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INNOVATION. TECHNOLOGY. RELIABILITY.

2700rr Series XL Wireless Roll Racing Timing System Owner's Manual

Rev A

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High Performance Batteries
Lithium Iron Phosphate (LiFePO4)

Congratulations on your recent purchase of race timing equipment from RaceAmerica. This equipment contains high performance lithium ion batteries. This document provide guidance to optimize Lithium based batteries for years of use.

BACKGROUND

High performance Lithium battery technology is quite different from other battery technologies. Lithium batteries can retain higher charge capacity in a smaller and lighter package. There is no memory to the Lithium battery to contend with but Lithium does have one drawback, they are more sensitive to misuse. Care must be taken to avoid overcharging and draining the batteries to avoid permanent damage. The equipment using Lithium batteries contains protection circuitry to reduce the chance of misuse. In conjunction with preventative care, the chance of permanent damage to the batteries is eliminated.

CHARGING

Use only battery chargers designed for Lithium batteries. This type of charger is designed to match the charging characteristics of the Lithium battery. Lithium battery chargers are available in several voltages and must match the voltage of the battery pack. Using a non Lithium battery charger will damage the Lithium batteries reducing their ability to charge to full capacity. Using a charger rated at a voltage different than the battery pack, both lower and higher voltage rating, will cause permanent damage to Lithium batteries.

Charge the batteries after each use. Lithium batteries will bleed off the charge slowly over time. This is not a 'charge memory' issue like other rechargeable batteries, it is the nature of Lithium batteries to bleed off some level of charge. The longer the batteries remain unused, the more the charge is reduced. Prior to next use, connect the charger to top off the charge.

Lithium batteries are unlike Sealed Lead Acid (SLA) batteries when trickle charging over periods of time. Lithium batteries can be overcharged if left on the charger for an extended period of time causing permanent damage to the battery cells. Discontinue charging when the charge LED indicator turns green indicating the Lithium batteries are at their recommended charge capacity.

STORAGE

Store your timing equipment containing Lithium batteries in a cool, dry place. Elevated temperatures increase the slow loss of charge and low temperatures decrease the charge capacity of the batteries. Extreme temperatures, high or low, can cause permanent damage to the Lithium chemistry of the battery.

If batteries are to be stored for an extended period of time, top off the battery charge every 30 days as described under charging above. This insures the charge does not drop below minimum levels and will require a short period of charge compared to charging after use.

THEORY OF OPERATION

The 2700rr Series Roll Race Timers are dual microprocessor controlled completely self-contained race timing systems utilizing the latest CMOS technology circuit components to provide a highly accurate wireless drag timing solution. The system contains internal quartz crystal clocks to maintain time accuracy and display of race results to one thousandth of a second (0.001 sec) and multiple microprocessors to manage the data collected on the track.

The wireless data management of the system represents a true break through in race timing methodology. RaceAmerica uses proprietary technology blended with industrial grade wireless technology to give ease of use and accuracy. Each sensor trip (beam break) is retained locally and transmitted (usually within 0.5 sec) to the main control at the Console. This is the key to maintaining accuracy in increasingly cluttered radio frequency air space.

The Beam Emitters and Track Sensors operate on invisible (to the unaided human eye) Infra-red light. The coded light frequencies are constantly received by the Track Sensors until a car interrupts reception ('breaks' the beam). Sensor trips are monitored by T-Link wireless modules and transmitted back to the main timer control at the console. Time accuracy is maintained at 0.001 seconds.

The IR Beam Emitter to Track Sensor transmission operates on Line-of-Sight principles. This makes alignment of the units critical but simple. These units will operate over a wide range of conditions (full sun to total darkness) but should not be operated beyond the specification parameters (4 ft to 50 ft).

Once the system is properly set up and aligned on the racing surface, the timer console will 'monitor' the track sensors each time a run is made.

In racing mode, the system microprocessors take control of checking for a valid set of start conditions (expected blocked and unblocked sensors), then starts the run. The system then watches for subsequent beam interruptions at the start line and finish lines for speed and et trips. After all data is collected, Roll Race rules are applied to determine the winner and display this on the console plus output to PCs, printers and Scoreboards connected to the system. Data includes Redlights, Start Speeds and Start Delta ET, winner indication, Finish Speeds and ETs.

The 2700rr is intended for use with XLscore RR PC software or operated independantly.

2700 XL Wireless Quick Start Guide

This Quick Start guide can be helpful to use as a set of steps to follow for relatively experienced operators of the XL Wireless system.

1   Set up timing system hardware and cabling on race surface

2   Power on all T-Links and Infra-red Beam Emitter units

3   Connect all peripheral devices such as printers and scoreboards

4   Power on all printers and scoreboards; observe scoreboards for proper power up sequence.

5   Power on Console and any connected Wireless Link units

6   Go into Alignment Mode **[*5#]** and check alignment at all sensor locations. No counting digits means everything is aligned.
       Exit Alignment Mode **[#]** when done.

7   Go into System Config **[*4]** and the Configuration menu **[*8]** to set desired operating parameters

8   If printing results, enter Car # **[9]**

9   Start race **[0]**

10   Press **[#]** to return to main menu and clear last race

11   Next Race? Go to **[8]** or **[9]**

PACKAGE COMPONENTS

The standard configuration for Model 2700rr XL Wireless roll race package includes*:

1 - 2700rr Series Console Unit
2 - 05-5831 10ft Start Line cable
2 - 05-5830 66ft Finsh Line cable
4 - 5042 Dual Sided Emitters
8 - 5140 Track Sensors
4 - 5848 T-Link3 modules
2 - 6750RR Compliance Displays
1 - Owner's Manual

With these parts, the system will provide Start and Finish Lines Elapsed Time (ET), Speed and winner indication for two lanes.

Model 2700rr Available Options

High Gain Flat Panel Antenna
Antenna Extension Kit
7540 Protective Foam Stands
6045 Timeslip Printer Package
3128RR XLscore RR Race Management
      Software for PCs

6828/6628/6428 Single Line Dual
      Lane Digital Scoreboard
      (8/15/24" digits respectively)
6810/6610/6410 Dual Line Dual Lane
      Digital Scoreboard
      (8/15/24" digits respectively)
6070 Storage/Carry Cases

* Part numbers are for domestic operation
  (900 mhz Wireless); a 'Z' suffix part number
  designates international (2.4Ghz)

PRODUCT SPECIFICATIONS

The following listing provides the designed performance specifications for the 2700rr Series timing systems:

2700rr XL Wireless

Start Lane Width	4 to 40 feet
Finish Lane Width	4 to 50 feet
ET Timer Capacity	up to 90.000 sec
Time Accuracy	0.001 seconds
Minimum Speed 10ft Trap	1.70 MPH
66ft Trap	11.25 MPH
Power Requirements:	
Emitters	USB Battery Pack

5848 T-Link3

Frequency (domestic USA)	900MHz
(International)	2.4 GHz
External Battery (Li-Ion)	USB Battery Pack
T-Port Connections	
ID 'A'	Left Start
ID 'B'	Right Start
ID 'C'	Left Finish
ID 'D'	Right Finish
ID 'Z'	2700 Console
Connection Type	RJ-45 Modular
Max Operating Range	-20ºF to 120ºF
Battery Life	approx. 60 hours

Sensor and Emitter operation
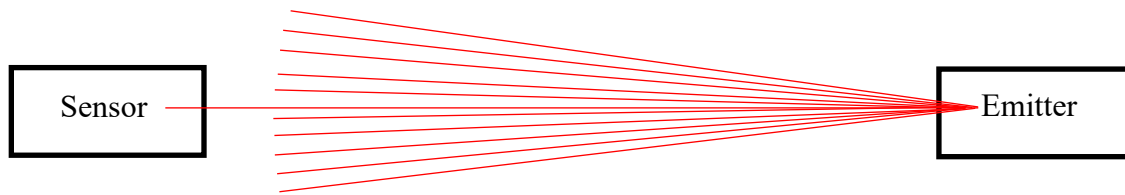
The Emitter throws a spot light like beam of infra-red light; the Sensor should be aligned near the center of the beam for optimal reception and alignment.

Fig 1 Sensor/Emitter Alignment

OPERATION

Track Sensors & Beam Emitter Operation

RaceAmerica utilizes a variety of Track Sensors and Beam Emitters in its timing systems. All operate on line-of-sight infra-red beam principles. The beam is created by the Beam Emitter and received by the Track Sensor. The operating specification is for a gap of between four and fifty feet between the Emitter and Sensor. These will operate in conditions ranging from full sun to total darkness without adjustment when properly aligned. The Beam Emitters require a power source while the Track Sensors are powered from the cable to the T-Link. The infra-red beam is a coded frequency which is detected by the sensor.

The beam operates on a generally established condition (ie, the sensor senses the presence of the beam), and is interrupted (broken) by the racer (beam blocked). The beam will automatically re-establish after being blocked. The detection of vehicles passing through the beam rapidly highlights the sophistication of this technology. In fact, many small items such as leaves, water, snow could interrupt the beam if moving slow enough. RaceAmerica minimizes the impact of these occurances by requiring multiple short interruptions of the beam to indicate an interruption as well as verification of beam conditions before a race is allowed to start.

Wireless Operation

The wireless features of this system have greatly simplified set-up and tear down but must be followed carefully. Sensor alignment can be checked locally at each T-Link module as well as on the Console. The wireless T-Link transceivers operate best on line-of-sight principals; the Console unit is the main event coordinator. Keeping antennas up and off the ground as high as possible will optimize performance. The console can show the Radio Frequency (RF) Integrity on a relative basis betweeen the various units. The system will operate correctly with low RF Integrity values however the system may have obvious delays while retries are accomplished during RF interference. Due to the nature of the technology, no timing accuracy is lost. Antenna extension kits are available if necessary. All system components for racing (T-Link IDs 'A' thru 'D' plus 'Z') must be on the same Optimizer Code; peripheral devices such as scoreboards and printers may be on different codes. If other systems are operating in the vicinity (within several miles), they must be on different Optimizer Codes (see RaceAmerica for unique codes). Do not operate any wireless device without the antenna on and do not operate wireless units within six feet of each other.

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.

The console also can display the battery charge level in each T-Link unit; charge batteries below 50% charge and before each event; charging may take 4 hours for each battery. The battery LED light will turn green when charging is complete and the units are 'topped-off'. A charged T-Link

will operate for 30 hours between charges. T-Links do not need to be 'topped-off' every thirty days when not being used.

The 2700rr XL Wireless system has numerous configurable options such as starting minimum and maximum speeds and time delta between vehicles at the start line. Operation of this wireless system is tolerant of many seemingly problematic situations. The technical design permits T-Link track units to be powered OFF/ON without missing more than one set of data; likewise with the Console and any peripheral devices. Generally, if a problem has occured, end race **ENTER [#]** or the system reset **RESET [*0]** will automatically sync up all modules for operation and time accuracy to begin the next race.

SET-UP STEPS - 2700 SERIES

The content of this manual is designed to assist the new system owner with the RaceAmerica system, however, it is strongly suggested that the system be set up in a race simulation area to gain familiarity with basic operation of the components prior to race day. This can be done in a driveway or garage. Walking through beams can simulate vehicles for purposes of familiarizing oneself with basic operation.

STEP 1 - Familiarize yourself with the components pictured in this manual and how they interconnect. See the track layout diagrams for proper placement of each component. The T-Link units are location specific (see label on the bottom of each T-Link). Spare ID 'C' T-Links can be reconfigured for another position on the track (with the T-Link reconfigure kit). Ensure the correct sensor is connected at each position (with the matching emitter opposing it)

The Speed sensors/emiters are placed immediately before the measured ET time and spaced at the configured trap length (10ft at start, 66ft at finish).

STEP 2 - Identify the emitter/sensor placement at the start line and finish line. The lane width should be set between four (4) and fifty (50) feet (optional 5052 Emitters have 75

ft range). Refer to the Track Sensors/Cabling Diagram page. Avoid running any of the system cables in conduit with 110/230VAC power lines as intermittent failures may occur. Speed Trap sensor spacing must match the system configuration to record accurate speeds. To help in determining initial beam emitter to track sensor alignment in wide track widths, eyeball a straight line between units. The system Alignment Mode will be utilized to verify alignment after power-up as well as using the T-Link units to view alignment locally.

STEP 3 - Place the electronic equipment in position as shown in diagram on page 14; connect the various cables.

Minimize the number of any other devices (such as PA systems)on the same electrical circuit as the timing system. When running power and data cables, do not run them in the same conduit.

STEP 4 - Prepare to connect the system to the power source.

Operating the system from a battery connected to a charger or running car engine will result in an over voltage condition and damage the timer.

Go to Power-on/Self-test section to actually apply power to the various system components.

XL Wireless
Console Connectors

12VDC/3A Power
Connector

RS232 Data Port
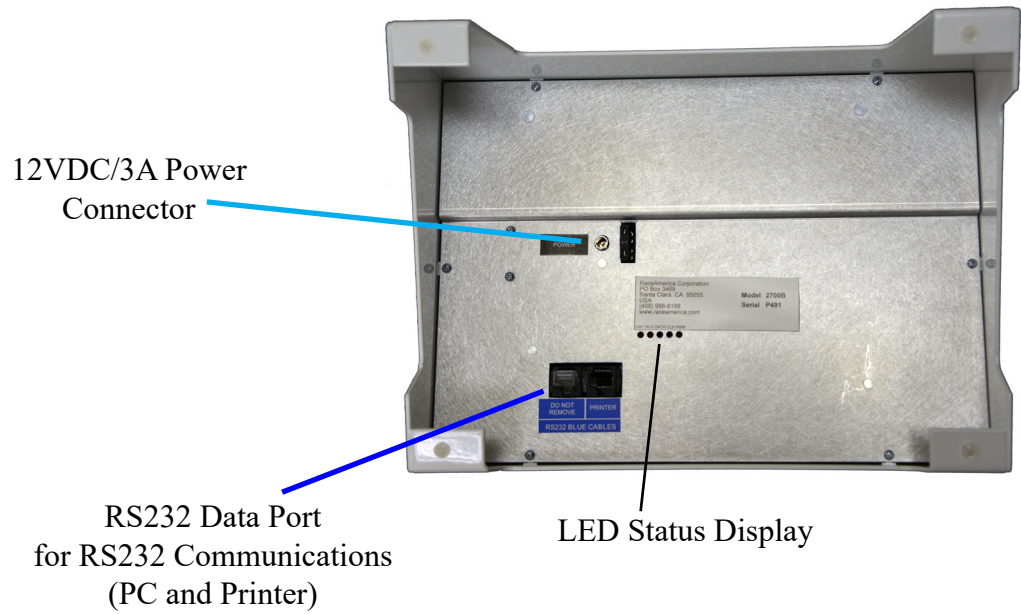for RS232 Communications
(PC and Printer)

LED Status Display

Fig 2 - Cable connectors on the underside of the XL Wireless console.

These are NOT Ethernet cables!!!

Align Status
Solid RED - Finish out of alignment
Solid GREEN - Speed out of alignment
Solid YELLOW - Finish and Speed out of alignment

RF Receive Status
Blink GREEN - Receive
Blink RED - Transmit

ID Code
e.g. 'C'

Optimizer Code
e.g. C17

Power
Blink RED/GREEN - Power ON

Battery
Insert USB Battery Pack

Fig. 3 - T-Link control center. The track sensor cable plugs into the T-Port connector.

T-Link bottom showing track position ID label.
'D' position is Right Lane Speed/Finish on optimizer code C30

Track sensor alignment can be monitored by observing the red/green LED. This may be easier than using the console alignment diagnosis.
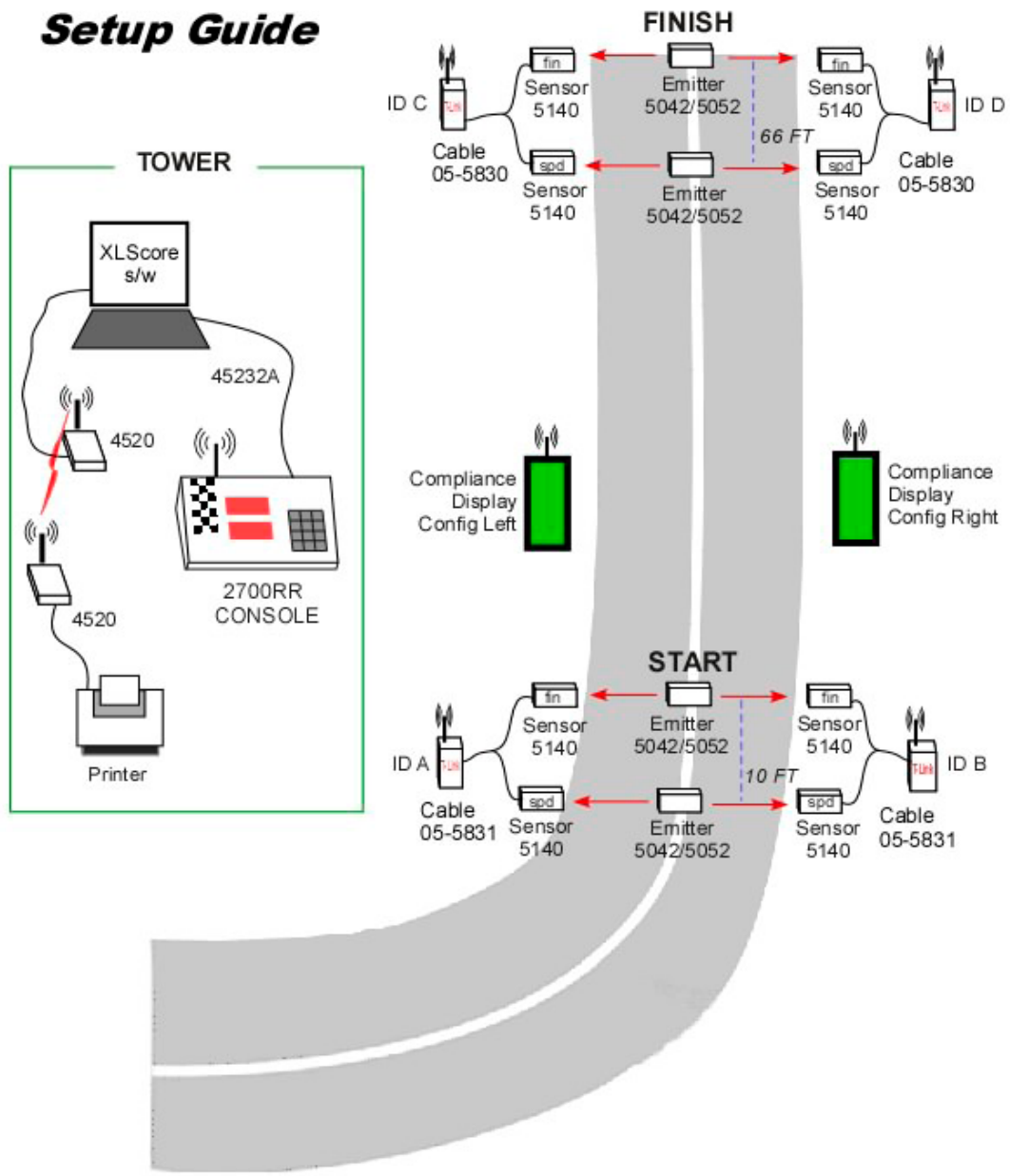
Figure 4 - Roll Race System Layout

KEYPAD FUNCTIONING

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.

NAVIGATING TIMER MENUS

The XL Wireless Timer Console has a system diagnostic menu and two configuration menus:

The **[*5 DIAG]** Diagnostics menu includes Sensor Alignment, T-Link battery level and wireless RF signal integrity - functions used over the course of an event.

The **[*4 SYSTEM]** System menu includes Test sensors at race start, Printer setup, Speed Trap configuration and Timeslip Print Header - functions rarely changed during an event.

The **[*8 CONFIG]** Configuration menu includes Starting Tree selection, Race results to display when available and Race finish point - settings likely to change each race or class.

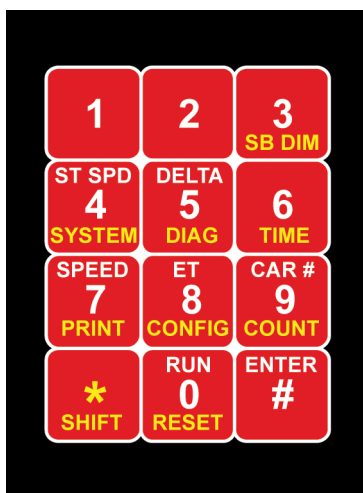Each menu will be covered in detail in upcoming sections of this manual.

Fig 5 - Console Keypad

POWER-ON/SELF-TEST

Power is applied to each independent component of the system. Verify that antennas have been installed on all T-Link units including the Tree-Link and console before applying power.

First, it is best to turn on the T-Links at the finish line Speed/Finish and verify alignment on the T-Links (see page 13). Connect the console to power; the console goes through a test and visual display of all segments in the display windows contained within the primary microprocessor. Normal communication is established with the Tree, the Tree lights will go out and the console will briefly show **[uPdAtE] [run]**. Press ***0 [RESET]** on the keypad to attempt to establish communications agai.

The test concludes when the upper console display shows the product model number **[2700rr]** and the lower display shows the code revision level **[x.xx.x].**

If a printer is connected to the Console, press **[*1]** REPORT to print a summary of currently saved parameters. See Fig 7 for an example. Use this summary to determine what needs to be changed, if anything.

At the conclusion of the console power-up sequence, the system can be Configured (***8**), Diagnosed (***5**), operated (**0**) or put into background monitoring (#) mode.

BACKGROUND MONITORING

Background sensor monitoring gives the race director early warning about a possible problem and occurs when no other functions are being performed such as configure, print, enter dial-in or run a race. The background monitoring mode will display **[SEnSor] [-tESt-]** in the upper/lower windows if all sensors are aligned. If any sensors are out of alignment, the display will show the offending positions in the following format - **[LSF-SF] [rSF-SF]** - where the upper/lower windows are left/right lanes respectively and the positions (left to right) start line speed, start line ET (T-Link IDs A&B), finish line speed and finish line ET (T-Link IDs C&D). Properly

aligned sensors will show with a (-), misaligned sensors will show the position letter (ex. left lane finish line ET sensor out of alignment**[L----F] [r-----]**) and wireless units not connected (possibly no communications/no T-Link) will show three horizontal bars.

Background monitoring will automatically switch between **[SEnSor] [-tESt-]** and **[L----F] [r-----]** as alignment conditions change. Background monitoring checks the sensors and updates the displays every five seconds. Use Alignment mode for continuous alignment setup and testing. Use background monitoring as a guide for starting races; a sensor out of alignment will not stop a race but may indicate a bad time or speed if ignored.

DIAGNOSTICS MENU (Figure 6)

SENSOR ALIGNMENT

All RaceAmerica timing systems have an alignment mode. This is very useful for verifying correct Emitter/Sensor alignment. Wireless systems have alignment checks at each T-Link which continuously displays alignment status with the LED as well as live on the console. After the track layout has been determined and the Sensors and Emitters placed in the proper positions, use T-Link LED status to initially test alignment,then enter alignment mode section within the Diagnostics menu on the console by pressing (asterick, then 5 then pound sign) **[*5#] DIAG ALIGN ENTER** keys to verify correct alignment of START and FINISH (T-Link IDs A&B&C&D). The LED Display momentarily indicates the position of each sensor on the console display with letters representing each emitter/sensor pair **[AA bb] [CC dd]**. The leters indicate each T-Link ID on track where the left letter is the speed sensor and the right letter is the ET sensor, **Start line** sensors are monitored in the top display and **Finish line** sensors in the lower display. The Status Display then changes each digit to a zero for each sensor being monitored **[00 00] [00 00]**. 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 , way out of alignment or not present (a triple bar **[=]** is displayed). 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. It should also be noted that once the zero digit has started counting, it will never stop at zero again unless Alignment Mode is exited and re-entered. This can be helpful for leaving the system in alignment mode for an extended period of time to check on an intermittent condition.

To maximize 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 emitters and track sensors. This will maximize the alignment accuracy.

Remember, the beam emitters and track sensors operate on a 'Line-of-Sight' concept and may require shims if they are installed on a race track 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. Lane width should be between four and fifty feet; eyeball a straight line between the two to get close.

Press the **[#] ENTER** key to exit Align Mode and return to Background Monitoring mode.

NOTE: When beam emitters are powered on, a pink glow can be observed when looking into the emitter from close range; toggle the switch to observe the change (Use caution and look for only brief periods to avoid visual problems). Sensors
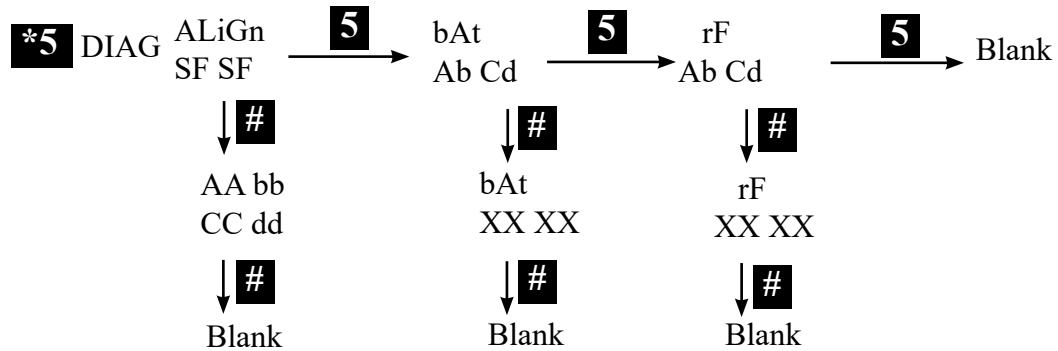
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Figure 6 - Diagnostic Menu, Press ***5 [DIAG]**

get power for an internal red LED when connected to the cable. Checking for this light can confirm power is getting to each sensor.

BATTERY LEVEL

The T-Link battery charge level can be viewed by pressing ***55# and [bAt] [Ab Cd]** will display. The letters represent T-Link IDs. The letters will be replaced by the percentage of battery power remaining. 0 for 0%, 1 for 10%, 2 for 20%, etc and a dash for 100%. Any reading above 40% should be adequate for hours of operation.

Press **# [ENTER]** to return to Background Monitoring mode.

RF INTEGRITY

The T-Link RF signal integrity can be viewed by pressing ***555#** and **[rF] [Ab Cd]** will display. The letters represent T-Link IDs. 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 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 weak. The position of the T-Links and their antennas can be moved to optimize the RF Integrity level. Highly directional flat panel antennas may need to be considered to remedy a high interference location.

Press **# [ENTER]** to return to background monitoring.

SYSTEM MENU (Figure 7)

CONFIGURE PRINT HEADER

The XL Wireless allows a custom four line timeslip print header of up to 39 characters per line. Input is accomplished using character codes for each desired character position (see work sheets). Press ***4 [Shift System] [ConFiG] [HEAdEr]**. Press **# [ENTER]** to view the setup dialog as follows **[L1 C01] [XX00]** indicating Line 1 Character 01; the XX is prompting for the character code for the desired character; refer to the worksheet for the correct code, press **[#]** to move to character 02 **[L1 C02] [YYXX00]** where YY is Character 01 and XX is prompting for character 02; 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 **[*]** to return to background monitoring.

CONFIGURE MENU (Figure 8)

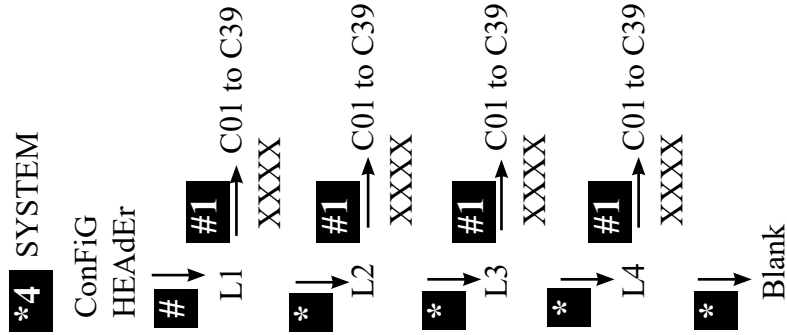Use the Configure menu to enter speed and time differential at start line.

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Figure 7 - System Settings Menu, Press ***4 [SYSTEM]**
Start Line refers to T-Link IDs A & B (A & b),
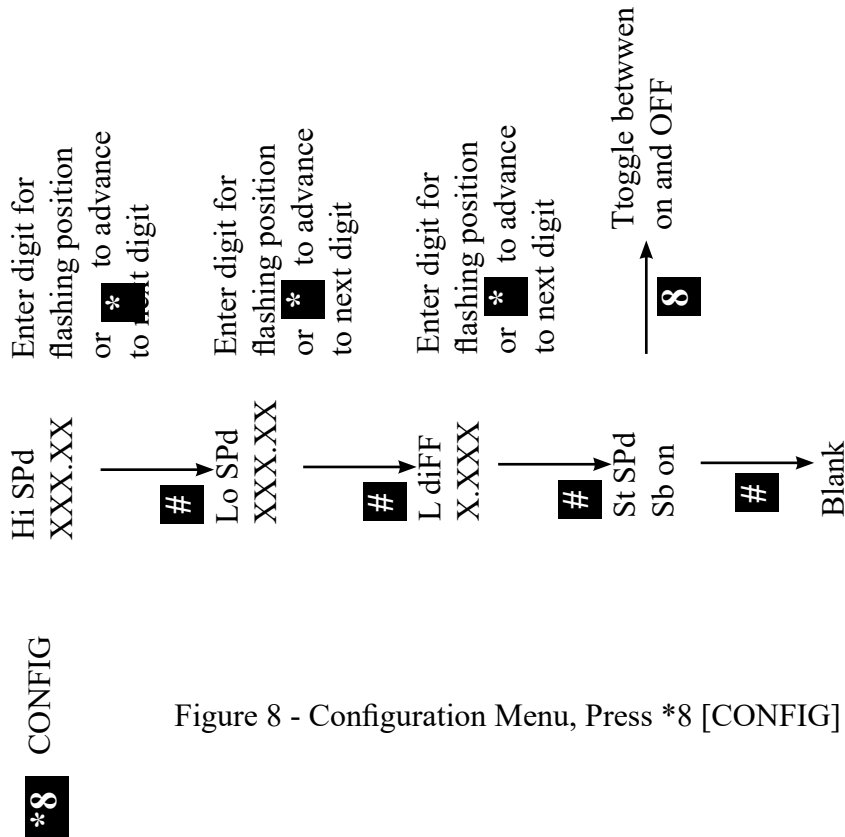Finish line refers to IDs C & D (C & d)

Figure 8 - Configuration Menu, Press *8 [CONFIG]

CONFIGURE RACE

Use the Configure menu to enter start line race parameters. Press ***8** to view the current maximum speed allowed at the start line. **[Hi SPd] [XXX.XX]** is displayed. The flashing digit can be updated by pressing 0 through 9 or the **[*]** to advance to the next digit. Press **[#]** to save the entered value and advance to the minimum start speed. **[Lo SPd] [XXX.XX]** is displayed. The flashing digit can be updated by pressing 0 through 9 or the **[*]** to advance to the next digit. Press **[#]** to save the entered value and advance to the minimum time differential between vehicles crossing the start line. This setting insures vehicles are side-by-side at the start of the run. **[t diFF] [X.XX]** is displayed. The flashing digit can be updated by pressing 0 through 9 or the **[*]** to advance to the next digit. Press **[#]** to save the entered value and advance to the next setting to enable or disable displaying start speeds on LED scoreboards. **[St SPd] [Sb on]** is displayed. Press **[8]** to toggle the setting on and off. Press **[#]** to save all settings.

RUNNING A RACE

The system is now powered on, aligned and configured. Press the **[#] ENTER** key to clear any display condition and show background monitoring.

Press the **[9] CAR #** key to view the current Car numbers; press the **[9]** key again to zero out the existing times and enter new numbers (top display is for left lane and bottom display is for right lane times) input the racers Car numbers. Press the **[#] ENTER** key to accept the new numbers (all zeros is acceptable). This information will appear on timeslips and in data captured in PCs after the race.

Stage the race vehicles by moving them into the Pre-Stage (if present) and Stage beams (Pre-Stage and Stage lights on the Tree come on).

To start the race, press the **[0] RUN** key. The Compliance Lights will flash red/green to confirm start of a run. Once a driver crosses the starting line, they must cross the finish line to complete their run. As the race progresses, the

displays (and connected scoreboards) will display start speeds for each lane if enabled. The timer compares the start speeds of each vehicle to the min/max parameters entered, then compares the time differential at the start line to the entered parameter. The Compliance Displays will display red in each lane if the speed is outside the min/max parameter or green if speed is between the parameters. If the time differential is higher than the set parameter, both Compliance Displays will turn red. When both vehicles cross the finish line, the Display will indicate the finish Speeds and finish Elapsed Times.

After both lanes have completed their runs, if a printer option is present, the selected number of timeslips will print. **[Print] [SLiP]** will display in window after a race when printing is occuring. Additional prints can be made by pressing the **[*7] PRINT** key. If a Scoreboard option is present, the Scoreboard will display the selected information (ET/SPEED).

The Console Display will show the **Left ET** in the upper display and the **Right ET** in the lower display. After each race, the race data can be displayed: Press **[4]** to view start speeds, press **[5]** to view start time differential, press **[7]** to view finish speed, press **[8]**, to view finish ETs.

Race results are available for recall and reprint until the **[0]** key is pressed for a new race.

TIME & COUNT FUNCTIONS

The console and network scoreboards have a provision to set a twelve hour clock and display time on connected scoreboards. Additionally, a 60 minute countdown timer can be used to time breaks in the race action.

To set the time of day, press **[*6] TIME** and enter a valid time of day; press **[#] ENTER** to send the time to the scoreboards. Press **[#] ENTER** again to clear the display and scoreboards. Press **[*6]** to view time on the console. To start the countdown clock, press **[*9] COUNT** and enter a beginning countdown point (e.g. 2000 for 20 minutes), press **[#] ENTER** to send the countdown status to the display and scoreboards; press **[#] ENTER** again to clear the countdown. Press **[*9]**

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to view time remaining on the console.

KEYPAD FUNCTIONS

The Model 2700 Drag System 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:

KEY 0

The **[0] RUN** key is used to start a race.

KEY 4

To display the START SPEED results from the last run, press the **[4] ST SPD** key to display Start Speed results for both lanes; press **[#] ENTER** to clear.

KEY 5

To display the START TIME DIFFERENTIAL results from the last run, press the **[5] DELTA** key to display differential results; press **[#] ENTER** to clear.

KEY 7

To display the FINISH SPEED results from the last run, press the **[7] SPEED** key to display speed for both lanes; press **[#]** to clear.

KEY 8

To display the FINISH ET results from the last run, press the **[8] ET** key to view Elapsed Times for both lanes; press **[#]** to clear.

KEY 9

The **[9] CAR#** key is used to enter the Car number for each lane. Press the **[9]** key to view the current Car numbers; press the **[9]** key again to change the times. Press the **[#] ENTER** key to accept the changes.

KEY*

The **[*]** key is used as a 'SHIFT' key to enter the second key function modes (Yellow type).

KEY

The **[#] ENTER** key is used to accept input values, end races without a finish or clear the Tree.

KEY *0

To manually reset the console, press **[*0]** RESET and be ready to continue.

KEY *3

To set brightness levels on scoreboards used with the 2700rr system. When data is displaying on the scoreboard, press **[*3]** to enter Brightness mode, then press keys 1 thru 8 to set the desired brightness level (1 is brightest, 8 dimmest). Press **[#]** when done. Scoreboards must be firmware level H.x or later. The scoreboards will retain this setting as long as they are powered ON.

KEY *4

Press the **[*4] SYSTEM** key on the Keypad to enter the system configuration menu to set custom header parameters.

KEY *5

To review system diagnostics (Sensor Alignment, Battery Levels and RF Signal Integrity), press **[*5]** to enter the DIAGNOSTIC mode. Repeated presses of the [5] key will cycle between the different sections; press [#] ENTER to monitor the displayed status; press [#] ENTER again to return to system operation. See the section on **ALIGNMENT MODE** earlier in this manual.

KEY *6

Press the **[*6] TIME** key on the Keypad to set the time of day for display on scoreboards used with the 2700rr. The time is maintained until new data is received or the scoreboard is powered on. Scoreboards must be firmware level H.x or later

KEY *7

To manually print the timeslip to the printer, press the **[*7] PRINT** key. This can be done at any time to verify cabling and printer settings; race results in a test condition may all be zeros. Non-RaceAmerica printers connected to the XL Wireless system must be configured for RS232

serial communications, 9600 baud, No Parity, 1 Stop Bit, No Handshake; thsee parameters can be set on the printer (a custom cable may be required).

KEY *8

Press the **[*8] CONFIG** key on the keypad to enter the system configuration section menu to set race parameters and scoreboard usage.

KEY *9

Press the **[*9] COUNT** key on the Keypad to set a countdown timer up to 60 minutes on scoreboards used with the 2700rr. The countdown continues until it reaches zero, new data is received and power is ON. Scoreboards must be firmware level H.x or later.

KEY **2

Press **[**2]** to send test data to scoreboards.

STATUS DISPLAY MESSAGES

During normal operation, messages will appear in the Console 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

This message indicates the system is entering the alignment mode for checking the alignment of the emitter/sensor pairs on the track.

End

This messages indicates all starting vehicles for that pair of lanes have crossed the finish line and the run is over.

OFF

Displays for selection to disable various options.

on

Displays for selection to enable various options.

PC EnAbLE

Displays when PC is in command. Marks PC only functions.

L----F r-----

Background montioring (above indicating the left finish sensor is out of alignment).

SEnSor tESt

Displays when background sensor monitoring is active and all sensors are properly aligned.

Print SLiP

Indicates timeslip data is being sent to the printer ports..

SPEEd

Displays in configuration setup to enable or disable the Speed option. If sensors are not connected to the system, Speed must be OFF.

TROUBLE SHOOTING

Some operational conditions which may cause operational problems or be symptomatic of problems which should be addressed are listed here with solutions.

Alignment problems - Use new emitter batteries; interchange positions of similiar units to isolate specific emitter, sensor or cable problems; disable positions to continue event.

System resets at power-up or when the Tree comes down - Check power supply for low voltage condition; may manifest itself as a generator surging or bogging down; check for adequate wire gauge on long power runs and extension cords.

Scoreboards do not display correct results. After determining the communications are correctly cabled or wired, press **2 from the keypad to display simulated race results. The scoreboards should show 12.345/135.79 for the left lane ET/Spd and 67.890/246.80 for the right lane ET/Spd.

CONNECTING PERIPHERAL DEVICES

The XL Wireless console can be connected to a variety of peripheral devices including PCs, Printers and Scoreboards. The printer is connected via cable or wireless RF data links.

Other peripherals are connected via Wireless RF Links which work best with line of site operation and operate to distances in excess of a quarter mile.

RaceAmerica Scoreboards (models 6828, 6628, 6428, 6810, 6610 and 6410) can be connected with internal wireless units. Scoreboard data is sent immediately and automatically at the conclusion of a race as the data is displayed on the console. Scoreboards contain internal 'smarts' to sort the data string and display the race results (selected by DIP switch settings on each display unit). Choices include Left/Right Lane data, ET, Speed, winner indication (flash winning lane) or alternating between Speed and ET (6828,6628 and 6428 models only). Additionally, eight brightness levels, time of day display and a countdown timer are available for special situations and managing your event.

A printer is a desireable peripheral to print timeslips for the participants. Printers receive a special output format transmitted serially at 9600 baud.

RACE MANAGEMENT SOFTWARE

RaceAmerica XL Score RR Race Management Software can be used to control the Model 2700rr XL Wireless timing sysem to manage the racing action. XLscore RR is PC based software which includes Classes, Driver Registration, Practice, Qualifications, Eliminations Ladder creation (up to 64 cars per class) and status output in HTML format for viewing in networked web browsers. See the XLscore RR manual (part no. 3128RR) for additional details. Some 2700rr functions are not available in PC mode.

WIRELESS FIRMWARE UPDATE

The 2700rr console internal firmware can be updated in the field using a PC Utility program and the wireless network. A wireless link unit on the same optimizer code as the console is required with the PC. If using XLscore RR software, the PC wireless modem will work with the utility software. Follow on-screen instructions with utility to complete the update. Call RaceAmerica for details.

MAINTENANCE

The 2700rr Series Console, Beam Emitters, and Track Sensors do not require any maintenance beyond simple cleaning. Keep your system components dry between uses.

To insure uninterrupted operation on raceday, it is suggested to keep track of battery usage hours so as to have fully charged batteries. T-Link units should be kept at more than 40% charged. Plan to recharge the USB Battery Packs in the Beam Emitters after about 60 hours use. Low battery voltage (Emitters below 4.5VDC) will cause intermittent operation of the system resulting in intermittent cars detected at the starting line or the finish line as the battery power weakens.

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

To minimize race program interruptions, RaceAmerica recommends the purchase of spare parts. A spare emitter/sensor pair and end of track cable sections 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.

```
2700rr Series XL Wireless
       Drag Timing System

    T-Link Wireless Technology

1234        Car Number        9876

Left         by 1.47    WIN   Right

  NO          Redlight          NO

115.26      660 Ft Speed      128.27
9.301        660 Ft Time       8.303

143.45      Vehicle Speed     160.63
14.351       Elapsed Time     13.303

Timing by RaceAmerica's T-Link Wireless
          www.raceamerica.com
```

Figure 9 - Timeslip example

TIMESLIP HEADER

The 2700rr 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				

Figure 10 - 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																																							

Figure 11 - Timeslip Header Character Code Worksheet

7540 - Foam Stand Assembly Instructions
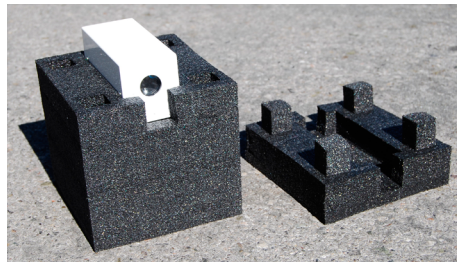

Base Foam   Top Foam

Assembly Components

USB Battery Emitter (5042)
1. Install battery pack.
2. Separate the Base of the Foam Stand from the Top.
3. Place the 5040/5050/5058 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.

Track Sensor (5140)
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.

Outside Dimensions:
    6.5” W x 7.25” L x 7.5” H
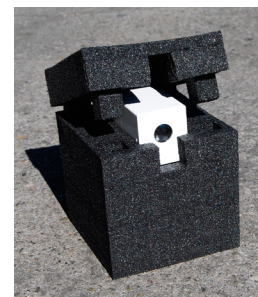
Sensor/Emitter
placement in Foam Base

Sensor back
Note cable routing

Complete Assembly