



GPS, Compass & Topographic Maps





GANDER MOUNTAIN SEMINAR

Presented by





ENDLESS TRAILS

TRAIL PLANNING, LAYOUT,
LOCATION & MAPPING



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GPS



Output settings:

The GPS unit is capable of many settings for location coordinates and units of distance. This makes the end user subject to disorientation unless they have some idea of what the difference is between these display units and how they affect their position on the earth.



GEOGRAPHIC COORDINATES



The display of geographic coordinates come in three flavors.



DEGREES, MINUTES &
SECONDS.

DEGREES, MINUTES &
DECIMALS OF MINUTES



DEGREES & DECIMALS OF
DEGREES



EXAMPLE



Take a reading in a specific place.
Write down you datum and display
coordinates.



Change your datum and display
information. Your GPS unit will
give you your position in the new
settings. Note differences in
display. ARE they really apparent
? Not always.



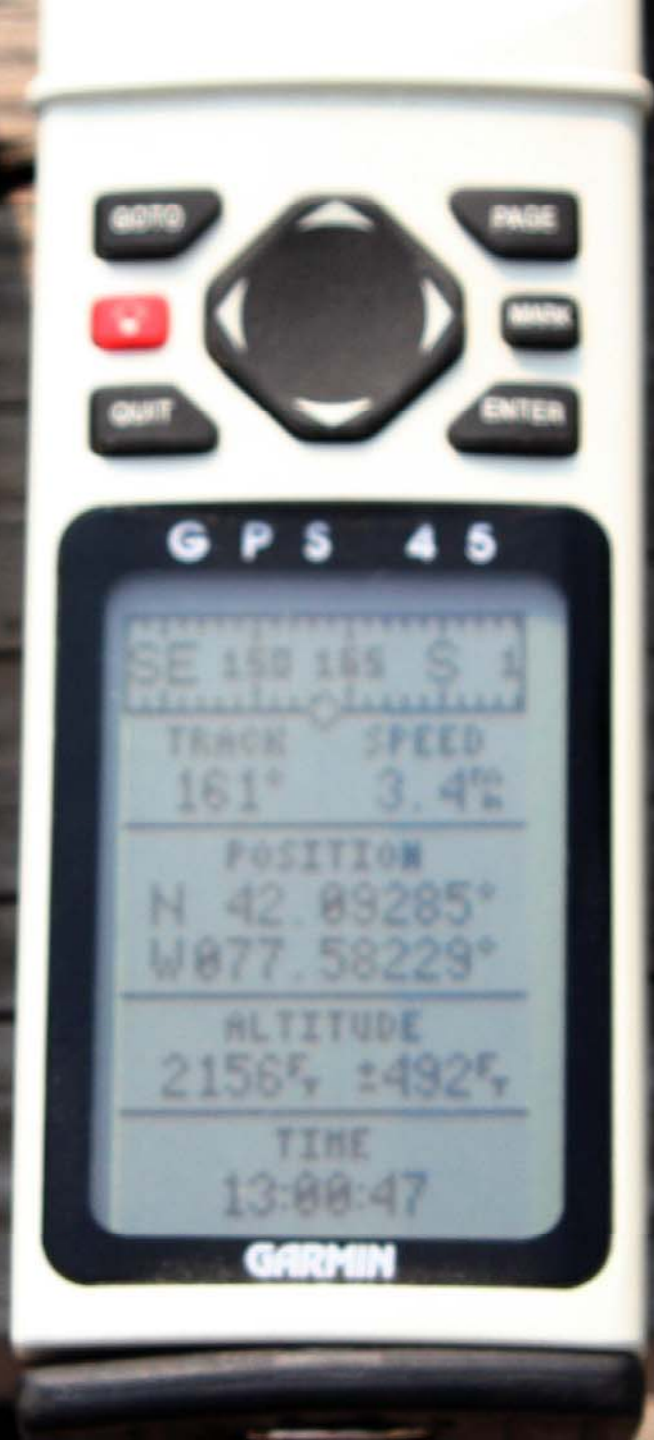


Learn the difference in your settings.



If you are given a set of coordinates in degrees, minutes and seconds and are trying to find that position with your GPS unit set in degrees and decimals of degrees, in this area of the world you can expect to be 12.5 MILES away from your destination. In most cases, this would constitute being lost.







GRID



Grid readings have the same problem as geographic coordinates, they have many choices and many Datums. At first they seem complicated but once you get used to them they are very useful





START-DATA

UP

ENTER

DOWN

POSITION

EL
E

EL
E

Sat 6/8 epe 2m

18 2 86.402

T 46 63.417

Alti 2096 ft

SUUNTO

DISTANCE



Units of distance is offered in many varieties.



METERS – THE REST OF THE WORLD WORKS IN METERS !

MILES

Statue miles

Nautical miles

FEET about 12 inches long.



For all practical purposes, hand held units may be able to get you within 30 to 100 feet, regardless of what the manufacturer states.



ELEVATIONS



Elevations given with handheld GPS unit are not to be taken seriously. If you happen to be at a known point of elevation and the GPS unit give you a reading of the same elevation, its just dumb luck. Wait....it will change.



GPSmap 76S MARK

SPEED

0.0 ^m/_h

GPS ELEVATION/ACCURACY

2086 ^f

42.2 ^f

3D Differential



17-JUN-07 09:03:05^A

N 42.09380°
W 077.58274°

GARMIN

G P S

NW 330 345
54E 02E

TRACK SP
341° 0

POSITION
N 42.093
W 077.582

ALTITUDE
2160^F ±

TIME
13:03:05

GARMIN

FIELD EXERCISE



Mark a point in an open place (good access to sky) and in a place under canopy (evergreen tree)



Take readings at both places and log them with a point name you can easily remember.

Walk, run or drive away from the points.



Set your GPS unit to the GoTo field and pick one of the points.



Walk, run or drive until your GPS unit says you are at that point.



STOP RIGHT THERE!!!!!!!!!!!!

How far are you from your original position? Make a mental note of this.

Try locating both of these points at different times of day, different days. It will vary. This will give you an idea of how accurate your unit is.



SECOND PHASE



If you think my statement before about being 12.5 miles off was an exaggeration, set your unit from one geographic coordinate system to another and maneuver until you are at the same reading in the different display.

HINT: Drive, it will take a lot less time.





At first this may seem kind of lame or dumb, but if you are going to use this thing to get to and from places, it would be a good idea to know just how much you can depend on it under real conditions.



DATUMS



The Datum is the origin of the coordinate system you have set on your GPS.



Some Datums are setup as a world-wide system, some are very local. The same display reading in one datum can be a long way from the same reading in another.





If you intend to share or publish data that you have gathered it is imperative to include your Datum and Coordinate system.



Even if you do this only for your own use, it is a good idea to keep track of what system you are working in. If you wipe out your GPS unit and have the data printed out someplace, your information is not lost.





Unless you have a specific need for a Datum, WGS-84 works very well. It is a world wide system and is included in most if not all GPS units.



Last words on Datums.

Moscow is right next to Binghamton in the Datum of the Solar System.



WAYPOINTS



Until I got my first GPS unit, I had never heard the term waypoint.



A waypoint is a position of interest to the data gatherer. It can include information beyond position coordinates or not.

Most GPS units have something called MOB (man over board) a single button to get a quick position for emergency or temporary use.





If you have waypoints that you want to return to often, you may want to write that information down or download it from your unit along with the Datum. That way you can share it, or put into a new unit when the time comes.



Waypoints may be input by hand into your unit. If you do this, Datum and coordinate system are important, unless your intention is to only get within 12.5 miles.



Some units will automatically log a waypoint at certain intervals. This interval may be a distance or a unit of time. It can be very handy.





If you use a software program to download and upload positional information into your GPS, the Datum and coordinate information usually tags along. Verify this.



Before you pick a point in the middle of nowhere and try to navigate to it, try something familiar. Walk before you run juggling chainsaws!





TRACKS & ROUTES



Most GPS units will automatically create a track while you are moving. Some call this the “breadcrumb trail”.

Your unit will usually display this trail you are walking. If you are zoomed in close enough, you can actually walk in a circle and see it on screen.





The track gives you a graphic location of where you have been and can be used to “backtrack” your way out. It is a good idea to grab some waypoints along the track. If you lose the track from your unit, a route can be created that connects the waypoints with a series of straight lines. The route can be maneuvered along from point to point. Once you have a route set, you can go back to it time and again.





Real handy if you are trying to get to or from someplace and run out of daylight. Most GPS units are equipped with some way to illuminate the screen.



Illumination eats energy, be aware of what your screen settings are for lighting your screen.





Routes, tracks and waypoints can be created on the fly in the field and downloaded into your mapping software on the computer or created on your computer and uploaded into your GPS unit.



Waypoints can also be scaled from maps and logged into GPS and Computers by hand.



Remember DATUM &
COORDINATES!!!!!!!!!!!!!!



GPS v ROCK



A GPS unit with dead batteries is less useful than your basic rock. The basic rock will hold things down and may be used with a knife to create a spark to start a fire.



RULES



Rule # 1 CARRY EXTRA
BATTERIES (FRESH) with you.



Rule #2 If you ignored rule 1, you
better know where you are.

Rule #3 Do not depend on GPS as
being your only source of
“knowing where you are”



Rule #4 “LOST” is a TV show, not a
location.



THE COMPUTER



The computer is not a necessity with GPS. It is however, a great source of information and a great way to keep track of that information.



There are many different mapping software programs out there. Find what suites your needs and your budget.

As you progress with this equipment your needs may change, and a good basic topographic package will probably always be useful and a good investment.





A basic package you know how to work is much more valuable than a sophisticated one you do not know how to work.



The important part of the software is printer ease. Maps printed at unusable or unknown scales are just pictures.

When you are in the computer you are working in a “Real Time Scale”. In other words, a foot is a foot. Printing that out so you can measure on the map is the trick.





You are not going to be able to carry an indeterminate variety of measurement tools with you in the field. Find what works.



There are topo tools marketed that work very well. If you can match these scales, your maps can interface with purchased paper maps. This can be very helpful at times.



WARNING



Most software mapping packages have updates that can be downloaded from the “net”. If possible save your old version separately.



Vendors make changes that you may not want or that you don't have time right now to learn. The old version that works the way you want it to is momentarily at least more valuable to you.





Most software will adapt the information you are downloading from your GPS to the settings in the computer, if they are different than your GPS. However, some of the GIS grade programs don't. Make sure you check. Useless information just takes up space.





TOPOGRAPHIC MAPS



Feet Vs. Meters (Kinda like a yard)

Some of the newer topographic maps available from the government are in metric scales. If you are not comfortable with meters, work on it, its just a different unit of measurement. Like coordinates, distance is a number it represents a tool to get from here to there.



42.0666666° N

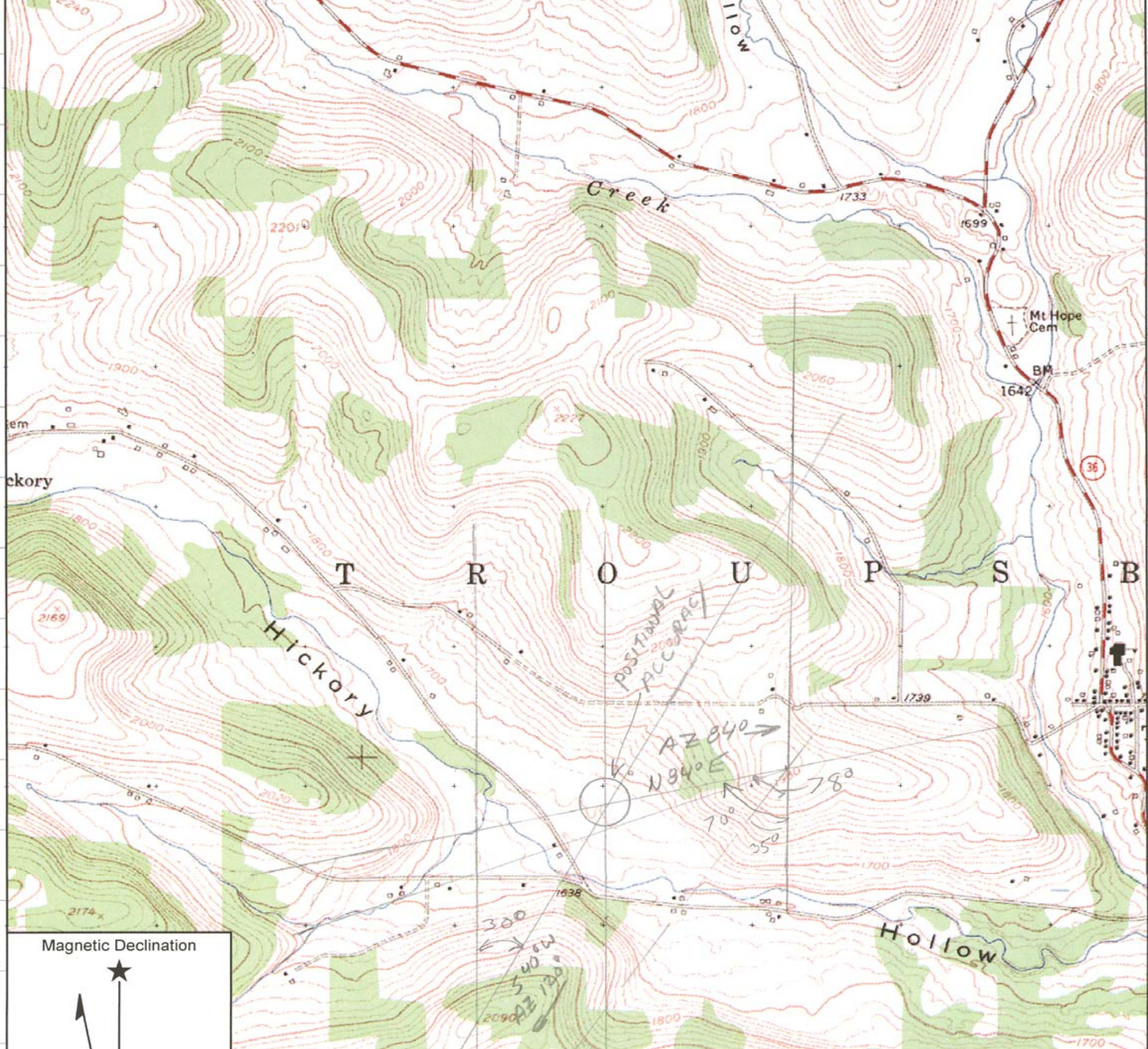
42.0500000° N

42.0333333° N

42.0666666° N

42.0500000° N

42.0333333° N



Magnetic Declination





Map Scale

Scale is represented in two different ways.

Example: 1: 24000

1 unit = 24000 units, whatever they are. 1 inch = 24000 inches.

Example: 1"=2000'

1 inch = 2000 feet



The above are the same scale represented two different ways. B

Be aware of the differences.





LEGENDS/SYMBOLS



All topographic maps produced by USGS or found in most topographic software packages use a standard set of symbols. Learn what they are. Many software packages allow you to use these symbols in association with your waypoints. This will allow others to know graphically what information you have included.



Other map stuff



Carry a notebook and a pencil with you.



Pens freeze. A pencil can be sharpened with your knife and works in the cold. Use a # 2 as pencils write in a lighter color in very cold conditions.



Note your location in on paper if your out for multiple days. You may want to leave a note.





Mark your position on your map every time you make camp. Should your GPS croak out on you at least your last position is marked and you can figure out how to call for help or get out from there. It is a whole lot less stressful than “yep, my gps is busted, I don’t know where I am, and I hope it rains.”



TO SCALE & POSITION
w/ WAYPOINTER.

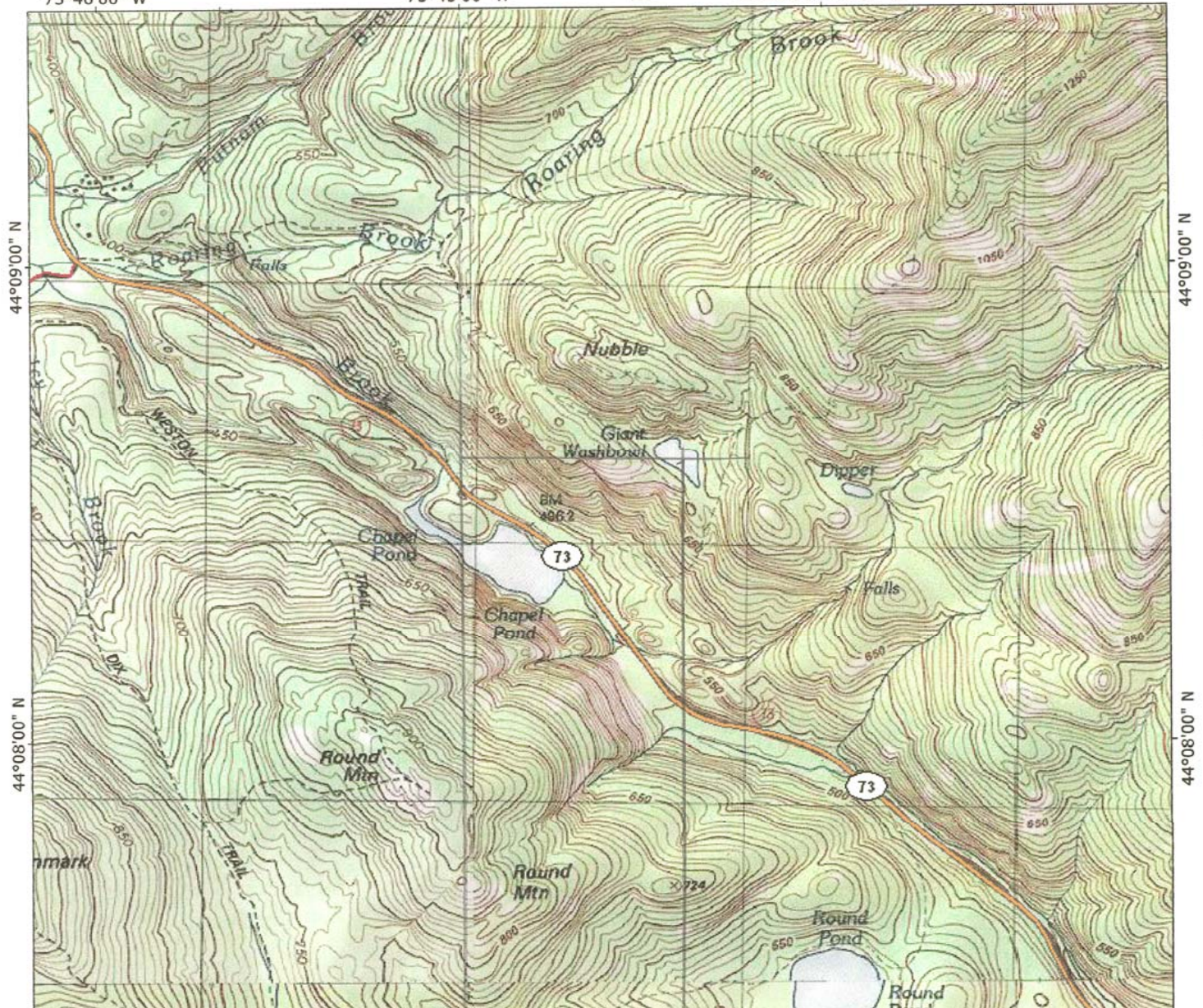
73-44-34" W
-26"

TOPO! map printed on 09/01/07 from "Untitled.tpo"

73°46'00" W

73°45'00" W

WGS84 73°44'00" W



44°09'00" N

44°09'00" N

44°08'00" N

44°08'00" N

44-07-35"

COMPASS



What kind of compass?

Ball Compass? No. It is inexpensive and will tell you roughly what general direction you are headed.

Electronic compass? NO! Batteries!, if we are using a topo an compass its because our GPS took a dive. If we had extra batteries we would still be using it.

A Real expensive compass that surveyors use?
For me, yes, I have been using this Suunto KB-14 for over 30 years. For the average person, no, too expensive and it doesn't; do what you need without other tools.

Something that has enough tools that you can figure out where you are and get out.





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Here are two Suunto
compasses and a Brunton.
Silva makes a similar type
and most other manufacturers
make something like these.



They cost about \$30 and give
you a lot of tool for the value.

Like GPS, unless you learn how
to use them, a rock is better.



Declination



Most “storebought topos” have a north arrow and a secondary arrow. One points to Grid north and the other to Magnetic north. The difference is called “Declination”



GPS can be set to magnetic or grid or sometimes called True north. Topo maps are Grid north. The trick to accurate navigation from these maps is to take declination into consideration when plotting your position. It’s not difficult, it just takes some getting used to.



CONCLUSION



If nothing else, take away from here a sense of objectivity.



Learn your equipment

Learn your faults





**“NOT ALL WHO
WANDER ARE
LOST”**



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