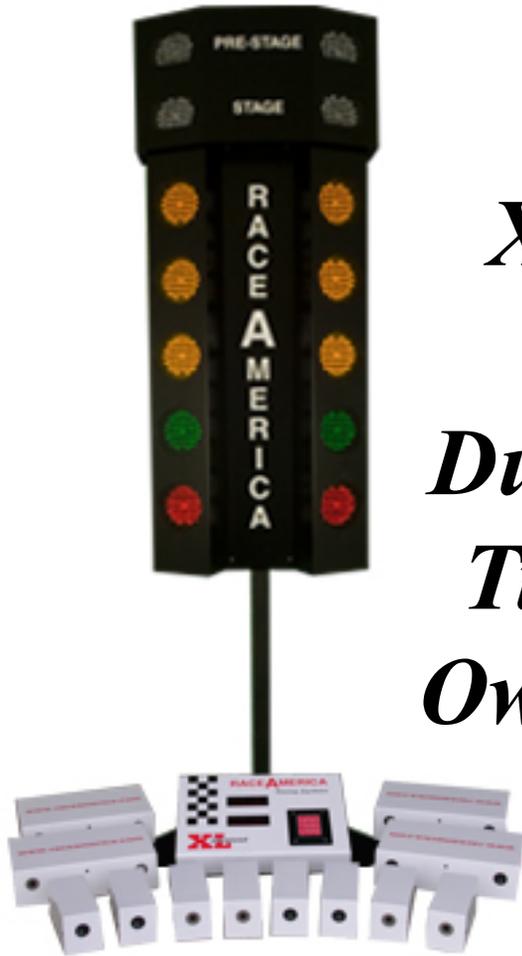


RACE AMERICA

INNOVATION. TECHNOLOGY. RELIABILITY.



2650 Series XL Advanced

Dual Lane Drag Timing System Owner's Manual

Rev Q

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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

THEORY OF OPERATION

The 2650 Series Drag Timers are dual microprocessor controlled completely self-contained race timing systems utilizing the latest CMOS technology circuit components to provide a highly accurate drag 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.

Power is supplied to the timer console and track sensor components from the TREE.

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).

The IR Beam Emitter to Track Sensor transmission operates on Line-of-Sight principles. This makes alignment of the units critical. 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 microprocessor takes control of checking for a valid set of start conditions (expected blocked and unblocked sensors), then starts the lights (with adjustment for Full and Pro formats as well as any bracket or index adjustments) while watching for a start in either lane (a foul start will freeze the tree at the point of foul), records Reaction Time for each lane as the racers start, then watches for subsequent beam interruptions at the 60 foot, Speed and Finish points; after all data is collected, NHRA rules are applied to determine the winner and display this on the TREE and console plus output to PCs, printers and Scoreboards connected to the system. Data includes RT, Redlights, ET, winner indication, Dial in times, breakouts and total time.



DTSS / SST
LED Drag Tree

2650 XL Advanced 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 Advanced system.

- 1 Set up timing system hardware and cabling on race surface
- 2 Power on all 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 timing system at the Tree; observe light sequences for proper power up sequence; press # for Stage status.
- 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. Turn off sensor test for sensors not available (*4 SYSTEM)
- 7 Go into System Config (*8) to set line feeds to eject a timeslip, timeslips to auto print, Pre-Stage light functionality.
- 8 Select PRO or FULL starting lights (3)
- 9 If running brackets on model 2650B, enter Dial-In times (6)
- 10 If printing results or sending to a PC, enter Car # (9)
- 11 Stage racers
- 12 Start race (0) or use optional Starter's Button
- 13 Press # to return to Stage status and clear last race
- 14 Next Race? Go to (8) or (11)

PACKAGE COMPONENTS**The standard Model 2650 XL Advanced dual lane drag package includes:**

1 - 2650 Series Console Unit factory configured ships as follows:

Heads-up (2650H) or Index (2650B) Starts
Speed Trap length of 10', 66' or 20M
Speed display in MPH or KPH
Standard or Custom Timeslip Header

- 1 - 02-2503 Competition 12 VDC Tree w/Stage
- 1 - Base Plate Tree Stand/33" Iron Pipe
- 1 - Owner's Manual
- 1 - Console to Track Cable

- Centerline Cable Option includes:

- 1 -Interconnect Cable for 60'/SPEED/FINISH
- 1-Extension cable section for 1320' cabling
- 2 - 5040B IR Beam Emitters (Finish)
- 2 - 5140D IR Track Sensors (Finish)
- 2 - 5058B IR Beam Emitters (Stage/Start)
- 2 - 5158D IR Track Sensors (Stage/Start)

- Outside Cable Option includes:

- 1 -Interconnect Cable for 60'/SPEED/FINISH (cable is in three sections)
- 1-Extension cable section for 1320' cabling
- 1 - 5042B IR Beam Emitter (Finish)
- 2 - 5140D IR Track Sensors (Finish)
- 2 - 5058B IR Beam Emitters (Stage/Start)
- 2 - 5158D IR Track Sensors (Stage/Start)

With these parts, the system will provide staging, Reaction Time (RT), Elapsed Time (ET) and winner indication for two lanes.

Model 2650 Available Options:

Standard Cabling options:

Centerline - 200', 330', 500, 660', 1320'
Outside - 200', 330', 500, 660', 1320'

- 6013C - 60 Ft Detection - Centerline cable
- 6013D - 60 Ft Detection - Outside cables
- 6020C - Speed Detection - Centerline cable
- 6020D - Speed Detection - Outside cables

Tree Options:

- 02-2512 - DTSS 110/230VAC Professional with Pre-Stage, Stage and Rear Facing Lights
- 02-2734 - SST 110/230VAC Professional with Pre-Stage (Single-Sided Tree)

Staging Options:

- 6026A Dual Beam Staging - add Guard
 - 2-Dual IR Beam Emitters (5054LM/RM)
 - 2-Dual IR Track Sensors (5156LM/RM)
- 6027A Staging Electronics - add Pre-Stage
 - 2-Dual Emitters (5063L/R)
 - 2-Dual Sensors (5163L/R)
- 6023A Pre-Stage Electronics - add Pre-Stage and Guard beams
 - 2-Tri-Beam Emitters (5067L/R)
 - 2-Tri-Beam Sensors (5167L/R)

7540D Foam Stands

06-26SB Starter's Button - 25 foot cable

6038S Dot-Matrix Timeslip Printer Package

6042A Thermal Timeslip printer (with logo)

3122A Custom Timeslip Header

3126A XLscore Data Capture Software for PCs

6528C/6828C/6628C/6624C Single Line Dual Lane Digital Scoreboard (5/8/15/24" digits respectively)

6810C/6610C/6410C Dual Line Dual Lane Digital Scoreboard (8/15/24" digits respectively)

4500B Data Communication PODs (for printers and displays greater than 25 ft from console)

4520A Wireless RF Data Link

6080A Heavy Duty Cable Winders

6085A Standard Duty Cable Winders

6070B Storage/Carry Case

*Pre-stage operates via console program button unless a Pre-Stage start option is available.

LOCAL REQUIREMENTS

Additional items required to operate the 2650 Series timing system package and options:

Batteries for Beam Emitters (see table pg 9)
DC TREE - 12VDC automotive battery

AC TREE -
1 -110VAC 20Amp circuit/230VAC 10Amp
1 - Surge Suppression Power Strip (20A)

Other options:

12VDC source for each printer or Scoreboard
(110/230 VAC with optional adapter)

PRODUCT SPECIFICATIONS

The following listing provides the designed performance specifications for the 2650 Series timing systems:

Start/Finish Lane Width	4 to 50 Feet
ET Timer Capacity	up to 90.000 sec
RT Timer Capacity	up to 9.999 sec
Time Accuracy	0.001 seconds
DC TREE Dimensions	75" X 20" X 20"
DC TREE Weight	~ 45 pounds
AC TREE Dimensions	82" X 20" X 20"
AC TREE Weight	~ 55 pounds
Power Requirements:	
DC TREE	12VDC Source
AC TREE	110 VAC - 20A
AC TREE	230 VAC - 10A
Emitters	AA/C batteries

OPERATION

Track Sensors and Beam Emitter Options

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 (batteries or AC adapters) while the Track Sensors are powered from the cable to the Control Console. The infra-red beam is a coded frequency which is detected by the sensor. Different frequencies are used for different locations in different systems. Beam Emitter voltage should not fall below 4.5 Volts DC while operating.

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 can interrupt the beam. RaceAmerica tries to minimize the impact of these occurrences by requiring multiple short interruptions of the beam to indicate an interruption as well as verification of expected beam conditions before a race is allowed to start.

RaceAmerica Professional Dual Beam Sensors utilize multiple infra-red frequencies due to the close proximity of each sensor to positively insure the correct signal is broken or blocked. This is why track position and orientation is critical.

RaceAmerica Single Beam Staging/Start Sensors (5058B/5158D) operate in both blocked and unblocked modes depending on system conditions. The unblocked mode allows for alignment check. The mode is reversed once a car has staged (blocked the beam) and the system

Beam Emitter and Track Sensor Options

Model 5040/5042 - IR Beam Emitter

Standard



5140D Sensor



5040B Emitter



5042B 5042B
Two-Side Emitter

Used for 60Ft, Speed and Finish track locations. Emitters utilize 4 'AA' batteries each; 5042 uses 'C' batteries (with outside cables)

Standard



5158D Sensor



5058B Emitter

Standard Start Line Sensors and Emitters are used for single beam Stage/Start. Emitters use 4 'AA' batteries each.

6027 Option



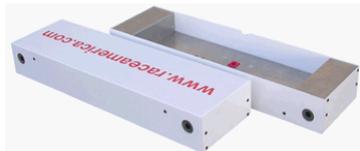
5163L/R Dual Beam Sensor



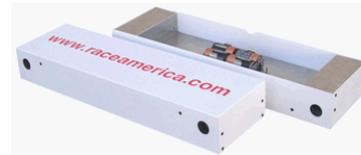
5063L/R Dual Beam Emitter

Add Pre-Stage
Use 4 'C' Batteries for each emitter

6026 Option



5156LM/RM Dual Beam Sensor



5054LM/RM Dual Beam Emitter

Professional Dual Beam Sensors and Emitters add Guard upgrade for ATV and Snowmobile applications. Use 4 'C' batteries for each emitter.

6023 Option



Model 5167L/R - Tri-Beam Sensor



Model 5067L/R - Tri-Beam Emitter

Professional Triple Beam Sensors and Emitters are an upgrade option used to add Pre-Staging and a Guard beam for all applications. Use 4 'C' batteries for each emitter.

is about to start a race. The ET timer for a lane with a blocked beam will start when the beam is re-established as the vehicle pulls away. The beam can re-establish in less than 0.0001 seconds.

RaceAmerica offers several different sensor and emitter models (see Beam Emitter and Sensor models); depending on a variety of requirements. See the table of Sensor/Emitter combinations which operate with the Model 2650 XL Advanced system. In general, non-similar sensor/emitter pairs will not function correctly. All start line sensor options connect to the same Start cable connections; make sure left and right lane positions are correct.



SET-UP STEPS - 2650 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 without stretching the cables all out 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. The Track Sensor Interconnect Cable is configured for connection between the timer console, starting line, and finish line; cable drops are pre-configured for the Tree, a Starter's Button, 60 Foot times and a Speed trap. Track lengths greater than 500 foot will be in two cable

segments; outside cables will join at the starting line. The large round connector connects to the console and the smaller connectors (RJ12) connect to the Track Sensors at the start line, 60 foot, speed trap and finish line as indicated on the cable near each RJ12 connector. Ensure the correct sensor is connected at each position (with the matching emitter opposing it)

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. Layout the Track Sensor Interconnect Cables on the track site as illustrated on the Track Sensors/Cabling Diagram pages based on the options included with the system. Route cables to avoid vehicle and pedestrian traffic. Additionally, avoid running any of the system cables in conduit with 110/230VAC power lines as intermittent failures may occur. Speed Trap sensor spacing is set to the system requirements to record accurate speeds. To help in determining initial beam emitter to track sensor alignment in wide track widths, use a string stretched between the beam emitter and track sensor or eyeball a straight line between units. The system Alignment Mode will be utilized to verify alignment after power-up.

STEP 3 - Assemble the TREE to the base as shown in the setup photos. Multiple base plates may be required for windy racing conditions. Install flood lamps in the AC TREE models.

STEP 4 - Route the cables, place the equipment in position. Connect the Track Interconnect cable. This cable has connector drops for the TREE, all Track Sensor positions (Start, 60 Ft, Speed and Finish), and the Starter's Button.

STEP 5 - Connect cables for optional Starter's Button, Printer(s), PC(s), PODs, Wireless Links and Scoreboards to the appropriate connectors. The system will operate without these options connected. See Connecting Peripheral Devices for details about these options.

Sensor and Emitter operation

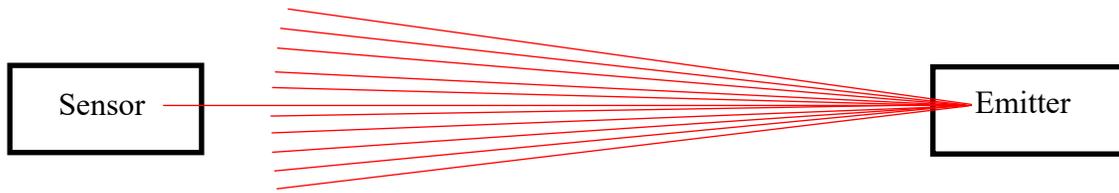


Fig 1 The Emitter throws a spot light like beam of infra-red light; the Sensor should be aligned near the center of the beam for optimal reception and alignment.

STEP 6 - Connect the system to the power source. For the DC TREE, connect the RED (+ or Positive) and BLACK (- or Negative) alligator clips to the 12VDC battery and you're ready to begin. **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.**

For the AC TREE option, connect the TREE to the AC power source. With AC power, a surge

suppression power strip may be required at the TREE to compensate for line voltage fluctuations.

Go to Power-on/Self-test section to familiarize with system operation.

XL Advanced Console Connectors

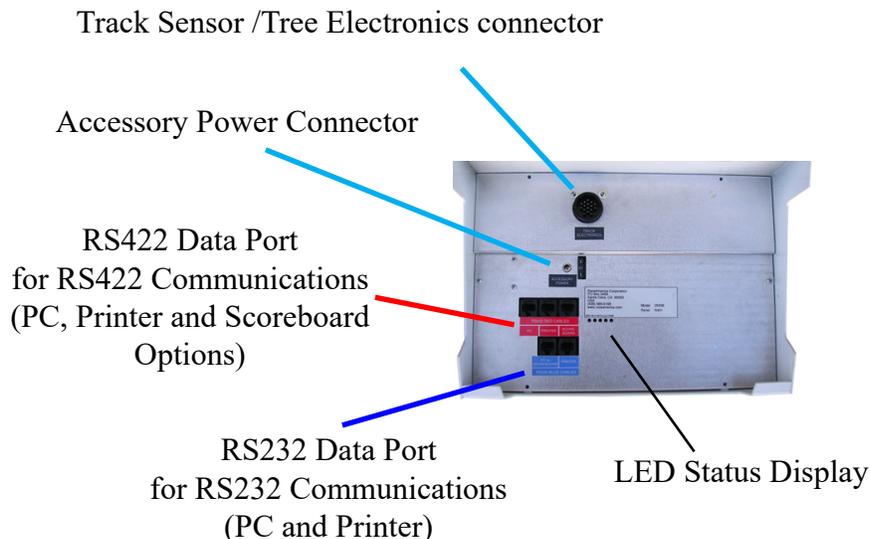


Fig 2 Cable connectors are on the underside of the XL Advanced enclosure.

The DTSS Tree as seen from the back bottom with post stand stored and clamped inside. The removeable Tree Electronics module is shown on the right (actually left side of Tree from the front).



DTSS Tree bottom

Picture below shows the post partially extended. There is an internal stop so the post will not come out too far. Loosen/tighten the clamp nuts on the U-bolt (9/16 in deep socket) at the desired position. Four 1/4-20 wing nuts secure the post to the base.

Post extension



DTSS Tree Electronics

The DTSS Tree Electronics module can be removed for service.

Unplug the Tree before proceeding.

Three screws hold the module - front and back plus left side at the bottom. A #2 Phillips screw driver will handle the job. After the screws are removed, as the module comes out, unplug any cables and antenna cables.

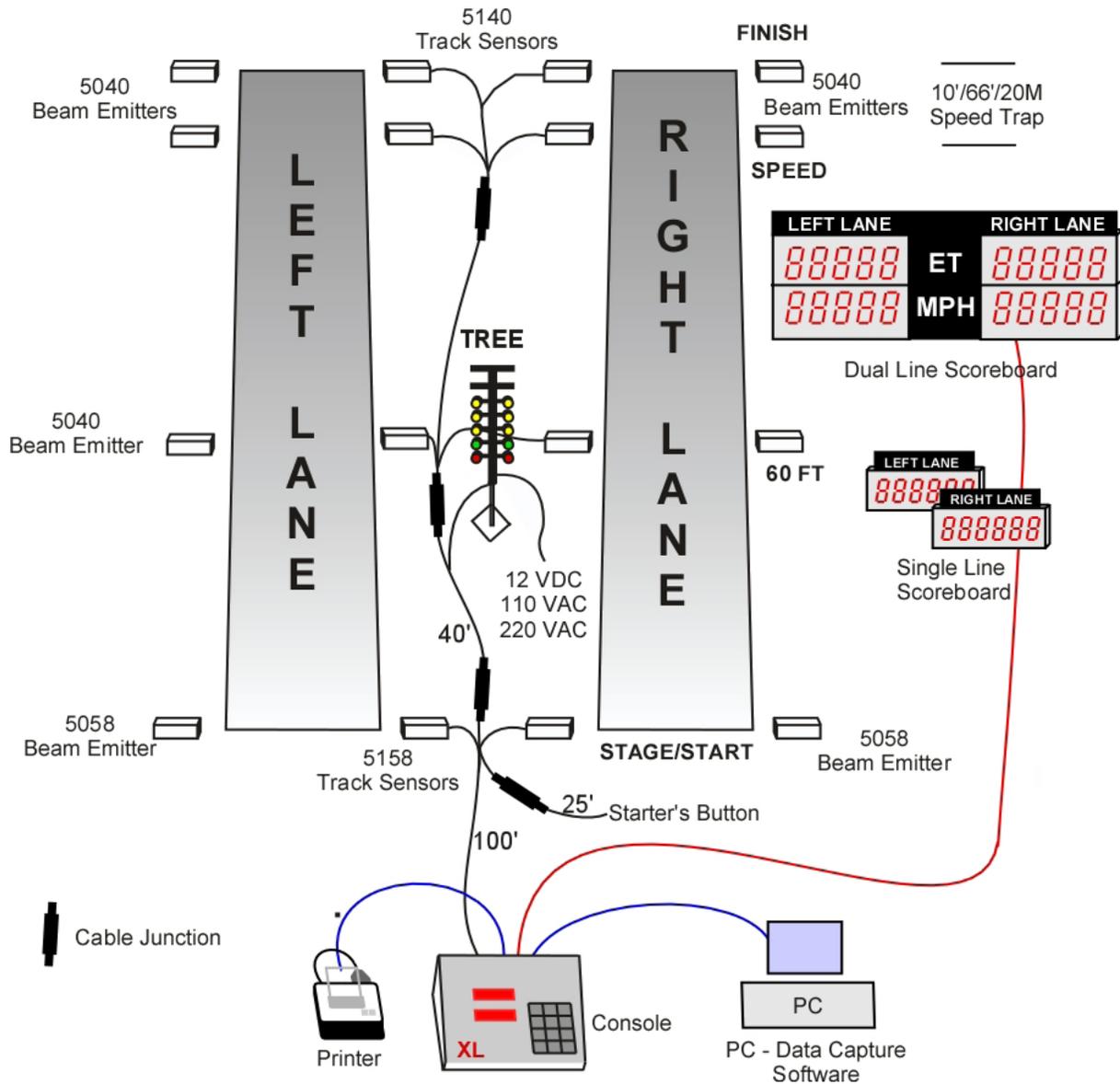
Reassemble in the reverse order



TRACK SENSORS/CABLING DIAGRAM

Fig 3 Centerline cables

Single Beam Stage/Start with Speed Detection



NOTES:

Cable length between XL Advanced console and starting line is 100 feet.

Speed Trap distance is configured in the timer at 10 feet, 66 feet or 20 meters and saved in the system. Connectors for 60 FT and Speed Options are on the cable even if they are not purchased with the system. Unpurchased options must be disabled in the console configuration setup.

Track cable lengths can be from 132' to 1320' as required. Cables can be routed down the center of the track or outside. Lengths of 500 feet or more are broken into segments. Cable winders are convenient for long lengths.

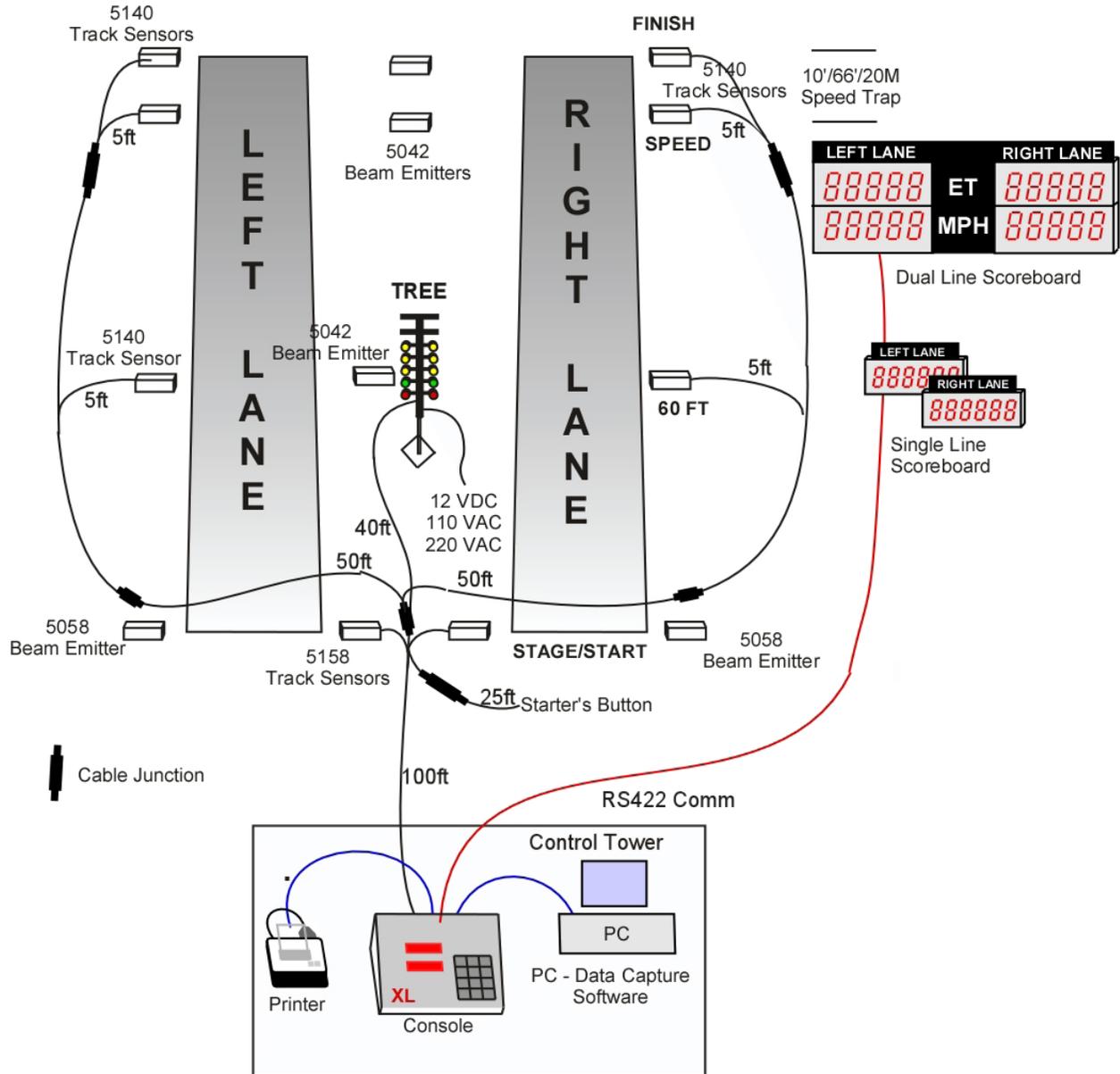
Peripheral devices such as Printers, PCs and Scoreboards can operate up to 25 feet on RS232 communications; conversion to RS422 communications (with 4500A PODs) allows placement at greater distances. Communication to scoreboards is by a RS422 port on the console. Wireless RF Links are also available for remote peripherals.

Pre-Stage and Guard Beam options can replace the standard start sensors and emitters (5158/5058).

TRACK SENSORS/CABLING DIAGRAM

Fig 4 Outside cables

Single Beam Stage/Start with Speed Detection



NOTES:

Cable length between XL Advanced console and starting line is 100 feet.

Speed Trap distance is configured in the timer at 10 feet, 66 feet or 20 meters and saved in the system. Connectors for 60 FT and Speed Options are on the cable even if they are not purchased with the system. Unpurchased options must be disabled in the console configuration setup.

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Pre-Stage and Guard Beam options can replace the standard start sensors and emitters (5158/5058).

POWER-ON/SELF-TEST

Connecting the power to the TREE turns on the system and places the RaceAmerica 2650 Series Timer into a self-test of the microprocessor circuitry, and the ‘Christmas’ Tree. This is an internal test as well as a visual check of the TREE lights. The upper/lower console displays will show [trEE] [tEst 1] thru [trEE] [tEst 5] as the self-test progresses. The upper console display shows the product model number [2650] and the lower display shows the code revision level [A.00] contained within the microprocessor.

The TREE sequences through a lamp test and circuitry test by illuminating the left red lamp and stepping up through the green and yellows, Stage and Pre-stage (Pre-Stage TREE only) on the left side, then on the right side to Stage and Pre-stage (Pre-Stage TREE). This repeats rapidly and then all lamps are flashed once to conclude the self-test. When the tree has completed the self-test display, the system is fully functional and ready for final configuration and setup. If the lights do not follow this sequence or some lights were not illuminated, check for insufficient power, defective bulbs or bad cable connections.

At the conclusion of the self-test, press the **ENTER (#)** key to display the Stage status screen (Fig 5). This is a graphic showing the Pre-Stage

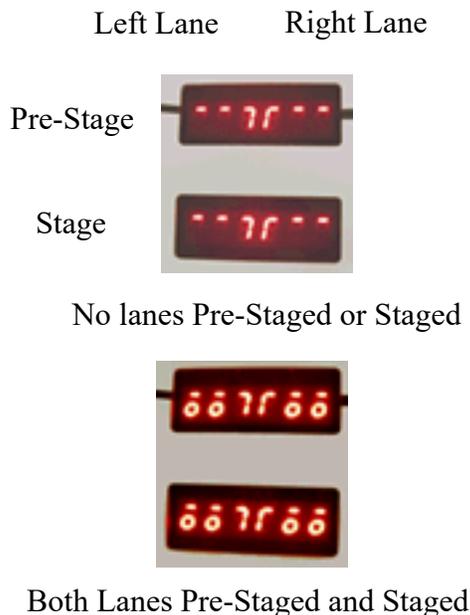


Fig 5 Stage Status Screen

and Stage light positions for both lanes at the top of the TREE. If the Pre-Stage track electronics option is not installed in the system, the Pre-Stage lights will be on until they are reconfigured by the system. Once the system has powered up, the Pre-Stage and Stage sensors are active and indicate a vehicle present when blocked or misaligned.

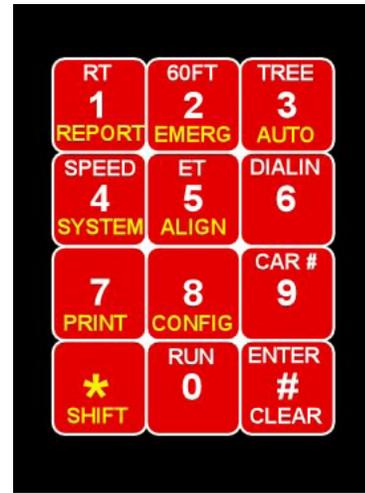


Fig 6 - Console Keypad

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 Advanced Timer Console has two configuration menus:

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

The [*8 CONFIG] Configuration menu includes Tree operation and ET/Total Time selection - settings likely to change each race or class.

The selections made in these menus are 14

2650 rev A.00 Configuration Parameters	
--- Tree Settings	
Pre-Stage Lights	Stage
Tree Input Power	110VAC
Redlights Allowed	First
Perfect RT=0.000	Off
Tree Win Light Pattern	4
--- Printer Settings	
Number of Line Feeds	10
Autoprint copies	1
--- Speed Trap Settings	
Trap Length	66 feet
MPH (USA) or Km/H(Euro)	MPH
--- Track Config Settings	
Total Elapsed Time	ET
--- Track Sensors	
60 foot	Test No
Speed	No
Finish	Yes
--- Timeslip Header	
2650 Series XL Advanced Drag Timing System	
dp Dual Processor Timing System	

Fig 7 - Printout of Configuration Parameters
Press [*1] [REPORT]

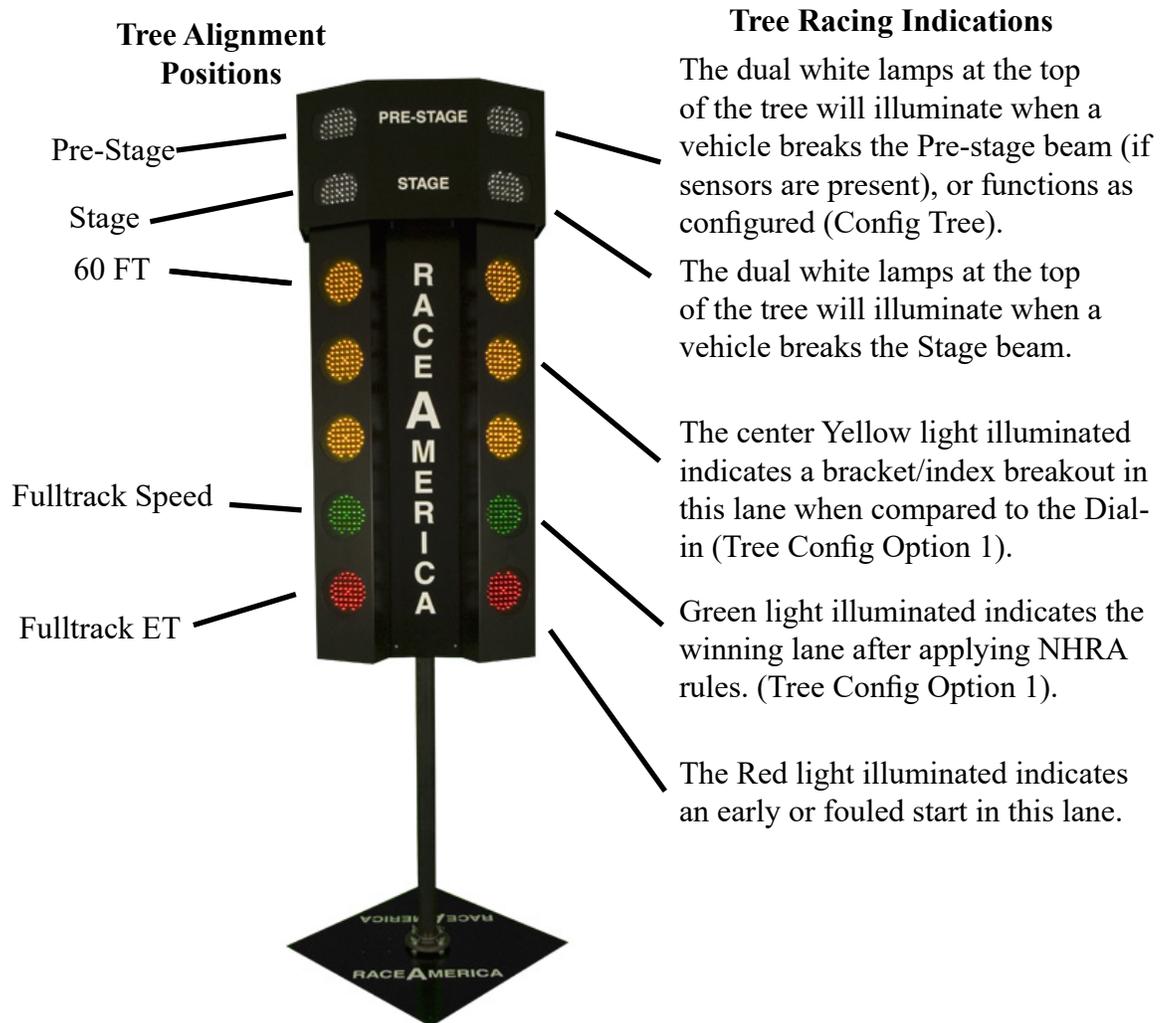
saved - even when power has been turned off. The system configuration selections can be printed by pressing *1 [REPORT] on the keypad (Fig 7).

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

SENSOR ALIGNMENT

All RaceAmerica timing systems have an alignment mode. This is very useful for verifying correct Emitter/Sensor alignment.. After the track layout has been determined and the Sensors and Emitters placed in the proper positions, enter alignment mode section by pressing the [*5] **ALiGn ALIGN** keys to verify correct alignment. Alignment conditions also display on the Tree as shown in the definitions of Tree Lights picture. The LED Display momentarily indicates the position of each sensor on the console display with letters representing each emitter/sensor pair [SS-6SF]. The digits indicate Pre-Stage, Stage, 60 foot, Speed and Finish respectively. Left lane sensors are monitored in the top display and Right lane sensors in the lower display. The Status Display then changes each digit to a zero for each sensor being monitored [00-000]. If the Beam Emitter and Track Sensor are operating properly and aligned, the '0' digit will not change and the Tree lights will be OFF. 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 and the corresponding Tree light will be on or flickering. Once the emitter/sensor pair are aligned properly, the digit will stop counting and the Tree light will go out. If the alignment is off a little or intermittent, the digit for that emitter/sensor pair will count when they float out of alignment. Note that the Pre-Stage position is always active on the Tree. 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

DEFINITIONS OF THE TREE LIGHTS



The Tree displays sensor alignment by illuminating a bulb for each sensor position when in alignment mode (left legend).

The Tree also displays a full variety of information during racing activity (right legend).

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 Alignment Mode and return to Stage status mode.

If optional Dual-Beam (Stage with Guard beam) or Tri-Beam Start Line Track Electronics were purchased to add the True Guard Beam and Pre-stage beams to the Stage at the starting line, follow this alignment technique to properly align all beams.

If optional Guard beams are present, position the Dual/Tri-Beam Emitters and Sensors on the track and connect the start line cables as outlined in the timing system hardware manual. Power on the timing system and enter into alignment mode. Align the Pre-stage beams as usual and confirm Pre-stage beam alignment and operation. Next block the Stage beam on either the Dual/Tri-Beam Emitter or Sensor. With the Stage beam blocked, the Stage light on the tree will illuminate when the Guard beam is properly aligned. Rotating the Dual/Tri-Beam Sensor left or right on the track will cause the Guard beam to go out of alignment and the Stage light on the tree

to go out. Position the Dual/Tri-Beam Sensor so the Pre-stage beam and the Guard beam are fully functional. This can be tested by blocking and unblocking the Pre-stage (if present) and Guard beams. Unblock the Stage beam and the Stage light on the tree will go out. If the Stage beam does not go out, fine tune the positioning by slowly rotating the Dual/Tri-Beam left or right until the Stage light goes out. Recheck the Pre-stage and Guard beams for alignment.

To final check all three beams are properly aligned, block the Pre-stage beam and the Pre-stage light on the tree will illuminate. Block the Stage beam and the Stage light on the tree will illuminate. With the Stage beam blocked, block the Guard beam also and the Stage light on the tree should go out.

If all three beams are not aligned, check the parallel position of the Dual/Tri-Beam Emitter then repeat the Dual/Tri-Beam Sensor alignment process on the above rotating the Dual/Tri-Beams in smaller increments left or right, up and down.

SYSTEM MENU (Fig 8)

CONFIGURE SENSOR TEST

Select the sensors to be tested after a start request is sent to the tree and before the tree comes down; the Finish sensors are always checked. Press *4 [Shift System] [ConFiG] [tESt]. Press # [ENTER] to view the current selection for 60 ft sensors [60 Ft] [on]; press [4] to toggle to the opposite selection; press [#] **ENTER** to accept a choice and move to Speed [SPEED] [OFF]; press [4] to toggle to the opposite selection; press [#] to accept a choice and return to the main menu.

CONFIGURE TIMESLIP PRINTER

The number of timeslips to automatically print and the number or line feeds to eject a timeslip to tear it off.

Press *44 [Shift System] [ConFiG] [Print]. Press # [ENTER] to view the current selection for Printer Line feeds [LF] [10]; enter a new number using the keypad; press [#] **ENTER** to accept the

*4 SYSTEM

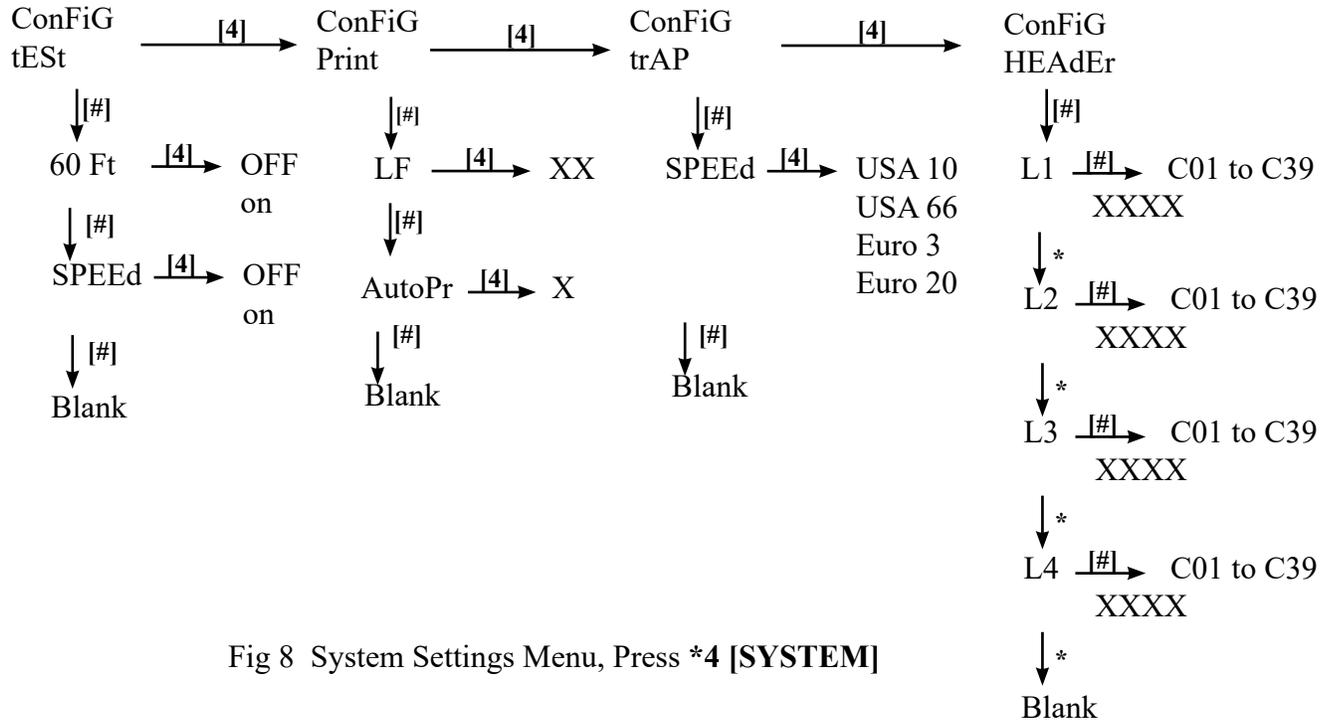


Fig 8 System Settings Menu, Press *4 [SYSTEM]

number; next [AutoPr] [1] will show indicating the number of timeslips to autoprint (blinking digit); press a number on the keypad (0-9) for the desired number of copies; press [#] ENTER to save and return to the main menu.

CONFIGURE SPEED TRAP

Select the speed trap length to be used.

Press *444 [Shift System] [ConFiG] [trAP]. Press # [ENTER] to view the current selection for Speed Trap, cycle through [trAP] [USA10] for 10ft MPH trap, [trAP] [USA66] for 66ft MPH trap, [trAP] [Euro3] for 3 meter Km/PH trap, and [trAP] [Euro20] for 20 meter Km/PH trap by repeatedly pressing [4], press [#] [ENTER] to accept the selection and return to the main menu.

CONFIGURE PRINT HEADER

The XL Advanced 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 *4444 [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 the main menu.

CONFIGURE MENU (Fig 9)

CONFIGURE TREE

Use the Configure menu to select Tree functions, results to be displayed and how they are calculated. Press *8 [Shift ConFiG], [ConFiG] [tree]. Press # [ENTER] to view the current selection for use of Pre-Stage lights [PrE-St] [on] which means Pre-Stage is ON and will function

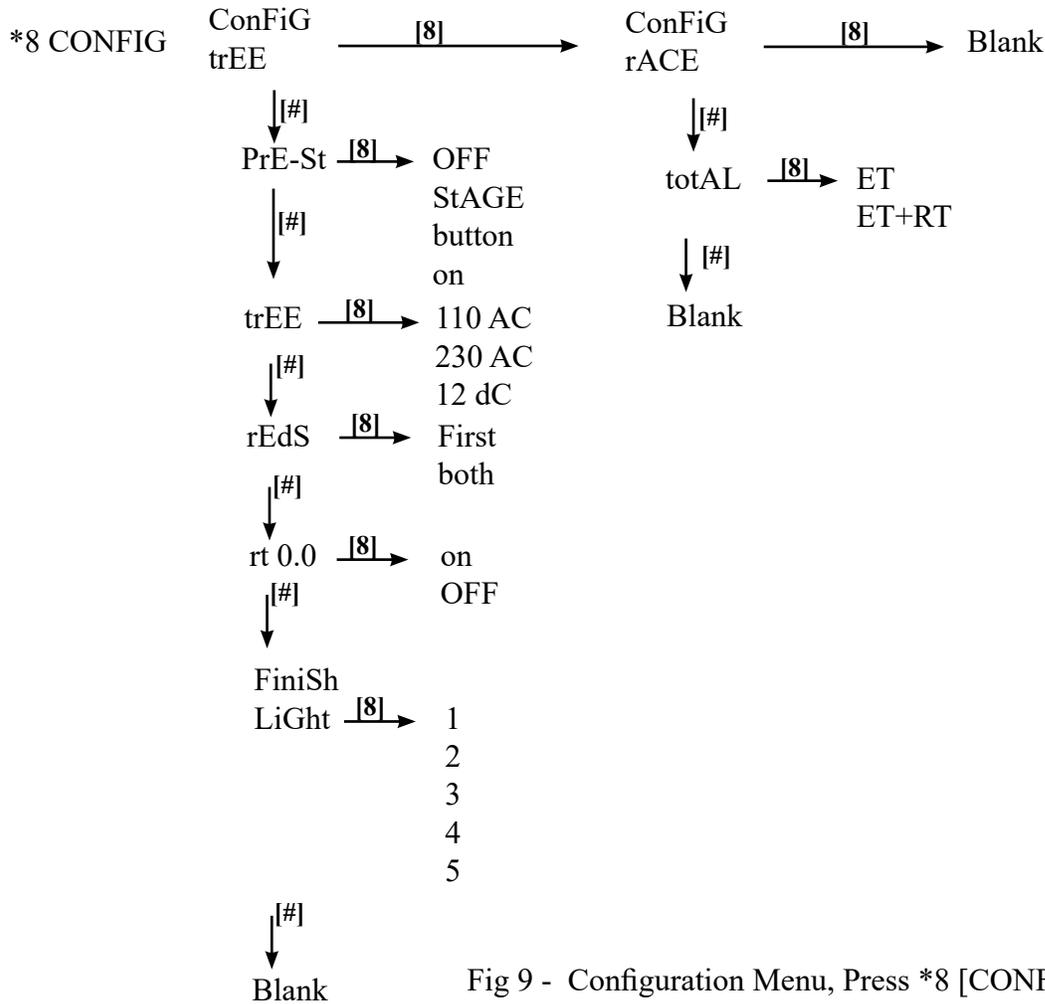


Fig 9 - Configuration Menu, Press *8 [CONFIG]

with the track electronics option; repeated presses of the **[8] CONFIG** key cycles the lower display through the other options. These include **[OFF]** which deactivates all Pre-Stage display, **[StAGE]** will turn on the Pre-Stage lights with the Stage lights, **[button]** will turn on the Pre-Stage lights the first time the **[0] RUN** key (or Push-button) is pressed to manually control the Pre-Stage lights. This is useful to tell the next set of drivers to come to the line. **[On]** will set Pre-stage to operate independently. Press the **[#] ENTER** key to accept the desired condition and move to power source **[trEE] [110 AC]**; press **[8]** to view **[trEE] [230 AC]**; press **[8]** to view **[trEE] [12 dC]**; press **[#]** to select the correct tree voltage and move to red lights to be displayed **[rEdS] [FirSt]** to display

only the first lane to redlight. If both lanes redlight, press **[8]** to cycle to **[rEdS] [both]**. Press **[#]** to move to Reaction Time (RT) reporting **[rt 0.0] [Off]**. Select **[OFF]** to use the 0.400/0.500 reporting from the last yellow or select **[On]** to report RT from the Green light (positive or negative); press **[#]** to select the winning lane lights to display **[FiniSh] [LiGhtX]** where five choices for **X** (1-5) can be selected. Choice '0' does not indicate winner on the tree. Choice '1' displays winning lane, redlights and breakouts; choices '2-5' have five second animated winning lane displays only (go ahead, check 'em out); press **[#]** to go to the main menu.

Use the Configure menu to select finish location (full-track or half-track) and how times are calculated (ET or ET+RT). Press ***888 [Shift ConFiG], [ConFiG] [rACE]**. Press **# [ENTER]** to view the current selection for total ET time reporting **[totAL] [ET]**; press **[8]** to toggle to **[Et rt]**; press **# [ENTER]** to make the desired selection and return to the main menu.

At this point the timer is ready to time the first run. It might be a good idea to recheck the sensor alignments after changing any configurations and to print the configuration parameters (*1).

RUNNING A RACE

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

Races can be run in a console key start (or optional push-button) mode or the system can be set to automatically start races in an unattended mode.

NOTE: When operating the system in the auto start mode, extra care must be taken to keep the race track continuously clear of vehicles since another racer can start at almost any time.

Next, race parameters for starting light sequence (Pro or Full), Dial-in times and Car numbers can be entered if time slips are to be printed or data capture software will be collecting race results. Select the desired starting sequence (Pro or Full) by pressing the **[3] TREE** key; the current Dialin/Crosstalk and Tree will show as **[di Ct] [Full .5]**. 'di' indicates a non-zero Dialin is currently entered (**[6]** key); 'Ct' means Crosstalk is active (by definition, Crosstalk only affects Full tree starts). Press **[3]** repeatedly to cycle through the other Tree options - **Pro .4, Full .4, Pro .5** - selecting the desired light by pressing **[#] ENTER**. After a selection, the display will show the current Crosstalk setting **[Ct] [OFF]**; press **[3]** to toggle to turn Crosstalk on; press **[#] ENTER** to close out Tree selections.

The PRO format turns on all yellows then green at a 0.400 or 0.500 second interval. The FULL or SPORTSMAN format turns on each yellow, then green at 0.500 or 0.400 second intervals.

The Crosstalk option is similar to the NHRA Crosstalk function and is enabled for bracket racing under a FULL starting tree. When the slower vehicle's top yellow light illuminates on the tree, the top yellow in the other lane will also illuminate. The slower lane's yellows will illuminate in sequence as usual while the other lane's top yellow will remain illuminated until that lane's bracket advances to the next yellow. When Crosstalk is OFF, the tree starting sequence is not altered from normal starting sequences.

Each stored configuration remains the starting settings until changed; this includes Car number and Dial-ins.

CONSOLE KEY START

If running brackets, press the **[6] DIALIN** key to view the current Dial-in times; press the **[6]** 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 Dial-in times. Press the **[#] ENTER** key to accept the new times (all zeros will be heads-up format). Bracket racing is a form of handicapping where the expected Elapsed Time is entered for each racer, the starts are adjusted so both racers with perfect reaction times and both run their Dial-in, they will finish at the same time. If either racer runs faster than their Dial-in time, they 'Breakout' and this will be displayed after the race by illuminating the middle yellow light on the Tree if Finish Light sequence [1] was selected; it will also print on the timeslip.

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 system will automatically check the alignment of selected test sensors and emitters prior to starting the Tree. If the alignments are all good after the **[0]** key was pressed, the Tree will begin the starting light sequence. If a driver interrupts the starting beam prior to the green lamp illuminating in that lane, the starting sequence will stop for that lane, freezing the tree and illuminating the red/yellow lamps indicating a redlight start in that lane. Once a driver crosses the starting line, they must cross the finish line to complete their run. The Tree will continue to illuminate the red or green lamps until both lanes have crossed the finish line (or only one lane crosses the finish line in the case of a BYE run). When both vehicles cross the finish line, the Display will indicate the Elapsed Times or Total Times (ET or ET+RT if selected).

After both lanes have completed their runs, the Tree will display the redlight conditions of each lane if Finish Light sequence [1] was selected. The selected Finish Light sequence will be illuminated for the winning lane after applying NHRA rules for reaction time, breakouts, redlights, and first to cross the finish line. 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 occurring. 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/MPH/RT).

The Console Display will show the **Left ET** in the upper display and the **Right ET** in the lower display; a box **[o]** to the left of one ET indicates the winning lane. After each race, the race data can be displayed: Press **[1]** to view Reaction Times, press **[2]** to view 60 ft times; press **[4]** to view ET.

If an emitter/sensor pair were out of alignment when the **[0]** key was pressed, the console will display **[SS-6SF] [SS-6SF]** in the LED displays and flash the offending emitter/sensor pair(s). Pressing the **[*5] ALIGN** keys will enter alignment mode and the problem can be corrected by re-aligning the emitter/sensor pair. If sensors

or emitters are damaged and there are no spares available, options such as 60 foot and Speed can be turned off (no start test) and the sensors used on required positions (Finish).

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

Dial-in racing is started by pressing the **[6] DIALIN** key on the Keypad to display current Dial-ins, then press **[6]** again to enter the Dial-in for the Left and Right lanes; the next start will apply the appropriate differential to the starting sequence of the race. At the end of a Dial-in race, the Tree will additionally indicate a bracket breakout if one occurs on either lane by illuminating the center yellow light if Finish Light sequence [1] was selected. Dial-in selections can be checked by pressing the **[6]** key.

NOTE: As a general rule, if the Tree has a green

2650 Series XL Advanced Drag Timing System			
dp Dual Processor Timing System			
Left	by 1.256	Right	
1234	Car Number	WIN	9876
9.301	Elapsed Time		8.303
82.45	Vehicle Speed		92.63
0.955	Reaction Time		0.697
NO	Redlight		NO
0.000	Dial-in/Index		0.000
NO	Breakout		NO
2.813	60 Ft Time		2.931
Timing by RaceAmerica Corporation www.raceamerica.com			

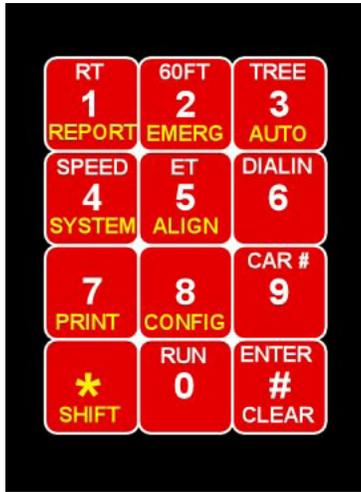
Fig 12 - Timeslip example

or red lamp illuminated, one of the lanes has not completed its run and crossed the finish line. The [#] ENTER key must be pressed by the operator to end the race and capture the data up to the point of the problem.

AUTO START

If you wish to use the Auto Start feature of the 2650 system, press the [*3] AUTO key to switch to the unattended mode. The console display will show [Auto] [run]. When either lane moves into the Stage beam, the display will begin a seven second countdown [Auto] [run 7], [Auto] [run 6]....[Auto] [run 1] to [Auto] [StArt] at which point the tree comes down. At the end of the race, results are displayed, printed and/or sent to connected PCs and scoreboards. Results will stay in the display until another Stage is detected. All other functions of the manual starts are similar; if one or both racers do not finish after starting, the console [#] ENTER key must be pressed. By its nature, Auto Start does not use brackets (dial-ins). Press [#] ENTER to leave Auto Start mode and return to console key starts.

NOTE: When operating the system in the auto start mode, extra care must be taken to keep the race track continuously clear of vehicles since another racer can start at almost any time.



Model 2650B Keypad (Dial-ins)
On the Model 2600H, the Dial-in function is not available.

KEYPAD FUNCTIONS

The Model 2650 Drag System ships configured either for Heads-up (2650H) or Dial-in (2650B) options.

The Model 2650 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 1

To display the RT results from the last run, press the [1] **RT** key to view Reaction Times for both lanes; press [#] to clear.

KEY 2

To display the 60 ft ET results from the last run, press the [2] **60FT** key to view 60 ft ETs for both lanes; press [#] to clear.

KEY 3

Press the [3] **TREE** key to view the currently selected starting tree; press [#] **ENTER** to accept. Repeated presses of the [3] **TREE** key cycles through the available starting light sequences:

PRO 400	(standard)
FULL 400	(optional)
PRO 500	(optional)
FULL 500	(standard)

A PRO Tree illuminates all yellows, then Green at the selected interval; a FULL Tree (also known as SPORTSMAN Tree) illuminates each yellow, then green at the selected intervals. Press # [ENTER] on the desired choice and move to Crosstalk selection. Repeated presses of the [3] key cycles between OFF and on. Press [#] when the desired choice is displayed.

KEY 4

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

KEY 6

The [6] **DIALIN** key is used to enter the bracket or index for each lane on the 2600B dual lane system. Press the [6] key to view the current Dial-ins; press the [6] key again to change the times. Press the [#] **ENTER** key to accept the changes.

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 [#] **ENTER** key is used to accept input values, end races without a finish or clear the TREE, and returns to the Stage Status display

KEY*

To display the 60 Foot time results from the last run, press the [*] **60FT** key to display 60 Foot times for both lanes; press [#] to clear.

KEY *1

To print the system configuration report, press [*1] **REPORT**.

KEY *2

To put the system in a 'hold' situation and indicate such to the racers, press [*2] **EMERG** to indicate some form of emergency, press [#] to return to the main menu.

KEY *3

To put the system in Auto Start mode, press [*3] **AUTO** to allow races to start without operator control, press [#] to return to the main menu and exit Auto Start mode.

KEY *4

Press the [*4] **SYSTEM** key on the Keypad to enter the system configuration menu to set test, print, speed trap and custom header parameters. See Fig 8 for the full menu.

KEY *5

To check or monitor the alignment of the IR Track Sensors and Beam Emitters in all four lanes, press the [*5] **ALIGN** key to enter alignment mode. See the section on **ALIGNMENT MODE** earlier in this manual.

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 Advanced system must be configured for RS232 serial communications, 9600 baud, No Parity, 1 Stop Bit, No Handshake; these 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 Tree, Data Display and race finish point. See Fig 9 for the full menu.

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

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

AutoPr

Displays in the upper display during configuration for the number of timeslips to auto print after each race.

DiAL-in

Displays in upper display when selecting the starting Tree format if a Dial-in other than zero is entered.

End

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

Full

Full (Sportsman) starting format Tree is selected.

LF

During configuration of the printer, the user is prompted to enter the desired number of line feeds to be added to each timeslip to properly eject the paper for tearoff from the printer.

OFF

Displays for selection to disable various options.

on

Displays for selection to enable various options.

PrE-St

Displays in the upper display during configuration or Pre-Stage functionality.

PS-6SF

When entering Alignment Mode, this message will appear in sequence to indicate the alignment of the Track Sensors and Beam Emitters will be continuously monitored and the results displayed; left lane in upper display, right lane in lower display.

Print SLiP

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

Pro

PRO starting format Tree is selected.

button

Appears in Pre-Stage configuration; selection will allow the starter or race director to press the [0] RUN key to turn on the Pre-Stage lights to call the racers to the line, the next press of the [0] key starts the Tree.

SPEEd

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

StAGE

Appears in the Pre-Stage configuration; selection of Stage will turn on the Pre-Stage lights when the Stage lights come on as a vehicle stages.

60 Ft

Displays in configuration setup to enable or disable the 60 Ft option. If sensors are not connected to the system, 60 Ft must be OFF.

CONNECTING PERIPHERAL DEVICES

The XL Advanced console can be connected to a variety of peripheral devices including PCs, Printers, Scoreboards and a Starter's Button. These devices can be connected via cable or wireless RF data links.

The **Starter's Button** (06-SB26) connects to the cable connector at the starting line. The Starter's Button functions exactly as the **[0] RUN** console key and in parallel with it.

For other peripherals, RaceAmerica provides several choices and make connection simple and easy to understand. For each race, run results are compiled and sent to peripheral device ports such as Printers, Scoreboards and PCs in formats each can understand. Further, this data is sent in RS232 communications protocol for short distances (<100') and in RS422 communication protocol for greater distances. RaceAmerica color codes cables to keep these two protocols separate - blue for RS232 and red for RS422 help track operators plug cables into the correct data ports on the console and peripheral devices. New wireless RF Link communications can be substituted for either of the data formats to eliminate the cables and communication PODs. Wireless RF Links work best with line of site operation and operate to distances in excess of a quarter mile.

RaceAmerica Scoreboards (models 6528, 6828, 6628, 6428,6810,6610 and 6410) can be connected directly to the system via the RS422 data port. A RS232/RS422 communications POD is required at the Scoreboard to convert the data to RS232 format for display. The 4500A communication PODs are used to convert data between RS232 and RS422 formats. Generally, RaceAmerica provides power to the PODs from the RS232 device it is closest to (via the cable 07-4554).

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, RT, winner indication

(flashing one lane) or alternating between Speed and ET (6528, 6828,6628 and 6428 models only).

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

Race results can be sent to a PC with a serial port via either either protocol. RaceAmerica's XLSCORE software can receive the race results, add logic (such as driver's names, class, event date) and save to a file or print locally with a local printer. For communication to PCs, a RaceAmerica 06-PC05 cable will be required. If communication PODs are used, the POD will require a separate 9VDC power source at the PC.

For long length RS422 communications, a 07-3434 cable will be required. These are available in standard and custom lengths for any application.

If using wireless RF links, special cables will be required to connect between the console or peripheral device and the wireless RF link unit. RF link units are mounted in clear air away from sources of interference.

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 similar units to isolate specific emitter, sensor or cable problems; disable positions to continue event.

Tree Light says ON/OFF - Using Alignment Mode, switch sensors to isolate the problem to the tree, cables or sensors.

Intermittent flickering of tree lights - check power supply for momentary over voltage condition.

System resets 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 cable gauge for long power runs.

Q-Mile Speed/ETs give false/very low values - Symptomatic of low voltage or insufficient current as the Tree comes down. Try disconnecting bulbs on back of tree; check power cable for gauge/distance from source.

MAINTENANCE

The 2650 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. 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 4.5VDC) will cause intermittent operation of the system resulting in intermittent cars detected at the starting line or the finish line as the batteries 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.

TIMESLIP HEADER WORKSHEET

The 2650 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				

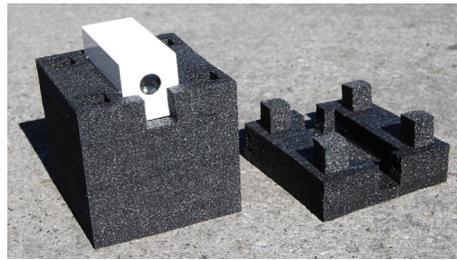
Fig 14 - Timeslip Header Character Codes

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					
Printed Character																																												
Character Code																																												
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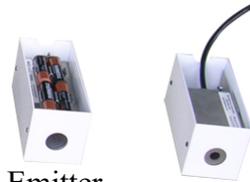
Fig 15 - Timeslip Header Character Code Worksheet

7540D - Foam Stand Assembly Instructions



Base Foam

Top Foam



Emitter

Sensor

Assembly Components

'AA' Battery Emitter (5040B, 5050B & 5058B)

1. Install batteries and turn on the Emitter.
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 their alignment with the corresponding Base holes. Place on the track.



Sensor/Emitter placement in Foam Base

Track Sensor (5140D & 5158D)

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 their alignment with the corresponding Base holes. Place on the track.



Sensor back
Note cable routing

'C' Battery Emitter (5042B)

1. Same as above except place the 'C' Battery pack in the Base standing on its edge.

For additional stability

1. Place weight in the Base well as required.

Outside Dimensions:

6.5" W x 7.25" L x 7.5" H



Complete Assembly

REVISION HISTORY

- A - Original release
- B - Added pic of 5042
- C - Corrected 60ft cabling diagram
- D - 09/04 - to the Stage Keypad to red; rev history to pg 23
- E - 07/05- add Guard beam alignment addendum
- F - 08/05 - metal sensors/emitters + Foams + Quik Start
- G - 04/06 - Delete display of RT after both lanes start
- H - 05/06 - Add cable dimensions on track layout diagrams + modify foam stand instr.
- J - 10/06 - Convert to InDesign plus part number corrections.
- K - 02/07 - New console decoration photos - checkered flag look
- L - 07/07 - Dual processor board, model to 2650, new features
- M - 09/07 - add Auto Start *3 control
- N - 11/07 - Foam Stand B to C
- O - 12/08 - Correct Config Parameter printout (re. ET)
- P - 04/15 - Replaced tree with DTSS, Foam Stand C to D