

**RIX**

**ROCKET  
TELEMATICS**

**RTx/GPS Quick Start Guide**

A simple “Buy it and Fly it” out-of-the-box GPS guide

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## Introduction

Welcome to the RTx Quick Start Guide! For use throughout this Quick Start Guide, we will be describing a standard setup of the GPS/RTx system using GPS modules in both rocket and base units and an LCD display for the base.

[NOTE: There are many configurations available: You can order a base unit without a GPS if you're just using Bluetooth on a base unit to send coordinate data directly to a Phone unit or Tablet. Also, there is no need for an LCD screen in this format. This also lowers user cost considerably.]

The Quick Start guide is intended for those with little or NO knowledge of previously using a GPS. If you have GPS experience, just turn the units on and most of the information will be self explanatory. [or see the full manual]

An outstanding feature on the navigation screen is the directional "arrows" << left, >> right, and ^ straight ahead. If you have previous experience with RF tracking [falcon trackers], this makes transitioning to our GPS a breeze.

You may already know how to listen to beeps and watch a meter. Louder beeps and a stronger signal on your meter = proper heading to rocket. Missile Works incorporates this direction-finding feature with the GPS/RTx by using visual arrows. When you turn in the direction the arrows are pointing, the unit will lead you directly to the rocket. The straight ahead arrows ^ are shown when your active heading is plus or minus 3 degrees from the rocket heading. No need for latitude or longitude coordinates or a handheld GPS to find the rocket!

## Getting Started

First things first, you will probably want to play with all the buttons and settings, and that's fine. BUT "what do I do, if I goof things up?" Remember THIS:

**NOTE: TO RESET ALL SETTINGS TO DEFAULT, USE THIS PROCEDURE!!!!**

- Push and HOLD the programming/pause pushbutton
- While the pushbutton is pressed, apply power to the RTx/GPS base unit
- Continue holding down the pushbutton for approximately 5 seconds
- Release the pushbutton when it beeps (POST code 1 is beeped)
- Shut the RTx/GPS off. Done. You have just reset everything and are ready to go again.

GPS units are power hungry little devils. You can use a 9-volt battery, but life expectancy is around one hour to one hour and a quarter. 1 hr -1hr 15 minutes. Recommended is a 1-cell 750mAH Lipo [Turnigy Nano-tech @ HobbyKing]. These have been tested to provide 10 hours of continuous operation. Should the battery in the rocket die before locating it or you must come back the next day, this unit has another great feature built in. It stores the last received location in memory and by switching to the appropriate screen, you can just pick up where you left off and the directional "arrows" will take you to the landing location.

The easiest way to gain experience without confusion is to practice using the transmitter [rocket] and receiver [base] alone. Once mastered, THEN tether/hook up the RRC3 to the GPS to piggyback all that data to the ground during flight. When tethered to the RRC3, the 3-dip switch settings must be changed on both rocket and base unit in order to "recognize" the RRC3. When using the GPS stand alone, you must also reset the 3 DIP switches. Pay attention to DIP switches if you change configurations.

Hook a battery to your base and rocket unit. A simple jumper wire can be used for a power switch. Take the units outside [note: metal roofs and buildings can block signals from satellites.]

First, turn on the rocket unit, then the base. It can take a minute or two for satellite lock. The screens on the LCD should begin to scroll between 4 different LCD screens (shown below). This will occur every 2 seconds (shows screen 1 and pauses 2 seconds, shows the next screen for 2 seconds and so on).

When the base begins to receive “packets” [data], there will be a “beep” for each packet. When you hear this beep you know you have radio packets from the rocket and everything is functioning correctly. You may also change the scrolling rate to 1 a second refresh, or the tone of the beeps, or delete the beeping entirely if desired [see full manual].

### Getting Familiar with RTx

For our learning exercise, you will want to tap the “PROGRAM/PAUSE” button to pause the LCD scrolling when GPS data screen is displayed (see page 5 if you’re unsure of the button location):



This display shows the additional GPS data available from the ROCKET unit. The data displayed here reflects your current settings of the LCD Update Options setting. By default, the COG and SOG values (Course Over Ground and Speed Over Ground) are not shown.

The GPS Lock Status codes are as follows:

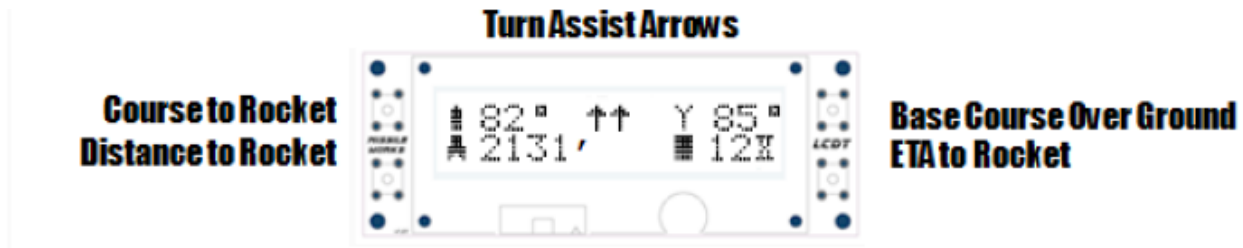
GPS Lock Status	Notes
<b>NF = No Fix</b>	<b>Don't fly your Rocket if there's no GPS FIX data</b>
G2 = 2D Solution	Lat/Lon only (no altitude). 3-satellite minimum.
G3 = 3D Solution	3D position of Lat/Lon/Altitude. 4-satellite minimum.
D2 = Diff 2D Solution	Lat/Lon only with SBAS* (no altitude). 3-satellite minimum.
D3 = Diff 3D Solution	3D position of Lat/Lon/Altitude with SBAS*. 4-satellite minimum.

\* SBAS = Space Based Augmentation System

These are the possible Lock Status codes showing on the display. You want to see “G3” with a minimum of 4 satellites showing for proper function. That’s on the lower right side, the number next to the little antenna dish. You can have many more than 4; I’ve had as many as 15, but 4 is the minimum magic number! [screen above shows 10] If nothing happens after several minutes [this can happen, no worries], leave base on and turn off the rocket unit, wait 5 seconds, and restart it.

After attaining “lock” with at least 4 satellites, push pause again and screens should change every 2 seconds, Take a moment and see what they all are showing. You can “pause” on any of them for closer scrutiny.

After playing awhile and familiarizing yourself with the GPS data screen, tap the "PROGRAM" button to restart the LCD scrolling. Pause the LCD scrolling when you see the Navigational Display screen.



The Course and Distance to Rocket are continuously displayed. The Turn Assist Arrows, ETA (Estimated Time of Arrival), and BASE COG (Course Over Ground) are ONLY displayed when the BASE unit is moving  $\geq 1$ Km/Hour, otherwise the arrows are not shown and the COG/ETA are displayed as a question mark (?), depicting their uncertainty when the BASE unit is stationary. Once you're moving with the BASE unit, use the Turn Assist Arrows to turn left (<<) or right (>>) to converge your Course Over Ground with the Course to the Rocket. When both courses (headings) are within  $\pm 3$  degrees of each other, the Turn Assist Arrows will point straight up as shown above, indicating you're effectively heading straight toward your rocket.

**REMEMBER YOU MUST BE MOVING WITH BASE UNIT TO SEE DIRECTIONAL ARROWS AND TIME [ETA] TO ROCKET!!!! IF YOU SEE QUESTION MARKS (??'s) .....YOU NEED TO MOVE!**

Even if you just walk back and forth slowly (it's all it takes), the base unit MUST sense motion to update and navigate. Now place the rocket unit with GPS antenna [square beige box] facing up on solid location and walk away from the rocket while holding the base unit until you're at least 100ft. away from rocket unit [the farther the better].

Turn around and slowly walk back [at first until you learn] toward the rocket unit. Directional arrows will begin to function and you can see by walking in different directions how they work. Once you have it figured out, walk several hundred yards' distance and change direction a few times while walking back to the rocket unit to see how the arrows easily "find" the rocket.

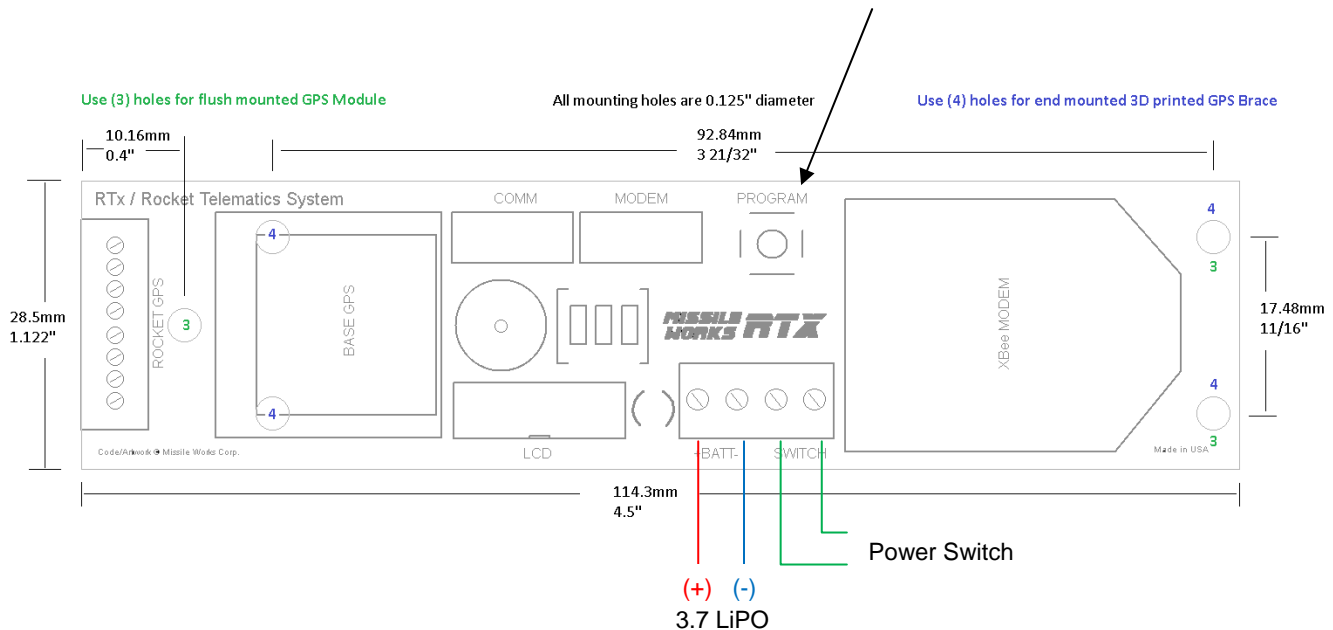
Walk at a faster pace and you'll notice the ETA [estimated time of arrival] to the rocket changes. A faster pace will show less time, and a slower pace shows a longer time. When actually launching/retrieving for real, if you see an ETA of 20-30 minutes or longer, time to get in the car if possible [unless you want a LONG walk] and drive to a closer location to your rocket.

The example screen above shows rocket at course of 82 degrees and base unit moving at 85 degrees. As a directional reference, remember that North is 0/360, East is 90, South is 180, West is 270. If you know where North is at your launch location, all this really gets simple.

**NOTE:** GPS units in general are accurate within 20-30 meters [60ft]. This means once you get within 60ft of rocket [give or take, at times I've gotten 15ft, other times 75 ft], the Navigation display can go wonkers showing screwball headings and data (because of this "general accuracy"). At this point under most conditions, you should already see your rocket anyhow. Just like your old falcon/RF tracker, if you get to within 50-100 ft of the transmitter, the signal is so strong you can end up walking in circles!

## Mounting and Wiring

Here are the mounting dimensions of the RTx, the PROGRAM/PAUSE Button, and general wiring diagram.



Your RTx mounting system can be as simple as this:

Make a small sled, same size or slightly larger than unit, attach battery [recommended 3.7 v 1S 750Ma LiPO] to one side and using 4-40 hardware, mount GPS to the other side.

Wrap the sled with bubble wrap and place it in nose cone or in av-bay where there is room. Add more bubble wrap to immobilize the sled and you are good to go. Using a simple power switch wire and twisting leads for power provides fast moving of your unit between flights to different rockets. The switch wire can be fished through a vent hole or hole in a bulkplate. It's best to turn on at your table, attain lock, tape the switch wire to bulkplate, then add your shear-pins and go to pad.

This gives you a "hot start" on rail rather than going to pads, placing on rail, and waiting several minutes for lock, normally known as "cold" start.

That's as simple as it gets. Of course, you can mount to altimeter sled or custom sled in the NC using screw switches, Schurter, or other types.

Just to be "sure," it is advisable when placed in av-bay [before first time use], power up both altimeter [just e-match] and GPS, let run for 5-10 minutes to affirm there are no issues between units. None have been found so far, but there is always the unknown.

When mounting unit in rocket, it's advisable to mark externally [with a bit of tape that can be pulled off or permanent with marker] location of GPS antenna, the tan square one. When placing rocket on rail/in tower, you do NOT want antenna facing/against the rail/rails. They can block signal reception. In tower, place such that antenna is between rod/rails of tower. When against metal rail/rails tower, it creates a "Faraday cage" blocking signal. Knowing WHERE your antenna is can alleviate this.

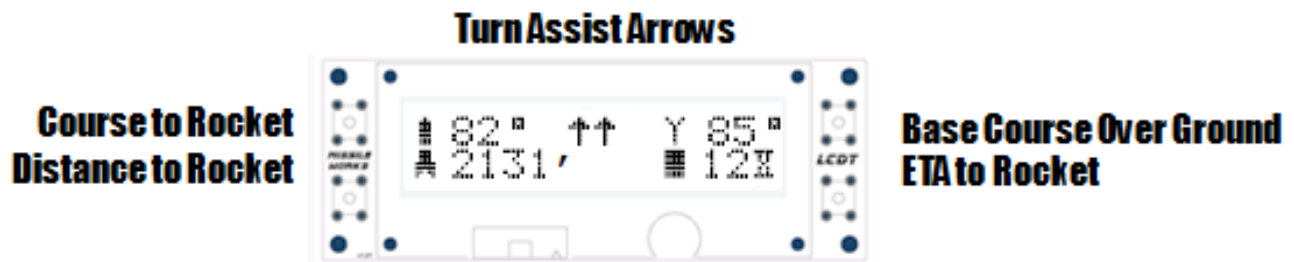
### GPS Data Screen

Rocket Unit GPS Data Display



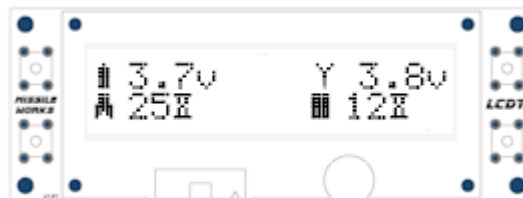
### Navigation Screen

Shows the Distance and Course to Rocket, and Base Unit Course and ETA to Rocket.



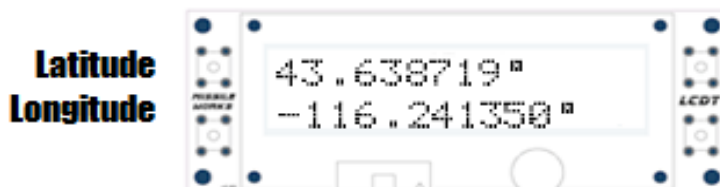
### Status Screen

Shows the Battery voltage and total runtime of Rocket and Base Units in the current session.



### Lat/Lon Screen

Rocket Unit Lat/Lon coordinates



(note: LCD Screens are shown in “scrolling order”)

### **RTx Recovery using the LRC (Last Received Coordinates)**

Here's where the RTx System really shines! Your landing location is stored in the base system memory. Should you not recover your rocket due to nightfall, rain, or whatever, you can come back days later and still find it.

**WARNING:** Don't fly another rocket if you have several units as the memory is overwritten per flight!

**NOTE:** Always write down the last LAT/LON coordinates on paper as a backup to the RTx memory.

Even though the battery may die in the rocket unit, last location can be found by going to Menu Mode on the Base unit. Turn the unit on and tap the Pause/Program button within 5 seconds. This mode is how you change/check on all your GPS setting for transmitter/base [details on all that in full User Manual]. We are only concerned with using to LRC Controls [last received coordinates]. Enable that screen by tapping on the upper right button of the LCD Terminal.



Now unit will act like there is a “live” hunt going on. Directional arrows begin working and the compass headings magically appear. You can now begin walking/driving to landing location.

### **You are Ready to Fly!**

The Quick Start is a fast track guide for those who are new to GPS or those who are familiar with directional RF tracking. The RTX system can be used in the same fashion. It makes for a seamless transition from RF [falcon tracking units, Comm-Spec, Marshall, LLC, etc.] to the GPS functionality of the Missile Works RTX/GPS.

This unit can be used as simply as following the arrows/compass headings in lieu of “beeps” found in standard tracking units, or as complex as Google Earth mapping, with exact locations, should you have the needed Android phone with Bluetooth etc., etc.

***Enjoy your flights, and now enjoy your recoveries just as much or more!***

### **Product Warranty**

Missile Works Corporation has exercised reasonable care in the design and manufacture of this product and warrants the original purchaser that the RTX/GPS is free of defects and that it will operate at a satisfactory level of performance for a period of one year from the original date of purchase. If the system fails to operate as specified, return the unit (or units) within the warranty period for repair or replacement (at our discretion). The system must be returned by the original purchaser and be free of modification or any other physical damage which renders the system inoperable. Upon repair or replacement of the unit, Missile Works Corporation will return the unit postage-paid to the original purchaser.

### **Product Disclaimer and Limit of Liability**

Because the use and application of this equipment are beyond our control, the purchaser or user agrees to hold harmless Missile Works Corporation and their agents from any and all claims, demands, actions, debts, liabilities, judgments, costs, and attorney fees arising out of, claimed on account of, or in any manner predicated upon, loss or damage to property of, or injuries to or the death of, any and all persons arising out of the use of this equipment. Due to the nature of electronic devices -- and the application and environments for those devices -- the possibility of failure can never be totally ruled out. It is the responsibility of the purchaser or user of this equipment to properly test and simulate the actual conditions under which the device is intended to be used to ensure the highest degree of reliability and success.

## Summary Sheet (Print this page and keep it in your Range Box)

1. Always turn unit in rocket on first, then base. Base will be searching for signal from rocket.
2. If no signal on base after 1-2 minutes, power off the rocket unit, wait 5 seconds, and try again. The Base Unit will “time out” after 60 seconds and also must be restarted. You need G-3 status & 4 satellites for GPS to function. Most of the time lock is attained in less than 60 seconds. Clouds/low ceiling/bad weather may take longer.
3. Be sure you are on the “Navigational” screen to begin your search.
4. Tap pause button to freeze any screen. Tap pause button again to continue rotation of screens.
5. Best to start units up and get “lock before placing on pad/tower. Hot start is always better than cold start on the pad.
6. YOU must be “MOVING” to enable directional arrows on BASE unit.
7. After turning power off on base or coming back to find rocket at later time you must enable the LRC [last received coordinates screen] screen in Menu Mode to begin your search.  
**Do NOT fly again till lost rocket is found. Memory is overwritten by a new flight.**
8. When placing rocket on rail/in tower, best results if GPS antenna is not against rail/rods.
9. Your Base unit must contain GPS when ordered to use the navigational features. The RTx system comes to you set for standalone GPS use. No need to change DIP switch settings UNLESS hooking up the RRC3.
10. If “tethering” [connecting] the GPS to RRC3, the 3-DIP switch settings must be changed on both base AND rocket. See full manual for details. They must be changed BACK if RRC3 is disconnected and GPS is used stand alone.
11. Each unit is assigned an electronic serial #. This can be displayed in Menu Mode with a quick tap of the Program/Pause button. This serial number is needed when adding more rocket GPS’s to your fleet or programming a new one if you lose GPS with your rocket, so that it matches the base unit. You need this # when ordering more so the new ones can be properly programmed to your specific base. There are over 60,000 Network ID’s, so you never need worry about someone else being on yours at a large launch. Missile Works maintains a list of all sold units and their ID’s, so if you buy a unit from a third party or different vendors, you can always get more matched units. Units are identified by Network ID #, not by name or vendor.
12. Yes, you can have several rocket units operating with one base. But only the unit currently in use may be powered on. Be sure, if you have multiple units in different rockets, that you shut down the units NOT being flown.

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