



Multitime World Champion F1C flier Randy Archer and son Ryan show GPS receiver with wind speed and direction station. They like using GPS to locate models after long flights. Sometimes flyoff flights get far away, and it is helpful to have a way to find where they land using wind information and GPS receiver.

Searching for Free Flight Airplanes

by John Patton

FOR MANY YEARS we Free Flyers have been wandering around trying to find our airplanes on foot or atop small dirt bikes, following what we hope are the "lines" the models took during their flights. Most of the time we try to get visual lines or fixes on the directions our airplanes take by sighting in on a mountain, a tree, or, here in Arizona, a cactus. We are usually successful, and we get our models back to fly again.

However, sometimes we get off-course because we have to cross obstacles such as ditches or highways, or because we just plain don't walk too straight. If we waste a bunch of time searching and can't find our models quickly, it affects how many flights we can put up at a contest. The best time to fly on any given contest day is usually fairly short. The ultimate nightmare is losing models that really should be easy to find.

This article will explore a simple way to locate a model based on knowledge of wind speed to calculate flight distance and wind direction to predict a point where the model should be sitting using a Global Positioning System (GPS). It is a relatively inexpensive yet high-tech approach to getting our models out of the corn! By knowing the amount of time the airplane is in the air and the accurate wind speed and direction, we can easily go right to the model.

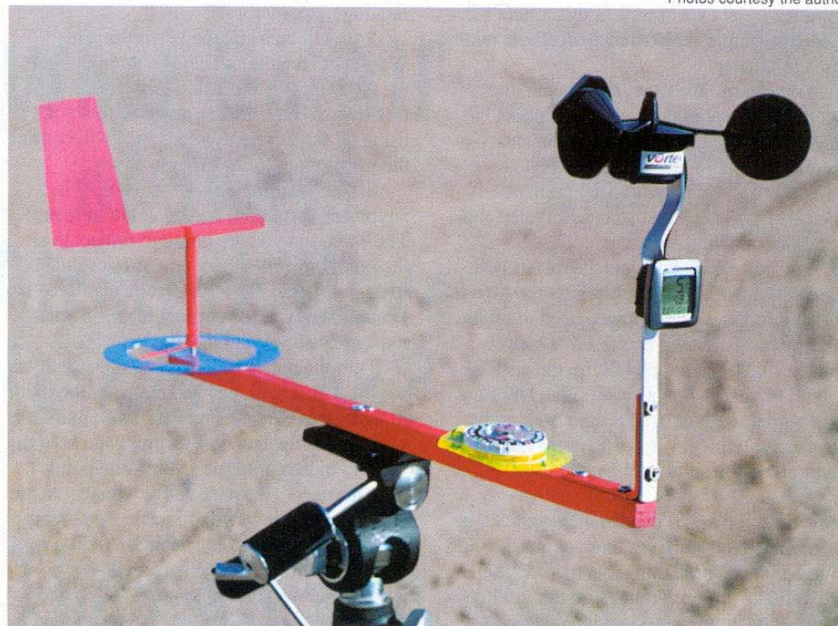
A Free Flight model is set up to glide in circles as it follows the

wind to its (it is hoped) max flight. The aircraft drifts downwind in this circle for as long as you have set the timer for the dethermalizer device. This is a known time and is used for your calculations with a fudge factor for how long it takes your airplane to lose altitude when dethermalized.

It is good if you can see the model and time it until it reaches earth. This reduces any time-related errors. Even if the flight is not a max, you can accurately follow the aircraft's path straight downwind with GPS information. This is difficult to do with only a compass if you are not an expert.

There are some nice marine binoculars available with built-in electronic compasses that can give you an accurate heading as you follow the model's flight path. You need to know wind speed and direction accurately for the next part of the equation. The old wet finger up in the air ain't gonna do it!

Several inexpensive wind-speed meters on the market (some even advertised in this magazine) should be within any club fund's or most serious modeler's reach. You can be in business for way less than \$100. Commercial wind-direction meters are more



Wind-speed meter shows current, average wind speeds. Unit logs max wind speed too. Wind direction is measured on protractor.

$$\text{DISTANCE TO LANDING (MILES)} = \text{WINDSPEED} \times \text{TIME} / 60$$

		TIME (MINUTES)									
		1	2	3	4	5	6	7	8	9	10
W I N D S P E E D (MPH)	1	0	0.03	0.05	0.07	0.08	0.1	0.12	0.13	0.2	0.2
	2	0.03	0.07	0.1	0.13	0.17	0.2	0.23	0.27	0.3	0.3
	3	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.5	0.5
	4	0.07	0.13	0.2	0.27	0.33	0.4	0.47	0.53	0.6	0.7
	5	0.08	0.17	0.25	0.33	0.42	0.5	0.58	0.67	0.8	0.8
	6	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	7	0.12	0.23	0.35	0.47	0.58	0.7	0.82	0.93	1.1	1.2
	8	0.13	0.27	0.4	0.53	0.67	0.8	0.93	1.07	1.2	1.3
	9	0.15	0.3	0.45	0.6	0.75	0.9	1.05	1.2	1.4	1.5
	10	0.17	0.33	0.5	0.67	0.83	1	1.17	1.33	1.5	1.7
	11	0.18	0.37	0.55	0.73	0.92	1.1	1.28	1.47	1.7	1.8
	12	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
	13	0.22	0.43	0.65	0.87	1.08	1.3	1.52	1.73	2	2.2
	14	0.23	0.47	0.7	0.94	1.17	1.4	1.63	1.87	2.1	2.3
	15	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.3	2.5

complex (read expensive). In this article I'll refer to a simple yet extremely accurate wind-direction meter.

You can use the time of flight and the wind speed to predict how far the model has traveled since launch; that is the distance traveled. Then you can use the GPS to navigate to the point where the airplane should be by using the distance traveled and wind-direction information.

You can easily calculate the distance the model has traveled by multiplying the time of flight in minutes by the wind speed in miles per hour and dividing by 60. For a four-minute flight in a 6 mph breeze, the airplane should travel $6 \times 4 \div 60 = .40$ mile. During a seven-minute flight in an 8 mph breeze, the airplane will travel $7 \times 8 \div 60 = .93$ mile. The chart gives you some numbers to use.

Now that you know the distance, you can get to the high-tech stuff; for that you need a GPS unit. Don't let these things scare you. There are as many options/features on these things as there are bumps on a pickle. You don't really need all the fancy maps for your use.

The simplest unit (inexpensive) is the Garmin eTrex personal navigator (the yellow one). You can find these for \$100 in sporting-goods places and on the Internet. Any GPS will do the trick, and if you really need a

moving map, go for it!

You will be using the "Projecting a Waypoint" feature, which is common to all the GPS units. It is outside the scope of this article to explain how to navigate to a point using all the different brands, so I will confine the instructions to the Garmin eTrex.

In GPS terminology, a "waypoint" is anyplace you choose for the unit to remember. The waypoint you are going to project to is the point on earth where you have calculated that your model has landed. You also need to know where you are coming from, so you must create a waypoint at the launch site.

Turn the unit on and let it find its satellites per the instruction manual. This gets the unit to figure out where it is on earth. To mark a waypoint at the launch site, press and hold the "Enter" button until the "Mark Waypoints" page appears. This page shows where you are on earth and allows you to name the launch-site waypoint something such as "field."

When the launch site is named—field—use the "Down" button to go to "OK," and then press "Enter." Use the "Page" button to go to the "Menu" page. Select and enter "Waypoints." Find and select the "field" waypoint. This will open the "Review Waypoints" page with "field" as the waypoint.

Next, project to a waypoint at the distance and bearing as calculated. Select and enter

"Project" on the "Review Waypoints" page. This will open the "Project Waypoint" page. The unit will assign a number—which you should remember—to the projected waypoint or you can name it yourself.

Enter the distance and angle we arrived at earlier in the number and angle fields, and the GPS will have a place to go to. After the "Edit Number" and "Edit Angle" features are entered, you will return to the "Review Waypoint" page.

Scroll to the "Go To" function and hit "Enter"; that will activate with the selected waypoint as the destination. It will also activate the "Pointer" page, which will steer you to the waypoint where your model is resting.

Since the GPS unit won't let you put in a number smaller than .1 mile for distance, remember that .01 mile is 52.8 feet. If you need to travel .34 mile to your model, enter .3 mile in the GPS and go another 211 feet (as measured on the GPS readout) with the pointer indicating that you are going straight away from your waypoint. It may be easier to use the "Map" page to follow the line to the model.

A basic and accurate anemometer to measure wind speed and direction is shown in the illustrations. A wind-speed meter—the Vortex Pro-1200—is mounted on one end of a bar. Wind direction is measured at the other end of the bar by a weathervane device that indicates the bearing in compass degrees as measured on a protractor.

Mount the whole rig on a tripod to get it high off of the ground. Orient the bar to magnetic north, and read the wind direction on the protractor scale that increases numerically clockwise.

It seems as though you have just gone back to school, doesn't it? Enough with the lessons—let's go fly! **MA**

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