Sensor and Beam Emitter at the start line

has failed to maintain alignment while the Timer AC4 was performing realtime testing after a car passed through the start line beam. This message will disappear when another message is displayed in the Status Display. It will appear each time the start line alignment is detected as bad.

StoP

This message confirms all timers have been stopped and are ready for the next run to begin with the next run number.

StArt

This message indicates the starting of a new timer. It will appear every time the starting line beam is interrupted by a car or the manual start key is pressed on the keypad. The four timers in the Timer Display are rotated downward. The topmost timer of the Timer Display is reset to zero and starts counting.

FiniSH

This message indicates the Finish of the longest running timer. It will appear every time the finish line beam is interrupted by a car or the manual finish key is pressed on the keypad.

SPLit

The Split message will appear briefly every time the Continue key [5] is pressed on the keypad in dual sensor modes. This allows for a 'split time finish' to be restarted.

TECHNICAL DETAILS

Timer AC4 is designed to interface with third party race management software. The timer sends signals to the PC each time a car breaks the finish line beam. The following communication strings are sent to the PC:

Car finishes: [hex80]fffsss[cr][lf]

        or   [hex80]fffssm[cr][lf]

MAINTENANCE

The Model 3850 TIMER AC4 Console, Beam Emitters, and Track Sensors do not require any maintenance.

To insure uninterrupted operation on raceday, it is suggested to keep track of battery usage hours so as to have fully charged batteries. Plan to replace the alkaline AA cells in the Beam Emitters after about 60 hours use. If you are using rechargeable AA cells, recharge them each day. Low battery voltage (Emitters below 4.2V DC) will cause intermittent operation of the system resulting in intermittent trips detected at the starting line or the finish line as the battery power weakens. T-Link2 units ontain Li-Ion batteries which have a charger of their own. Take special care to use the correct charger for different batteries.

To maintain the highest level of timing accuracy and minimize false trips, annual preventative maintenance and calibration should be performed on all system track sensors and beam emitter units.

SPARE PARTS

Further to minimize race program interruptions, RaceAmerica recommends some spare parts. A spare emitter/sensor pair and sensor cable should be available in the event of an unfortunate accident during a program. Contact RaceAmerica for availability and pricing of spares items.

SUPPORT AGREEMENTS

Support agreements are available from RaceAmerica providing Telephone Assistance on technical issues and operational questions, repair and/or replacement of hardware failures, Software and Firmware updates and bug reporting, and Annual Preventative Maintenance on all system track sensors and beam emitter units. Contact RaceAmerica for more information and pricing of Support Agreements.

TIMESLIP HEADER

The 3850 Series Console allows custom timeslip header input for four lines of up to 39 characters each to print at the top of each timeslip. Input for the Timeslip Header is found in the **[ConFig] [HEAdEr]** menu. Once the configuration is input, it is saved until changed or deleted. Input is from the keypad via a two-digit code for each character. The console display prompts for each line, character and character code (existing or new) being input.

The following table lists the codes for each character (note: upper and lower case letters have different codes). Use the worksheet on the next page to lay out the desired print text and cross-reference the codes for sequential input. Only desired text including spaces need to be input for each line; any line or lines can be left blank also.

Character	Code	Character	Code	Character	Code
Space	00	A	33	a	65
!	01	B	34	b	66
@	02	C	35	c	67
#	03	D	36	d	68
$	04	E	37	e	69
%	05	F	38	f	70
&	06	G	39	g	71
'	07	H	40	h	72
(	08	I	41	i	73
)	09	J	42	j	74
*	10	K	43	k	75
+	11	L	44	l	76
'	12	M	45	m	77
-	13	N	46	n	78
.	14	O	47	o	79
/	15	P	48	p	80
0	16	Q	49	q	81
1	17	R	50	r	82
2	18	S	51	s	83
3	19	T	52	t	84
4	20	U	53	u	85
5	21	V	54	v	86
6	22	W	55	w	87
7	23	X	56	x	88
8	24	Y	57	y	89
9	25	Z	58	z	90
:	26	[	59	{	91
;	27	v	60			92
<	28			61	}	93
=	29	]	62	~	94
>	30	_	63		
?	31	'	64		
@	32				

Fig 12 - Timeslip Header Character Codes

TIMESLIP LAYOUT WORKSHEET

| Character Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Line 1 Printed Character																																							
Line 1 Character Code																																							
Line 2 Printed Character																																							
Line 2 Character Code																																							
Line 3 Printed Character																																							
Line 3 Character Code																																							
Line 4 Printed Character																																							
Line 4 Character Code																																							

Fig 13 - Timeslip Header Character Code Worksheet

24

7540D - Foam Stand Assembly Instructions
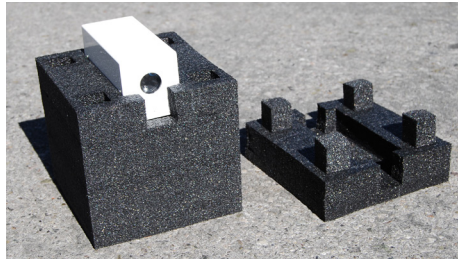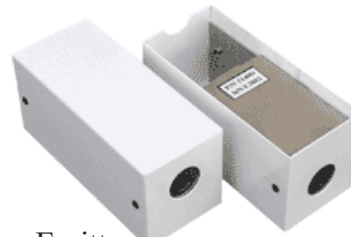
Base Foam   Top Foam   Emitter   Sensor

Assembly Components

**'AA' Battery Emitter (5040, 5042, 5050 & 5058)**
1. Install batteries and turn on the Emitter.
2. Separate the Base of the Foam Stand from the Top.
3. Place the 5040/5042/5050/5058 Emitter into the Base foam with the battery side down.
4. Slide the Top on the Base paying attention to the four corner pins and thier lignment with the corresponding Base holes. Place on the track.
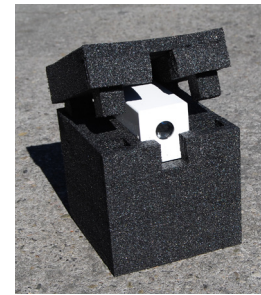
Sensor/Emitter
placement in Foam Base

Track Sensor (5140 & 5158)
1. Separate the Base of the Foam Stand from the Top.
2. Connect the cable to the sensor
3. Place the 5140/5158 Sensor into the base (open end down)
4. Slide the Top on the Base paying attention to the four corner pins and thier lignment with the corresponding Base holes. Place on the track.

For additional stability

1. Place weight in the Base well as required.
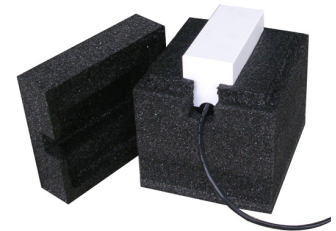
Sensor back
Note cable routing

Outside Dimensions:
    6.5" W x 7.25" L x 7.5" H

Complete Assembly

25