



INNOVATION. TECHNOLOGY. RELIABILITY.

Model 5432E
Display Timer
Owner's Manual

Rev B



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LIMITED WARRANTY

To the original purchaser of this RaceAmerica product, RaceAmerica warrants it to be in good working order for a period of ninety (90) days from the date of purchase from RaceAmerica or an authorized RaceAmerica distributor. Should this product malfunction during the warranty period, RaceAmerica will, at its option, repair or replace it at no charge, provided the product has not been subjected to misuse, abuse, or alterations, modifications, and/or repairs not authorized by RaceAmerica.

Any product requiring Limited Warranty service during the warranty period should be returned to RaceAmerica with proof of purchase. If return of merchandise is by mail, the customer agrees to insure the product, prepay shipping charges, and ship the product to RaceAmerica, Inc., 280 Martin Avenue Unit 1, Santa Clara, CA 95050.

ALL EXPRESSED AND IMPLIED WARRANTIES FOR THIS PRODUCT ARE LIMITED IN DURATION TO THE ABOVE NINETY DAY PERIOD.

UNDER NO CIRCUMSTANCES WILL RACEAMERICA BE LIABLE TO THE USER FOR DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, SUCH PRODUCT.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.



5432E Twenty-four Inch Display Timer

PRODUCT OVERVIEW

The Model 5432E twenty-four inch digital Display Timer is a micro-processor controlled system based upon the 7-segment format display digit using the latest technology Ultra-Bright LEDs. The 5432E Display Timer is a standalone integrated Timer and Digital Display with live running time. Model 5140 Infra-red Track Sensors located on the race track relay start and stop signals to the 5432E for timing purposes. The system operates on simple push-button operation for Reset (Clear) and Sensor alignment or via optional wireless control. Output can be captured with PC Control software via a wireless transceiver.

RaceAmerica offers Display Timers in five, eight, fifteen and twenty-four inch digits. The display is viewable at wide angles and in full sun. The Sensors operate in a wide range of conditions from total darkness to full sun and are available with operational ranges of 50', 75' and 250'.

A wireless option allows a PC to control the timer and receive the data.

NOTE: THIS PRODUCT USES ULTRA-BRIGHT LED TECHNOLOGY. DUE TO THE BRIGHTNESS LEVEL OF THIS DISPLAY, CARE SHOULD BE TAKEN, AS WITH ANY BRIGHT LIGHTING SOURCE, TO AVOID PROLONGED VIEWING AT CLOSE RANGE AND SHORT DISTANCES. AS WITH ANY BRIGHT LIGHTING SOURCE, VISION MAY BE AFFECTED SHORT TERM SIMILAR TO CAMERA FLASHES.

THEORY OF OPERATION

The Model 5432E Large Display Timer is a standalone elapsed time (separate start and finish points) timer and large digital display with an

interconnect cable to connect the Infra-red Sensors and the hand-held push-button. The display timer contains an alignment mode to insure alignment of the sensors to the respective emitters at each location on the track.

Pressing the push-button resets the display and places the display timer into a ready mode. When the vehicle passes between the start emitter and start sensor 'breaking' the start beam, the timer begins to count and displays the elapsed time in seconds and fractions (ss.fff). When the vehicle breaks the finish beam, the timer displays the elapsed time to a thousandth of a second.

The timer will not reset for a run if either of the sensors are out of alignment.

PACKAGE COMPONENTS

- 5 - 24" digit Display Units
- 12 - Mounting Plates/Screws
- 2 - 5140 Track Sensors
- 2 - 5040 Infra-red Beam Emitters
- 3 - Track cables - Start/Finish/Display sections
- 1 - Push-button cable
- 1 - Owner's Manual

Model 5432E Available Options:

- 6524 24VDC/2.5A AC Power Adapter
- 6401B Permanent Installation Kit (includes AC)
- 6501D External 24VDC Battery Kit

Emitter options:

- 50ft range - Model 5040 (standard)
- 75ft range - Model 5050
- 250ft range - Model 5060

'W' suffix - Domestic USA Internal Wireless Datacomm link

'X' suffix - International Internal Wireless Datacomm link

4520A Domestic Wireless Data Comm Links
 4620A International Wireless Data Comm Links
 Note: Wireless networks require a minimum of two transceivers; one must be internal in a display.

LOCAL REQUIREMENTS

Additional items required to operate the 5432E Display Timer and options:

- 1 - 24VDC/2.5A Power source
- 1 - Mounting structure

PRODUCT SPECS Model 5432E

Display Type:	7-Segment
Digit Size:	24" x 10"
Number of digits:	Five
Dimensions (half):	113"W x 29"H x 4"D
Mounting:	Brackets to top/btm tabs
Housing:	Powder Coated Steel
View Filter:	Red Transparent acrylic
View Range:	1000' in full sun
Power Req't:	24VDC/2.5A
Data Comm:	RS422 serial
Weight (total):	89#
Display Format:	ss.fff

PRODUCT SET-UP

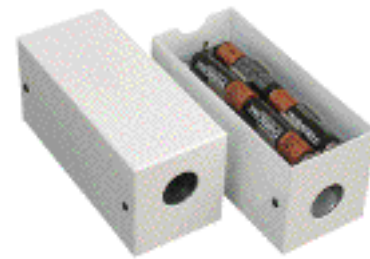
Model 5432E Large Display Timer is designed to be mounted into a permanent structure.

RaceAmerica has tried to make use of the display timer as simple as possible, 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 one 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 starting line, the finish line and the timer. Several connectors may connect different segments of this cable. The cable is keyed to match the start line and finish line track sensors, position identified at the track sensor end of the cable (Fig.4). The large round connector connects to the display and the smaller connectors (RJ11) connect to the Track Sensors at the start line and the finish line as indicated on the cable near the RJ11 connector.

The Model 5432E Display Timer is assembled as five individual digits. Bolts on the vertical tabs hold the individual digits together (Fig. 2). Assemble using the digit position labels located



Model 5040 - Infra-red Beam Emitter

Note On/Off switch and placement for four AA batteries for each Beam Emitter. Beam Emitters are interchangeable with one another.



Model 5140 - Infra-red Track Sensor

Note cable connector is located inside and underneath. Track Sensors are interchangeable with one another.

Fig. 1 - Track Sensors and Emitters

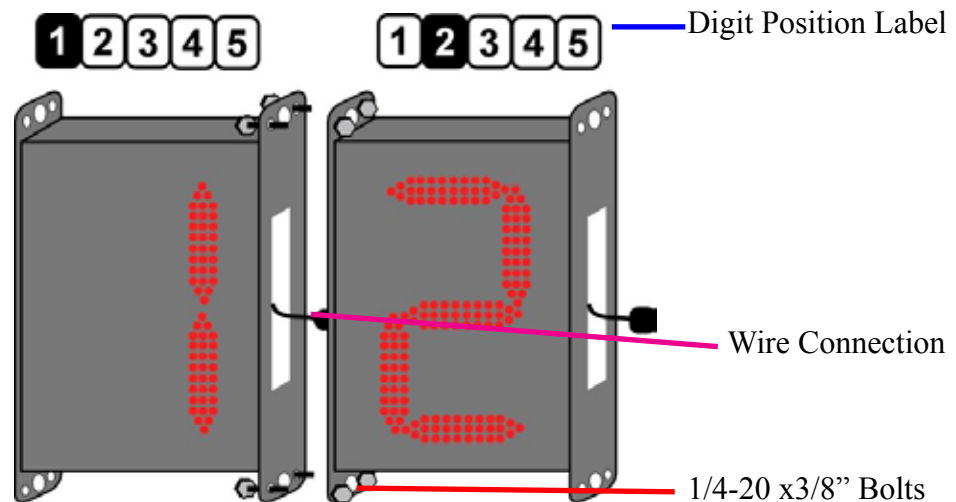


Figure 2 - 24:" Cable and unit assembly

on the top of each digit (segment is identified by the inverse printing of its number). A full unit will have segments one thru five assembled from left to right, digits facing front.

Connect the cable to the connector between each two digits as they are assembled. A horizontal and vertical frame structure is required to mount the display (see figure 3). This structure can then be suspended or secured to the ground.

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 (for standard 5040 Beam Emitters). Layout the Track Sensor Interconnect Cables on the track site as illustrated on the Track Sensors/Cabling Diagram (Fig. 4).

STEP 3 - Connect the Power

Power is supplied to the display and sensors through the 24VDC power input. Connecting power to the display will set the display into a power-up self-test sequence. Turn on the Beam Emitters

POWER-ON SELF-TEST

When the 5432E power source is connected, the display timer begins an internal self-test and external visual check of the display segments.

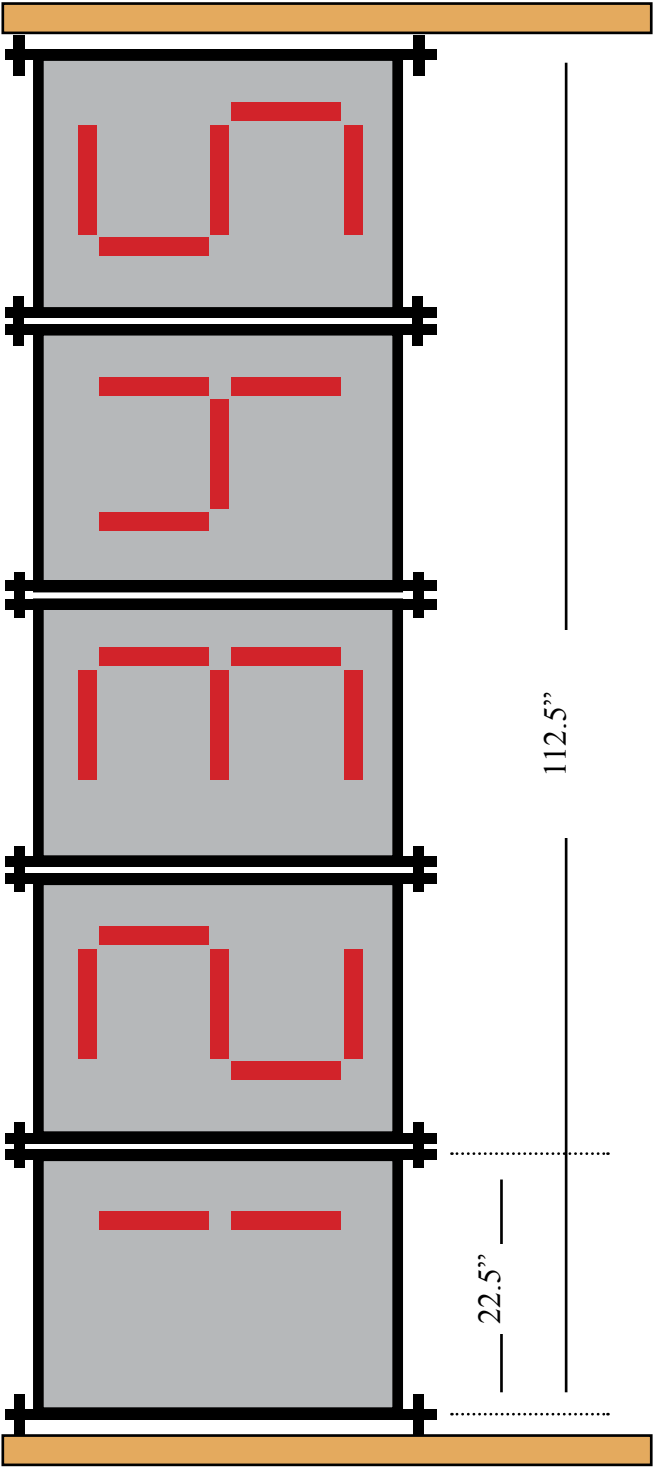
The self-test begins by stepping through each segment of all five digits, one segment at a time including the decimal point which exists to the right of the second digit. The self-test continues by sequentially illuminating each segment until all segments and the decimal point are on. The self-test continues by drawing a square frame by sliding a small square from left to right, then down and right to left. The square then collapses and the revision level of the code (eg [-SEA0]) running in the microprocessor is displayed, then [rEAdy] scrolls in from left to right and blanks out. The display advances to Alignment Mode.

ALIGNMENT MODE

On initial system power-up, the system automatically enters Alignment Mode; the display shows Align [ALiGn] briefly, then [-S-F-] is displayed indicating the START and FINISH sensor/emitter pairs followed by [0S-F0].

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 (1-2-3....8-9-1-2....) slowly if slightly out of alignment or continuously

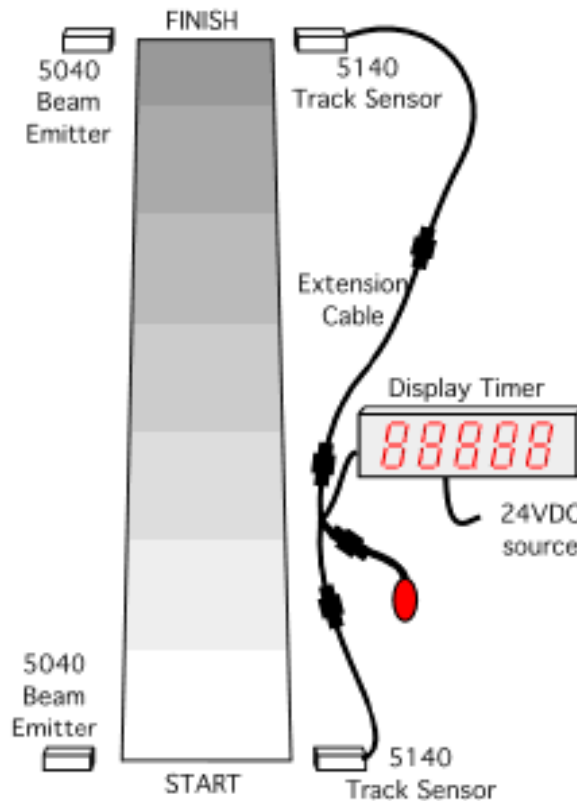
24" Scoreboard Mounting



- Each inclosure is 10.2cm (4") deep
- A 15.2cm (6") X 22.9 (9") box projects 5.1cm (2") out from the left digit for power/data connections
- Bolts at top and bottom secure digits together
- A horizontal brace would nicely secure all digits

Figure 3 - Twenty-four inch scoreboard assembly and mounting

TRACK SENSORS/CABLING DIAGRAM



NOTES:

Track cable lengths can be from 50' to 1320' as required.

With different length sensor cables, either one can be start or finish since the main interconnect cable segment identifies the position.

Extension cable sections may be purchased. Generally, sections greater than 660ft will be split into two sections.

Fig. 4 - Track Layout

if they are not functioning properly or way out of alignment. Once the emitter/sensor pair are aligned properly, the digit will stop counting. If the alignment is off a little or intermittent, the digit for that emitter/sensor pair will count when they float out of alignment.

To maximize the alignment of the emitter/sensor pairs, it is suggested to rotate the beam emitter slowly left and right until out of alignment, to detect the left/right limits of alignment. Viewing the display to establish these limits will help establish the extremes of the emitter/sensor alignment. This technique will determine the maximum lateral detection angle. Rotating the beam emitter up and down until out of alignment determines the maximum vertical detection angle. Once these extremes are established, position the beam emitter in the center of the left/right detection angle and up/down detection angle. Repeat this same process with the other Beam Emitter and Track Sensor. This will maximize the alignment accuracy.

When both sensors are aligned, press the button to exit alignment mode and enter Run Mode. To return to alignment mode, press and hold the button until the Align sequence is displayed.

OPERATION

Enter the Run Mode by pressing the push-button, the display shows a progressive sequence of dashes [----], then the timer blanks everything except the decimal point [_.] indicating it is ready to time a run. When an object breaks the start beam, the timer will immediately begin to count live and display the elapsed time. When an object breaks the finish beam, the timer freezes the elapsed time. Press the push-button to reset the timer for another run.

Both sensors are checked for proper alignment before the timer is reset and allowed to start. If either or both sensors are out of alignment, the display will show [-S-F-] with the non-aligned sensor position letter flashing. Go to Align Mode (press and hold the button), correct the problem, exit align and start the next run.

MAINTENANCE

The 5432 Series Display Timer, Beam Emitters, and Track Sensors require minimal maintenance.

Periodically clean off the red acrylic front of the display with a soft wet rag; be careful not to scratch the surface with dust or sand which may be on the front or in the rag.

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 $\leq 4.2V$ DC) will cause intermittent operation of the system resulting in intermittent detections 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

Further to minimize race program interruptions, RaceAmerica recommends some 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.

Permanent Display Installation Kit

Part # 6601A

Kit Application

The Permanent Display Installation Kit is designed for tracks where permanent installation of the display is required. Power and data connections are routed to the scoreboard through 3/4" conduit attached to the backside of the display. The kit provides connection to a 110VAC or 230VAC source to power the scoreboard. Mounting hardware attaches to the display and provides weather protection for the electrical connections.

Kit Components

- Lower bracket with 3/4" conduit connectors
- Aluminum cover
- 110/230VAC Power Adapter brick
- Screws for attachment to enclosure (#8-32 X 3/8").

Kit Installation

1. After mounting the display securely, attach the Lower Bracket with conduit connectors using two screws (#8-32 X 3/8")
2. Secure the AC Adapter to the velcro pad and plug into the power plug on the display.
3. Bring in 110/230 VAC power through one of the conduit connectors and splice to the appropriate wires for the AC source.
4. Bring in the data cable through the other conduit connector and connect to the circuit board. Do not route data cables in the same conduit as power cables. (Wireless units will not have a data cable).
5. Install the Cover over the AC Adapter and wires; secure with six screws (#8-32 X 3/8").

