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10/11/02

Guide to Using a Garmin GPS III Plus: Navigation, Data Collection, Data Transfer and ArcView Theme Creation

Compiled by:

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Materials from:

GPS for the Incident Command System Course - 2002

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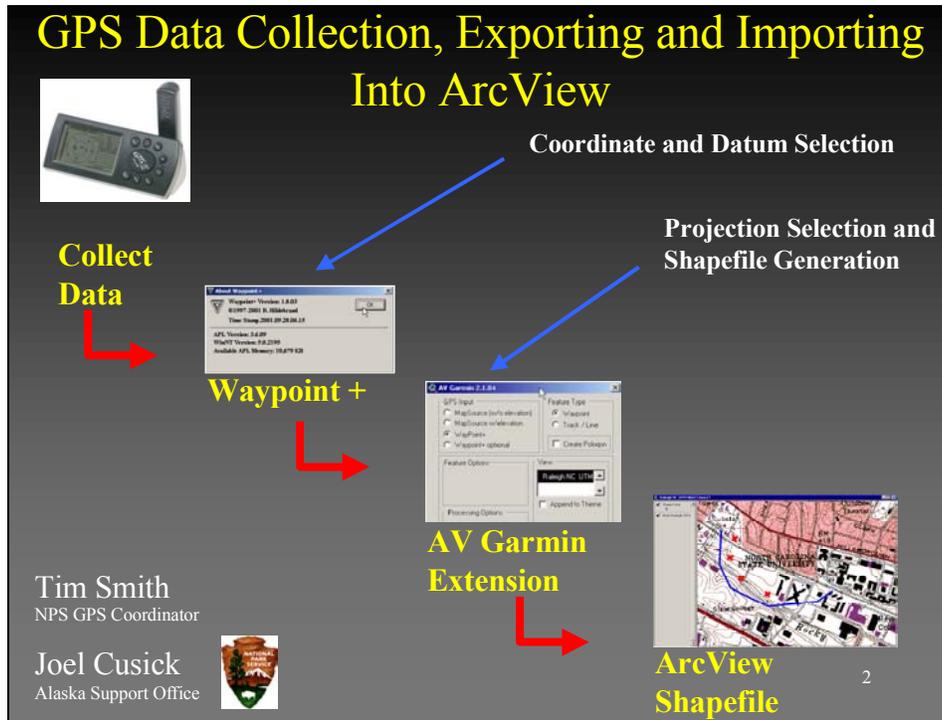
This power point presentation has been edited for use as a “how-to” guide for GPS data collection with a Garmin III Plus and transfer to a GIS (ArcView).

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This graphic serves as a flow chart of how to get from GPS to GIS. The process has been broken down into modules: data collection with a Garmin GPS III Plus receiver, data transfer with Waypoint +, use of AV Garmin in ArcView for shapefile creation. Each module contains some introductory or supplemental reference information and may have sub-modules, referred to as “parts” to simplify operations. An additional module has been added to the end that explains shapefile creation in ArcView without the AV Garmin extension.

Contents

- I. Data Collection with a Garmin III Plus GPS Receiver**
 - A. Receiver overview and setup**
 - B. Waypoint collection, creation and navigation**
 - C. Track logging setup and data collection**
 - D. GPS mission checklist and metadata field form**
- II. Waypoint +**
 - A. Installation and configuration**
 - B. Data transfer with Waypoint+**
 - C. Waypoint creation and upload to receiver**
- III. AVGarmin Installation and Quick Start**
- IV. ArcView Shapefile Creation**
- V. Shapefile creation in ArcView without AVGarmin**

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The GPS guide will cover the following five modules:

- I. Data Collection
- II. Waypoint +
- III. AVGarmin
- IV. ArcView with AVGarmin
- V. ArcView without AVGarmin

I. Collect Data

Collect Data

Waypoint +

AV Garmin Extension

ArcView Shapefile

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Alaska Support Office

I. Collect Data

Collecting data with the Garmin GPS III Plus is the first step in the process. To do that you will need to understand the basics of the Garmin III Plus.

A. Receiver Overview, Almanac Download and Receiver Setup

Part A. Receiver Overview, Almanac Download and Receiver Setup

Garmin GPS III Plus Overview



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Garmin GPS III Plus Overview

Garmin GPS III Plus Specifications

PHYSICAL

- Case:** Fully-gasketed, high-impact plastic alloy, waterproof to IPX7 standards
- Size:** 6.15"H x 2"W x 1.23"D (15.6 x 5.1 x 1.23 cm)
- Weight:** Approx. 9 ounces (255g) w/ batteries
- Temperature Range:** 5 to 158°F (-15° to 70°C)†
- Memory Back Up:** Internal Lithium Battery

PERFORMANCE

- Receiver:** Differential-ready PhaseTrac12™
- Acquisition Time:** Approx. 15 seconds (warm start)
Approx. 45 seconds (EZinit/cold start)
Approx. 5 minutes (AutoLocate™)
- Update Rate:** 1/second, continuous

- Position Accuracy:** 1-5 meters (3-15 ft) with DGPS corrections*
15 meters (49 ft) RMS**

- Velocity Accuracy:** 0.1 knot RMS steady state

- Dynamics:** Performs to specification to 6 g's

- Interfaces:** NMEA 183, RTCM (for DGPS corrections) and RS-232 for PC interface

- Antenna:** Detachable with standard BNC connector

POWER

- Input:** Four 1.5-volt AA batteries† or 10-32 VDC external
- Power Consumption:** 0.5 watts max.
- Battery Life:** Up to 36 hours in Power Saver mode ‡

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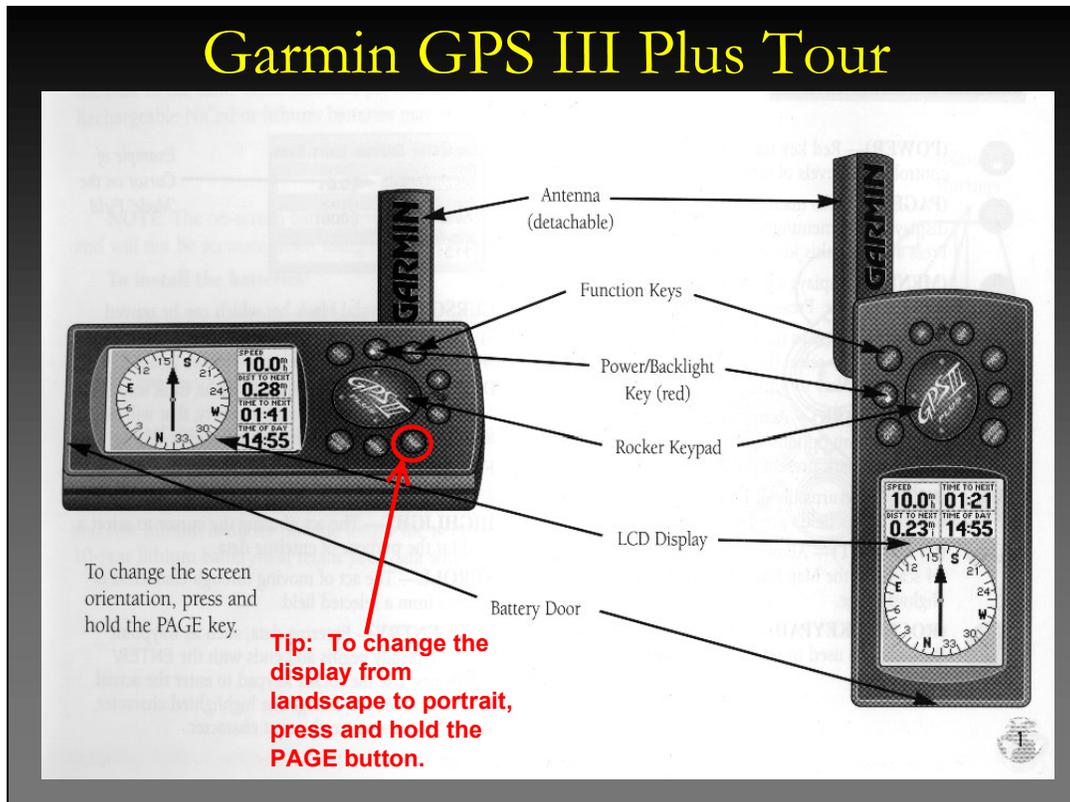
Specifications

Garmin GPS III Plus Buttons

-  **(POWER)**— Red key turns the unit on and off, and controls three levels of screen backlighting intensity.
-  **(PAGE)**— Scrolls main pages in sequence and returns display from a menu/options page to a main page. Press and hold this key to change screen orientation.
-  **(MENU)**— Displays a menu of available options for the current page. Press twice to display the Main Menu.
-  **(GOTO)**— Displays the GOTO waypoint window, allowing you to select the destination waypoint. Press and hold this key to activate MOB feature.
-  **(ENTER/MARK)**— Activates highlighted fields and confirms menu options and data entry. Press and hold this key to mark present position as a waypoint.
-  **(QUIT)**— Returns the display to a previous page or restores a data field's previous value.
-  **(IN and OUT)**— Allows you to zoom in/out through 24 scales on the Map Page. Also adjusts scale on the Highway Page.
-  **(ROCKER KEYPAD)**— Controls the movement of the cursor, is used to select options and positions, and to enter data.

Garmin GPS III Plus Buttons and what they do.

Garmin GPS III Plus Tour

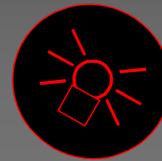


Garmin GPS III Plus Tour

Garmin GPS III Plus



To turn on the GPS unit, push and hold the **POWER** button.



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First step, turn on receiver by pushing and holding the power (light bulb) button.

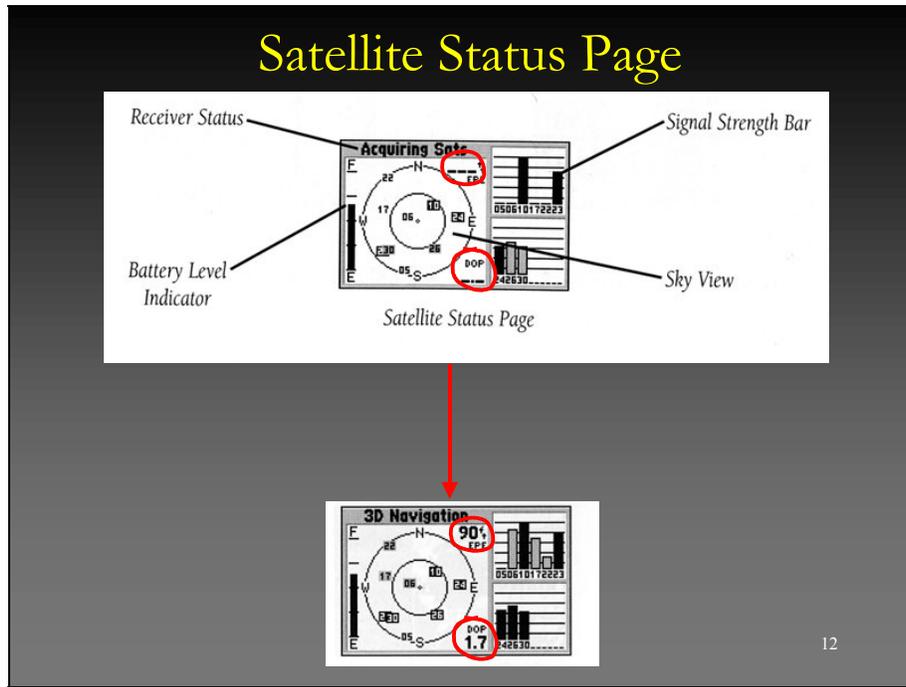
Slide 11

Garmin GPS III Plus Screen Pages

The slide displays six different screen pages from the Garmin GPS III Plus, arranged in a grid. A central circular arrow with 'PAGE' and 'QUIT' labels indicates that these pages can be navigated through. The pages are:

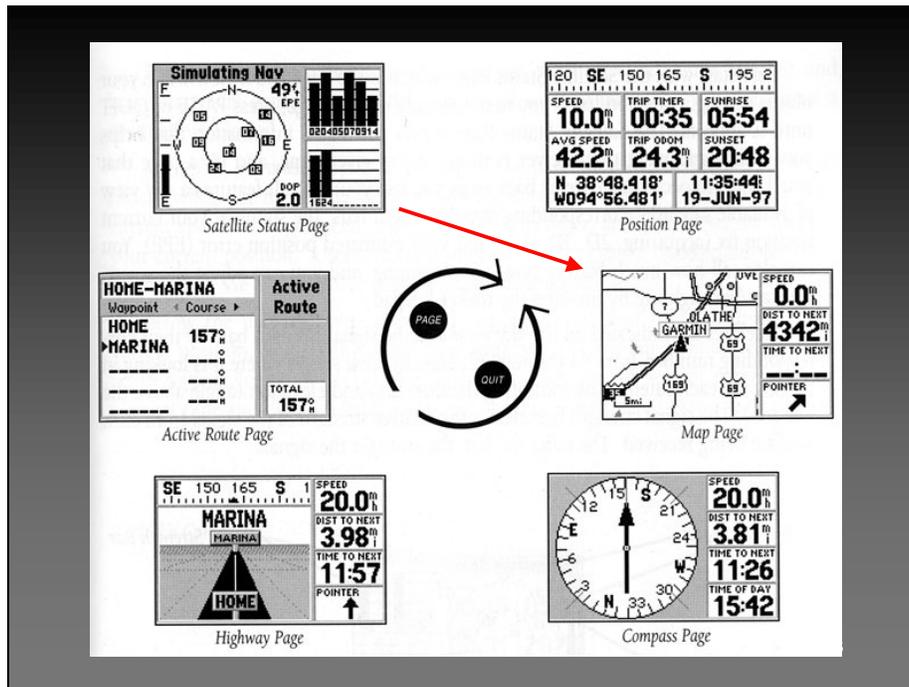
- Satellite Status Page:** Shows a circular diagram of satellite positions, EPE (Estimated Position Error) of 49%, DOP (Dilution of Precision) of 2.0, and a bar graph of signal strength.
- Position Page:** Displays coordinates (N 38°48.418', W 094°56.481'), speed (10.0 m/h), trip timer (00:35), sunrise (05:54), and sunset (20:48).
- Active Route Page:** Shows a route from HOME to MARINA with a distance of 157 miles and a total time of 157 hours.
- Map Page:** Shows a map with a route highlighted, including labels for OLATHE and GARMIN, and a speed of 0.0 m/h.
- Highway Page:** Shows a highway map with a route from MARINA to HOME, a distance of 3.98 miles, and a time to next of 11:57.
- Compass Page:** Shows a compass rose with a speed of 20.0 m/h, a distance to next of 3.81 miles, and a time of day of 15:42.

These are the six screens (Pages) that are easily scrolled through (forward) by using the Page button and scrolled back with the Quit button.



The Satellite Status Page is a very important page to view during both navigation and data collection operations. Here you will be able to see satellite configuration (geometry) and lock, check for 3D navigation, and monitor **Estimated Positional Error (EPE)** and **Dilution Of Precision (DOP)**.

Note: Garmin receivers report DOP. This is a measure of HDOP (Horizontal Dilution of Precision) and not PDOP (Position Dilution of Precision). As a rule of thumb, HDOP is roughly half the value of PDOP, so for instance if your goal is to collect data when PDOP is less than six, then pay attention to the DOP reading on the receiver when it goes above 3. EPE is useful in assessing position accuracy without thinking in terms of DOP.



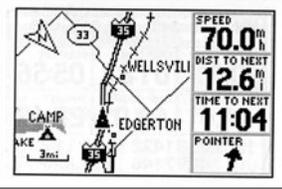
Following the Position Page, which shows information such as speed, coordinates, date and time, is the Map Page. The Map Page is useful to view primarily during navigation but can also be helpful during data collection.

Map Page



The screenshot shows a map with a route highlighted. A line points to the current location on the map, labeled 'Present Position'. A box on the right contains data fields: 'SPEED 70.0 mi/h', 'DIST TO NEXT 13.5 mi', and 'TIME TO NEXT 11:38'. An arrow points to a nearby location on the map, labeled 'Nearby Waypoint'. The text 'Map Page' is centered below the screenshot.

Direction of Movement Up Option
This option is good for slow movement (walking)



This Data Fields turned on option



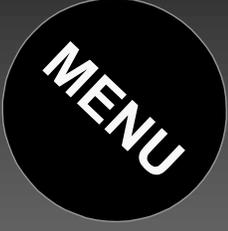
No Data Fields option

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The Map Page shows your position, nearby waypoints (if available) and the data fields of your choice. There are user specified display settings such as direction of movement.

Setting up the Map Page

Push **MENU** button

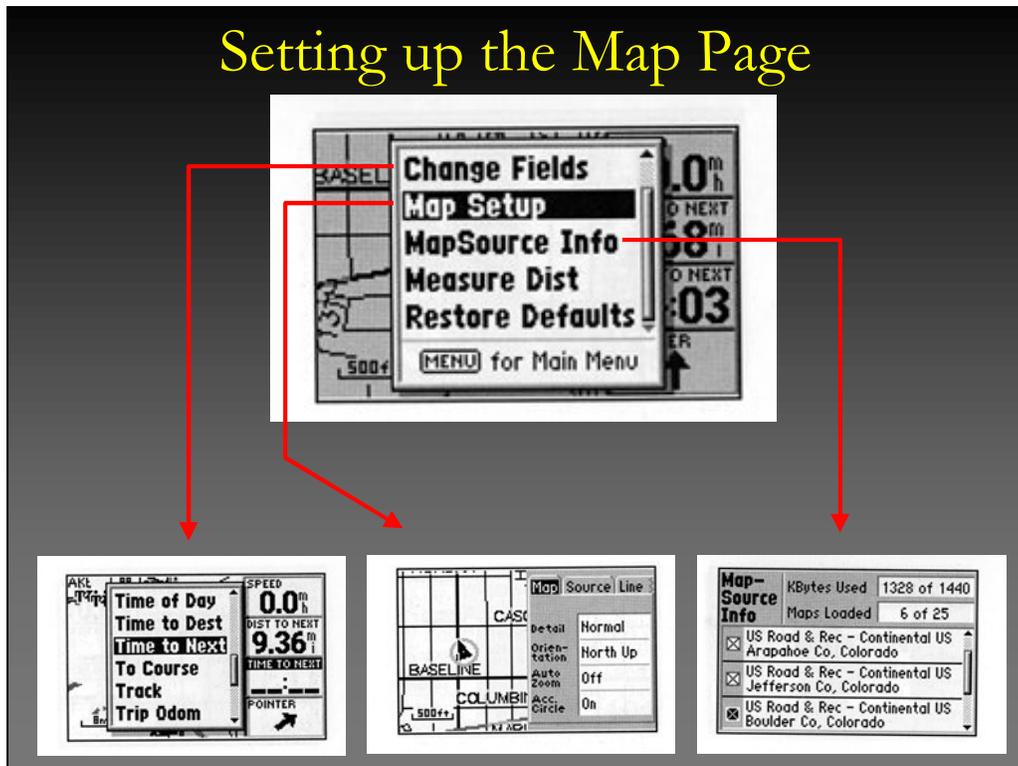


A circular button with the word 'MENU' written diagonally across it.

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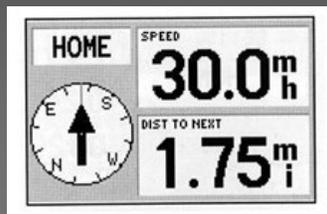
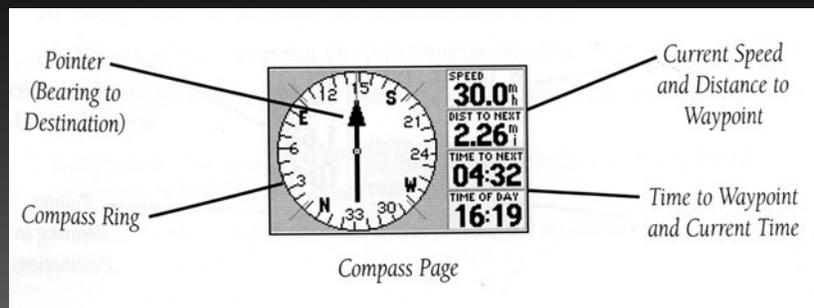
To set up the map page with your preferences, push the Menu button once while viewing the Map Page.

Setting up the Map Page



You can *turn off* or *change* the fields that are displayed on the Map Page by pressing Enter or go back one step by pressing Quit. You can also change the map setup for items such as map detail and orientation.

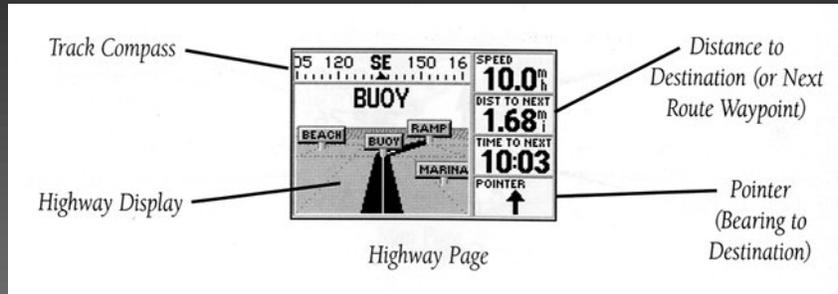
Compass Page



with "Big Numbers"

The Compass Page will display the fields of your choice by setting them in the menu. You can also set the display with big numbers. Note: the compass is not electronic so it will only display correctly while you are moving.

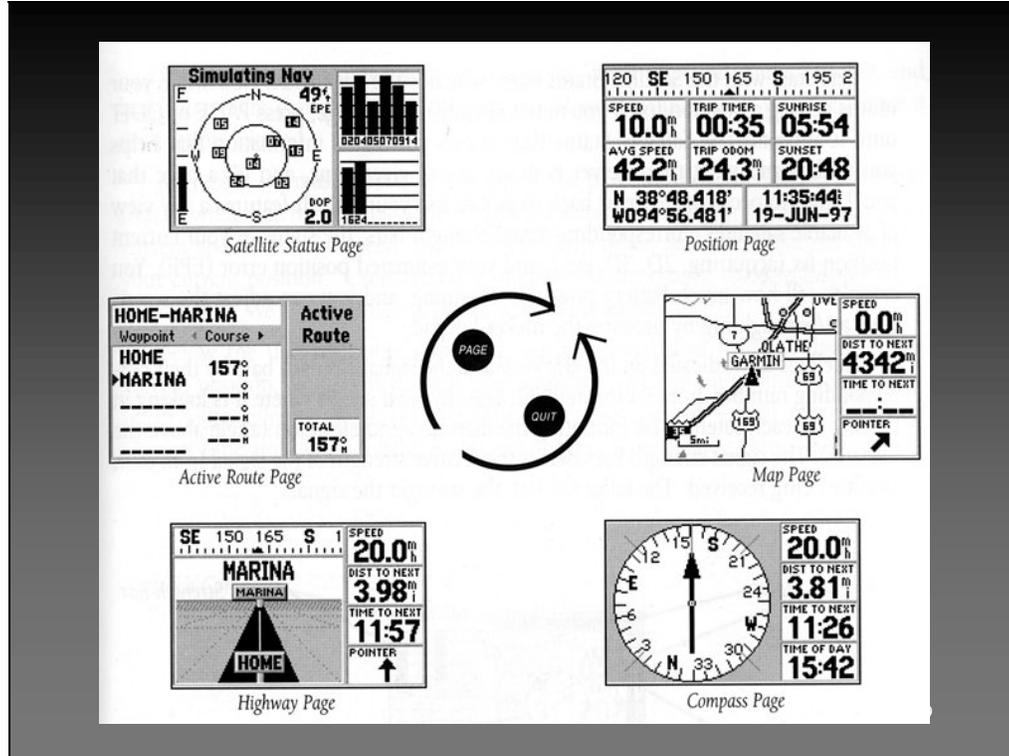
Highway Page



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The Highway Page is an optional navigation tool. You can also change fields in this page from the menu.

Slide 19



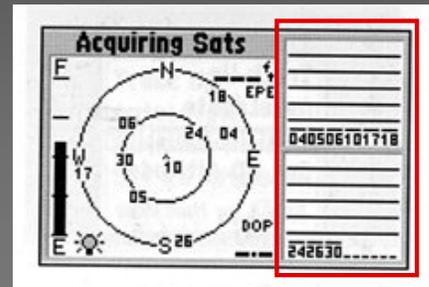
Again, the pages can be scrolled though (clockwise) by pressing the Page button and scrolled through backwards by pressing the Quit button. Enter and Quit are also buttons that work interchangeably. Each Page has its own Menu and you can access that Page's menu by pressing Menu *once* while viewing the Page of choice. To access the *Main Menu* you can press the Menu button *twice* - no matter which Page is being viewed.

Downloading a New Almanac



Turn on the GPS unit, push and hold the **POWER** button.

Initial screen appears.
Wait until the first
satellite signal bar
turns solid black.



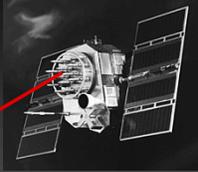
Downloading a new almanac is the next step in using the receiver.

Why do GPS receivers need a current almanac? An almanac is a kind of log which contains information on the GPS satellite constellation, especially the health and location of individual satellites. Global positioning receivers need a current almanac to be able to quickly identify which satellites are in their hemisphere of the sky, and to choose the best satellite signals for positioning. The almanac also contains information on the unique pseudo random noise code transmitted by each satellite (allowing the receiver to identify each satellite signal).

A problem occurs when a GPS receiver is not used for a long period of time (more than 30 days). The almanac stored in a receiver's memory becomes outdated fairly quickly because new information is constantly being uploaded to the satellite constellation from Space Command. The GPS almanac tells a GPS receiver which satellites are functioning, which are "down" (not transmitting), and if there are any new satellites on line (remember that satellites are continuously being replaced). Without an updated almanac, a GPS receiver cannot effectively do its job.

Downloading a New Almanac

Every satellites continuously transmits almanac data as part of its signal.



A GPS receiver need only acquire one satellite signal to begin downloading a new almanac. Wait 12-13 minutes after first satellite signal is acquired.



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How does a GPS receiver acquire a new almanac? When a GPS receiver is brand new its almanac is almost certainly outdated; just as if a receiver has been left turned off for a long period of time. When this occurs it can seem to a user that the receiver is malfunctioning because it won't quickly acquire satellite signals. In actuality it may only be an outdated almanac. There are three ways a GPS receiver can acquire a new almanac:

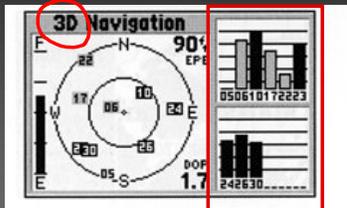
- It can automatically download a new almanac once it acquires a GPS satellite signal. This takes about 12-13 minutes once a satellite signal is acquired. As long as a GPS receiver is turned on and providing current position information it has an updated almanac.
- A current almanac can be downloaded from the Internet and uploaded to a GPS receiver via third party software. Global positioning base stations provide the almanac data for the web.

An almanac may be swapped among receivers either directly (via a cable link) or by disk and software using a computer.

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Downloading a New Almanac

Almanac is updated when map page updates with your location and 3D Navigation is established.

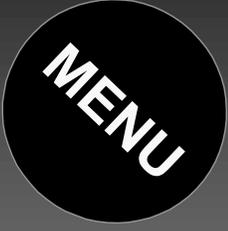


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You will know that the almanac is updated when your Map Page updates with your current location and the Satellite Page reads **3D Navigation**.

Slide 23

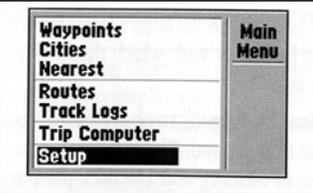
Push **MENU** button **twice** to access the main menu.



The next step after updating the almanac is receiver setup. No matter what page you are on, press the Menu button *twice* to access the main menu.

Slide 24

Receiver Setup



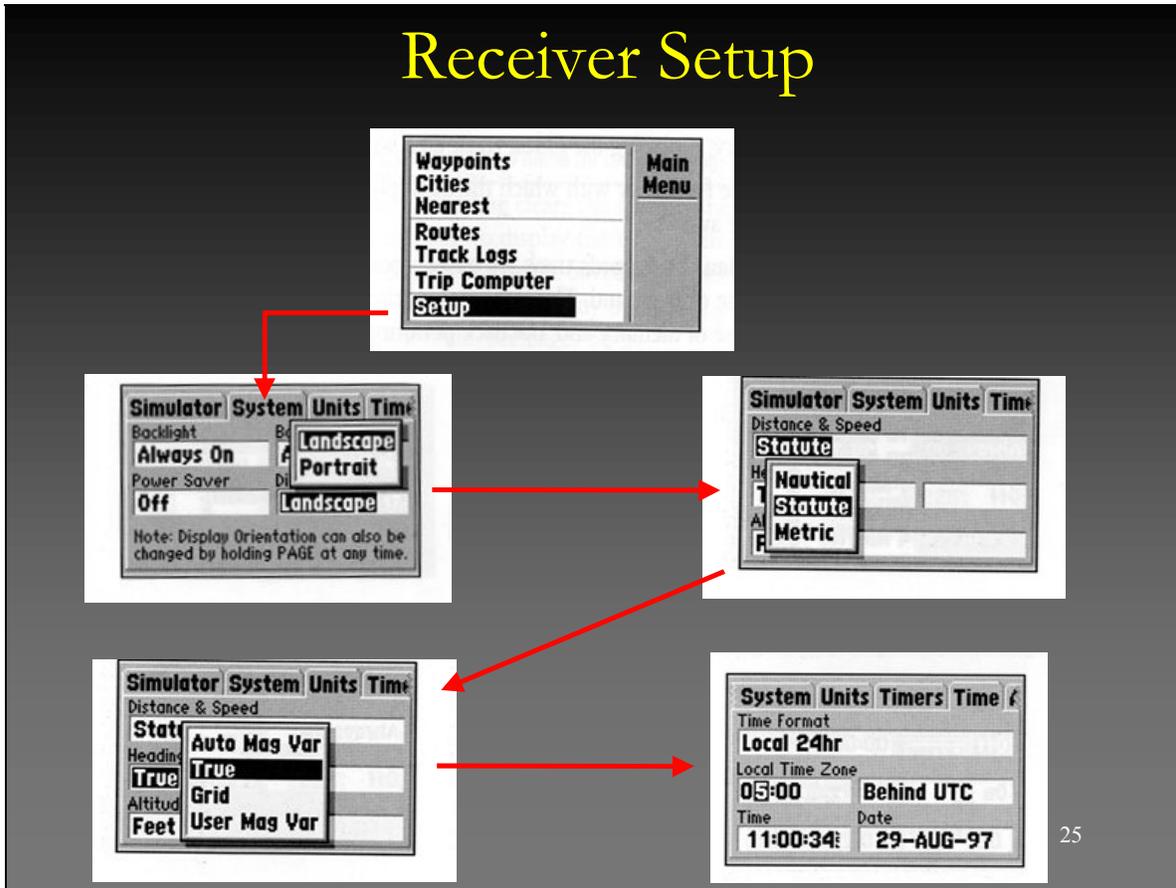
Scroll down to **SETUP** and push



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Scroll down to Setup and press Enter.

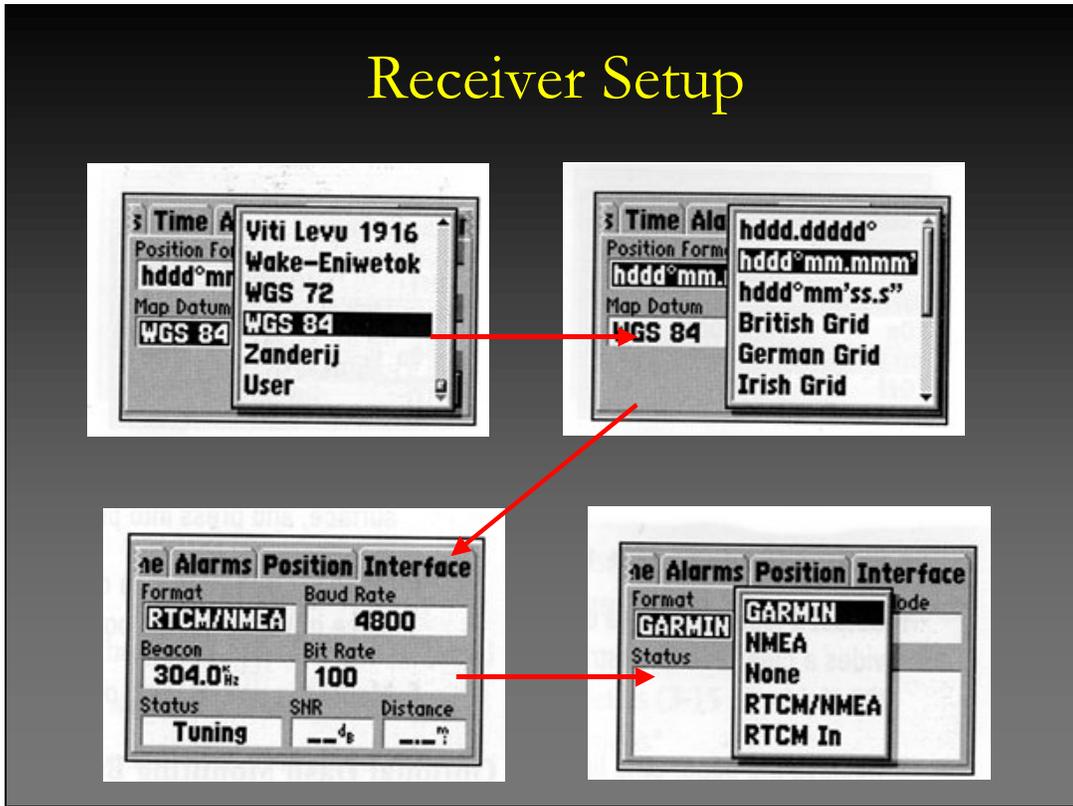
Receiver Setup



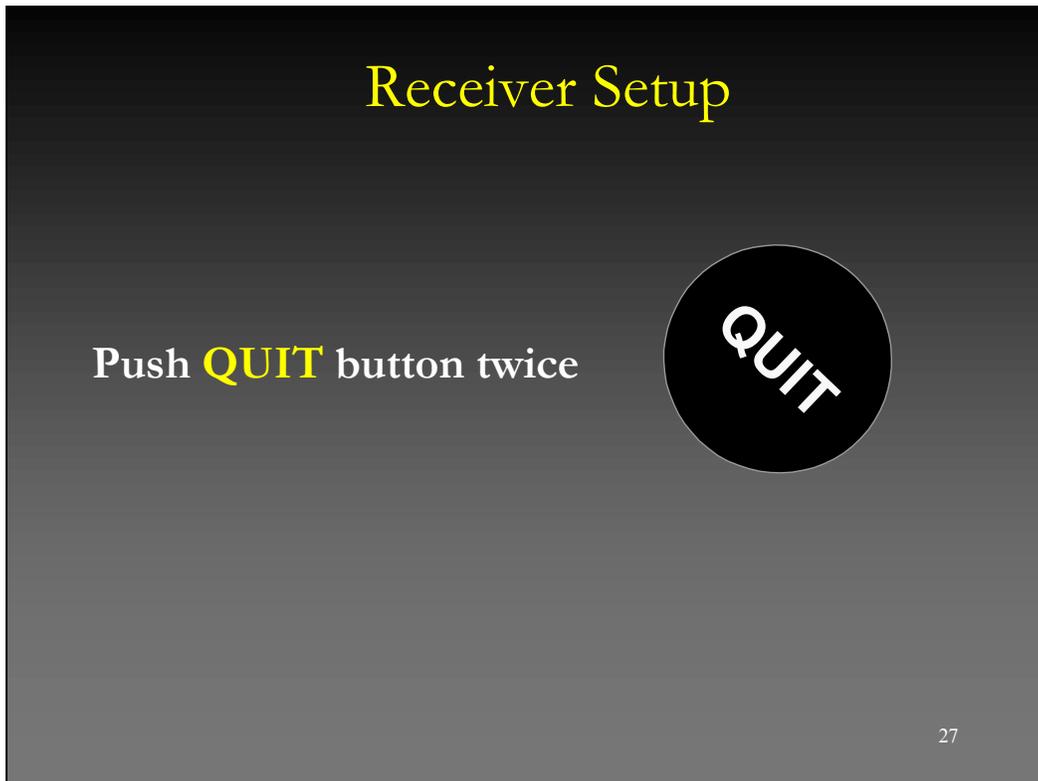
Scroll through all of the tabs in setup to see what your options are and set according to your preferences.

Important things to note here are that Units and Position are for **DISPLAY** purposes only. The GPS **ALWAYS** collects data in a unique internal coordinate system of Earth Centered Earth Fixed (ECEF) and datum of World Geodetic System 1984 (WGS84). You won't find either of these parameters on maps. WGS84 is a computer model datum that has no relationship to maps. In "map" terms ECEF, WGS84 would display similar to Latitude and Longitude, NAD83.

- You should set the receiver to display in coordinates you are comfortable viewing OR if you are using the receiver with a map; you need to set the display to *match your map*. Most field personnel are comfortable working in feet and Latitude and Longitude in degrees, minutes and seconds, while aviators prefer degrees and decimal minutes. Make sure you are aware of what your display is set to so if you are *communicating* location information to others (either written or verbally), you know which format the coordinates are in. Not knowing what datum you are (or should be) communicating location in can generate errors on the ground of up to *several hundred meters* in some parts of North America.
- You can set your Heading to display with either True or with Magnetic Variation, and don't forget to set your Time to the local time zone.

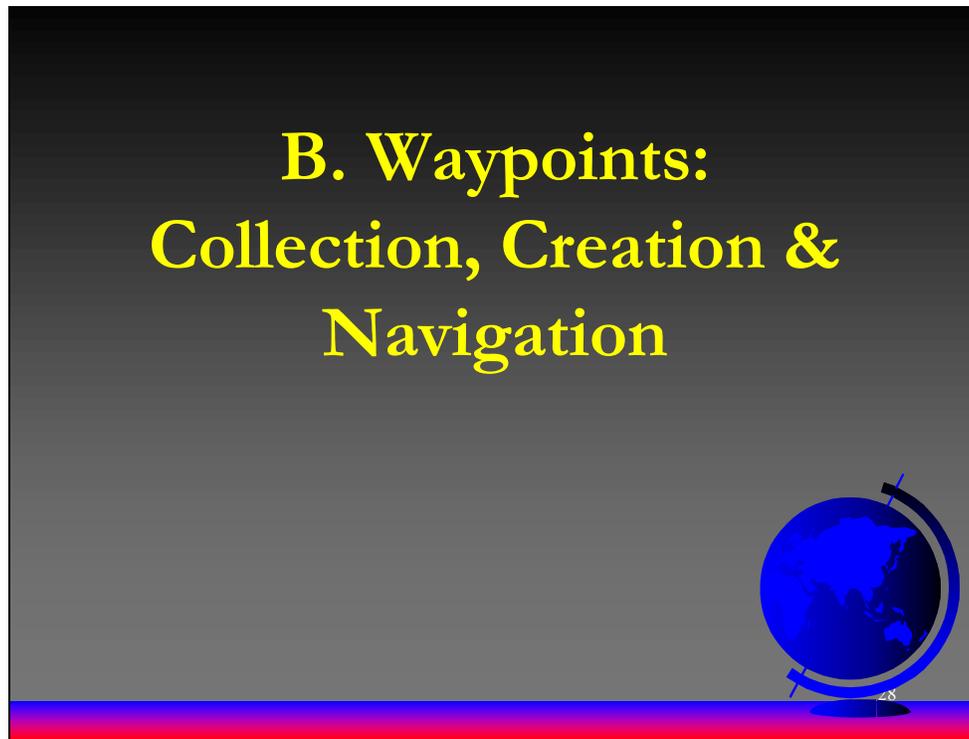


For this manual, we set the Units to Statute (U.S. Survey Foot). Position is set to Degrees and Decimal minutes (hddd mm.mmm), and Datum is WGS84. Interface Format should be set to Garmin.



When you are finished with Receiver Setup, push the Quit button *twice*.

10/11/02



Part B. Waypoints



Collecting waypoints in the field means that for the *position* you occupy at that moment, you have collected a *point*. You can collect your position in the form of a point by pressing and holding down the Enter/Mark button until a Mark Waypoint screen appears. Examples of features to collect as waypoints include park signs, campsites, and helispots.

Collecting a Waypoint

New Waypoint	
017	Done
Comment	Reference
CRTD 14:57	-----
31-MAR-01	Bearing
Position	000°
18 T 0507813	Distance
UTM 4562908	0%

“New Waypoint” screen appears.

Use rocker/keypad to scroll through waypoint screen, and push **ENTER** to edit each option. Push **ENTER** again to save each change.




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You can accept the waypoint name and symbol that the GPS assigns or you can rename and give a new symbol to the waypoint.

Many Garmin GPS units are limited to 500 waypoints. If you are collecting an area (polygon such as a fire) with waypoints, pay attention to how many you are marking and how many you will need (e.g. it takes about 200 waypoints to pretty accurately map the perimeter of a 10,000 to 15,000 acre fire from a helicopter).

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Collecting a Waypoint

New Waypoint	
017	Done
Comment	Reference
CRTD 14:57	-----
31-MAR-01	Bearing
Position	000°
18 T 0507813	Distance
UTM 4562908	0%

Edit waypoint map symbol (optional).

Edit waypoint name (optional)

Use rocker/keypad to scroll, and push **ENTER** to edit each option.

Push **ENTER** button to save each change.

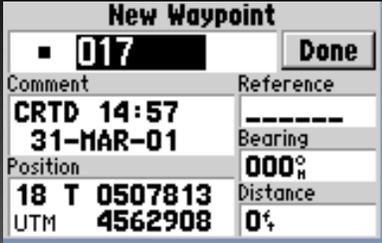



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Garmin uses the following waypoint creation structure:

- All waypoints saved in memory are given a default sequential numeric value for a name (“017” shown in the diagram). This number can be changed to any alphanumeric name.
- Comment, by default, shows the waypoint’s creation date and time. This can be changed to any comment.
- To move between entries use the rocker/keypad to scroll down, up, left and right.
- After editing an entry, press Enter/Mark button to save the entry in memory.

Collecting a Waypoint



New Waypoint	
■ 017	Done
Comment	Reference
CRTD 14:57	-----
31-MAR-01	Bearing
Position	000°
18 T 0507813	Distance
UTM 4562908	0%

To Average Waypoint Position -
Push the **MENU** button

Use rocker/keypad to scroll to **Average Position**, and push **ENTER**. Push **ENTER** again after desired number of positions are collected in **Measurement Count**

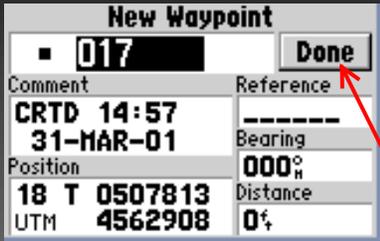




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If your mode of transportation during data collection (i.e. walking or driving) allows you to stop to collect a waypoint, you should consider *averaging* your waypoint position. What this means is that the satellites will record your position many times (as many as you wait for). When you tell the receiver to stop averaging position, it does just that. Your marked location (waypoint) will be much more accurate based on the average of your positions.

Collecting a Waypoint



New Waypoint	
■ 017	Done
Comment	Reference
CRTD 14:57	-----
31-MAR-01	Bearing
Position	000°
18 T 0507813	Distance
UTM 4562908	0%

To end waypoint edit,
use rocker/keypad to scroll to **DONE** and press **ENTER**.




33

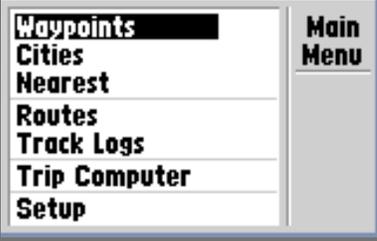
To end your waypoint edit, scroll to Done and press Enter.

Waypoint Creation

Push **MENU** button twice to access the main menu.



Main menu appears with "Waypoints" highlighted by default.



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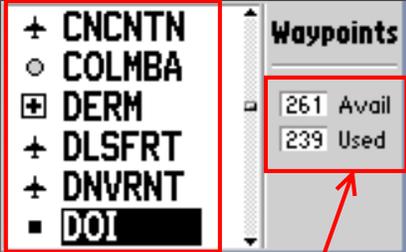
Another method of waypoint creation is to go through the Waypoint Menu. Push the Menu button *twice* to access the Main Menu and Scroll to Waypoints. Press Enter to access the Waypoints Menu.

GPS III Plus Waypoint Creation

Push **ENTER** button.



Waypoint list



Waypoint screen appears showing list of waypoints already saved in the receiver.

The GPS III Plus can store up to 500 waypoints.

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If you have collected waypoints, you will see them displayed in the waypoint list. Notice that Available and Used Waypoints are displayed.

GPS III Plus Waypoint Creation

Push **MENU** button.



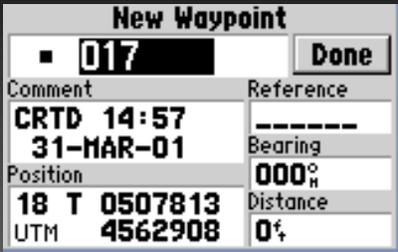
Waypoint options menu appears. "New waypoint" is highlighted by default.

Push **ENTER** button.

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Press the Menu button to access Waypoint options. Here is where you can, among other things, create a New Waypoint.

GPS III Plus Waypoint Creation



"New Waypoint" screen appears.

Use rocker/keypad to scroll through waypoint screen, and push **ENTER** to edit each option. Push **ENTER** again to save each change.

37

The New Waypoint screen appears. You can change the symbol and name here. The position displayed (in this case UTM coordinates) is your current position. If you have created a new waypoint because you have coordinates that were given to you or you read on a map, you can scroll down and *edit* the coordinates.

GPS III Plus Waypoint Creation

New Waypoint	
Name	017
Comment	CRTD 14:57 31-MAR-01
Reference	-----
Bearing	-----
Position	000° _N
Distance	0%
UTM	4562908

Use rocker/keypad to scroll, and push **ENTER** to edit each option.

Push **ENTER** button to save each change.

GPS III PLUS

ENTER MARK

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Waypoint coordinates must be entered in the same coordinate format selected in receiver setup. In this diagram UTM is the coordinate format. If the coordinates are in latitude and longitude (and there are three variations of lat/long), this receiver will need to be set to the appropriate lat/long format in Setup.

- There is an additional method to creating a new waypoint. In New Waypoint screen, a new waypoint can be created if the bearing and distance from the receiver's current position is known (i.e. exact coordinates for new waypoint not known). These can be entered into Bearing and Distance.
- Again, to move between entries use the rocker/keypad to scroll down, up, left and right. After editing an entry, press Enter/Mark button to save the entry in memory.
- If entering more than one new waypoint into memory, do not press the Done button between waypoints. Use the Enter/Mark button in the waypoint name block to create a new waypoint.

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GPS III Plus Waypoint Creation

New Waypoint	
Name	017
Comment	CRTD 14:57 31-MAR-01
Reference	-----
Bearing	-----
Position	000° _N
Distance	0%
UTM	4562908

To end waypoint edit, use rocker/keypad to scroll to **DONE** and press **ENTER**.

Push **QUIT** button twice to get out of Waypoint list.

GPS III PLUS

ENTER MARK

QUIT

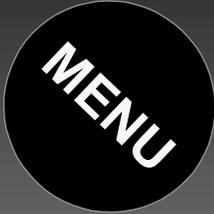
39

Use the Done button only after all new waypoints have been created to exit the New Waypoint screen. Press the Quit button twice to exit the Waypoint list screen.

GPS III Plus Navigation

Push **MENU** button twice to access Main Menu and the Waypoint Menu.

Or...



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To navigate to a waypoint, push the Menu button twice to access the main menu and the waypoint menu or...

GPS III Plus Navigation

Push **GOTO** button to bring up waypoint list. Select the waypoint you want to navigate to, and press **ENTER**.



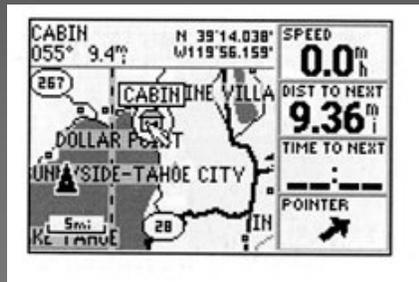
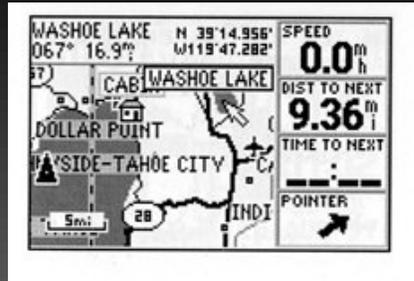

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There are three ways to navigate. All three methods of navigation use the GOTO button.

- If you choose to use the Waypoint menu to access the Waypoint list, you can select the waypoint you would like to navigate to and press the Goto button.
- If you choose to press the Goto button first, it will list the waypoints and you can select the one you want and press enter.

Navigation & the Map Page

Move the cursor over a feature and an ID bubble pops up. **In addition**, you get distance, bearing and coordinates to that point from your present location.



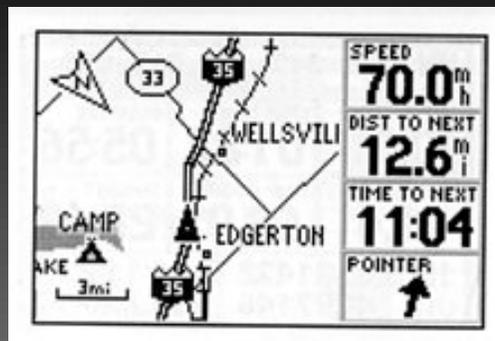
Move the cursor over a feature and push **GOTO** button if you would like to navigate to that feature.

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A third way to navigate is by picking a point on the Map page of the receiver. From the Map page, use the rocker button to scroll (with the map pointer) to the area you would like to navigate to. Press the Goto button and then Enter to confirm you would like to navigate to the Map pointer location.

Slide 43

GPS III Plus Navigation



The map page will appear indicating direction of travel to destination waypoint.

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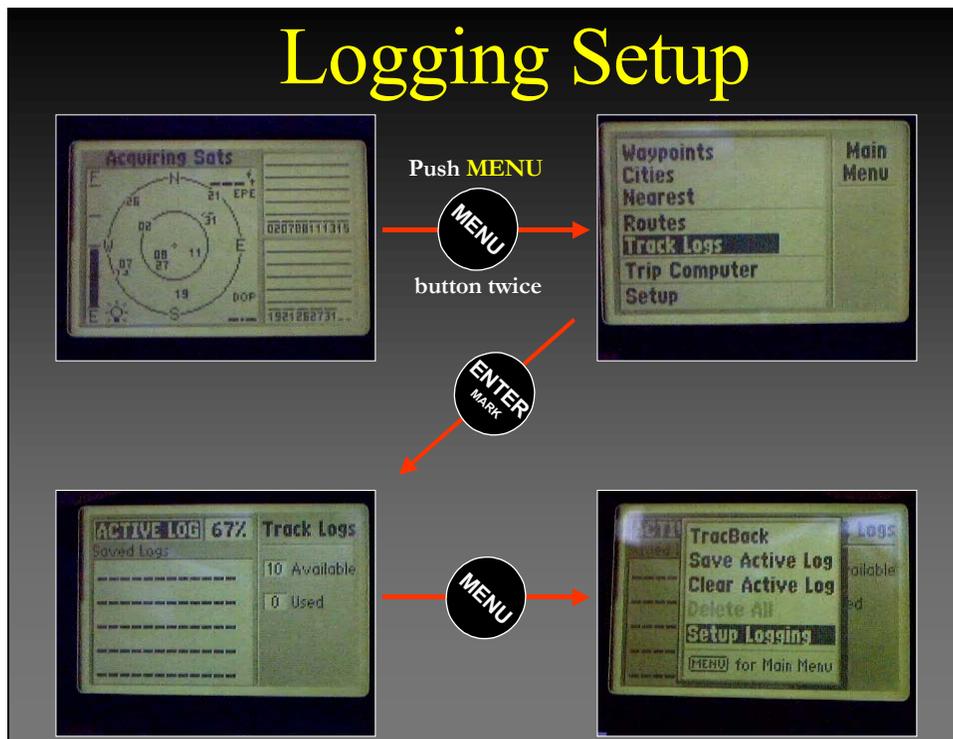
The Map page will open and display information in the data fields you set up.

C. Tracks: Logging Setup & Track Log Data Collection

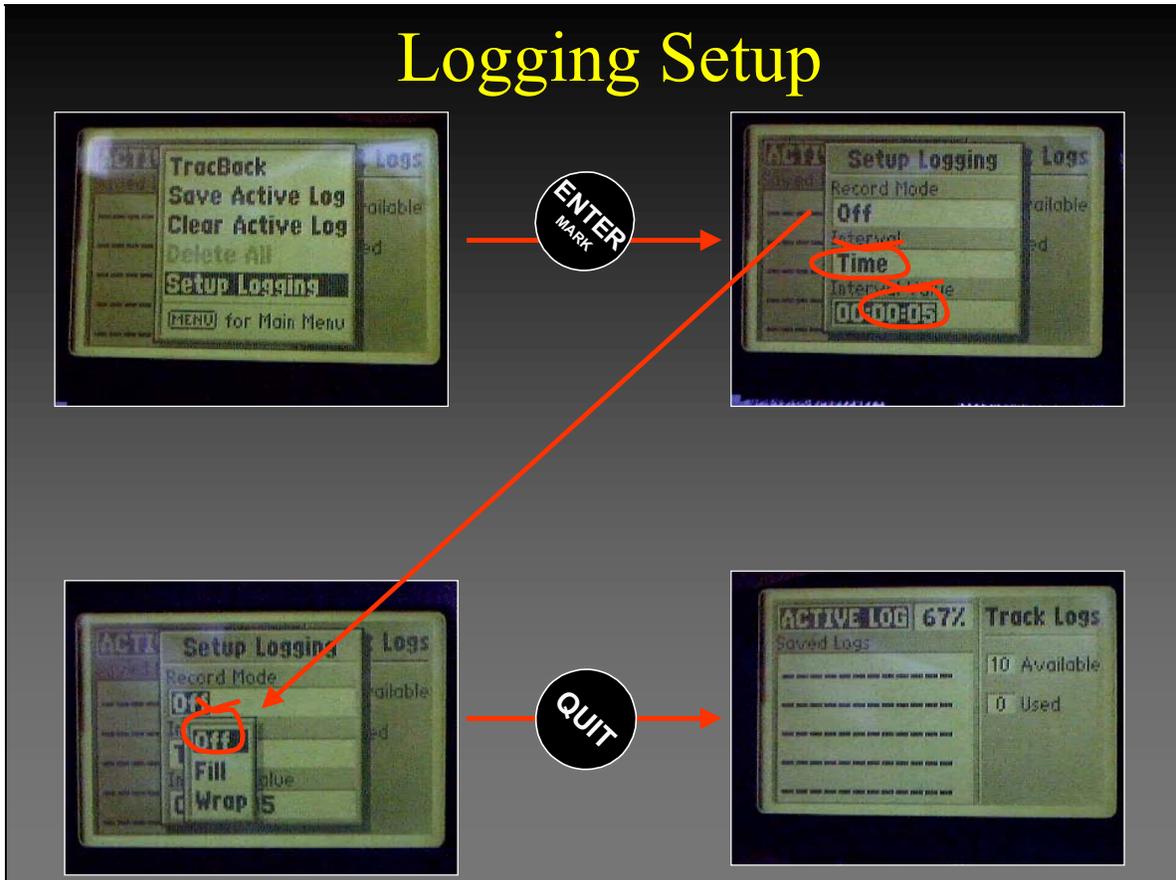


Part C. Tracks

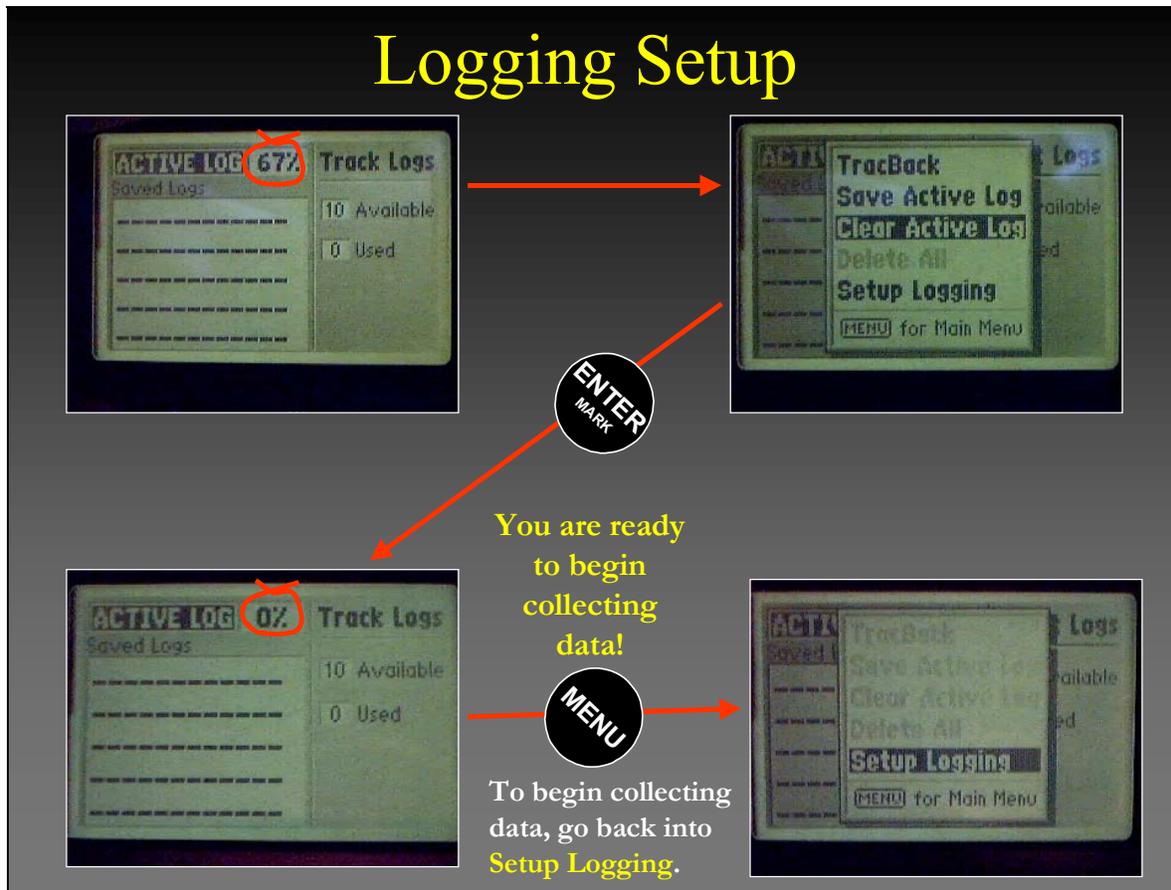
Collecting (logging) a track in the field means that for the position you occupy at that moment, you have collected a point. It is different from collecting waypoints because the *points are collected automatically* in a method and interval that you have set. You can think of it as “streaming” points. Because of the nature of the points, tracks are the appropriate method for *line or polygon* feature collection (e.g. trails, handline, and fire perimeters). Sometimes collecting waypoints for line and polygon features concurrently with track collection is a good idea as a back-up of the track feature (i.e. you can connect the dots in the GIS) or to mark points of beginning, ending, or turning.



To set up the logging options for tracks, push Menu *twice* to access the main menu. Go down to Track Logs and press Enter. This will bring you to the Track Logs screen. If you press Menu once, you can choose the Setup Logging option.

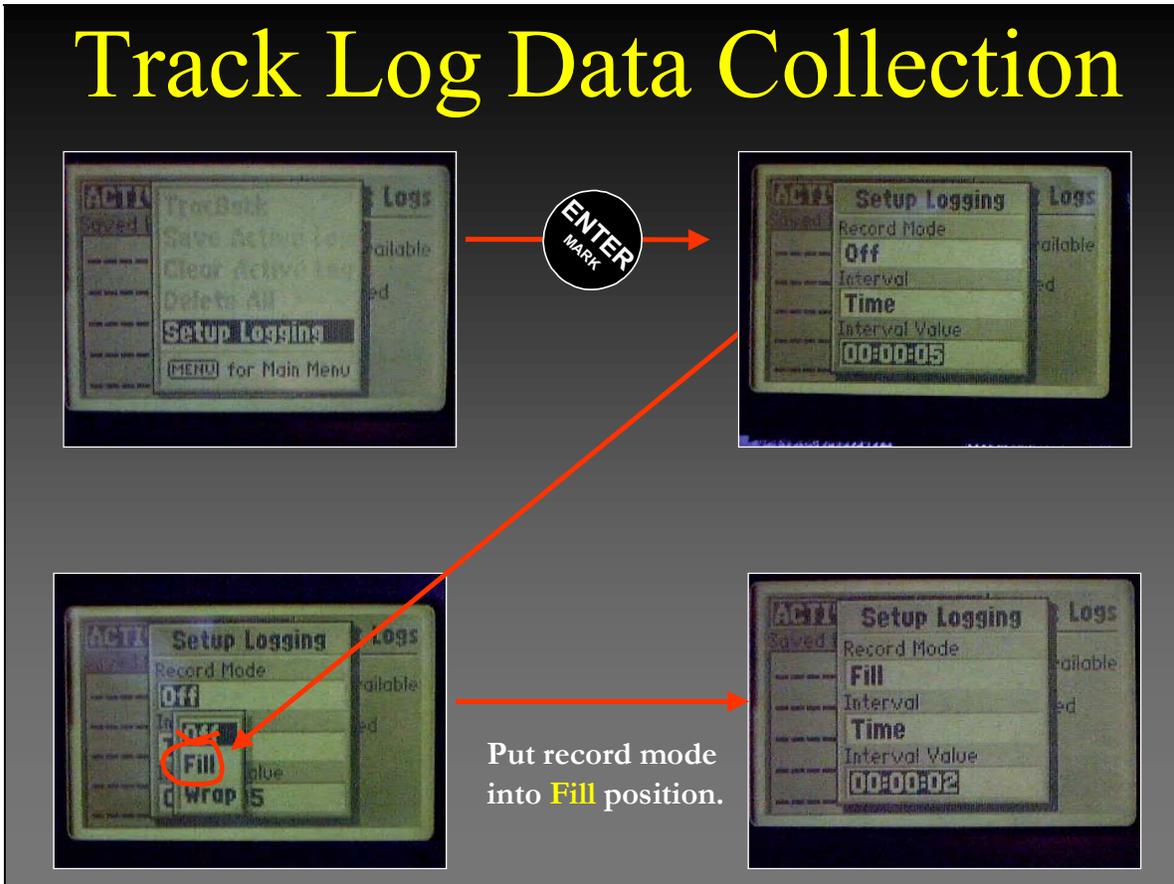


- There are three settings here: Record Mode, Interval, and Interval Value. Choose an interval of resolution, distance or time and an interval value for that setting.
- The default setting is *Resolution*. This setting is a wise choice to ensure the frugal use of your 1900 track points. A new point is collected only when your course direction (vector) changes. For example, if you are walking in a straight line for 10 feet and then begin walking a curvy line, you would see a track point at your beginning point, one at the point where you turned to begin collecting on the curvy trail and points throughout the curvy trail that switches direction frequently.
- If you are mapping a fairly straight road but you want to ensure a point is taken every 10 feet, you may want to choose *Distance* as your interval rather than resolution. A reason to collect with distance rather than time may be that you would like to be able to stop to look at something or eat your lunch, and the GPS won't collect a position until you proceed on to the distance you set.
- If your mode of travel is helicopter you may want to choose *Time* rather than distance to ensure consistent collection when the ship slows down and speeds up around fingers of a fire for instance, or when mapping a fire on a steep slope since the distance setting is measuring horizontal distance and you may be moving vertically.
- There are some things to consider when setting your time interval value. You have 1900 track points available before you fill up the memory. There are 3600 seconds in an hour, so if you collect a point every second you will fill your memory with just over 30 minutes of collect time. A point every 2 seconds = 1 hour of collection time, 5 seconds = 2.5 hours and so on. If you are collecting data in a helicopter or automobile you can cover a lot of ground in 5 seconds so make the time selection carefully.
- Change record mode to Off if it is not already set that way.

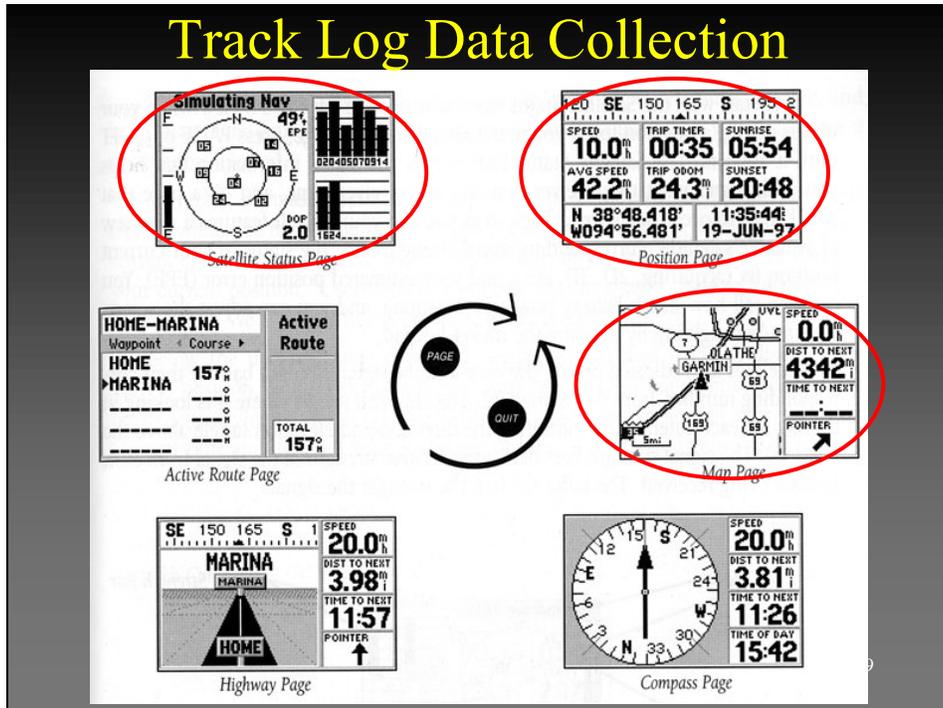


- Displayed next to the Active Log box is the percentage of active log that is used. If you don't need to keep the active log track then press menu and choose Clear Active Log.
- If you want to save the active log, you can choose Save Active Log **BUT be warned**, the receiver will cull the track points that it "thinks" you don't need. For instance, a round, irregular shaped polygon like a fire perimeter, may end up being a square after it is saved. For this reason, saving the active log in the receiver is NOT recommended. A better way to save the active log is to download to a PC. That process is covered in Module II. Waypoint +.
- To begin collecting an active log (track) go back into Setup Logging.

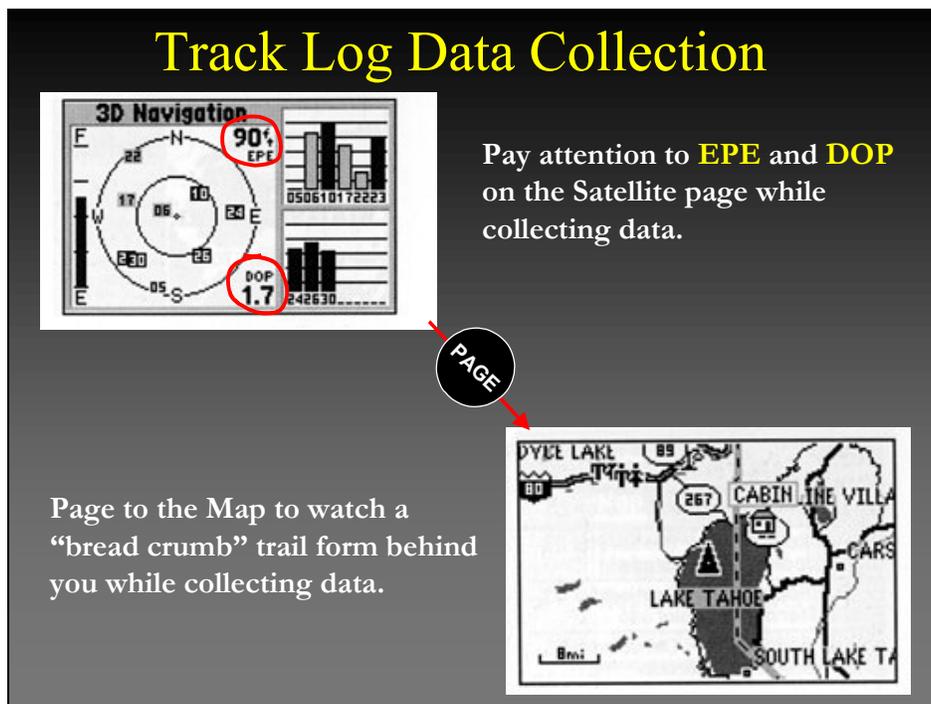
Track Log Data Collection



Verify your logging interval and interval value. Change the Record Mode to either Fill or Wrap. Fill will fill the receiver with track points based on your logging interval and then will stop collection. Wrap will fill the receiver and start over again, deleting the oldest points first. It is important to know the size or length of the area you are collecting data for so you can avoid stopping data collection or writing over data before you intend to.



These are the Pages that are the most useful during track log collection. The Satellite Page is important to view for 3D status, EPE, and DOP. The Position Page is useful for showing items such as speed and direction of travel. The Map Page is good to look at for assurance that you are collecting a track log. A “bread crumb trail” will form behind you as you collect the track. To zoom in and out of the data collection area on the map, press the In and Out buttons.



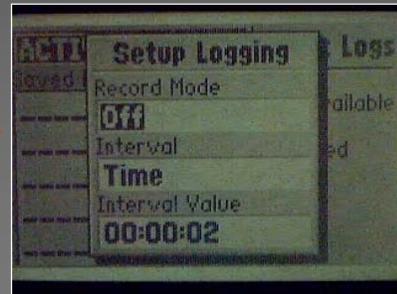
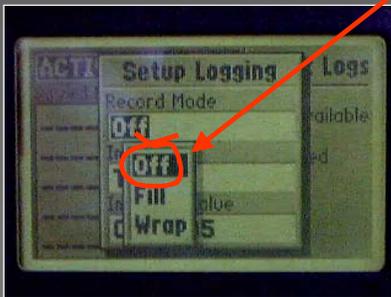
Pay attention to **EPE** and **DOP** on the Satellite page while collecting data.

Page to the Map to watch a “bread crumb” trail form behind you while collecting data.

The most important and informative pages to flip back and forth between are the Satellite Page and the Map Page. Paying attention to EPE and DOP are helpful in determining the accuracy of your data.

Track Log Data Collection

After you have finished collecting data, go back into **Setup Logging** and put record mode into **Off** position.



After you have finished collection data, go back into Setup Logging and change record mode back to Off position. Another quick way to stop track logging is to simply turn the receiver *off*. Remember; do not save your active track. You will save it on your PC after you download it.



Part D. GPS Mission Checklist and the Metadata Field Form

GPS Rules to Live By

- **Plan the mission to achieve the objectives.**
- **Select appropriate equipment for the mission.**
- **Coordinate mission with the GIS specialist.**
- **Coordinate aerial mapping missions with Air Operations.**
- **Execute a QuickPlan* to check satellite status prior to mission.**
- **Always carry a map and compass as backup when in the field.**
- **Match receiver coordinate system and datum with map coordinate system and datum (if using a map).**
- **Use only 3D positioning whenever possible.**
- **Verify that all equipment connections are sound prior to start of the mission.**
- **Record metadata in a notebook or on the metadata form.**
- **Carry spare batteries (if needed).**

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Properly and safely executing a mapping mission on large and small incidents requires considerable planning prior to stepping aboard the helicopter or going out in the field. You must coordinate your activities with the incident command staff (which will vary depending on the size of the incident). Planning is equally important for non-incident, day-to-day navigation and data collection excursions.

*Quick Plan is a GPS planning tool developed by Trimble©. It allows Trimble GPS users to plan their mission within the Pathfinder Office program. Non-Trimble users can install Quick Plan independently and use it to plan their GPS mission. A power point presentation on the download, installation and use of Quick Plan can be found on the CD under the Quick Plan folder. Quick Plan software is on the CD in the *Software* folder or can be downloaded for free from the Internet at: http://trimble.com/support_trl.asp?Nav=Collection-3629

GPS Mission Checklist

Briefing	Briefing
Mission Objective(s) Understood/Clear	
Logistics to Execute/Complete Mission Clear	
Data/Product Datum Format Clear	
Delivered Data/Product Format Clear	
Equipment	Equipment
GPS Receiver	
Cables	
External Antenna	
Batteries/Power Source	
Paper Map & Compass	
Notebook & Pencil	
Metadata Forms	
Prep GPS Receiver	Prep GPS
Waypoints – Delete Old	
Tracks – Delete Old/Setup Logging	
Setup – Units/Time/Position	
Check Wires and Connections	
Updated Receiver Almanac	
Quick Plan	Quick Plan
Satellite Status Checked	
Times of Day to Avoid Collection	

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A GPS Mission Checklist is a good thing to develop for yourself and others carrying out GPS missions. This checklist is provided on the CD in the *Documents* folder. You should use it or create one that is geared toward your specific mission.

Metadata – Overview and Methods

- Data about data (metadata) provide the lineage for GIS thematic layers.
- As a GPS specialist, metadata provide a critical link between your field data and the interpretation of your digital track and positioning effort.
- No other user can reconstruct the conditions or settings, so you need to capture these for the data user.
- All Federal data managers and data collectors are required to document the efforts and expenditures of public money on data collection by completing metadata records.
- The GIS specialist must have this documentation to display and use your data correctly. Without it, your task is not completed, and uncertainty over the product will result.
- Specifically, this deliverable ensures that your professional effort gives a complete and unambiguous track of your mapping effort.

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Metadata is very important in the creation of GIS data. The more information you provide regarding the data collection, the more useful the GIS data will be and the easier it will be to produce FGDC compliant metadata. NPS employees are mandated to create FGDC compliant metadata for all data they create. For more information on metadata go to: <http://www.nps.gov/gis>

A metadata field form is useful for recording information both before and after data collection. It is equally important whether that information helps you or someone else in the final documentation of the data. The metadata field form used in this guide can be found on the CD in the *Documents* folder.

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Metadata Field Form

Incident GPS Metadata Form (Field Log)

Date of data collection (mm/dd/yyyy): _____
 Time of data collection: Start: _____ Stop: _____

Data collector(s) name: _____
 Collector's contact information: _____

Geographic location of GPS survey: _____
 County/Park/Forest/Preserve: _____
 State/Province: _____
 Purpose of GPS survey: _____
 Incident (project) name: _____
 Describe GPS mission: _____

GPS equipment: Make _____ Model _____
 Real-time differential correction employed: No Yes Beacon Frequency: _____ kHz

Method of travel used to collect data:
 Aerial: Helicopter Fixed Wing
 Ground: Motor Vehicle Foot Non-Motorized (describe): _____
 Watercraft (describe): _____

Units: Meters Feet
 Coordinate system: L/L-dd L/L-dms L/L-dm UTM UTMzone Other
 Datum: NAD83 NAD27 WGS84 Other: _____

Number of waypoints collected: _____
 Number of tracks collected: _____
 Record Dilution of Precision (DOP) or Estimated Horizontal Error (EHE) range of values: Min _____ Max _____
 Track Log Intervals: Distance (Units _____) Time (Interval _____)

Export File Information:
 Working Path Directory (e.g. c:/waypoint+/data): _____
 Waypoint+ file name(s): _____

ESRI shapefile name(s): _____

Machine or disk name: _____
 File information contact person: _____

Metadata completed by: _____ Date: _____

Page 1
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The pre-field collection phase (top half of form) documents the setup of the GPS receiver and the projection and datum output to the future GIS thematic layers.

- Note that documentation depends on the type of GPS receiver used on the mission
- Consider the top half as a pre-mission checklist to aid in verifying your complete set-up of all functional details of the GPS mission

The bottom half (post-field) describes what you did, and how the collection occurred.

- Complete all sections of the bottom half, ensuring that another operator could, if needed, reproduce your data
- Fill in the portions that define the units, coordinate system and datum (This refers to what you intend to, or have already downloaded the data as)
- Document every decision that affected your data set (Giving an approximation of EPE and DOP is helpful if you monitored it during the mission)
- Add any descriptions or details that can add to the details of your tracks, points, or file contents
- Turn in your form with your data if you are giving it to another person to use in a GIS

Metadata Field Form

MAP: General Course (diagram in square below)

Remarks (provide any unique and useful information pertinent to the data collected during the GPS mission, or information about the mission itself):

Page 2

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Sketch out your data collection course on the back of the form (second page) and add any additional comments.

II. Waypoint+

Collect Data

Waypoint +

AV Garmin Extension

ArcView Shapefile

Tim Smith
NPS GPS Coordinator

Joel Cusick
Alaska Support Office

II. Waypoint +

A. Waypoint + Installation and Configuration

Part A. Waypoint + Installation and Configuration

Waypoint+ *

- Overview
 - Free software designed to allow download and upload of waypoints, tracks and routes from the Garmin to a PC
 - Simplifies creation/editing/viewing of GPS data
 - Ability to transform the datum from WGS84 - ???
 - Allows for transferring GPS data to GIS (via AVGarmin)
 - Available from Internet or your CD
 - Internet: <http://www.tapr.org/~kh2z/Waypoint/>
 - CD: /Software/Waypoint1803

*Developer: B. Hildebrand Copyright © 1996, 1997 Brent Hildebrand

Waypoint + Overview:

- Free software designed to allow download and upload of waypoints, tracks and routes from the Garmin to a PC
- Simplifies creation/editing/viewing of GPS data
- Ability to project data from ECEF to ???
- Ability to transform the datum from WGS84 to ???
- Allows for transferring GPS data to GIS (via AVGarmin)
- Available from Internet: <http://www.tapr.org/~kh2z/Waypoint/>
- Or on CD in this manual: /Software/Waypoint1803

Slide 61

Why Waypoint+ ?

- There are other methods for downloading waypoints and tracks from a Garmin
 - Mapsource
 - Minnesota DNRGarmin
- Waypoint+ selected because...
 - Its free 
 - It does datum transformation
 - Works with AVGarmin to allow creating shapefiles in any projection format

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Why Waypoint + 1.8.03?

- There are many 3rd party approaches to downloading Garmin collected data into Maps. The two NPS uses most are MapSource and DNR Garmin
- MapSource is \$100 and is recommended for Garmin users - you get maps. The user is capable of downloading and uploading to AVGarmin using this technique.

- DNRGarmin is a free ArcView extension that also allows the user to load Garmin data into ArcView. This program however has no projection or datum transformation engine built in, so you must rely on transforming your data in ArcView using the Projection Utility Wizard.
- Waypoint + is a good software choice because...
 - It's free
 - It projects
 - It transforms Datum
 - And... works well with AVGarmin to allow creation of shapefiles in any projection format.
 - Plus the viewer can manipulate/view track and waypoint data prior to ArcView, saving time.

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Installing Waypoint+

- Requirements
 - Windows 95 or higher
 - ~ 1.7mb of free hard disk space
 - A free serial port (Com1 - 4)
 - Garmin receiver
 - Garmin power/data cable
- Using Waypoint+ Version 1.8.03



Tip: Waypoint+ works with most Garmin's. You may need to purchase the paid version of Waypoint (v1.8.55 ~ \$30) to communicate with GPSMap76, GPSMap76S and GarminV

Waypoint+ requires the following:

- Windows 95 or higher
- ~ 1.7mb of free hard disk space
- A free serial port (Com1 - 4)
- Garmin receiver
- Garmin power/data cable

This manual covers the use of version 1.8.03. Current as of Feb 2002

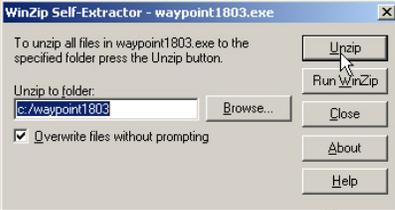
You need to purchase the paid version (~\$30.00) is required to communicate and download date/time info from the newer Garmins. Contact Kathie Hansen or Tim Smith for purchasing options.

Installing Waypoint+

- Installation Steps
 - Insert CD
 - Navigate to /Software/Waypoint1803
 - Double-click on “waypoint1803.exe”
 - Installation defaults to “c:/waypoint1803”
 - Press the Unzip button



Warning: Default settings will overwrite any previous installation!



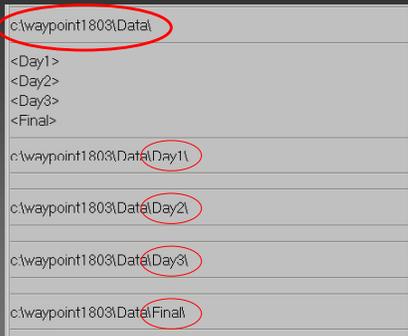
The image shows a screenshot of the WinZip Self-Extractor dialog box for 'waypoint1803.exe'. The dialog has a title bar 'WinZip Self-Extractor - waypoint1803.exe'. The main text says 'To unzip all files in waypoint1803.exe to the specified folder press the Unzip button.' Below this, there is a field 'Unzip to folder:' with the text 'c:/waypoint1803' and a 'Browse...' button. There is a checked checkbox for 'Overwrite files without prompting'. On the right side, there are buttons for 'Unzip', 'Run WinZip', 'Close', 'About', and 'Help'. A mouse cursor is pointing at the 'Unzip' button.

Installation Steps

- Insert CD
- Navigate to /Software/Waypoint1803
- Double-click on “waypoint1803.exe”
- Installation defaults to “c:/waypoint1803”
- Press the Unzip button

Installing Waypoint+

- Installation Steps (cont.)
 - Press OK to confirm files unzipped
 - Press Close button
- This installation provides a Data subdirectory for organizing your data



The image shows a screenshot of a file explorer window displaying a directory tree. The root directory is 'c:\waypoint1803\Data'. Underneath it, there are several subdirectories: '<Day1>', '<Day2>', '<Day3>', and '<Final>'. Each of these subdirectories has its own subdirectory: 'c:\waypoint1803\Data\Day1', 'c:\waypoint1803\Data\Day2', 'c:\waypoint1803\Data\Day3', and 'c:\waypoint1803\Data\Final'. Red circles are drawn around each of these directory names in the tree view.



Tip: Installation requires WinZip. Find WinZip on the CD / Software/Winzip

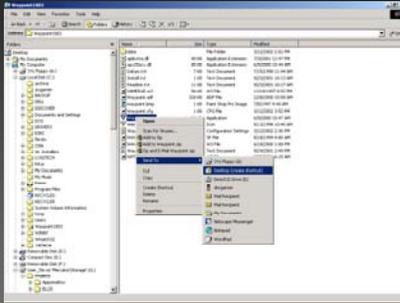
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Installation Steps

- If you are unable to UNZIP, navigate to the CD under /Software/Winzip and double-click exe to install.
- The Waypoint+ exe will also provide a directory file structure for organizing data but you can create your own directory structure elsewhere as well.

Installing Waypoint+

- Create Shortcut on your desktop
 - Open Windows Explorer
 - Navigate to c:/Waypoint1803 directory
 - Right click on waypoint.exe
 - Select “Send To”
 - Click on “Desktop (Create Shortcut)”




*** Your Done!!!

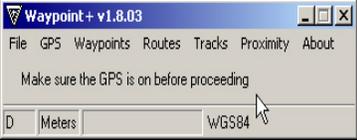
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Create a Waypoint+ shortcut on your desktop.

- Open Windows Explorer
- Navigate to c:/Waypoint1803 directory
- Right click on waypoint.exe
- Select “Create Shortcut”
- Right click on the new shortcut
- Select “Rename” and type “Waypoint+1803”
- Copy new shortcut to your Desktop - You’re Done!!!

Quick Start: Waypoint+

- Start Program
 - Double-click on the desktop shortcut
 - Press OK to start program
 - You should see this!
- Configuration is next!

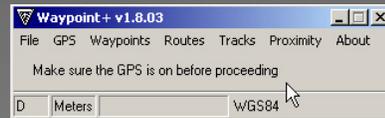
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Now that the shortcut is created, you can start Waypoint+ for the first time and configure the program for use!

- Double-click on the desktop shortcut
- Press OK to start program
- You should see the program’s window

Waypoint+ Configuration

- Three Setup requirements when using Waypoint+ with AVGarmin...
 - 1) Coordinate data needs to be **decimal degrees**
 - 2) The **datum** needs to be set. The datum set *must* match the datum of your other GIS layers
 - 3) All Waypoint+ files need to be in text (**comma-delimited**) format



There are Three Setup requirements when using Waypoint+ with AVGarmin...

- 1) Coordinate data needs to be **decimal degrees**
- 2) The **datum** needs to be set. The datum set must match the datum of your other GIS layers
- 3) All Waypoint+ files need to be in text (**comma-delimited**) format

We will concentrate for now on the first two. The 3rd step will be covered in Part B. Transfer Data with Waypoint +.

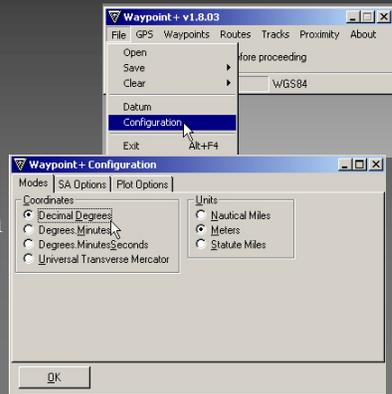
Slide 68

Waypoint+ Configuration

- Setup requirements
 - 1) Coordinate data needs to be **decimal degrees**
 - Select File | Configuration
 - Ensure Coordinates are Decimal Degrees
 - Ensure Units are meters
 - Press OK to return to main window



Tip: Setting Coordinates to Decimal Degree here only determines the projection of text data. You can project the data later on.

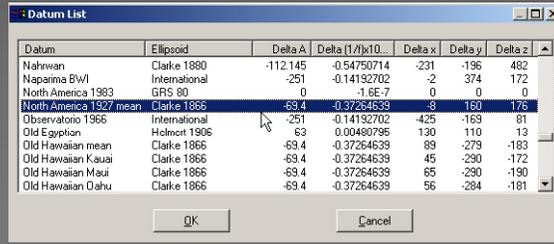


ArcView and AVGarmin *need* decimal degree data. **YOU MUST SET COORDINATES TO DD.** You can project the data to whatever projection you desire (including UTM) in AVGarmin

- 1) Coordinate data to **Decimal Degrees**
 - Select File | Configuration
 - Ensure Units are set to **Meters**
 - Press OK to return to main window

Waypoint+ Configuration

- Setup requirements (cont.)
 - 2) The **datum** needs to be set. The datum set must match the datum of your other GIS layers
 - Select File | Datum
 - Scroll down list of datums. (e.g. select NAD27)
 - Press OK to return to main window



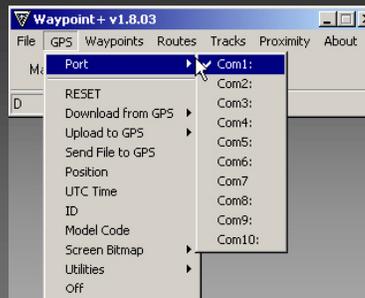
Now...the **datum** needs to be set. The datum set *must* match the datum of your other GIS layers.

2) To set the **datum**

- Select File | Datum
- Scroll down list of datums. (E.g. select NAD27)
- Press OK to return to main window

Waypoint+ Configuration

- Setup requirements (cont.)
- Make sure Com Port is set
 - Select GPS | Port
 - Ensure Port Set to Com1



Tip: Com ports can be taken over by various external devices. You may need to select alternative Com devices.

Last thing in setup is to ensure you have checked a Com port to communicate with the Garmin. Try defaulting to Com1, assuming you have no device using this port.

- Make sure Com Port is set
 - Select GPS | Port
 - Ensure Port Set to Com1

Waypoint+ Configuration

- Congratulations! Waypoint+ is setup and ready to receive data from the Garmin GPS unit!



Tip: Setting up Waypoint+ is easy and the program retains all settings the next time you run the program!

This concludes setting up Waypoint+. Now you're ready to Download coordinates from the Garmin GPS III Plus and view them on your PC!

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Waypoint+ Summary

- Completed Installation of Waypoint+
 - Created a desktop shortcut to start program
- Waypoint+ Configuration
 - Coordinate data set to Decimal Degree
 - Datum set to match your needs (e.g. NAD27)
- Next Step
 - Now you are ready to download from your Garmin GPS and view the data in Waypoint+

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Check your Garmin for proper communication protocol.

Downloading Garmin with Waypoint+

Collect Data

Waypoint +

AV Garmin Extension

ArcView Shapefile

Tim Smith
NPS GPS Coordinator

Joel Cusick
Alaska Support Office

Now we will focus on the transition from Module I to Module II to accomplish data download.

B. Transfer Data with Waypoint +

Part B. Transfer Data with Waypoint +

Downloading Garmin



- Connect GPS unit to PC



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Connect GPS unit to PC by connecting the serial cable to the PC and the other end into the data transfer port of the receiver.

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Downloading Garmin

- Start Receiver
 - Push the ON button
 - Push the **MENU** button twice
 - Scroll down to **SETUP**
 - Push **ENTER**
 - Scroll sideways the **INTERFACE** tab



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Start receiver and go to Setup and then Interface.

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Downloading Garmin

Waypoints
Cities
Nearest
Routes
Track Logs
Trip Computer
Setup

• Check Interface Protocol

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Be sure to check the interface protocol on the Garmin so that it can communicate with the PC. It needs to be set to Format | Garmin and Transfer Mode | Host. This becomes a very important check when you are using real-time differential

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Quick Start: Waypoint+

- Start Program
- Check Three Setup requirements for AVGarmin...
 - 1) Coordinate data needs to be **decimal degrees**
 - 2) The **datum** needs to be set. The datum set *must* match the datum of your other GIS layers
 - 3) All Waypoint+ files need to be in text (**comma-delimited**) format

Check the configuration of Waypoint + again to ensure your settings were retained.

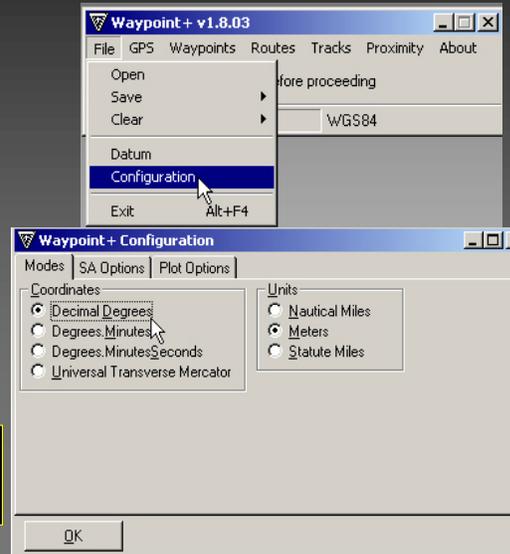
- 1) Coordinate data needs to be **decimal degrees**
- 2) The **datum** needs to be set. The datum set must match the datum of your other GIS layers
- 3) All Waypoint+ files need to be in text (**comma-delimited**) format

Quick Start: Waypoint+

- Setup requirements
 - 1) Coordinate data needs to be **decimal degrees**
 - Select File | Configuration
 - Ensure Coordinates are Decimal Degrees
 - Ensure Units are meters
 - Press OK to return to main window



Tip: Setting Coordinates to Decimal Degree here only determines the configuration of text data. You can project the data later on.



If needed, reset the configuration by following the steps above.

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Quick Start: Waypoint+

- Setup requirements (cont.)
 - 2) The **datum** needs to be set. The datum set must match the datum of your other GIS layers
 - Select File | Datum
 - Scroll down list of datums. Select NAD27
 - Press OK to return to main window



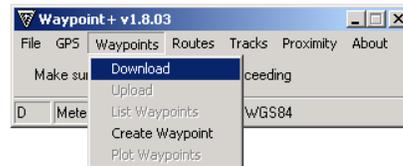
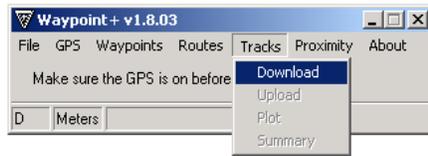
If needed, reset the datum by following the steps above.

Waypoint + Operations

- **Download Data from Receiver to PC**
 - For Tracks: Pick Tracks | Download
 - For Waypoints: Pick Waypoints | Download

Tracks

Waypoints



Tip: The data will stay in memory until you either clear it out or exit Waypoint +.

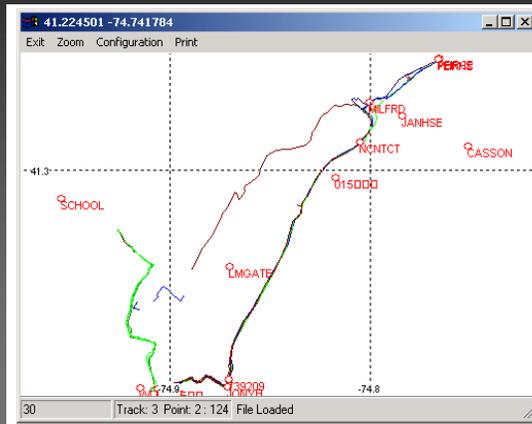
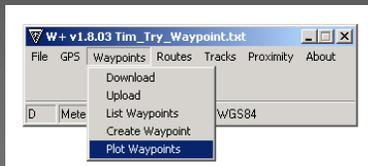
For Tracks:
Pick Tracks | Download

For Waypoints:
Pick Waypoints | Download

Tip: The data will stay in memory until you either clear it out or exit Waypoint +

Waypoint + Operations

- **Plot Tracks and Waypoints**



Tip: Look at the data to see if it appears good.

For Tracks:
Pick Tracks | Plot

For Waypoints:
Pick Waypoints | Plot

Waypoint + Operations

- **Track Summary**
 - Delete unwanted tracks from list
 - Join track segments as needed

Track	Km	Km/hr	Points	Duration	Start	Stop
1	8.03	14.85	64	000:32:25	2001/06/20 20:27:31	2001/06/20 20:59:56
2	10.85	65.55	59	000:09:56	2001/06/21 00:42:01	2001/06/21 00:51:57
3	1.01	84.88	4	000:00:43	2001/06/21 13:44:07	2001/06/21 13:44:50
4	4.32	11.43	46	000:22:42	2001/06/21 13:45:27	2001/06/21 14:08:09
5	2.09	52.01	19	000:02:25	2001/06/21 14:09:17	2001/06/21 14:11:42
6	22.45	62.99	117	000:21:23	2001/06/21 22:09:37	2001/06/21 22:31:00
7	7.11	78.05	21	000:05:26	2001/06/22 14:20:31	2001/06/22 14:25:59
8	0.63	48.45	7	000:00:47	2001/06/22 14:26:56	2001/06/22 14:27:43
9	0.70	43.70	5	000:00:58	2001/06/22 14:28:21	2001/06/22 14:29:19
10	0.05	16.27	2	000:00:11	2001/06/22 14:29:58	2001/06/22 14:30:09
11	1.40	59.87	11	000:01:24	2001/06/22 19:23:02	2001/06/22 19:24:26
12	9.37	35.09	63	000:15:01	2001/06/22 19:49:27	2001/06/22 20:05:28
13	18.83	39.12	123	000:28:53	2001/06/22 20:14:50	2001/06/22 20:43:43
14	0.72	36.45	7	000:01:11	2001/06/25 12:52:07	2001/06/25 12:53:18
15	0.00	0.00	1	000:00:00	2001/06/25 12:54:07	2001/06/25 12:54:07
16	2.36	52.22	16	000:02:43	2001/06/25 12:57:17	2001/06/25 13:00:00
17	17.96	50.17	105	000:21:23	2001/06/25 13:01:14	2001/06/25 13:22:43
18	6.30	58.90	31	000:06:25	2001/06/25 17:46:25	2001/06/25 17:52:50
19	14.68	83.34	65	000:10:34	2001/06/25 17:53:27	2001/06/25 18:04:01
20	5.22	39.78	43	000:07:52	2001/06/26 12:42:07	2001/06/26 12:49:59
21	17.93	78.04	64	000:13:47	2001/06/26 12:50:29	2001/06/26 13:04:16
22	23.73	73.58	109	000:19:21	2001/06/26 22:05:37	2001/06/26 22:24:58
23	0.00	0.00	1	000:00:00	2001/06/26 22:38:10	2001/06/26 22:38:10
24	0.17	1.28	3	000:08:13	2001/06/26 23:03:40	2001/06/26 23:11:53
25	7.85	55.74	53	000:08:27	2001/06/27 13:07:37	2001/06/27 13:16:04
26	24.56	23.35	145	001:03:07	2001/06/27 21:06:56	2001/06/27 22:10:03
27	1.17	45.33	0	000:01:31	2001/06/20 13:03:36	2001/06/20 13:05:07
28	3.30	62.17	22	000:03:11	2001/06/28 13:05:31	2001/06/28 13:08:42
29	1.57	102.68	4	000:00:55	2001/06/28 13:09:19	2001/06/28 13:10:14
30	15.32	65.20	70	000:14:06	2001/06/28 13:10:52	2001/06/28 13:24:58
31	0.08	0.36	7	000:13:06	2001/06/28 13:28:50	2001/06/28 13:41:56
32	4.55	42.51	28	000:06:25	2001/06/29 20:39:55	2001/06/29 20:46:20
33	19.35	79.75	84	000:14:34	2001/06/29 21:43:26	2001/06/29 21:58:00

Pick Tracks | Summary
You can review and edit your collected tracks in this option
Tip: Clear memory after each export.

Waypoint + Operations

- **Waypoint List and Editor**
 - Summarize, edit and create

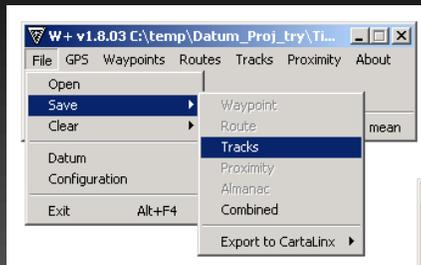
Waypoint	Latitude	Longitude	Description
001	41.750670	-124.182855	001
002	41.559434	-124.087953	002
003	40.710161	-74.180144	003
004	39.811749	-77.246305	004
005	39.811728	-77.246279	005
006	39.811707	-77.246220	006
007	39.811664	-77.246134	007
009	32.825453	-79.825759	009

Name	Latitude	Longitude	Description
WPT 1	74.458908	-124.45678	FIRE CAMP

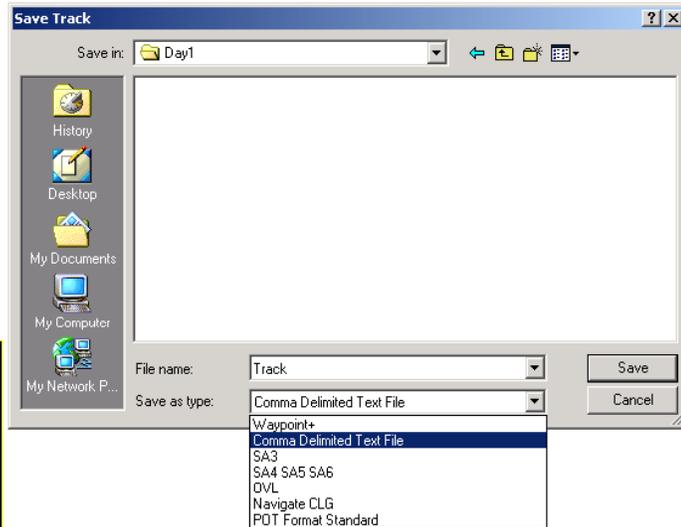
Pick Waypoints | Summary
You can review and edit your collected waypoints in this option.

Tip: Pick Waypoints | Create Waypoints in order to make new waypoints for uploading back to the Garmin receiver

Waypoint + Operations



- Save to an ASCII Text File



Tip: Remember that you must have the configuration set to latitude/longitude, decimal degrees and have the datum set so that it will match your GIS data.

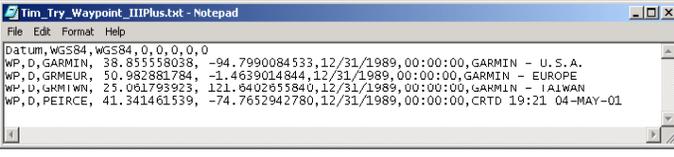
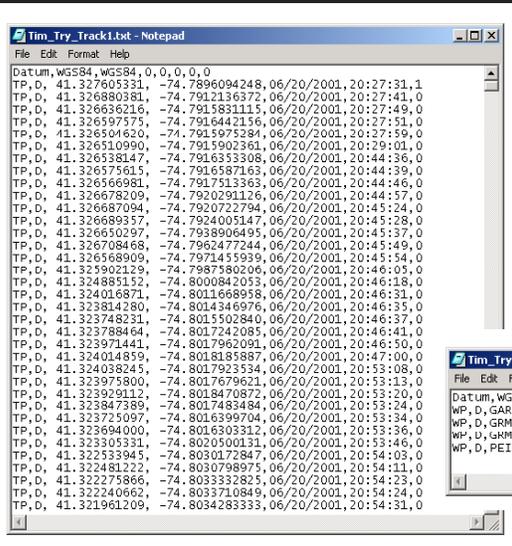
Things to remember prior to saving the text file:

- Again, make sure that the configuration (FILE | CONFIGURATION) and datum (FILE | DATUM) are set correctly.
- You must have the configuration set to latitude/longitude, decimal degrees if you will be using AVGarmin to bring the data into ArcView.
- You must have the datum set so that it will match your GIS data.
- Save your data to a **Comma Delimited Text File**.

Track Waypoint + Operations

- Review the text file output with TextPad or Notepad.

Waypoint



 Tip: These files can be reread into Waypoint + at any time for additional processing or uploading back to the Garmin receiver.

These files can be reread into Waypoint + at any time for additional processing or uploading back to the Garmin receiver.

Power Down the GPS III Plus

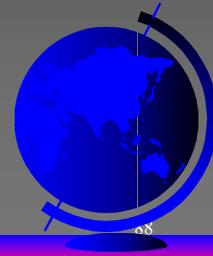
To turn off the GPS unit, push and hold the **POWER** button until the LCD screen goes blank.



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Power Down the Receiver

C. Creating Waypoints and Uploading to Receiver



Part C. Creating Waypoints and Uploading to Receiver

Uploading Data from Waypoint+ to Garmin



Waypoint +



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You can upload data to the Garmin Receiver with Waypoint +.

Upload Data to Garmin

Connect
GPS unit
to PC



- **Start Receiver**
 - Push the ON button
 - Push the MENU button twice
 - Scroll down to SETUP
 - Push ENTER
 - Scroll sideways the INTERFACE tab

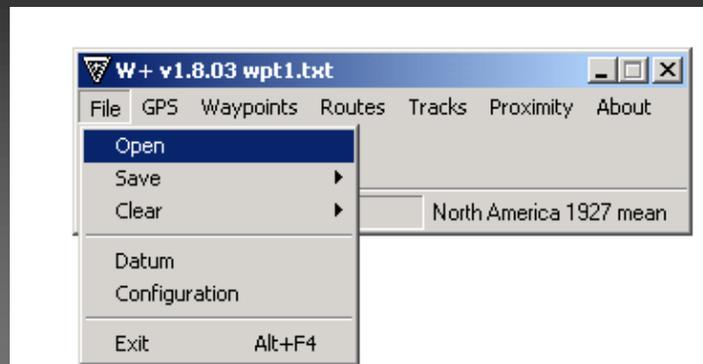


Connect receiver, start receiver and ensure interface is set to GARMIN.

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Upload Data to Garmin

- **Start Waypoint+**
 - Open File for Uploading



Tip: You can upload a .txt files previously downloaded from a receiver OR you can create your own .txt file by using TextPad or Notepad to make edits. Make sure you follow the same file format to ensure it will compatible with the receiver.

In Waypoint +, open file for uploading. You can upload a .txt file previously downloaded from a receiver OR you can create your own .txt file by using TextPad or Notepad to make edits. Make sure you follow the same file format to ensure it will compatible with the receiver.

Upload Data to Garmin

- Review Tracks and Waypoints Before Upload

The screenshot shows two windows from the Garmin software. The left window displays the 'Tracks' menu with options: Download, Upload, Plot, and Summary. The right window shows a map with several waypoints plotted, including 'SCHOOL', 'LMGATE', '15000', 'MONTCT', 'JANHSE', 'PERNS', 'CASSON', '749', '33009', and '38009'. The status bar at the bottom indicates 'Track: 3 Point: 2: 124 File Loaded'.

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Tip: Look at the data to see if it appears good.

For Tracks:
Pick Tracks | Plot

For Waypoints:
Pick Waypoints | Plot

Upload Data to Garmin

- Track Summary
 - Delete unwanted tracks from list
 - Join track segments as needed

The screenshot shows the 'Track Summary' window with a table of track data. A red arrow points from the 'Summary' option in the 'Tracks' menu to the table.

Track	Km	Km/hr	Points	Duration	Start	Stop
1	8.03	14.85	64	000:32:25	2001/06/20 20:27:31	2001/06/20 20:59:56
2	10.85	65.55	58	000:09:56	2001/06/21 00:42:01	2001/06/21 00:51:57
3	1.01	84.88	4	000:00:43	2001/06/21 13:44:07	2001/06/21 13:44:50
4	4.32	11.43	46	000:22:42	2001/06/21 13:45:27	2001/06/21 14:08:09
5	2.09	52.01	19	000:02:25	2001/06/21 14:09:17	2001/06/21 14:11:42
6	22.45	62.99	117	000:21:23	2001/06/21 22:09:37	2001/06/21 22:31:00
7	7.11	78.05	21	000:05:28	2001/06/22 14:20:31	2001/06/22 14:25:59
8	0.63	48.45	7	000:00:47	2001/06/22 14:26:56	2001/06/22 14:27:43
9	0.70	43.70	5	000:00:58	2001/06/22 14:28:21	2001/06/22 14:29:19
10	0.05	16.27	2	000:00:11	2001/06/22 14:29:58	2001/06/22 14:30:09
11	1.40	59.87	11	000:01:24	2001/06/22 19:23:02	2001/06/22 19:24:26
12	9.37	35.09	63	000:16:01	2001/06/22 19:49:27	2001/06/22 20:05:28
13	18.83	39.12	123	000:28:53	2001/06/22 20:14:50	2001/06/22 20:43:43
14	0.72	36.45	7	000:01:11	2001/06/25 12:52:07	2001/06/25 12:53:18
15	0.00	0.00	1	000:00:00	2001/06/25 12:54:07	2001/06/25 12:54:07
16	2.36	52.22	16	000:02:43	2001/06/25 12:57:17	2001/06/25 13:00:00
17	17.96	50.17	105	000:21:29	2001/06/25 13:01:14	2001/06/25 13:22:43
18	6.30	58.90	31	000:06:25	2001/06/25 17:46:25	2001/06/25 17:52:50
19	14.68	83.34	65	000:10:34	2001/06/25 17:53:27	2001/06/25 18:04:01
20	5.22	39.78	43	000:07:52	2001/06/26 12:42:07	2001/06/26 12:49:59
21	17.93	78.04	64	000:13:47	2001/06/26 12:50:29	2001/06/26 13:04:16
22	23.73	73.58	109	000:19:21	2001/06/26 22:05:37	2001/06/26 22:24:58
23	0.00	0.00	1	000:00:00	2001/06/26 22:28:10	2001/06/26 22:28:10
24	0.17	1.28	3	000:08:13	2001/06/26 23:03:40	2001/06/26 23:11:53
25	7.85	55.74	53	000:08:27	2001/06/27 13:07:37	2001/06/27 13:16:04
26	24.56	23.35	145	001:03:07	2001/06/27 21:06:56	2001/06/27 22:10:03
27	1.17	46.30	0	000:01:31	2001/06/28 13:03:36	2001/06/28 13:05:07
28	3.30	62.17	22	000:03:11	2001/06/28 13:05:31	2001/06/28 13:08:42
29	1.57	102.68	4	000:00:55	2001/06/28 13:09:19	2001/06/28 13:10:14
30	15.32	65.20	70	000:14:06	2001/06/28 13:10:52	2001/06/28 13:24:58
31	0.08	0.36	7	000:13:06	2001/06/28 13:28:50	2001/06/28 13:41:56
32	4.55	42.51	28	000:06:25	2001/06/29 20:39:55	2001/06/29 20:46:20
33	19.36	79.75	84	000:14:34	2001/06/29 21:43:26	2001/06/29 21:58:00

Pick Tracks | Summary
You can review and edit your collected tracks in this option

Upload Data to Garmin

- **Waypoint List and Editor**
 - Summarize, edit and create

Waypoint	Latitude	Longitude	Description
001	41.750670	-124.182855	001
002	41.559434	-124.087953	002
003	40.710161	-74.180144	003
004	39.811749	-77.246305	004
005	39.811728	-77.246279	005
006	39.811707	-77.246220	006
007	39.811664	-77.246134	007
009	32.825453	-79.825759	009

Name	Latitude	Longitude	Description
WPT 1	74.458908	-124.45678	FIRE CAMP

Pick Waypoints | Summary
You can review and edit your collected waypoints in this option.

Upload Data to Garmin

- **Upload Waypoints and Tracks to Receiver from PC**
 - For Track: Pick Tracks | Upload
 - For Waypoints: Pick Waypoints | Upload

Tracks Waypoints

File	GPS	Waypoints	Routes	Tracks	Proximity	About
File Loaded				Download		
D	Meters	TRK		Upload		983
				Plot		
				Summary		

File	GPS	Waypoints	Routes	Tracks	Proximity	About
File Load						
D	Mete					North America 1927 mean

Tip: The data will stay in memory until you either clear it out or exit Waypoint +.

For Tracks:
Pick Tracks | Upload

For Waypoints:
Pick Waypoints | Upload

Tip: The data will stay in memory until you either clear it out or exit Waypoint +

III. AV Garmin Extension



Collect Data



Waypoint +



AV Garmin Extension



ArcView Shapefile

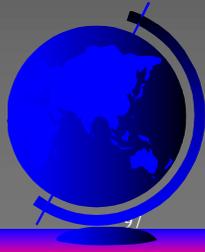
Tim Smith
NPS GPS Coordinator

Joel Cusick
Alaska Support Office



III. AV Garmin Extension

AV Garmin Installation and Quick Start



Installing AV Garmin and Quick Start

AV Garmin *

- Overview
 - Free ArcView® 3.x extension designed to allow ArcView users to...
 - Create shapefiles in ArcView from data collected with your Garmin GPS
 - Create shapefiles in any projection format
 - Append existing shapefile with additional GPS data
 - Available from Internet or your CD
 - Internet: <http://maphost.dfg.ca.gov/>
 - CD: /AVExtensions/AVGarmin2199

*Developer: Isaac Oshima California Dept. of Fish and Game

AV Garmin Overview

- Free ArcView 3.x extension designed to allow import of waypoints and tracks that were downloaded with MapSource or Waypoint +.
- Creates shapefiles in ArcView from data collected with your Garmin GPS
- Create shapefiles in any projection format
- Append existing shapefile with additional GPS data
- Available from Internet or your CD
 - Internet: <http://maphost.dfg.ca.gov/>
 - CD: /AVExtensions/AVGarmin2199

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AV Garmin

- Overview (cont.)
 - AV Garmin does not directly communicate with the Garmin GPS. You can use Garmin MapSource or Waypoint+ shareware.
 - For this application we will use AV Garmin in conjunction with the Waypoint+ shareware
 - Both have been distributed for your use on your CD.

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- AV Garmin does not directly communicate with the Garmin GPS. You can use Garmin MapSource or Waypoint+ shareware.
- These directions cover use of AV Garmin in conjunction with the Waypoint+ shareware

Why AV Garmin?

- There are other methods for importing Garmin data into ArcView
 - Minnesota DNRGarmin, OziExplorer, Fugawi....
- AV Garmin selected because...
 - Uses ArcView© 3.x as parent software - one of the most common GIS software in use
 - Its free 
 - Works with Waypoint+ to allow creating shapefiles in any projection format

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There are other methods for importing Garmin data into ArcView

- Minnesota DNRGarmin
- OziExplorer
- Fugawi....

AV Garmin selected because...

Uses ArcView© 3.x as parent software - the most widely available GIS

- It's **free**
- Works with Waypoint+ to allow creation of shapefiles in any projection format

Installing AV Garmin

- Requirements
 - ArcView 3.1 or higher installed and functional
- AV Garmin extension adds one button to the ArcView View GUI


- These instructions are for AV Garmin Version 2.1.99

 **Tip:** AV Garmin works with most Garmin's. You may need to purchase the paid version of Waypoint+ or MapSource to provide data from eTrex, GPSMap76, GPSMap76S and GarminV.

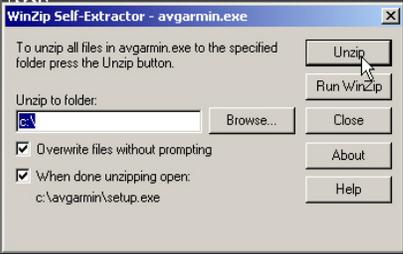
- Requires ArcView 3.1 or higher installed and functional
- AV Garmin extension adds one button to the ArcView View GUI
- The following are directions for using AV Garmin Version 2.1.99
- AV Garmin works with most Garmins. You may need to purchase the paid version of Waypoint+ or MapSource to provide data from eTrex, GPSMap76 and GarminV

Installing AV Garmin

- AV Garmin Extension Installation Steps
 - Insert CD
 - Navigate to /AVExtensions/AVGarmin2199
 - Double-click on “avgarmin.exe”
 - Installation guides you through a series of dialog boxes
 - Press the Unzip button



Warning: Close all other applications when running this self extractor!



Installation Steps

- Insert Training CD
- Navigate to /AVExtensions/AVGarmin2199
- Double-click on “avgarmin.exe”
- Installation guides you through a series of dialog boxes
- Press the Unzip button

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Installing AV Garmin

- Installation Steps (cont.)
 - This self-extractor will unzip into c:/avgarmin directory then run setup.exe.
 - The default path for installation is C:\ESRI\AV_GIS30\ARCVIEW
 - If you have installed ArcView in a non-default directory, change the path when prompted.
 - You may delete the c:/avgarmin directory when finished.



Tip: If an error occurs, install manually.

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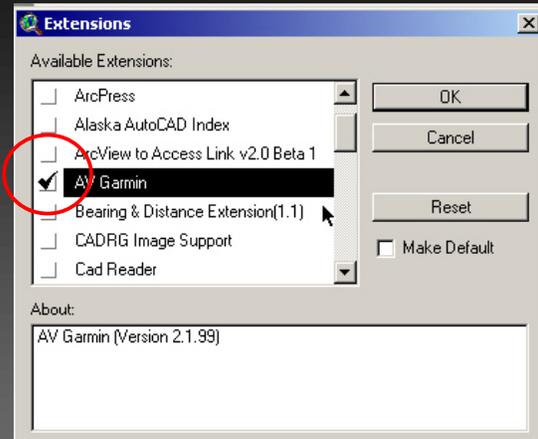
Installation Steps (cont.)

- This self-extractor will unzip into c:/avgarmin directory then run setup.exe.
- The default path for installation is C:\ESRI\AV_GIS30\ARCVIEW
- If you have installed ArcView in a non-default directory, change the path when prompted.
- You may delete the c:/avgarmin directory when finished.

Quick Start: AV Garmin

- Installation Steps (cont.)

- Open ArcView
- Select File | Extensions
- Scroll down list and load the extension 
- Press OK



- Make a View active and press on the far right button

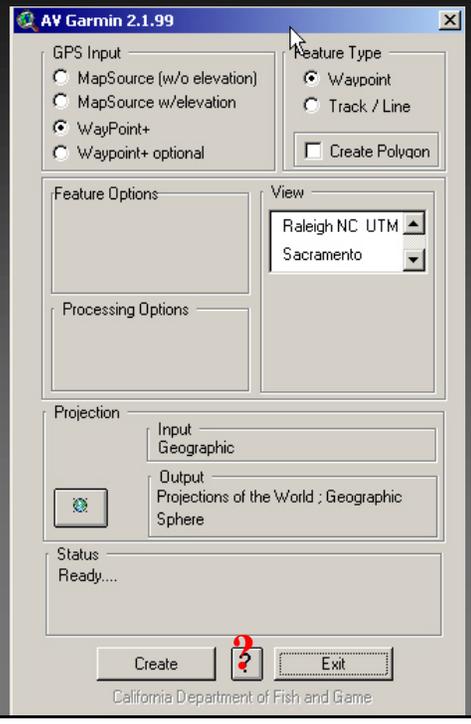


Installation Steps (cont.)

- Open ArcView
- Select File | Extensions
- Scroll down list and load the extension
- Press OK
- Now make a View active and press on the far right button

Quick Start: AV Garmin

- Success! AV Garmin is ready
- Press the ? for more help on the program.



Success! AV Garmin is ready. There is great help available by pressing the “?” at bottom of dialog box.

Quick Start: AV Garmin

- Congratulations! AV Garmin is ready



 Tip: Setting up AV Garmin is easy and the program retains all settings the next time you run the program!

AVGarmin setup is easy and retains settings the next time you run the program.

IV. ArcView Shapefile Creation

Tim Smith
NPS GPS Coordinator

Joel Cusick
Alaska Support Office

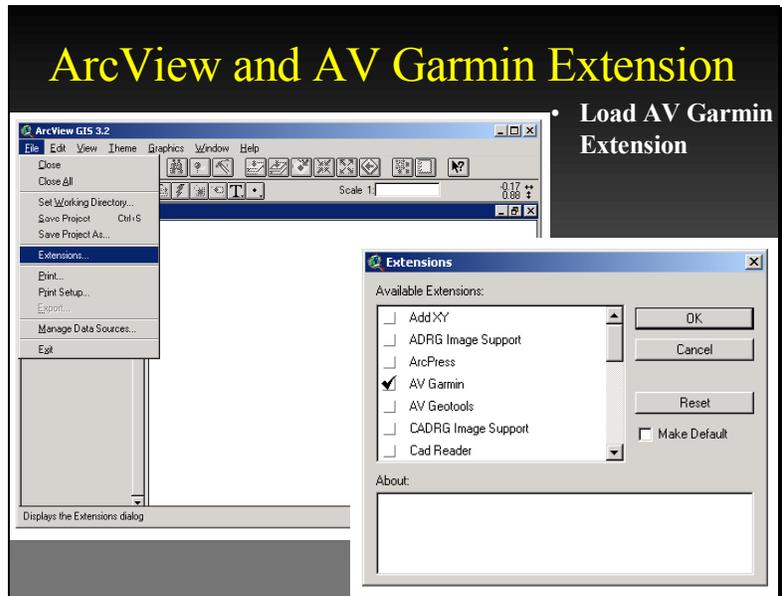
IV. ArcView Shapefile Creation

ArcView and AV Garmin Extension

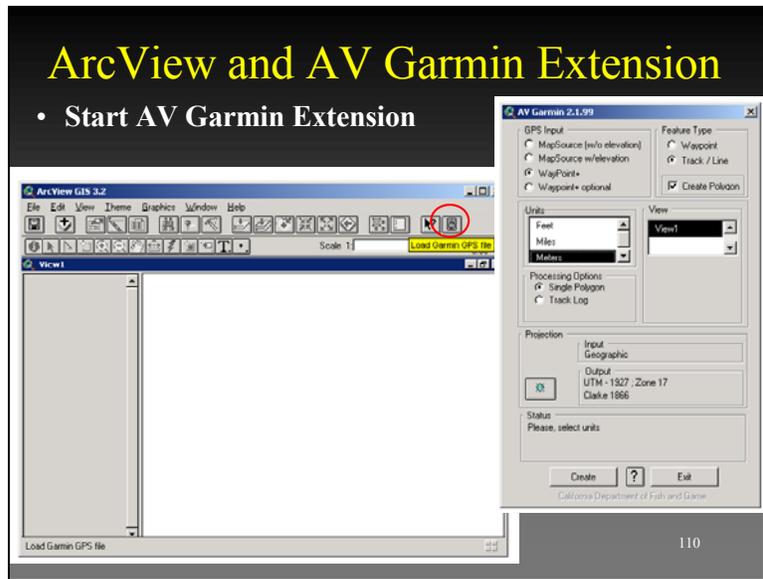
- Start ArcView and Set View Properties

- Start ArcView
- Select View | Properties
- Set your Map and distance units to meters.

Note: You can set your distance units to feet or anything else if you would like to measure in feet, etc.



- If you haven't already done so, load the AVGarmin extension as you would any ArcView extension.
- Pick File | Extensions and check AVGarmin



- Select the AVGarmin button in the upper right of the screen.
- Select Waypoint + as your GPS Input [Note: You may need to use “Waypoint + Optional” if you are using a newer Garmin such as an eTrex, GPM76, GPSMap76S or a V. If you use this option with a III Plus there will be no time/date information in your final output.]
- Select Track or Waypoint Feature Type
- Check Create Polygon if you are importing a track that you want to make into a polygon rather than a polyline. [Note: Setting this option will allow you to get area value quickly. This is useful when downloading a track that is intended to be a polygon(s) as a final shape. If the track's intended final shapes contain a combination of both lines and polygons, download track as lines and make polygons from polylines with another ArcView extension.]
- Set Units to Meters
- Select the View you would like the shapefile to be put in.
- Projection –You need to set the Projection to *match your other GIS data* (e.g. UTM). [Note: You CANNOT change the Datum here. You must set this option the same as the Datum that you set in Waypoint +.]

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AV Garmin Options

- **Set AV Garmin Options**
 - Select Processing Option for Single or Multiple Polygon Generation

Processing Options:

- Set for Single when generating one polygon from all of your collected tracks.

Note: If AVGarmin creates a “bad” polygon (i.e. connects the dots in a strange way) then you should create the theme as a line and use an extension like XTools* to convert polyline to polygon.

*XTools is a free ArcView extension that is on the CD in the AVExtensions folder.

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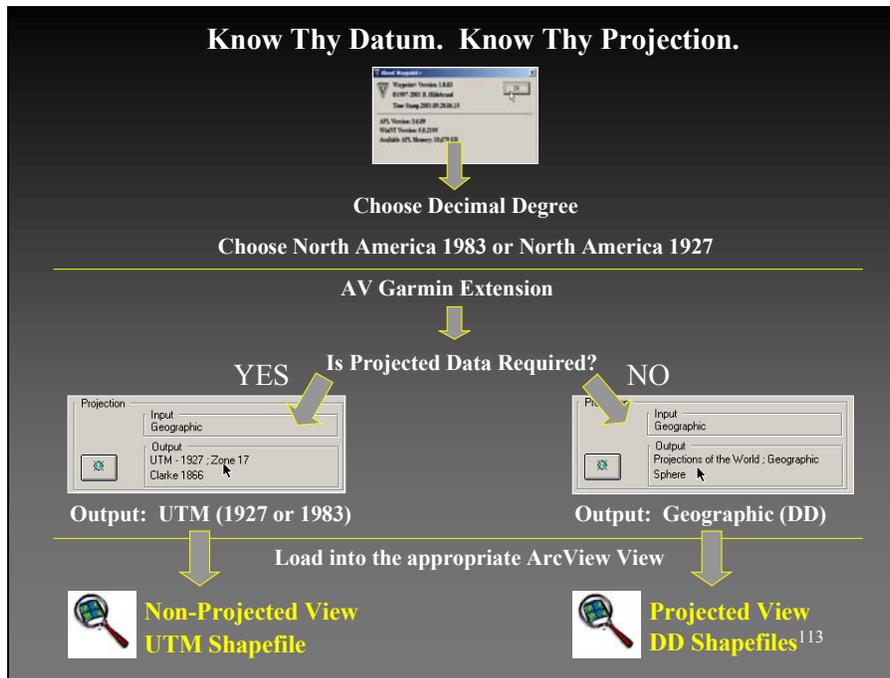
AV Garmin Options

- **Set AV Garmin Options**
 - Select Processing Option for Single or Multiple Polygon Generation

Processing Options:

- Set Track Log option if you want multiple polygons from multiple track segments.

Note: If AVGarmin creates a “bad” polygon (i.e. connects the dots in a strange way) then you should create the theme as a line and use an extension like XTools to convert polyline to polygon.



Aaahhh... Alas... to project or not to project. That is the question! Fortunately for most of us, it is NOT a dilemma. The answer for us is, DO NOT set a projection for your view. Just bring your projected data into a (unprojected) view. Simple!

Explanation: In parks in the lower 48, we use *projected data* (usually UTM, NAD83) in *unprojected ArcView Views*. In Alaska parks and in other areas and agencies geographic data (Latitude and Longitude in Decimal Degrees) may be the preferred format. Decimal Degrees is used because of its versatility in ArcView. You can project DD data by simply projecting the View (also called projecting data *on the fly*). *True* projection of the Decimal Degree data should be done with the ArcView Projection Utility or by some other program.

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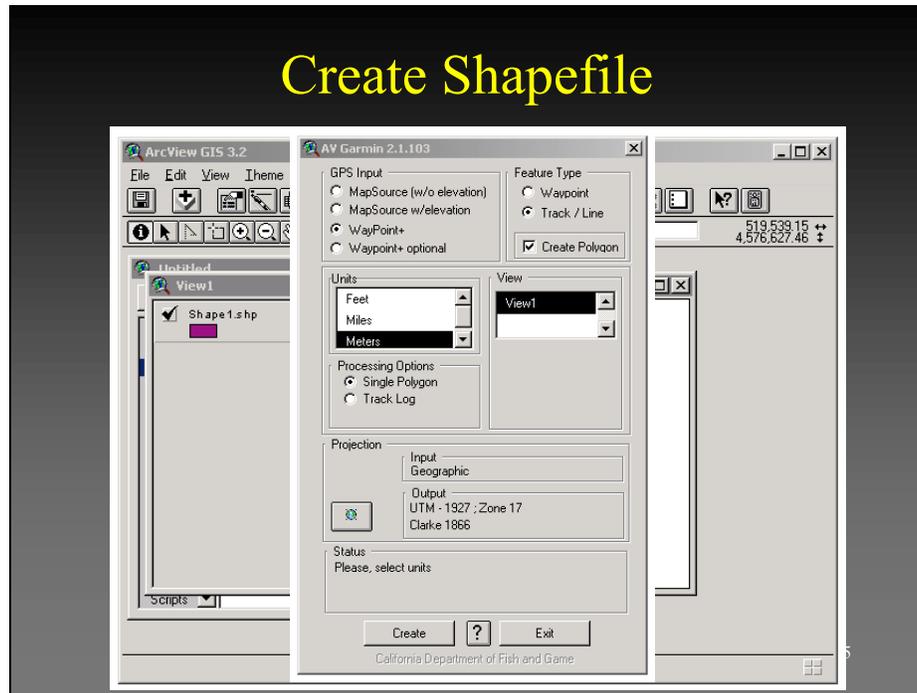
AV Garmin Options

- Select Input and Output Files

Tip: Pay close attention to file management.

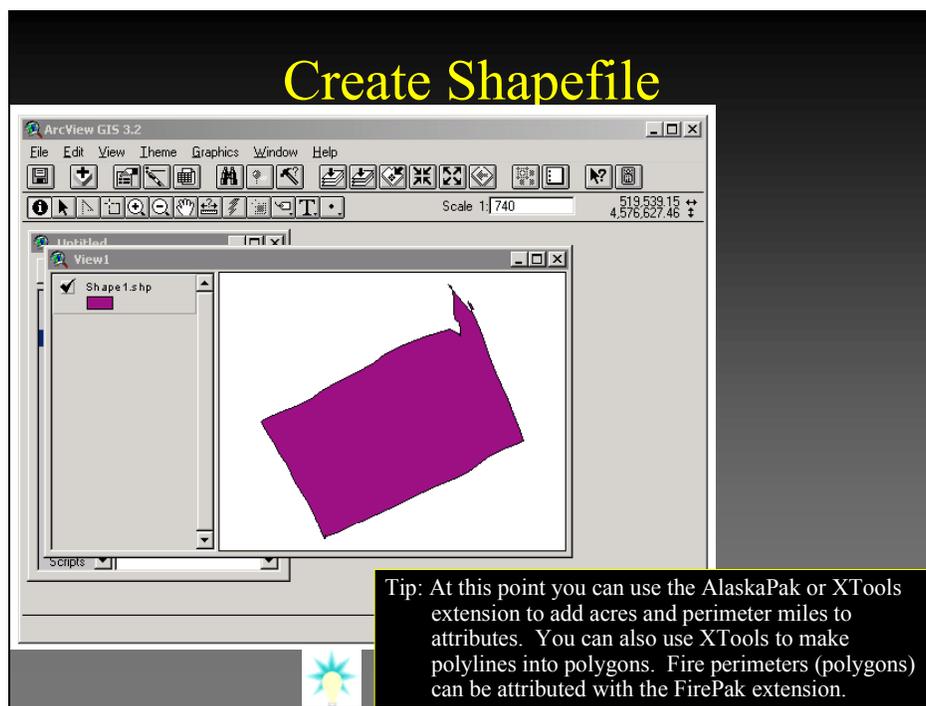
Select the Waypoint + input .txt file that you would like to use and then name the output shapefile.
Tip: Pay close attention to file management.

Slide 115



- The screen will return to this and you should see the Shapefile building and being added to you View.
- Push the Exit button to close the AV Garmin window.

Slide 116

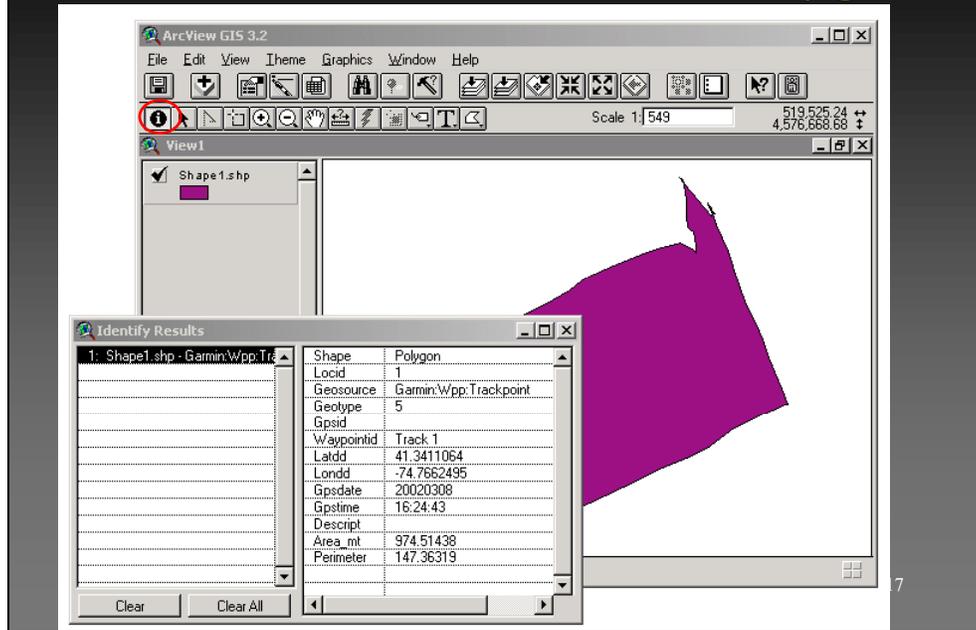


Your Shapefile is now ready for editing.

Tip: At this point you can use the AlaskaPak* or XTools* extension to add acres and perimeter miles to attributes. You can also use XTools to make polylines into polygons. Fire perimeters (polygons) can be attributed with the FirePak* extension.

*The AlaskaPak, Xtools and FirePak free ArcView extensions and installation instructions can be found in the *AVExtensions* folder.

Get Information About the Polygon

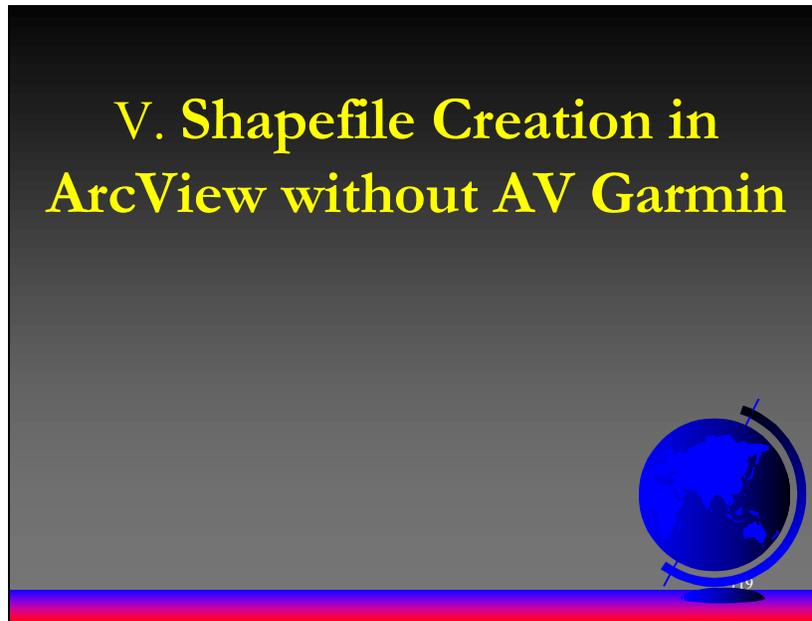


Can you use the "Information" button and select the polygon to display the area, etc.

Let's Review Important Things to Remember

- Check your Garmin for proper communication protocol.
 - Must be Garmin
- Be sure that your configuration is properly set before you export to comma delimited ASCII text file from Waypoint +.
 - Decimal Degree
 - Datum (same as your GIS)
 - Save as comma delimited ASCII text file
- Make the proper selections of datum and projection in AV Garmin ArcView extension.
- Know where you save your files so that you do not have to look for them.

Check your Garmin for proper communication protocol.
Be sure that your configuration is properly set before you export to comma delimited ASCII text file from Waypoint +.
Make the proper selections of datum and projection in AVGarmin ArcView extension.
Know where you save your files so that you do not have to look for them.



V. Shapefile Creation in ArcView without AV Garmin

Downloading Garmin with Waypoint+

Collect Data

Waypoint +

**TextPad, Notepad or
WordPad**

ArcView Shapefile

Tim Smith
NPS GPS Coordinator

Joel Cusick
Alaska Support Office

This is essentially a repeat of Module II. Part B. but will be *different* since we are going to use Waypoint + without using AV Garmin as our tool to interface with ArcView. The biggest difference is that AV Garmin requires data to be in Decimal Degrees to be able to read it. AV Garmin was also the tool to convert the projection before it is viewed in ArcView. Without AV Garmin, we will specify our desired final GIS shapefile projection (and datum) in Waypoint +. Waypoint + will be our projection tool rather than AV Garmin.

Note: This method is helpful to understand in case you don't have AV Garmin as an option or in case for some reason AV Garmin is not working properly. Some refer to the method as the "old fashioned way." The next three slides are review, but be sure to notice how things change in the fourth.

Downloading Garmin

Connect GPS unit to PC

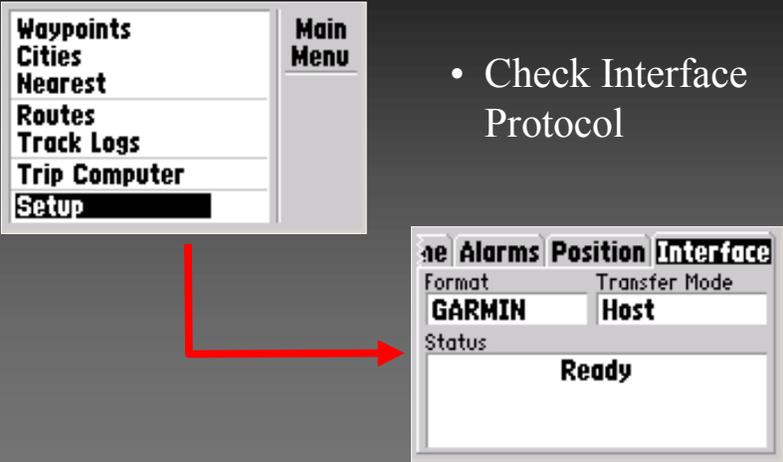


- **Start Receiver**
 - Push the ON button
 - Push the MENU button twice
 - Scroll down to SETUP
 - Push ENTER
 - Scroll sideways the INTERFACE tab



REVIEW - Start Receiver

Downloading Garmin



- Check Interface Protocol

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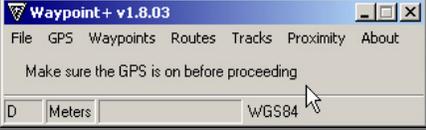
REVIEW-

Be sure to check the interface protocol on the Garmin so that it can communicate with the PC. This becomes a very important check when you are using real-time differential

Slide 123

Quick Start: Waypoint+

- Start Program
 - Double-click on the desktop shortcut
 - Press OK to start program
 - You should see this!
- Configuration is next!

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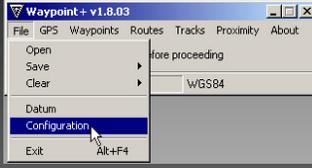
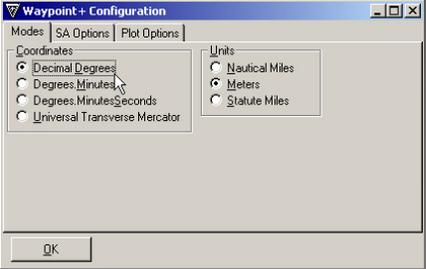
REVIEW-

- Double-click on the desktop shortcut
- Press OK to start program
- You should see the program's window
- Now onto Configuration

Slide 124

Quick Start: Waypoint+

- Setup requirements
 - 1) Coordinate data needs to be set
 - Select File | Configuration
 - Select **Coordinates (same as GIS)**
 - Select **Units (same as GIS)**
 - Press OK to return to main window

Tip: You are setting coordinates and units to match your GIS

NEW- Here is where things are different!

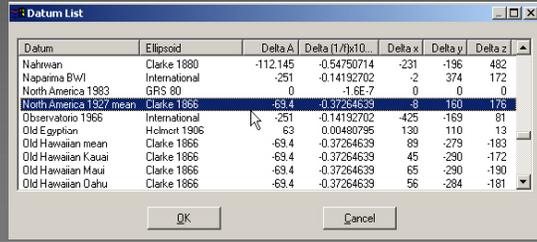
1) Coordinate data needs to be set

Select File | Configuration - Set **Coordinates** to match GIS data! (E.g. UTM)Set **Units** - again, same as GIS (e.g. UTM data would be Meters)

Press OK to return to main window

Quick Start: Waypoint+

- Setup requirements (cont.)
 - 2) The **datum** needs to be set. The datum set must match the datum of your other GIS layers
 - Select File | Datum
 - Scroll down list of datums and select
 - Press OK to return to main window



REVIEW-

This is the same as when we configured for AV Garmin use!
The **datum** setting **must** match the datum of your other **GIS** layers.

Here is how to set the datum

Select File | Datum

Scroll down list of datums to choose

Press OK to return to main window

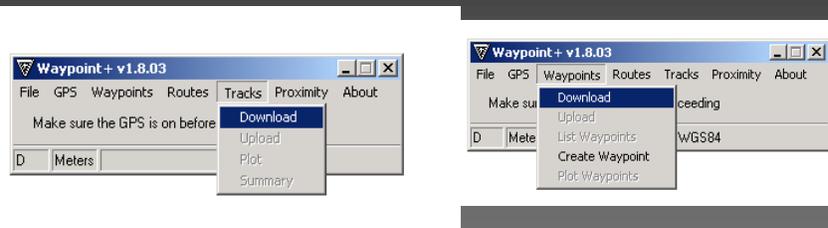
Slide 126

Waypoint + Operations

- **Download Data from Receiver to PC**
 - For Tracks: Pick Tracks | Download
 - For Waypoints: Pick Waypoints | Download

Tracks

Waypoints



Tip: The data will stay in memory until you either clear it out or exit Waypoint +.

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REVIEW-

For Tracks:
Pick Tracks | Download

For Waypoints:
Pick Waypoints | Download

Tip: The data will stay in memory until you either clear it out or exit Waypoint +

Slide 127

Waypoint + Operations

- Plot Tracks and Waypoints

Tip: Look at the data to see if it appears good.

REVIEW-
For Tracks:
Pick Tracks | Plot

For Waypoints:
Pick Waypoints | Plot

Slide 128

Waypoint + Operations

- Track Summary
 - Delete unwanted tracks from list
 - Join track segments as needed

Track	Km	Km/hr	Points	Duration	Start	Stop
1	8.03	14.85	64	000:32:25	2001/06/20 20:27:31	2001/06/20 20:59:56
2	10.85	85.55	58	000:09:56	2001/06/21 00:42:01	2001/06/21 00:51:57
3	1.01	84.88	4	000:00:43	2001/06/21 13:44:07	2001/06/21 13:44:50
4	4.32	11.43	46	000:22:42	2001/06/21 13:45:27	2001/06/21 14:08:09
5	2.09	52.01	19	000:02:25	2001/06/21 14:09:17	2001/06/21 14:11:42
6	22.45	62.99	117	000:21:23	2001/06/21 22:09:37	2001/06/21 22:31:00
7	7.11	78.05	21	000:05:28	2001/06/22 14:20:31	2001/06/22 14:25:59
8	0.63	48.45	7	000:00:47	2001/06/22 14:26:56	2001/06/22 14:27:43
9	0.70	43.70	5	000:00:58	2001/06/22 14:28:21	2001/06/22 14:29:19
10	0.05	16.27	2	000:00:11	2001/06/22 14:29:58	2001/06/22 14:30:09
11	1.40	59.87	11	000:01:24	2001/06/22 19:23:02	2001/06/22 19:24:26
12	9.37	35.09	63	000:16:01	2001/06/22 19:49:27	2001/06/22 20:05:28
13	19.83	39.12	123	000:28:53	2001/06/22 20:14:50	2001/06/22 20:43:43
14	0.72	36.45	7	000:01:11	2001/06/25 12:52:07	2001/06/25 12:53:18
15	0.00	0.00	1	000:00:00	2001/06/25 12:54:07	2001/06/25 12:54:07
16	2.36	52.22	16	000:02:43	2001/06/25 12:57:17	2001/06/25 13:00:00
17	17.36	50.17	105	000:21:29	2001/06/25 13:01:14	2001/06/25 13:22:43
18	6.30	59.90	31	000:06:25	2001/06/25 17:46:25	2001/06/25 17:52:50
19	14.68	83.34	65	000:10:34	2001/06/25 17:53:27	2001/06/25 18:04:01
20	5.22	39.78	43	000:07:52	2001/06/26 12:42:07	2001/06/26 12:49:59
21	17.33	78.04	64	000:13:47	2001/06/26 12:50:29	2001/06/26 13:04:16
22	23.73	73.58	109	000:19:21	2001/06/26 22:05:37	2001/06/26 22:24:58
23	0.00	0.00	1	000:00:00	2001/06/26 22:38:10	2001/06/26 22:38:10
24	0.17	1.29	3	000:00:13	2001/06/26 23:03:40	2001/06/26 23:11:53
25	7.85	55.74	53	000:08:27	2001/06/27 13:07:37	2001/06/27 13:16:04
26	24.56	23.35	145	001:03:07	2001/06/27 21:06:56	2001/06/27 22:10:03
27	1.17	46.30	0	000:01:31	2001/06/28 13:03:36	2001/06/28 13:05:07
28	3.30	62.17	22	000:03:11	2001/06/28 13:05:31	2001/06/28 13:08:42
29	1.57	102.88	4	000:00:55	2001/06/28 13:09:19	2001/06/28 13:10:14
30	15.32	65.20	70	000:14:06	2001/06/28 13:10:52	2001/06/28 13:24:58
31	0.08	0.36	7	000:13:06	2001/06/28 13:28:50	2001/06/28 13:41:56
32	4.55	42.51	28	000:06:25	2001/06/29 20:39:55	2001/06/29 20:46:20
33	19.36	79.75	84	000:14:34	2001/06/29 21:43:26	2001/06/29 21:58:00

Tip: Clear memory after each export.

REVIEW-
Pick Tracks | Summary
You can review and edit your collected tracks in this option

Tip: Clear memory after each export.

Waypoint + Operations

- **Waypoint List and Editor**
- Summarize, edit and create

Waypoint	Latitude	Longitude	Description
001	41.750670	-124.182855	001
002	41.559434	-124.087953	002
003	40.710161	-74.180144	003
004	39.811749	-77.246305	004
005	39.811728	-77.246279	005
006	39.811707	-77.246220	006
007	39.811684	-77.246134	007
009	32.825453	-79.825759	009

Name	Latitude	Longitude	Description
WPT 1	74.458908	-124.45678	FIRE CAMP

REVIEW-

Pick Waypoints | Summary

You can review and edit your collected waypoints in this option.

Pick Waypoints | Create Waypoints in order to make new waypoints for uploading back to the Garmin receiver

Slide 130

Waypoint + Operations

- **Save to an ASCII Text File**

Tip: Remember that you must have the configuration set to latitude/longitude, decimal degrees and have the datum set so that it will match your GIS data.

REVIEW-

Things to remember prior to saving the text file:

Again, make sure that the configuration (FILE | CONFIGURATION) and datum (FILE | DATUM) are set correctly.

You must have the coordinate system and datum set so that it will match your GIS data.

Save your data to a **comma delimited text file**.

Waypoint + Operations

Track

- Review the text file output with text pad or notepad.

Waypoint

Tip: These files can be reread into Waypoint + at any time for additional processing or uploading back to the Garmin receiver.

REVIEW-

These files can be reread into Waypoint + at any time for additional processing or uploading back to the Garmin receiver.

Waypoint + Operations

- Track Summary
 - Delete unwanted tracks from list
 - Join track segments as needed

Track	Km	Km/hr	Points	Duration	Start	Stop
1	8.03	14.85	64	000:32:25	2001/06/20 20:27:31	2001/06/20 20:59:56
2	10.85	65.55	58	000:09:56	2001/06/21 00:42:01	2001/06/21 00:51:57
3	1.01	84.88	4	000:00:43	2001/06/21 13:44:07	2001/06/21 13:44:50
4	4.32	11.43	46	000:22:42	2001/06/21 13:45:27	2001/06/21 14:08:09
5	2.09	52.01	19	000:02:25	2001/06/21 14:09:17	2001/06/21 14:11:42
6	22.45	62.93	117	000:21:23	2001/06/21 22:08:37	2001/06/21 22:31:00
7	7.11	78.05	21	000:05:28	2001/06/22 14:20:31	2001/06/22 14:25:59
8	0.63	48.45	7	000:00:47	2001/06/22 14:26:56	2001/06/22 14:27:43
9	0.70	43.70	5	000:00:59	2001/06/22 14:28:21	2001/06/22 14:28:19
10	0.05	16.27	2	000:00:11	2001/06/22 14:28:58	2001/06/22 14:30:09
11	1.40	59.87	11	000:01:24	2001/06/22 19:23:02	2001/06/22 19:24:26
12	9.37	35.09	63	000:16:01	2001/06/22 19:49:27	2001/06/22 20:05:28
13	16.63	39.12	123	000:28:53	2001/06/22 20:14:50	2001/06/22 20:43:43
14	0.72	36.45	7	000:01:11	2001/06/25 12:52:07	2001/06/25 12:53:18
15	0.00	0.00	1	000:00:00	2001/06/25 12:54:07	2001/06/25 12:54:07
16	2.36	52.22	16	000:02:43	2001/06/25 12:57:17	2001/06/25 13:00:00
17	17.96	50.17	105	000:21:29	2001/06/25 13:01:14	2001/06/25 13:22:43
18	6.30	58.90	31	000:06:25	2001/06/25 17:46:25	2001/06/25 17:52:50
19	14.68	83.34	65	000:10:34	2001/06/25 17:53:27	2001/06/25 18:04:01
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22	23.73	73.58	109	000:19:21	2001/06/26 22:05:37	2001/06/26 22:24:58
23	0.00	0.00	0	000:00:00	2001/06/26 22:28:10	2001/06/26 22:28:10
24	0.17	1.28	3	000:08:13	2001/06/26 23:03:40	2001/06/26 23:11:53
25	7.85	55.74	53	000:08:27	2001/06/27 13:07:37	2001/06/27 13:16:04
26	24.56	23.35	145	001:03:07	2001/06/27 21:06:56	2001/06/27 22:10:03
27	1.17	46.33	0	000:01:31	2001/06/28 13:03:36	2001/06/28 13:05:07
28	3.30	62.17	22	000:03:11	2001/06/28 13:05:31	2001/06/28 13:08:42
29	1.57	102.68	4	000:00:55	2001/06/28 13:09:19	2001/06/28 13:10:14
30	15.32	65.20	70	000:14:06	2001/06/28 13:10:52	2001/06/28 13:24:58
31	0.08	0.36	7	000:13:06	2001/06/28 13:28:50	2001/06/28 13:41:56
32	4.95	42.51	28	000:06:25	2001/06/28 20:39:58	2001/06/28 20:46:20
33	19.36	79.75	84	000:14:34	2001/06/28 21:43:26	2001/06/28 21:58:00

Tip: Clear memory after each export.

REVIEW-

Pick Tracks | Summary
You can review and edit your collected tracks in this option

Tip: Clear memory after each export.

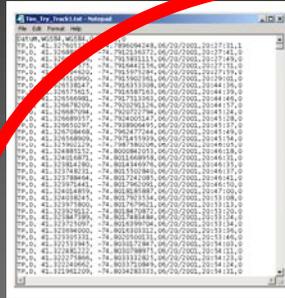
Notepad to ArcView



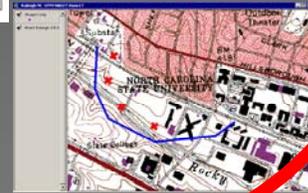
Collect Data



Waypoint +



TextPad, Notepad or WordPad



ArcView Shanefield 135

Tim Smith
NPS GPS Coordinator

Joel Cusick
Alaska Support Office

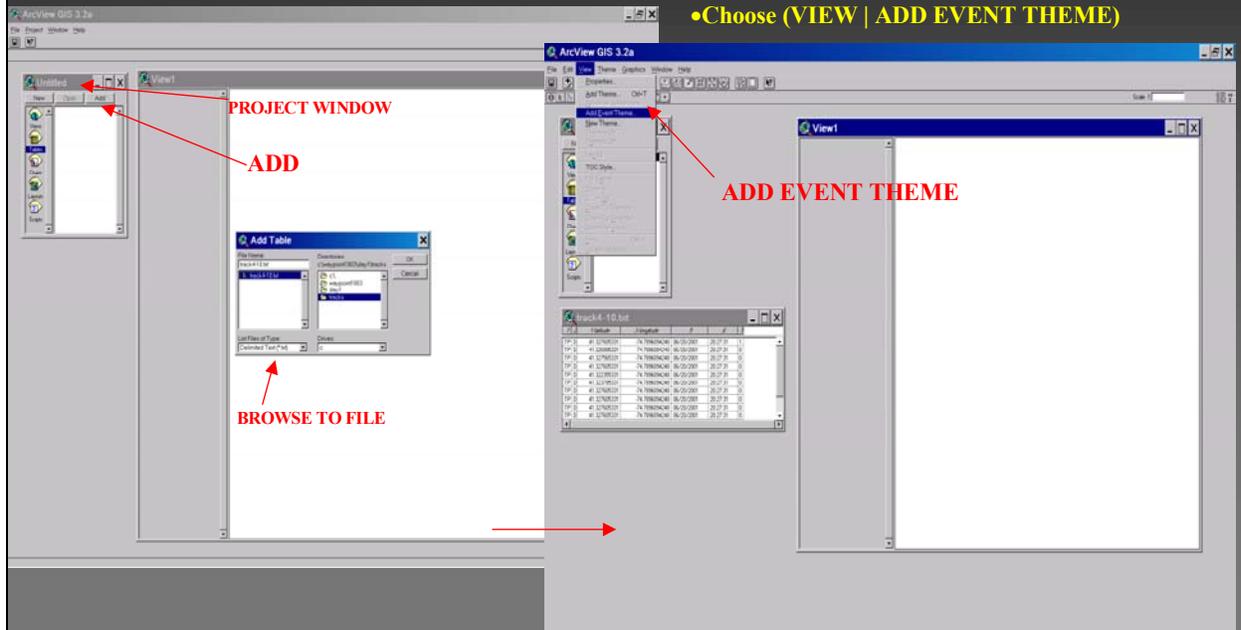


The next step is going from your text editor program to ArcView.

Notepad to ArcView

- In ArcView go to the **project window**
- Choose the table icon and click **ADD**
- In **LIST FILES OF TYPE** – choose **Delimited Text (*.txt)**
- Choose the file that you just saved from **Notepad** and click **OK**

- Go to the **View window** in ArcView
- Choose **(VIEW | ADD EVENT THEME)**



- In ArcView go to the project window
- Choose the table icon
- ADD a table
- In LIST FILES OF TYPE – choose Delimited Text (*.txt)
- Choose the file that you just saved from Notepad and click OK
- Go to the View window in ArcView
- Choose (VIEW | ADD EVENT THEME)

Notepad to ArcView

CONVERT TO SHAPEFILE

- In the Table pulldown – choose the table that you just added
- In the X field pulldown choose LONGITUDE
- In the Y field pulldown choose LATITUDE
- You should now have the collected GPS points in the view
- If you want to save these points as a shape file make the event theme active and
- Choose (THEME | CONVERT TO SHAPEFILE)
- If you want to convert the points to a polyline use XTools or AlaskaPak
- If you want to convert the polyline to a polygon use XTools

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- In the Add Event Theme dialog that appears
- In the table pulldown – choose the table that you just added
- In the x field pulldown choose longitude (or UTM easting)
- In the y field pulldown choose latitude (or UTM northing)
- You should now have the collected GPS points (either waypoints or track points) in the view
- You need to save these points as a shapefile so make the event theme active and...
- Choose (THEME | CONVERT TO SHAPEFILE)
- If you want to convert the points to a polyline use Xtools or AlaskaPak
- If you want to convert the polyline to a polygon use Xtools

Let's Review Important Things to Remember

- Check your Garmin for proper communication protocol.
 - Must be Garmin
- Be sure that your configuration is properly set before you export to comma delimited ASCII text file from Waypoint +.
 - Projection and Datum (same as your GIS)
 - Comma delimited ASCII text file
- Know where you save your files so that you do not have to look for them.

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- Check your Garmin for proper communication protocol.
- Be sure that your configuration is properly set before you export to comma delimited ASCII text file from Waypoint +.
- Know where you save your files so that you do not have to look for them.