



INNOVATION. TECHNOLOGY. RELIABILITY.

4-Digit Elapsed Time Display Timer

Models 4532E, 4832E & 4432E

Owner's Manual

Rev D

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Table of Contents

LIMITED WARRANTY3

PRODUCT OVERVIEW4

PACKAGE COMPONENTS4

POWER REQUIREMENTS.....4

PRODUCT SPECIFICATIONS4

THEORY OF OPERATION5

TIMER SET-UP5

POWER-ON SELF-TEST.....6

ALIGNMENT MODE6

TRACK SENSORS/CABLING DIAGRAM7

OPERATION.....8

DIP SWITCH DEFINITIONS8

PC DATA CAPTURE8

MAINTENANCE9

SPARE PARTS9

SUPPORT AGREEMENTS.....9



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.

PRODUCT OVERVIEW

Models 4532E (5" digits)/4832E (8" digits)/4432E (24" digits) Elapsed Time Display Timers (hereafter referred to as 4X32E) are micro-processor controlled systems based upon the 7-segment format display digit using the latest technology Ultra-Bright LEDs. The 4X32E 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 4X32E for timing purposes. The system operates on simple push-button operation for Reset (Clear) and Sensor alignment. Output display format is DIP switch selectable; the timing time range is based on the selected display format and can range from seconds to hours. Output can be captured with the PC Capture software via the RS232 data connection.

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.

Wireless versions of this product are available.

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.

PACKAGE COMPONENTS

Each Display Timer package includes:

- 1 - Elapsed Time Display Timer Unit
(24" digit model is in four sections)
- 1 - Power Patch Cord
- 3 - Sensor Interconnect Cables
- 2 - Infra-red Beam Emitters, model 5040
- 2 - Infra-red Track Sensors, model 5140
- 2 - Display table stands (5" only)
- 1 - Owner's Manual

AVAILABLE OPTIONS

Cabling options:

- Up to 1320 feet Start to Stop sensors
- 7540B Foam Stands
- 6038S Dot-Matrix Timeslip Printer Package
- 6501A AC Adapter (12V/2A)
- 6501C AC Adapter (24V)
- 6075A Carry/Storage case (5" only)
- 5050/5060 Extended range emitters (75'/250')
- 3121A Data Capture Software for PCs

POWER REQUIREMENTS

The 5"/8" Display Timers operate on any 12VDC power source capable of 0.85 ampere current load maximum. Maximum voltage should never exceed 13.2VDC at the Power Input Connector. An automotive battery is ideal. The 24" Display Timer requires 24VDC.

The model 5040 IR Emitters require four AA-size batteries. Batteries may be alkaline or NiCad rechargeable.

PRODUCT SPECIFICATIONS

The following listing provides the design performance specifications for the 4832E/4532E/4432E Display Timers.

SPECIFICATIONS Model 4832E

Display Type:	7-Segment
Digit Height:	Eight Inch Tall
Number of digits:	Four
Output - seconds	Switch selectable
Dimensions:	14-1/4" x 32.3" x 3"
Mounting:	Top 1/4" Eyelets
Housing:	Powder Coat Aluminum
View Filter:	Red Transparent acrylic
View Range:	320' in full sun
Operating Range	-20°F to 120°F

SPECIFICATIONS Model 4532E

Display Type:	7-Segment
Digit Height:	Five Inch Tall
Number of digits:	Four
Output - seconds	Switch selectable
Dimensions:	11.5" x 20.3" x 3"
Mounting:	Top 3/16" Eyelets
Housing:	Powder Coat Steel
View Filter:	Red Transparent acrylic
View Range:	200' in full sun
Operating Range	-20°F to 120°F

SPECIFICATIONS Model 4432E

Display Type:	7-Segment
Digit Height:	Twenty-four Inch Tall
Number of digits:	Four
Output - seconds	Switch selectable
Dimensions:	29" x 90" x 4"
Mounting:	Brackets for each digit
Housing:	Powder Coat Steel
View Filter:	Red Transparent acrylic
View Range:	1000' in full sun
Operating Range	-20°F to 120°F

THEORY OF OPERATION

The Model 4X32E Display Timer is a standalone elapsed time timer and large digital display with an interconnect cable to connect the Infra-red Sensors and the handheld 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 the selected format (see DIP Switch settings). When the vehicle breaks the finish beam, the timer freezes the elapsed time.

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

**Model 5040/5050 - IR Beam Emitter**

Note On/Off switch and placement for four AA batteries for each Beam Emitter. All Beam Emitters are fully interchangeable with one another. Picture shows top and bottom of units.

**Model 5140 - IR Track Sensor**

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

TIMER SET-UP

The 5"/8" Display Timer is designed to hang free using the top eyelets supplied with the display. The 24" Timer must be securely attached to a structure or frame.

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. The RJ45 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.

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 Cable on the track site as illustrated on the Track Sensors/Cabling Diagram page.

STEP 3 - Connect the Power

Power is supplied to the display through the 12VDC power input alligator clips. Connecting power to the display will set the display into a power-up self-test mode.

POWER-ON SELF-TEST

When the 4X32E power source is connected, the display timer begins an internal self-test and external visual check of the display elements.

The self-test begins by stepping through each segment of all four digits, one segment at a time including the colon or decimal point which exist to the right of each digit except the rightmost digit. The self-test continues by sequentially illuminating each segment until all segments, colons, and decimal points are on. Then cycles back off one segment at a time. Finally, the revision level of the code (eg [--A.0]) running in the microprocessor is displayed. The display then advances to Alignment Mode.

ALIGNMENT MODE

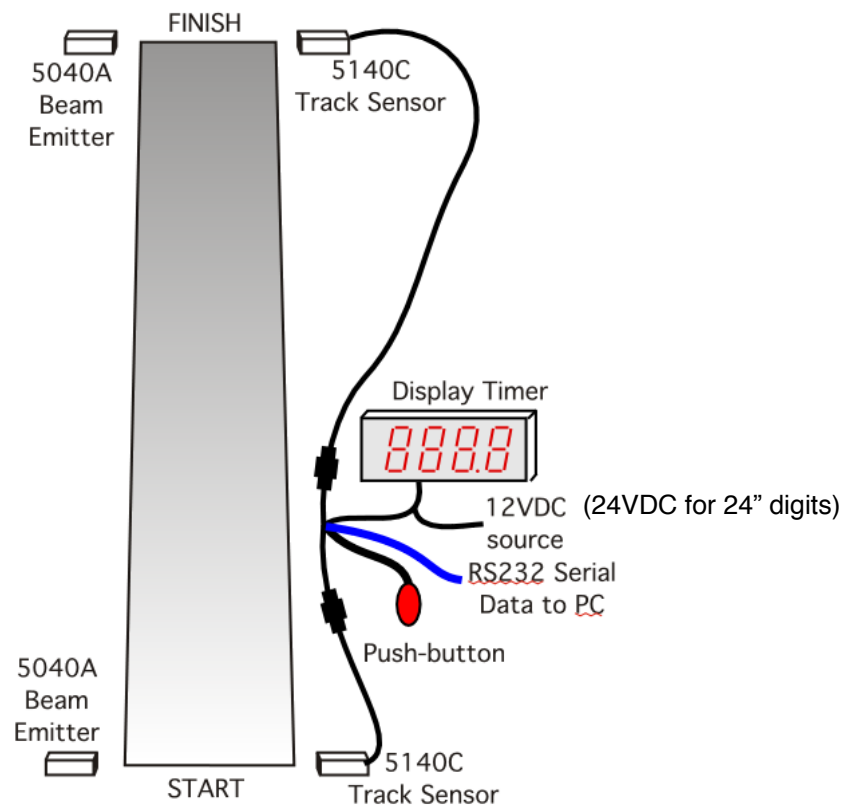
On initial system powerup, the system automatically enters Alignment Mode; the display shows Align [ALGN] briefly, then [-SF-] is displayed indicating the START and FINISH sensor/emitter pairs followed by [0SF0].

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 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 all other beam emitters and all Track Sensors. 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.

TRACK SENSORS/CABLING DIAGRAM



NOTES:

Track cable lengths can be from 10' 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. This enables the display to be placed closer to the start or finish as desired.

Peripheral devices such as printers can operate up to 100 feet on RS232 communications; conversion to RS422 data communication allows placement at any distance.

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 elapsed time in the data format selected (see DIP switches). 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 [-SF-] 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.

DIP SWITCH DEFINITIONS

The Timer can operate in two different modes - Run and Diagnostic - by selection of the DIP switches. The 8 DIP switches located on the back of the Display Timer are numbered from 1 to 8 and can be switched ON or OFF. The ON position is indicated on the switch itself. Each switch function and setting are discussed below.

Diagnostic mode

Switch number 1 enables and disables the diagnostic capabilities of the Timer. When enabled, the Timer receives data and displays error codes when invalid data has been received. The following table is used to set switch number 1 to enable/disable the diagnostic feature:

Diagnostic Mode	<u>1</u>
Disabled	ON
Enabled	OFF

NOTE: IF SWITCH NUMBER 1 IS SET TO 'OFF' DURING THE POWER-UP SELF-TEST, THE DISPLAY WILL CONTINUOUSLY

LOOP ON THE SELF-TEST UNTIL SWITCH NUMBER 1 IS SET TO THE 'ON' POSITION.

DISPLAY FORMAT

The Display Format is set using DIP switches 2, 3 and 4 as follows (S=Seconds, F=Fractions):

Display Format	<u>2</u>	<u>3</u>	<u>4</u>
Auto-ranging (from S.FFF to SSS.F)	ON	ON	ON
SSS.F	OFF	ON	ON
SS.FF	ON	OFF	ON
S.FFF	OFF	OFF	ON

DIP Switches 6, 7 and 8 must always be OFF, switch 5 should be ON.

PC DATA CAPTURE

A PC can be connected to the serial port and ETs captured. Communications are at 9600 baud. Cables and Data Capture Software are available from RaceAmerica.

MAINTENANCE

The 4X32E Elapsed Time 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 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.