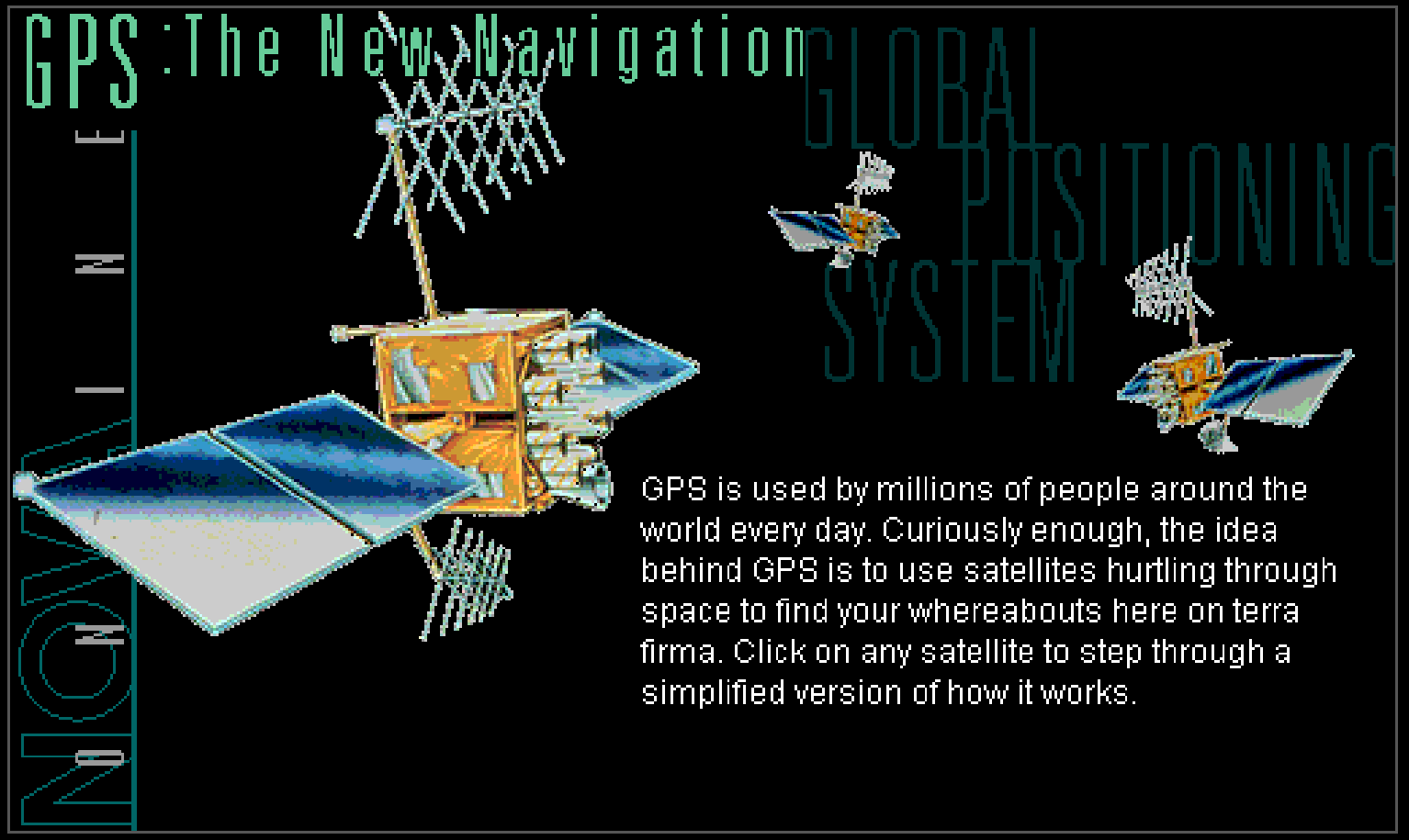


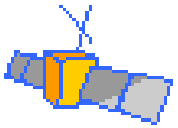

•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS WORKSHOP AGENDA

1. Intro
2. Powerpoint (GPS)
3. Introduction to & set up of Garmin Etrex Units – Basic Navigation
4. Two Activities:
    a. Geocaching (Marc)
    b. Mapping Your School Back Campus (Rob)
5. Outdoor Activity
    a. Recording waypoints
    b. Using the Go To feature (geocaching)
6. Mapping recorded waypoints (Back indoors)

# GPS: The New Navigation

You'll need to find your distance to three satellites in order to find out where you are. The satellites and your GPS receiver are generating duplicate signals at exactly the same time. But, because the satellites' signal travels at the speed of light (186,000 miles per second), the satellite's radio signal still takes a few hundredths of a second for it to arrive at your GPS receiver.



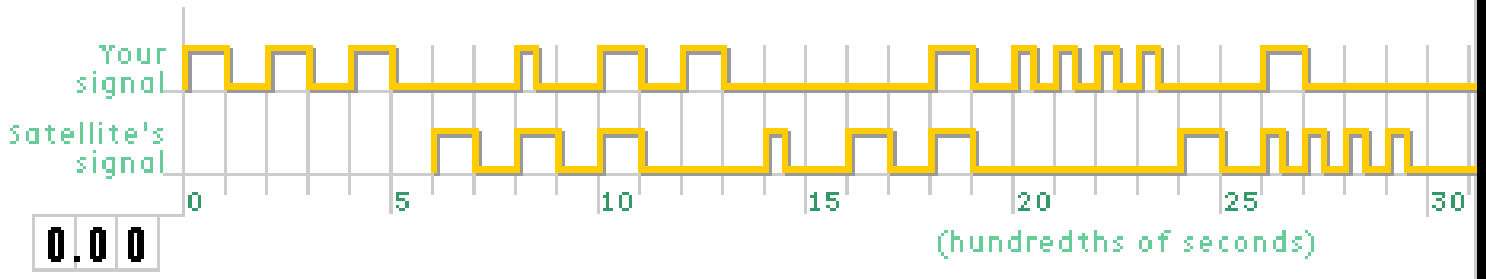
Click on your GPS receiver to get a signal from the first satellite.


•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation

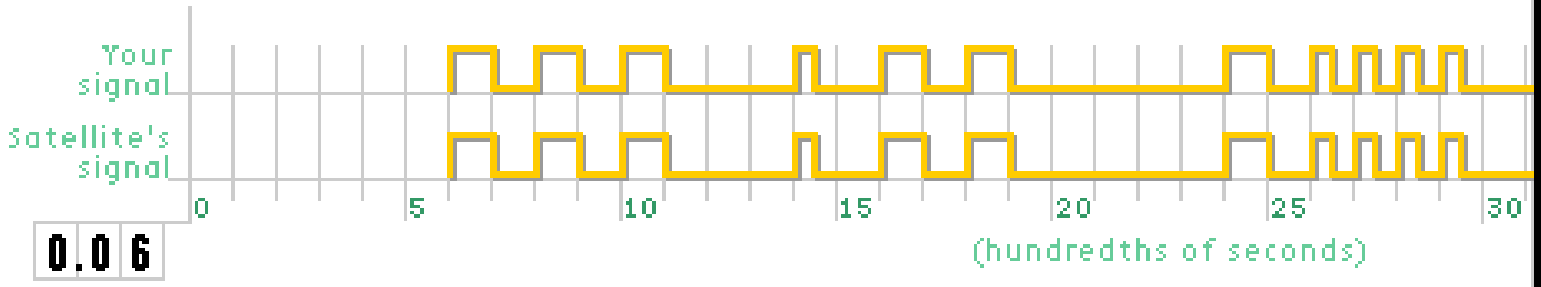
By the time you get the satellite's duplicate signal, it's out of sync with the one you generated by 0.06 second.

Click on your signal to continue.




•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation




You'd like to know your distance from the satellite. The signal travelled at the speed of light, which is 186,000 miles per second, and took six hundredths of a second (0.06) to reach your GPS receiver.

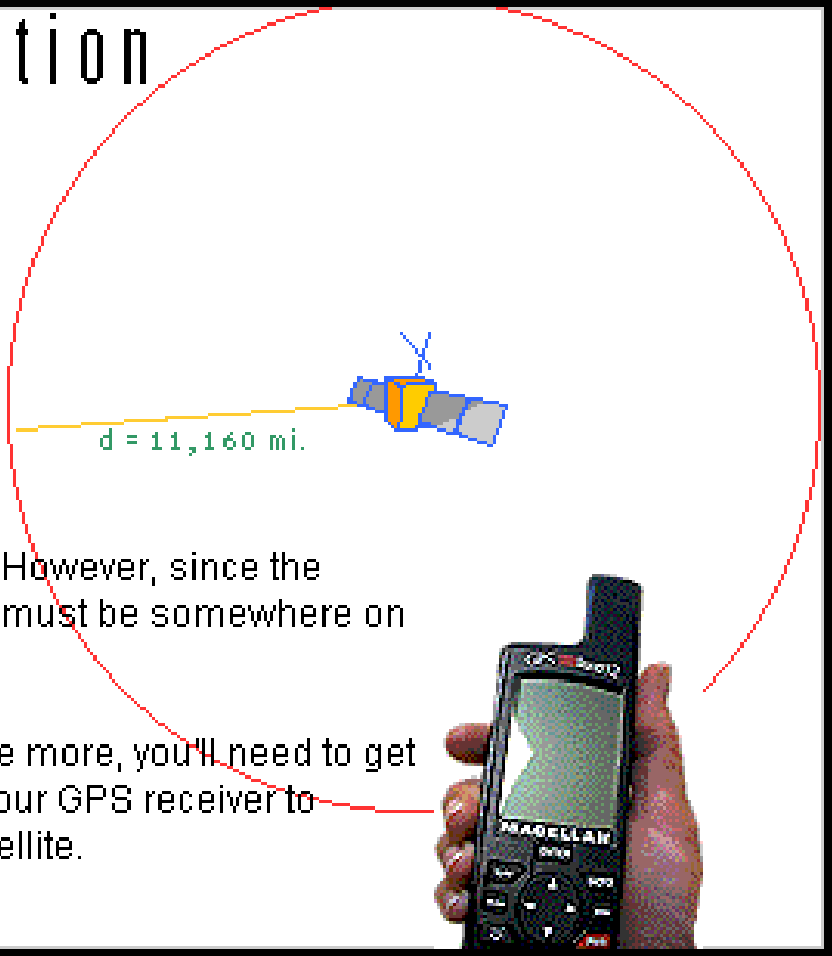
speed x time = distance

Plugging the known variables into the equation below allows you to figure out the distance from the satellite. Click on your signal to continue.

| 186000 | miles/second x | .06 | second = | 11,160 | miles |
|---|---|---|---|---|---|

•http://www.pbs.org/wgbh/nova/longitude/gps.html

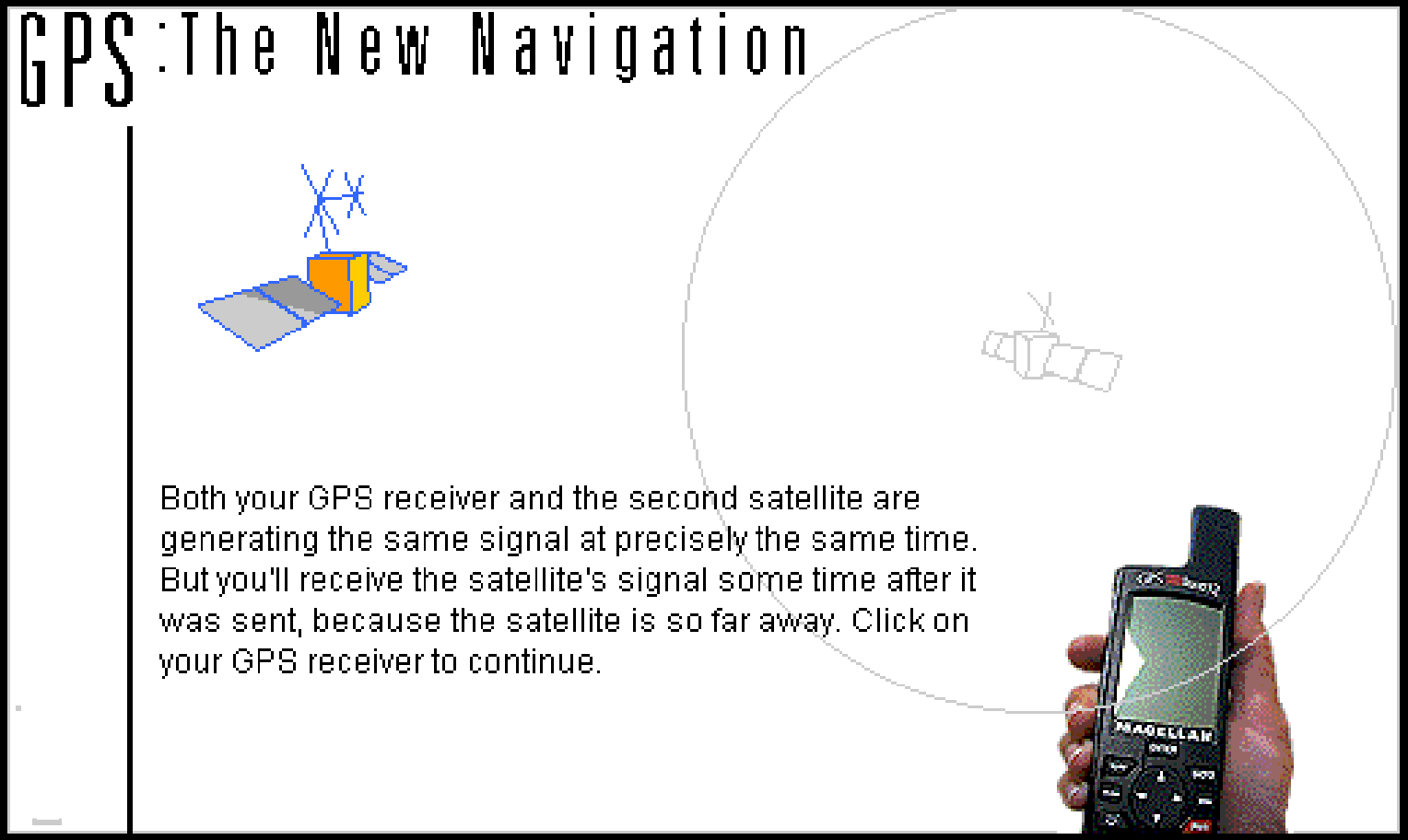
# GPS: The New Navigation




You still don't know where you are. However, since the satellite is 11,160 miles away, you must be somewhere on this sphere.

To narrow down your location some more, you'll need to get a fix on another satellite. Click on your GPS receiver to receive a signal from a second satellite.

•http://www.pbs.org/wgbh/nova/longitude/gps.html

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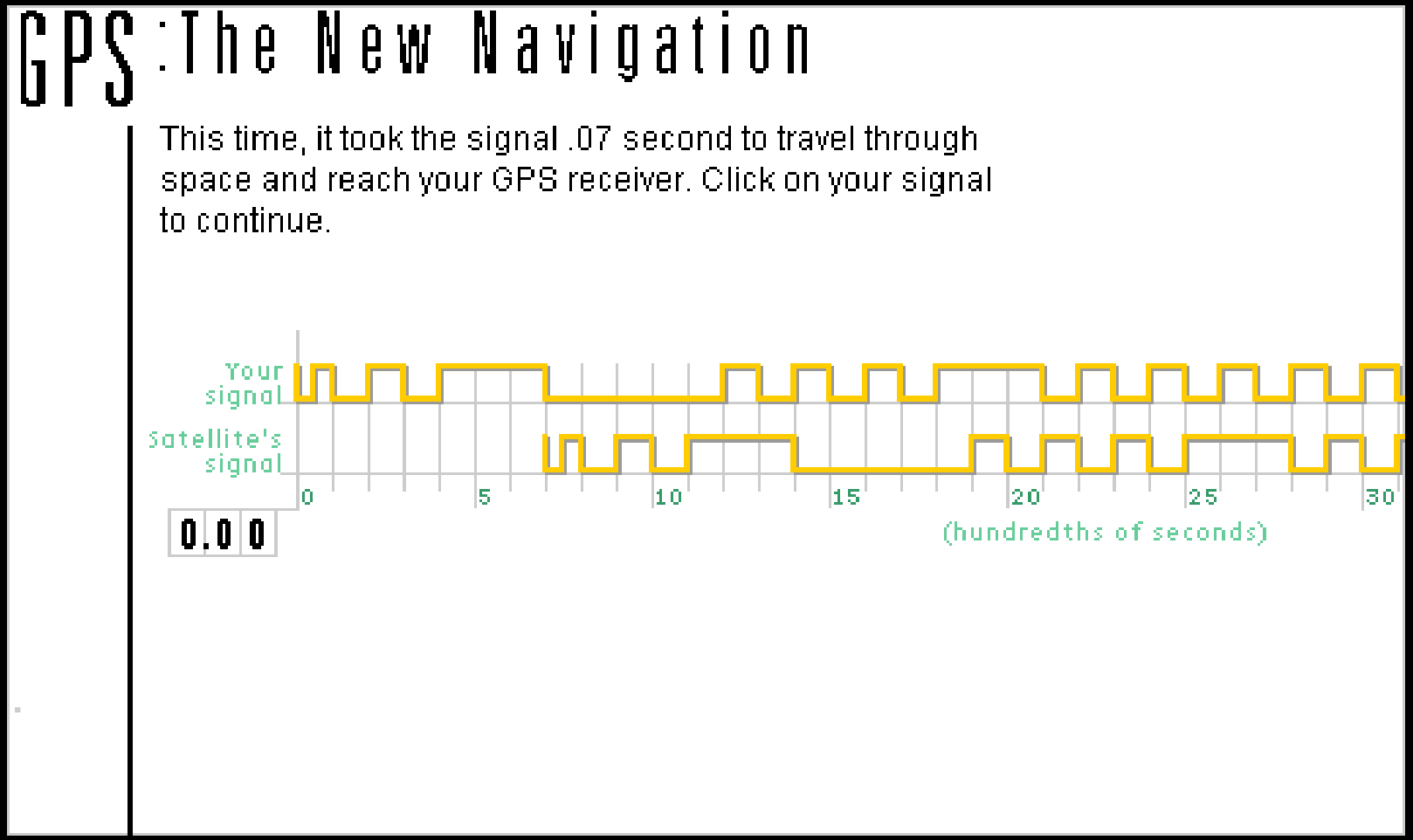
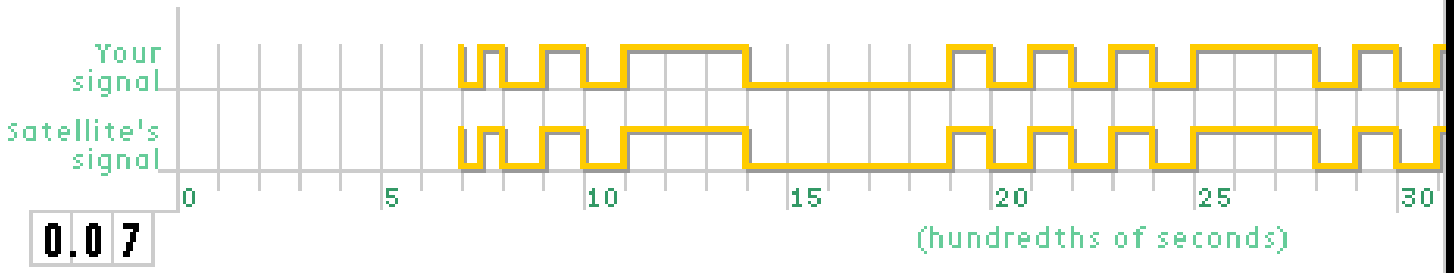



•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation




0.07

To help narrow down your location, you need to know your distance from this satellite. Just as before, the signal travelled at the speed of light, which is 186,000 miles per second, but this time it took 7 hundredths of a second (.07 second) to reach your GPS receiver.

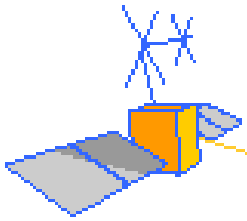
speed x time = distance

Plugging the known variables into the equation below allows you to figure out the distance from the satellite. Click on your signal to continue.

186000 miles/second x .07 second = 13,020 miles

- http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation



d = 13,120 mi.

You are somewhere on this intersection

Now, in addition to knowing that you must be somewhere on the first sphere, you know that you must also be somewhere on this second sphere. Which means that you can only be on the circle where the two spheres intersect.

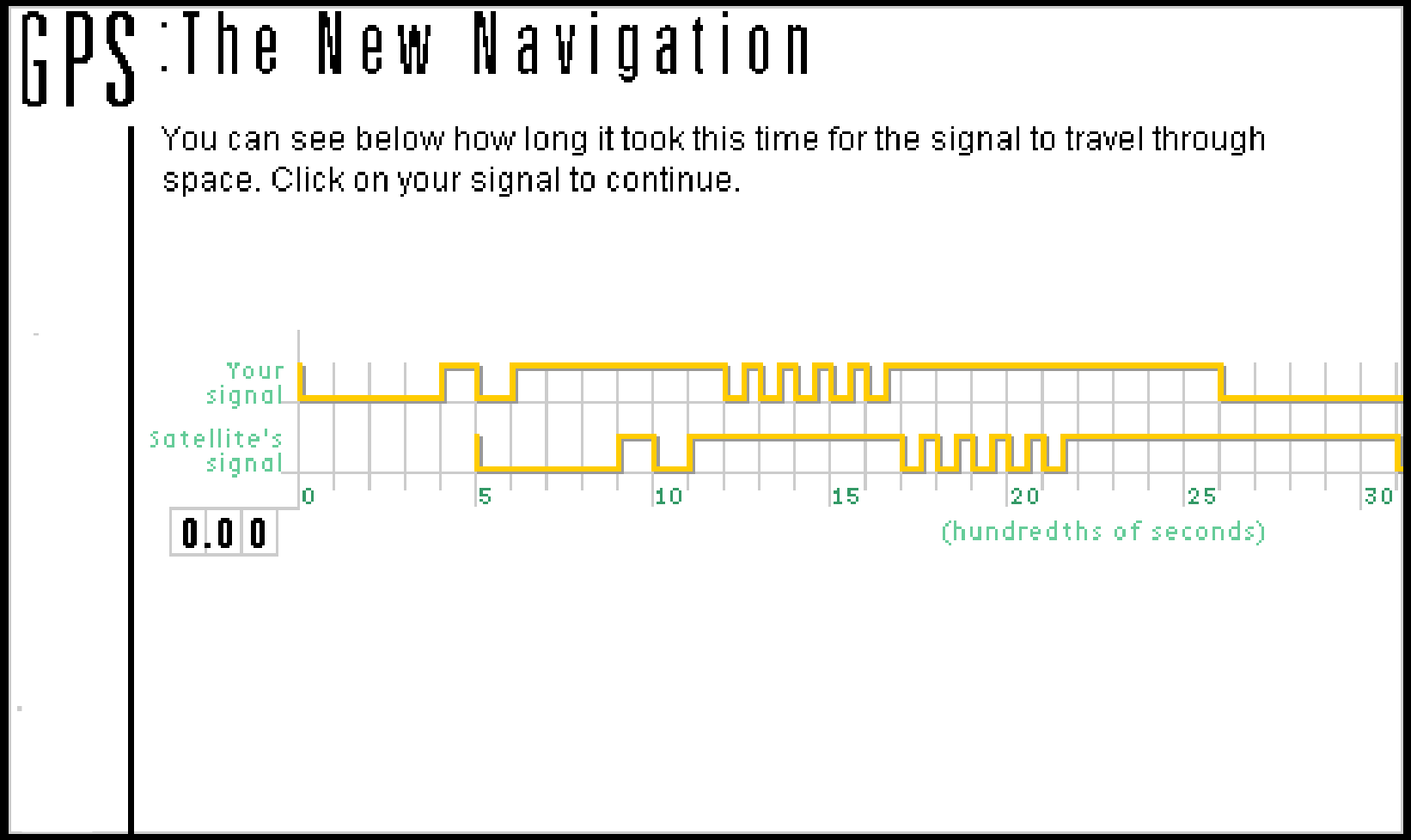
To narrow down your location even further, you'll need to check your distance to one more satellite.


•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation

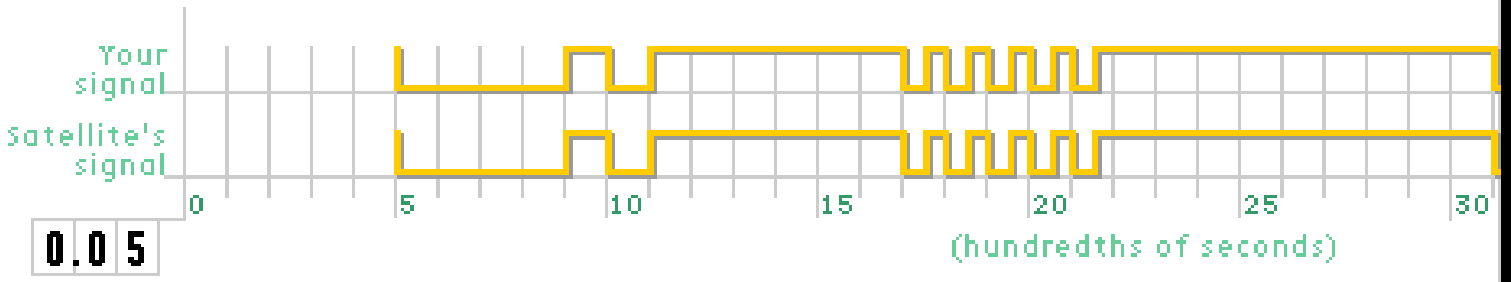
Just as before, the third satellite and your GPS receiver are generating duplicate signals (different from each of the previous two) at exactly the same time. You may have noticed that unless both the satellite and the receiver have clocks set to precisely the same time, none of this works. It'll take a fraction of a second for the satellite's signal to travel through space and arrive at your GPS receiver.


•http://www.pbs.org/wgbh/nova/longitude/gps.html




•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation




0.0 5

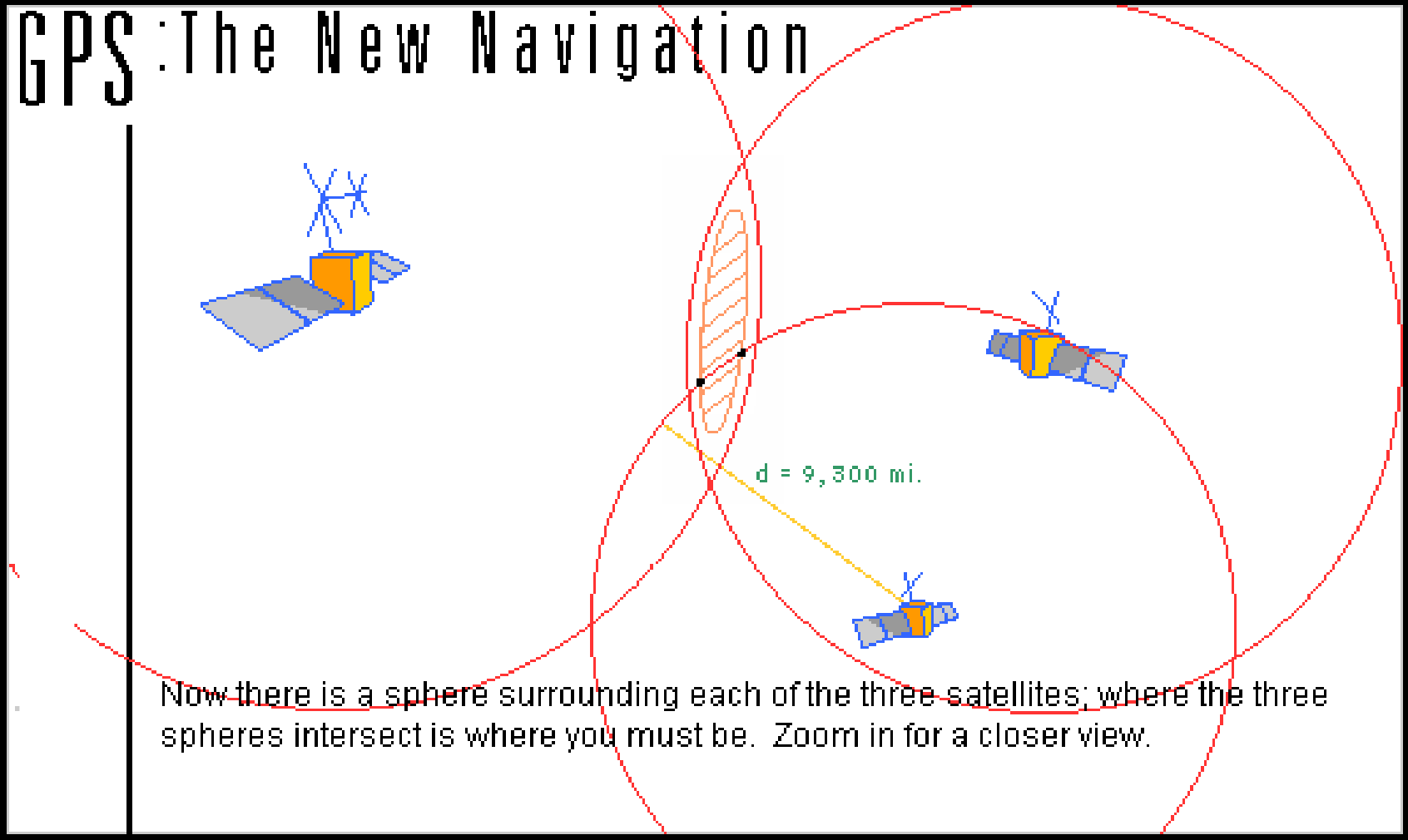
This time the signal took five hundredths of a second (.05 second) to reach your GPS receiver.

speed x time = distance

Plugging the known variables into the equation below allows you to figure out the distance from the satellite. Click on your signal to continue.

| 186000 | miles/second x | .05 | second = | 9,300 | miles |
|---|---|---|---|---|---|

- http://www.pbs.org/wgbh/nova/longitude/gps.html

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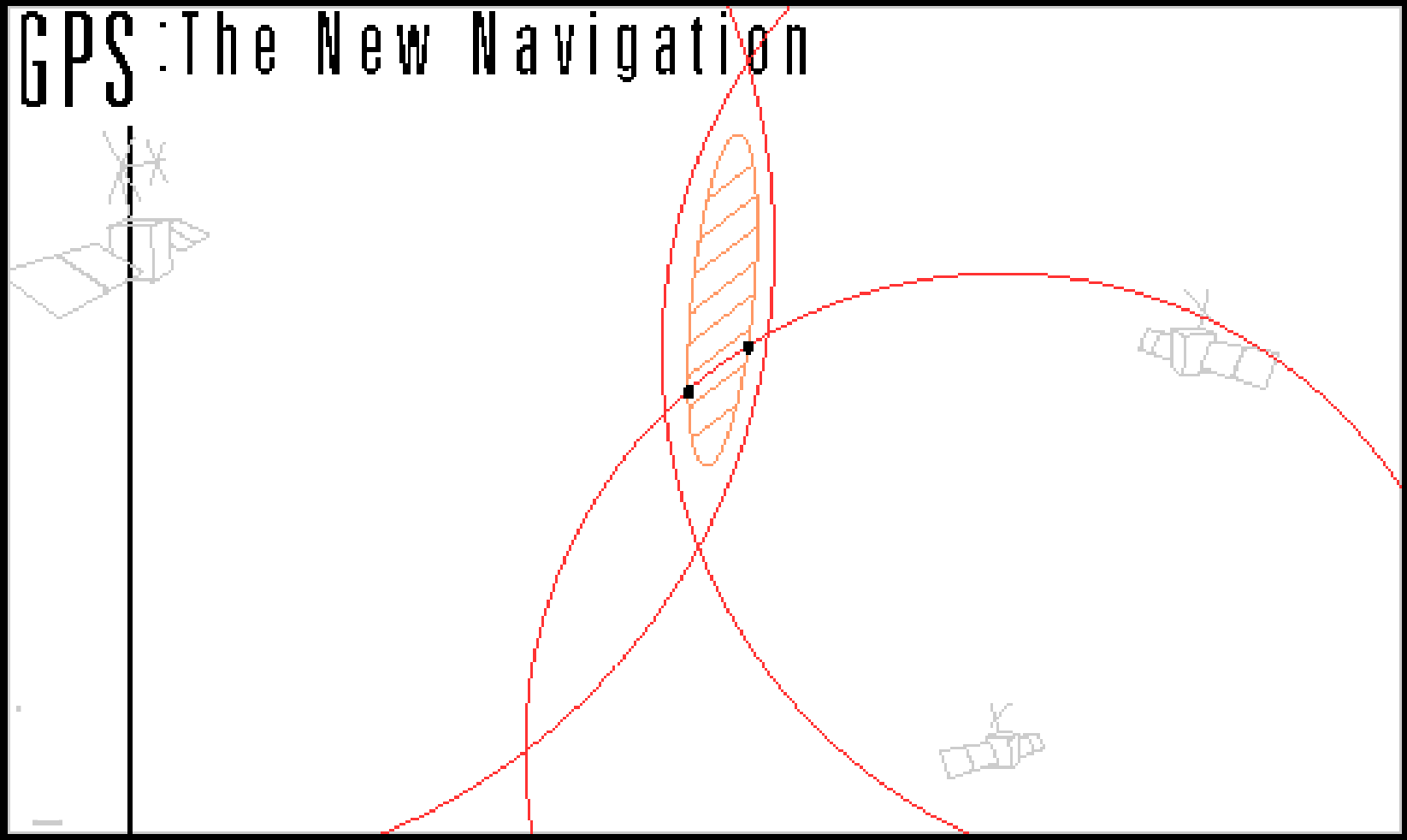


•http://www.pbs.org/wgbh/nova/longitude/gps.html

# GPS: The New Navigation

You've discovered that, just as you had hoped, you are in Barbados (where the first accurate timepiece for finding longitude was tested) at 13.06 degrees north latitude and 59.37 degrees west longitude. Your GPS receiver figures all this out in less than second. Just as centuries ago sailors found their longitude at sea by knowing the time at sea and in their home port, GPS works by knowing the time on both the satellite and the GPS receiver.

•http://www.pbs.org/wgbh/nova/longitude/gps.html

# Geocaching

**What is geocaching?**

Geocaching is much like the game hide-and-go-seek. Instead of seeking for a hiding person, players use GPS and sometimes additional navigational tools to find a hidden "treasure," known as a geocache.

# The Premise of Geocaching

The premise of geocaching, occasionally referred to as a “stash hunt,” is to use a GPS receiver, map, and compass to navigate to the geographic coordinate of the hidden cache. This task can prove to be quite challenging and fun as it could take hours to find a well hidden cache.

# Caches

Caches can be as rudimentary as a 35 mm film container filled with scraps of paper serving as a logbook or as elaborate as a plastic chest filled with unique treasure and a formal logbook.

Once you have successfully found the cache, the basic rule is to sign the logbook as a means of proving you found it and then return the cache to the exact location in which it was discovered.

# Common Symbols used in Geocaching

**Taken from: http://www.geocaching.com/about/cache_types.aspx**

## Traditional Cache

This is the original cache type consisting, at a bare minimum, a container and a log book. Normally you'll find a tupperware container, ammo box, or bucket filled with goodies, The coordinates listed on the traditional cache page is the exact location for the cache.

The general rule of thumb is, "If you take an item, leave an item, and write in the logbook." Some caches are themed, so make sure to read the description before going on a hunt.

## Multi-Cache (offset Cache)

A multi-cache ("multiple") involves two or more locations, the final location being a physical container.

## Letterbox Hybrid

A letterbox is another form of treasure hunting using clues instead of coordinates. In some cases, however, a letterbox has coordinates, and the owner has made it a letterbox and a geocache.

## Mystery or puzzle caches

The “catch-all” of cache types, this form of cache can involve complicated puzzles you will first need to solve to determine the coordinates.

# Geocaching Games & Variations

Multicache:

In this game, the players are required to find several cache boxes in sequence in order to find the final box.  The player use directions in each box to find the next box in sequence.


# Travel Bug

## What is a Travel Bug?

- Simply put, a Travel Bug is a trackable tag that you attach to an item. This allows you to track your item on Geocaching.com. The item becomes a hitchhiker that is carried from cache to cache (or person to person) in the real world and you can follow its progress online.

## What does a Travel Bug do?

It's really up to the owner of the bug to give it whatever task they desire. Or no task at all. The fun of a travel bug is inventing new goals for the Travel Bug to achieve. One Bug's goal may be to reach a specific country, or travel to 10 countries.

# How do Travel Bugs work?

Each Travel Bug has its own unique tracking number stamped on it. This tracking number is used as proof by the user that they found the item. It also doubles as a way for the user to locate the personal web page for the travel bug.

Travel Bugs are tracked with the help of users who go online and "grab" them from caches, or receive them from users. The idea is by picking up and dropping off Travel Bugs on the web site you are mirroring the Bug's real world adventures. Each Travel Bug has its own "diary" that follows its movements.

Where to buy a travel bug-

http://www.gpscity.ca/item-geocaching-travel-bug-singel-pack/geobug.htm

# Sources and Resources

- http://www.pbs.org/wgbh/nova/longitude/gps.html
- http://www.geocaching.com/
- http://www.geocoins.ca/track.php?coin=1824&submitted=1