



The Leader in Event Critical Timing Electronics

***Model 4520 & 4620
Wireless RF Data Comm
Link Networks***



Owner's Manual

Rev D

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RACEAMERICA

T i m i n g S y s t e m s

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.

PACKAGE COMPONENTS

The 4520 and 4620 Wireless RF Link Network units are sold in different configurations as follows (hereafter referred to as 4X20 when the statement applies to all models):

Model 4520A External Wireless RF Link Units (for Domestic USA/Canada applications)

For one or two way communications between a RaceAmerica Timer and Scoreboard, Printer or PC; required at the Timer side.

Model 4520C Internal Wireless RF Link Units (for Domestic USA/Canada applications)

For receive data located at a Scoreboard

Model 4520U External Wireless RF Link Units (for Domestic USA/Canada applications)

For one or two way communications between a PC and a RaceAmerica Timer, Scoreboard, Printer; bus powered USB connection to PC.

Model 4620A External Wireless RF Link Units (for International applications)

For one or two way communications between a RaceAmerica Timer and Scoreboard, Printer or PC; required at the Timer side.

Model 4620C Internal Wireless RF Link Units (for International applications)

For receive data located at a Scoreboard

Model 4620U External Wireless RF Link Units (for International applications)

For one or two way communications between a PC and a RaceAmerica Timer, Scoreboard, Printer; bus powered USB connection to PC.

Power patch cord (12VDC) for non-powered units

All units include an Owners Manual.
USB units require FTDI device drivers installed in the PC (download from www.raceamerica.com).

Each pair of units (network) is configured to operate together and will have the same first three digits of the Optimizer Code (e.g. **A20x**) printed on the face. These are specifically configured at the factory to minimize interference from other devices and perform optimally together. Review the network diagrams to understand the various pieces required for each network.

Available Options:

- 07-4554 Blue cable for RS232 connections - Scoreboard/printer side
- 06-X025 Blue cable for RS232 connections - Timer side
- 06-PC05 Blue RS232 cable 5 Ft for connection to a PC
- 07-3434 Red RS422 cable
- AC Adapter 9VDC (for non-powered units)
- Debug Utility for PC with software/hardware
- 4590 High gain extended range Yagi antennas

THEORY OF OPERATION

The 4X20 Series Wireless RF Links create a network to transmit RS232/RS422 serial data between timing system components. The Link operates on RF radio principles and is a “Plug and Play” addition to the timing system. As with any wireless device, a number of factors will affect performance. These RF links will operate best when the link unit antenna is well off the ground and with a ‘line of sight’ between the transmitter and receiver. Each network of units will be shipped configured, optimized and identified for each application.

The link units will receive power from RaceAmerica timers, scoreboards and displays via the blue RS232 cable and from external sources when connected to PCs, printers or RS422 Timer connections.

Since each network of units operates together for each communication path, similarly identified units and cables are connected at each end (effectively replacing a hard wire connection between devices). Once connected and operational, the RF Link units operate transparently to racing operations.

Wireless RF Links minimize data transmission errors and avoid interference using a ‘channel hopping’ scheme and, therefore, must use matched units at both ends. Although the channel hopping scheme maximizes dependability, local RF may interfere with communications. Placement of links away from strong radio signals is required for optimum performance. Multiple receivers can operate with a single transmitter on a network.

PRODUCT SPECIFICATIONS

The following listing provides the designed performance specifications for the 4X20 Series Wireless Link Units:

Data Type	Serial RS232/422
Operating Range	Miles (with high antennas)
Cable connection	RJ45/USB

Power Requirements:

Link unit (each)	9VDC/300ma
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SETUP & OPERATION

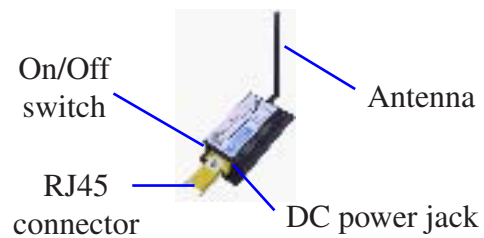
The wireless link is sold in several different configurations which are unique for each different data comm network. It is suggested to set up the system in close proximity to test before performing a full scale set-up on race day.

STEP 1 - Familiarization

Familiarize yourself with the components pictured in this manual on the following pages and how they interconnect. Understand operation and placement to assure optimum performance. Install antennas on all wireless units. 4620C Internal Units need only the antenna screwed on the top of the scoreboard.

STEP 2 - Link Placement

Identify placement of the RF link units. The links operate optimally when their antennas have ‘line of sight’ between each other and are elevated at least three feet off the ground, however the links will function thru walls and windows. Various mounting is provided (velcro/screws) to attach



Model 4X20 Wireless RF Link Unit

Each link unit will be labeled with an optimizer code (first three characters) and location when location is critical. Two links with the same optimizer will communicate with each other and complete the data connection.

units to the back of scoreboards and displays or next to printers and computers. Longer cables are available to provide better antenna positioning if required. Link units should not be positioned in direct contact with moisture.

STEP 3 - Connecting Cables

Connect the cables as shown in the diagrams.

The fourth character in the optimizer code will have a ‘R’ or ‘B’ indicating required Red or blue cable to be connected.

Units configured for RS232 connections use the **Blue** link cable plugged into the **Blue RS232** scoreboard, display, printer or PC ports. Power can be supplied to the wireless unit from a scoreboard or display.

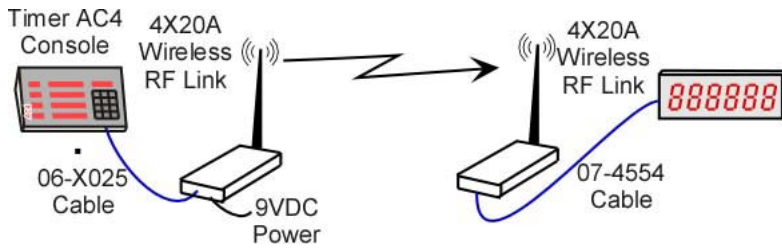
Units configured for RS422 connections use the **Red** link cable plugged into the **Red RS422** timer, printer and scoreboard ports.

Connect power cables as required.

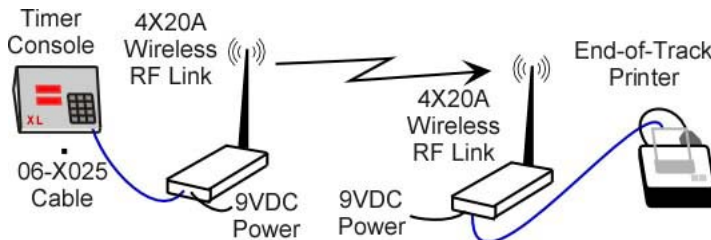
STEP 4 - Power On

Power the system and link units on. Link units connected via RS232 blue connections to RaceAmerica timers, scoreboards and displays will receive power from them. When connected to PCs or printers, the units will require a separate power source. When powered on and ready, the

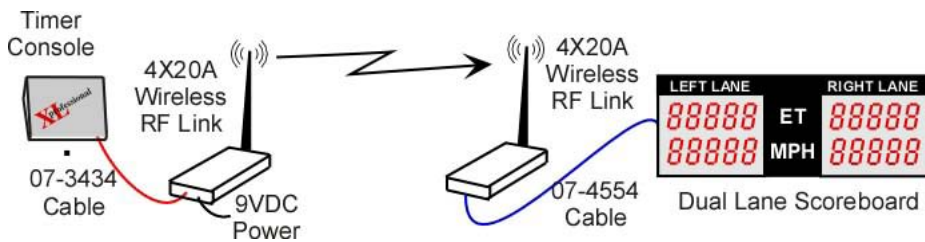
NETWORK DIAGRAMS



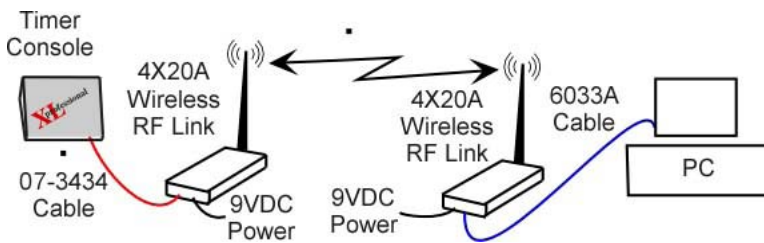
Timer to Scoreboard Networks
A RaceAmerica Timer sending data to a Display with RS232 Blue connections



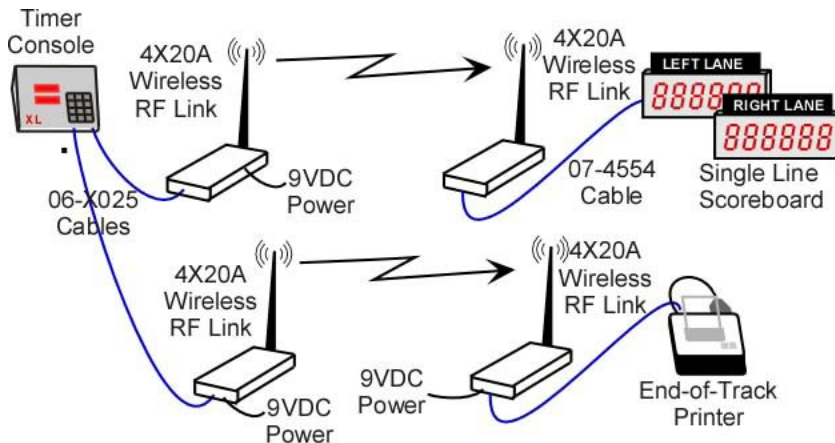
Timer to Printer Networks
A RaceAmerica Timer sending data to a printer with RS232 Blue connections



A 2800 Series RaceAmerica XL Professional Timer sending data to a Scoreboard with RS422 Red connections Timer to Wireless and RS232 Blue connections Wireless to scoreboard.



Timer to PC Network
A 2850 Series RaceAmerica XL Professional Timer sending and receiving data with a computer with RS422 Red connections Timer to Wireless and RS232 Blue connections Wireless to PC.. Note this is a two way communication network.



Multiple Networks
A RaceAmerica Timer sending data to a Scoreboard and Printer on different links; each link pair would have unique optimizer codes. Shown using RS232 Blue connections at all points.

links should have the red LED illuminated.

STEP 5 - Send Data

Run the timing system as normal; when data is sent to the device connected via RF link, everything is passed the same as if hard wired. When data is transmitted the green LED will be on and the red LED will blink; when data is received by a link unit, the yellow LED will be illuminated.

TROUBLESHOOTING

Minimal troubleshooting is possible without sophisticated software and equipment; however, verify that all units are on (red LED illuminated) and that data is being sent (green LED on and red LED blinking briefly as data is sent) and received (yellow LED on as data is received). Note that data is sent at the conclusion of a race so it is important to run a complete race (or simulated short race) and then observe the RF units for activity. The data should appear on the console/PC and then display.

If the green LED illuminates or the green and yellow LEDs alternate, the Link is encountering interference and may require moving the units. If the data is received correctly, the units are encountering interference but able to overcome and communicate.

For all devices with a short RS232 blue cable, the cable can be plugged directly between the console and scoreboard, printer or display to verify data is sent and received without the wireless link in the circuit.

Moving the RF Links closer together may resolve interference problems in some situations. High gain antennas will improve RF signal integrity.

RaceAmerica offers a debug utility kit to test the RF links in a non-timing system environment. The utility includes PC test software (PC required with 9-pin serial port) and a hardware device to echo data sent from the PC back to the PC from the remote link unit. This should not normally be necessary and used as a last resort only.

When using the USB interface models, make sure the FTDI device drivers are properly installed in the PC.

DIP SWITCH SETTINGS

The 4X20 Series RF Link DIP switches located on one end of the unit should be set as follows for RS232 data connections:

Switch #	Setting
1	ON
2-6	OFF

Only **Blue RS232** data cables should be connected to the RF Link Unit configured for RS232 connections.

The 4X20 Series RF Link DIP switches located on one end of the unit should be set as follows for RS422 data communications:

Switch #	Setting
2	ON
1, 3-6	OFF

Only **Red RS422** data cables should be connected to the RF Link Unit configured for RS422 communications.

MAINTENANCE

The 4X20 Series RF Link units do not require any maintenance beyond normal cleaning. Protect units from direct contact with moisture.

SUPPORT AGREEMENTS

Support agreements are available from RaceAmerica providing 24/7 Telephone Assistance on technical issues and operational questions, repair and/or replacement of hardware failures, Software and Firmware updates, bug reporting, and Annual Preventative Maintenance on all system components. Contact RaceAmerica for more information and pricing of Support Agreements.