RACE AMERICA

INNOVATION. TECHNOLOGY. RELIABILITY.

Large Digital Display Owner's Manual

Models 6560D & 6860D

Rev C

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RACE AMERICA

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LIMITED WARRANTY

To the original purchaser of this RaceAmerica product, RaceAmerica warrants the product 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 or common carrier, the customer agrees to insure the product, prepay shipping charges, and ship the product to RaceAmerica, Inc. for service.

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PRODUCT OVERVIEW

The Model 6560D & 6860D Large Digital Displays (hereafter referred to as 6X60 are microprocessor controlled systems based upon the 7-segment format display digit using the latest technology Ultra-Bright LEDs. The display uses an RS232 serial link to receive data to be displayed. The serial link is configured for 9600 baud. The 6X60 is capable of displaying numbers 0 through 9 and alpha letters A through Z with the exception of K, M, and W. Selected punctuation marks are also among the displayable character set listed in the back of this manual. The 6X60 is designed to connect to RaceAmerica AC4 autocross timers, RaceAmerica custom timers, personal computers running race management software, and selected non-RaceAmerica timers. Timer selection and data format is selected through the DIP switch settings located on the rear of the display. Data connections can be via hard wire or via Wireless Data Network Link units.

These displays are all available with internal batteries/external chargers and wireless communications for remote placement.

The wireless option requires a transmiter at the data source and a receiver at the display. The receiver can be internal (from factory) or external.

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

1 - Large Digital Display Unit
1 - Power Patch Cord
1 - Owner's Manual
2 - Table Stands (Model 6560 only)

Model 6X60 Available Options:

06-X100 RS232 Cable up to 100'
4500A Data Communication POD (for printers and displays greater than100ft from console)
07-3434 RS422 Cable(for use with PODs)
4520 External Wireless Datacomm Link
'W' option - Internal Wireless Datacomm Link
'B' option - Internal Battery/External Charger
6501A AC Power Adapter
6076B/6077A Carry Case (6860 only)
6075A Carry Case (6560 only)
7606B Display Stand (40" tall)

LOCAL REQUIREMENTS

Additional items required to operate the 6X60 Series Digital Display and options:

1 - 12VDC automotive battery

Other options:
AC power source for AC adapters

PRODUCT SPECIFICATIONS 6560D

Display Type:	7-Segment
Digit Height:	Five Inch Tall
Number of digits:	Six
Dimensions:	11.5” x 27.6” x 3”
Mounting:	Top 3/16” Eyelets - 22”c
Housing:	Powder coated steel
View Filter:	Red Transparent acrylic
View Range:	200’ in full sun

PRODUCT SPECIFICATIONS 6860D

Display Type:	7-Segment
Digit Height:	Eight Inch Tall
Number of digits:	Six
Dimensions:	14-1/4” x 46-3/4” x 3”
Mounting:	Top 1/4” Eyelets - 30” c
Housing:	Powder coated steel
View Filter:	Red Transparent acrylic
View Range:	320’ in full sun

POWER REQUIREMENTS

The Large Display can be powered by a 12VDC automotive battery or any 12VDC power source capable of 0.85 ampere current load maximum. Average power consumption is approximately 0.4 ampere. Maximum voltage should never exceed 13.2VDC at the Power Input Connector (NO chargers or running cars).

PRODUCT SET-UP

The model 6860 Large Digital Displays are designed to hang free using the top eyelets supplied with the display. A display stand is also available from RaceAmerica to hang the display at a good viewing level 40” above ground level.

The models 6560 Large Digital Displays are designed to be placed on a table with the table stands for stability but also have eyelets for hanging, if preferred.

STEP 1 - Configure the Display

The DIP Switches are located on the backside of the display behind the removable cover. They are used to match the communications format and the display format to the data sent to the display from the timing system or PC. To determine the correct switch settings, read the **DIP SWITCH SETTINGS** section of this manual. Switch settings have two positions, ON and OFF. The ON position is indicated on the DIP switch and is active when the switch button is moved to the right side when viewed from the back of the display.

STEP 2 - Establish the Data Interface

The Display can receive data via a hard wired cable or a wireless data link (Internal or External). The display receives RS232 data at 9600 baud.

An interface cable contains a RJ45 modular connector on one end of the cable and is connected to the display using the SERIAL PORT connector on the back of the display. When inserting this connector, press inward until a click is heard to lock the cable in place. If the cable remains loose and no click is heard, carefully bend outward the locking tab on the RJ45 connector approximately 45 degrees from the connector body. Re-insert the cable into the serial port until the click is heard and the cable remains locked in place. To remove this cable, pinch the locking tab against the body of the RJ45 connector and pull the connector out.

Depending upon the type of timer or PC connected to the display, the other end of the cable may contain an RJ45 connector for RaceAmerica timing systems. In this case, either end of the cable can be connected to the display or the RaceAmerica

timer. If connecting to a PC or non-RaceAmerica timer, a 9-pin D-sub or 25-pin connector will terminate the other end of the cable and should be inserted into the serial communications port to be used to send data to the display.

For wireless models, an Internal Wireless Data Network or external unit is used. For external wireless installations, connect the 07-4554 cable between the wireless link and the scoreboard (RJ45 connector). The external wireless link unit is mounted on the back of the display. For internal wireless, simply install the antenna on the display and connect the Wireless Data Transceiver at the data source. Use DIP switches 7/8 to switch between internal wireless and hard-wire/external wireless.

STEP 3 - Connect the Power

Power can be supplied to the display from an external 12V source (battery or AC Adapter) or from an internal battery. If power is supplied to the display externally, connect through the 12VDC POWER INPUT connector located on the rear of the display. Connecting power to the display will set the display into a power-up self-test mode. If the power source is an internal battery, turn on the power using the switch on the bottom of the display.

POWER-ON SELF-TEST

When the 6X60 power source is connected, the display begins an internal self-test and and external visual check of the display elements.

The self-test begins by stepping through each segment of all six digits, one segment at a time including the colon or decimal point which exist to the right of each digit except the right-most digit. The self-test continues by sequentially illuminating each segment until all segments, colons, and decimal points 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 running in the microprocessor is displayed. When the internal self-test and external visual test is complete, **[rEAdy]** scrolls in from left to right. Lastly, the display will show all digits full bright and minimum brightness (programatically controlable from some PC software. Finally, the display will blank out leaving only one or two dim LEDs ON within the first digit. The display is now ready for use.

NOTE: IF SWITCH NUMBER 1 IS SET TO THE 'OFF' POSITION 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.

DIP SWITCH SETTINGS

The 6X60 can operate in different modes dependent upon the device sending the information and race results to be displayed. The 8 DIP switches located on the back of the Large Display 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 as well as recommended settings when connected to RaceAmerica timing systems, non-RaceAmerica timers, PC's running race management software for auotcross, and devices conforming to established industry standard data formats. The hold time and display format may not apply to all timers.

Display Hold Time

Switch number 6 determines the length of time to display the race results before clearing the display. When race results are displayed, the display will continue to display the results for either 15 seconds for fast paced action or 120 seconds for large viewing audiences. If the display is sent new race results prior to the 15 or 120 seconds expiring, the display will be updated with the new results and the display hold time timer is reset to 15 or 120 seconds.

Display Hold Time	6
15 seconds	ON
120 seconds	OFF

Internal Hard Wired/External Wireless

Switches 7 and 8 determine the data source for the display:

External Hard Wired

Switch	Position
7	ON
8	OFF

Internal Wireless

Switch	Position
7	OFF
8	ON

Data Sources

Switches 3, 4 and 5 are set to match the type of timing system connected to the Large Display in order for the Large Display to decode the information to be displayed. The following table is used to set the switches to select the type of data source hardware:

Data Source Type	3	4	5
Timer AC4 3800			
E.10.X (m.ss.fff)	ON	ON	ON
F.10.X (sss.fff)	OFF	ON	ON
E.0X.7 (m.ss.fff)/PC	OFF	ON	ON
F.0X.7 (sss.fff)/PC		ON	ON
ON			
E.0X.7 (m.ss.fff)/log/slip	OFF	OFF	ON
E.0X.7 (sss.fff)/log/slip	ON	OFF	ON
S-Trap 3230	ON	ON	OFF
Timer SBD 3220			
Differential	ON	OFF	OFF
Lane 1	ON	OFF	OFF
Lane 2	OFF	OFF	OFF
JA Circuits Timer	ON	ON	ON
Chronomix Format	ON	ON	ON
PC w/ AutoX/TS software	ON	ON	ON
PC w/ AXware software	ON	ON	ON
PC w/ GPSoftware	ON	ON	ON
PC w/ Display Utility	ON	ON	ON

Diagnostic mode

Switch number 1 enables and disables the diagnostic capabilities of the Large Display. When enabled, the Large Display 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	1
Normal Operation	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.

Factory Usee

Switch number 2 enables and disables the factory diagnostic capabilities of the Large Display.

DO NOT CHANGE THIS SWITCH

Factory Use	2
Factory Use	ON
Normal Operation	OFF

DISPLAY UTILITY

RaceAmerica offers a Windows based Display Utility for download from it's web site (http://www.raceamerica.com) to handle some of the special functions discussed here without requiring knowledge of the specific character command sets.

The utility allows several functions to be sent from the PC to the display - a time of day clock, a count-down timer, a six digit time, a combination display of time and position summary and us to six word sentences. This is also helpful for troubleshooting.

PROGRAMMING FUNCTIONS

For developers designing a software interface to the RaceAmerica 6X60 Large Digital Display, the following documentation illustrates the control and display functions designed into the 6X60 Display. All data strings listed in this section are sent to the display via the serial port and display of the information occurs immediately after receipt of the entire data string.

Display Race Results

Race results are displayed on display model 6X60 for 15 seconds when the display receives the following data strings. After 15 seconds, the display blanks out.

[hex80]fffsss[cr]
where the time to be displayed is sss seconds and fff fractions of a second sent in reverse order and displayed as sss.fff with switch number 4 set to the ON position

[hex80]fffssm[cr]
where the time to be displayed is m minutes, ss seconds and fff fractions of a second sent in reverse order and displayed as m:ss.fff with switch number 4 set to the OFF position

Countdown Timer

Model 6X60 can act as a timer counting backwards until zero is reached. The starting time is sent to the display in the following formats:

[hex84]fffsss[cr]
where the starting time to count to zero is sss seconds and fff fractions of a second sent in reverse order and displayed as sss with switch number 4 set to the ON position (fractions of a second are ignored)

[hex84]fffssm[cr]
where the starting time to count to zero is m minutes, ss seconds and fff fractions of a second sent in reverse order and displayed as sss with switch number 4 set to the OFF position (fractions of a second are ignored)

Extended Race Results

Model 6X60 contains a unique interface to race management software packages where the current run, best run and current place in the standings can be displayed in sequence by the Large Display. The display sequences as follows:

THIS
RUN
(time of current run)
BEST
RUN
(time of best run)
PLACE
(place in standings)
THIS
RUN
(time of current run repeated and held)

[hex88]fffssspppfffsss[cr]
where the first fffsss is the current time, the ppp is the place (1 through 999), the second fffsss is the best time, where time is displayed as sss.fff with switch number 4 set to the ON position

[hex88]fffssmpppfffssm[cr]
where the first fffssm is the current time, the ppp is the place (1 through 999), the second fffssm is the best time, where time is displayed as m:ss.fff with switch number 4 set to the OFF position

Display Sentences

Another unique feature of the 6X60 is its ability to utilize the 7-segment digit format to display alpha characters. Most of the alphabet and selected punctuation marks can be displayed in one to six character words. Sentences can be sent to the display and are flashed in sequence on the display. It takes a couple of sentences to fully comprehend the combination of upper and lower case characters used to form words. The data string is position formatted to six characters

per word including blanks, ending the sentence with a line feed or a carriage return and line feed as follows:

[hex8C]aaaaaabbbbbbccccccdddddd[cr]

where each six bytes is parsed by the display in sequence as aaaaaa is the first to be displayed, then bbbbbb, then cccccc, then dddddd

EXAMPLE: if the phrase 'start your engine' is to be displayed, the data string would look like:

[hex8C]start^your^^engine[cr]

where ^ represents a 'space' inserted in the string for illustration purposes.

a space could have been placed before and after the 'your' to center it on the display instead of both spaces after the 'your' to equal six characters.

See the next page for a complete list and illustration of displayable characters, digits, and punctuation marks.

Time of Day Clock

Model 6X60 contains an internal clock to keep track of the time of day once set. To set the time of day, use the following string which will set the clock and display the time sent. Time of day is displayed continuously until another command string is received by the display.

[hex92]mmhh[cr]

to set the time of day, where the time of day is hh hours and mm minutes in standard non-military time format.

[hex94]mmhh[cr]

to display the current time, where hh and mm can be any characters and are ignored by the display.

Display Brightness

Model 6X60 can be dimmed if desired for a particular application (eg. indoor or night time operation).

[hexA8]x[crc][cr]

to change the brightness of the display. Valid values for 'x' are one thru 8 (1-8) one being the brightest and eight the dimmest.

DISPLAY MAINTENANCE

The model 6X60 Large Digital Display does not require any maintenance to maintain proper operation. If the display is to be used in rainy or wet conditions, it is suggested to protect the back panel from direct moisture by shielding the connection to power and the serial port.

To clean the red acrylic lens, use a non-abrasive cleaner on a soft cloth. This will keep the protective lens clean and maximize visibility and clarity of the digits. If the red lens is soiled with mud or dirt, gently remove the grit using a soft cloth being careful not to press when wiping to avoid scratching the red lens material.

SPARE PARTS

Further to minimize race program interruptions, RaceAmerica recommends some spare parts. While the Display may not shut down the racing action, related cables and PODs for the Display should be in considered. Contact RaceAmerica for availability and pricing.

SUPPORT AGREEMENTS

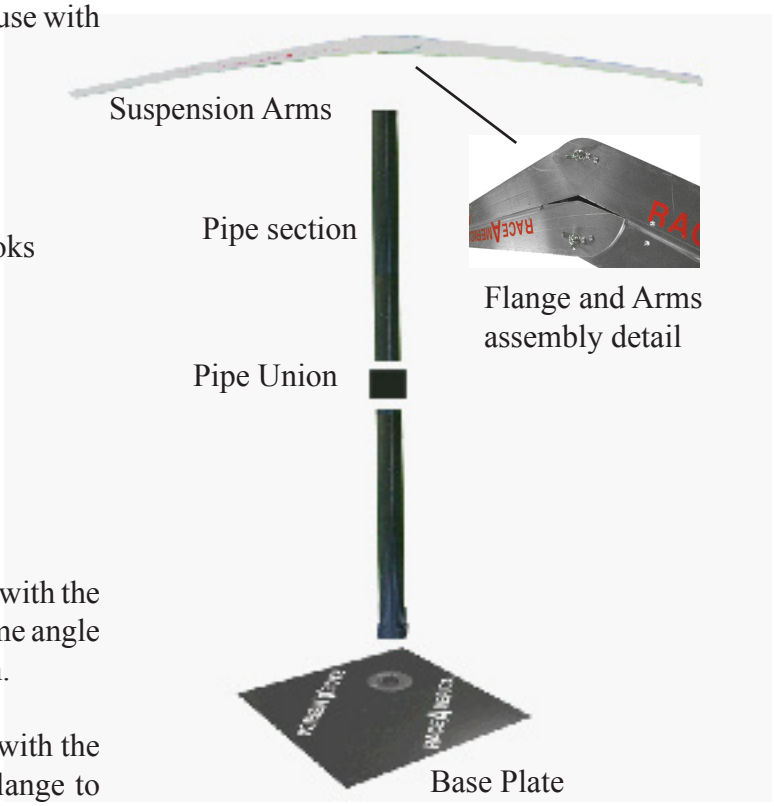
Support agreements are available from RaceAmerica providing Telephone Assistance on technical issues and operational questions, repair and/or replacement of hardware failures, Software and Firmware updates and bug reporting. Contact RaceAmerica for more information and pricing.

Uppercase Letters

Lowercase Letters

DISPLAY STAND ASSEMBLY INSTRUCTIONS

This assembly instruction is intended for use with six digit eight inch digital displays.



7606B Stand Kit Contents

2 - Suspension Stand Arms with 'J' hooks
1 - Pipe Flange
2 - 20 in pipe sections
1 - Pipe union
1 - Base Plate with Pipe Flange
2 - 1/4-20 bolts with wing nuts

Assembly

1) Assemble the suspension arms with the pipe flange and 1/4-20 bolts at most extreme angle setting. Orient flange and 'J' hooks down.

2) Connect the two pipe sections with the coupling and screw into the base plate flange to assemble the post.

3) Carefully screw the suspension arm assembly onto the post. Align such that arms will suspend the display over the center of the base plate on the diagonal for maximum stability.

4) Hang the display on the 'J' hooks; some droop is normal; the display will swing in the wind.

Additional Stability - (if required)

1) Place a weight onto the base plate or stake it into the ground

Assembled Suspension Stand

REVISION HISTORY

Rev A - 06/08 - New board/CPU chip - built from 6XX0 Rev X
Rev B - 07/08 - Correct DIP 3 for Min/Sec (reversed)
Rev C - 06/11 - Removed 4 digit offerings