

RaceTime Hardware

Manual for RaceTime and RaceTime2

dBcom

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Affordable, Portable, Reliable, Automated T&S

Setup and Operation Overview

- Receiver
- Trackside Antenna
- Vehicle Transmitters

Typical Hardware Configurations

- Standard RaceTime System
- RaceTime System with Antenna Cable Extender etc...

Receiver model RX1C

Amplified Speaker model RSPK1

UniDirectional Antenna model FD900

Transmitter model TX1C

Transmitter model TX1CW

Handheld Transmitter Monitor model M1C

Antenna Cable Extender model AMP2

Battery Backup model UPS12

Hard Facts

- Receiver Issues
- Antenna Issues
- Transmitter Issues
- Interference Issues

Transmitter Mounting Guidelines

Transmitter Hard Wiring

Transmitter Mounting and Wiring Guidelines for Fun Karts

BASIC SYSTEM FEATURES

- Track widths up to 120 feet (37M) with FD900 antenna, unidirectional.
- Use multiple antennas to cover track and pit lane, using optional COMB4 combiner.
- Standard accuracy to 1/100 second, 3/100 typical, optional timing light for 1/1000 second accuracy.
- 200 vehicle (400 optional) per race capability for RaceTime, 1,000,000 vehicle capability for RaceTime2.
- At least 10 simultaneous crossings possible without error.
- A minimum of 100 hour vehicle transmitter battery lifetime.

ABOUT THIS MANUAL

- First read this *Setup and Operation* section to get a feel for the basic system components: the Receiver, the Trackside Antenna, and the Vehicle Transmitters.
- Then, consult the *Typical Hardware Configurations* page for a graphical representation of system setup, including part and model numbers.
- Refer to the *hardware data sheets* in this manual for detailed information about individual system components.
- See the *Hard Facts* section at the back of this manual for trouble shooting and general information.

Information in this manual is for both RaceTime and RaceTime2 systems.

RECEIVER SETUP

Refer to the Receiver data sheet for more information
See Typical Hardware Configurations section for interconnect diagrams

SETUP

- The RX1C receiver is connected to the trackside antenna, the amplified speaker, a power source, and the T&S computer.
- Connect the receiver to trackside antenna using the supplied N10C50 coax cable, or optional AMP2 300 foot (91M) cable and amplifier.
- Connect the receiver to the amplified speaker using the supplied cable.
- Connect the receiver to a power source using; either the supplied 12VBC cable connected to a 12 to 16 volt DC source, or the supplied D12V500 wall supply connected to 120 volts AC - *UPS12 or standard UPS recommended*.
- Connect the receiver to the T&S computer using the supplied N8M9D computer cable, or with no more than 150 feet (46M) of standard RS232 computer cable.

SETTING THE RANGE

- The system reception range is set using the rear panel RANGE control, while listening to the RSPK1 amplified speaker, for optimum system accuracy.
- Receiver range should be set so that the vehicle's transmitter, as indicated by a buzzing sound, is heard for 1.5 to 2 seconds as the vehicle is passing the trackside antenna at race speed.
- A buzzing sound of less than 1 second indicates range control is set too low, or improperly an mounted vehicle transmitter, while a buzzing sound of more than 2 seconds indicates range control set too high.

TRACKSIDE ANTENNA SETUP

Refer to the Antenna data sheet(s) for more information
See Typical Hardware Configurations section for interconnect diagrams

SETUP

- Attach the trackside antenna to the tripod; extend the tripod legs and shaft to maximum height.
- The antenna should be pointed directly across the track, and should be placed as close to the track as is possible and safe, and away from metal.
- Connect the antenna to the receiver using the supplied N10C50 coax cable or optional AMP2 300 foot (91M) cable and amplifier.

NOTE

- The antenna will also pick up vehicle transmitters in the rearward direction to a distance of about 1/8 of the forward range.

VEHICLE TRANSMITTER INSTALLATION

Refer to the Transmitter and Transmitter Mounting Guidelines sections for more information

ATTACHMENT

- A transmitter is attached to each vehicle in a race, or can be carried in the drivers suit pocket - safe mounting is your responsibility!
- Attach the transmitter in the same location and with the same orientation on each vehicle in the run group for maximum accuracy .
- Attach in a relatively elevated location, a few inches away from metal, on the side of the vehicle facing the trackside antenna.
- Examples of successful attachment methods used by our customers:

Sedan - Use velcro to attach transmitter to rear side window, away from cage and body metal.

Formula or Spec Racer - Use velcro and tie wrap, or custom plastic plate to attach transmitter to front bulkhead in nonmetallic nose section, or between frame members, and as elevated as possible.

Enduro Kart - Use dBcom transmitter pouch to attach transmitter on inside upper surface of nose section.

Sprinter Kart - Use dBcom transmitter pouch or velcro and tie wrap to attach transmitter to seat, front fairing, or number plate.

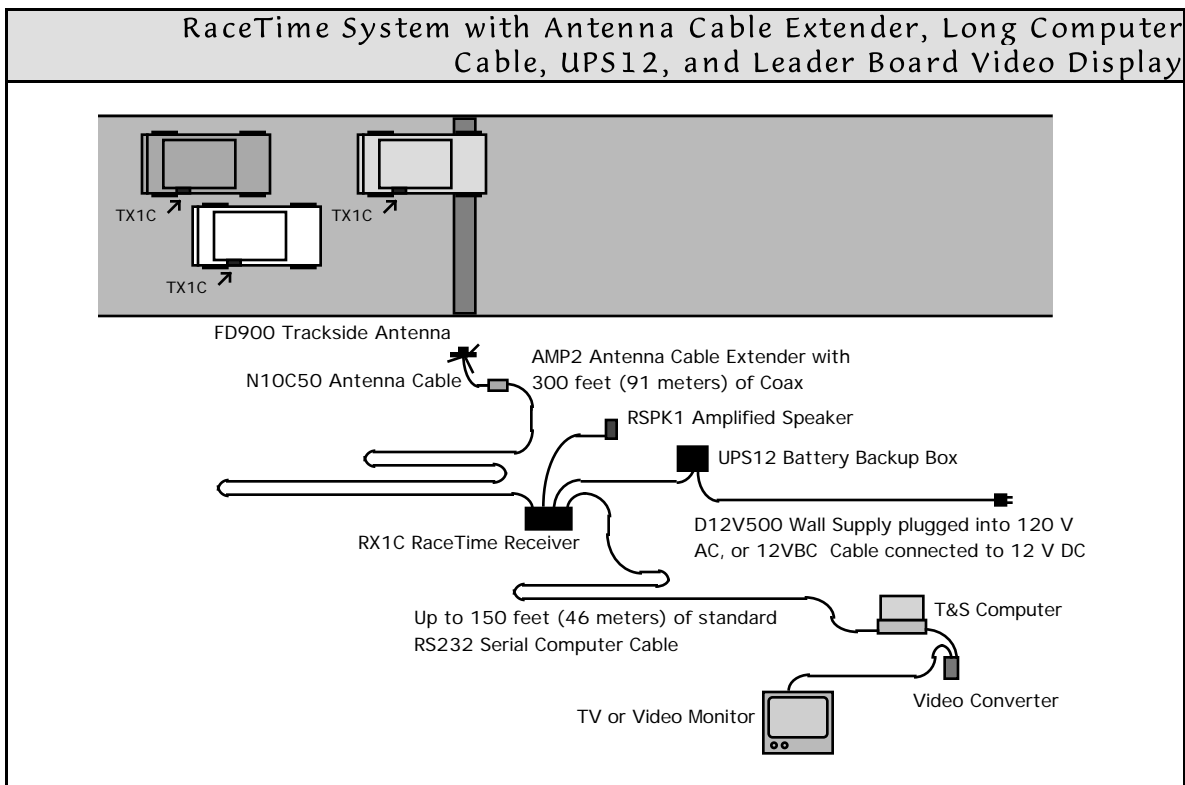
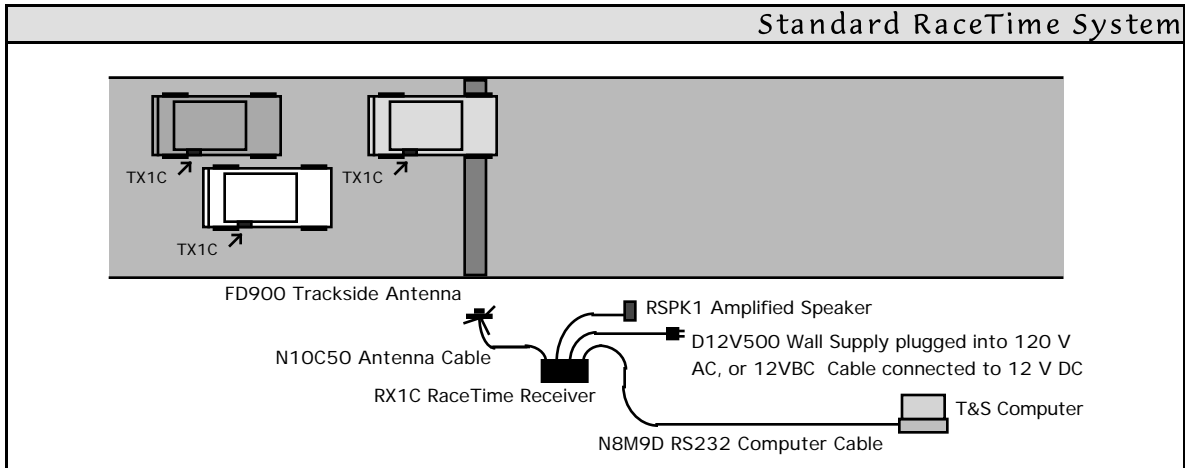
Motorcycle - Use velcro or dBcom pouch or zipable camera pack to attach transmitter to rear upper body work.

Snowmobile - Use velcro or dBcom pouch to attach transmitter to front fairing, or carry in drivers suit pocket.

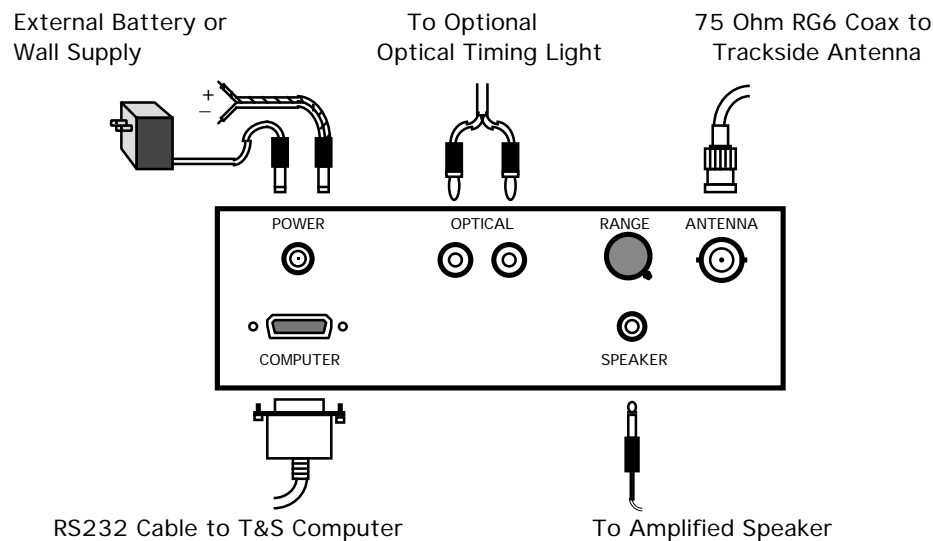
See *Transmitter and Hard Facts* section for more information on mounting.

POWERING

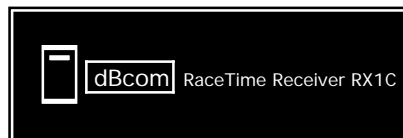
- Standard RaceTime transmitters begin to operate as soon as they are powered; alkaline battery powered transmitters will operate for at least 100 hours - no need to remove battery for entire race weekend.



- The receiver is powered from **12 volts to 16 volts DC** at 500 milli-amps. This can be supplied by the wall supply or by an external power source. The marked wire must be connected to the + side of the external power source.
- The optional optical timing light is plugged into the rear panel banana jacks. Observe polarity by matching plugs to same color jacks.
- The range control is used to set reception range of the receiver. It should be adjusted such that a passing vehicle is received for about 2 seconds as heard with the external amplified speaker.
- The trackside antenna is plugged into the antenna connector. Use the supplied N10C50 coaxial cable, or the optional AMP2 300 foot (91M) cable and amplifier.



- The receiver is connected to the timing and scoring computer by a standard 9 pin M/F RS232 computer cable. Use the supplied N8M9D cable, or no more than 150 feet (46M) of RS232 cable.
- An external amplified speaker can be connected to the speaker jack with a miniature phone plug cable.



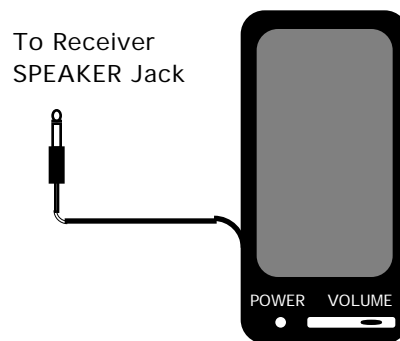
Power to the receiver is turned on and off with the front panel switch.
Power on is indicated by the switch light.
Use dBcom UPS12 or equivalent to **prevent interruption of receiver power** and subsequent loss of lap information.

IMPORTANT

The RX1C can be **DAMAGED** by incorrect powering!

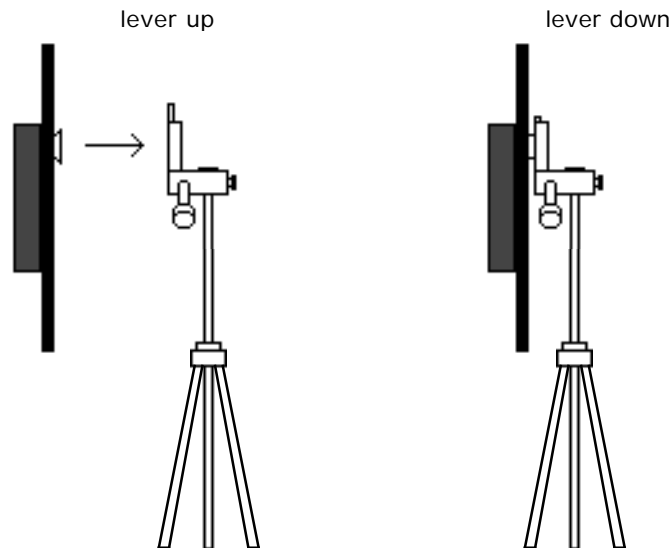
FCC required notice: "This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

- The RSPK1 Amplified Speaker is connected to the RX1C Receiver using the supplied cable, and is used as an aid to setting the receiver's range control for optimum system accuracy.
- Receiver range should be set so that the vehicle's transmitter, as indicated by a buzzing sound, is heard for about 1.5 to 2 seconds as the vehicle is passing the trackside antenna.
- There can be some differences in received signal duration between different vehicle transmitters, depending upon:
 - battery condition*
 - mounting location*
 - close proximity to metal*
 - distance away from the trackside antenna.*Set the range control, as above, using the vehicle transmitter which is heard for the shortest amount of time.
- Note that the Amplified Speaker can also be plugged into the optional Handheld Transmitter Monitor, model M1C. This allows for portable use in finding lost or misplaced transmitters.



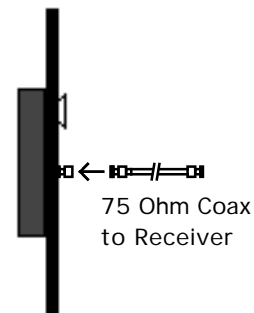
The Amplified Speaker is powered from 4 C or AA cells, with battery access through the rear panel.

- **FD900 Assembly:** The flat profile FD900 is assembled by placing the mounting plate on the back of the antenna into the vertically oriented tripod mount as shown below:



- **Range Considerations:** The FD900 has a maximum range of about 120 feet (37M) in front of the antenna, with the receiver range control set to maximum. Note: The FD900 is designed to be highly directional - It will pick up transmitters to only about 10 feet (3M) behind the antenna.

- **Cable Connection:** The FD900 is connected to the RaceTime receiver. Use the supplied N10C50 cable, or no more than 30 feet (10M) of 75 ohm RG6 coaxial cable, or the optional AMP2 300 foot (91M) cable and amplifier.

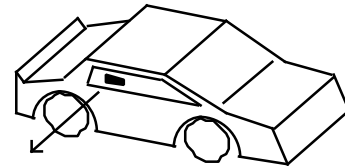


- **Placement:** The FD900 Antenna should have a clear view, be pointed directly across the track, and should be as close to the track as is possible and safe. The antenna can be mounted flush against buildings, fences, etc., but keep the antenna front clear from obstruction.
- Even though the FD900 itself is weather proof, water in the connectors can reduce system performance. It is suggested that **Silicon Gel** be sparingly applied to the connectors in order to provide an additional measure of water proofing.

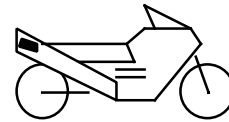
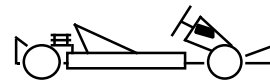
- For optimum performance, the transmitter should be mounted roughly horizontal, as high up as is practical, and on the side of the vehicle closest to the Trackside Antenna.
- Velcro is provided with the transmitter as an aid to vehicle attachment. Additional attachment or confinement **MUST** be used when safety is a concern.

NOTE:
The transmitter should be kept away from metallic edges, surfaces, or wires by at least 2 inches.

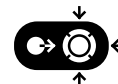
See *Hard Facts* section for more information on transmitter mounting.



Toward Trackside Antenna



- Typical battery lifetime is 100 hours when powered by a 9 volt alkaline battery.
- The transmitter does not have a power switch; it is operational as soon as a battery is installed. The battery should be removed during periods of disuse.
- Battery voltage can be measured with a volt-meter if there are doubts about battery freshness. The battery should be replaced if the voltage is less than 8 volts.
- Maintenance note: The transmitter's + battery connector can spread apart from indelicate battery installation and removal. The connector can be gently bent back into proper shape with fine pliers. There are no other user serviceable parts inside.



NOTE: The TX1C can be **damaged** if the battery is connected up backwards!



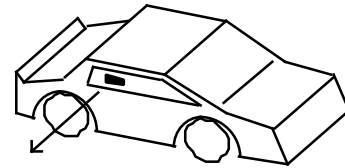
Battery access is through the removable back cover.

FCC required notice: "This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

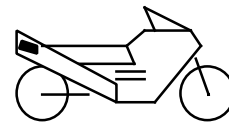
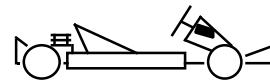
- For optimum performance, the transmitter should be mounted roughly horizontal, as high up as is practical, and on the side of the vehicle closest to the Trackside Antenna.
- Velcro is provided with the transmitter as an aid to vehicle attachment. Additional attachment or confinement **MUST** be used when safety is a concern.

NOTE:
The transmitter should be kept away from metallic edges, surfaces, or wires by at least 2 inches.

See *Hard Facts* section for more information on transmitter mounting.

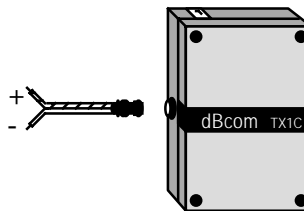


Toward Trackside Antenna



- The TX1C(W) is externally powered from 10 volts to 16 volts at 6 milli-amps.
- The transmitter does not have a power switch; it is operational as soon as power is applied.
- Maintenance note: There are no user serviceable parts inside.

NOTE: The TX1C(W) can be **damaged** if the power is connected up backwards!



The power connector is on the side of the transmitter.
The marked wire must be connected to the + side of the power source.
See *Hard Facts* section for more wiring information.

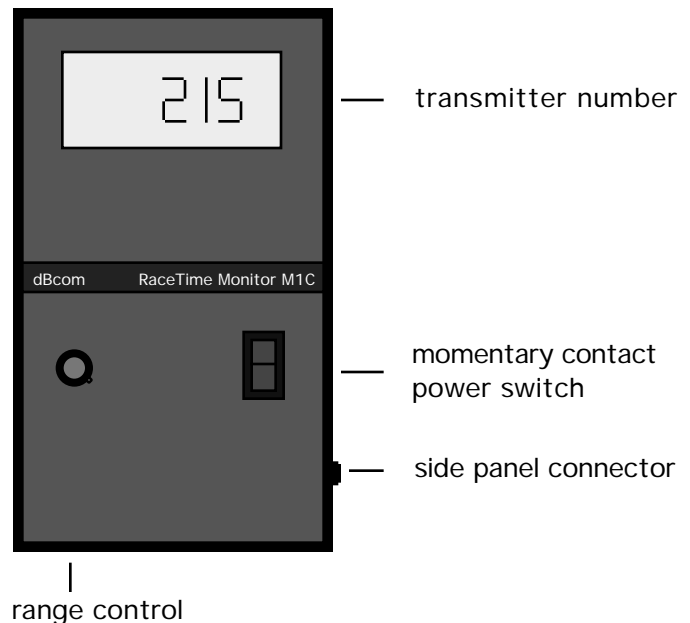
FCC required notice: "This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

RaceTime HANDHELD TRANSMITTER MONITOR

dBcom

model M1C

- The handheld monitor displays the number of a nearby, correctly functioning, RaceTime TX1Cx transmitter when the front panel momentary contact power switch is depressed.
- The RSPK1 amplified speaker can be plugged into the side panel connector. This feature can be used for locating lost RaceTime TX1Cx transmitters by listening for the characteristic transmitter buzzing sound.
- The display shows **-ON-** indicating M1C power on, *OR* the M1C shows a number corresponding to the detected transmitter number.
- The display shows **Batt** for a low M1C (not a low detected TX1C transmitter) battery
- Adjust the front panel range control to maximum (cw) for long range use. Maximum range is about 20 feet (6M).
- Adjust the front panel range control near minimum (ccw) for close range use.

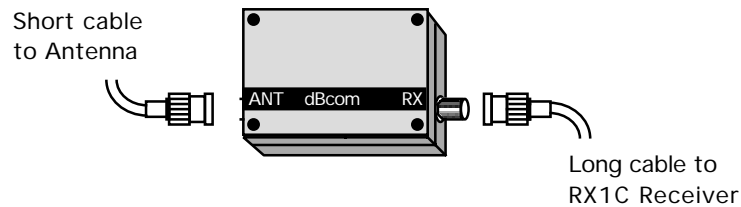


9 volt battery access is through the removable back panel.

Note: A flickering display is usually an indication of the reception of multiple transmitters. Adjust the range control near minimum and position the M1C monitor close to the desired transmitter to eliminate flicker.

Note: The M1C provides a **go/no-go indication only**, i.e. dead transmitter battery, transmitter malfunction, etc. A transmitter can be mounted improperly and still read out on the M1C display!

Connection to Antenna: Use the N10C50 cable, or no more than 30 feet (10M) of 75 ohm RG6 coaxial cable, to connect the Antenna to the AMP2's **ANT** connector.



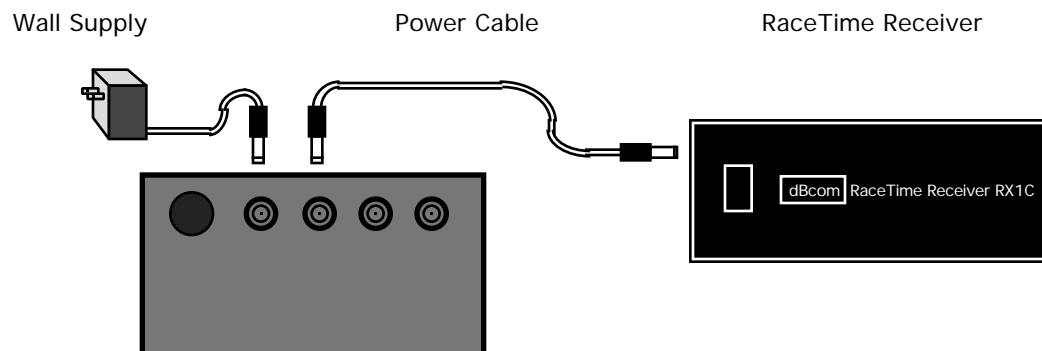
Connection to RX1C Receiver: Use the supplied 300 foot (91M) cable, or 300 feet (91M) of 75 ohm RG6 coaxial cable, to connect the AMP2's **RX** connector to the RX1C's rear panel **ANTENNA** connector.

- The AMP2 is automatically powered from the RX1C receiver - no additional power source is required.
- Even though the AMP2 itself is weather proof, water in the connectors can reduce system performance. It is suggested that the AMP2 be kept out of the rain, and sheltered, so that condensation will not form. **Silicon Gel** can also be sparingly applied to the connectors in order to provide an additional measure of water proofing.

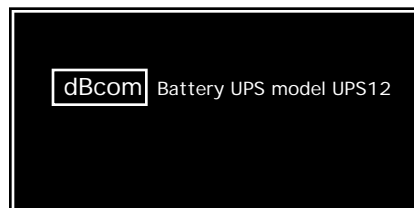
Important: The cable lengths and types are important! Be sure to use only the short 75 ohm RG6 coaxial cable between the antenna and the AMP2, and only the long, 300 foot (91M) 75 ohm RG6 coaxial cable between the AMP2 and the RX1C receiver. Use of other cable lengths and types may result improper system reception range.

NOTE The long length of RG6 cable typically comes in 3 100 foot lengths and IS NOT intended to be strung overhead, as tension can cause conductors to separate. Please contact dBcom for single 300 foot lengths of armored RG6 cable if you must suspend the cable overhead for your installation.

- The UPS12 Battery Backup will provide full power to the RaceTime receiver, and other 12 volt powered dBcom equipment, for at least 6 hours in the event of AC power failure.
- Connect the UPS12 to the wall supply (which is plugged into an AC power source), and the RaceTime receiver, using the supplied cable.
- Make sure the UPS12 is ready for use by charging it overnight with the standard wall supply.
- UPS12 functionality can be verified by disconnecting the standard wall supply and observing that the receiver power light is lit.

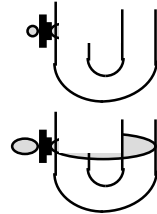


Check the rear panel fuse before and after charging and use. Replace only with a 8 amp unit, if required.



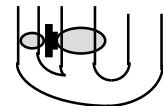
RECEIVER ISSUES

- If RaceTime misses some vehicle crossings:
the receiver's RANGE control may be set to low, and may not be picking up vehicle transmitters over the entire racing lane
- If RaceTime registers extra vehicle crossings:
the receiver's RANGE control may be set to high, and may be picking up vehicle transmitters at more than one point on the track
- The RX1C receiver is not water proof - be sure to keep the receiver out of the rain, and sheltered, so that condensation will not form.
- Refer to the Receiver and the Amplified Speaker data sheets in this manual for more information about setting the RANGE control.



ANTENNA ISSUES

- If RaceTime misses some vehicle crossings, the antenna may be:
to far from the track
near metal
metal between the track and the antenna
not high enough
 - If RaceTime registers extra vehicle crossings, the antenna may be receiving vehicle transmitters off the back of the antenna from, for example:
tight loop backed track sections
hot pit lane
paddock
- The antenna may need to be relocated in this case.
- Refer to the Antenna data sheet for typical pickup range information.



TRANSMITTER ISSUES

- Occasionally, the RaceTime system will not pick up a vehicle transmitter as it goes by the trackside antenna. Below are some reasons that this may happen:
weak or dead battery
transmitter mounted on or near metal
transmitter not mounted on side of vehicle facing trackside antenna
transmitter mounted to close to ground level
damaged battery connector(s)
transmitter interior wet
receiver range control set to low (see above)
antenna location problems (see above)
- Refer to the Transmitter data sheets in this manual for battery and mounting information.
- Note: The optional M1C Handheld Transmitter Monitor can help you avoid and diagnose many of these potential problems.

INTERFERENCE ISSUES

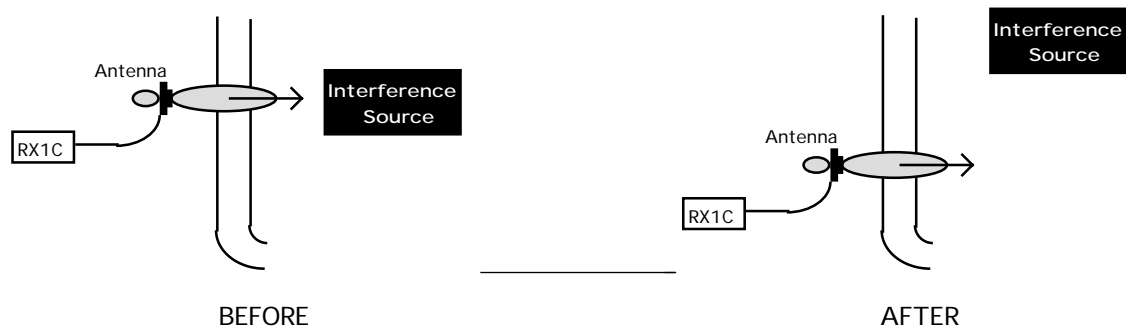
- RaceTime Systems use radio equipment in the UHF frequency range. RaceTime is specifically designed to filter out unwanted interferences, but occasionally, as with any system, special circumstances can cause a problem.
- The amplified speaker is highly useful for determining if the RaceTime system is being interfered with. If you hear other than the normal vehicle transmitter buzz sound from the RSPK1, then you may have an interference problem!
- The UHF frequency band that RaceTime uses (902 to 928 MHz) is a shared frequency band. Some equipment which MAY interfere with proper operation include:

nearby cell phone towers (within 1/4 mile or so)

nearby RF modems in the 902 to 928 MHz band (within a few hundred feet)

other nearby radio equipment at these frequencies

- In almost all of the (rare!) cases of interference problems, re-positioning the trackside antenna and/or the source of interference, as well as reducing the output power of the source of interference, will eliminate the problem:



- Common radio equipment which DOES NOT interfere with RaceTime systems operation include:
 - cell phones (unless VERY close to antenna or receiver)
 - 900 MHz cordless phones (unless VERY close to antenna or receiver)
 - 49 MHz cordless phones
 - AM, Shortwave, FM and TV stations
 - CB equipment
 - paggers
- Please call dBcom if you require further assistance in this matter - we can offer advice as well as special "notch" filters.

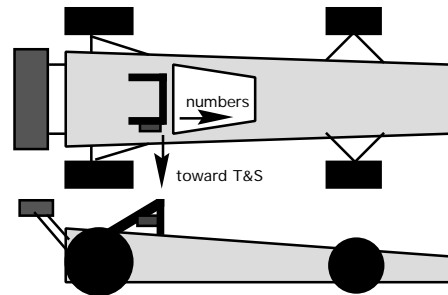
As a radio transmitting device, your TX1C transmitter must be mounted:

- In a relatively **ELEVATED** location.
- In a location which is **NOT** "shielded", i.e., not between radiator and front grill.
- **NOT** directly on metal, carbon fiber, or padded metal dashboard - the numbered end (antenna end) should be at least an inch away from metal.
- Although not critical, it is preferred that the numbered end (antenna end) of the transmitter be pointed in the direction of travel.

System performance is optimized when all vehicles in a run group have their transmitters mounted at approximately the same elevation and with the same orientation!

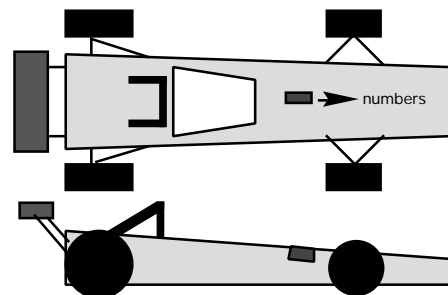
Non-Metallic or Metallic Bodied Mounting Guidelines - Preferred for Formula, Spec Racer

The transmitter should be mounted directly to a plastic plate suspended between the roll bar members using industrial velcro or pouch. Keep the numbered end at least an inch away from the metallic roll bar. See *Roll Bar Mounting Detail* section below.



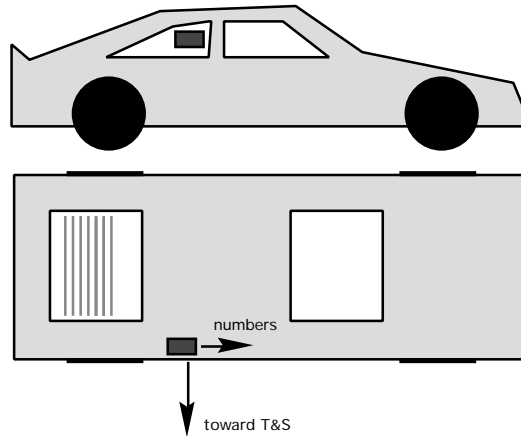
Non-Metallic Bodied Mounting Guidelines - Alternate for Formula, Spec Racer (Enduro Kart - Preferred)

The transmitter can be mounted either directly to the non-metallic body shell or on a plastic plate suspended between internal frame members using industrial velcro or pouch. Mount the transmitter at the most elevated point as is practical.

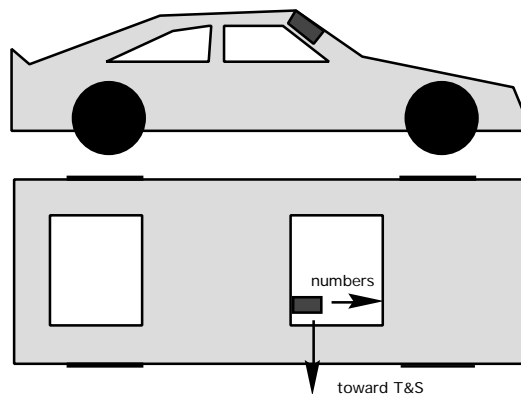


Sedan and Convertible Mounting Guidelines - Preferred

The transmitter should be mounted directly on the side rear window area facing timing and scoring using industrial velcro, or using a Roll Bar mount as shown in the *Roll Bar Mounting Detail* section below. Again, please mount the transmitter at the most elevated point practical as illustrated below:

**Sedan and Convertible Mounting Guidelines - Alternate**

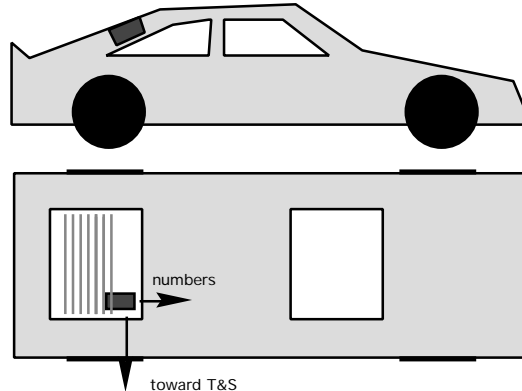
The transmitter can be mounted directly on the upper front windshield area using industrial velcro. Again, please mount the transmitter at the most elevated point practical as illustrated below:



NOTE: Keep the numbered end of the transmitter more than an inch away from body metal, metallic window trim, etc...

Sedan Mounting Guidelines - Alternate

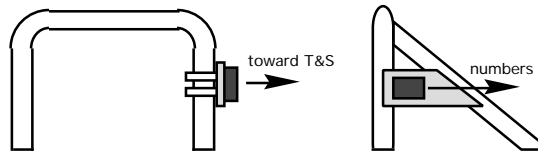
The transmitter can be mounted directly on the upper rear windshield area using industrial velcro. Again, please mount the transmitter at the most elevated point practical as illustrated below:



NOTE: Keep the numbered end of the transmitter more than an inch away from body metal, metallic window trim, etc... Also, rear window defoggers are made of metallic heating wire- keep the number end of the transmitter off of the heater elements.

Roll Bar Mounting Detail

When mounted in a roll bar location, the transmitter should be mounted on a plastic sheet to space the transmitter out from the metallic roll bar, and can be secured using industrial velcro or a pouch, as illustrated below:

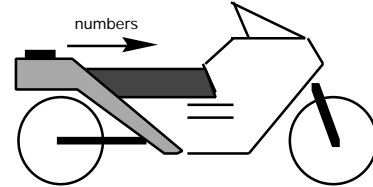


NOTE: Keep the numbered end of the transmitter more than an inch away from the roll bar - it is permissible to have the battery end close to metal if required.

Please remember that the standard battery powered TX1C transmitter is not water resistant. If you want to play in the rain, you can place the battery powered transmitter in a plastic baggy before attachment, or use our water resistant model!

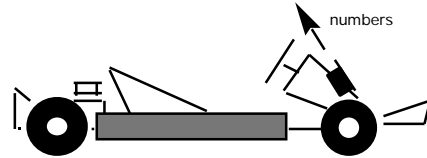
Motorcycle Mounting Guidelines - Preferred

The transmitter should be mounted flat, directly to the top of the tail cowl using industrial velcro or pouch. The transmitter's numbered end must be at least 1 inch away from metal or **carbon fiber**.



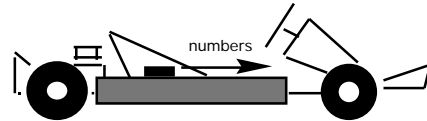
Kart Mounting Guidelines - Preferred

The transmitter should be mounted directly on the rear of the number plate using industrial velcro or pouch. Ensure that the numbered end is at least 1 inch away from metal, carbon fiber, and from metallic numbers.



Kart Mounting Guidelines - Alternate

The transmitter can be mounted directly on the side pod using industrial velcro or pouch. Ensure that the numbered end is at least 1 inch away from metal, carbon fiber, and from metallic numbers.



Please remember that the standard battery powered TX1C transmitter is not water resistant. If you want to play in the rain, you can place the battery powered transmitter in a plastic baggy before attachment, or use our water resistant model!

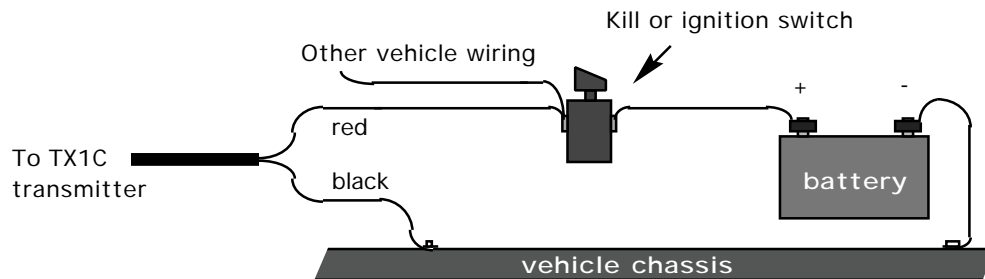
Again we remind you that:

System performance is optimized when all vehicles in a run group have their transmitters mounted at approximately the same elevation and with the same orientation!

Please call one of our representatives if you require further assistance in regard to mounting issues.

CONNECTION

RaceTime TX1C transmitters *with hardwire kit* are powered from an 11 to 16 volt DC source as shown below:



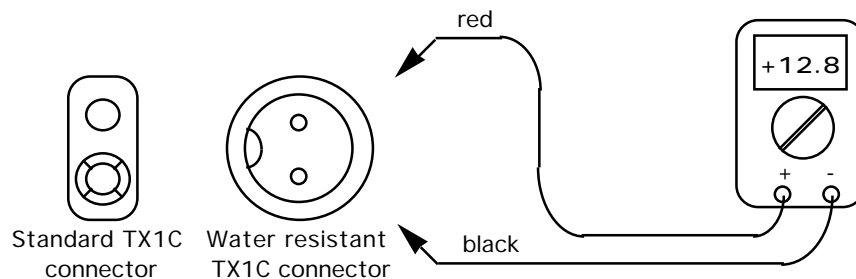
Be sure to use good wiring practices and leave a fair amount of cable free at the transmitter and switch ends for strain relief.

NOTE: The transmitter hardwire kit's red wire should be connected to the first switch in line from the battery - either the kill (safety) switch, or the main ignition switch, or to a terminal block directly connected to the switch. Do NOT connect to auxiliary equipment, such as pumps, ignition boxes, etc.

NOTE: For positive ground vehicles, simply reverse the red and black wires shown in the diagram above.

TESTING

Looking at the end of the hardwire kit's connector, your volt meter should read approximately positive 12 to 15 volts DC when connected as shown below:

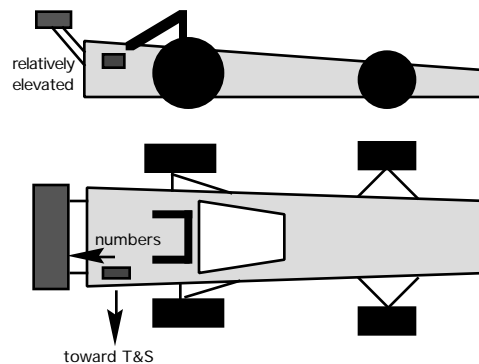


Please make sure that your connections are not intermittent by gently tugging on each connection while noting full voltage as read on the volt meter.

MOUNTING

As a transmitting device, your TX1C transmitter must be mounted:

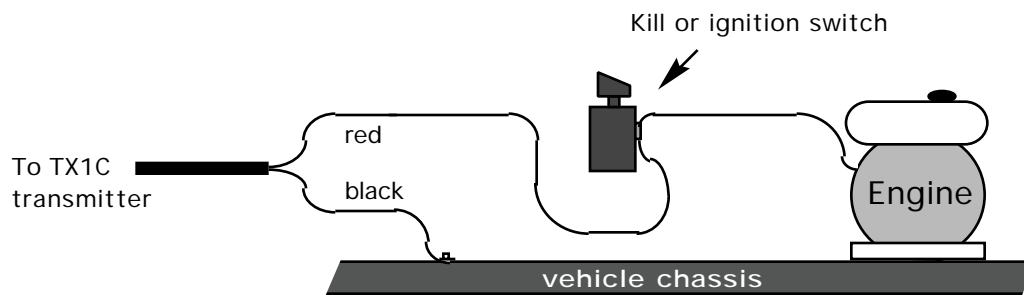
- In a relatively ELEVATED location.
- In a location which is NOT "shielded", i.e., not behind a metallic or carbon fiber body panel.
- NOT directly on metal plate, carbon fiber panel, or padded metal dashboard, however it CAN be mounted on a narrow metallic frame member.
- Although not critical, it is preferred that the number stickered end of the transmitter be pointed rearward.



System performance is optimized when all vehicles have their transmitters mounted at approximately the same elevation and with the same orientation!

WIRING

RaceTime TX1C transmitters *with E8V power supply* are powered directly from a Honda (or equivalent) engine's magneto or kill switch:



Be sure to use good wiring practices and leave a fair amount of cable free at the transmitter and switch ends for strain relief.