RACEAMERICA

INNOVATION. TECHNOLOGY. RELIABILITY.

3905 Series Laptimer

Lap Timing System Owner's Manual

Rev H1

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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

PACKAGE COMPONENTS

The standard 3905 Series Laptimer includes:

1 - 3905 Series Console Unit factory configured
as follows:
 Standard twelve digit display with keypad
   control functions
1 - 5040 Infra-red Beam Emitter
1 - 5140 Infra-red Track Sensor
1 - Track Electronics Cable for
     Track Sensor - 100'
1 - Owners Manual

3905 Series Available Options:

Cabling options:
   Cable length - 250', 500'

6042S Dot-Matrix Timeslip Printer Package
6502 AC Power Adapter
6070 Carry Case
7540 Foam stands
6560/6860/6650/6450 Scoreboard
5050 USB Desktop Battery Charger
4520 Wireless Datacomm Links for Printers,
   PCs and Scoreboards
55-E670 USB Battery Pack

LOCAL REQUIREMENTS

Additional items required to operate the 3905
Series timing system package and options:

USB Battery Packs for 504x emitters
Console - 12VDC automotive battery

Other options:
12VDC source for each Printer/Digital Display
   (AC adapters available)

PRODUCT SPECIFICATIONS

The following listing provides the design performance specifications for the 3905 Series timing system:

Start/Finish Lane Width	4 to 50 feet
ET Timer Capacity	up to 900.000 sec
Time Accuracy	0.001 seconds
Power Requirements:	
Console - Power	12VDC 1A
Emitter	USB Battery Pack

THEORY OF OPERATION

The 3905 Laptimer is a microprocessor controlled completely self contained lap timing system utilizing the latest CMOS technology circuit components to provide a highly accurate 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 from a 12VDC source.

The beam emitter and track sensor operate on invisible (to the unaided human eye) Infra-red light. The coded light frequencies are constantly received by the track sensor until a car interrupts reception ('breaks' the beam).

The IR beam emitter to track sensor transmission operates on Line-of-Sight principles. This makes alignment of these units critical.

Once the system is properly set up and aligned on the racing surface, the timer console is reset to start timing the first driver/car.

After the system is reset, the first beam interruption starts the timer (unless the racer/car number option is activated), each subsequent beam interruption (lap completed) freezes the time on the display, sends the time to any connected PCs and/or scoreboards, immediately starts the next lap in the background. This continues until the system is reset for another racer. Results for up to nine laps for the last racer can be recalled and printed in summary format.

Track Sensor and 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 55-E670 USB Battery Pack 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 reestablish 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 occurances 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 offers several different sensor and emitter models; depending on a variety of requirements. The following table summarizes the different Sensor/Emitter combinations utilized with the Model 3905 Laptimer system.

5140 Sensor

5040 Emitter

Fig. 1 IR Track Sensor & Beam Emitter

Note cable connector is located underneath the 5140 Sensor. Pictures show top and bottom of units to show battery storage areas.

Sensor	Emitter	Application
5140 Single Beam Sensor	5040 Single Emitter	Start/Finish Detection
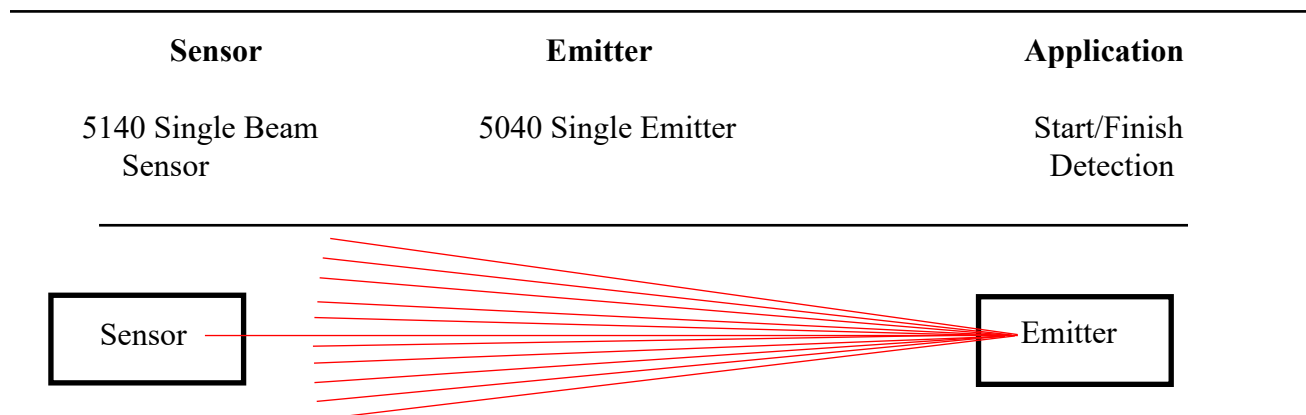
Fig. 2   Emitter/Sensor operation theory

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.

SYSTEM SETUP/OPERATION

SETUP

The Laptimer should be setup per Fig. 3; placing the Start/Finish line (Timing Line) at the desired point on the track and the console at its designated location.

POWER ON/SELF-TEST

Connecting the 12VDC battery to the System Console places the RaceAmerica 3905 Series Timer into a self-test of the microprocessor circuitry and the LED (Light Emitting Diode) display . This is an internal test as well as a visual check of the LED display. The LED Displays progressively sequence the digit '8' through each segment of all digits and then progressively turns them off; finally, the upper console display shows the product model number **[3905]** and the lower display shows the code revision level i.e.**[C.00.0]** contained within the microprocessor.

After power-up, check the sensor alignment and make any configuration changes to the default settings before timing a lap.

ALIGNMENT MODE

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 Sensor and Emitter placed in the proper positions, press **[5] ALIGN** key) to enter alignment mode. The LED Display shows **[ALIGn]** in the upper display and briefly **[---0--]** in the lower display. The digit indicates the sensor. The zero **[0]** digit indicates the alignment condition for the sensor. 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 the emitter/sensor pair will count slowly if slightly out of alignment or continuously if they are not functioning properly or way out of alignment. Once the emitter/sensor pair are aligned properly, the digit will stop counting.

If the alignment is off a little or intermittent, the digit for that emitter/sensor pair will count when they float out of alignment. Remember, the Beam Emitter and Track Sensor operate on a 'Line-of-Sight' concept and may require shims if they are installed on a street with a crown. Leaves, people, and other debris will also break the beams and could give false signals, so keep everyone and everything clear of the Beam Emitter and Track Sensor during racing activity.

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 Emitter and both Track Sensors. This will maximize the alignment accuracy. 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 reentered. This can be helpful for leaving the system in alignment mode for an extended period of time to check on an intermittent condition.
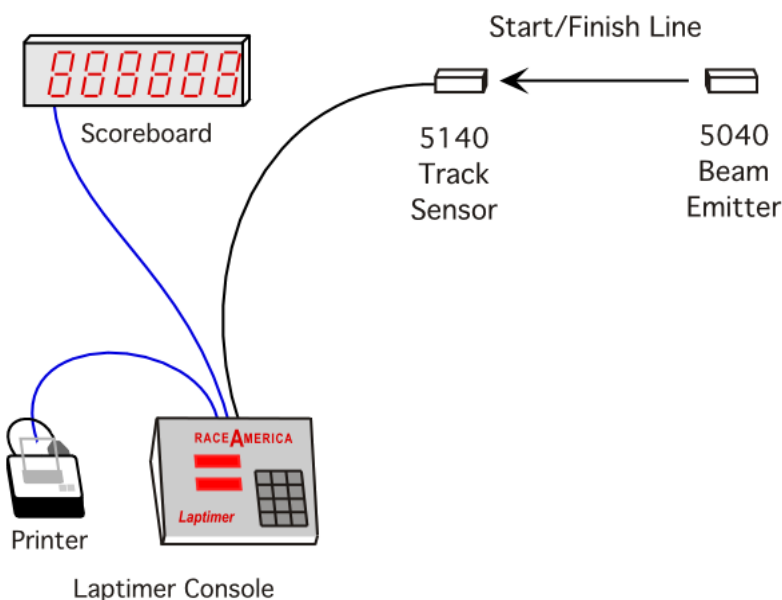
At this point the system is properly aligned. Press the **[#] ENTER** key to exit Alignment Mode.

SYSTEM CONFIGURATION

The Laptimer ships with the following factory default settings:

Print Line Feeds   12

If any of these settings need to be changed, press the **[8] CONFIG** key on the Keypad to enter the system configuration mode, the console displays **[LF] [12]** (Upper/Lower displays) and the user is prompted for the number of line feeds (blinking digit) to add to the end of the timeslip to properly eject the timeslip for tearoff. Enter the number of line feeds required and press the **[#]**

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Start/Finish Line

888888

Scoreboard

5140
Track
Sensor

5040
Beam
Emitter

Printer

RACE**A**MERICA

Laptimer

Laptimer Console

Fig. 3 Laptimer Cabling and Equipment Setup

ENTER key to confirm. Next, the display will show [Hold] [5]. Press 2 thr 9 on the keypad to select the time to hold the last lap in the display before resuming live counting, press [#] ENTER to save. Next the display will show [Count] [yES] to select whether any connected large digit displays count live. Press 8 to toggle between [yES] and [no], press [#] ENTER to save. Live counting should be set to NO if the data is being sent to a computer.

TIMING LAPS

Before timing laps, it may be desireable (but not required) to enter the racer numbers so they will appear on the printout and in data transmitted to PC capture software. To enter a racer number, press the **CAR# [9]** key on the keypad to view the existing entries; press **[9]** again to enter a new number; press **[#] ENTER** to accept the entry. The timer will hold data for up to nine laps and be able to print a summary of all laps after each car completes their laps.

To time a lap, press the **RESET [2]** key. The timer immediately checks all track sensors to insure they are operating and aligned properly. The timer performs this function automatically while displaying **[rESEt] [------]** 1 to 6 dashes

on the upper/lower LED displays. If the sensor fails the alignment test by triggering during this test, the timer will indicate **[ALIGn] [FAILEd]**. If the sensor/emitter pairs are aligned, the LED display will display **[rEAdy]** when it is ready to time a lap. Once the sensor is triggered, the upper display will count live until the sensor is triggered again. At this point the LED display shows **[LAP X] [XX.XXX]** as the results of the lap and sends the results to any connected PCs, and Scoreboards. The upper display will hold the lap number for three seconds and then show the live count of the next lap with the prior lap time on the lower display. This process will repeat for up to nine laps; press **STOP [1]** to stop timing the car. Press **PRINT [0]** to send the data summary to the printer (if connected). Before resetting the system for the next racer, the press **RECAL [3]** and then a number for a lap time to review and display on the console as **[LAP X] [XXX.XXX]**. Press another number to review a different lap. Repeat this sequence for the next racer.

If a Fail condition is detected, press **[#] ENTER** to go to alignment mode to correct the bad alignment, press **[#] ENTER** to leave alignment mode.
Press **RESET [2]** to time another racer.

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STOP A LAP PRIOR TO FINISH

To stop the timer during a lap, press the **[1] STOP** button and the timer will show **[StOP]** in the upper display and **[XXX.XXX]** in the lower display representing the time of the last completed lap; press **[#] RETURN** again to clear the displays.

SYSTEM OPTIONS

Several options (Printer, Digital Display or PC) can be connected by RS232 cable connections up to 100 feet or by a Wireless Link for greater distances (line of sight up to a quarter mile). Connectors are on the underside of the console.

PRINTER OPTION

Connect the timeslip printer interface cable to the 3905 Laptimer using the **RS232 PRINTER PORT** on the console. The 3905 will auto print the configured number of timeslips after each racer is has completed their laps and the timer is stopped. Additional copies can be printed by pressing the **[0] PRINT** key before the timer is reset. The print function is disabled if the timer is timing a run.

A custom print header option is available to replace the Model 3905 Laptimer header; this header can consist of up to four lines of 31 characters each.

SCOREBOARD OPTIONS

The Laptimer can be connected to a scoreboard to display race results for a crowd and the competitors. Connect the model 6560/6860 Scoreboard to view the Lap Time immediately upon completion of each lap. Connect the RS232 blue interface cable to the PC or Scoreboard connector.

ADDING PC CAPTURE SOFTWARE

The Laptimer can be connected to a PC (Windows 7 or later Operating System) to capture the times and build a file with racers names and race results. RaceAmerica offers an optional data capture software package for this purpose.

SERIAL PORT CONFIGURATION

The RS232 Serial Port can be configured for a printer or to interface to a PC running data capture software.

When connecting to the Serial Port, the interface must be configured as 9600 baud, 2 stop bits, no handshake, and no parity. The data received will be in timeslip format.

Model 3905 LAPTIMER

Car # XXXX

Lap # 1   XXX.XXX
Lap # 2   XXX.XXX
Lap # 3   XXX.XXX
Lap # 4   XXX.XXX
Lap # 5   XXX.XXX
Lap # 6   XXX.XXX
Lap # 7   XXX.XXX
Lap # 8   XXX.XXX
Lap # 9   XXX.XXX

Fig. 4   Timeslip Printout

Fig. 5 3905 Keypad

KEYPAD FUNCTIONS

KEY 0
Pressing the **[0]** key after timing has been stopped will print a summary of up to the last nine laps (or the last reset).

KEY 1
Pressing the **[1]** key at any time will Stop the lap currently being timed. Use this function to end a racers laps and then be prepared to start a new racer.

KEY 2
The **[2]** key is used to reset the timer to prepare for a new Racer/Car.

KEY 3
Pressing the **[3]** key will enter the Recall Mode; press **RECAL [3]** and then a number for a lap time to recall and display on the console as **[LAP X] [XXX.XXX]**. Press another number to recall a different lap. This memory is lost when the system is reset for the next racer.

KEY 5
Pressing the **[5]** key at any time will put the timer into Alignment mode. See alignment instructions to interpret the display.

KEY 8
Pressing **[8]** on the keypad will enter the Configuration Mode.

The status display will immediately display **[LF]** followed by **[10]**. This indicates the number of line feeds the printer will advance after each racer; enter the desired number using the numeric keys on keypad for the two positions, press**[#]** to accept the number (No printer? Any number is OK).

Next, the status display will prompt with **[no.]** followed by **[yES]**. This option will prompt for a Racer/Car number after each Reset and before the clock can start if a Racer/Car number is wanted on the timeslip printout. Accept **[yES]** by pressing **[#]**; press **[1]** to toggle the selection to **[no]** and press **[#]**.

Next, the display will briefly show **[Hold]** followed by **[05]**. This option is the time in seconds that a lap time will be displayed in the status display before reverting to live counting display of the current lap in progress, Use the numeric keys to input the desired hold time, press the **[#]** key to accept.

KEY 9
Pressing the **[9]** key will enter the Racer/Car number Mode; press the **CAR# [9]** key on the keypad to view the existing entries; press **[9]** again to enter new numbers; press **[#] ENTER** to accept the entries.

KEY 4, 6 and, 7
Used for numeric keypad input.

MAINTENANCE

The 3905 Laptimer Console, Beam Emitters, and Track Sensors do not require any special maintenance. Keeping the equipment clean and dry when not in use is recommended.

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 USB Battery Pack in the beam emitters after about 60 hours use. 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.

7540C - Foam Stand Assembly Instructions

Base Foam   Top Foam   Emitter   Sensor
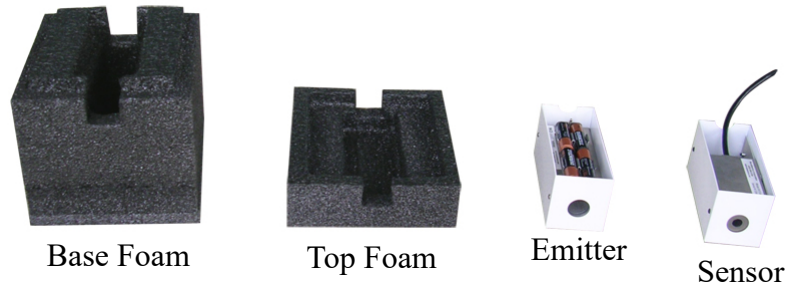
Assembly Components

'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. Place on the track.

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. Press the Top on the Base. Place on the track.

'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

Sensor/Emitter
placement in Foam Base

Sensor back
Note cable routing

Complete Assembly

REVISION HISTORY

A - Original release

B - Enhanced output functions

C - 06/04 - Metal enclosure, new electronics,
   two line data display, data recall

D - 07/05 -Metal sensors/emitters, add foam stands; rev history to new page.

E - 02/07 - Checkered console, convert to InDesign

F - 06/12 - fom stnad to current rev (7540C) and add output to counting display