

M68C S/Map & M68C IceMachine™

Fish-finding Sonar & Mapping GPS

Installation and Operation Instructions

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WARNING!

A CAREFUL NAVIGATOR NEVER RELIES ON ONLY ONE METHOD TO OBTAIN POSITION INFORMATION.

CAUTION

When showing navigation data to a position (waypoint), a GPS unit will show the shortest, most direct path to the waypoint. It provides navigation data to the waypoint regardless of obstructions. Therefore, the prudent navigator will not only take advantage of all available navigation tools when traveling to a waypoint, but will also visually check to make sure a clear, safe path to the waypoint is always available.

WARNING!

When a GPS unit is used in a vehicle, the vehicle operator is solely responsible for operating the vehicle in a safe manner. Vehicle operators must maintain full surveillance of all pertinent driving, boating or flying conditions at all times. An accident or collision resulting in damage to property, personal injury or death could occur if the operator of a GPS-equipped vehicle fails to pay full attention to travel conditions and vehicle operation while the vehicle is in motion.

Notes

Section 1: Read Me First!

How this manual can get you out on the water, fast!

Welcome to the exciting world of digital sonar and GPS! We know you're anxious to begin finding fish, but we have a favor to ask. Before you grab the unit and begin installing it, please give us a moment or two to explain how our manual can help you get the best performance from your combination fish finder and GPS receiver.

First, we want to thank you for buying a Lowrance sonar/GPS unit. Whether you're a first time user or a professional fisherman, you'll discover that your unit is easy to use, yet capable of handling demanding navigation and sonar tasks.

Our goal for this book is to get you on the water fast, with a minimum of fuss. Like you, we'd rather spend more time boating or fishing and less time reading the manual!

So, we designed our book so that you *don't* have to read the *whole thing* from front to back for the information you want. At the start (or end) of each segment, we'll tell you what content is coming up next. If it's a concept you're already familiar with, we'll show you how and where to skip ahead for the next important topic. We've also made it easy to look up any tips you may need from time to time. Here's how:

The manual is organized into 11 sections. This first section is an introduction to the M68 sonar and GPS. It tells you the basics you need to know before you can make the unit look around and tell you where you are, or look below the surface to find some fish.

Section 2 will help you install your unit, as well as the transducer (the most important part of any sonar installation). We'll also tell you about some of the available accessories.

Section 3 covers *Basic Sonar Operation*. It will show you how easy it is to run your sonar, right out of the box. This section features a one-page Sonar Quick Reference. **(If you've already jumped ahead and figured out how to install the unit yourself, and you just *can't* wait any longer, turn to the Quick Reference on page 37 and head for the water with your unit!)**

After you've gained some experience with your sonar, you'll want to check out Section 4, which discusses more advanced *Sonar Options and Other Features*.

When you come to a sonar menu command on the unit's screen, you can look it up in the manual by skimming over the table of contents or the in-

dex, or just flipping through Section 3 or scanning through the sonar options in Section 4.

Section 5 is a brief introduction to the powerful ice fishing applications of the M68C and M68C IceMachine. (See section 2 to learn how you can get the most out of your M68C with the addition of a special portable power pack for ice fishing.)

If you're having difficulty with your sonar, you can find an answer to the most common problems in Section 6, *Sonar Troubleshooting*.

The manual switches from sonar to navigation in Section 7, which introduces you to *Basic GPS Operations*. **This section features a one-page GPS Quick Reference on page 91.**

Section 7 contains short, easy-to-scan GPS lessons that follow one another in chronological order. They're all you'll need to know to find your way on the water quickly.

After you've learned the basics (or if you already have some GPS experience), you may want to try out some of the unit's many advanced navigation features. That brings us to Section 8, *Advanced GPS Operations*. This section contains the rest of the unit's GPS command functions, organized in alphabetical order.

When you come to a GPS menu command on the screen, you can look it up in the manual by skimming over the table of contents or index, just flipping through Section 7 or scanning through the command portion of Section 8.

This unit is ready to use right out of the box, but you can fine tune and customize its operation with dozens of options. Since sonar is the unit's key feature, we put the main sonar options in Section 4. Some options, such as screen brightness settings, affect both sonar and GPS operations. We describe how to use those common options along with GPS options in Section 9, *System Setup and GPS Setup Options*. Section 9 is organized in alphabetical order.

In Section 10, we go into more detail on one of the unit's most remarkable GPS capabilities — Searching. There are so many map items you can search for, we had to give this function its own section in the manual!

Finally, in Section 11, we offer *Supplemental Material*, including a list of the GPS datums used, warranties and customer service information. Now, if you're into the fine details, glance over the next segment on specifications to see just how much sonar and GPS power your unit contains. It's important to *us* (and our power users), but, if *you* don't care how many watts of power the unit has, or how many waypoints it can store, skip ahead to important information on how sonar works, on page 4. (Background on GPS begins on page 5.)

Capabilities and Specifications: M68

General

- Display:**..... High-contrast Film SuperTwist LCD. Diagonal viewing area: 3.5" (8.9 cm).
- Resolution:**..... 160 pixel x 240 pixel resolution; 38,400 total pixels.
- Backlighting:**..... LED backlit screen with multiple lighting levels; backlit keypad.
- Input power:**..... 10 to 17 volts DC.
- Current drain:** 170 ma lights off; 240 ma lights on.
- Case size:**..... 5.8" H x 4.3" W x 2.5" D (14.7 cm H x 10.8 cm W x 6.6 cm D) sealed, waterproof; suitable for saltwater use.
- Back-up memory:** Built-in memory stores GPS data for decades. User settings are stored when unit is turned off.
- Languages:**..... 10; menu languages selectable by user.

Sonar

- Frequency:**..... 200 kHz.
- Transducer:**..... A Skimmer[®] transducer comes packed with your sonar unit. Its 20° cone angle offers a wide fish detection area of up to 60° with high sensitivity settings. Operates at boat speeds up to 70 mph (61 kts).
- Transmitter:**..... 800 watts peak-to-peak; 100 watts RMS.
- Sonar sounding depth capability:** 600 feet (180 meters). Actual capability depends on transducer configuration and installation, bottom composition and water conditions. All sonar units typically read deeper in fresh water than in salt water.
- Depth display:**..... Continuous display.
- Audible alarms:** Deep/shallow/fish/zone.
- Automatic ranging:**..... Yes, with instant screen updates.
- Auto bottom track:**..... Yes
- Zoom bottom track:** Yes.
- Split-screen zoom:**..... Yes.
- Surface water temp:**..... Yes, built into transducer.

GPS

- Receiver/antenna:** Internal 12 parallel channel GPS/WAAS.
- Position updates:** Every second.
- Position points:** 1,000 waypoints; 1,000 event marker icons.
- Man Overboard:**..... MOB feature precisely marks man overboard location with special icon, then automatically displays navigation data to that position.
- Audible alarms:** Arrival/off-course/destination passed/anchor.
- Graphic symbols for waypoints or event marker icons:** 42.
- Routes:**..... 100; up to 100 waypoints per route.
- Plot Trails:**..... 10 savable; up to 9,999 points per trail.
- Zoom range:**..... 39 ranges; 0.02 to 4,000 miles.

NOTICE!

The storage and operation temperature range for your unit is from -4 degrees to +167 degrees Fahrenheit (-20 degrees to +75 degrees Celsius). *Extended storage or operation in temperatures higher or lower than specified will damage the liquid crystal display in your unit. This type of damage is not covered by the warranty.* For more information, contact the factory's Customer Service Department; phone numbers are listed on the last page.

How Your Sonar Works

Sonar has been around since the 1940s, so if you already know how it works, skip down to read about the relatively new technology of GPS. But, if you've never owned a sonar fish finder, this segment will tell you the underwater basics.

Sonar is an abbreviation for Sound Navigation and Ranging, a technology developed during World War II for tracking enemy submarines. (Lowrance developed the world's *first* transistorized *sportfishing* sonar in 1957.) A sonar consists of a transmitter, transducer, receiver and display. In simple terms, here's how it finds the bottom, or the fish:

The transmitter emits an electrical impulse, which the transducer converts into a sound wave and sends into the water. (The sound frequency can't be heard by humans or fish.) The sound wave strikes an object (fish, structure, bottom) and bounces back to the transducer, which converts the sound back into an electrical signal.

The receiver amplifies this return signal, or echo, and sends it to the

display, where an image of the object appears on the scrolling sonar chart. The sonar's microprocessor calculates the time lapse between the transmitted signal and echo return to determine the distance to the object. The whole process repeats itself several times each second.

How Your GPS Works

You'll navigate faster and easier if you understand how this unit scans the sky to tell you where you are on the earth — and, where you're going. (But if you already have a working understanding of GPS receivers and the GPS navigation system, skip on ahead to Section 2, *Installation & Accessories* on page 9. If you're new to GPS, read on, and you can later impress your friends with your new-found knowledge.)

First, think of your unit as a small but powerful computer. (But don't worry — we made this unit easy to use, so you don't need to be a computer expert to find your way!) The unit includes a keypad and a screen with menus so you can tell it what to do. The screen also lets the unit show your location on a moving map, as well as point the way to your destination.

This unit uses an internal antenna/receiver module, which makes the whole system work something like your car radio. But instead of your favorite dance tunes, this receiver tunes in to a couple of dozen GPS satellites circling the earth. (It will also listen in to the WAAS satellites in orbit, but more about that in the upcoming segment introducing you to GPS and WAAS.)

Your unit listens to signals from as many satellites as it can "see" above the horizon, eliminates the weakest signals, then computes its location in relation to those satellites. Once it figures its latitude and longitude, the unit plots that position on the GPS screen. The whole process takes place several times a second!

Another portion of the unit's onboard memory is devoted to *recording* GPS navigation information, which includes waypoints, event marker icons, trails and routes. This lets you look back the way you came, and retrace your path. Think of this data storage like the hard drive memory in a computer or a tape in a cassette tape recorder. You can save several different GPS data files, erase 'em and record new ones, over and over again.

Introduction to GPS and WAAS

Well, now you know the basics of how the unit does its work. You might be ready to jump ahead to Section 2, *Installation & Accessories*, on page 13, so you can mount your unit and plug in the power. Or you might want to see how our text formatting makes the manual tutorials easy to skim. If that's the case, move on to "How to Use This Manual" on page 10. But, if you want to understand the current state of satellite navigation, look over this segment describing how GPS and its new companion

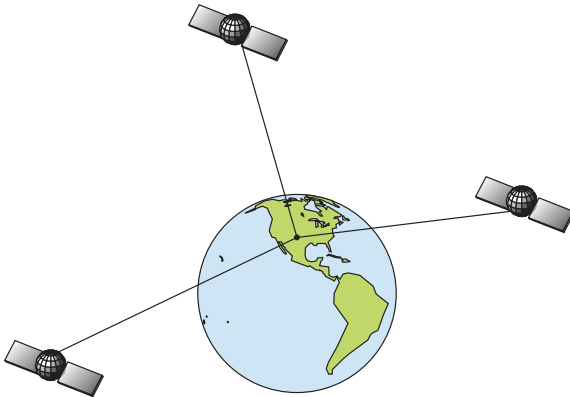
WAAS work together to get you where you're going.

The Global Positioning System (GPS) was launched July 17, 1995 by the United States Department of Defense. It was designed as a 24-hour-a-day, 365-days-a-year, all weather global navigation system for the armed forces of the U.S. and its allies. Civilian use was also available at first, but it was less accurate because the military scrambled the signal somewhat, using a process called Selective Availability (SA.)

GPS proved so useful for civilian navigation that the federal government discontinued SA on May 2, 2000, after the military developed other methods to deny GPS service to enemy forces. Reliable accuracy for civilian users jumped from 100 meters (330 feet) under SA to the present level of 10 to 20 meters (about 30 to 60 feet.)

Twenty-four satellites orbit 10,900 nautical miles above the Earth, passing overhead twice daily. A series of ground stations (with precisely surveyed locations) controls the satellites and monitors their exact locations in the sky. Each satellite broadcasts a low-power signal that identifies the satellite and its position above the earth. Three of these satellites are spares, unused until needed. The rest virtually guarantee that at least four satellites are in view nearly anywhere on Earth at all times.

The system requires signal reception from three satellites in order to determine a position. This is called a 2D fix. It takes four satellites to determine both position and elevation (your height above sea level — also called altitude). This is called a 3D fix.



A minimum of three satellites are required to determine a 2D fix.

Remember, the unit must have a clear view of the satellites in order to receive their signals. Unlike radio or television signals, GPS works at very high frequencies. These signals can be easily blocked by trees, buildings, an automobile roof, even your body.

Like most GPS receivers, this unit doesn't have a compass or any other navigation aid built inside. It relies solely on the signals from the satellites to calculate a position. Speed, direction of travel, and distance are all calculated from position information. Therefore, in order for the unit to determine direction of travel, you must be moving and the faster, the better. This is not to say that it won't work at walking or trolling speeds — it will. There will simply be more "wandering" of the data shown on the display.

GPS alone is plenty accurate for route navigation, but the U.S. Federal Aviation Administration has special aircraft navigation needs that go beyond basic GPS. So, the FAA has developed a program to boost GPS performance with its Wide Area Augmentation System, or WAAS. The FAA commissioned the system on July 11, 2003.

WAAS is designed to increase GPS accuracy to within 7.6 meters vertically and horizontally, but it consistently delivers accuracies within 1-2 meters horizontal and 2-3 meters vertical, according to the FAA. It does this by broadcasting correction signals on GPS frequencies. Your unit automatically receives both GPS and WAAS signals.

However, there are some fringe areas of the U.S., including parts of Alaska, that do not yet receive robust WAAS coverage. Continued WAAS development is planned to extend WAAS coverage in the years to come.

WAAS boosts the accuracy of land GPS navigation, but the system is designed for aircraft. The satellites are in a fixed orbit around the Equator, so they appear very low in the sky to someone on the ground in North America. Aircraft and vessels on open water can get consistently good WAAS reception, but terrain, foliage or even large man-made structures can sometimes block the WAAS signal from ground receivers.

You'll find that using your GPS receiver is both easy and amazingly accurate. It's easily the most accurate method of electronic navigation available to the general public today. Remember, however, that this receiver is only a tool. Always have another method of navigation available, such as a map or chart and a compass.

Also remember that this unit will always show navigation information in the shortest line from your present position to a waypoint, regardless of terrain! It only calculates position, it can't know what's between you and your destination, for example. It's up to you to safely navigate around obstacles, no matter how you're using this product.

How to use this manual: typographical conventions

Many instructions are listed as numbered steps. The keypad and arrow "keystrokes" appear as boldface type. So, if you're in a real hurry (or just need a reminder), you can skim the instructions and pick out what

menu command to use by finding the boldface command text. The following paragraphs explain how to interpret the text formatting for those commands and other instructions:

Arrow Keys

The arrow keys control the movement of dotted cross-hair lines on your mapping screen called the cursor. The arrow keys also control a horizontal line depth cursor on the sonar screen. The arrow keys help you move around the menus so you can execute different commands. They are represented by symbols like these, which denote the down arrow key, the up arrow, the left arrow and the right arrow: ↓ ↑ ← →.

Keyboard

The other keys perform a variety of functions. When the text refers to a key to press, the key is shown in bold, sans serif type. For example, the "Enter/Icons" key is shown as **ENT** and the "Menu" key is shown as **MENU**.

Menu Commands

A menu command or a menu option will appear in small capital letters, in a bold sans serif type like this: **ROUTE PLANNING**. These indicate that you are to select this command or option from a menu or take an action of some kind with the menu item. Text that you may need to enter or file names you need to select are shown in italic type, such as *trail name*.

Instructions = Menu Sequences

Most functions you perform with this unit are described as a sequence of key strokes and selecting menu commands. We've written them in a condensed manner for quick and easy reading.

For example, instructions for navigating a trail would look like this:

1. From the Plotter Page, press **MENU | MENU | ↓** to **MY TRAILS | ENT**.
2. Press **↓** to *Trail 1* | **ENT | → | ↓** to **NAVIGATE | ENT**.
3. You are asked to wait while it converts the trail into a route.
4. The wait message disappears and the unit begins showing navigation information along the trail. Now, begin moving and follow your unit's directions.

Translated into complete English, step 1 above would mean: "Start on the Plotter Page. Press the Menu key twice. Next, repeatedly press (or press and hold) the down arrow key to scroll down the menu and select (highlight) the My Trails menu command. Finally, press the Enter key."

Step 2 would mean: "Press the down arrow key repeatedly to scroll to the trail named Trail 1, and press Enter. Next, press the right arrow key and then the down arrow key to highlight the Navigate command, then press Enter."

Section 2: Installation & Accessories

Preparations

You can install the sonar and GPS systems in some other order if you prefer, but we recommend this installation sequence:

CAUTION:

You should read over this entire installation section before drilling any holes in your vehicle or vessel!

1. Determine the approximate location for the sonar/GPS unit, so you can plan how and where to route the power/transducer cable. This will help you make sure you have enough cable length for the desired configuration.
2. Determine the approximate location for the transducer and its cable route.
3. Determine the location of your battery or other power connection, along with the power cable route.
4. Install the transducer and route the transducer cable to the sonar/GPS unit.
5. Route the power cable from the unit's location to an appropriate power source and connect it there.
6. Connect the transducer/power cable to the unit and mount the sonar/GPS unit to the bracket.

Transducer Installation

These instructions will help you install your Skimmer[®] transducer on a transom, on a trolling motor or inside a hull. Please read all instructions before proceeding with any installation.

Your Skimmer transducer typically comes packaged with a one-piece stainless steel bracket for mounting it to the transom of your boat. The optional trolling motor mount uses a one-piece plastic bracket with an adjustable strap. These are "kick-up" mounting brackets. They help prevent damage if the transducer strikes an object while the boat is moving. If the transducer does "kick-up," the bracket can easily be pushed back into place without tools.

Read these instructions carefully *before* attempting the installation. Determine which of the installation methods is right for your boat.

Remember, the transducer location and installation is the most critical part of a sonar installation.

Recommended Tools and supplies

If you prefer the option of routing the cable through the transom, you will need a 5/8" drill bit.

NOTE:

The following installation types also call for these recommended tools and required supplies that you must provide (supplies listed here are *not* included):

Transom installation

Tools include: two adjustable wrenches, drill, #29 (0.136") drill bit, flat-head screwdriver. Supplies: *high quality, marine grade* above- or below-waterline sealant/adhesive compound.

Trolling motor installations

Tools: two adjustable wrenches, flat-head screwdriver. Supplies: plastic cable ties.

Shoot-through hull installations

Tools: these will vary depending on your hull's composition. Consult your boat dealer or manufacturer. Other tools are a wooden craft stick or similar tool for stirring and applying epoxy, and a paper plate or piece of cardboard to mix the epoxy on. Supplies: rubbing alcohol, 100 grit sandpaper, specially formulated epoxy adhesive available from LEI (see ordering information on the inside back cover). A sandwich hull also requires polyester resin.

Selecting a Transducer Location

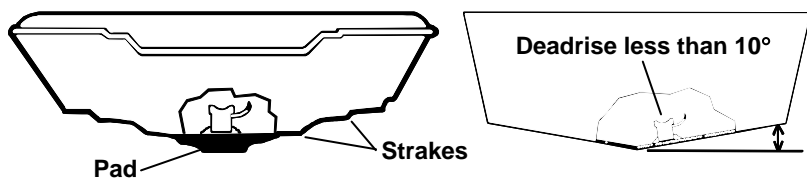
1. The location must be in the water at all times, at all operating speeds.
2. The transducer must be placed in a location that has a *smooth flow* of water at all times. If the transducer is not placed in a smooth flow of water, interference caused by bubbles and turbulence will show on the sonar's display in the form of random lines or dots whenever the boat is moving.

NOTE:

Some aluminum boats with strakes or ribs on the outside of the hull create large amounts of turbulence at high speed. These boats typically have large outboard motors capable of propelling the boat at speeds faster than 35 mph. Typically, a good transom location on aluminum boats is between the ribs closest to the engine.

3. The transducer should be installed with its face pointing straight down, if possible. *For shoot-thru applications:* Many popular fishing

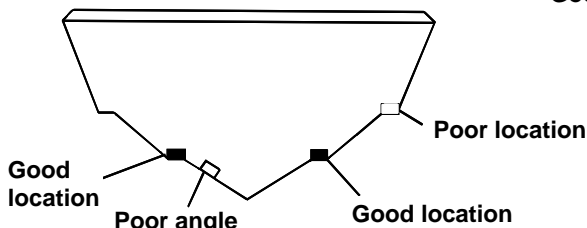
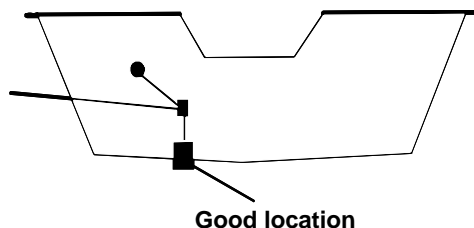
boat hulls have a flat keel pad that offers a good mounting surface. On vee hulls, try to place the transducer where the deadrise is 10° or less.



Left, vee pad hull; right, vee hull. A pod style transducer is shown here, but the principle is the same for Skimmers inside a hull.

4. If the transducer is mounted on the transom, make sure it doesn't interfere with the trailer or hauling of the boat. Also, don't mount it closer than approximately one foot from the engine's lower unit. This will prevent cavitation (bubble) interference with propeller operation.
5. If possible, route the transducer cable away from other wiring on the boat. Electrical noise from engine wiring, bilge pumps and aerators can be displayed on the sonar's screen. Use caution when routing the transducer cable around these wires.

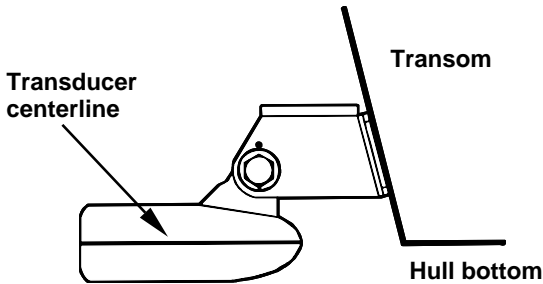
CAUTION: Clamp the transducer cable to transom near the transducer. This will help prevent the transducer from entering the boat if it is knocked off at high speed.



Good and poor transducer locations.

How low should you go?

For most situations, you should install your Skimmer transducer so that its centerline is level with the bottom of the boat hull. This will usually give you the best combination of smooth water flow and protection from bangs and bumps.



Align transducer centerline with hull bottom.

However, there are times when you may need to adjust the transducer slightly higher or lower. (The slots in the mounting brackets allow you to loosen the screws and slide the transducer up or down.) If you frequently lose bottom signal lock while running at high speed, the transducer may be coming out of the water as you cross waves or wakes. Move the transducer a little lower to help prevent this.

If you cruise or fish around lots of structure and cover, your transducer may be frequently kicking up from object strikes. If you wish, you may move the transducer a little higher for more protection.

There are two extremes you should avoid. Never let the edge of the mounting bracket extend below the bottom of the hull. Never let the bottom – the face – of the transducer rise above the bottom of the hull.

Shoot-thru-hull vs. Transom Mounting

In a shoot-thru-hull installation, the transducer is bonded to the *inside* of the hull with epoxy. The sonar "ping" signal actually passes through the hull and into the water. This differs from a bolt-thru-hull installation (often called simply "thru-hull"). In that case, a hole is cut in the hull and a specially designed transducer is mounted *through* the hull with a threaded shaft and nut. This puts the transducer in direct contact with the water.

Typically, shoot-thru-hull installations give excellent high speed operation and good to excellent depth capability. There is no possibility of transducer damage from floating objects, as there is with a transom-mounted transducer. A transducer mounted inside the hull can't be knocked off when docking or loading on a trailer.

However, the shoot-thru-hull installation does have its drawbacks. First, some loss of sensitivity does occur, even on the best hulls. This varies from hull to hull, even from different installations on the same hull. This is caused by differences in hull lay-up and construction.

Second, the transducer angle cannot be adjusted for the best fish arches on your sonar display. (This is not an issue for flasher-style sonars.) Lack of angle adjustment can be particularly troublesome on hulls that sit with the bow high when at rest or at slow trolling speeds.

Third, a transducer **CAN NOT** shoot through wood and metal hulls. Those hulls require either a transom mount or a thru-hull installation.

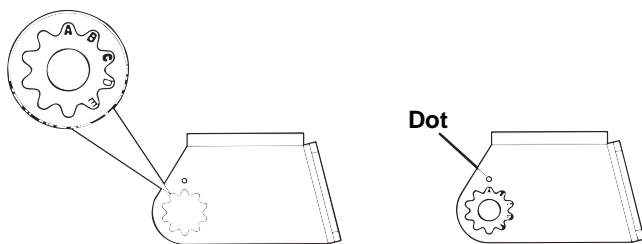
Fourth, if your Skimmer transducer has a built in temp sensor, it will only show the temperature of the bilge, not the water surface temp.

Follow the testing procedures listed in the shoot-thru-hull installation section at the end of this lesson to determine if you can satisfactorily shoot through the hull.

TRANSOM TRANSDUCER ASSEMBLY AND MOUNTING

The best way to install the transducer is to loosely assemble all of the parts first, place the transducer's bracket against the transom and see if you can move the transducer so that it's parallel with the ground.

- 1. Assembling the bracket.** Press the two small plastic ratchets into the sides of the metal bracket as shown in the following illustration. Notice there are letters molded into each ratchet. Place each ratchet into the bracket with the letter "A" aligned with the dot stamped into the metal bracket. This position sets the transducer's coarse angle adjustment for a 14° transom. Most outboard and stern-drive transoms have a 14° angle.

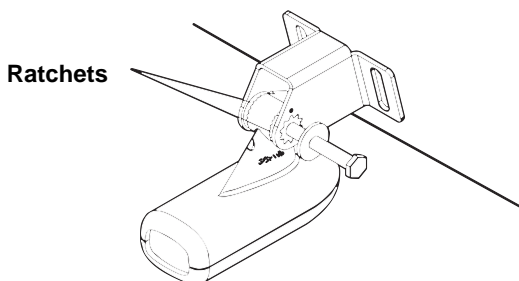


Align plastic ratchets in bracket.

- 2. Aligning the transducer on the transom.** Slide the transducer between the two ratchets. Temporarily slide the bolt through the transducer assembly and hold it against the transom. Looking at the transducer from the side, check to see if it will adjust so that its face is parallel to the ground. If it does, then the "A" position is correct for your hull.

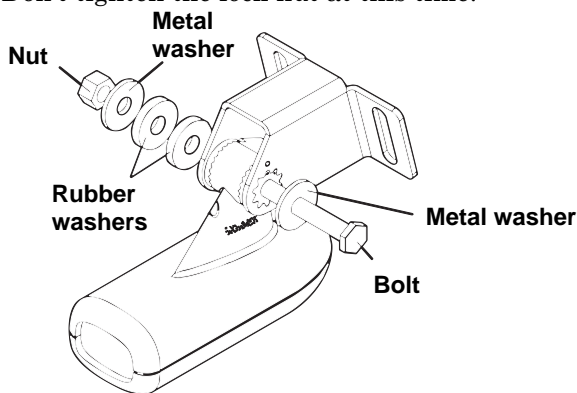
If the transducer's face isn't parallel with the ground, remove the transducer and ratchets from the bracket. Place the ratchets into the holes in the bracket with the letter "B" aligned with the dot stamped in the bracket.

Reassemble the transducer and bracket and place them against the transom. Again, check to see if you can move the transducer so it's parallel with the ground. If you can, then go to step 3. If it doesn't, repeat step 2, but use a different alignment letter until you can place the transducer on the transom correctly.



Insert bolt and check transducer position on transom.

3. Assembling the transducer. Once you determine the correct position for the ratchets, assemble the transducer as shown in the following figure. Don't tighten the lock nut at this time.

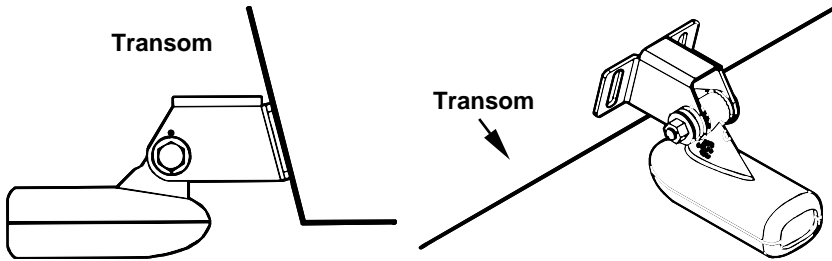


Assemble transducer and bracket.

4. Drilling mounting holes. Hold the transducer and bracket assembly against the transom. The transducer should be roughly parallel to the ground. The transducer's centerline should be in line with the bottom of the hull. Don't let the bracket extend below the hull!

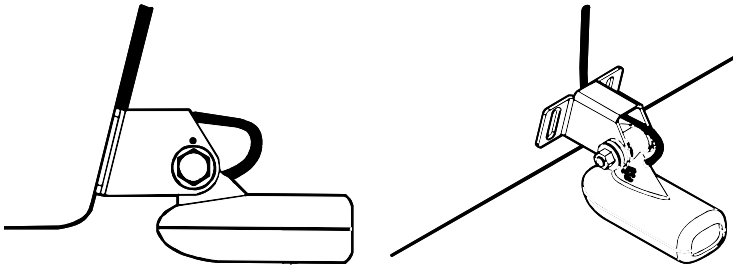
Mark the center of each slot for the mounting screw pilot holes. You will drill one hole in the center of each slot.

Drill the holes using the #29 bit (for the #10 screws).



Position transducer mount on transom and mark mounting holes.
Side view shown at left and seen from above at right.

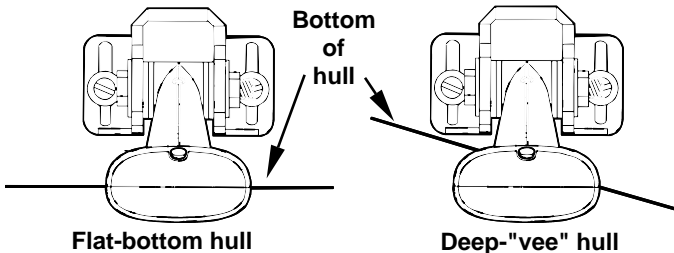
5. **Attaching transducer to transom.** Remove the transducer from the bracket and re-assemble it with the cable passing through the bracket over the bolt as shown in the following figures.



Route cable over bolt and through bracket. Side view shown at left and seen from above at right.

Attach the transducer to the transom. Slide the transducer up or down until it's aligned properly with the bottom of the hull as shown in the preceding and following figures. Tighten the bracket's mounting screws, sealing them with the sealant/adhesive compound.

Adjust the transducer so that it's parallel to the ground and tighten the nut until it touches the outer washer, then add 1/4 turn. *Don't over tighten the lock nut!* If you do, the transducer won't "kick-up" if it strikes an object in the water.



Align transducer centerline with hull bottom and attach to transom.

- 6. Route the transducer cable through or over the transom to the sonar unit.** Make sure to leave some slack in the cable at the transducer. If possible, route the transducer cable away from other wiring on the boat. Electrical noise from the engine's wiring, bilge pumps, VHF radio wires and cables, and aerators can be picked up by the sonar. Use caution when routing the transducer cable around these wires.

WARNING:

Clamp the transducer cable to the transom close to the transducer. This can prevent the transducer from entering the boat if it is knocked off at high speed.

If you need to drill a hole in the transom to pass the connector through, the required hole size is 5/8".

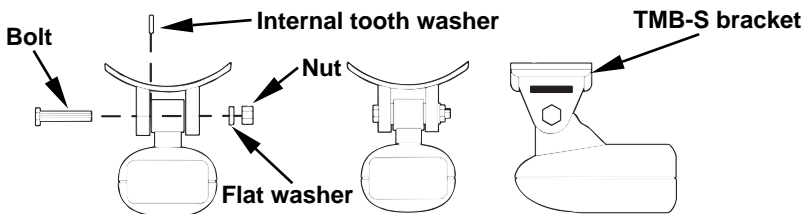
Caution:

If you drill a hole in the transom for the cable, make sure it is located above the waterline. After installation, be sure to seal the hole with the same marine grade above- or below-waterline sealant/adhesive used for the mounting screws.

- 7. Make a test run to determine the results.** If the bottom is lost at high speed, or if noise appears on the display, try sliding the transducer bracket down. This puts the transducer deeper into the water, hopefully below the turbulence causing the noise. Don't allow the transducer bracket to go below the bottom of the hull!

TROLLING MOTOR BRACKET INSTALLATION

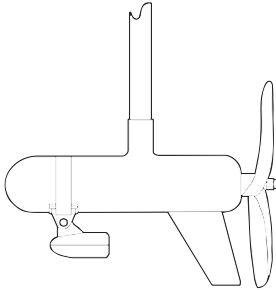
1. Attach the optional TMB-S bracket to the transducer as shown in the following figure, using the hardware supplied with the transducer. (Note: The internal tooth washer is supplied with the TMB-S.)



Attach motor mounting bracket to transducer.

2. Slide the adjustable strap supplied with the TMB-S through the slot in the transducer bracket and wrap it around the trolling motor. Position the transducer to aim straight down when the motor is in the water. Tighten the strap securely.

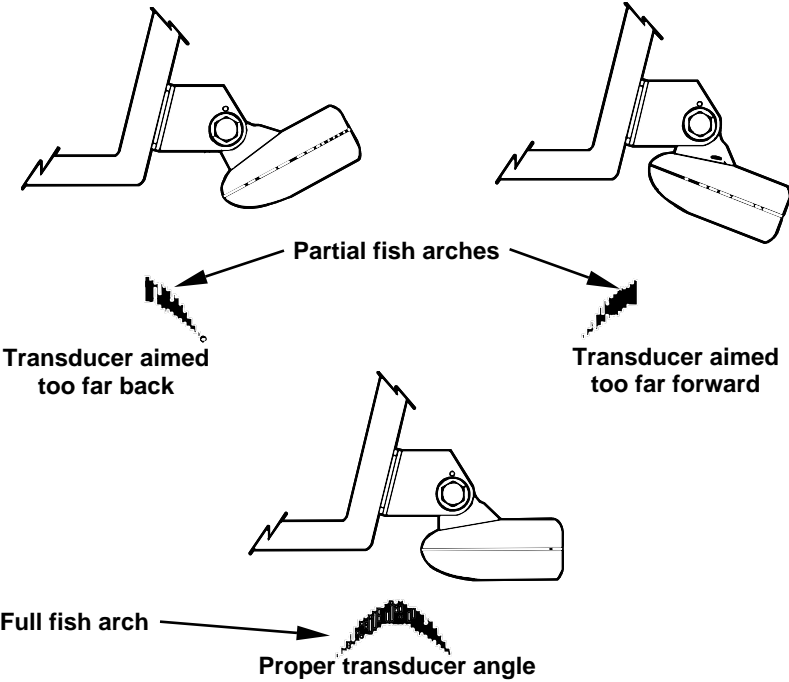
- Route the transducer cable alongside the trolling motor shaft. Use plastic ties (not included) to attach the transducer cable to the trolling motor shaft. Make sure there is enough slack in the cable for the motor to turn freely. Route the cable to the sonar unit and the transducer is ready for use.



Transducer mounted on trolling motor, side view.

TRANSDUCER ORIENTATION AND FISH ARCHES

If you do not get good fish arches on your display, it could be because the transducer is not parallel with the ground when the boat is at rest in the water or at slow trolling speeds.



Transducer angles and their effects on fish arches.

If the arch slopes up – but not back down – then the front of the transducer is too high and needs to be lowered. If only the back half of the arch is printed, then the nose of the transducer is angled too far down and needs to be raised.

NOTE:

Periodically wash the transducer's face with soap and water to remove any oil film. Oil and dirt on the face will reduce the sensitivity or may even prevent operation.

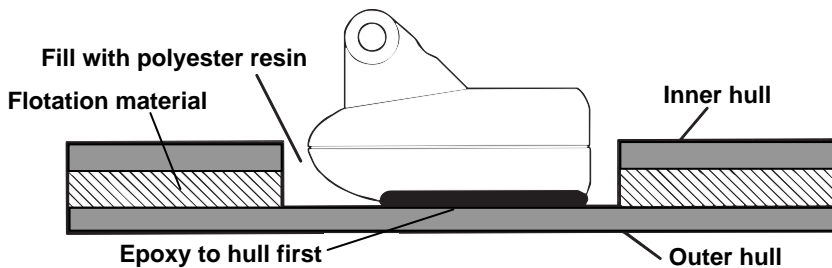
SHOOT-THRU-HULL PREPARATION

Hulls With Floatation Materials

The transducer installation inside a fiberglass hull must be in an area that does not have air bubbles in the resin or separated fiberglass layers. The sonar signal must pass through solid fiberglass. A successful transducer installation can be made on hulls with flotation materials (such as plywood, balsa wood or foam) between layers of fiberglass if the material is removed from the chosen area. See the figure below.

WARNING:

Do not remove any material from your inner hull unless you know the hull's composition. Careless grinding or cutting on your hull can result in damage that could sink your boat. Contact your boat dealer or manufacturer to confirm your hull specifications.

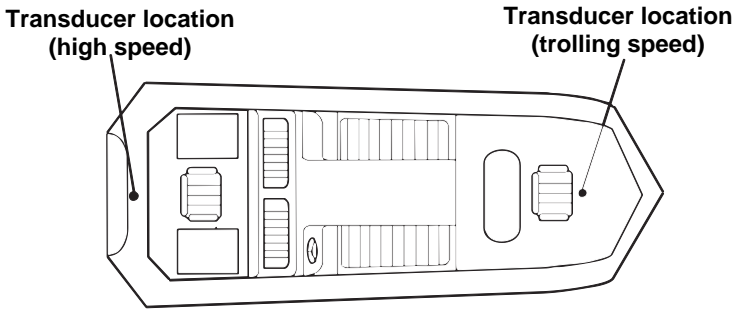


Epoxy the transducer to a solid portion of the hull.

For example, some (but not all) manufacturers use a layer of fiberglass, then a core of balsa wood, finishing with an outer layer of fiberglass. Removing the inner layer of fiberglass and the balsa wood core exposes the outer layer of fiberglass. The transducer can then be epoxied directly to the outer layer of fiberglass. After the epoxy cures for 24 hours, fill the remaining space with polyester resin. When the job is finished, the hull is watertight and structurally sound. Remember, the sonar signal must pass through *solid* fiberglass. Any air bubbles in the fiberglass or the epoxy will reduce or eliminate the sonar signals.

Testing Determines Best Location

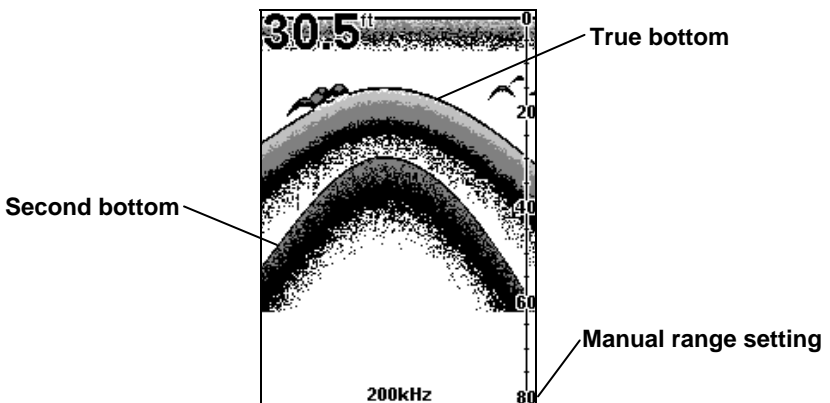
Ideally, the shoot-thru transducer should be installed as close to the transom as possible, close to the centerline. This will give you the best performance during high speed maneuvers.



Shoot-thru-hull transducer locations for high speed or trolling speed operation.

To choose the proper location for shoot-thru-hull mounting, follow these testing procedures: (You may need a helper to complete these steps.)

1. Anchor the boat in about 30 feet of water. Add a little water to the sump of the boat. Plug the transducer into the sonar unit, turn it on, then hold the transducer over the side of the boat in the water. Adjust the sensitivity and range controls until a second bottom echo is seen on the display. (You'll need to turn off Auto Sensitivity, Auto Depth Range and ASP™. Try a range setting that is two to three times the water depth. The harder (more rocky) the bottom, the easier it will be to get a second bottom signal.) Don't touch the controls once they've been set.



Example of a second bottom signal. Unit is in 30 feet of water, with range set at 80 feet and sensitivity set at 87 percent.

2. Next, take the transducer out of the water and place it in the water in the sump of the boat, face down. (The transducer face is shown in the figure on the following page.) Notice how the signal strength decreases. The second bottom signal will probably disappear and the bottom signal intensity will likely decrease.
3. Now move the transducer around to find the best location with the strongest possible bottom signal. If you find a spot with an acceptable bottom signal, mark the location and move on to step 4.

If you can't get an acceptable bottom signal, try turning up the sensitivity by three or five keystrokes and then move the transducer around once more. If you find a spot that works, mark it and move on to step 4.

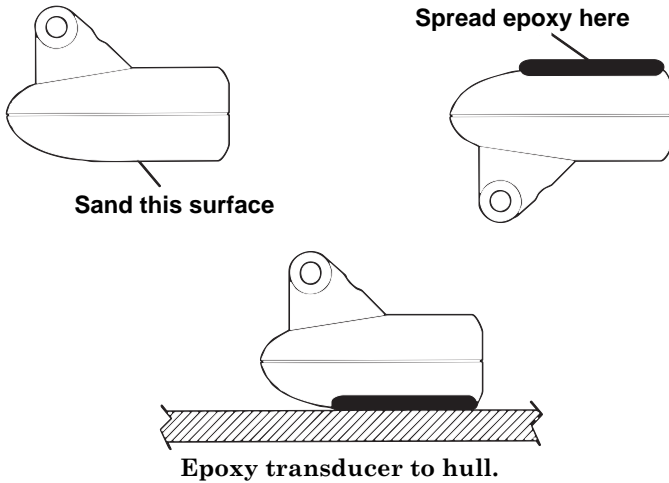
If you have to turn up sensitivity by more than five keystrokes to get a good signal, the transducer should be mounted on the outside of the hull. This is especially true if you have to turn sensitivity all the way up to get a decent bottom signal.

4. Most people can get good results by following steps 1 through 3, so this step is *optional*. If you want to make an extra effort to be absolutely sure that your selected location will work under all conditions, make a test run with the boat on plane and observe the bottom signal. You'll need to figure some way to prop the transducer into position while you make your test run. (A brick or two might be sufficient to hold it in place.)
5. When you're satisfied with a location, mark it and proceed with the installation.

Shoot-thru-hull Installation

If you are installing the transducer on a hull with floatation material sandwiched within the hull, refer to the text "Hulls With Flotation Materials" beginning on page 18.

1. Make sure the area is clean, dry and free of oil or grease, then sand both the inside surface of the hull and the face of the transducer with 100 grit sandpaper. The sanded hull area should be about 1-1/2 times the diameter of the transducer. The surface of the hull must be flat so the entire transducer face is in contact with the hull prior to bonding. After sanding, clean the hull and transducer with rubbing alcohol to remove any sanding debris.



WARNING:

Use *only* the epoxy available from LEI. It has been formulated to work with these installation procedures. Other epoxy types may be too thin or may not cure to the right consistency for optimum transducer performance.

2. The epoxy consists of the epoxy itself and a hardener. Remove the two compounds from the package and place them on the paper plate.

Thoroughly stir the two compounds together until the mixture has a uniform color and consistency. Do not mix too fast or bubbles will form in the epoxy. After mixing, you have 20 minutes to complete the installation before the epoxy becomes unworkable.

Spread a thin layer of epoxy (about 1/16" or 1.5 mm thick) on the face of the transducer as shown in the previous figure. *Make sure there are no air pockets in the epoxy layer!* Then, apply the remaining epoxy to the sanded area on the hull.

3. Press the transducer into the epoxy, twisting and turning it to force any air bubbles out from under the transducer face. Stop pressing when you bottom out on the hull. When you're finished, the face of the transducer should be parallel with the hull, with a minimum amount of epoxy between the hull and transducer.
4. Apply a weight, such as a brick, to hold the transducer in place while the epoxy cures. Be careful not to bump the transducer while the epoxy is wet. Leave the weight in place for a minimum of three hours. Allow the epoxy to cure for 24 hours before moving the boat.

5. After the epoxy has cured, route the cable to the sonar unit and it's ready to use.

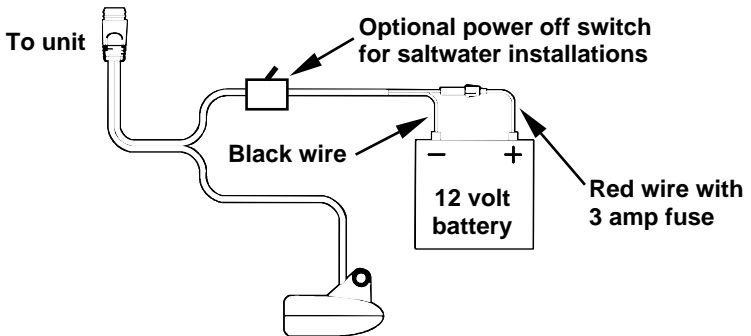
POWER AND CABLE CONNECTIONS

The unit works from a 12-volt battery system. For the best results, attach the power cable directly to the battery. You can attach the power cable to an accessory or power buss, however you may have problems with electrical interference. Therefore, it's safer to go ahead and attach the power cable directly to the battery.

CAUTION:

When using the unit in a saltwater environment, we strongly recommend that you shut off the power supply to the power cable when the unit is not in use. When the unit is turned off but still connected to a power supply, electrolysis can occur in the power cable plug. This may result in corrosion of the plug body along with the electrical contacts in the cable and the unit's power socket.

In saltwater environments we recommend you connect the power cable to the auxiliary power switch included in most boat designs. If that results in electrical interference, or if such a switch is not available, we recommend connecting direct to the battery and installing an inline switch. This will let you shut off power to the power cable when the unit is not in use. When you are not using the unit, you should always shut off power to the power cable, especially when the power cable is disconnected from the unit.



Power and transducer connections for the M68 sonar units (direct battery connection shown).

If possible, keep the power cable away from other boat wiring, especially the engine's wires. This will provide the best isolation from electrical noise. If the cable is not long enough, splice #18 gauge wire onto it. The power cable has two wires, red and black. Red is the positive

lead, black is negative or ground. Make sure to attach the in-line fuse holder to the red lead *as close to the power source as possible*.

For example, if you have to extend the power cable to the battery or power buss, attach one end of the fuse holder directly to the battery or power buss. This will protect both the unit and the power cable in the event of a short. It uses a 3-amp fuse.

WARNING:

This product *must* be independently fused with the enclosed 3-amp fuse (or equivalent), even if you connect to a fused accessory or power buss.

If a malfunction happens inside the unit, extensive damage can occur if the enclosed fuse is not used. As with all electrical devices, this unit could be damaged to a point that it is unrepairable and could even cause harm to the user when not properly fused.

CAUTION:

Failure to use the enclosed 3-amp fuse will void your warranty! For a replacement, use a type 3AG 3-amp fuse.

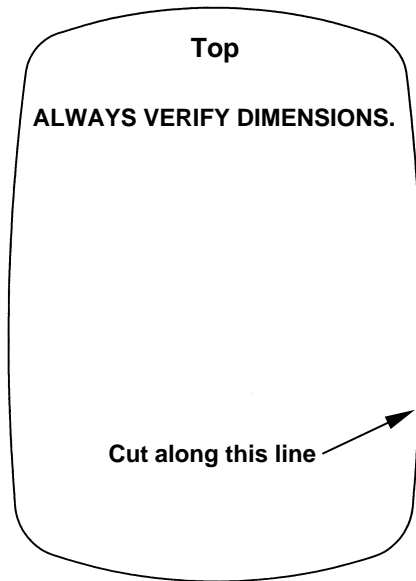
This unit has reverse polarity protection. No damage will occur if the power wires are reversed. However, the unit will not work until the wires are attached correctly.

MOUNTING THE SONAR UNIT: In-Dash or Bracket

You can install the sonar unit on the top of a dash with the supplied bracket. It can also be installed in the dash with an optional FM-6 dash-mounting kit.

In-Dash Installation

The following figure shows the approximate shape for in-dash mounting an M68. The in-dash adapter kit includes a template for cutting the mounting hole and complete installation instructions on instruction sheet 988-0147-631.



In-dash mounting template for M68.

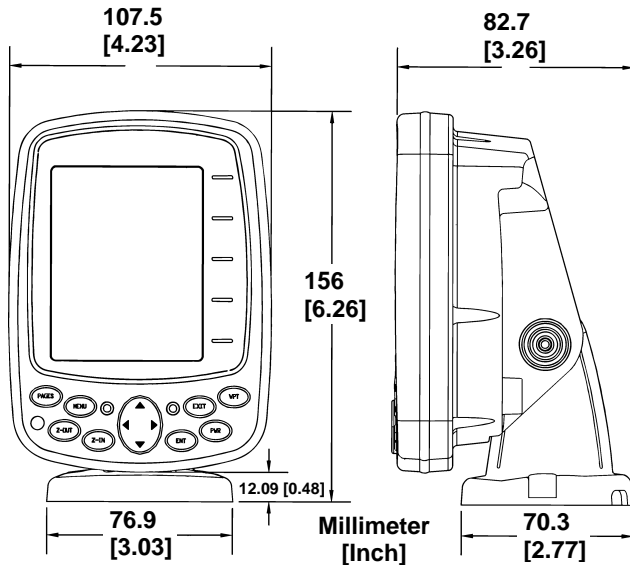
NOTE: This figure is *not* printed to scale.

Bracket Installation

Mount the unit in any convenient location, provided there is clearance when it's tilted for the best viewing angle. You should also make sure there is enough room behind the unit to attach the power/transducer cable. (See the following drawings, which show the dimensions of a mounted M68 sonar unit.)

Holes in the bracket's base allow wood screw or through-bolt mounting. You may need to place a piece of plywood on the back side of thin panels to reinforce the panel and secure the mounting hardware.

Drill a 5/8" (15.9 mm) hole in the dash for the power/transducer cable. The best location for this hole is immediately under the mounting bracket location. This way, the bracket can be installed so that it covers the hole, holds the cable in position and results in a neat installation. Some customers, however, prefer to mount the bracket to the side of the cable hole — it's a matter of personal preference. After drilling the hole, pass the connector *up* through the hole from under the dash.

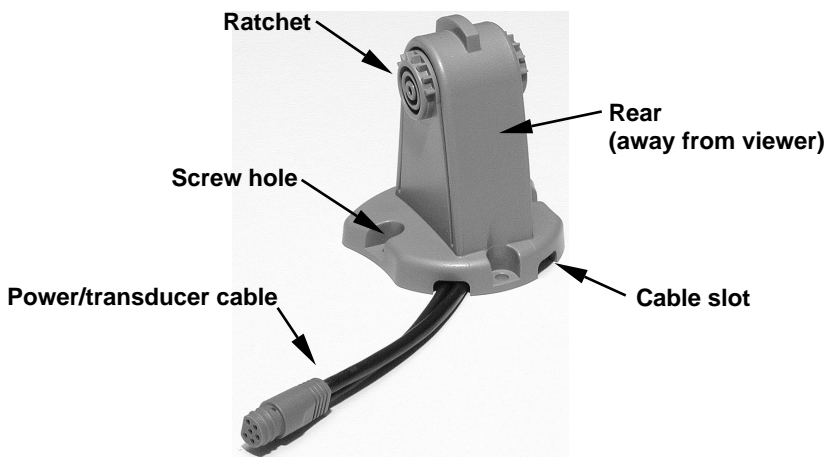


Front view (left) and side view (right) showing dimensions of the M68 when mounted on quick release bracket.

If you wish, you can fill in the hole around the cable with a good marine sealant compound. (Some marine dealers stock cable hole covers to conceal the opening.)

This unit uses a quick release mounting bracket. When you run the cable through the hole, make sure you allow enough slack for tilting the unit and attaching the connector. (The snug fit of the push-on waterproof connector requires some force to attach.) Also be sure there is enough cable slack for rotation if you decide to use the optional GBSA-3 swivel base. The swivel base lets you to rotate the sonar so it can be seen from different parts of the boat.

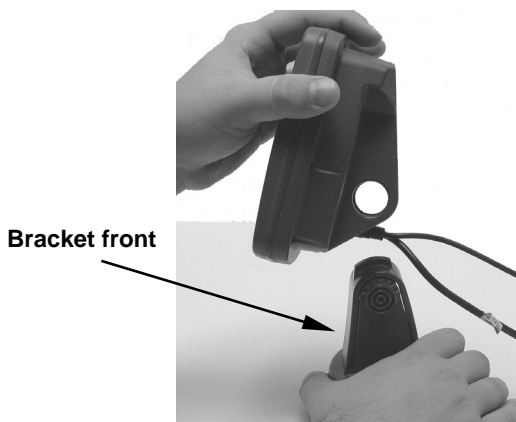
Align the bracket over the cable hole with the cable slots facing away from you and fit the cable through one of the slots. Fasten the bracket to the dash using the three screw holes.



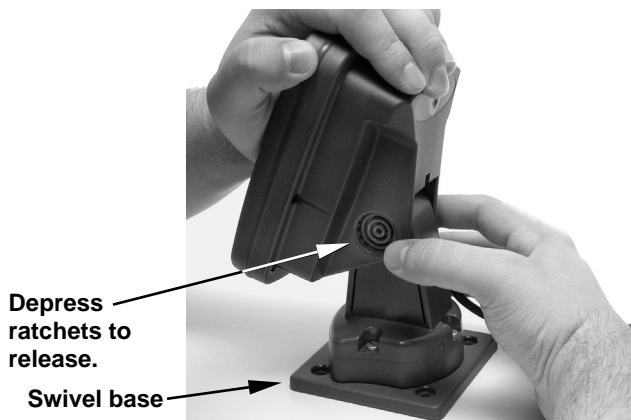
M68 quick release mounting bracket. Slots in the base allow routing the cable from beneath the mount.

Attach the unit to the bracket by first connecting the power/transducer cable. Then, hold the sonar unit vertically and slide it onto the bracket from above. (The back of the unit should be touching the front of the bracket as you lower it into position.) As you push down, the unit will lock into place with a distinct click.

To adjust the viewing angle, pinch the ratchets with one hand, then tilt the unit with your other hand. Release the ratchets and the unit locks into the new position. To dismount the unit for storage, press the ratchets and lift the unit off the bracket.



Mount the sonar: slide the unit onto the bracket from above.



Adjust viewing angle: use one hand to press and release the spring-loaded ratchets while you move the unit with the other hand. An optional GBSA-3 swivel base is shown with the quick release bracket.

Portable Sonar Installation

Like many Lowrance products, the M68 sonar is capable of portable operation. It uses the optional PPP-12 portable power pack.

The power pack and portable transducers expand the uses for your sonar. You can use your M68 sonar unit on your boat or take it to the dock, on a float tube, on an ice fishing trip or use it as a second sonar in a friend's boat. (An alternative to the PPP-12 is the PPP-15 portable power pack, which was designed especially for ice fishing. It includes a rechargeable gel cell battery and a transducer designed for stationary use. The entire rig is contained in a carry bag that fits inside a five-gallon plastic bucket.)

The PPP-12 package includes the power pack, battery adapter and a portable transducer. The transducer can be stored inside the power pack. The PPP-12 requires eight AA alkaline batteries. Batteries are not included.

To use a portable power pack, you simply install the batteries and then attach the sonar unit to the power pack's bracket. Plug in the power/transducer cable and you're ready to fish.

The PPP-12 has a quick-release mounting bracket built into the case.

Installing the Batteries

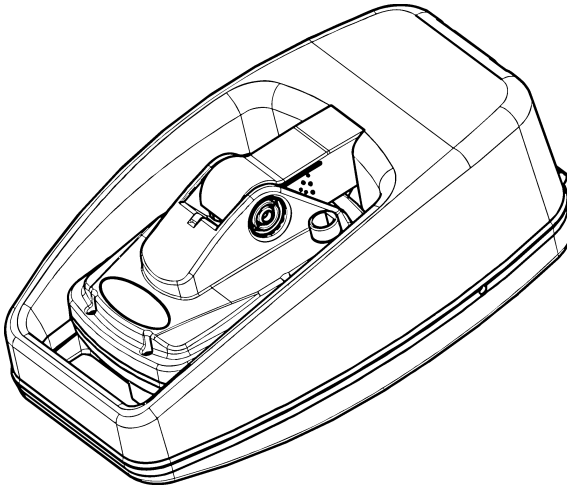
Release the latch on the front of the power pack case. Open the compartment and install eight AA batteries into the adapter. For the longest life, we recommend you use alkaline batteries.

NOTE:

When the unit is not in use, we recommend you unplug the power connector to reduce the possibility of corrosion or battery drain.

When you store the unit, always remove the batteries because dead batteries can leak and corrode the contacts.

After installing the batteries, plug the cable's power connector into the socket on the battery compartment cover. Route the cable's unit connector and about 6 inches of cable through the opening under the sonar mount. Close the cover, plug the connector into the sonar unit and mount the unit on the built-in bracket.

**PPP-12 Portable Power Pack with a sonar unit stowed for transport.**

Turn the unit on. If it doesn't work, make sure the battery terminals are making good contact against the battery contacts. Also check the wiring connections on the battery adapter. The red wire on the power cable should be attached to the red wire on the battery adapter and the power cable's black wire should be connected to the black wire on the battery adapter.

If it still doesn't work, check the battery voltage. Most of the complaints we receive about portable units result from stale batteries. Make sure the ones you buy are fresh.

In cold weather the efficiency of dry cell batteries drops with the temperature. We find it a good idea to have the sonar unit good and warm along with the batteries before we leave home.

If the batteries do lose a charge, you can sometimes restore them by placing them in a warm room or car interior. A better way is to replace them with batteries that have been kept warm.

WARNING:

Never heat the batteries over an open flame or direct hot air onto them. A fire or explosion could result.

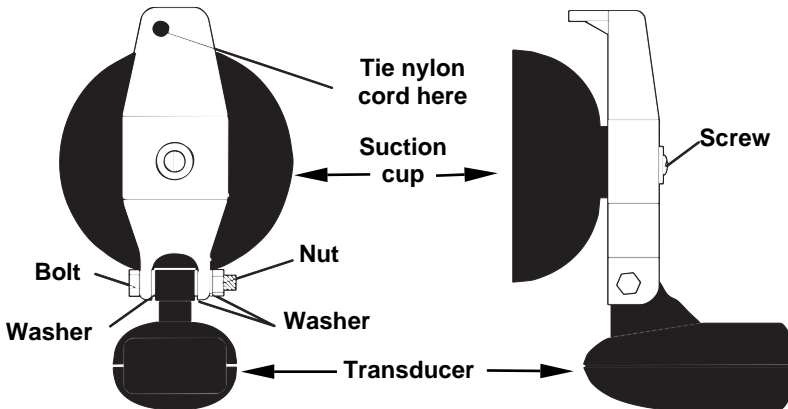
Portable Transducer Assembly

Recommended tools for installation include a slotted screw driver and two adjustable wrenches.

Assemble the transducer and bracket as shown in the following figure. Attach the transducer to the bracket with the supplied hardware.

Make sure there is one washer on each side of the transducer, inside the bracket. Slide the other washer over the end of the bolt and thread the nut onto it.

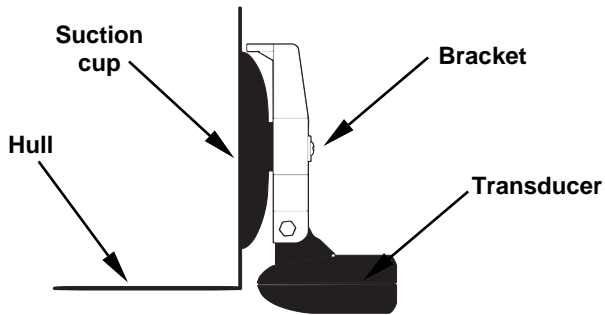
Screw the suction cup onto the bracket using the supplied screw and flat washer. Tie the nylon cord through the hole in the top of the bracket. When using this transducer, tie the other end of the nylon cord to the boat. This will help prevent the loss of the transducer if it comes off the boat.



Portable transducer assembly: rear view (left) and side view (right.)

Clean the chosen area of the hull before attaching the suction cup. Locate the transducer on the hull as shown in the following figure. Don't allow the bracket to extend below the hull, because water pressure against it can cause the suction cup to come off at speed.

Moisten the cup, then press it onto the hull as firmly as possible. Tie the nylon cord to the boat and route the transducer cable to the sonar unit. Your portable sonar is now ready for use.



Portable transducer installed on boat transom.

NOTE:

For optimum operation, the portable transducer should be adjusted so that it is parallel to the ground. For more information on this, see the earlier segment on Transducer Orientation and Fish Arches.

Now that you have your unit installed, move on to Sec. 3, *Basic Sonar Operations*. There, we'll present a series of step-by-step tutorials to teach you the basics of your sonar operation.

NOTE:

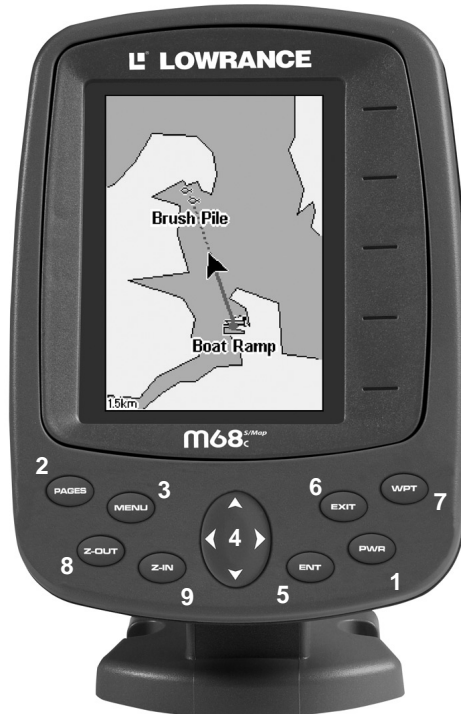
When you first turn the unit on, the Map Page appears. If you'd rather start learning about GPS operation first, turn over to Sec. 7, *Basic GPS Operations*. (Remember, you don't need to read this manual from cover-to-cover to get going. We designed it so you can skip around to the section *you* want to read.)

Section 3:

Basic Sonar Operation

KEYBOARD BASICS

The unit sounds a tone when you press any key. This tells you the unit has accepted a command. Numbers in the photo correspond to key explanations below:



**Lowrance M68 Sonar, front view, showing screen and keyboard.
(A close-up of the keyboard can be found at the beginning of Sec. 7)**

1. **PWR/LIGHT** (Power & Light) – The PWR key turns the unit on and off and activates the backlight.
2. **PAGES** – Pressing this and the arrow keys (4) switches the unit between the different page display screens. (There are four GPS Pages and four Sonar Page display options.) Each set of pages represents one of the unit's major operation modes.
3. **MENU** – Press this key to show the menus and submenus, which allow you to select a command or adjust a feature. This also accesses search functions for streets and intersections.

4. **ARROW KEYS** – These keys are used to navigate through the menus, make menu selections, move the plotter cursor and sonar chart cursor and enter data.

5. **ENT** (Enter) – This key allows you to save data, accept values or execute menu commands. It is also used to create event marker icons.

6. **EXIT** – The Exit key lets you return to the previous screen, clear data or erase a menu.

7. **WPT** – (Waypoint) The Waypoint key is used to save and recall waypoints, search for waypoints and access the waypoint list. It's also involved in some navigation functions.

8. **ZOUT** – (Zoom Out) – This key lets you zoom the screen out. On the Sonar Page, this key returns you to a full sonar chart display, showing the entire water column from surface to bottom. On the Plotter Page, this lets you see a larger geographic area on the display. Less detail is seen as you zoom out.

9. **ZIN** – (Zoom In) – This key lets you zoom the screen in. On the Sonar Page, this key enlarges fish signals and bottom detail. On the Plotter Page, zooming in lets you see greater detail in a smaller geographic area on the display.

Memory

This unit has permanent memory that saves all user settings, even when power is removed. It does not require, nor does it use an internal backup battery, so you never have to worry about replacement batteries.

Menus

Your sonar unit will work fine right out of the box with the factory default settings. You only need to learn a few basic functions to enhance your viewing. We'll discuss them briefly here, then talk about them and all the other commands in more detail in Sec. 4, *Advanced Sonar Operation*.

Sonar Mode has two primary menus that control its operation. They are the Main Menu and the Sonar Menu.

Main Menu

The Main Menu contains some basic function commands and some setup option commands. You access the Main Menu by pressing **MENU | MENU**. You run a command by using \uparrow or \downarrow to highlight the command and then pressing **ENT**. To clear the Main Menu screen and return to the Page display, press **EXIT**. (Remember, our text style for "**MENU | MENU**" means "press the Menu key twice." See a full explanation of our instruction text formatting on page 8, *Instructions = Menu Sequences*.)



Main Menu.

The Main Menu commands and their functions are:

Screen command: changes the contrast or brightness of the display screen.

Sounds command: enables or disables the sounds for key strokes and alarms and sets the alarm style.

Alarms command: turns GPS alarms on or off and changes alarm thresholds.

Route Planning command: used to plan, view or navigate a route.

My Trails command: shows, creates and deletes plot trails. Also used to navigate or backtrack a trail.

Cancel Navigation command: turns off the various navigation commands. Used to stop navigating after you have reached your destination waypoint, Point of Interest or map cursor location; or after you reach the end of a route or trail.

Sonar Setup command: sets various sonar options.

GPS Setup command: sets various GPS receiver options.

System Setup command: sets general configuration options.

Sun/Moon Calculations command: finds the rising and setting time of the sun and the moon.

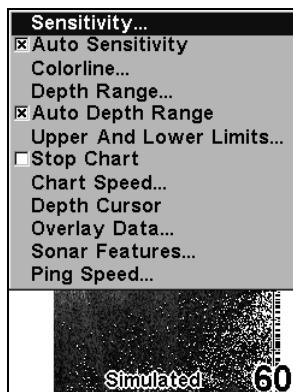
Trip Calculator command: shows trip status and statistics.

Timers command: controls the up timer, down timer and alarm clock settings.

Sonar Menu

The Sonar Menu contains commands for the major sonar features and

options. You access the Sonar Menu by pressing the **MENU** key one time. You run a command by using \uparrow or \downarrow to highlight the command and then pressing **ENT**. To clear the menu screen and return to the Page display, press **EXIT**.



Sonar Page Menu. Most of these functions are discussed in *Sec. 4, Advanced Sonar Operation.*

Sonar Menu Commands

The Sonar Menu contains commands for the major sonar features and options. Most of them are only described in detail in Sec. 4, but Sensitivity and Auto Sensitivity are important basic functions that are discussed both here and in the Advanced Sonar section. The other Sonar Menu commands include:

- **ColorLine™** command: separates fish and structure near the bottom from the actual bottom, and defines bottom composition/hardness.
- **Depth Range** command: manually sets the depth range shown on the sonar chart.
- **Auto Depth Range** command: automatically sets the depth range shown on the sonar chart to always keep the bottom in view.
- **Upper and Lower Limits** command: sets the upper and lower depth limits of the sonar chart. Lets you zoom in on a specific portion of the water column.
- **Stop Chart** command: stops the sonar chart from scrolling. Used when you want to "freeze" the image for closer study.
- **Chart Speed** command: sets the scrolling speed of the sonar chart.
- **Depth Cursor** command: displays a cursor line on the sonar chart which allows you to accurately measure the depth of a sonar target.

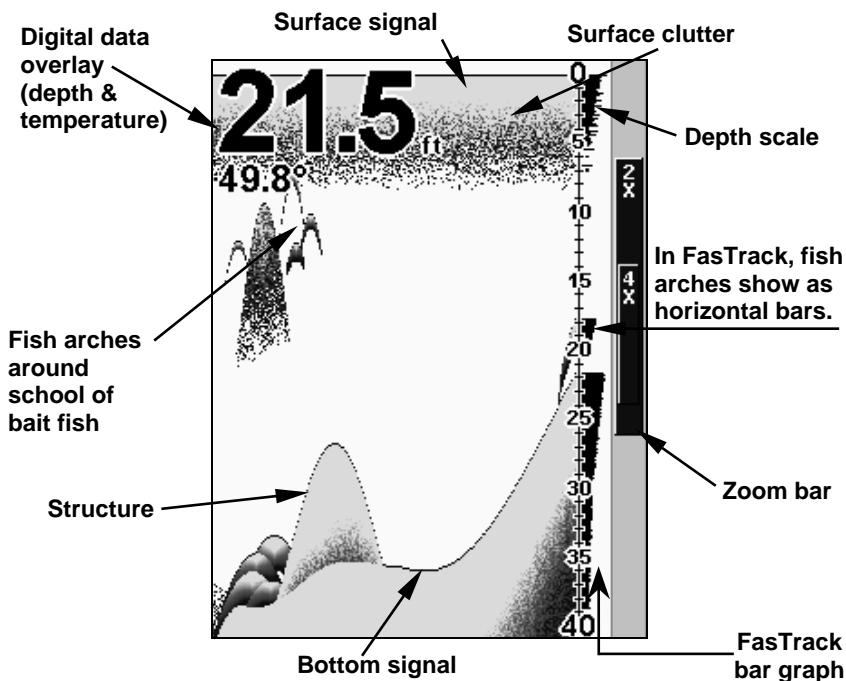
- **Overlay Data** command: chooses what types of information (such as water temperature) to show overlaid on the sonar chart screen.
- **Sonar Features** command: launches the Sonar Features menu which controls many functions and options, including screen color mode, auto depth and sensitivity, surface clarity, noise rejection, Fish I.D.™ symbols, the zoom bar and zone bar.
- **Ping Speed** command: sets the rate at which sonar pings are made.

Pages

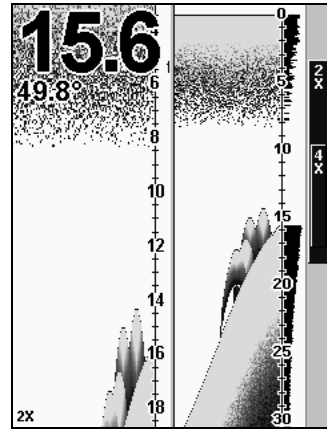
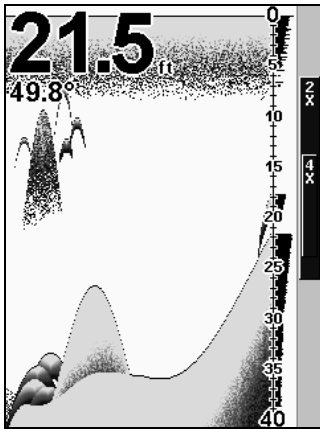
The M68 has four major Sonar display options. They are the Full Sonar Chart, Split Zoom Sonar Chart, Digital Data and Flasher.

You access the various display modes by pressing the **PAGES** key, then pressing → to **SONAR** | ↑ or ↓ to *desired page* | **ENT**.

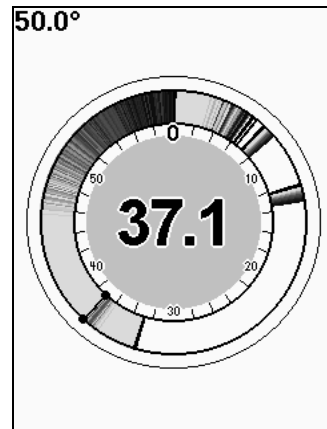
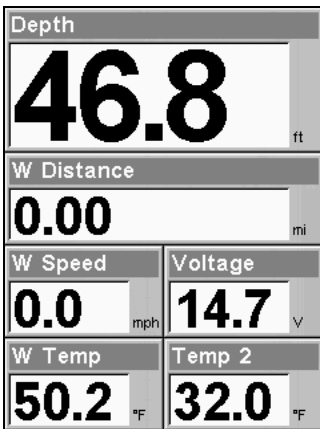
The Full Sonar Chart is the main Sonar display option. This is a "cross-section" view of the water column beneath the boat. The chart moves across the screen, displaying sonar signal echoes that represent fish, structure and the bottom.



Sonar Page, showing full sonar chart mode.



Sonar chart display options (from left) full sonar chart and split zoom.



Sonar chart display options (from left) digital data and flasher.

You can customize how the Sonar Page pictures and other data are displayed in many ways. We'll discuss all of those features and options in the Advanced Sonar Operation section, but to show you how easy the sonar unit is to operate, the following page contains a simplified, 10-step quick reference that will cover most fish finding situations. The quick reference describes how your unit will operate with all the sonar features in their automatic modes, which are set at the factory.

Basic Sonar Quick Reference

1. Mount the transducer and unit. Connect the unit to electric power and the transducer.

2. Launch your boat.

3. To turn on the unit, press and release **PWR** key.

4. Head for your fishing grounds. Your unit automatically displays digital depth and surface water temperature in the corner of the screen.

The auto settings will track the bottom, displaying it in the lower portion of the screen. The full sonar chart will scroll from right to left, showing you what's under the boat as you cruise across the water.

5. As you're watching the sonar returns, you can change the display by:

Zoom in to enlarge the chart for more detail: press **ZIN**.

Zoom out to return to full chart mode: press **ZOUT**.

6. If necessary, adjust sensitivity to improve chart readability. Press **MENU|ENT** and the Sensitivity Menu will appear on the left of your screen. Use **↑** and **↓** to change the setting.

Boosting sensitivity will show more information on your screen, which may cause clutter. Reducing sensitivity will filter out some information, but could omit important images. We recommend adjusting sensitivity until the background is lightly "peppered" — that is, scattered dots appear, but individual objects (like fish arches or bottom structure) can be easily picked out of the background.

7. Watch the display for the appearance of fish arches. When you see arches, you've found fish! Stop the boat and get your lure or bait into the water at the depth indicated on the sonar chart.

8. Gauge the fish depth by visually comparing the fish arches with the depth scale on the right side of the screen, or get a more accurate measure with the Depth Cursor. Press **MENU|↓** to **DEPTH CURSOR|ENT**. Press **↓** (or **↑**) to align the cursor line with the fish arch. The exact depth appears in a box at the right end of the cursor line. To clear the cursor, press **EXIT**.

9. If you are drifting at a very low speed or anchored, you are not moving fast enough for a fish to return the tell-tale fish arch signal. As you drift over a fish, or as a fish swims through the transducer's signal cone, the fish echo will appear as a straight line suspended between the surface and the bottom.

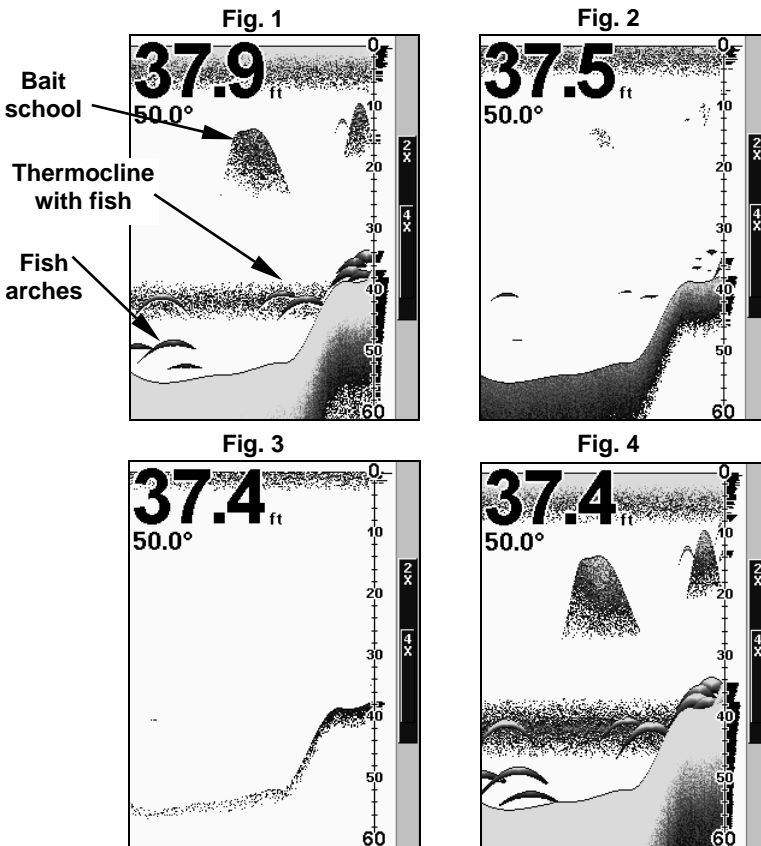
10. To turn off the unit, press and hold **PWR** key for three seconds.

Sonar Operations

As you can see from the quick reference on the previous page, basic operation is pretty easy, right out of the box. If you are a sonar novice, try operating the unit with the factory defaults until you get a feel for how it's working.

As you're learning the basics, there is one setting you might want to tinker with from time to time — Sensitivity.

Sensitivity controls the unit's ability to pick up echoes. If you want to see more detail, try increasing the sensitivity, a little at a time. There are situations when too much clutter appears on the screen. Decreasing the sensitivity can reduce the clutter and show the strongest fish echoes, if fish are present. As you change the sensitivity setting, you can see the difference on the chart as it scrolls.



These figures show results of different sensitivity levels on the same location. Fig. 1: Sensitivity at 87 percent, determined by Auto Sensitivity. Typical of full auto mode. Fig. 2: Sensitivity set at 50 percent. Fig. 3: Sensitivity set at 20 percent. Fig. 4: Sensitivity set at 100 percent.

You can change the sensitivity level whether you are in Auto Sensitivity mode or Manual Sensitivity mode. The adjustment method works the same in both modes, but it gives you slightly different results.

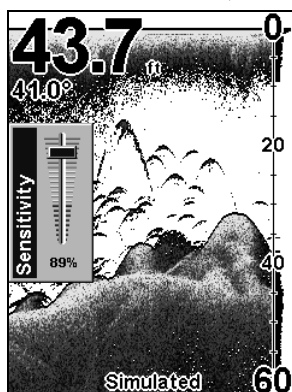
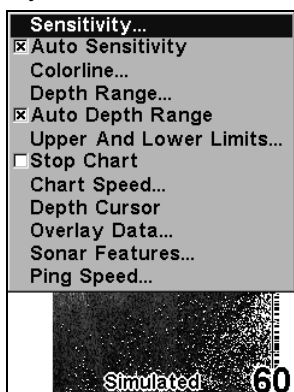
Adjusting sensitivity in Auto Sensitivity Mode is similar to manually adjusting a car's speed with the accelerator pedal while cruise control is on. You can tell the car to run faster, but when you let off the gas the cruise control *automatically* keeps you from running slower than the minimum speed setting. In the sonar unit, auto mode will let you increase sensitivity to 100 percent, but the unit will *limit* your *minimum* setting. This prevents you from turning sensitivity down too low to allow automatic bottom tracking. When you change the setting with auto turned on, the unit will continue to track the bottom and make minor adjustments to the sensitivity level, with a bias toward the setting you selected.

Adjusting sensitivity in Manual Sensitivity Mode is similar to driving a car without cruise control — you have *complete* manual control of the car's speed. In the sonar unit, manual mode allows you to set sensitivity at 100 percent (maximum) or zero percent (minimum.) Depending on water conditions, the bottom signal may completely disappear from the screen when you reduce sensitivity to about 50 percent or less!

Try adjusting sensitivity in both auto and manual modes to see how they work.

To adjust sensitivity:

1. Press **MENU | ENT**.
2. The Sensitivity Control Bar appears. Press ↓ to decrease sensitivity; press ↑ to increase sensitivity. When it's set at the desired level, press **EXIT**. (When you reach the maximum or minimum limit, a tone sounds.)



At left, Sonar Menu with Sensitivity command selected. At right, the Sensitivity Control Bar.

NOTE:

If you want to change the sensitivity in Manual Mode, first turn off Auto Sensitivity: from the Sonar Page, press **MENU** | **↓** to **AUTO SENSITIVITY** | **ENT** | **↑** to **SENSITIVITY** | **ENT**. Press **↓** or **↑** to pick a different sensitivity setting. When it's set at the desired level, press **EXIT**.

Important Tip:

While you are experimenting and learning, it's possible to scramble the settings so that the sonar picture disappears from your screen. If that happens, remember that it's easy to switch back to full automatic operation by simply restoring the factory auto settings. Here's how:

To Restore Factory Settings

1. Press **MENU** | **MENU** | **↓** to **SYSTEM SETUP** | **ENT** | **↓** to **RESET OPTIONS** | **ENT**.
2. The unit asks if you want to reset all the options. Select **YES** and press **ENT**. All options are reset, and the unit reverts back to the original settings.

Fish Symbols vs. Full Sonar Chart

You may have noticed in the quick reference that we used fish arches in full sonar chart mode for our example, and not the popular Fish I.D.[™] fish symbol feature. Here's why.

Fish I.D. is an easier way for a sonar novice to recognize a fishy signal return when he sees it. However, locating fish by symbol *only* has some limitations.

Your sonar unit's microprocessor is remarkably powerful, but it can be fooled. Some of the echoes *calculated* to be fish could be tree limbs or turtles! *To see what's under your boat in maximum detail, we recommend you turn off Fish I.D. and begin learning to interpret fish arches.*

Fish I.D. is most handy when you're in another part of the boat or performing some task that prevents you from watching the sonar screen. Then, you can turn on Fish I.D. and the audible fish alarm. When that lunker swims under your boat, you'll hear it!

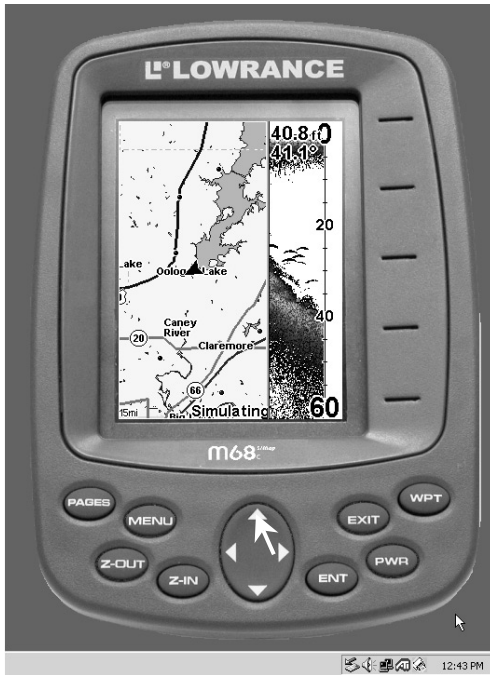
Fish I.D. can also be useful when you want to screen out some of the sonar detail gathered by your unit. For example, in one case fishermen in San Francisco Bay saw clouds of clutter in the water but no fish arches. When a down rigger was pulled up, it brought up several small jellyfish. The fishermen switched their Lowrance sonar to Fish I.D., which screened out the schools of jellyfish and clearly showed the game fish there as fish symbols.

Other Free Training Aids

The following section discusses Fish I.D., fish alarms and other features in greater detail. If you or a friend has Internet access, you can also learn more about interpreting what you see on your sonar screen. Visit our web site, WWW.LOWRANCE.COM. Be sure to check out the free Sonar Tutorial, which includes animated illustrations and more pictures of actual sonar returns, all described in detail. There's even a "printer friendly" version of the tutorial available on our web site...it makes a great supplement to this operation manual!

For the ultimate training aid, be sure to download the free emulator software for your unit. Aside from being just plain fun, this program can help you learn both basic and advanced operations without burning boat fuel! Lowrance is the first sonar manufacturer to provide this type of training tool for customers.

This PC application simulates the actual sonar unit on your computer. You can run it from your computer keyboard or use your mouse to press the virtual keys. Easy download and installation instructions are available on our web site.



Free training emulator is available for your unit on our web site. To run it, click the buttons with your mouse pointer.

Notes

Section 4:

Sonar Options & Other Features

Material in this section is arranged in alphabetical order.

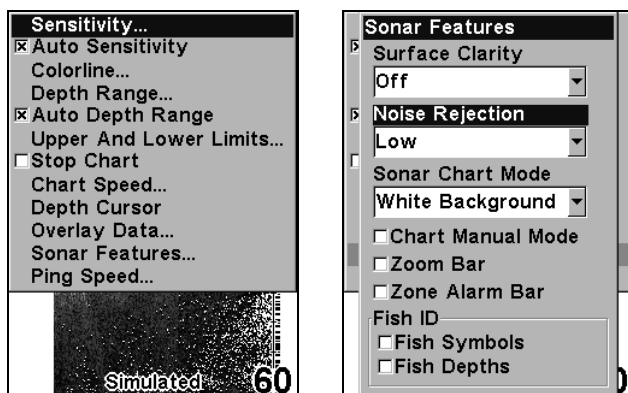
ASP™ (Advanced Signal Processing)

The ASP™ feature is a noise rejection system built into the sonar unit that constantly evaluates the effects of boat speed, water conditions and interference. This automatic feature gives you the best display possible under most conditions.

The ASP feature is an effective tool in combating noise. In sonar terms, noise is any undesired signal. It is caused by electrical and mechanical sources such as bilge pumps, engine ignition systems and wiring, air bubbles passing over the face of the transducer, even vibration from the engine. In all cases, noise can produce unwanted marks on the display.

The ASP feature has four settings — Off, Low, Medium and High. If you have high noise levels, try using the "High" ASP setting. However, if you are having trouble with noise, we suggest that you take steps to find the interference source and fix it, rather than continually using the unit with the high ASP setting.

There are times when you may want to turn the ASP feature off. This allows you to view all incoming echoes before they are processed by the ASP feature.



At left, Sonar Menu with Sonar Features selected. In the Sonar Features menu, Noise Rejection is selected with ASP in the default low setting.

To change the ASP level:

1. From the Sonar Page, press **MENU** | ↓ to **SONAR FEATURES** | **ENT**.
2. Press ↓ to **NOISE REJECTION** | **ENT**.

3. Press **↓** or **↑** to select a setting, then press **ENT**.
4. To return to the previous page, press **EXIT | EXIT**.

Alarms

This unit has three different types of sonar alarms. The first is a Fish Alarm. It sounds when the Fish I.D.[™] feature determines that an echo is a fish.

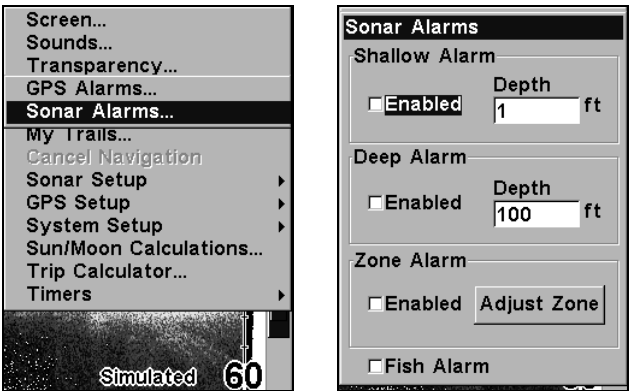
Another alarm is the Zone Alarm, which consists of a bar on the side of the screen. Any echo on the chart that appears inside this bar triggers the alarm.

The last alarm setting is the Depth Alarm, which has both a Shallow and a Deep setting. Only the bottom signal will trigger this alarm. This is useful as an anchor watch, a shallow water alert or for navigation.

Depth Alarms

The depth alarms sound a tone when the bottom signal goes shallower than the shallow alarm's setting or deeper than the deep alarm's setting. For example, if you set the shallow alarm to 10 feet, the alarm will sound a tone if the bottom signal is less than 10 feet. It will continue to sound until the bottom goes deeper than 10 feet.

The deep alarm works just the opposite. It sounds a warning tone if the bottom depth goes deeper than the alarm's setting. Both depth alarms work only off the digital bottom depth signals. No other targets will trip these alarms. These alarms can be used at the same time or individually.



At left, Main Menu and Sonar Alarms command.

At right, the Sonar Alarms menu.

To adjust and turn on the shallow alarm:

1. Press **MENU | MENU | ↓** to **ALARMS | ENT | ↓** to **SONAR ALARMS | ENT**.
2. Press **→** to **SHALLOW ALARM DEPTH | ENT**.

3. Press \uparrow or \downarrow until the depth is correct, then press **ENT**.
4. Press \leftarrow to **SHALLOW ALARM ENABLED | ENT | EXIT**.
5. To turn off the alarm, press **MENU | MENU | \downarrow to ALARMS | ENT | \downarrow to SONAR ALARMS | ENT | ENT | EXIT**.

To switch to a different depth setting, open the Sonar Alarms menu and repeat the instructions in step 3 above.

To adjust and turn on the deep alarm:

1. Press **MENU | MENU | \downarrow to ALARMS | ENT | \downarrow to SONAR ALARMS | ENT**.
2. Press \downarrow to **DEEP ALARM DEPTH | ENT**.
3. Press \uparrow or \downarrow until the depth is correct, then press **ENT**.
4. Press \leftarrow to **DEEP ALARM ENABLED | ENT | EXIT**.
5. To turn off the alarm, press **MENU | MENU | \downarrow to ALARMS | ENT | \downarrow to SONAR ALARMS | ENT | \downarrow to DEEP ALARM ENABLED | ENT | EXIT**.

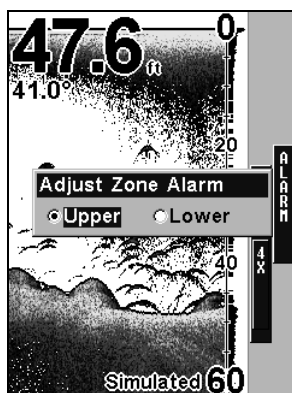
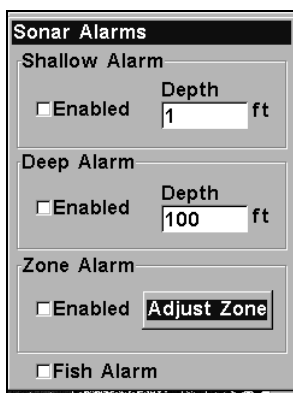
To switch to a different depth setting, open the Sonar Alarms menu and repeat the instructions in step 3 above.

Zone Alarm

The zone alarm is triggered when any echo passes inside the zone alarm bar, shown on the right side of the screen.

To adjust and turn on the zone alarm:

1. Press **MENU | MENU | \downarrow to ALARMS | ENT | \downarrow to SONAR ALARMS | ENT**.
2. Press \downarrow to **ZONE ALARM ENABLED | \rightarrow to ADJUST ZONE | ENT**.



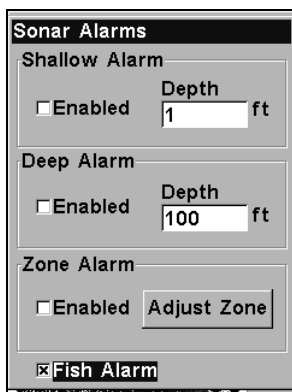
At left, Sonar Alarms menu, with Adjust Zone command selected.
At right, Adjust Zone Alarm selection box, with Upper Limit selected.

3. To set the upper boundary for the Zone Alarm, use ← or → to select **UPPER**, then press ↑ or ↓ to move the top of the bar to the desired depth.
4. To set the lower boundary for the Zone Alarm, use ← or → to select **LOWER**, then press ↑ or ↓ to move the bottom of the bar to the desired depth.
5. Press **EXIT** | ← to **ZONE ALARM ENABLED** | **ENT** | **EXIT** | **EXIT** | **EXIT**. Now, any echo — fish, bottom, structure — within the zone alarm's depth range will trigger the zone alarm.
6. To turn off the alarm, press **MENU** | **MENU** | ↓ to **ALARMS** | **ENT** | ↓ to **SONAR ALARMS** | **ENT** | ↓ to **ZONE ALARM ENABLED** | **ENT** | **EXIT** | **EXIT** | **EXIT**.

To switch to a different depth setting, open the Sonar Alarms menu and repeat the instructions in steps 3 and 4 above.

Fish Alarm

Use the fish alarm for a distinctive audible alarm when fish or other suspended objects are detected by the Fish I.D.™ feature (Fish I.D. must be turned on for the Fish Alarm to work). A different tone sounds for each fish symbol size shown on the display.



Sonar Alarms menu with Fish Alarm selected. The check box to the left is checked, indicating the alarm is turned on.

To turn the fish alarm on:

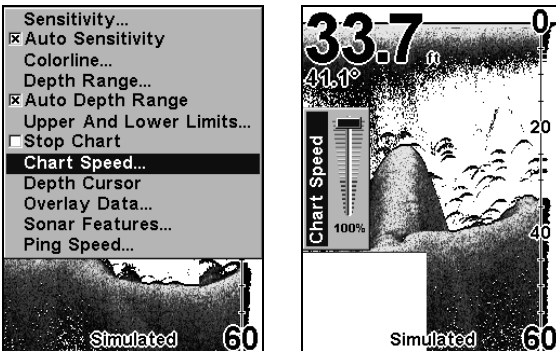
1. Press **MENU** | **MENU** | ↓ to **ALARMS** | **ENT** | ↓ to **SONAR ALARMS** | **ENT**.
2. Press ↓ to **FISH ALARM** | **ENT** | **EXIT**.
3. To turn off the alarm, press **MENU** | **MENU** | ↓ to **ALARMS** | **ENT** | ↓ to **SONAR ALARMS** | **ENT** | ↓ to **FISH ALARM** | **ENT** | **EXIT**.

Chart Speed

The rate that echoes scroll across the screen is called the chart speed. The default is maximum; we recommend that you leave the speed set there for virtually all fishing conditions.

However, you might consider experimenting with chart speed when you are stationary or drifting very slowly. You may sometimes achieve better images as you slow down the chart speed to match how fast you are moving across the bottom.

If you are at anchor, ice fishing or fishing from a dock, experiment with a chart speed around 50 percent. If you are drifting slowly, try a chart speed around 75 percent. When you are stationary and a fish swims through the sonar signal cone, the image appears on the screen as a long line instead of a fish arch. Reducing the chart speed may result in a shorter line that more closely resembles a regular fish return.



At left, Sonar Page menu with Chart Speed command selected.

At right, Chart Speed Control Bar.

If you do experiment with chart speed, remember to reset it to maximum when you resume trolling or moving across the water at higher speed. To change chart speed:

1. From the Sonar Page, press **MENU** | **↓** to **CHART SPEED** | **ENT**.
2. The Chart Speed Control Bar appears. Press **↓** to decrease chart speed; press **↑** to increase chart speed.
3. When it's set at the desired level, press **EXIT**.

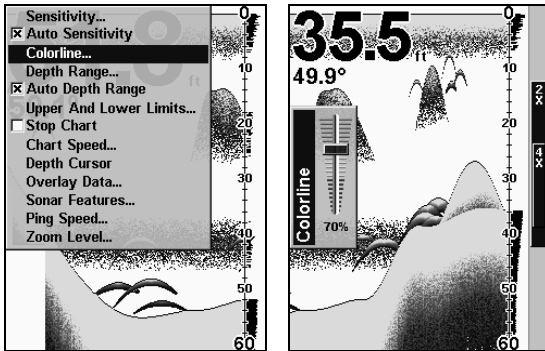
ColorLine™

ColorLine lets you distinguish between strong and weak echoes. It "paints" a brighter color on targets that are stronger than a preset value. This allows you to tell the difference between a hard and soft bottom. For example, a soft, muddy or weedy bottom returns a weaker signal which is shown with a narrow, colored line (dark blue tinged with red or a little yellow.) Since fish are among the weakest echoes,

they show up mostly as blue arches. A hard bottom or other relatively hard target returns a strong signal which causes a wider brightly colored line (reddish yellow to bright yellow.)

If you have two signals of equal size, one with red to yellow color and the other without, then the target with brighter color (yellow) is the stronger signal. This helps distinguish weeds from trees on the bottom, or fish from structure.

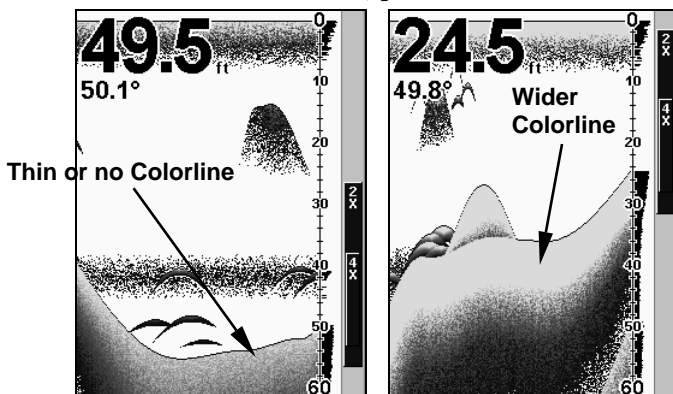
ColorLine is adjustable. Experiment with your unit to find the ColorLine setting that's best for you.



At left, Sonar Page menu with ColorLine command selected.
At right, the ColorLine control bar.

To adjust the ColorLine level:

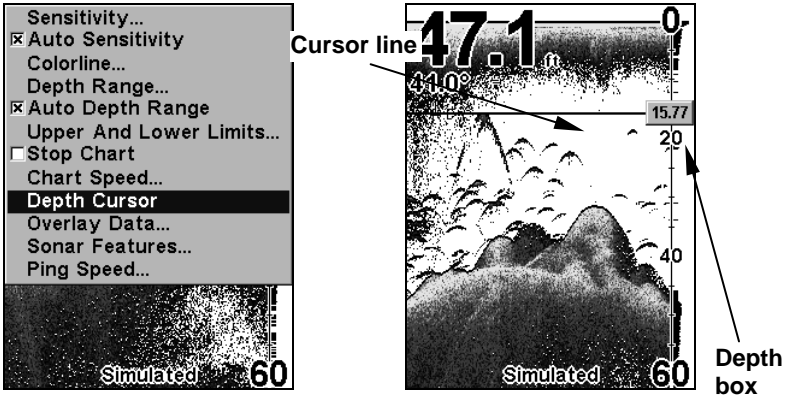
1. From the Sonar Page, press **MENU** | **↓** to **COLORLINE** | **ENT**.
2. The ColorLine Control Bar appears. Press **↓** to decrease ColorLine; press **↑** to increase Colorline.
3. When it's set at the desired level, press **EXIT**.



At left, little Colorline indicates a soft bottom, probably sand or mud.
At right, the wider Colorline indicates a harder, rocky bottom.

Depth Cursor

The depth cursor consists of a horizontal line with a digital depth box on the right side. The numbers inside the box show the depth of the cursor.



At left, Sonar Page menu with Depth Cursor command selected. At right, sonar chart with the depth cursor active. The line indicates the large fish is 15.77 feet deep.

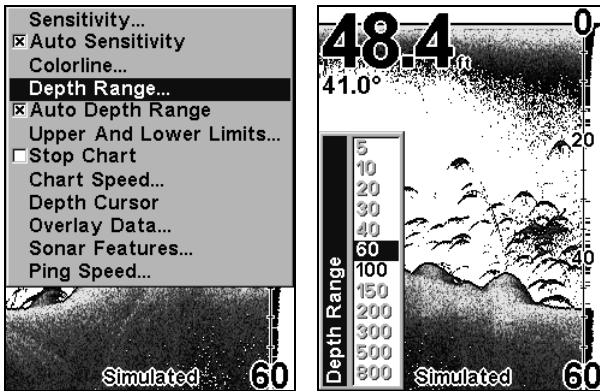
The cursor can be moved to any location on the screen, letting you pinpoint the depth of a target.

1. From the Sonar Page, press **MENU** | ↓ to **DEPTH CURSOR** | **ENT**.
2. The depth cursor appears. Press ↓ to lower the cursor line; press ↑ to raise the cursor line.
3. To clear the depth cursor, press **EXIT**.

Depth Range - Automatic

When turned on for the first time, the bottom signal is automatically placed in the lower half of the screen. This is called Auto Ranging and is part of the automatic function. However, depending upon the bottom depth and the current range, you can change the range to a different depth. To do this:

1. From the Sonar Page, press **MENU** | ↓ to **DEPTH RANGE** | **ENT**.



At left, Sonar Page menu with Depth Range command selected. At right, the Depth Range Control Scale.

2. The Depth Range Control Scale appears. Press \uparrow or \downarrow to select a different depth range. A dark bar highlights the selected range. Range numbers in gray cannot be selected.
3. When the new range is selected, press **EXIT** to clear the menu.

Depth Range - Manual

You have complete control over the range when the unit is in the manual mode. There are 12 depth ranges, from 5 feet to 800 feet.

To switch to Manual Depth Range:

1. First, turn off automatic depth range. From the Sonar Page, press **MENU** | \downarrow to **AUTO DEPTH RANGE** | **ENT**.
2. Press \uparrow to **DEPTH RANGE** | **ENT** and the Depth Range Control Scale appears.
3. Press \downarrow or \uparrow to select a different depth range. A horizontal dark bar highlights the selected range.
4. When the new range is selected, press **EXIT** to clear the menu.

To turn Auto Depth Range on again:

1. From the Sonar Page, press **MENU** | \downarrow to **AUTO DEPTH RANGE** | **ENT** | **EXIT**.

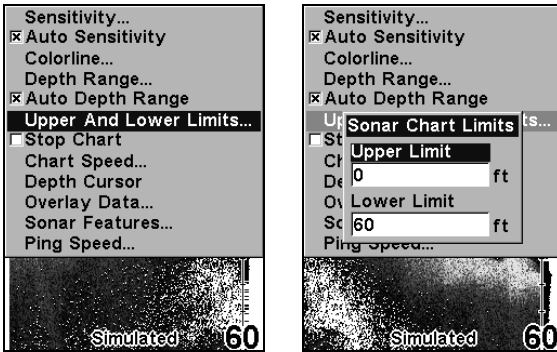
NOTE:

The sonar's depth capability depends on the transducer installation, water and bottom conditions, and other factors.

Depth Range - Upper and Lower Limits

Virtually any segment of the water column can be displayed by using the upper and lower limit feature. This lets you pick the shallow and deep depth range limits that are shown on the screen, provided there is at least 5 feet between the upper and lower limit you select. For example, a range from 12 feet to 34 feet could be used.

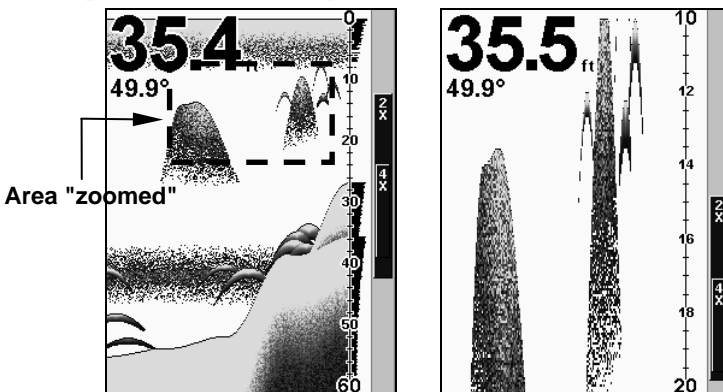
Changing the upper and lower limits gives you far greater control over the depth range. This feature lets you "zoom in" the display in almost unlimited combinations. Nearly any segment of the water column, from the surface to the bottom can be shown. This enlarges the sonar targets to best suit your fishing needs and water conditions.



At left, Sonar Page Menu with Upper and Lower Limits command selected. At right, Sonar Chart Limits menu, with Upper Limit selected.

To change the upper and lower limits:

1. From the Sonar Page, press **MENU** | **↓** to **UPPER AND LOWER LIMITS** | **ENT**. The Sonar Chart Limits menu appears, with Upper Limit selected.
2. To set the upper limit, press **ENT**. Press **↑** or **↓** until the first digit is correct, then **→** to move to the second digit. Repeat until the depth is correct, then press **EXIT**.
3. To set the lower limit, press **↓** to **LOWER LIMIT** | **ENT**. Press **↑** or **↓** until the first digit is correct, then **→** to move to the second digit. Repeat until the depth is correct, then press **EXIT** | **EXIT** | **EXIT**.



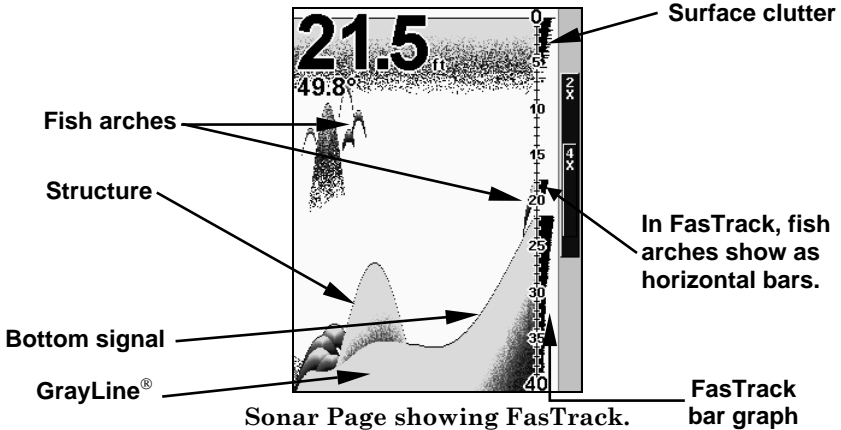
Normal display, in auto depth range mode, left. At right, display "zoomed" with Upper and Lower Limits focusing on the portion of the water column from 10 feet to 20 feet deep.

To turn off upper and lower limits:

1. From the Sonar Page, press **MENU** | ↓ to **AUTO DEPTH RANGE** | **ENT** | **EXIT**.

FasTrack™

This feature automatically converts all echoes to short horizontal lines on the display's far right side. The graph on the rest of the screen continues to operate normally. FasTrack gives you a rapid update of conditions directly under the boat. This makes it useful for ice fishing, or when you're fishing at anchor. When the boat is not moving, fish signals are long, drawn out lines on a normal chart display. FasTrack converts the graph to a vertical bar graph that, with practice, makes a useful addition to fishing at a stationary location.



Fish I.D.™ (Fish Symbols & Depths)

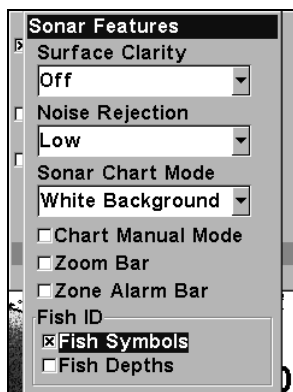
The Fish I.D. feature identifies targets that meet certain conditions as fish. The microcomputer analyzes all echoes and eliminates surface clutter, thermoclines, and other signals that are undesirable. In most instances, remaining targets are fish. The Fish I.D. feature displays fish symbols on the screen in place of the actual fish echoes.

There are several fish symbol sizes. These are used to designate the relative size between targets. In other words, Fish I.D. displays a small fish symbol when it thinks a target is a small fish, a medium fish symbol on a larger target and so on.

The sonar's microcomputer is sophisticated, but it can be fooled. It can't distinguish between fish and other suspended objects such as trotlines, turtles, submerged floats, air bubbles, etc. Individual tree limbs extending outwards from a group of limbs is the hardest object for the Fish I.D. feature to distinguish from fish.

You may see fish symbols on the screen when actually, there are no fish. The reverse is also true.

Does that mean Fish I.D. is broken? No — the feature is simply interpreting sonar returns in a specific way to help take some of the work out of reading the screen. Remember: Fish I.D. is one of the many tools we provide so you can analyze your sonar returns for maximum fish finding information. This and other features can help you successfully "see" beneath the boat under varied water and fishing conditions. So, practice with the unit in both the Fish I.D. mode and without to become more familiar with the feature. The default for Fish I.D. is off.



Sonar Features menu with Fish I.D. Symbols selected.
When the check box to the left is checked, the feature is on.

To turn the Fish I.D. feature on:

1. From the Sonar Page, press **MENU** | **↓** to **SONAR FEATURES** | **ENT**.
2. Press **↓** to **FISH ID SYMBOLS** | **ENT** | **EXIT** | **EXIT**.

To turn off Fish I.D., repeat these instructions.

FishTrack™

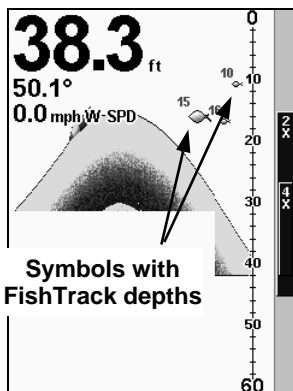
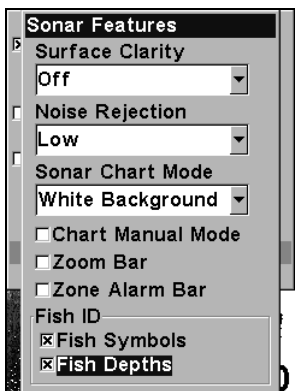
The FishTrack feature shows the depth of a fish symbol when it appears on the display. This lets you accurately gauge the depth of targets. This feature is available only when the Fish I.D. feature is on. The default setting for FishTrack is off.

To turn on FishTrack:

(**Note:** These instructions will turn on FishTrack *and* Fish I.D. at the same time.)

1. From the Sonar Page, press **MENU** | **↓** to **SONAR FEATURES** | **ENT**.
2. Press **↓** to **FISH ID DEPTHS** | **ENT** | **EXIT** | **EXIT**.

To turn off FishTrack, repeat these instructions. Turning off FishTrack in this manner will not turn off Fish I.D. symbols.



Sonar Features menu with Fish I.D. Depths selected. When the check box to the left is checked, the feature is on. At right, Sonar Page showing Fish I.D. symbols and FishTrack depths turned on.

HyperScroll™

See the entry on Ping Speed, which controls the HyperScroll feature.

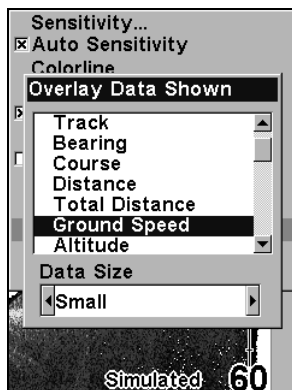
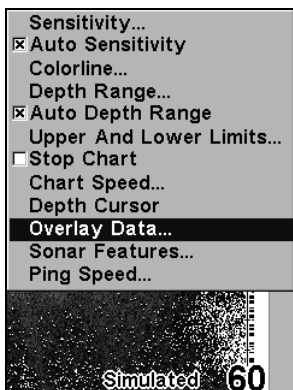
Noise Rejection

See the entry on Advanced Signal Processing in this section.

Overlay Data

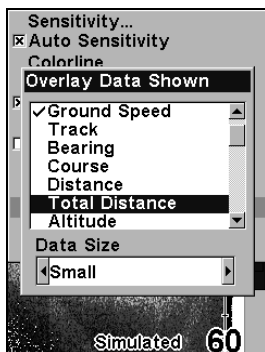
To change the digital data shown on top of the sonar page:

1. Press **MENU** | **↓** to **OVERLAY DATA** | **ENT**.
2. Press **↓** or **↑** to select *Data Type* | **ENT**.



Overlay Data command on the Sonar Menu, at left. Overlay Data Shown selection menu, right. In this example, we scrolled down the data list to highlight "Ground Speed."

When selected, a check mark appears beside the data type. (If you wish, you may now use **↓** or **↑** to select other Data Types for display.)



Data list showing "Ground Speed" turned on to display on Sonar Page.

3. To return to the previous page, press **EXIT | EXIT**.

To turn off displayed data:

1. Press **MENU | ↓** to **OVERLAY DATA | ENT**.

2. Press **↓** or **↑** to select *Data Type*, then press **ENT** until the check mark to the left of the selected data type disappears. (If you wish, you may now use **↓** or **↑** to select other Data Types to turn off.)

3. To return to the previous page, press **EXIT | EXIT**.

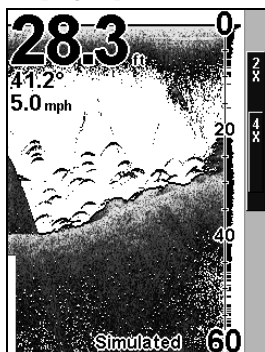
To change displayed data font size:

1. Press **MENU | ↓** to **OVERLAY DATA | ENT**.

2. Press **↑** or **↓** to select *Data Type*. The **DATA SIZE** (displayed in the bottom of the Overlay Data Shown window) can be changed using **←** or **→**. When the size is right, press **EXIT**.

The selected data type will be displayed in the new size. (To change the font size for another Data Type, press **ENT** and repeat these steps, beginning with step two above.)

3. To return to the previous page, press **EXIT**.



Sonar chart with Overlay Data turned on. This example shows Depth, Water Temperature and the Ground Speed of the boat.

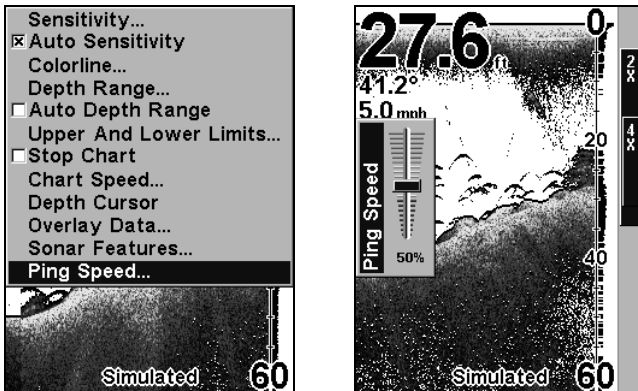
Ping Speed & HyperScroll™

Ping Speed controls the rate at which the transmitter and transducer broadcast sonar sound waves — pings — into the water. The unit has a default ping speed of 50 percent. At normal boating speeds, this automatically provides enough return echoes to refresh the screen and scroll the chart at maximum chart speed.

However, when you are running at high speeds, or just want the fastest possible screen update, you may want to use the HyperScroll™ feature. When you change the Ping Speed to any setting greater than 50 percent, the unit automatically enters HyperScroll mode.

These faster ping rates allow you to maintain a high-detail picture on the screen, and the screen refresh rate and chart scroll speed can keep pace with the boat as it moves quickly over the bottom terrain.

When using HyperScroll, you may also need to manually decrease the sensitivity for optimum performance. Depending on water depth and other conditions, HyperScroll may cause a second bottom echo to return to the transducer during the next ping cycle, or sounding. This can result in a large amount of clutter appearing on the screen. If this occurs, just decrease the sensitivity to a level that eliminates the clutter. When you turn HyperScroll off, you can return to your original sensitivity level.



At left, Sonar Menu with Ping Speed command selected.
Ping Speed Control Bar, right, at default setting.

To change Ping Speed:

1. From the Sonar Page, press **MENU** | ↓ to **PING SPEED** | **ENT**.
2. The Ping Speed Control Bar appears. Press ↑ to increase ping speed; press ↓ to decrease ping speed. When it's set at the desired level, press **EXIT**.

To adjust Sensitivity:

1. From the Sonar Page, press **MENU | ENT**.
2. The Sensitivity Control Bar appears. Press **↓** to decrease sensitivity; press **↑** to increase sensitivity. When it's set at the desired level, press **EXIT**. (When you reach the maximum or minimum limit, a tone sounds.)

To turn off HyperScroll:

1. From the Sonar Page, press **MENU | ↓** to **PING SPEED | ENT**.
2. The Ping Speed Control Bar appears. Press **↓** to decrease ping speed to 50 percent. When it's set at the desired level, press **EXIT**.

When you boost ping speed and switch into HyperScroll, the width of the FasTrack bar graph display doubles in width at the right side of the screen. This allows you to better see the virtually instantaneous sonar returns, just as you would on a flasher sonar unit. For more information on FasTrack, see its entry in this section.

Reset Options

This command is used to reset all features, options and settings to their original factory defaults. This is useful when you have changed several settings and want to return the unit to basic automatic operation.

1. Press **MENU | MENU | ↓** to **SYSTEM SETUP | ENT | ↓** to **RESET OPTIONS | ENT**.
2. Press **↑** or **↓** to **Yes | ENT**.
3. All the menus are cleared and all options are returned to the factory settings.



System Menu with Reset Options command selected.

Sensitivity & Auto Sensitivity

The sensitivity controls the ability of the unit to pick up echoes. Sensitivity can be adjusted, because water conditions vary greatly. A low sensitivity level (from zero to 50 percent) excludes much of the bottom information, fish signals, and other target information.

Boosting sensitivity will show more information on your screen, which may cause clutter. Reducing sensitivity will filter out some information, but could omit important images. We recommend adjusting sensitivity until the background is lightly "peppered" — that is, scattered dots appear, but individual objects (like fish arches or bottom structure) can be easily picked out of the background.

Automatic Sensitivity

The default sensitivity mode is automatic. The unit bases the sensitivity level on water depth and conditions. When the unit is in the automatic mode, sensitivity is automatically adjusted to keep a solid bottom signal displayed, plus a little more power. This gives it the capability to show fish and other detail.

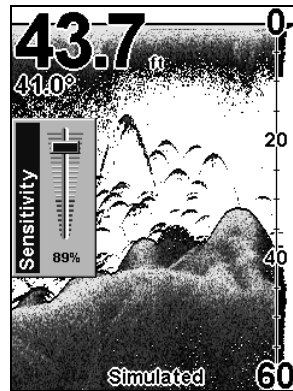
However, situations occur when it becomes necessary to increase or decrease the sensitivity. This typically happens when you wish to see more detail, so an increase in sensitivity is indicated. Or, wave action and boat wakes can create enough tiny air bubbles to clutter much of the water column. In that case, a decrease in sensitivity is indicated to reduce some of the clutter.

The control bar used to adjust sensitivity up or down is the same whether the unit is in the automatic or manual mode. In automatic you can adjust sensitivity up to 100 percent but the unit will limit your *minimum* setting. In auto, the unit will continue to make small adjustments, allowing for the setting you selected.

In manual mode, you have *complete* control over sensitivity, with the ability to set it anywhere from zero to 100 percent. Once you select a level in manual, the unit will continue to use that exact sensitivity setting until you change it or revert to auto mode.

To adjust sensitivity in auto mode:

1. Press **MENU | ENT**.
2. The Sensitivity Control Bar appears. Press ↓ to decrease sensitivity; press ↑ to increase sensitivity. When it's set at the desired level, press **EXIT**. (When you reach the maximum or minimum limit, a tone sounds.)



At left, Sonar Menu with Sensitivity command selected. At right, the Sensitivity Control Bar.

To adjust sensitivity in manual mode:

1. First, turn off Auto Sensitivity: from the Sonar Page, press **MENU** | ↓ to **AUTO SENSITIVITY** | **ENT**.
2. Press ↑ to **SENSITIVITY** | **ENT** and the Sensitivity Control Bar appears. Press ↓ or ↑ to pick a different sensitivity setting. When it's set at the desired level, press **EXIT**.

To turn Auto Sensitivity back on:

From the Sonar Page, press **MENU** | ↓ to **AUTO SENSITIVITY** | **ENT** | **EXIT**.

NOTE:

To return to the original factory setting for Auto Sensitivity, see the entry in this section on Reset Options. If sensitivity is in manual mode, the Reset Options command will switch back to Auto and reset the factory setting at the same time.

Tip:

For quicker sensitivity adjustments, try leaving the Sensitivity Control Bar on the screen as the chart scrolls. You can see the changes on the screen as you press the up or down arrows. This is handy when there's a lot of clutter in the water, and you are matching the sensitivity to rapidly changing water conditions.

Set Keel Offset

This unit measures water depth from the face of the transducer. Since the transducer is installed below the water surface, the distance displayed by the digital depth, chart depth scale, chart cursor or fish symbols is *not* the exact water depth. If the transducer is 1 foot below the surface, and the screen shows the water depth as 30 feet, then the actual depth is 31 feet.

On sailboats or other large vessels with deep drafts, the distance between the transducer installation and the keel or lower engine unit can be several feet. In those cases, an inexact depth reading could result in grounding or striking underwater structure. The Keel Offset feature eliminates the need for the navigator to mentally calculate how much water is under his keel.

Keel Offset lets you calibrate the digital depth indicators: chart depth scale, chart cursor depth and fish symbol depth displayed on the screen. To calibrate the depth indicators, first measure the distance from the face of the transducer to the lowest part of the boat. In this example, we will use 3.5 feet. We enter this as a *negative* 3.5 feet, which makes the depth indicators perform as if the transducer's lower in the water than it really is.

1. Press **MENU | MENU | ↓** to **SONAR SETUP | ↓** to **SET KEEL OFFSET | ENT**.
2. The Keel Offset dialog box appears. Press **↓** to so that the displayed number shows a minus (–) sign instead of the plus (+) sign.
3. Press **↓** until the number shows – 3.5, then press **EXIT**. The depth indicators now accurately show the depth of water beneath the keel.

NOTE:

If knowing the exact depth of water beneath the keel is less important, you can calibrate the depth indicators so that they show the actual water depth from surface to bottom. To do this, first measure the distance from the face of the transducer up to the surface (the water line on the boat). In this example, we will use 1.5 feet. This will be entered as a *positive* 1.5 feet, which makes the depth indicators perform as if the transducer's higher in the water than it really is.

1. Press **MENU | MENU | ↓** to **SET KEEL OFFSET | ENT**.
2. The Keel Offset dialog box appears with a plus (+) sign at the front of the box.
3. Press **↑** until the displayed number is + 1.5, then press **EXIT**. The depth indicators now accurately show the water depth from surface to bottom.

Sonar Color Mode

The default color scheme for the sonar chart is white background, but we offer other variations to suit your viewing preferences. You can select the chart to be displayed in grayscale, blue background, reverse grayscale, bottom black or IceView mode. (For more information on IceView, see the entry on that topic Sec. 5.)

To change the chart mode color scheme:

1. From the Sonar Page, press **MENU | ↓** to **SONAR FEATURES | ENT**.

2. Press ↓ to **SONAR CHART MODE** | **ENT**.
3. Press ↓ or ↑ to *Mode Name* | **ENT**.
4. Press **EXIT** | **EXIT** to return to the Sonar Page.

Sonar Page & Sonar Chart Display Options

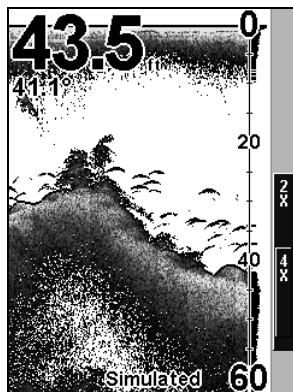
The M68 offers four Sonar chart display options. To choose among them, press **EXIT** to clear any menus, then press **PAGES** and use the arrow keys to select the desired mode.

Full Sonar Chart

This is the default mode used when the Sonar is turned on for the first time or when it's reset to the factory defaults.

The bottom signal scrolls across the screen from right to left. Depth scales on the right side of the screen aid in determining the depth of targets. The line at the top of the screen represents the surface. The bottom depth and surface temperature (if the unit is equipped with a temperature sensor or a transducer with a temp sensor built in) show at the top left corner of the screen.

The FasTrack™ display shows just to the right of the scale. This changes all echoes into short horizontal bars, replicating a flasher sonar. The zoom bar on the far right shows the area that's zoomed when the zoom is in use. (See the Zoom section for more information.)

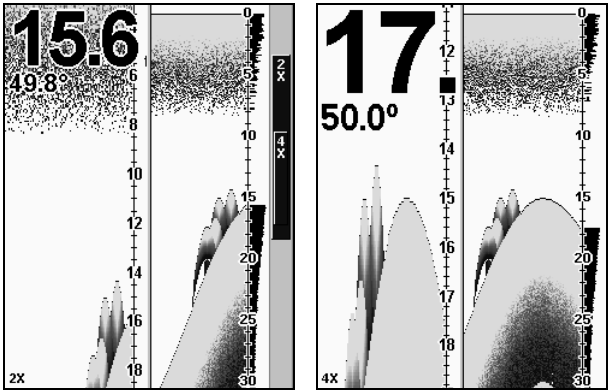


Full Sonar Chart. The Overlay Data (depth and water temperature) are each set to a different text size.

Split Zoom Sonar Chart

A split chart shows the underwater world from the surface to the bottom on the right side of the screen. The left side shows an enlarged version of the right side.

The zoom range shows at the bottom left corner of the screen.



Split Zoom Sonar Chart. Image at left shows the left window zoomed to 2X. The right image shows the left window zoomed to 4X.

The depth overlay data is set to the default large text size; the water temperature is set to the medium text size.

Digital Data/Chart

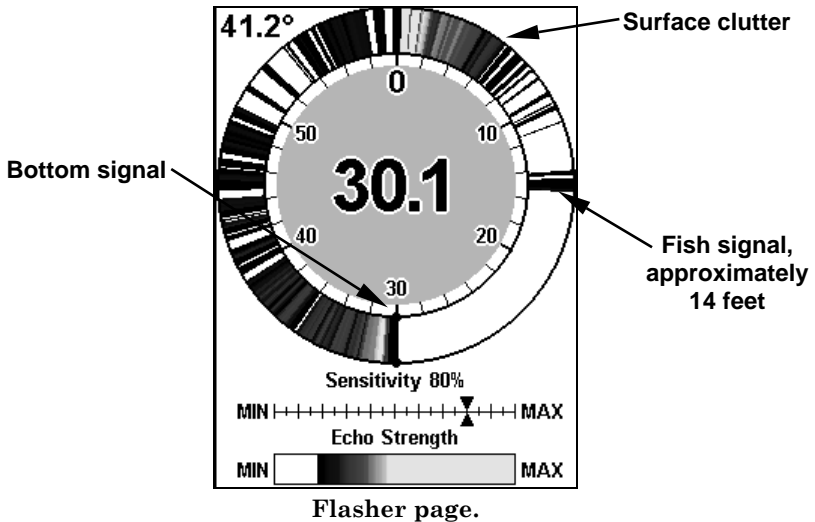
This mode shows seven digital data boxes or windows containing (by default): Water Depth; Water Temp; Temp 2; Track; Distance to Destination; Speed; and the unit's Voltage.

Depth	
48.5 ft	
W Temp	Voltage
41.0 °F	14.7 V
Temp 2	Speed
--. °F	5.0 mph
Track	Distance
285° mag	8.72 mi

Digital Data/Chart

Flasher

The Flasher page represents a flasher style sonar. A circular dial shows all returning echoes at a high screen refresh rate. It uses the ColorLine feature to show weaker targets as lighter colors. The bottom depth is also shown as a black bar across the outer circle.



Sonar Simulator

This unit has a built-in simulator that lets you run it as if you were on the water. All sonar features and functions are useable. When in simulator mode, you will see [Simulator Mode] in the Sonar Page title bar. To use the simulator:

1. From the Sonar Page, press **MENU|MENU|↓** to **SONAR SETUP|↓** to **SONAR SIMULATOR|ENT**.
2. Turn off Sonar Simulator by pressing **MENU|MENU|↓** to **SONAR SIMULATOR|ENT|EXIT**.

NOTE:

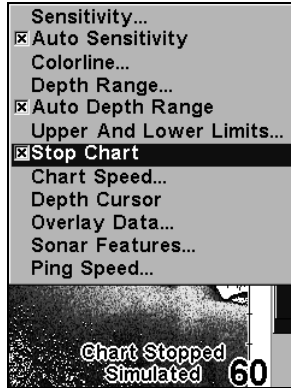
If you turn on your unit before attaching a transducer, it may enter a demo mode. The words "demo mode" in a pop-up box flash in the middle of the screen and a sonar chart plays much like the simulator. Unlike the simulator, the demo mode is for demonstration only, and will automatically stop as soon as you turn on the unit with a transducer attached. The simulator will continue to function normally.

Stop Chart

If you are running multiple units on a boat, there are times when you may want to turn off the sonar. This command turns off the sonar and stops the chart from scrolling. Sonar restarts automatically each time you turn on your unit.

Press **MENU|↓** to **STOP CHART|ENT|EXIT**.

To turn on sonar and start the chart scrolling again, repeat the above step.



Sonar Menu with Stop Chart command selected. The box is unchecked, indicating that the chart is scrolling across the screen.

Surface Clarity

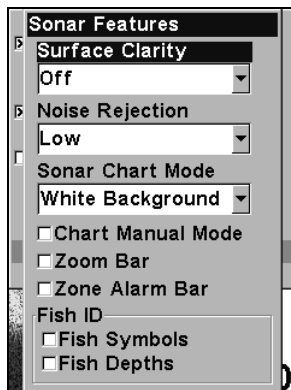
The markings extending downward from the zero line on the chart are called "surface clutter." These markings are caused by wave action, boat wakes, temperature inversion and more.

The surface clarity control reduces or eliminates surface clutter signals from the display. It does this by changing the sensitivity of the receiver, decreasing it near the surface and gradually increasing it as the depth increases.

There are three levels of surface clarity available: low, medium, or high. It can also be turned off. The default level is off.

To adjust the Surface Clarity level:

1. From the Sonar Page, press **MENU** | **↓** to **SONAR FEATURES** | **ENT** | **ENT**.



Sonar Features menu with Surface Clarity selected.

2. Press ↓ or ↑ to select *clarity level* | **EXIT** | **EXIT** | **EXIT**.

Upper and Lower Limits

See the entry in this section for Depth Range - Upper and Lower Limits

Zoom & Zoom Bar

"Zooming" the display is used to enlarge small detail, fish signals and the bottom with its associated structure.

The 2X zoom doubles the size of all echoes on the screen. The 4X zoom quadruples the size of the echoes. You can also turn on a zoom bar on the far right side of the screen; this shows which echoes will be displayed on the screen when the Zoom commands are used.

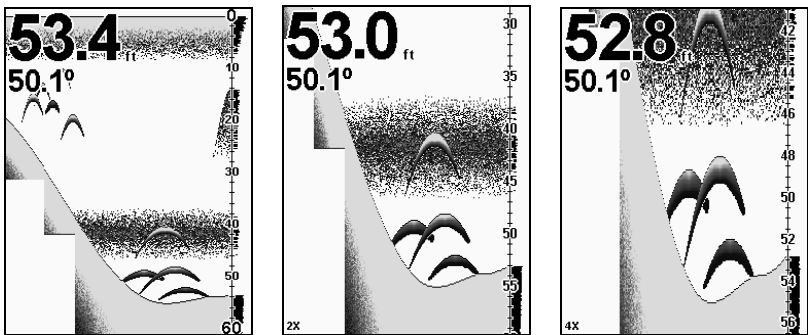
For example, turning on the 2X zoom will show all echoes that are between the top and bottom of the 2X zoom bar. The 4X zoom will show only the echoes between the top and bottom of the 4X zoom bar.

To switch the zoom:

1. Press **ZIN** to increase the zoom display to 2X. Press **ZIN** again for a 4X zoom.
2. Press **ZOUT** to reduce the zoom and show more of the chart.

To turn on the Zoom Bar:

1. Press **MENU** | ↓ to **SONAR FEATURES** | **ENT**.
2. The Sonar Features menu appears. Press ↓ to **ZOOM BAR** | **ENT** | **EXIT** | **EXIT**.
3. To turn off the Zoom Bar, repeat steps 1 and 2.



At left, Sonar Page, normal view. Center, same view zoomed to 2X. Right, same view zoomed to 4X

Zoom Pan

Your unit has the handy ability to quickly zoom in on any portion of the water column with just the touch of an arrow key. The Zoom Pan feature

lets you rapidly move the zoomed area up and down to different depths. By "pointing" your zoom at different portions of the chart as it scrolls, you can get a good, close-up look at structure or cover below you.

To use Zoom Pan, switch to a manual depth Range setting (see page 50) and turn on 2X or 4X Zoom. Then, simply press ↑ or ↓ to pan up and down the water column.

Section 5: Ice Fishing

The M68C and the M68C IceMachine™ work exactly alike. Each M68C unit contains a menu command that allows you to switch the sonar in and out of IceMachine mode. The only differences between the two packages are the accessories they are shipped with.

The IceMachine™ package includes the M68C sonar unit and the PPP-15 portable power pack. The PPP-15 includes a self-leveling ice fishing transducer, a rechargeable battery and charger, and a freeze-resistant carry bag that fits inside a typical 5-gallon plastic bucket.

The regular M68C package includes the Skimmer® transom-mount transducer with built-in temperature sensor. If you purchased a regular M68C package, you can buy the PPP-15 separately. If you purchased an IceMachine package, you can buy a Skimmer transducer separately with mounts for transom, trolling motor or portable suction-cup installations.

NOTE:

Your unit is capable of accepting as many as two temperature sensors during warm weather fishing. This is accomplished by using a Skimmer transducer with a built-in sensor for Temp 1 and an optional second sensor for Temp 2. The ice fishing transducer does not contain a temp sensor, so only one temperature reading can be displayed while ice fishing. This requires the purchase of the optional TS-2U temp sensor. This model has a fixed electronic address which designates it as the second of two sensors. To display this temperature correctly, from the Ice Flasher page, press **MENU** | ↓ to **OVERLAY DATA** | **ENT**. Then press ↓ to *Temperature 2* | **ENT**. Press **EXIT** | **EXIT** to clear the menus. For more information and figures showing sensor configurations, see the Speed and Temperature Sensor entry in Sec. 2, Installation.

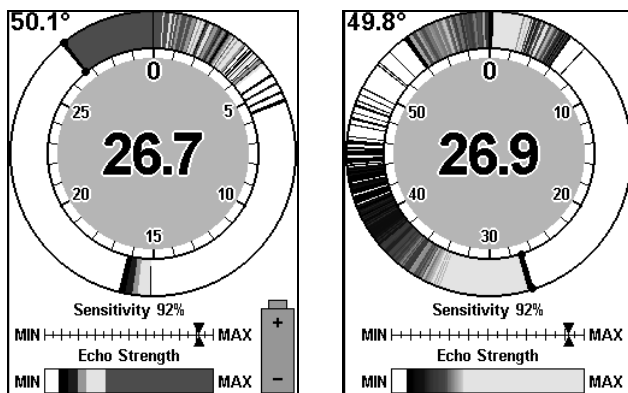
These accessory combinations and the unit's digital flashers and scrolling chart display make the M68C the most versatile ice fishing sonar/GPS unit in its class. Owning an M68C is like having a GPS and two fish finders rolled into one, because it's equally at home on a boat in summer or on the ice in winter.

This section covers the basic *ice fishing* functions. In addition to the instructions found here, be sure to read the PPP-15 instruction booklet, part number 988-0147-871. It will tell you how to set up the ice fishing power pack and mount the M68C.

Introduction to IceMachine Mode

Your unit has five pages that display sonar information. In addition to Full Sonar Chart, Split Zoom Sonar Chart, Digital Data and Flasher,

there is the Ice Flasher. This page is only visible in IceMachine Mode. You can tell at a glance which mode you are in because the battery gauge only appears in the lower right corner of the Ice Flasher page.



Ice Flasher page, left, and normal Flasher page, right.

The ice mode differs from normal mode in two ways. First, the unit changes how it filters incoming sonar echoes. This helps reduce some of the surface clutter that can be picked up from the zone where the water surface meets the bottom of the ice.

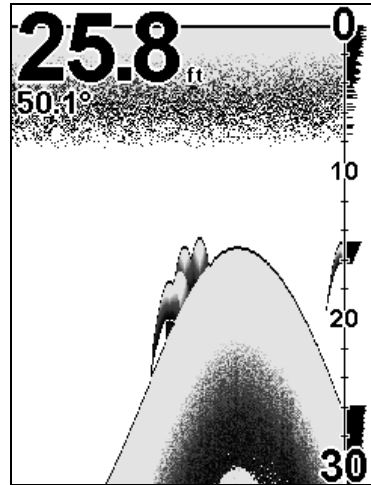
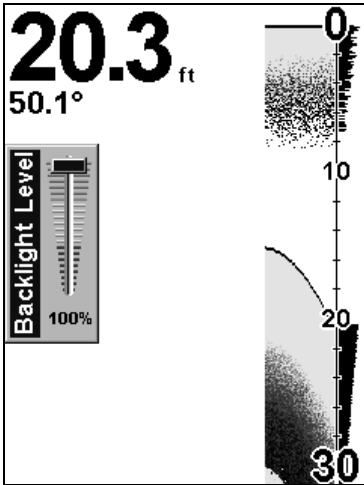
Second, the Ice Flasher defaults to a special IceView color mode with fewer, higher-contrast colors than normal mode. This simplified color scheme makes it easier to "see" and interpret a fish signal when it appears on the flasher screen.

The Split Zoom and Sonar Chart pages share the same settings. The chart pages, the Flasher and Ice Flasher pages each have their own independent controls for Sensitivity, ColorLine™ and sonar color mode. For example, if you make any Sensitivity changes to the sonar chart page, the sensitivity settings for the Flasher and Ice Flasher are unchanged. Each of these settings are saved when you turn the unit off, so you can keep your favorite settings for each operating mode.

Remember, no matter what changes you make to the various settings, you can always restore the factory defaults by using the Reset Options command, which is described in Sec. 4.

IceMachine Mode Operation

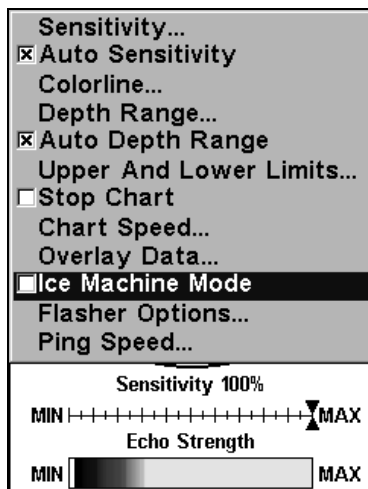
To turn on the M68C, press and release the **PWR** key. Just as in normal mode, the Backlight control will appear for five seconds and then automatically clear. You can adjust it with the ↓ and ↑ buttons, or clear it immediately by pressing the **EXIT** button.



At left, M68C IceMachine opening screen, showing the Full Sonar Chart Page. The Backlight Level control bar automatically disappears after five seconds. At right, the Full Sonar Chart is shown.

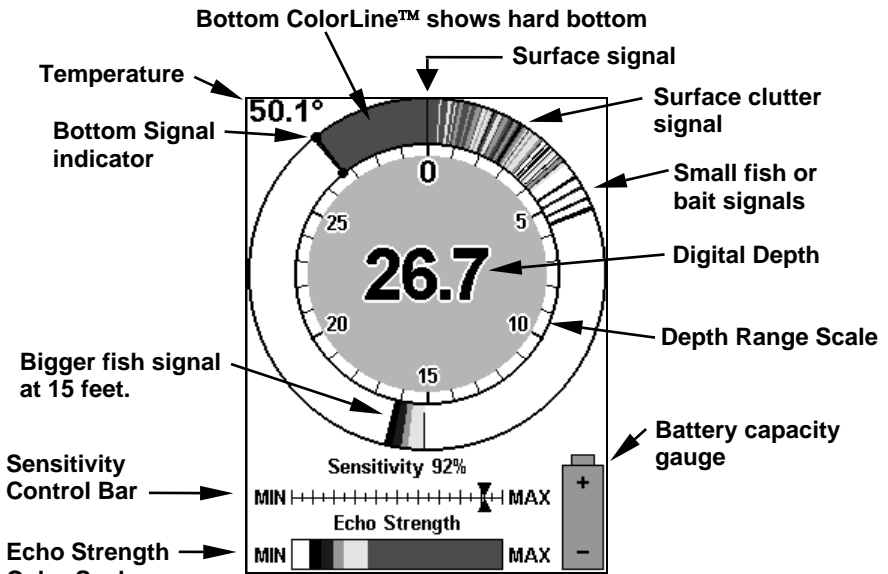
To enter the IceMachine mode:

1. From the Full Chart Sonar page, press **ENT | ENT | ENT** to switch to the normal Flasher page.
2. Press **MENU | ↓** to **ICEMACHINE MODE | ENT | EXIT** and the Ice Flasher appears. (To leave IceMachine mode and return to normal operation, just repeat step 2.)



Flasher Page Menu, with IceMachine Mode command highlighted but turned off (box not checked).

The following figure shows the various components of the Ice Flasher page display.



Ice Flasher page. Temp display requires optional TS-2U temp sensor.

Sensitivity

Sensitivity and Auto Sensitivity are described in detail in Sec. 4. To adjust sensitivity on the Flasher or Ice Flasher page, simply press \uparrow to increase sensitivity and press \downarrow to decrease sensitivity. The changes are displayed on the horizontal Sensitivity Control Bar. The Echo Strength Color Scale also changes as you adjust sensitivity.

Important:

Setting Sensitivity for Ice Fishing

The IceMachine's basic operation is pretty easy, right out of the box. If you're a sonar novice, try operating the unit with the automatic factory default settings until you get a feel for how it's working.

As you're learning the basics however, Sensitivity is the one important setting that you *should* adjust while ice fishing. We strongly recommend you try the following method for "tuning" your sensitivity to match the current water conditions. It will help you see your bait, cut through any clutter in the water and dramatically show fish when they move in to check your offering. As you learn to interpret the signals on the flasher screen, you'll be able to modify your presentation based on how fish react to your lure.

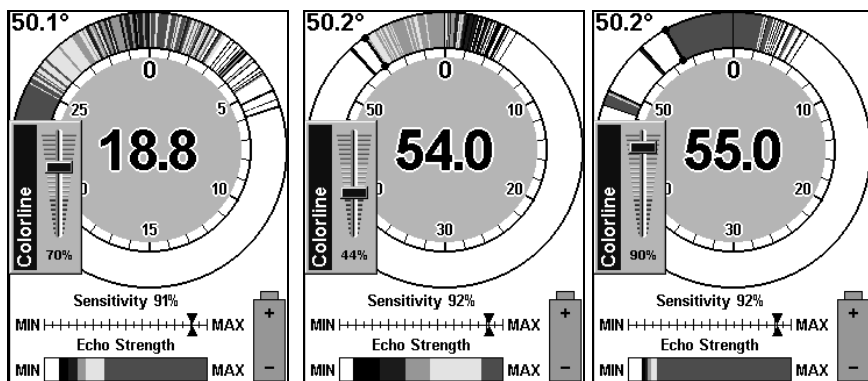
To adjust sensitivity:

1. Start with your IceMachine showing the Ice Flasher page, in the default IceView color mode.
2. Drop your lure five to 10 feet directly below the transducer. You should be able to follow the fall of the bait on the flasher screen.
2. Use the arrow keys to turn the sensitivity up or down until the lure is barely visible as a black or blue signal band on the screen.
3. Now fish at the desired depth. When a fish approaches the bait, its signal will stand out from the lure because it will be a moving signal that is wider and a brighter color than your lure.

ColorLine™

ColorLine is described in detail in Sec. 4. ColorLine changes will be reflected in the Echo Strength Color Scale. This scale considers both sensitivity and ColorLine and then shows you the relationship of signal strength to signal color. To adjust the ColorLine level:

1. From the Ice Flasher Page, press **MENU** | ↓ to **COLORLINE** | **ENT**.
2. The ColorLine Control Bar appears. Press ↓ to decrease ColorLine; press ↑ to increase ColorLine.
3. When it's set at the desired level, press **EXIT**.

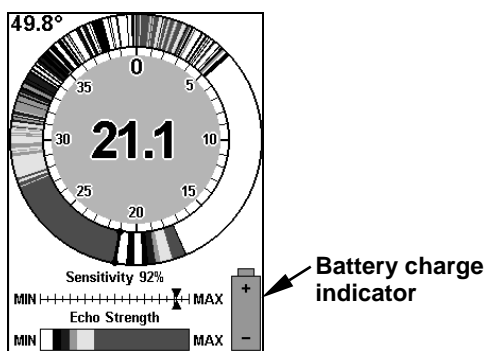


ColorLine distinguishes between weak and strong sonar signals by "painting" them with different colors. You can adjust ColorLine to suit your personal viewing tastes. The left figure shows the default ColorLine setting. The center figure shows a lower ColorLine setting and at right, a higher setting. These black and white illustrations don't show it, but the far left band on the Echo Strength scale is black, followed by blue, green, yellow and at the far right, red.

In the Ice Flasher, the weakest signals are shown in black and the strongest signals show as red. Fish are among the weakest echoes, so they show up mostly as black and blue bands on the flasher screen. The hardest surfaces, like the bottom, show as red. Cover in the form of weed beds or submerged timber display in the blue to yellow range.

Battery Gauge

The Ice Flasher has a battery gauge that shows the capacity of the rechargeable battery. When the battery is fully charged, the gauge is filled with green. As power is consumed, the fill level drops and turns to yellow (70 percent charged) and red (30 percent). When the gauge shows 0 percent, you should turn off the unit to save your settings, and then recharge the battery.



This battery gauge is solid green, indicating a full charge.

Sonar Signal Interpretation

When you monitor your flasher screen for signs of fish, there are three signal band characteristics to watch for: movement, color and thickness.

Signal band movement

In a stationary setting like ice fishing, the bottom, structure and cover will show on the flasher screen as stationary bands of color. Signals between the surface and the bottom that come and go or move up and down (even slightly) will be fish that have appeared inside the sonar signal cone.

Signal band color

The color of the signal bands correspond to both fish size and their position in the sonar signal cone. Black and blue signals tend to be smaller fish, or fish that are at the outside edge of the sonar cone. These smaller or more distant fish return weaker echoes.

Red signals are much larger fish, or fish that are in the center of the sonar cone, almost directly below the transducer. They return the strongest echoes.

Signals that are yellow and some other color result from mid-sized fish that are in a transition zone between the center and outer edges of the sonar cone. They represent medium-strong echoes.

As a fish moves through part of the signal cone, the signal may change from black to blue to green or yellow then back again. The signals may appear to move up slightly and then back down, even if the fish doesn't actually change depth. This is caused by the relative distance from the transducer to the fish as it passes by the transducer.

Signal band thickness

Simply put, smaller fish return smaller echoes that result in thinner and fainter signal bands. A thin signal can also indicate a fish located toward the outer edge of the signal cone. As fish size increases, the echoes grow stronger and the signal band grows wider. Signal width also increases as a fish approaches the center of the sonar cone.

Ice Flasher Options

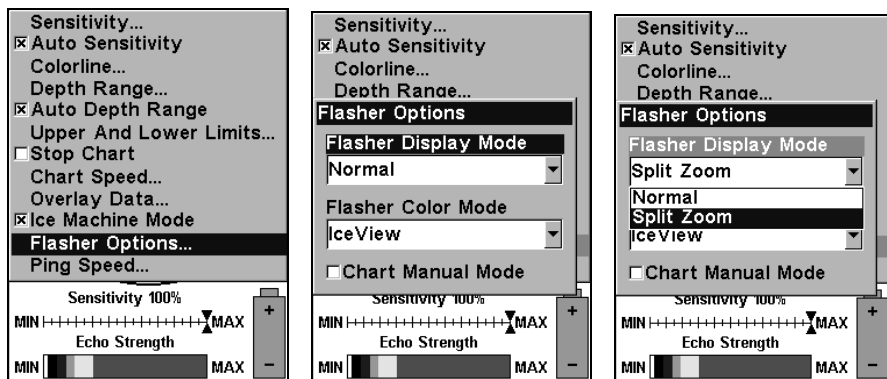
Split Zoom Display Mode

When ice fishing season arrives, you're often searching for fish that are hugging the warmer water at the bottom of the lake. When walleye or perch are holding right on the bottom, your M68C IceMachine can separate those fish from the bottom with a remarkable Split Zoom display mode.

In this mode, the right half of the flasher screen operates normally with the surface at the 12 o'clock position and the bottom of the depth range at the 6 o'clock position. The left half of the flasher zooms in on the six feet just above the bottom, with the bottom at the 6 o'clock position and 6 feet *above* the bottom at the 12 o'clock position.

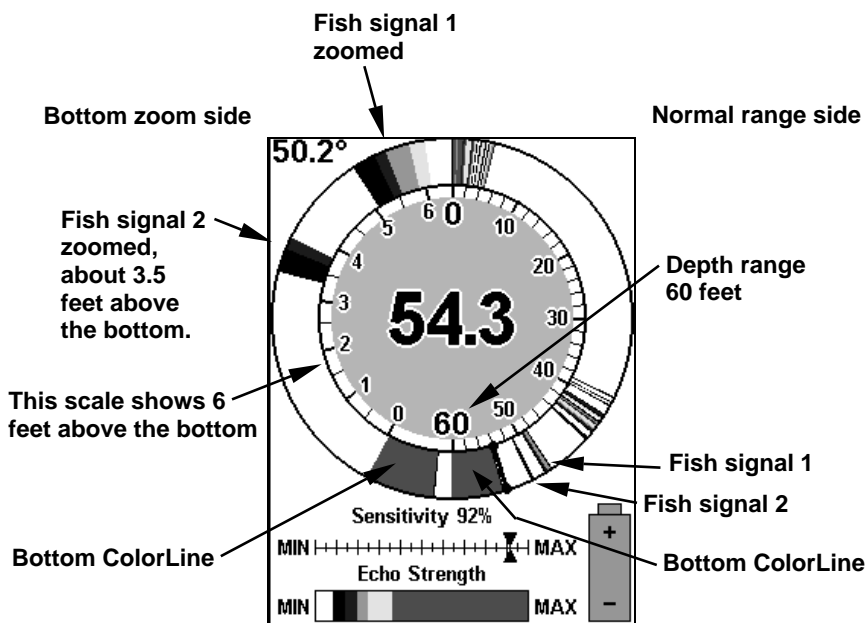
To switch to Split Zoom:

1. From a flasher page, press **MENU** | ↓ to **FLASHER OPTIONS** | **ENT**.
2. Press **ENT** | ↓ to **SPLIT ZOOM** | **ENT**.
3. Press **EXIT** | **EXIT** to return to the flasher page.
4. To return to normal mode, repeat these steps, but in step 2, select Normal instead of Split zoom



At left, Flasher Page Menu with Flasher Options command highlighted. Center, Flasher Options Menu with Flasher Display Mode selected. At right, the Split Zoom option has been selected.

The following figure show the bottom target separation possible using the flasher's Split Zoom.



Notice the bottom target separation with Split Zoom mode.

Color Modes

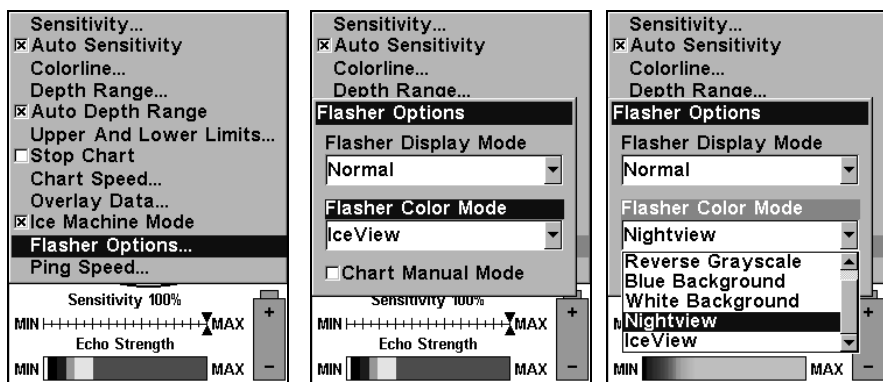
Sonar Color Mode is described in detail in Sec. 4. The ice fishing features have expanded the number of options and how the color modes are controlled while using either the Flasher or Ice Flasher.

There are six color mode options for the flasher pages, and seven for the sonar chart page. The Ice Flasher default color is the IceView mode, but other settings may suit your eyes better.

For example, some of our fishing friends favor the striking green-on-black contrast of the Nightview mode...they use it a lot, even in broad daylight! Experiment with the color modes to see which ones work best for you under various fishing and lighting conditions.

To change the Flasher or Ice Flasher page color scheme:

1. From a flasher page, press **MENU** | \downarrow to **FLASHER OPTIONS** | **ENT**.
2. Press \downarrow to **FLASHER COLOR MODE** | **ENT**.
3. Press \uparrow or \downarrow to *Mode Name* | **ENT**.
4. Press **EXIT** | **EXIT** to return to the flasher page.



At left, Ice Flasher menu with Flasher Options selected. Center, Flasher Options menu with Flasher Color Mode selected. At right, Nightview color option is selected.

Scouting Through the Ice

Since the 1960s, Lowrance flasher sonars have helped anglers hunt fish beneath the ice without drilling holes. That's because your IceMachine works as well through ice as it does through water!

This technique works best early in the winter fishing season, when ice is clear and free of bubble formation. There must also be wet, bubble-free contact between the transducer and the ice.

To shoot through solid ice, first brush away any snow from the spot you want to search. Then, pour a small amount of non-toxic recreational vehicle antifreeze onto the surface and place the transducer (face down) in the puddle.

Another variation used by some anglers requires a small plastic bag, such as a food storage bag. They fill the bag with a mixture of RV anti-freeze and water. The bag is placed on the ice surface, and the transducer is rested in the "puddle" just as your head rests on a pillow.

Section 6:

Sonar Troubleshooting

If your unit is not working, or if you need technical help, please use the following troubleshooting section before contacting the factory customer service department. It may save you the trouble of returning your unit for repair. For contact information, refer to the last page, just inside the back cover of this manual.

Unit won't turn on:

1. Check the power cable's connection at the unit. Also check the wiring.
2. Make sure the power cable is wired properly. The red wire connects to the positive battery terminal, black to negative or ground.
3. Check the fuse.
4. Measure the battery voltage at the unit's power connector. It should be at least 10 volts. If it isn't, the wiring to the unit is defective, the battery terminals or wiring on the terminals are corroded, or the battery needs charging.

Unit freezes, locks up, or operates erratically:

1. Electrical noise from the boat's motor, trolling motor, or an accessory may be interfering with the sonar unit. Rerouting the power and transducer cables away from other electrical wiring on the boat may help. Route the sonar unit's power cable directly to the battery instead of through a fuse block or ignition switch
2. Inspect the transducer cable for breaks, cuts, or pinched wires.
3. Check the transducer and power connector. Make sure it's securely plugged in to the unit.

Weak bottom echo, digital readings erratic, or no fish signals:

1. Make sure the transducer is pointing straight down. Clean the face of the transducer. Oil, dirt and fuel can cause a film to form on the transducer, reducing its effectiveness. If the transducer is mounted inside the hull, be sure it is shooting through only one layer of fiberglass and that it is securely bonded to the hull. When attaching a transducer to the inside of a hull, **ONLY** use the epoxy available from LEI (order information is inside the back cover). Do **NOT** use RTV silicone rubber adhesive or any other type of epoxy. The LEI epoxy is specially formulated so that it will cure properly for shoot-through applications.
2. Electrical noise from the boat's motor can interfere with the sonar. This causes the sonar to automatically increase its discrimination or noise rejection feature. This can cause the unit to eliminate weaker signals such as fish or even structure from the display.

3. The water may be deeper than the sonar's ability to find the bottom. If the sonar can't find the bottom signal while it's in the automatic mode, the digital sonar display will flash continuously. It may change the range to limits far greater than the water you are in. If this happens, place the unit in the manual mode, then change the range to a realistic one, (for example, 0-100 feet) and increase the sensitivity. As you move into shallower water, a bottom signal should appear.

4. Check the battery voltage. If the voltage drops, the unit's transmitter power also drops, reducing its ability to find the bottom or targets.

Bottom echo disappears at high speeds or erratic digital reading or weak bottom echo while boat is moving:

1. The transducer may be in turbulent water. It must be mounted in a smooth flow of water in order for the sonar to work at all boat speeds. Air bubbles in the water disrupt the sonar signals, interfering with its ability to find the bottom or other targets. The technical term for this is cavitation.

2. Electrical noise from the boat's motor can interfere with the sonar. This causes the sonar to automatically increase its discrimination or noise rejection feature. This can cause the unit to eliminate weaker signals such as fish or even structure from the display. Try using resistor spark plugs or routing the sonar unit's power and transducer cables away from other electrical wiring on the boat.

No fish arches when the Fish I.D. feature is off:

1. Make sure the transducer is pointing straight down. This is the most common problem if a partial arch is displayed.

2. The sensitivity may not be high enough. In order for the unit to display a fish arch, it has to be able to receive the fish's echo from the time it enters the cone until it leaves. If the sensitivity is not high enough, the unit shows the fish only when it is in the center of the cone.

3. Use the Zoom feature. It is much easier to display fish arches when zoomed in on a small range of water than a large one. For example, you will have much better luck seeing fish arches with a 30 to 60 foot range than a 0 to 60 foot range. This enlarges the targets, allowing the display to show much more detail.

4. The boat must be moving at a slow trolling speed to see fish arches. If the boat is motionless, fish stay in the cone, showing on the screen as straight horizontal lines.

NOISE

A major cause of sonar problems is electrical noise. This usually appears on the sonar's display as random patterns of dots or lines. In severe cases, it can completely cover the screen with black dots, or cause the unit to operate erratically, or not at all.

To eliminate or minimize the effects of electrical noise, first try to determine the cause. With the boat at rest in the water, the first thing you should do is turn all electrical equipment on the boat off. Make sure the engine is also off. Turn your sonar on, then turn off Noise Reject [also known as the ASP feature (Advanced Signal Processing)]. Sensitivity should be set at 90-95 percent. There should be a steady bottom signal on the display. Now turn on each piece of electrical equipment on the boat and view the effect on the sonar's display. For example, turn on the bilge pump and view the sonar display for noise. If no noise is present, turn the pump off, then turn on the VHF radio and transmit. Keep doing this until all electrical equipment has been turned on, their effect on the sonar display noted, then turned off.

If you find noise interference from an electrical instrument, trolling motor, pump, or radio, try to isolate the problem. You can usually reroute the sonar unit's power cable and transducer cable away from the wiring that is causing the interference. VHF radio antenna cables radiate noise when transmitting, so be sure to keep the sonar's wires away from it. You may need to route the sonar unit's power cable directly to the battery to isolate it from other wiring on the boat.

If no noise displays on the sonar unit from electrical equipment, then make sure everything except the sonar unit is turned off, then start the engine. Increase the RPM with the gearshift in neutral. If noise appears on the display, the problem could be one of three things; spark plugs, alternator, or tachometer wiring. Try using resistor spark plugs, alternator filters, or routing the sonar unit's power cable away from engine wiring. Again, routing the power cable directly to the battery helps eliminate noise problems. Make sure to use the in-line fuse supplied with the unit when wiring the power cable to the battery.

When no noise appears on the sonar unit after all of the above tests, then the noise source is probably cavitation. Many novices or persons with limited experience make hasty sonar installations which function perfectly in shallow water, or when the boat is at rest. In nearly all cases, the cause of the malfunction will be the location and/or angle of the transducer. The face of the transducer must be placed in a location that has a smooth flow of water at all boat speeds. Read your transducer owner's manual or the Installation instructions (Sec. 2) in this manual for the best mounting position.

Notes

Section 7: Basic GPS Operations

This section addresses the unit's *most basic* GPS operations. The tutorials presented in Sec. 7 follow a chronological order. Sec. 8, *Advanced GPS Operations*, will discuss other more advanced functions and utilities. Material in Sec. 8 is arranged in alphabetical order.

Before you turn on the M68 and find where you are, it's a good idea to learn about the different keys, the five GPS Page screens and how they all work together. BUT, if you just can't wait to get outside, turn to the one-page **Quick Reference** on page 91.

Keyboard



Lowrance M68, close-up of unit's keyboard.

1. **PWR** (Power) – The PWR key turns the unit on and off and activates the backlight.
2. **PAGES** – Pressing this and the arrow keys (4) switches the unit between the different GPS Page screens. (Satellites, Navigation, Position, Map with Sonar and Full Map.) Each page represents one of the unit's major operation modes.
3. **MENU** – Press this key to show the menus and submenus, which allow you to select a command or adjust a feature. This also accesses search functions for streets and intersections.

4. **ARROW KEYS** – These keys are used to navigate through the menus, make menu selections, move the map cursor and sonar chart cursor and enter data.

5. **ENT** (Enter) – This key allows you to save data, accept values or execute menu commands. It is also used to create event marker icons.

6. **EXIT** – The Exit key lets you return to the previous screen, clear data or erase a menu.

7. **WPT** – (Waypoint) The Waypoint key is used to save and recall waypoints, search for waypoints and access the waypoint list. It's also involved in some navigation functions.

8. **ZOUT** – (Zoom Out) – This key lets you zoom the screen out. On the Sonar Page, this key returns you to a full sonar chart display, showing the entire water column from surface to bottom. On the Full Map display, this lets you see a larger geographic area on the display. Less detail is seen as you zoom out.

9. **ZIN** – (Zoom In) – This key lets you zoom the screen in. On the Sonar Page, this key enlarges fish signals and bottom detail. On the Full Map display, zooming in lets you see greater detail in a smaller geographic area on the display.

Power/lights on and off

To turn on the unit, press **PWR**. As the unit powers up, the Full Map GPS Page is displayed first. (To switch to another page, press **PAGES** | ← or → to *Page Name* | ↑ or ↓ to *Display Mode* | **EXIT**.)

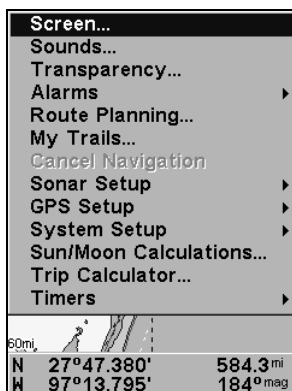
To turn on the backlight, press **PWR** again. The unit has three backlight levels to select from. Repeatedly pressing **PWR** will cycle through the backlight settings and turn off the backlight.

Turn off the unit by pressing and holding the **PWR** key for 3 seconds.

Main Menu

The M68 has a Main Menu, which contains some function commands and some setup option commands. The tutorial lessons in this section will deal only with functions, the basic commands that make the M68 do something. The unit will work fine for these lessons right out of the box with the factory default settings. But, if you want to learn about the various options, see Sec. 9, *System Setup and GPS Setup Options*.

You can access the Main Menu from any of the display options by pressing **MENU | MENU**. To clear the menu screen and return to the page display, press **EXIT**.



Main Menu.

The Main Menu commands and their functions are:

Screen command: changes the contrast or brightness of the display screen.

Sounds command: enables or disables the sounds for key strokes and alarms and sets the alarm style.

Alarms command: turns GPS or sonar alarms on or off and changes alarm thresholds.

Route Planning command: used to plan, view or navigate a route.

My Trails command: shows, hides, creates and deletes plot trails. Also used to navigate or backtrack a trail.

Cancel Navigation command: turns off the various navigation commands. Used to stop navigating after you have reached your destination waypoint, event marker icon or map cursor location; or after you reach the end of a route or trail.

Sonar Setup command: sets various sonar options.

GPS Setup command: sets various GPS receiver options.

System Setup command: sets general configuration options.

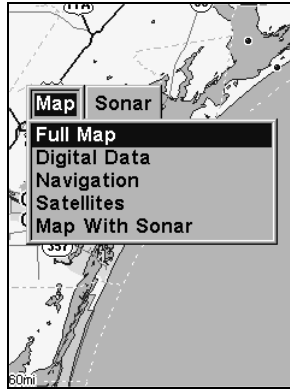
Sun/Moon Calculations command: finds the rising and setting time of the sun and the moon.

Trip Calculator command: shows trip status and statistics.

Timers command: controls the up timer, down timer and alarm clock settings.

Pages

The unit has two Pages that represent the two major operating modes. They are the Map Page and the Sonar Page. Each Page has several sub-set display options. They are accessed by pressing the **PAGES** key, then using \rightarrow or \leftarrow to select a Page, then \uparrow or \downarrow to select a display option. (Clear the Pages Menu by pressing **EXIT**.)



Pages Menu, showing some Map display options.

Sonar Page

The Sonar Page displays the sonar chart, a view of the water column from the surface to the bottom. The chart scrolls across the screen from right to left, displaying signal echoes that represent fish, structure and the bottom. The Sonar Page is discussed in detail in Sec. 3. To get to the Sonar Page: Press **PAGES** | \rightarrow to **SONAR** | **EXIT**.

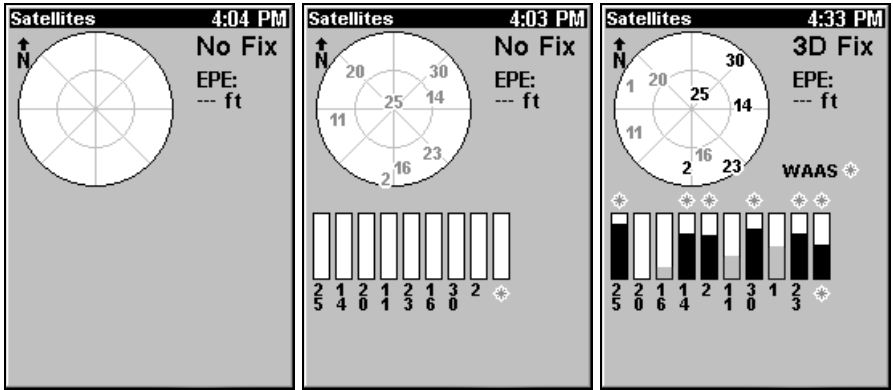
Satellite Status Page

The Satellite Status GPS Page, shown in the following images, provides detailed information on the status of the M68's satellite lock-on and position acquisition. To get to the Satellite Status Page: Press **PAGES** | \leftarrow to **MAP** | \uparrow or \downarrow to **SATELLITES** | **EXIT**.

No matter what Page display you are on, a flashing current position indicator/question mark symbol and flashing GPS data displays indicate that satellite lock has been lost and there is no position confirmed. The Satellite Status Page shows you the quality and accuracy of the current satellite lock-on and position calculation.

WARNING:

Do not begin navigating with this unit until the numbers have stopped flashing!



Satellite Page. Left view indicates unit has not locked on to any satellites and does not have a fix on its position. Center view shows satellites being scanned. Right view shows satellite lock-on with a 3D position acquired (latitude, longitude and altitude.)

This screen shows a graphical view of the satellites that are in view. Each satellite is shown on the circular chart relative to your position. The point in the center of the chart is directly overhead. The small inner ring represents 45° above the horizon and the large ring represents the horizon. North is at the top of the screen. You can use this to see which satellites are obstructed by obstacles in your immediate area if the unit is facing north.

The GPS receiver is tracking satellites those satellites whose numbers appear in light blue on the circular chart. The receiver hasn't locked onto a satellite if the number is dark blue, therefore it isn't being used to solve the position.

Beneath the circular graph are the bar graphs, one for each satellite in view. Since the unit has twelve channels, it can dedicate one channel per visible satellite. The taller the bar on the graph, the better the unit is receiving the signals from the satellite.

The "Estimated Position Error" (horizontal position error) shown in the upper right corner of the screen is the expected error from a benchmark location. In other words, if the EPE shows 50 feet, then the position shown by the unit is estimated to be within 50 feet of the actual location. This also gives you an indicator of the fix quality the unit currently has. The smaller the position error number, the better (and more accurate) the fix is. If the position error flashes dashes, then the unit hasn't locked onto the satellites, and the number shown isn't valid.

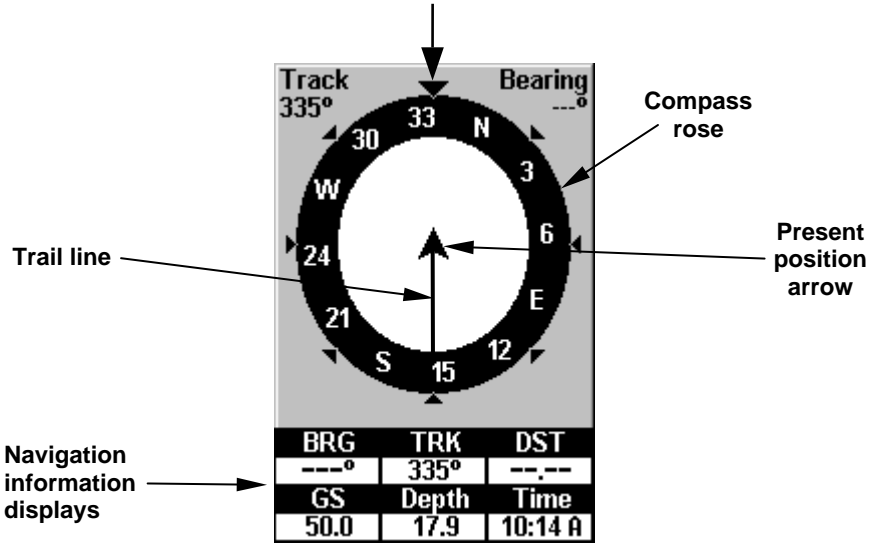
The Satellite Status Page has its own menu, which is used for setting various options. (Options and setup are discussed in Sec. 9.) To access the Satellite Status Page Menu, from the Status Page, press **MENU**.

Navigation Page

This screen has a compass rose that not only shows your direction of travel, but also the direction to a selected waypoint. To get to the Navigation Page: Press **PAGES** | ← to **MAP** | ↑ or ↓ to **NAVIGATION** | **EXIT**.

The navigation screen looks like the one below when you're *not* navigating to a waypoint or following a route or trail. Your position is shown by an arrow in the center of the screen. Your trail history, or path you've just taken, is depicted by the line extending from the arrow. The arrow pointing down at the top of the compass rose indicates the current track (direction of travel) you are taking.

Track or compass heading indicator, showing direction of travel



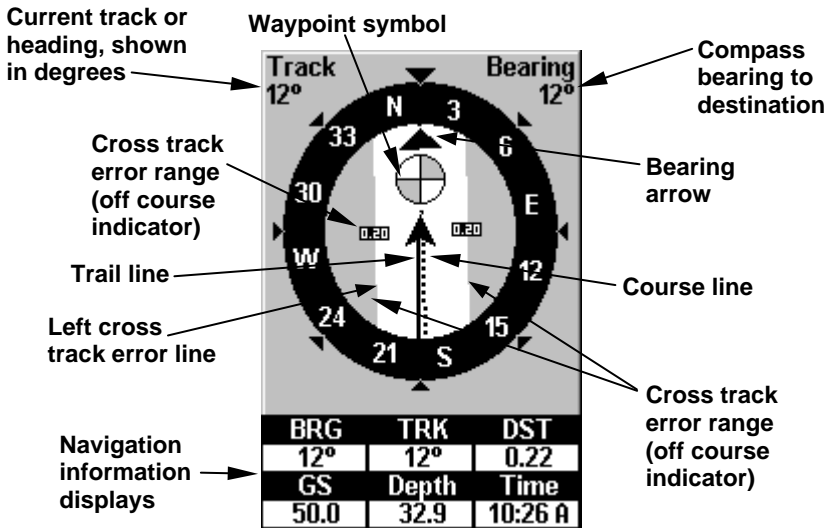
Navigation Page, recording a trail, traveling northwest. Page looks like this when the unit is not navigating to a waypoint, following a route, or backtracking a trail.

When navigating to a waypoint, the Navigation screen looks like the following figure. Your ground speed, track, distance and bearing to waypoint, and course are all shown digitally on this screen.

NOTE:

Remember, when the Speed, Track and Position information displays are flashing, satellite lock has not been achieved and no position fix has been determined. A question mark will also flash on the present position arrow in the center of the compass rose.

Speed (ground speed) is the velocity you are making over the ground. (If you wish, you can customize the Speed window to display Closing Speed instead. Closing Speed is also known as velocity made good. It's the speed that you're making toward the waypoint. For instructions, see the Customize Page Displays entry in Sec. 9.)



Navigation Page, backtracking a trail while creating a new trail.

Track is the heading, or the current direction you are actually traveling. Bearing is the direction of a line-of-sight from your present position to the destination. No matter what direction you are steering, the Bearing window shows the compass direction straight to the destination from your location at the moment. Distance shows how far it is to the waypoint you're navigating toward.

The Off Course window shows the current cross track error. This shows the distance you are off-course to the side of the desired course line. The course line is an imaginary line drawn from your position when you started navigating to the destination waypoint. The course line is shown on the Navigation Page screen (and the Map Page screen) as a red line.

The cross track error range is shown on the compass rose as a wide, white, corridor enclosing the course line. The outer edges of this white corridor represent lines that show the current cross track error range. The default for the cross track error range is 0.20 miles.

For example, if the present position symbol touches the right cross track error line, then you are 0.20 miles to the right of the desired course. You need to steer left to return to the desired course. You can use the **ZIN** or **ZOUT** keys to change the cross track error range.

A circular symbol depicting your destination (waypoint) appears on the screen as you approach the waypoint, as shown on the screen in the previous figure.

Travel Time is the time that it will take to reach your destination at your present closing speed. (You can also customize the time window to show Arrival Time instead. Arrival Time is the local time it will be when you arrive at the destination, based upon your present closing speed and track.)

In the previous example figure, the driver is headed north (a 12° track) toward a waypoint 12° (bearing) away. The cross track error range (white corridor) is 0.20 miles either side of the course. The driver is headed toward a waypoint which is 0.22 miles away.

The Navigation Page has its own menu, which is used for some advanced functions and for setting various options. (Options and setup are discussed in Sec. 9.) To access the Navigation Page Menu, from the Navigation Page, press **MENU**.

Full Map Page

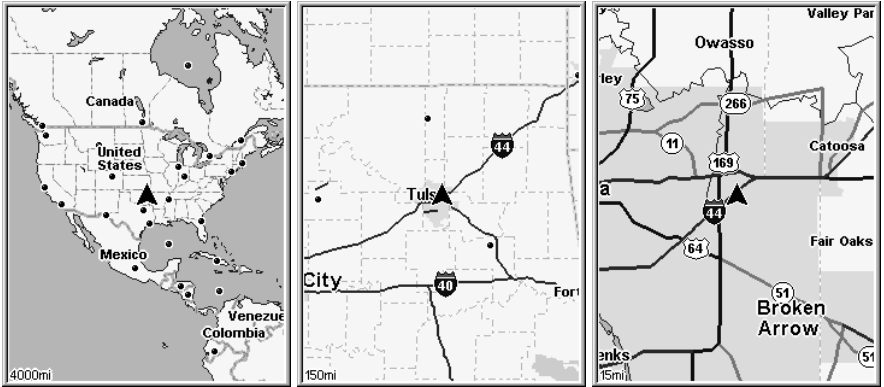
The Full Map screen shows your course and track from a "bird's-eye" view. By default, this unit shows the map with north always at the top of the screen. (This can be changed. See the topic *Map Orientation*, in Sec. 9.) If you're navigating to a waypoint, the map also shows your starting location, present position, course line and destination. You don't have to navigate to a waypoint, however, to use the map.

Full Map is the default screen that appears when you turn on the unit. To get to the Full Map from another page: Press **PAGES** | ← to **MAP** | **ENT**. When the Map Page is displayed, a screen similar to the following figures appears.

The arrow in the center of the screen is your present position. It points in the direction you're traveling. The magenta line extending from the back of the arrow is your plot trail, or path you've taken.

The map zoom range is the distance across the screen. This number shows in the lower left corner of the screen. In the first example figure below, the range is 4,000 miles from the left edge of the map to the right edge of the map.

The Zoom In and Zoom Out keys zoom the map to enlarge or reduce its coverage area and the amount of mapping detail shown. There are 39 available map zoom ranges, from 0.02 miles to 4,000 miles.



Far left, Map Page opening screen. Center, zoomed to 100 miles and right, zoomed to 15 miles.

The maximum zoom range for showing *additional* map detail is 20 miles. You can continue to zoom in closer, but the map will simply be enlarged without revealing more map content (except for a few major city streets).

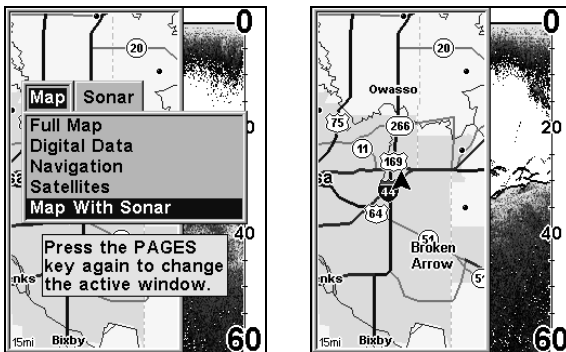
The background map includes: low-detail maps of the whole world (containing cities and political boundaries); and medium-detail maps of the United States.

The medium-detail U.S. maps contain: all incorporated cities; shaded metropolitan areas; county boundaries; some major city streets; Interstate, U.S. and state highways; lakes and streams; and more than 60,000 navigation aids and 10,000 wrecks and obstructions in U.S. coastal and Great Lakes waters

The Map Page has its own menu, which is used for several functions and for setting various options. To access the Map Page Menu, from the Map Page, press **MENU**.

The Pages Menu also offers several map display options under the Map Page category. To access them, press **PAGES** | ← or → to **MAP** | ↓ or ↑ to *Option name* | **EXIT**.

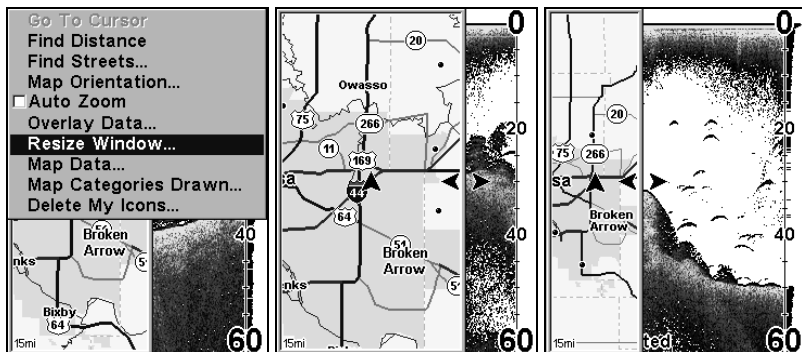
On the Map With Sonar page, that has two side-by-side windows, you can toggle back and forth between the two windows by pressing **PAGES** | **PAGES**. This allows you to change whether it's the Map or Sonar that the cursor, keyboard and menus operate on.



Pages Menu with Map With Sonar option selected, left.
Map With Sonar display, at right. The left map is active.

Resize Window is another extremely handy feature for pages that have two major windows. You can change the horizontal size of the windows to suit your viewing preference. Here's how:

1. From any two-window display, press **MENU** | \downarrow to **RESIZE WINDOW** | **ENT**.
2. Two flashing arrows appear along the centerline dividing the two windows. Press \leftarrow or \rightarrow to adjust the window widths. Press **EXIT** to clear the menu.
3. To change the window size again or revert back to the original display, just follow the steps above. (Most dual-window displays use half the screen for each window by default.) You can also use the Reset Options command to revert to the factory default.



At left, Map Menu with Resize Window command selected. Center, Resize Window command is active. At right, pressing the \leftarrow key moves the centerline to the left and enlarges the right window.

The following page contains a 12-step quick reference for the most basic GPS operations. If you don't want to carry the manual with you as you practice with the M68, you might consider photocopying this quick reference page and tucking it into your pocket.

GPS Quick Reference

Start outdoors, with a clear view of the open sky. As you practice, try navigating to a location at least a few blocks away. While you're learning, navigation in too small an area will constantly trigger arrival alarms.

1. Install the unit. (See complete installation details beginning on page 9.)
2. To turn on the M68, press and release **PWR** key.
3. Opening screen displays the moving map at the 4,000 mile zoom range. Rotate through the four main GPS Page screens (Full Map, Position, Navigation and Satellite Status) by pressing **PAGES** | ↓ or ↑ to select *Page Name* | **EXIT**. Switch Pages to display Satellite Status Page.
4. Wait while unit locates satellites and calculates current position. Process is visible on Satellite Page. This takes an average of 1 minute or less under clear sky conditions (unobstructed by terrain or structures). When the unit acquires position, a tone sounds and a position acquired message appears.
5. With position acquired, press **PAGES** key to display Full Map display, which shows your position in the center. You can move around the map by:
 - Zoom in** closer to see greater detail: press **ZIN** (zoom in key.)
 - Zoom out** to see more area, less detail: press **ZOUT** (zoom out key.)
 - Scroll** display north, south, east or west using arrow keys ↑ ↓ → ←.To stop scrolling, clear cursor, and return to current position, press **EXIT**.
6. Set a waypoint (*Wpt 001*) at your current position so you can navigate back here: press **WPT** | **WPT**. Waypoint symbol and "001" appears.
7. If you've already made some waypoints or event marker icons, zoom/scroll to find one of them to go to. Otherwise, travel a bit and set some practice waypoints. When you have one or two, use the arrow keys to center cursor cross-hair over one of the waypoints.
8. Navigate to selected destination: press **MENU** | **ENT** | **EXIT**. Follow dotted course line on Full Map or compass bearing arrow on Navigation Page.
9. At destination, Arrival Alarm goes off; to clear it, press **EXIT**. Cancel navigation: press **MENU** | **MENU** | ↓ to **CANCEL NAVIGATION** | **ENT** | ← to **YES** | **ENT**.
10. Return to *Wpt 1* by Backtrack Trail. Press **MENU** | **MENU** | ↓ to **MY TRAILS** | **ENT**. Press ↓ to *Trail 1* | **ENT** | ↓ then → to **NAVIGATE** | **ENT** | → to **REVERSE ROUTE** | **ENT** | ← to **NAVIGATE ROUTE** | **ENT**. (If arrival alarm sounds, press **EXIT**.) Follow navigation displays.
11. Back home, Arrival Alarm goes off; press **EXIT**. Cancel navigation: press **MENU** | **MENU** | ↓ to **CANCEL NAVIGATION** | **ENT** | ← to **YES** | **ENT**.
12. To turn off the unit, press and hold **PWR** key for three seconds.

Find Your Current Position

Finding your current position is as simple as turning the unit on. Under clear sky conditions, the unit automatically searches for satellites and calculates its position in approximately one minute or less.

NOTE:

"Clear sky" means open sky, unobstructed by terrain, dense foliage or structures. Clouds do not restrict GPS signal reception.

If for some reason satellite acquisition takes longer, you may be inside a structure or vehicle or in terrain that is blocking signal reception. To correct this, be sure you are positioned so that the unit's antenna (located inside the top of the unit) has as clear a view of the sky as possible, then turn the unit off and back on again.

Moving Around the Map: Zoom & Cursor Arrow Keys

The map is presented from a bird's eye view perspective. The current zoom range shows in the lower left corner of the screen.

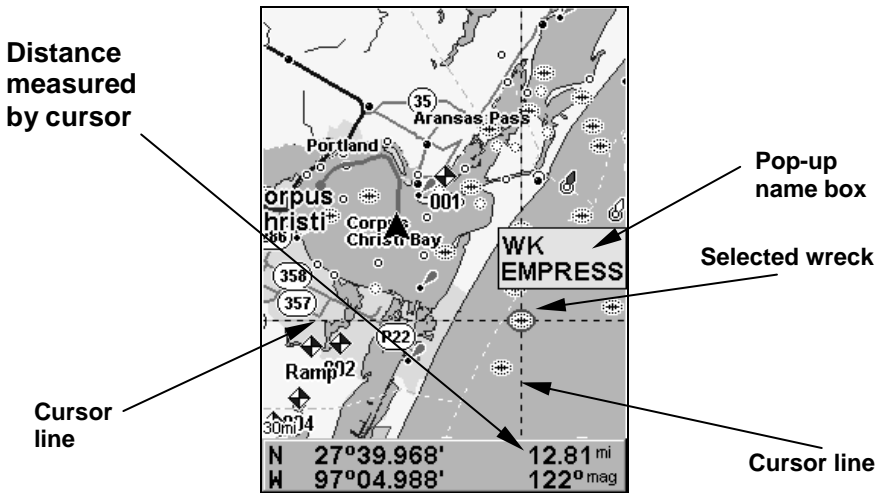
1. Press the **ZIN** key (zoom in) to move in closer and see greater detail in a smaller geographic area.
2. Press the **ZOUT** key (zoom out) to move farther away and see less map detail, but a larger geographic area.

When you are traveling, the map will automatically move as you move. This keeps your current location roughly centered on the screen.

You can manually pan or scroll the map northward, southward, eastward or westward by using the arrow keys, which launch the cross-hair map cursor. This allows you to look at map places other than your current position. To clear the cursor, press **EXIT**, which jumps the map back to the current position or the last known position.

Tip:

Use the cursor to determine the distance from your current position (or last known position, when working indoors) to any map object. Simply use the arrow keys to position the cursor over the object or landmark. The distance, measured in a straight line, appears in the box at the bottom of the screen. Press **EXIT** to clear the cursor.



The selected wreck (the *Empress*) to the southeast is 12.81 miles away.

Selecting Any Map Item With the Cursor

1. Use the zoom keys and the arrow keys to move around the map and find the item you wish to select.
2. Use the arrow keys and center the cursor cross-hair on the desired object. On most items, a pop-up box will give the name of the selected item.

Set a Waypoint

A waypoint is simply an electronic "address," based on the latitude and longitude of a position on the earth. A waypoint represents a location, spot, or destination that can be stored in memory, then be recalled and used later on for navigation purposes.

You can create a waypoint at the cursor position on the map, or at your current position while you are navigating. You can create a waypoint at any location by manually entering the position's latitude and longitude.

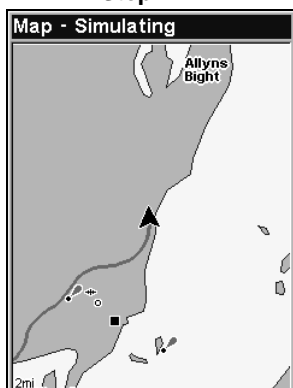
To create and save a Waypoint:

These first two techniques use the Quick Save method, the fastest and easiest way to create a waypoint.

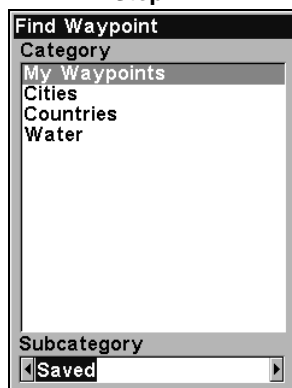
Create Waypoint at Current Position

While you are traveling, press **WPT|WPT**. The waypoint is saved and automatically given a name with a sequential number, such as "waypoint 003." The waypoint symbol and number appear on the map.

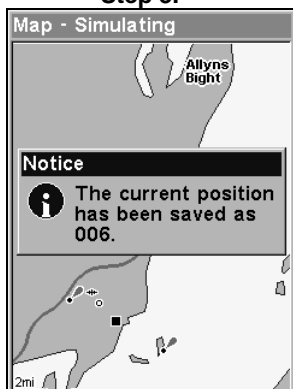
Step 1.



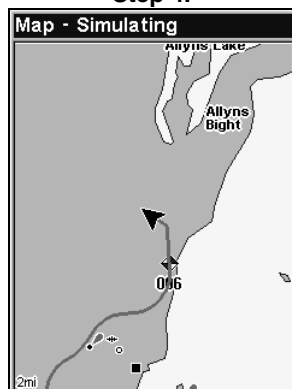
Step 2.



Step 3.



Step 4.



Sequence for setting a waypoint. Step 1: while traveling, *quickly* press **WPT** twice to call up Find Waypoint screen (seen in Step 2) and set a point. Step 3: a message says the waypoint has been saved. Step 4: vehicle continues on its way; number waypoint symbol is visible on map.

NOTE:

The Quick Save method uses the default waypoint symbol until you edit an existing waypoint and change its symbol. (Edit Waypoint Symbol is described in Sec. 8.) After you have changed a waypoint symbol, the unit will remember the one you chose and use it the *next* time you "quick save" a waypoint. To revert back to the *default* symbol, edit a waypoint and choose it, or use the Reset Options command (described in Sec. 9).

Create Waypoint on Map

1. Use the arrow keys to move the cursor to the place where you want to make a waypoint.

2. Press **WPT|WPT**. The waypoint is saved and automatically given a name with a sequential number, such as "waypoint 001." The waypoint symbol and number appear on the map.

Create Waypoint by Entering a Position

1. Press **WPT|→** to **NEW|ENT**.

2. Press **↓** to **ENTERED POSITION|ENT|↑** to **CREATE|ENT**.

3. Press **↓** to **LATITUDE|ENT**. Enter the latitude by pressing **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the latitude is correct. Press **ENT**.

4. Press **↓** to **LONGITUDE|ENT**. Enter the longitude by pressing **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the longitude is correct. Press **ENT**, then **EXIT|EXIT** to return to the previous page display. The waypoint is saved and automatically given a name with a sequential number, such as "waypoint 001." The waypoint symbol and number appear on the map and in the waypoint list.

Navigate To a Waypoint

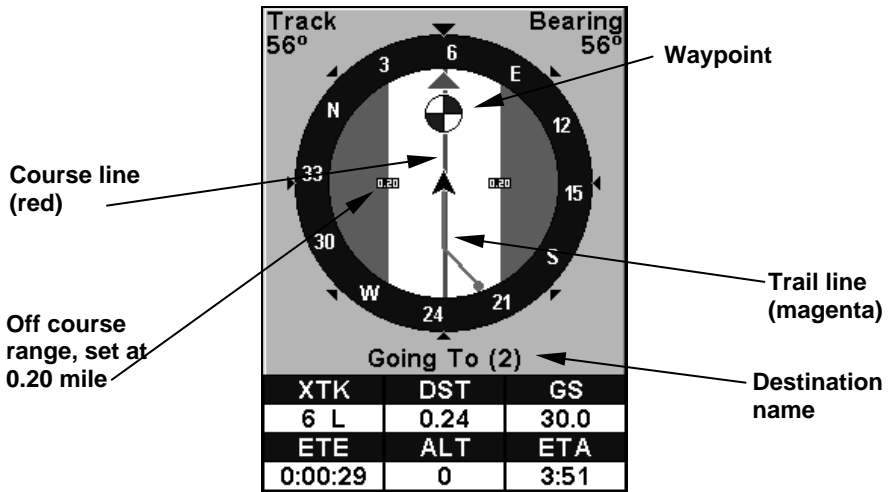
You can select any waypoint visible on the Map Page with the cursor, then use the Navigate to Cursor command (we'll describe how later in this section.) However, you can avoid scrolling the map to pick your waypoint if you use the Find Waypoint commands:

1. Press **WPT|ENT**. To look up the nearest waypoint, press **↓** to **NEAREST|ENT**; or, to look by name (and scroll through the entire waypoint list), press **ENT** (the Name command is already highlighted). For this example, look by name.

2. If your waypoint list is a long one, you can spell out the waypoint name in the **FIND BY NAME** box to search for it. (Press **↑** or **↓** to change the first character, then press **→** to move the cursor to the next character and repeat until the name is correct, then press **ENT** to jump to the list below.)

3. If the list is short, you can jump directly to the **FIND IN LIST** box by pressing **ENT**. Use **↑** or **↓** to select the waypoint name, press **ENT** and the waypoint information screen appears with the **Go To** command selected.

4. To begin navigating to the waypoint, press **ENT**.



Navigation Page, navigating toward waypoint 2 and leaving a trail.

Set Man Overboard (MOB) Waypoint

One of boating's most terrifying events is having a friend or family member fall overboard. This situation can be deadly on any body of water — fresh or salt. It's particularly dangerous at night or if you're out of sight of land. Of course, the first thing to do is remain calm and then use all standard safety procedures to rescue the person.

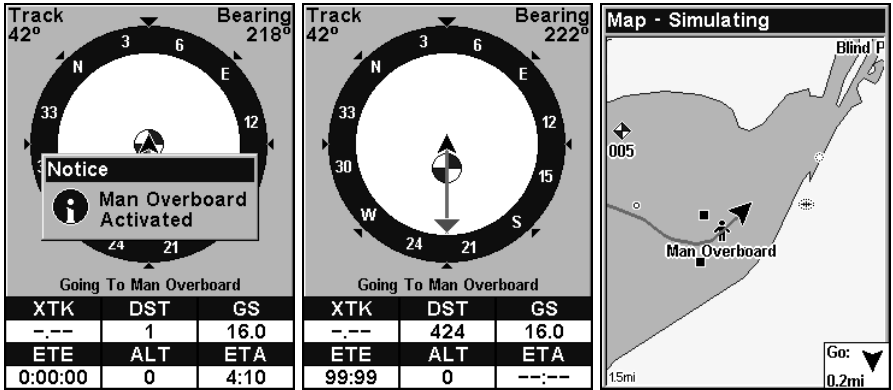
This unit has a man overboard feature that shows navigation data to the location where the feature was activated. To activate it, press the **ZOUT** and **ZIN** keys at the same time. Your position at the time these keys are pressed is used as the man overboard position.

Caution:

Saving a new "Man Overboard" waypoint will overwrite and erase the previous "Man Overboard" waypoint.

Navigate Back to MOB Waypoint

Find your way back to the accident position with the Navigation Page or Map Page. When MOB is activated, the Navigation Page automatically shows the compass rose with its bearing arrow pointing toward the man overboard position, and the destination name says "Going To Man Overboard." The Map Page displays a Man Overboard waypoint, represented by a human figure, and the steering arrow points where to steer to reach that position.



Navigating to Man Overboard: "Man Overboard activated" message shown at left. The Navigation Page is shown in the center and Map Page is shown at right. The victim is astern of the vessel; the GPS shows which direction to steer to for the rescue.

The man overboard position is also stored in the waypoint list for future reference. It can be edited the same as any other waypoint.

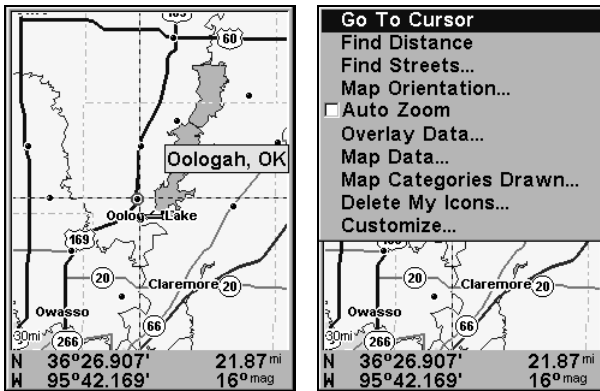
To cancel navigation to MOB, press **MENU | MENU | ↓** to **CANCEL NAVIGATION | ENT | ←** to **YES | ENT**. The unit stops showing navigation information.

Navigate to Cursor Position on Map

The **Go To CURSOR** command navigates to the current cursor position on the map. It's a quick and handy way to navigate to anything you can see on the map display.

1. Use the cursor (controlled by the arrow keys) with the zoom in and zoom out keys to maneuver around the map until you find a location you want to go to.

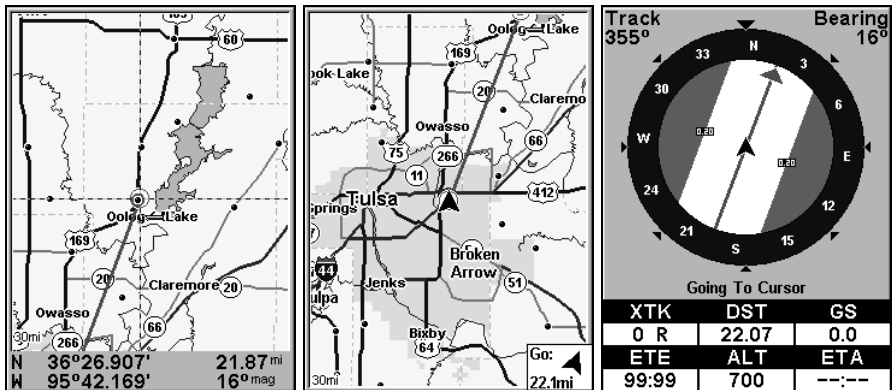
2. Center the cursor over the location to select it. See the example in the following figure. (Many map items such as waypoints, marine NavAids, towns, etc. can be "selected," and appear "highlighted" with a pop-up box. Other features, such as a river or a street intersection will not appear "highlighted," but the cursor will take you to those locations just the same.)



Navigate to cursor. In this example, the cursor has selected the town of Oologah, Oklahoma.

3. Press **MENU|ENT** and the M68 will begin navigating to the cursor location.

The Map Page will display a red line from your current position to the cursor position. The Navigation Page displays a compass rose showing navigation information to your destination. See the following examples.



The 30-mile zoom figure at left clearly shows the red course line connecting your current position to your destination. The 30-mile zoom, center, shows both current position and direction to destination on screen. The Navigation Page, right, will also show navigation information.

To stop navigating to the cursor, use the Cancel Navigation command: press **MENU|MENU|↓** to **CANCEL NAVIGATION|ENT|←** to **YES|ENT**. The M68 stops showing navigation information.

Navigate to a Map Place

For map places that are in view on the map, you can easily use the Navigate to Cursor command above; just use the cursor to select the map place.

The other method involves searching for map places with the Find Waypoint command, launched with the **WPT** key. Turn to Sec. 10, *Searching*, for detailed instructions on map place searches.)

After you have looked up an item with the Find Waypoint command, use the → to make sure the **Go To** command is highlighted at the bottom of the screen, then press **ENT**. The M68 begins showing navigation information to the item.

To cancel navigation, press **MENU | MENU | ↓** to **CANCEL NAVIGATION | ENT | ←** to **Yes | ENT**. The M68 stops showing navigation information.

Creating and Saving a Trail

A trail, or plot trail, is a string of position points plotted by the M68 as you travel. It's a travel history, a record of the path you have taken. Trails are useful for repeating a journey along the same track. They are particularly handy when you are trying to retrace your trip and go back the way you came. On the screen, trails are represented by a magenta line extending from the back of the current position arrow.

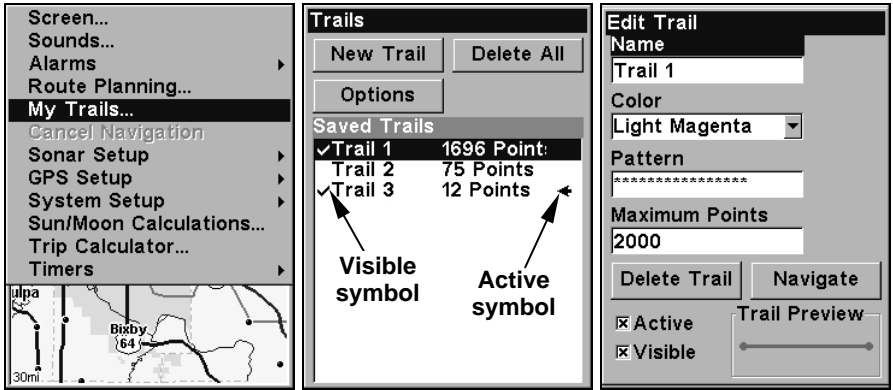
The M68 is set at the factory to automatically create and record a trail while the unit is turned on. The unit will continue recording the trail until the length reaches the maximum trail point setting (default is 2,000, but the unit can record trails 9,999 points long). When the point limit is reached, the M68 begins recording the trail over itself.

By default, the trail flashes once a second, making it easier to see against the background map. With the default auto setting, the M68 creates a trail by placing a dot (trail point) on the screen every time you change directions. (The methods used for creating a trail and the trail update rate can both be adjusted or even turned off. See Sec. 9 for *Trail Options*.)

To preserve a trail from point A to point B, you must "turn off" the trail by making it *inactive* before heading to point C or even back to point A. When the current trail is set inactive, the M68 *automatically* creates and begins recording a new trail.

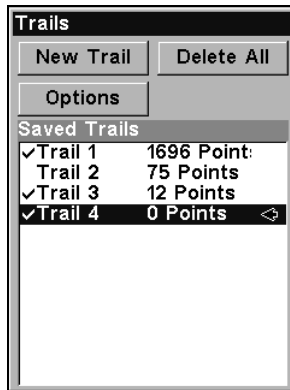
To Save a Trail

1. Press **MENU | MENU | ↓** to **MY TRAILS | ENT**.



Sequence for saving a trail and beginning a new one. At left, My Trails command. Center, the Trails Menu. The arrow to the right of Trail 3 indicates the trail is "active," and the check to the left indicates the trail is visible on the map display. The right figure shows the Edit Trail menu, with the Active command selected.

2. Press ↓ to the *Active Trail Name* | ENT.
3. Press ↓ to **ACTIVE** | ENT. This unchecks the Active option.
4. To return to the previous page, press **EXIT** | **EXIT** | **EXIT** | **EXIT**. As you left the Edit Trail menu, you will notice that a new trail was started with a new sequential number. In the example figure below, the new trail is number 3, showing zero points. Trail 3 also has an arrow beside it, showing it is the active trail. Note that Trail 1 is inactive (no arrow beside it), but it is still visible on the map. Only one trail at a time can be active, but several trails can be visible at the same time.



New trail, named "Trail 4," is created when Trail 3 is made inactive. Any new travel will be recorded in this trail, which is active and visible. Trails do not need to be visible in order to be active.

You can save and recall up to 10 different plot trails.

Tip:

Another quick way to stop recording one trail and begin a new one is to use the New Trail command: Press **MENU | MENU | ↓** to **MY TRAILS | ENT | ENT | EXIT | EXIT | EXIT**.

Caution:

You also have the option of completely turning off trail recording, under the trail Options command. However, if the Update Active Trail option is left turned off, it will cancel the automatic trail creation feature.

Displaying a Saved Trail

The active trail is automatically displayed on the map (the "Visible" option) with the factory default settings. You can selectively turn trail display off and on for any saved or active trail. In the Saved Trails List, visible trails have a check mark in front of the trail name.

To turn off trail display:

1. Press **MENU | MENU | ↓** to **MY TRAILS | ENT**.
2. Press **↓** to enter the Saved Trail list, then use **↑** or **↓** to select the desired *Trail Name* | **ENT**.
3. Press **↓** to **VISIBLE | ENT**. To return to the previous page, press **EXIT | EXIT | EXIT | EXIT**.

To turn on trail display:

1. Press **MENU | MENU | ↓** to **MY TRAILS | ENT**.
2. Press **↓** to enter the Saved Trail list, then use **↑** or **↓** to select the desired *Trail Name* | **ENT**.
3. Press **↓** to **VISIBLE | ENT**. To return to the previous page, press **EXIT | EXIT | EXIT | EXIT**.

Navigating Trails

There are three methods for following a trail: visual trailing, navigating a trail (forward) and backtracking a trail (backward). Try each method to see which you prefer.

Visual trailing is the simplest method. It uses only the Map Page and requires no menu commands at all. The technique works the same if you are running a trail forward (from start to end) or backward (from end to start.) However, visual trailing provides no navigation information during the trip, such as the time to your destination.

The other two methods provide a full range of navigation data and work with both the Map Page and Navigation Page. The only difference between them is "navigating a trail" follows a trail forward (from start to end) while "backtracking" follows a trail in reverse (from end to start.)

When hiking at walking speed with a hand-held GPS, we often just use visual back trailing because it is a bit better at following each little turn on a foot path. At faster speeds, such as the highway or on the water, the Navigate Trail and Backtrack Trail commands are handy.

Visual Trailing

1. On the Map Page, zoom (**ZIN** or **ZOUT**) so your flashing trail is visible.
2. Begin moving and watch the Map Page. Simply steer so that your current position arrow traces along the trail you have just made.

Tip:

Generally, when using this method, the smaller the zoom range, the more accurately you will be able to steer along the trail.

Navigate a Trail (forward)

The following figures illustrate the menu sequence for navigating a trail.

1. Press **MENU | MENU | ↓** to **MY TRAILS | ENT.**
2. Press **↓** to enter the Saved Trail list, then use **↑** or **↓** to select the desired *Trail Name* | **ENT.**
3. Press **↓** to **NAVIGATE | ENT.**
4. Press **ENT.** The unit begins showing navigation information along the trail.

NOTE:

If you are already located at or near the beginning of your trail, the arrival alarm will go off as soon as you hit Enter. Just press **EXIT** to clear the alarm and proceed.

5. Now, begin moving and follow your M68.
6. When you reach your destination, be sure to cancel your navigation: press **MENU | MENU | ↓** to **CANCEL NAVIGATION | ENT.** The M68 asks if you're sure; press **← | ENT.**

Figure 1.

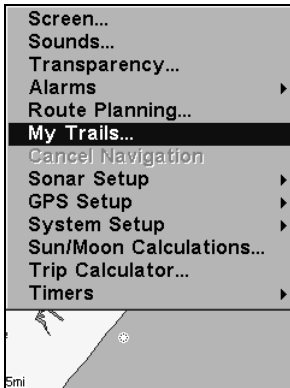


Figure 2.

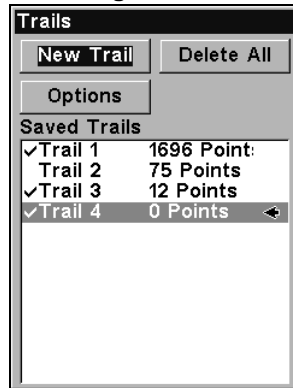


Figure 3.

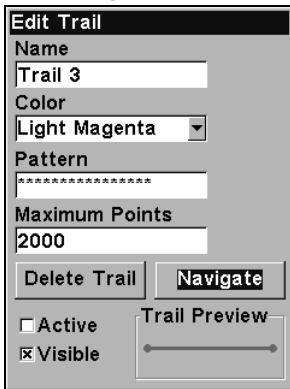
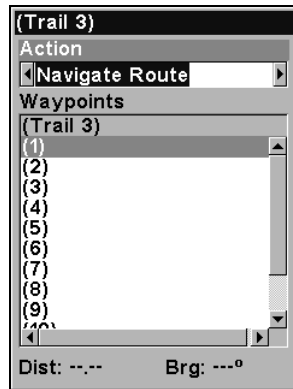


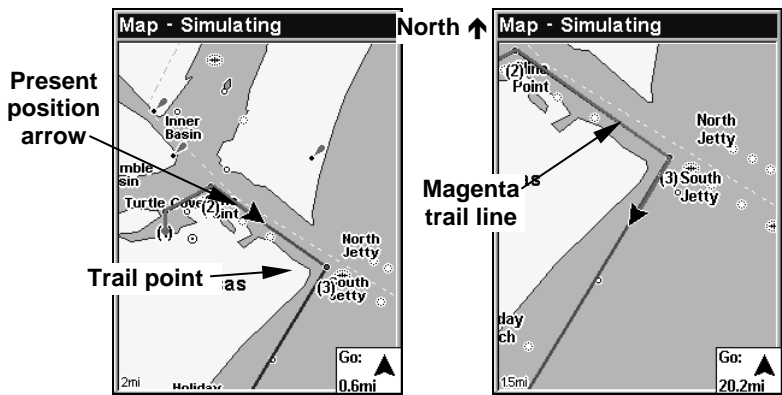
Figure 4.



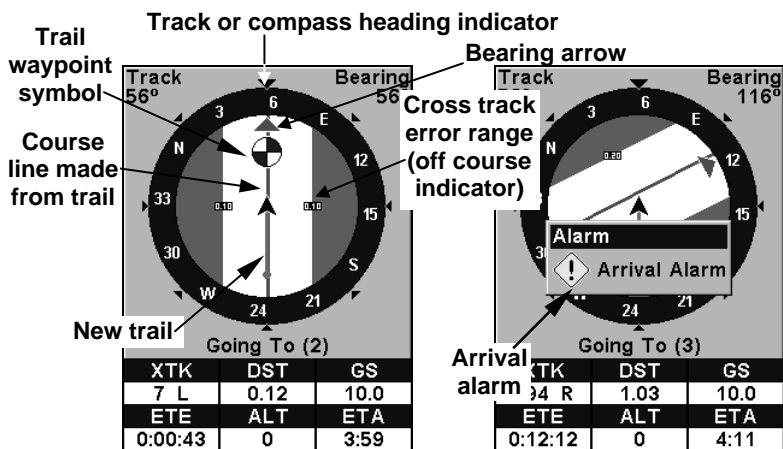
Navigate a trail menu sequence: Fig. 1, My Trails command. Fig. 2, Trails Menu. Fig. 3, Edit Trail Menu. Fig. 4, Edit Route Menu with Navigate Route command highlighted for Trail 1. A trail is always converted to a "route" when you navigate the trail.

On the Map Page, the trail you are navigating is represented by a flashing magenta line (if the visible trail option is on). The course you are following (the trail converted to a route) is represented by a red line. The Navigation Page and the Position Page will also show the course in the same way. The bearing arrow on the compass rose points to the next waypoint on the trail.

As you travel, the arrival alarm will go off when you near a trail waypoint, and the bearing arrow on the compass rose will swing around and point to the next trail waypoint. Press EXIT to clear the alarm.



Navigate trail, map views: at left driver is heading southeast straight toward trail point 3. At right, driver has reached point 3 and has turned southwest to follow the trail.



Navigate trail, navigation page (compass rose) views: at left, driver is heading northeast straight toward trail point 3; bearing arrow shows the trail point is 61 degrees (straight ahead.) At right, driver has reached trail point 3 and must turn southeast to follow the trail. Arrival alarm goes off and bearing arrow swings around to say turn right (south), toward the next waypoint, trail point 4. The M68 now shows navigation information to point 4, which is 0.55 miles away.

Navigate a Back Trail (backtrack, or reverse)

1. Press **MENU | MENU | ↓** to **MY TRAILS | ENT**.
2. Press **↓** to enter the Saved Trail list, then use **↑** or **↓** to select the desired *Trail Name* | **ENT**.
3. Press **↓** to **NAVIGATE | ENT**.

4. Press **→** to **REVERSE ROUTE | ENT | ←** to **NAVIGATE ROUTE | ENT**. The unit begins showing navigation information along the trail, in reverse.

NOTE:

If you are already located at or near the end of your trail, the arrival alarm will go off as soon as you hit Enter. Just press **EXIT** to clear the alarm and proceed.

5. Now, begin moving and follow your M68.

6. When you reach your destination, be sure to cancel your navigation: press **MENU | MENU | ↓** to **CANCEL NAVIGATION | ENT**. The M68 asks if you're sure; press **← | ENT**.

Cancel Navigation

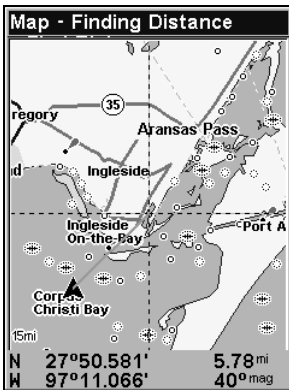
You can turn off any of the navigation commands after you reach your destination or at any other time by using the Cancel Navigation command. Press **MENU | MENU | ↓** to **CANCEL NAVIGATION | ENT | ←** to **YES | ENT**.

Notes

Section 8: Advanced GPS Operations

Find Distance From Current Position To Another Location

1. While on the Map Page press: **MENU** | ↓ to **FIND DISTANCE** | **ENT**.
2. Center your cursor over the position you want to find the distance to. A rubber band line appears, connecting your current position to the cursor's location. The distance along that line will appear in the box at the bottom of the screen. The box also shows the bearing to the point you're measuring to.
3. Press **EXIT** to return to regular operation.



At left, the distance from the boat's current position to the cove is 5.78 miles. At right, the distance from Houston to New Orleans is 316.9 miles.

Find Distance From Point to Point

You can also measure distance between two other points on the map.

1. While on the Map Page press: **MENU** | ↓ to **FIND DISTANCE** | **ENT**.
2. Center your cursor over the first position. (A rubber band line appears, connecting your *current* position to the cursor's location.) Press **ENT** to set the first point, and the rubber band line disappears.
3. Move the cursor to the second position. The rubber band line reappears, connecting the first point you set to the cursor. The distance along that line will appear in the box at the bottom of the screen.
4. Press **EXIT** to clear the command and return to the page screen.

Icons

Icons are graphic symbols used to mark some location, personal point of interest or event. They can be placed on the map screen, saved and re-

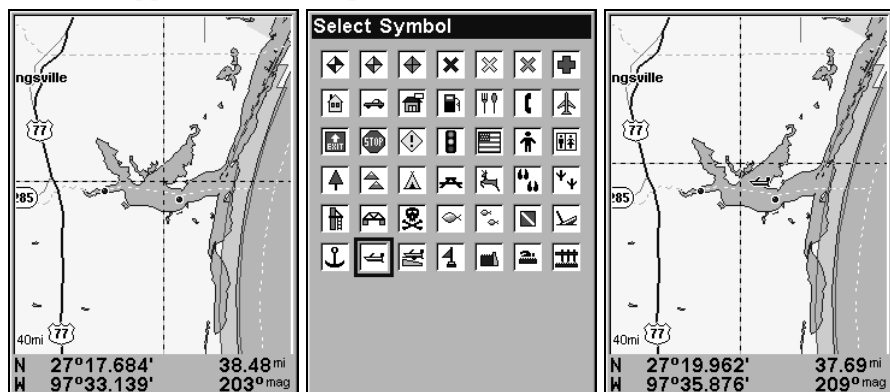
called later for navigation purposes. These are sometimes referred to as event marker icons. The M68 has 42 different symbols you can pick from when creating an icon.

Icons are similar to waypoints, but they do not store as much information (like names) as waypoints do. You can't use a menu to navigate to icons as you can with waypoints. (But, you *can* use the map cursor and navigate to any icon on the map.)

You can create an icon at the cursor position on the map, or at your current position while you are navigating.

Create Icon on Map

1. Use the arrow keys to move the cursor to the place where you want to make an icon.
2. Press **ENT** and the screen shows a "Select Icon Symbol" menu.
3. Press **←** or **↑** or **→** or **↓** to select your icon symbol, then press **ENT**. The icon appears on the map.



Cursor selects icon location, left; Select Icon Symbol menu, center; Boat Ramp icon on map, right. (Cursor has been moved for clarity.)

Create Icon at Current Position

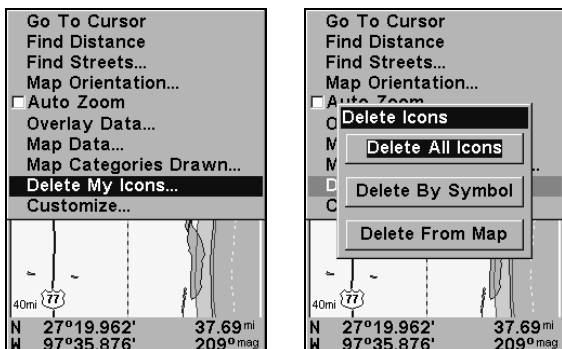
1. While you are traveling, press **ENT** and the screen shows a "Select Icon Symbol" menu.
2. Press **←** or **↑** or **→** or **↓** to select your icon symbol, then press **ENT**. The icon appears on the map.

Delete an Icon

You can delete all the icons at one time, you can delete all icons represented by a particular symbol, or you can use the cursor to delete a selected icon from the map.

1. Press **MENU** | **↓** to **DELETE MY ICONS** | **ENT**.

2. Press ↓ to **DELETE ALL ICONS**, **DELETE BY SYMBOL**, or **DELETE FROM MAP** and press **ENT**.



Delete icons menu.

The Delete All Icons command will ask if you are sure. Press ← to **YES|ENT**. All icons will be deleted from the map.

The Delete by Symbol command will launch the Select Symbol menu. Press ← or ↑ or → or ↓ to select the icon symbol to delete, then press **ENT**. A message appears saying all icons with the selected symbol have been deleted.

The Delete From Map command will prompt you to move the cursor over an icon to select it. After selecting the icon, press **ENT** and it disappears from the map.

Navigate to an Icon

Use the Navigate to Cursor command, and use the cursor to select the desired icon on the map.

1. Use arrow keys to center cursor cross-hair over the icon.
2. To navigate to the selected icon location: press **MENU|ENT|EXIT**. Follow course line on the Map Page or the compass bearing arrow on the Navigation Page.

Routes

A route is a series of waypoints, linked together in an ordered sequence, that's used to mark a course of travel. You can visualize a route as a string of beads: The beads represent waypoints and the string represents the course of travel connecting waypoint to waypoint.

The course from one waypoint to the next is a leg; routes are composed of one or more legs. The legs of all GPS routes are based on straight lines between waypoints.

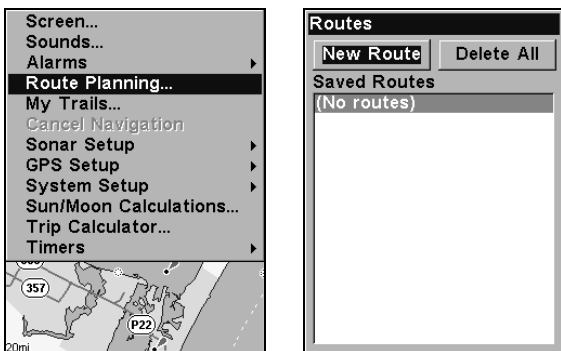
A route provides the automatic capability to navigate through several waypoints without having to reprogram the unit after arriving at each

waypoint. Once programmed into the GPS unit, a route provides the option of navigating forward through the route waypoints or in reverse order (you can even begin navigating in the middle of a route!)

Create and Save a Route

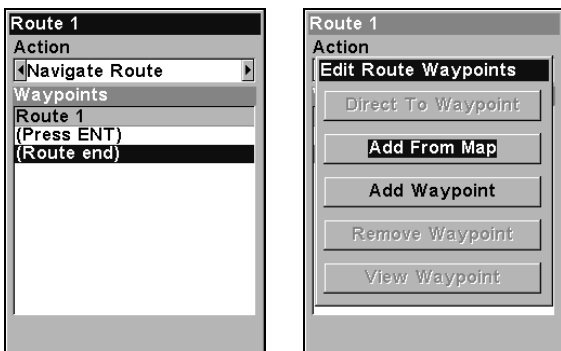
You can create a route by selecting existing waypoints from the waypoint list or you can set a series of route waypoints on the map with cursor arrows and the Enter key. In this example, we'll create a route from the map.

1. From the **NAVIGATION PAGE**, press **MENU|ENT** or from the **MAP PAGE**, press **MENU|MENU|↓** to **ROUTE PLANNING|ENT**.



Route Planning command on Main Menu, left, will open the Route List screen, right.

2. To add to an existing route, press **↓|↓|↑** or **↓** to *route name*|**ENT** (to create a new route, just press **ENT**). Then press **|↓** to **(ROUTE END)|ENT|↓** to **ADD FROM MAP|ENT**. The Map Page appears with the cursor showing.

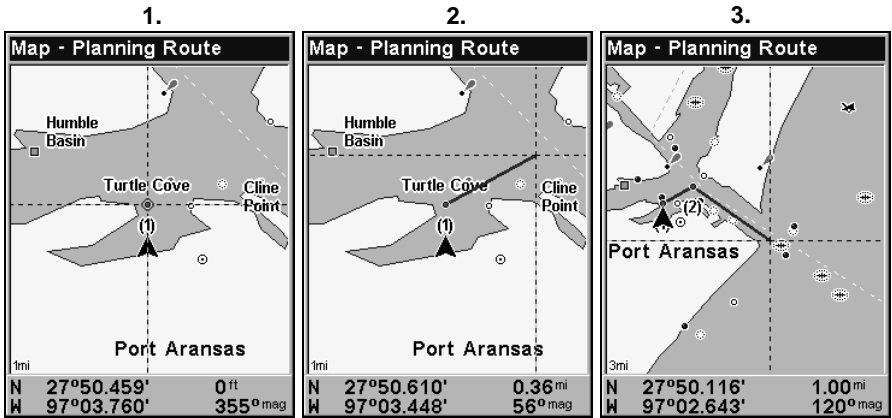


Edit Route menu, left. Edit Route Waypoints menu, right, with Add From Map command selected.

3. Use the Zoom keys and arrow keys to move the map and cursor until the cursor is centered on the spot where you want your route to begin.

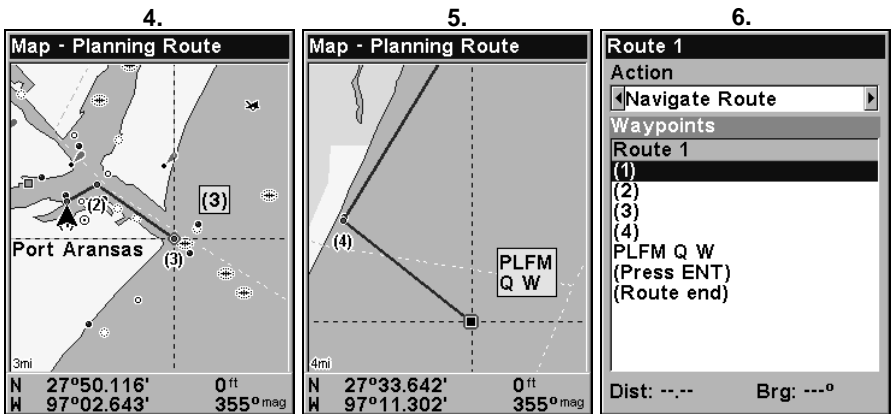
(If you are starting at your current position or the current cursor position, you are already at the starting spot.)

4. Set the first route waypoint: press **ENT**. In this example, we moved to the entrance of the cove where our boat was docked to start our route to a promising fishing spot next to an oil platform. (Creating this example route is illustrated in the following figures.)



Route creation sequence, from left: Fig. 1. Set route waypoint (1) at the cove entrance. Fig. 2. Move cursor northeast to set point (2) at channel entrance. Fig. 3. With point (2) set, move cursor southeast to mark channel exit with waypoint (3). In figures 2 and 3, notice the rubber band line extending from the previously set waypoint to the cursor.

This line will become the course for the route.



Route creation sequence, continued: Fig. 4. Point (3) set at channel mouth. Fig. 5. Waypoint (4) set further south along the beach, at a recognizable landmark (Bob Hall Pier). Waypoint PLFM Q W ends the route at an oil platform some distance from the shore. Fig. 6. Press **EXIT** to save the route and you return to this screen.

5. Move the cursor to the next point in the route, a spot where you need to turn or change direction, and press **ENT** to set the next waypoint.
6. Repeat step five until the route reaches your destination.
7. To save your route, press **EXIT**. The M68 reverts to the Edit Route screen, with the route automatically named "Route 1" and stored in the M68's internal memory.

You can edit the route and run other commands, but if you are finished with the route for now, return to the last page displayed by pressing **EXIT | EXIT | EXIT | EXIT**.

Delete a Route

1. From the **NAVIGATION PAGE**, press **MENU | ENT** or from the **MAP PAGE** press **MENU | MENU | ↓** to **ROUTE PLANNING | ENT**.
2. Press **↓** to *route name* | **ENT**.
3. Press **→** to **DELETE ROUTE | ENT | ←** to **YES | ENT**.

Tip:

You can also delete all routes at once:

1. From the **NAVIGATION PAGE**, press **MENU | ENT** or from the **MAP PAGE** press **MENU | MENU | ↓** to **ROUTE PLANNING | ENT**.
2. Press **→** to **DELETE ALL | ENT | ←** to **YES | ENT**.

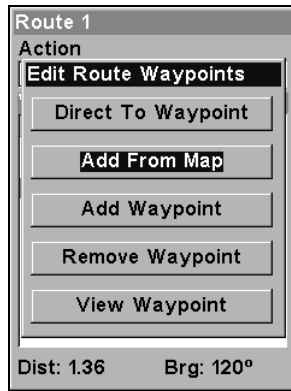
Edit a Route

You can edit the route name if you wish.

1. From the **NAVIGATION PAGE**, press **MENU | ENT** or from the **MAP PAGE** press **MENU | MENU | ↓** to **ROUTE PLANNING | ENT**.
2. Press **↓** to *route name* | **ENT | →** to **EDIT ROUTE NAME | ENT**.
3. Press **↑** or **↓** to change the first character, then press **→** to move the cursor to the next character and repeat until the name is correct, then press **ENT**. Return to the previous page by pressing **EXIT | EXIT | EXIT | EXIT**.

You can edit the route by adding and removing waypoints.

1. From the **NAVIGATION PAGE**, press **MENU | ENT** or from the **MAP PAGE** press **MENU | MENU | ↓** to **ROUTE PLANNING | ENT**.
2. Press **↓** to *route name* | **ENT | ↓** to **ROUTE WAYPOINTS LIST**. Use **↓** and **↑** to select a waypoint, then press **ENT**.

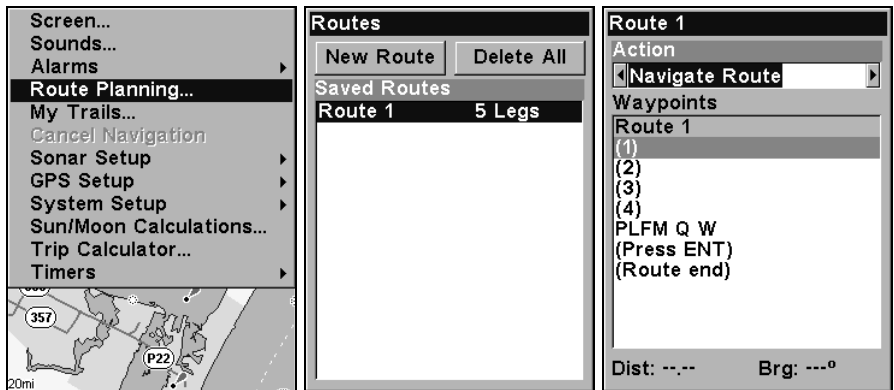


Edit Route Waypoints menu.

3. Use ↓ and ↑ to select a command from the Edit Route Waypoints menu and press **ENT**. Add From Map lets you insert a waypoint in the route by clicking on a map location with the cursor. Add Waypoint calls up the Waypoint List so you can insert a waypoint from the list. Remove Waypoint will delete the selected waypoint from the route. View Waypoint will show you where the selected waypoint is on the map.

Navigate a Route

1. From the **NAVIGATION PAGE**, press **MENU | ENT** or from the **MAP PAGE**, press **MENU | MENU | ↓** to **ROUTE PLANNING | ENT**.



Route Planning command on Main Menu, left; Routes menu, center; Edit Route menu, right. Navigate Route command is selected.

2. Press ↓ to select *route name* | **ENT** | **ENT**.

3. Upon arrival at your destination, cancel navigation: press **MENU | MENU | ↓** to **CANCEL NAVIGATION | ENT** | ← to **YES | ENT**.

The following figures show what the Navigation Page and Map Page look like while navigating a route.

Figure 1.

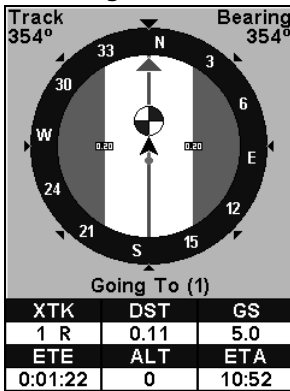
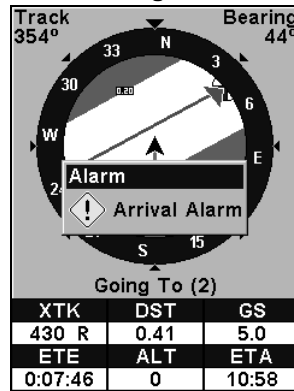


Figure 2.



Navigating along a route: Fig. 1 shows the Navigation Page at the start of a route, heading straight for the first waypoint (Wpt 1). In Fig. 2, the traveler has arrived at Wpt 1; the arrival alarm has been triggered and the bearing arrow on the compass rose has turned to point toward Wpt 2, off to the northeast.

Figure 3.

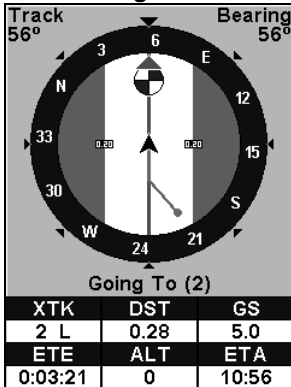
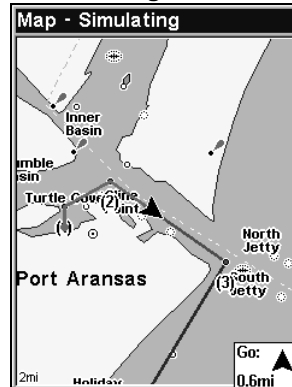


Figure 4.



In Fig. 3 the traveler has turned northeast on his new course and is heading straight for Wpt 2, which is 0.28 miles away. Fig. 4 shows route navigation on the Map Page. In this figure, the traveler has reached Wpt 2 and is starting on the leg between Wpts 2 and 3.

Navigate a Route in Reverse

Here's how you run a route backward, from the end waypoint to the beginning waypoint:

1. From the **NAVIGATION PAGE**, press **MENU|ENT** or from the **MAP PAGE**, press **MENU|MENU|↓** to **ROUTE PLANNING|ENT**.
2. Press **↓** to select *route name*|**ENT**|**→** to **REVERSE|ENT**|**←** to **NAVIGATE ROUTE|ENT**.
3. Upon arrival at your destination, cancel navigation: press **MENU|MENU|↓** to **CANCEL NAVIGATION|ENT**|**←** to **YES|ENT**.

Trails

Delete a Trail

This is the command used to erase or delete a trail: Press **MENU|MENU|↓** to **MY TRAILS|ENT**|**↓** to *trail name*|**ENT**|**↓** to **DELETE TRAIL|ENT**|**←** to **YES|ENT**.

Tip:

You can also delete all trails at once:

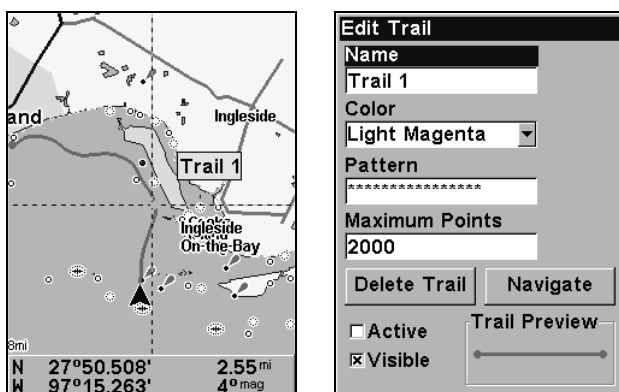
1. Press **MENU|MENU|↓** to **MY TRAILS|ENT**.
2. Press **→** to **DELETE ALL|ENT**|**←** to **YES|ENT**.

Edit a Trail Name

To edit a trail name: press **MENU|MENU|↓** to **MY TRAILS|ENT**|**↓** to *trail name*|**ENT|ENT**. Press **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the name is correct. Press **ENT** then **EXIT|EXIT|EXIT|EXIT** to return to the previous page display.

Tip:

You can quickly call up the Edit Trail menu by selecting a trail on the map with the cursor. Simply move the cursor over a trail and a pop-up box appears. Press **WPT** and the Edit Trail menu opens.



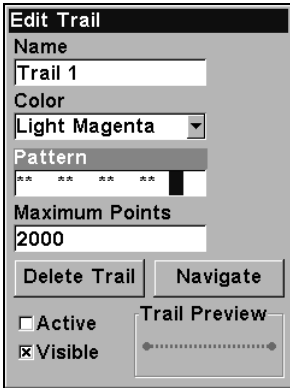
At left, trail selected with map cursor. The box at the bottom of the screen shows distance and bearing from current position to the selected point on the trail. At right, the Edit Trail menu.

Edit a Trail Color

To edit a trail color: press **MENU | MENU | ↓** to **MY TRAILS | ENT | ↓** to *trail name* | **ENT | ↓** to **COLOR | ENT**. Press **↑** or **↓** to select a color style, then press **ENT**. Press **EXIT | EXIT | EXIT | EXIT** to return to the previous page display.

Edit a Trail Pattern

To edit a trail pattern: press **MENU | MENU | ↓** to **MY TRAILS | ENT | ↓** to *trail name* | **ENT | ↓** to **PATTERN | ENT**. Press **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the pattern is correct. Press **ENT**, then **EXIT | EXIT | EXIT | EXIT** to return to the previous page display.



At left, Edit Trail Menu with Pattern option selected. At right, edited trail with dotted line pattern.

Utilities

Utilities are useful tools for traveling or for outdoor activities.

Alarm Clock

To get to the alarm clock menu: press **MENU | MENU | ↓** to **TIMERS | ENT | ↓** to **ALARM CLOCK | ENT**.

Sun/Moon Rise & Set Calculator

To get to the Sun/Moon menu: press **MENU | MENU | ↓** to **SUN/MOON CALCULATIONS | ENT**.

Trip Calculator

To get to the Calculator menu: press **MENU | MENU | ↓** to **TRIP CALCULATOR | ENT**.

Trip Down Timer

To get to the Down Timer menu: press **MENU | MENU | ↓** to **TIMERS | ENT | ↓** to **DOWN TIMER | ENT**.

Trip Up Timer

To get to the Up Timer menu: press **MENU | MENU | ↓** to **TIMERS | ENT | ENT**.

Waypoints

Delete a Waypoint

To delete a waypoint from the waypoint list: press **WPT | ENT | ENT | ENT | ↓** to *waypoint name* | **ENT | →** to **DELETE WAYPOINT | ENT | ←** to **YES | ENT**. To return to the previous page, press **EXIT | EXIT**.

To delete a waypoint from the map:

1. Use the arrow keys to select the waypoint with the cursor.
2. Press **WPT | →** to **DELETE WAYPOINT | ENT | ←** to **YES | ENT**. To return to the previous page and clear the cursor, press **EXIT**.

To delete all waypoints at one time: press **MENU | MENU | ↓** to **SYSTEM SETUP | ENT | ↓** to **DELETE ALL MY WAYPOINTS | ENT | ←** to **YES | ENT**. To return to the previous page, press **EXIT | EXIT**.

Edit a Waypoint

Waypoint Name

To edit waypoint name: 1. Press **WPT | ENT | ENT | ENT | ↓** to *waypoint name* | **ENT | →** to **EDIT WAYPOINT | ENT | ENT**.

2. Press **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the name is correct. Press **ENT** then **EXIT | EXIT | EXIT | EXIT** to return to the previous page display.

Waypoint Symbol

To edit waypoint symbol: 1. Press **WPT | ENT | ENT | ENT | ↓** to *waypoint name* | **ENT | →** to **EDIT WAYPOINT | ENT | ↓** then **→** to **CHOOSE SYMBOL | ENT**.

2. Use arrow keys to select desired symbol and press **ENT**. To return to the previous page, press **EXIT | EXIT | EXIT | EXIT**.

Waypoint Position

To edit waypoint position: 1. Press **WPT | ENT | ENT | ENT | ↓** to *waypoint name* | **ENT | →** to **EDIT WAYPOINT | ENT**.

2. Latitude: press **↓** to **LATITUDE | ENT**. Press **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the latitude is correct. Press **EXIT**.

3. Longitude: press **↓** to **LONGITUDE | ENT**. Press **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the longitude is correct. Press **EXIT**.

4. When latitude and longitude are correct, return to the previous page: press **EXIT | EXIT | EXIT | EXIT**.

Selecting a Waypoint

To select a waypoint on the map (for navigating to, for editing, etc.,) use the arrow keys and center the cursor over the waypoint. A highlighted halo will appear around the waypoint.

Set a Waypoint by Average Position

This feature sets a waypoint at the current position after taking several position readings and averaging them. This boosts waypoint position accuracy by helping to eliminate errors caused by atmospheric conditions and other factors.

1. Press **WPT** | → to **NEW** | **ENT**.
2. Press ↓ or ↑ to **AVERAGE POSITION** | **ENT** | ↑ to **CREATE** | **ENT**.
3. Wait while the unit takes points to average for the position. (The greater the number of points, the greater the accuracy.) When the desired number of points accumulates, press **ENT** to create and save the waypoint.
4. The Edit Waypoint menu appears. You can simply save the waypoint by pressing **EXIT** | **EXIT** or you can edit the waypoint.

Set a Waypoint by Projecting a Position

This feature sets a waypoint at a point located a specific distance and bearing from a reference position. The reference position can be selected from your waypoint list or the map feature list.

1. Press **WPT** | → to **NEW** | **ENT**.
2. Press ↓ to **PROJECTED POSITION** | **ENT** | ↑ to **CREATE** | **ENT**.
3. Press ↓ to **CHOOSE REFERENCE** | **ENT**. Use ↑ and ↓ to select a waypoint or map feature. When the point has been selected, press **ENT** and the point's position appears as the reference position.
4. Press ↓ to **DISTANCE** | **ENT**. Press ↑ or ↓ to change the first character, then press → to the next character and repeat until the distance is correct. Press **ENT**.
5. Press ↓ to **BEARING** | **ENT**. Press ↑ or ↓ to change the first character, then press → to the next character and repeat until the bearing is correct. Press **ENT**.
6. Press ↑ to **PROJECT** | **ENT**. The Edit Waypoint menu appears. You can simply save the new projected waypoint by pressing **EXIT** | **EXIT** or you can edit the waypoint. (Press **EXIT** | **ENT** if you want to immediately begin navigating to the new waypoint.)

Section 9: System & GPS Setup Options

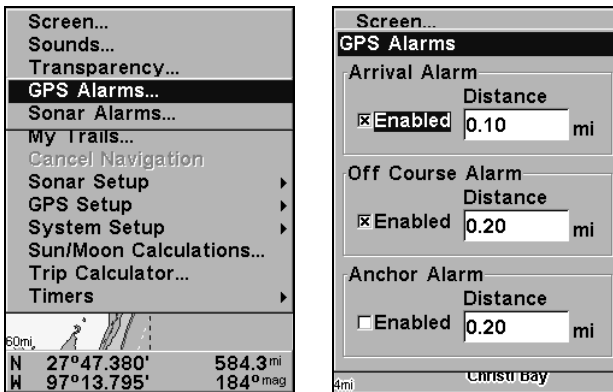
Alarms

This unit has several GPS alarms. The factory default setting has all the alarms turned on. You can turn the alarms off and on and change their distance settings.

You can set an arrival alarm to flash a warning message and sound a tone when you cross a preset distance from a waypoint. For example, if you have the arrival alarm set to 0.1 mile, then the alarm will flash a message when you come within 0.1 mile of the recalled waypoint.

The off course alarm warns you when your track drifts too far to the right or left of the course line to the waypoint. For example, if the alarm is set to 0.1 mile, then the alarm flashes a message if you drift 0.1 of a mile or more to the right or left of the line to the waypoint.

The anchor alarm is triggered when you drift outside of a preset radius. Again, using the 0.1 mile as an example, if you're anchored and your boat moves more than 0.1 mile, the alarm will flash a message and sound a tone.



Alarms command, left; Alarm menu, right.

To change alarm settings:

1. Press **MENU | MENU | ↓** to **ALARMS | ENT | ENT**.
2. Scroll **↓** or **↑** to select the desired category, then press **ENT** to check or clear the Enabled box. This turns the alarm on (checked) or off (unchecked).
3. To change distance settings, scroll **↓** or **↑** to select the desired category, then press **→ | ENT** to activate the distance dialog box. Press **↑** or **↓**

to change the first character, then press → to the next character and repeat until the distance is correct.

4. When your adjustments are finished, return to the last page displayed by repeatedly pressing **EXIT**.

Auto Satellite Search

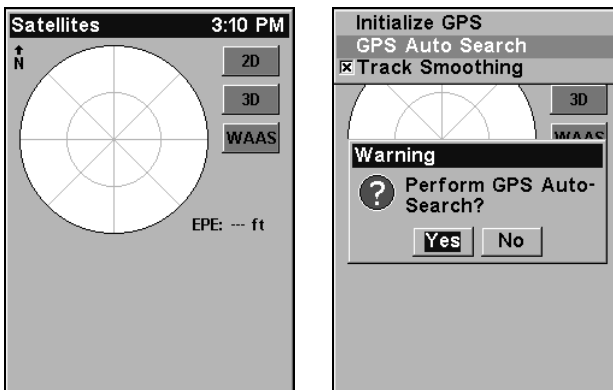
To lock onto the satellites, the GPS receiver needs to know its current position, UTC time and date. (Elevation (altitude) is also used in the equation, but it's rarely required to determine a position.) It needs this data so that it can calculate which satellites should be in view. It then searches for only those satellites.

When your GPS receiver is turned on for the first time, it doesn't know what your position or elevation (altitude) is. It does know the current UTC time and date since these were programmed into it at the factory and an internal clock keeps the time while the unit is turned off. (If the time and/or date are incorrect, you can set it using the "Set Local Time" menu.)

The unit begins searching for the satellites using the above data that it acquired the last time it was turned on. This probably was at the factory. Since you almost certainly aren't at our factory, it's probably looking for the wrong satellites.

If it doesn't find the satellites it's looking for after approximately one minute, the unit switches to Auto Search. The receiver looks for any satellite in the sky. Due to advanced technology, the auto search time has shrunk significantly from the early days of GPS.

Once the unit locks onto the satellites, it should take less than a minute to find your position the next time it's turned on, provided you haven't moved more than approximately 100 miles from the last location it was used.



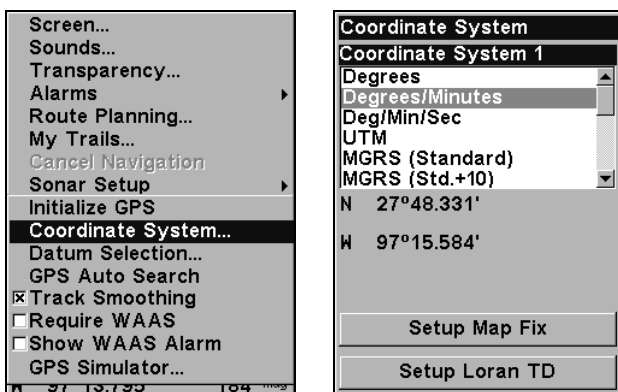
GPS Auto Search on the Satellite Status Menu.

You can force the unit to immediately kick into auto search mode. Here's how:

1. Press **PAGES** | ← to **MAP** | ↓ to **SATELLITES**.
2. Press **MENU** | ↓ to **GPS AUTO SEARCH** | **ENT** | ← to **YES** | **ENT**.

Coordinate System Selection

The Coordinate System Menu lets you select the coordinate system to use when displaying and entering position coordinates.



Menus for changing coordinate system used to display positions.

To get to Coordinate System Selection:

1. Press **MENU** | **MENU** | ↓ to **GPS SETUP** | **ENT**.
2. Press ↓ to **COORDINATE SYSTEM** | **ENT**.

This unit can show a position in degrees (36.14952°); degrees, minutes and thousandths of a minute (36° 28.700'); or degrees, minutes, seconds and tenths of a second (36° 28' 40.9"). It can also show position in: UTM (Universal Transverse Mercator) projection; MGRS (Standard); MGRS (Standard + 10); Map Fix; Loran TD; British, Irish, Finnish, German, New Zealand, Swedish, Swiss, Taiwan, Greek and Military grids.

UTM's are marked on USGS topographic charts. This system divides the Earth into 60 zones, each 6 degrees wide in longitude.

British, Irish, Finnish, German, New Zealand, Swedish, Swiss, Taiwan, and Greek grid systems are each the national coordinate system used only in their respective countries. In order to use these grid systems, you must be in the respective country. This unit will pick the matching datum for you when you select the grid. See the entry on Map Datum Selection for more information.

The military grid reference system (MGRS) uses two grid lettering schemes, which are referred to as standard and standard + 10 MGRS

on this unit. Your position and datum in use determines which one to use. If you use standard, and your position is off significantly, then try the alternate.

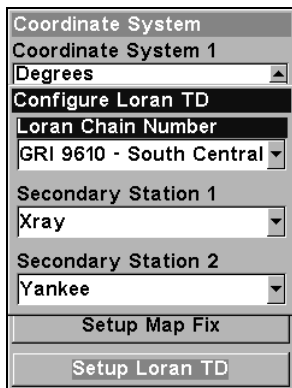
NOTE: When the position format is changed, it affects the way all positions are shown on all screens. This includes waypoints.

To change the coordinate system, press **ENT** while **COORDINATE SYSTEM** is highlighted. Press the \uparrow or \downarrow arrow keys to highlight the desired format. Press **ENT** to select it. Press **EXIT** to erase the menus.

To setup Loran TD:

NOTE:

If the Loran TD conversion is chosen, you must enter the local Loran chain identification for the master and slaves. Do this by selecting "Setup Loran TD" at the bottom of the "Coordinate System" menu and select the ID. Press **EXIT** to erase this menu.



Configure Loran TD menu.

Map Fix

Map Fix is used with charts or maps. This system asks for a reference position in latitude/longitude, which you take from a marked location on the map. It then shows the present position as distance on the map from that reference point.

For example, if it shows a distance of UP 4.00" and LEFT 0.50", you then measure up four inches and to the left a half-inch from the reference point on the map to find your location.

To configure a map fix:

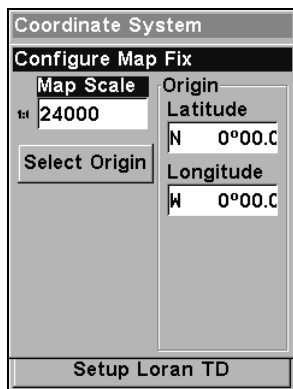
To use this format, you need to follow these steps in order. First, take your map of the area and determine a reference latitude/longitude. (Please note that in order for this system to work, the lati-

tude/longitude lines must be parallel with the edge of the map. USGS maps are parallel, others may not be. Also, this works better with smaller scale maps.) The reference position can be anywhere on the map, but the closer it is to your location, the smaller the numbers will be that you'll have to deal with.

Once you've decided on a reference position, you must save it as a waypoint. (See the waypoint section for information on saving a waypoint.) After you've saved the reference position as a waypoint, exit from the waypoint screens.

1. Press **MENU | MENU | ↓ to GPS SETUP | ENT.**
2. Press **↓ to COORDINATE SYSTEM | ENT.**
3. Press **↓ to SETUP MAP FIX | ENT.**

The following screen appears, and **MAP SCALE** is highlighted. Press **ENT** and enter the map's scale one numeral after another. The scale is generally at the bottom of the paper map. It's shown as a ratio, for example 1:24000. When the scale is entered, press **EXIT** and the unit returns to the Configure Map Fix screen.

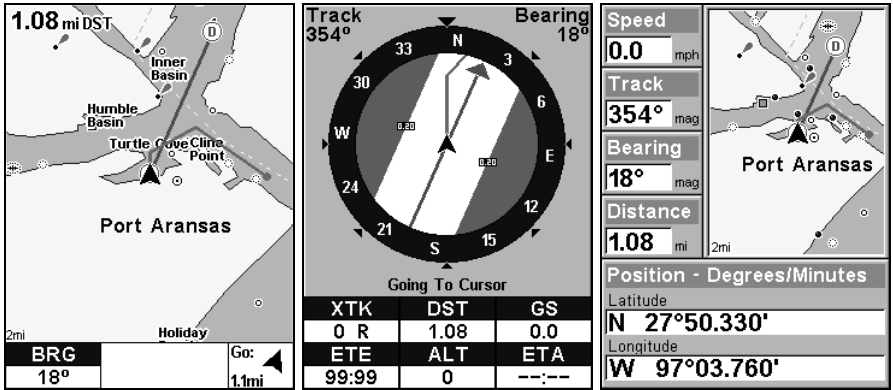


Configure a map fix so the M68 can find your position on a printed chart or topographical map.

Press **↓ to SELECT ORIGIN | ENT | ENT | ENT** to bring up the waypoint list. Select the waypoint that you saved the reference point under and press **ENT**. The unit displays a waypoint information screen with the command **SET AS ORIGIN** selected; press **ENT** and the unit returns to the Configure Map Fix menu. Finally, press **EXIT** to erase this menu. Now press **↑ to COORD SYSTEM | ENT**, select **MAP FIX** from the list and press **ENT | EXIT**. All position information now shows as a distance from the reference point you chose.

Customize Page Displays

The Full Map, Navigation and Position pages can all be customized to display many different types of navigation information in data boxes.



Pages can be customized by turning data boxes on or off.

These data boxes (sometimes referred to as text boxes, data windows or information displays) are controlled with the Customize command. The boxes usually appear at the edge of the display screen. Information type is abbreviated on the Map and Navigation pages, but spelled out on the Position page.

The Position Page boxes cannot be turned off; you can only change what information type is displayed in each window. In the previous Map Page figure, the Distance (1.48 mi DST) shown in the top left corner does not appear in a box. Unboxed text that "floats" on top of the screen is controlled by the Overlay Data command, discussed later in this section.

Customize Map or Navigation Page

While on the Map or Navigation pages, press **MENU** | **↓** to **CUSTOMIZE** | **ENT**. Press **↓** or **↑** to select a data box you would like to see on the page. With the data option highlighted, press **ENT**. The selected data option is checked and moves to the top of the list. After all options are set, press **EXIT** to return to the page display. Boxes at the bottom of the screen now provide the customized data.

NOTE:

The Map Page can display as many as six data boxes, plus the steering arrow box. The Navigation Page can display six data boxes. To turn off a data box, use the same instructions described above to uncheck a data option.

Customize Position Page

This page has four boxes you can customize. While on the GPS Position Page, press **MENU** | **↓** to **CUSTOMIZE** | **ENT**. The data box in the top left cor-

ner begins flashing. Use the arrow keys to select the box you want to change. With the display box highlighted and flashing, press **ENT** to open a list of options. Scroll **↑** and **↓** to select a different data option, then press **ENT**.

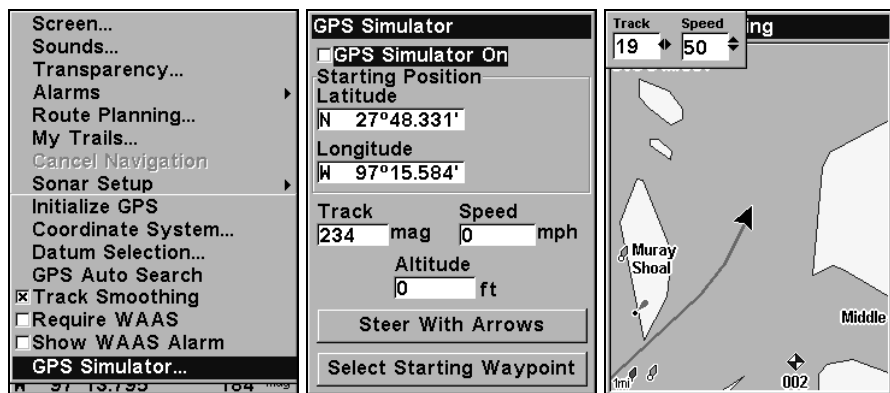
You can repeat these steps to change the display in another box. When all the changes are finished, press **EXIT** to return to the page display.

GPS Simulator

The GPS simulator lets you use the unit as if you were outdoors navigating somewhere. It's a great way to practice using your unit. You can set the starting location by entering latitude/longitude (Starting Position) or from a stored waypoint or map place location (**CHOOSE START** command). You can steer and change speed on the map by using the arrow keys (**STEER WITH ARROWS** command) or by setting the track and speed in the dialog boxes provided on the simulator menu screen.

To get to the GPS Simulator:

1. Press **MENU | MENU | ↓** to **GPS SETUP | ENT**.
2. Press **↓** to **GPS SIMULATOR | ENT**. The GPS Simulator Menu appears.



GPS Setup Menu, left; GPS Simulator menu, center.

Map Page showing Track and Speed steering arrow indicators, right.

In this example, you are "traveling" across Mudisland Point on a track of 19° at a speed of 50 miles per hour.

Make the desired settings for Track, Speed and Start location, then turn the simulator on by highlighting the **SIMULATOR ON** box and pressing **ENT**. Press **EXIT | EXIT | EXIT** to erase this menu. (If you want, you can turn on the simulator *and* the steering arrows at the same time with one keystroke. Instead of the **SIMULATOR ON** box, highlight **STEER W/ ARROWS** and press **ENT**.) A message and tone appear periodically, warning you that the simulator is on. To turn the simulator off, repeat the

above steps or turn the unit off.

While in simulator mode, you can press **EXIT** to clear the steering and speed boxes from the screen while continuing the simulation. This will allow you to use the map cursor during a simulation. . To turn steering and speed boxes back on again, return to the GPS Simulator menu, select the **STEER WITH ARROWS** command, press **ENT**.

Simulating Trail or Route Navigation

In Simulator mode, your unit can automatically follow a trail or route without manual steering if you use these steps:

1. From the Map Page, go to the simulator menu. Use the **SELECT START** command to pick a starting position at or near the beginning of your trail/route.
2. Set **SPEED** to zero. Select **STEER WITH ARROWS** command and press **ENT**, which turns on the simulator and returns you to the Map Page.
3. Begin navigating along the trail/route. (If you are close enough to the first waypoint, the arrival alarm will usually go off as soon as navigation begins. Press **EXIT** to clear the alarm.) When navigation starts, press **↑** to increase speed to the desired setting.
4. Press **EXIT** to turn off the steering and speed boxes. The unit will now automatically "steer" along the trail or route. When you arrive at your "destination," cancel navigation as you normally do.

Tip:

You can pick any spot on the map to begin your simulation session by using the Initialize GPS command. This makes your unit think it's located at the position you select. See the following entry for details.

Initialize GPS

This command is handy when you are practicing in simulator mode. (See the previous entry for *GPS Simulator*.) In simulator mode, this command makes the unit operate as if it is sitting someplace other than its actual location. So, you and your unit could be located in Kansas City, but easily practice navigating in the ocean off Islamorada, Florida.

1. Press **MENU | MENU | ↓** to **GPS SETUP | ENT | ENT**.
2. A message appears, telling you to move the cursor near the desired location and press **ENT**. When the message automatically clears, follow the message instructions.
3. In a moment, your present position marker arrow appears on the

map in the location you selected with the cursor. The unit will consider that spot as its last known position until changed by either a live satellite lock-on or a new simulator location.

Map Auto Zoom

This receiver has an auto zoom feature that eliminates much of the button pushing that other brands of GPS receivers force you to make. It works in conjunction with the navigation features.

First, start navigation to a waypoint. (See the waypoint section for more information on navigating to a waypoint.) Then, with the auto zoom mode on, the unit zooms out until the entire course shows, from the present position to the destination waypoint. As you travel toward the destination, the unit automatically begins zooming in — one zoom range at a time — always keeping the destination on the screen.

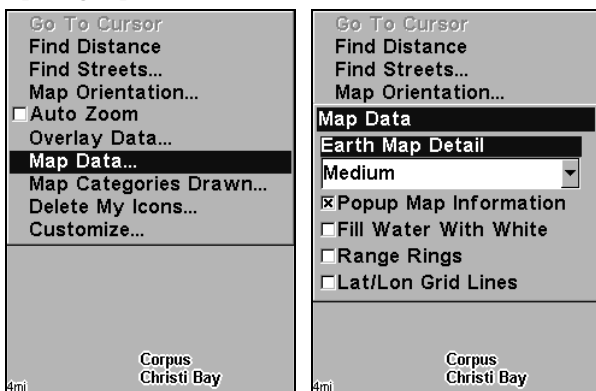
To turn this feature on, from the **MAP PAGE**, press **MENU** | ↓ to **AUTO ZOOM** | **ENT** | **EXIT**. Repeat these steps to turn it off.

Map Data

This menu lets you turn the map off, if desired (which turns the map screen into a GPS plotter); turn off or on the pop-up map info boxes; or fill water areas with white. You can also turn on or off Map Overlays, which display latitude and longitude grid lines or range rings on the map.

To get to Map Data:

From the Map Page, press **MENU** | ↓ to **MAP DATA** | **ENT**.



Map Menu, left, Map Data Menu, right.

Earth Map Detail

From the Map Page, press **MENU** | ↓ to **MAP DATA** | **ENT**. Press **ENT** to adjust the level of mapping details shown. Select **OFF** to change the unit to a simple plotter. After the option is set, press **EXIT** | **EXIT** to return to the page display.

Pop-up Map Info

From the Map Page, press **MENU** | ↓ to **MAP DATA** | **ENT**. Press ↓ to **POPUP MAP INFORMATION**. With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off.) After the option is set, press **EXIT** | **EXIT** to return to the page display.

Fill Water With White

From the Map Page, press **MENU** | ↓ to **MAP DATA** | **ENT**. Press ↓ to **FILL WATER WITH WHITE**. With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off.) After the option is set, press **EXIT** | **EXIT** to return to the page display.

Map Overlays (Range Rings; Lat/Long Grid)

The map screen can be customized with four range rings and/or grids that divide the screen into equal segments of latitude and longitude.

Range rings are handy for visually estimating distances on the map. The ring diameters are based on the current zoom range. For example: at the 100 mile zoom, the screen will show two rings with your current position in the center. The large ring touching the left and right sides of the screen is 100 miles in diameter (same as the zoom range). The second smaller ring is 50 miles in diameter (always 1/2 the zoom range).

The distance from your current position to the smaller ring (the ring's radius) is 25 miles (always 1/4 the zoom range). With the arrow keys and map cursor, you can scroll the map to see the third and fourth rings. In this example, the distance to the third ring is 75 miles and distance to the fourth ring is 100 miles from your current position.

To set range rings: From the Map Page, press **MENU** | ↓ to **MAP DATA** | **ENT**. Press ↓ to **RANGE RINGS**. With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off.) After the option is set, press **EXIT** | **EXIT** to return to the page display.

To set Lat/Long Grid: From the Map Page, press **MENU** | ↓ to **MAP DATA** | **ENT**. Press ↓ to **LAT/LON GRID LINES**. With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off.) After the option is set, press **EXIT** | **EXIT** to return to the page display.

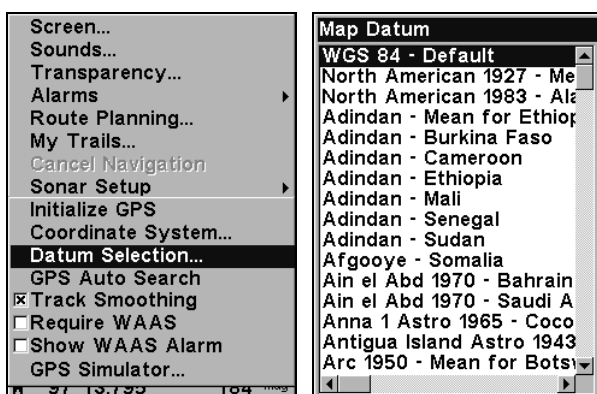
Map Datum Selection

Maps and charts are based on a survey of the area that's covered by the map or chart. These surveys are called "Datums." Maps that are created using different datums will show the same latitude/longitude in slightly different locations.

All datums are named. The GPS system is based on the WGS-84 datum, which covers the entire world. Other datums may also cover the entire world, or just a small portion of it. By default, your position shows using the WGS-84 datum. However, it can show your position using one of 191 different datums. Different datums can be selected; to change the datum:

1. Press **MENU | MENU | ↓** to **GPS SETUP | ENT | ↓** to **DATUM SELECTION | ENT**.
2. Scroll **↓** or **↑** to select the desired datum, then press **ENT**.
3. To return to the last page displayed, press **EXIT | EXIT**.

A list of the datums used by this unit is in the back of this manual.



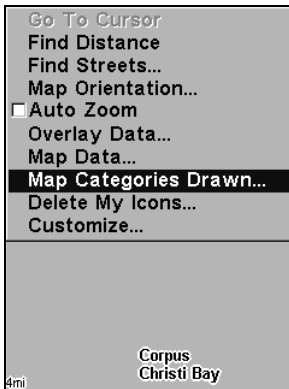
GPS Setup Menu, left, Map Datum Menu, right.

Map Detail Category Selection

This menu determines which of the mapping features are shown on the screen. This includes, waypoints, trails, icons, cities, highways, etc. You can selectively turn on or off any of these items, customizing the map to your needs.

To get to Map Categories:

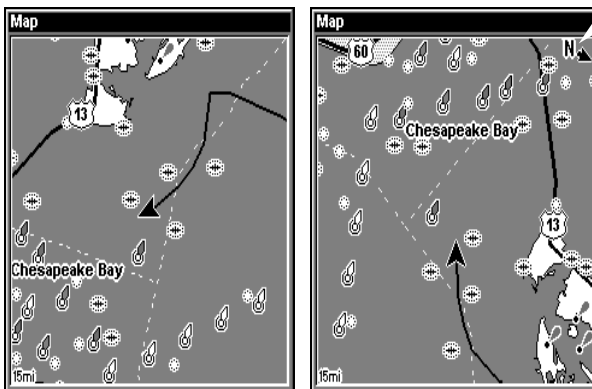
1. From the Map Page, press **MENU | ↓** to **MAP CATEGORIES | ENT**.
2. Press **↑** or **↓** to select a category (then press **→** to cycle through any available subcategories). Press **ENT** to turn the selected category or subcategory off (no check) or on (checked.)
3. To return to the last page displayed, press **EXIT | EXIT**.



Map Menu, left, Map Categories Drawn Menu, right.

Map Orientation

By default, this receiver shows the map with north always at the top of the screen. This is the way most maps and charts are printed on paper. **In Track Up mode, map shows "N" and arrow to indicate north.**



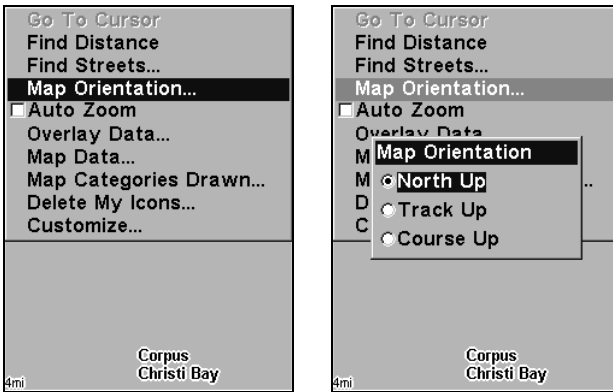
Map orientation at left is shown in north up and at right, track up.

This is fine if you're always traveling due north. What you see to your left corresponds to the left side of the map, to your right is shown on the right side of the map, and so on. However, if you travel any other direction, the map doesn't line up with your view of the world.

To correct this problem, a track-up mode rotates the map as you turn. Thus, what you see on the left side of the screen should always be to your left, and so on.

Another option is course-up mode, which keeps the map at the same orientation as the initial bearing to the waypoint. When either the track-up or course-up mode is on, an "N" shows on the map screen to help you see which direction is north.

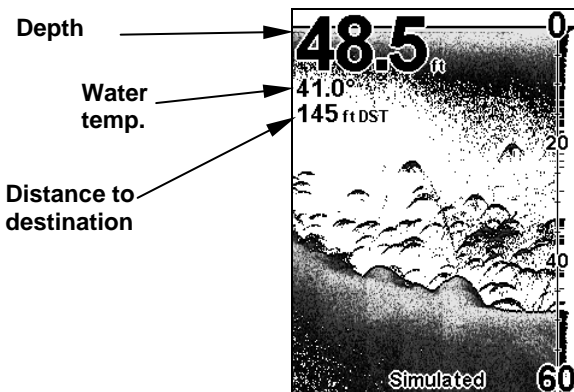
To change map orientation: from the Map Page, press **MENU** | **↓** to **MAP ORIENTATION** | **ENT**. Use **↑** or **↓** to select the desired mode, then press **ENT**. Press **EXIT** | **EXIT** to return to the page display.



Map Menu, left; Map Orientation menu with the North Up map orientation option selected, right.

Overlay Data

The Sonar Page and the Map Page can be customized to show many different types of navigation information as text that "floats" on top of the screen. This is called overlay data and is controlled by the Overlay Data command.



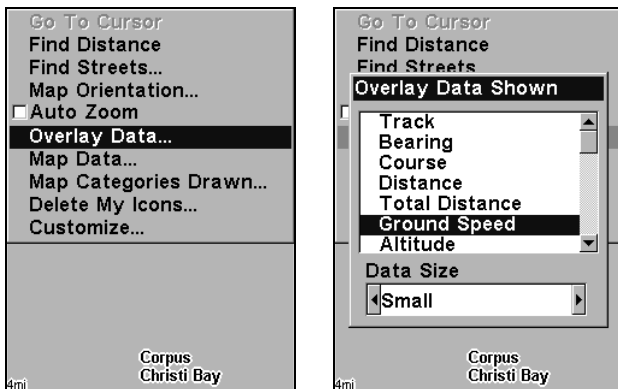
Sonar Page with Overlay Data turned on. This example shows Depth, Water Temp. and the Distance to the next waypoint in the current route.

Overlay data uses many of the same types of information available in data boxes (see *Customize Page Displays* earlier in this section), but the overlaid text is shown without boxes. It's another feature that lets you fully customize the screens to fit your viewing preferences.

To change the digital data shown on top of the Sonar Page or the Map Page: First, press **PAGES**, use → or ← to select a *Page Name*, then press **EXIT**.

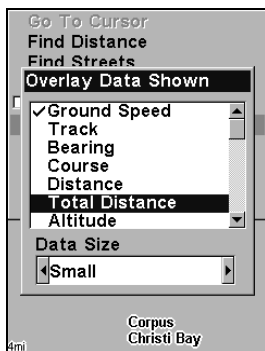
To select data for display:

1. From the Map or Sonar page, press **MENU** | ↓ to **OVERLAY DATA** | **ENT**.
2. Press ↓ or ↑ to select *Data Type* | **ENT**.



Overlay Data command on the GPS Menu, at left. **Overlay Data Shown** selection menu, right. In this example, we scrolled down the data list to highlight "Ground Speed."

When selected, the data type shifts to the top of the data list and a check mark appears beside the data type. (If you wish, you may now use ↓ or ↑ to select other Data Types for display.)



Data list showing "Ground Speed" selected to display on Map Page.

3. To return to the previous page, press **EXIT** | **EXIT**.

To turn off displayed data:

1. From the Map or Sonar page, press **MENU** | ↓ to **OVERLAY DATA** | **ENT**.
2. Press ↓ or ↑ to select *Data Type* | **ENT**. The selected data type disappears from the top of the list and reverts to its previous, unchecked position. (If you wish, you may now use ↓ or ↑ to select other Data Types to turn off.)

3. To return to the previous page, press **EXIT | EXIT**.

To change displayed data font size:

1. From the Map or Sonar page, press **MENU | ↓** to **OVERLAY DATA | ENT**.
2. Press **↓** or **↑** to select *Data Type* | press **→** or **←** to *Data Size* | **EXIT | EXIT**. The selected data type will be displayed in the new size. (To change the font size for more than one Data Type at the same time, just follow the above steps, but make all the needed changes before you press Exit to clear the menu.)

Tip:

If you wish, you can change the font size when you select a data type for the first time:

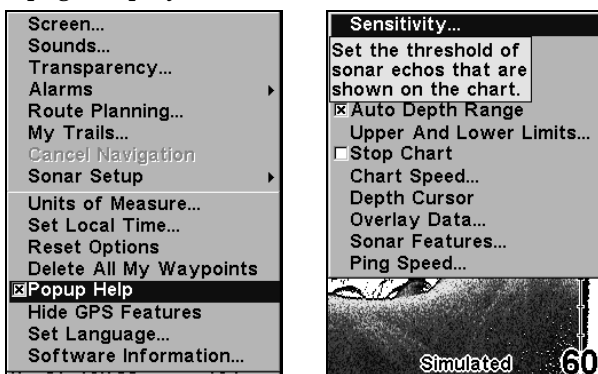
1. From the Map or Sonar page, press **MENU | ↓** to **OVERLAY DATA | ENT**.
2. Press **↓** or **↑** to select *Data Type* | press **→** or **←** to select *Data Size* | **ENT**.

The data will be shown in the new font size. To return to the previous page, press **EXIT | EXIT**.

Pop-up Help

Help is available for virtually all of the menu labels on this unit. By highlighting a menu item and leaving it highlighted for a few seconds, a "pop-up" message appears that describes the function of the menu item. This feature is on by default.

To set up Pop-up Help: Press **MENU | MENU | ↓** to **SYSTEM SETUP | ENT | ↓** to **POPUP HELP**. With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off.) After the option is set, press **EXIT | EXIT** to return to the page display.



System Setup Menu, left, with Pop-up Help command highlighted. At right, this example shows the Pop-up Help message for the Sensitivity command, located on the Sonar Menu.

Reset Options

To reset all features to their factory defaults:

Press **MENU | MENU | ↓** to **SYSTEM SETUP | ENT | ↓** to **RESET OPTIONS | ENT | ←** to **YES | ENT**.

NOTE:

Reset Options does *not* erase any waypoints, routes, icons, plot trails or sonar logs.



System Menu with Reset Options command selected.

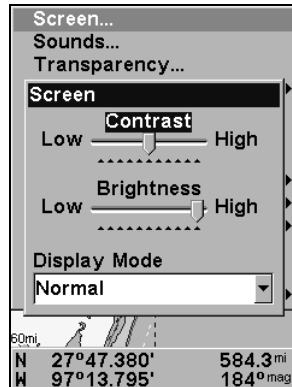
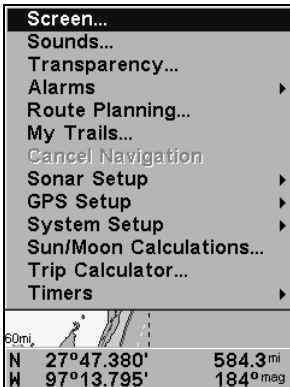
Screen Contrast and Brightness

To access the Screen menu, press **MENU | MENU | ENT**.

Once in the Screen menu:

To adjust the display's contrast:

The **CONTRAST** slider bar is already selected. Press **→** or **←** to move the bar. The left end of the scale is minimum contrast; the right end is maximum contrast.



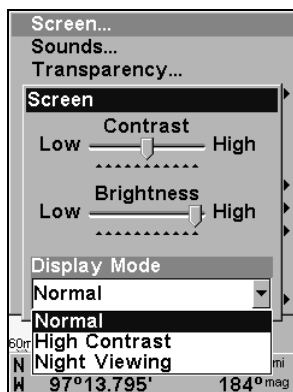
Screen Command, left, and Screen Menu with Contrast bar selected, right.

To adjust the display's brightness:

Press ↓ to **BRIGHTNESS**. Press → or ← to move the bar. The left end of the scale is minimum contrast; the right end is maximum contrast.

To adjust the screen's display mode:

Press ↓ to **DISPLAY MODE** | **ENT** | press ↑ or ↓ to select *mode* | **EXIT**.



Display Mode menu.

Set Language

This unit's menus are available in 10 languages: English, French, German, Spanish, Italian, Danish, Swedish, Russian, Dutch and Finnish. To select a different language:

1. Press **MENU** | **MENU** | ↓ to **SYSTEM SETUP** | **ENT**.
2. Press ↓ to **SET LANGUAGE...** | **ENT**.
3. Use ↓ or ↑ to select a different language and press **ENT**. All menus now appear in the language you selected.

Set Local Time

Using the correct local time setting is handy when estimating local arrival time while navigating. Also, the time and date are saved when a waypoint is created.

To access the Set Local Time menu, you must first acquire your position. Once that is done: press **MENU** | **MENU** | ↓ to **SYSTEM SETUP** | **ENT** | ↓ to **SET LOCAL TIME** | **ENT**.

Once in the Time Settings menu:

To set Local Time: Press **ENT**. Press ↑ or ↓ to change the first character, then press → to move the cursor to the next character. Repeat until the time is correct, then press **ENT**.

To set the Month: Press ↓ to **MONTH|ENT**. Press ↑ or ↓ to select the month, then press **ENT**.

To set the Day: Press → to **DAY|ENT**. Press ↑ or ↓ to select the day, then press **ENT**.

To set the Year: Press → to **YEAR|ENT**. Press ↑ or ↓ to select the year, then press **ENT**.

The last field in this menu is **CONFIG DST**. This feature allows your unit to automatically adjust with the time change caused by Daylight Saving Time (you should only have to set it once). You may select which set of rules matches DST in your region, or simply accept the default.

Once you have each field set the way you want, press **EXIT** repeatedly until you return to the previous page.

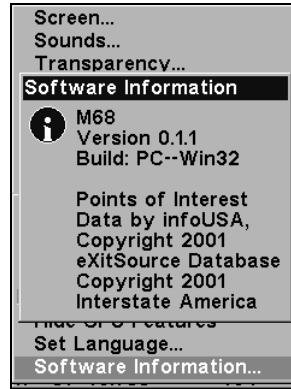
Show WAAS Alarm

When the signal is available, your unit will automatically use WAAS to boost the accuracy of the position fix. When the WAAS signal is lost or acquired, an alarm message appears. Since the U.S. government is still developing the WAAS system, it's not unusual for a GPS/WAAS receiver to frequently lose and reacquire its lock on a WAAS satellite. That can result in the alarm repeatedly going on and off. If you want, you have the option of turning off the WAAS Acquired/Lost alarm without affecting how the unit uses WAAS. Here's how:

1. Press **MENU | MENU | ↓** to **GPS SETUP | ENT | ↓** to **SHOW WAAS ALARM**.
2. With the option highlighted, press **ENT** to uncheck it (turn off) and check it (turn on). After the option is set, press **EXIT|EXIT** to return to the page display.

Software Version Information

From time to time, Lowrance updates the operating system software in some of its products. These upgrades make the unit perform better or introduce a new feature or function. You can find out what software version is running in your M68 by using the Software Information command.



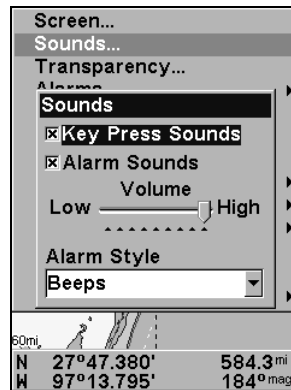
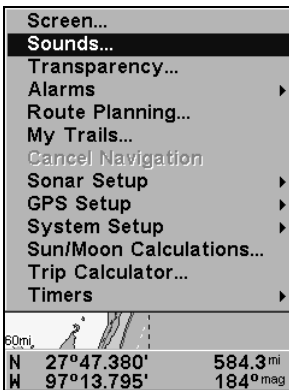
At left, Main Menu with Software Information command selected.
At right, the Software Information screen.

1. Press **MENU | MENU | ↓** to **SYSTEM SETUP | ENT|↓** to **SOFTWARE INFO | ENT**.
2. Read the information displayed on the screen.
3. To return to the last page displayed, press **EXIT | EXIT | EXIT**.

Sounds and Alarm Sound Styles

Sounds triggered by key strokes and alarms can be adjusted:

You first press **MENU | MENU | ↓** to **SOUNDS | ENT**.



Sounds command, left. At right, the Sounds menu.

Once in the Sounds menu:

To set Key Press Sounds: With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off). After the option is set, press **EXIT|EXIT** to return to the page display.

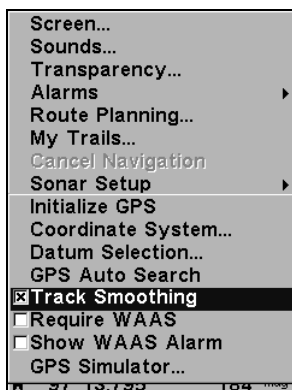
To set Alarm Sounds: Press ↓ to **ALARM SOUNDS**. With the option highlighted, press **ENT** to check it (turn on) and uncheck it (turn off). After the option is set, press **EXIT|EXIT** to return to the page display.

To set Alarm Volume: Press ↓ to **VOLUME**. Press → or ← to move the bar. The left end of the scale is low volume; the right end is high volume. After the option is set, press **EXIT|EXIT** to return to the page display.

To set Alarm Style: Press ↓ to **ALARM STYLE** | **ENT**. Press ↑ or ↓ to change the style, then press **ENT**. After the option is set, press **EXIT|EXIT** to return to the page display.

Track Smoothing

This is a factory setting on the GPS Setup menu that *should always be left on*. When stopped or traveling at slow speeds (such as walking or trolling), Track Smoothing prevents wandering of trails, the steering arrow, compass rose and a map in track-up mode.



Track Smoothing option, turned on.

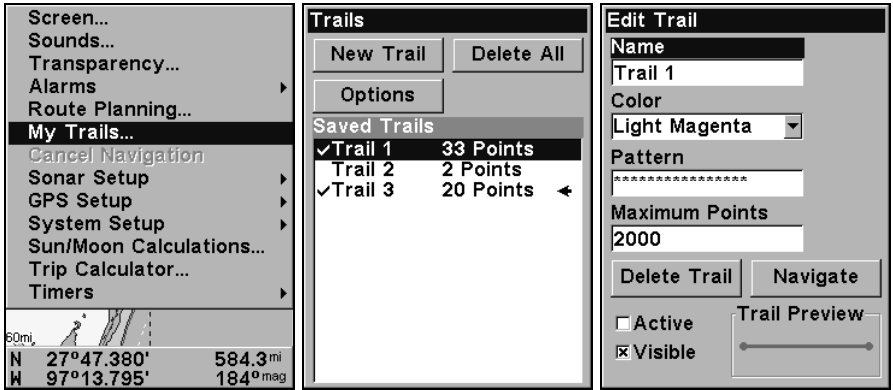
Trail Options

There are several options you can use with trails. Some affect all trails, other options can be applied to a particular trail. You can change the way trails are updated, you can display or hide trails, create a new trail, delete a trail, etc.

General Trail Options

To access the Trails Menu:

Press **MENU | MENU** | ↓ to **MY TRAILS** | **ENT**.



Main Menu, left, Trails Menu, center, Trail Options, right.

Delete All Trails

To remove all of the trails from memory: from the Trails Menu, press → to **DELETE ALL** | **ENT** | ← to **Yes** | **ENT**.

Update Active Trail Option

This menu lets you change the way the trail updates occur.

WARNING:

If you *uncheck* the **Update Trail option**, automatic trail creation and recording will be turned *off*. You must turn it back on to record trails. The default setting is on.

From the Trails Menu, press → to **TRAIL OPTIONS** | **ENT**. With **UPDATE TRAIL** highlighted, press **ENT** to check it (turn on) and uncheck it (turn off).

Update Trail Criteria (Auto, Time, Distance)

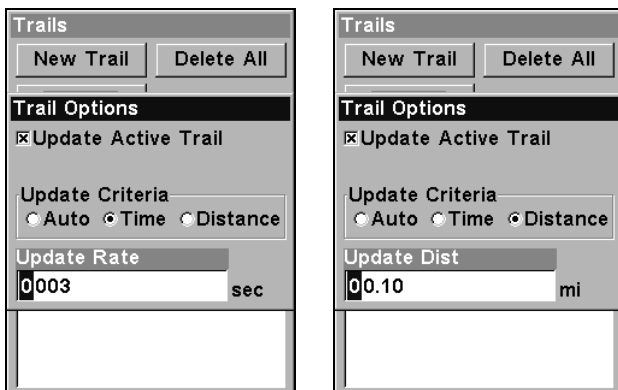
The options are: automatic, time, or distance. When it's in the default automatic mode, the unit doesn't update the plot trail while you're traveling in a straight line. Once you deviate from a straight line, the unit "drops" a plot point (trail waypoint) onto the trail. This conserves plot trail points. If a plot trail uses all of the available points allotted to it, the beginning points are taken away and placed at the end of the trail.

From the Trails Menu, press → to **TRAIL OPTIONS** | **ENT** | ↓ to **UPDATE CRITERIA** | **ENT**. Press ↑ or ↓ to select *criteria type* | **ENT**. If you selected Time, the Update Rate data entry box appears on the menu. If you selected Distance, the Update Distance data entry box appears on the menu.

Trail Update Rate (Time, Distance)

You can update a trail by time, with a range from 1 second to 9999 seconds; the default is 3 seconds. You can update by distance, with a range from 0.01 mile/nm/km to 9.99 mile/nm/km; the default is 0.10 miles.

With one of the Update Criteria selected, use the cursor arrows to highlight either the **UPDATE RATE** or **UPDATE DISTANCE** data entry boxes and press **ENT**. Press **↑** or **↓** to change the first character, then press **→** to the next character and repeat until the entry is correct. Press **EXIT** to return to the Trail Options Menu.

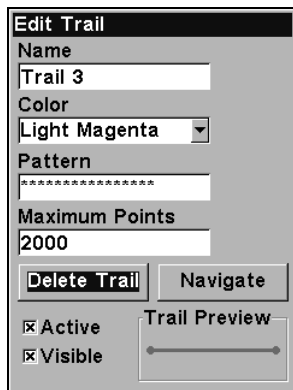


Trail Options menu: Update Time Rate setting, left, and Update Distance setting, right.

Specific Trail Options

Delete Trail

To delete a specific trail: From the Trails Menu, press **↓** to *Trail Name* | **ENT**. The Edit Trail menu appears as seen in the following figure. Press **↓** to **DELETE TRAIL** | **ENT** | **←** to **YES** | **ENT**.



Edit Trail menu.

New Trail

To manually start a new trail, in the Trails Menu, use the **→** to make sure **NEW TRAIL** is highlighted and press **ENT** | **EXIT**.

Trail Visible/Invisible and Other Trail Options

The name, maximum number of points in the trail, activity, and visibility are all changed on the Edit Trail menu screen. The Active setting determines whether or not the unit is recording new points for a particular trail.

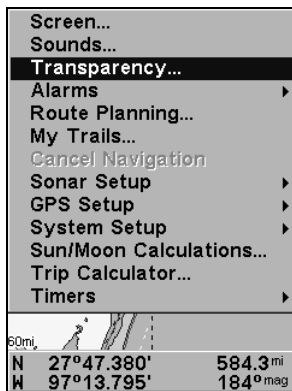
On the Edit Trail menu, press ↓ or ↑ to highlight the section you wish to change, then press **ENT**. Make your changes, then press **EXIT** to erase this menu.

You can also change the trail line color and pattern. For instructions, see the entries on Edit a Trail Color and Edit a Trail in Sec. 8, *Advanced GPS Operations*.

Transparency

Use the transparency menu to adjust the transparency of menu windows. A high transparency allows you to continue monitoring the sonar chart while adjusting feature settings, though the text of the menus may fade until it is unreadable. A low transparency will usually make menu text easier to read, at the cost of watching your sonar returns.

Experiment with this feature until you find the right level of transparency for your eyes.



Main Menu with Transparency command selected.

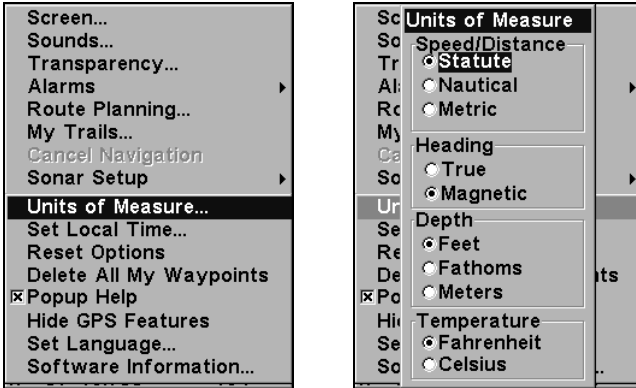
To adjust Menu Transparency level:

Press **MENU | MENU | ↓** to **TRANSPARENCY | ENT**. The **TRANSPARENCY** slider bar appears. Press ↑ or ↓ to move the bar. The lower end of the scale makes the menus opaque; the upper end is maximum transparency.

Units of Measure

This menu sets the speed and distance (statute or nautical miles, meters), depth (feet, fathoms, or meters), temperature (degrees Fahrenheit or Celsius) and heading (true or magnetic) units. To change the units:

Press **MENU | MENU | ↓** to **SYSTEM SETUP | ENT | ENT**.



Main Menu, left, Units of Measure Menu, right.

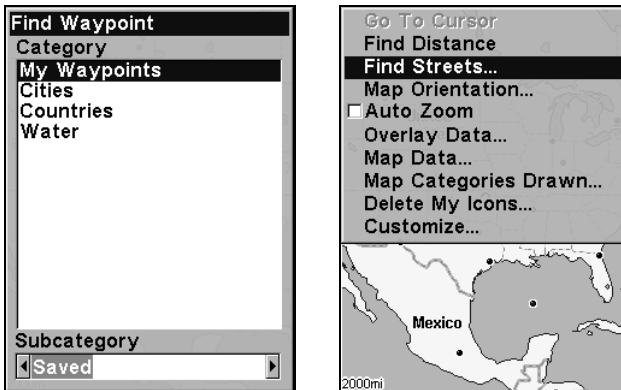
To set Units of Measure: Press ↓ to the desired units, then press **ENT**. After all the options are set as desired, press **EXIT | EXIT | EXIT** to return to the page display.

Section 10: Searching

NOTE:

The background map loaded in your unit lets you search for highways and arterial streets in the U.S., as well as land features, including cities and lakes. For a complete description of what detail is found in the background map, see page 89.

The unit's search functions all begin with either the Find Waypoint menu or the Map Page menu. Press **WPT** and the Find Waypoint menu appears for waypoints and land features. From the Map Page, press **MENU** and the Map Page menu appears for streets and intersections.



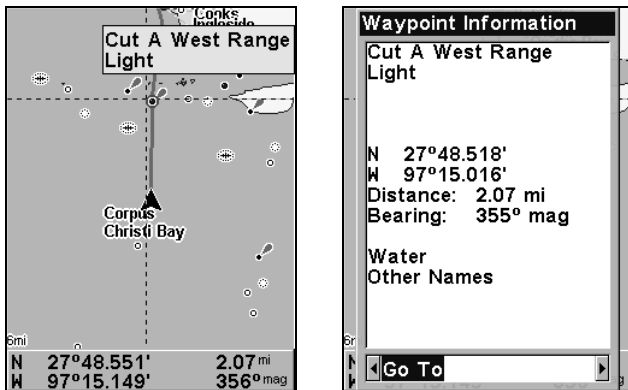
Find Waypoint menu, left and Map Page menu, right.

NOTE:

You can search for items even if the unit hasn't acquired a position yet, or start from a position other than your own. When you do a search, distance and bearing to the selected item will be calculated from the unit's current position. If the unit hasn't acquired a position, it will use the last known position. If the cursor is active, the unit will *always* begin the search at the cursor. You can look up items by name, or search for the item nearest to you.

Find Any Item Selected by Map Cursor

On the Map Page: with a map feature selected by the cursor press **WPT**. To return to the previous page, press **EXIT**.



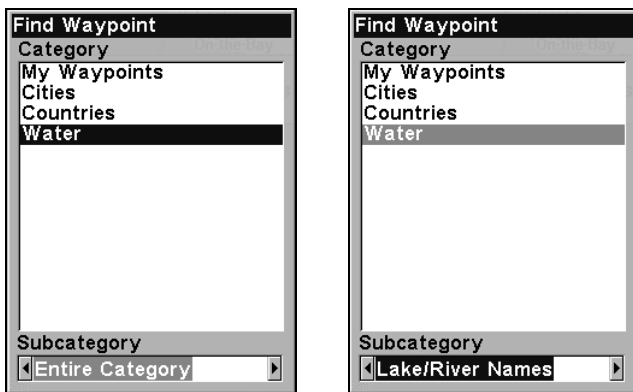
A Map Place selected by the cursor, left, Waypoint Information screen, right.

NOTE:

Since the Go To command is highlighted, you can navigate to the selected map place by pressing **ENT|EXIT** while in the Waypoint Information screen.

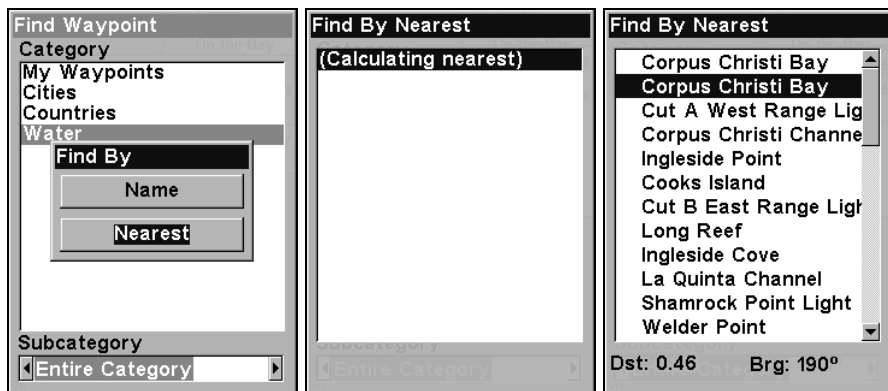
Find Map Places

1. Press **WPT**, press **↑** or **↓** to select a map place category, then press **ENT**. You will be given two options: Search By Name or By Nearest.



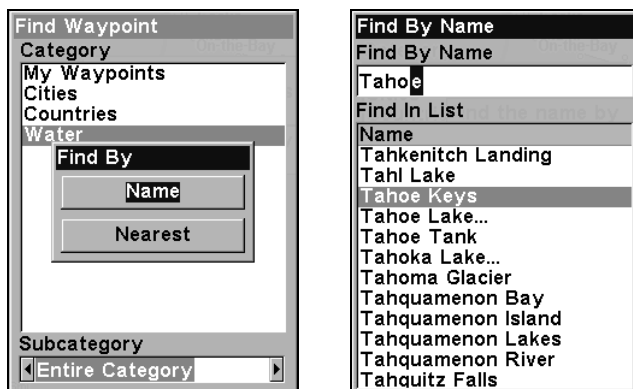
Find Waypoint menu with Water category selected, left, and with the Lake/River subcategory selected, right.

2. **Search by nearest.** Press **ENT**. The "Find By Nearest" menu will show a "calculating" screen, then a list of the nearest map places will appear. Press **↑** or **↓** to the selected map place and press **ENT** to call up the Waypoint Information screen.



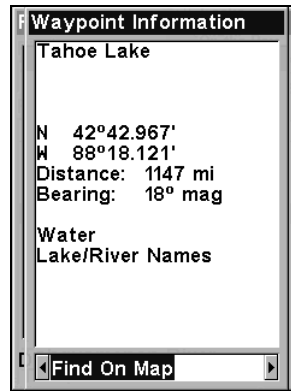
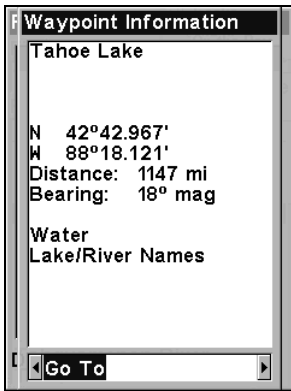
Find by Nearest option, left, Calculating screen, center, map places list, right.

3. **Search by name.** Press \downarrow |ENT. There are two options: **A.** You can **spell out** the map place in the top selection box. Press \uparrow or \downarrow to change the first letter, then press \rightarrow to move the cursor to the next letter and repeat until the name is correct, then press ENT|ENT. **B.** Jump down to the lower selection list by pressing ENT, then press \uparrow or \downarrow to select a map place from the list, then press ENT to call up the map place's Waypoint Information screen.



Find by Name option, left, Find by Name menu, right.

4. When the map place's Waypoint Information screen is displayed, you can choose to "Go To" the map place by pressing ENT or find it on the map by pressing \rightarrow |ENT.

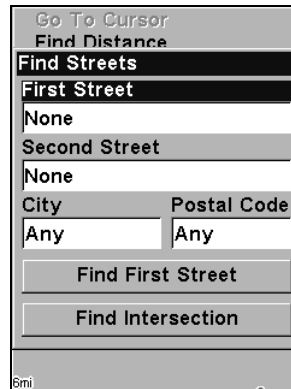
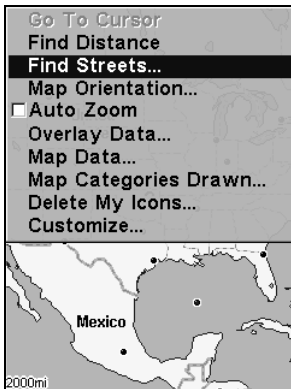


Go To Waypoint option, left; Find on Map option, right.

Find Streets or Intersections

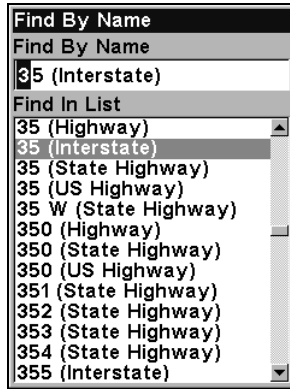
Find a Street

1. From the Map Page, press **MENU** | ↓ to **FIND STREETS** | **ENT** and the Find Streets Menu appears.



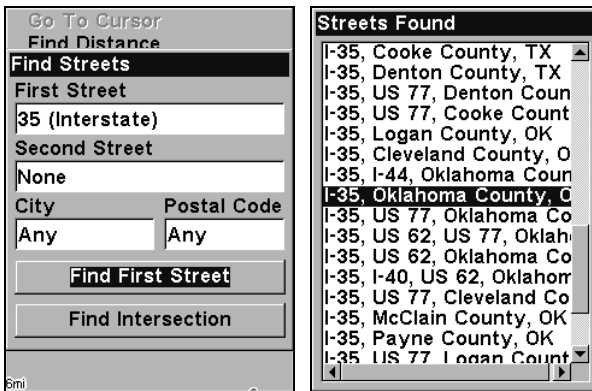
Find Streets command, left, Find Streets menu, right.

2. You must fill in a street name in the First Street dialog box. Press **ENT** to display the Find By Name menu. There are two options: **A**. You can **spell out** the street in the top selection box. Press ↑ or ↓ to change the first letter, then press → to move the cursor to the next letter and repeat until the name is correct, then press **ENT** | **ENT**. **B**. Or you can jump down to the lower box and pick a street from the **selection list**. Press **ENT**, then press ↑ or ↓ to select a street from the list and press **ENT**.



Find Street By Name menu. Spell out name in the top box, or select from the list in the lower box.

3. The Find Streets menu reappears with the street you're searching for in the First Street box. (In this example, it's I-35.) To search for that street, press \downarrow to **FIND FIRST STREET | ENT**. A message appears asking you to wait while the unit finds the street. When the Streets Found list appears, press \uparrow or \downarrow to select the street you are searching for and press **ENT**.



At left, the Find Streets menu with the Find First Street command highlighted. At right, Streets Found list.

4. The Map Page appears, with the cursor pointing to the found street.



**Map Page showing results of a street search.
The cursor points to the located street.**

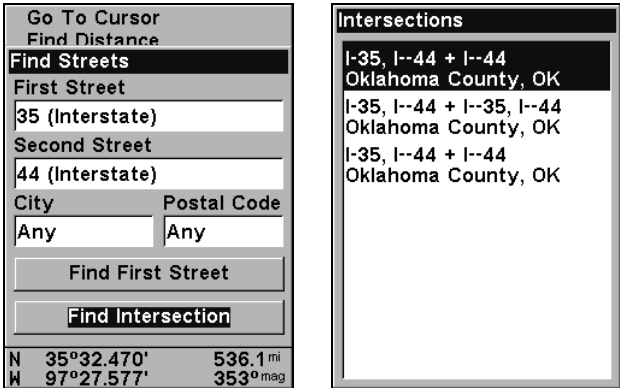
If you want to navigate to the found street at the cursor location, just press **MENU | ENT | EXIT**.

Find an Intersection

You must enter one street in the First Street dialog box and enter the next street in the Second Street dialog box.

1. From the Map Page, press **MENU | ↓** to **FIND STREETS | ENT** and the Find Streets Menu appears.
2. You must fill in a street name in the First Street dialog box. Press **ENT** to display the Find By Name menu. There are two options: **A.** You can **spell out** the street in the top selection box. Press **↑** or **↓** to change the first letter, then press **→** to move the cursor to the next letter and repeat until the name is correct, then press **ENT | ENT**. **B.** Or you can jump down to the lower box and pick a street from the **selection list**. Press **ENT**, then press **↑** or **↓** to select a street from the list and press **ENT**.
3. The Find Streets menu reappears with the street you're searching for in the First Street box. (In this example, it's I-35.)
4. Now fill in the second street. Press **↓** to **SECOND STREET | ENT** and the Find By Name menu appears again. Just like before, there are two options: **A.** You can **spell out** the second street in the top selection box. Press **↑** or **↓** to change the first letter, then press **→** to move the cursor to the next letter and repeat until the name is correct, then press **ENT | ENT**. **B.** Or you can jump down to the lower box and pick a second street from the **selection list**. Press **ENT**, then press **↑** or **↓** to select a street from the list and press **ENT**.
5. The Find Streets menu reappears with the first and second street

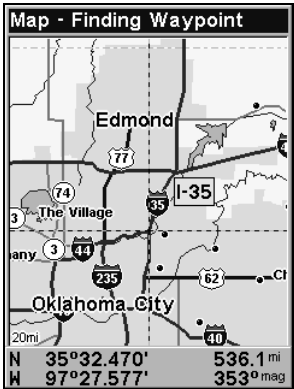
dialog boxes filled in. In this example, we selected I-44 as our second street. You could now use similar techniques to select a city or Zip code, but your search will probably be faster if you leave those boxes blank. (You can specify a city and/or Zip code later on to narrow the search, if the resulting list is too long.)



Find Intersection command highlighted, left.
Intersections Found list, right.

6. To search for the intersection of the two streets, press ↓ to **FIND INTERSECTION** | **ENT**. A message appears asking you to wait while the unit finds the intersection. When the Intersections Found list appears, press ↑ or ↓ to select the intersection you are searching for and press **ENT**. (In the previous example, we selected the intersection of I-35 and I-44.)

7. The Map Page appears, with the cursor pointing to the found intersection. The intersection in our example is shown below.



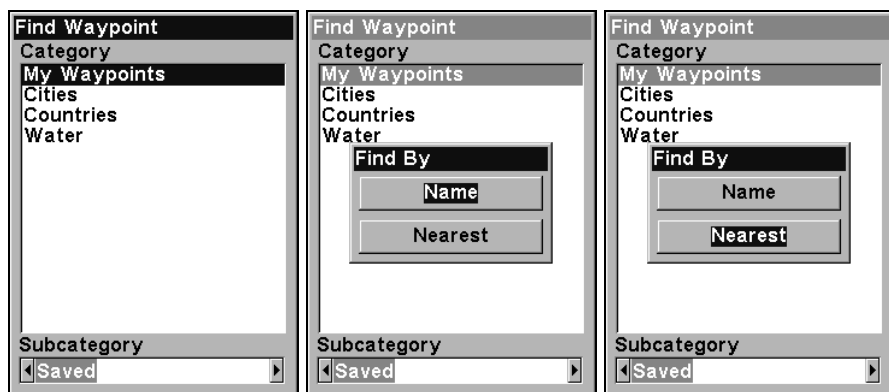
Map Page showing results of an intersection search.
The cursor points to the located intersection.

If you want to navigate to the found intersection, just press **MENU | ENT | EXIT**.

Find Waypoints

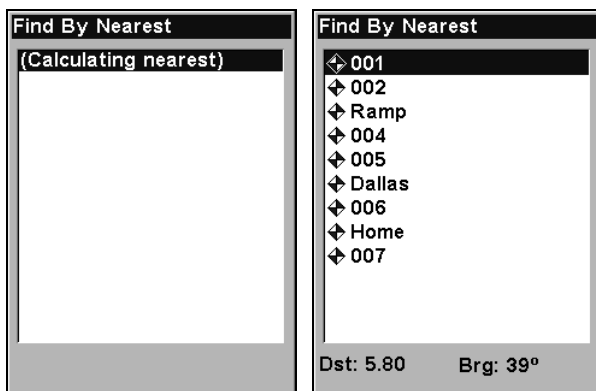
1. Press **WPT | ENT**.

2. If searching for the *Nearest* waypoint, press **ENT**. If searching for the waypoint *By Name*, press **↓** to **NEAREST | ENT**. (To search by name, jump to step 5 below.)



Find Waypoint menu, left; Find By Name command, center,
Find By Nearest command, right.

3. If you're looking for nearest, the unit says it is calculating, then a list of waypoints appears. The closest is highlighted at the top of the list and the farthest at the bottom of the list.



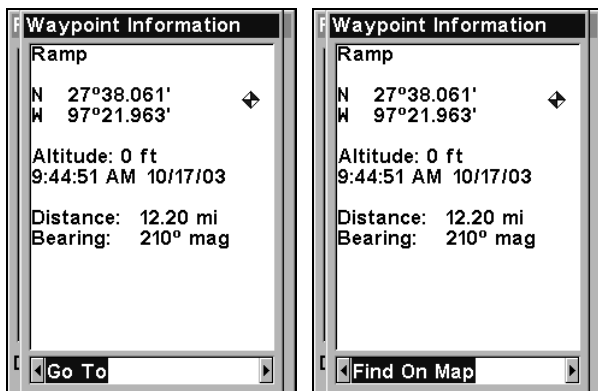
Calculating message, left, and list of the nearest waypoints, right.

4. To see location information on the closest (highlighted) waypoint, press **ENT** and the Waypoint Information screen appears. (If you

wanted to, you could select another waypoint from the list with the \uparrow or \downarrow keys.)

A. **To navigate** to the waypoint, press **ENT**. (The Go To Waypoint command is already highlighted.) The unit will show navigation information to the waypoint.

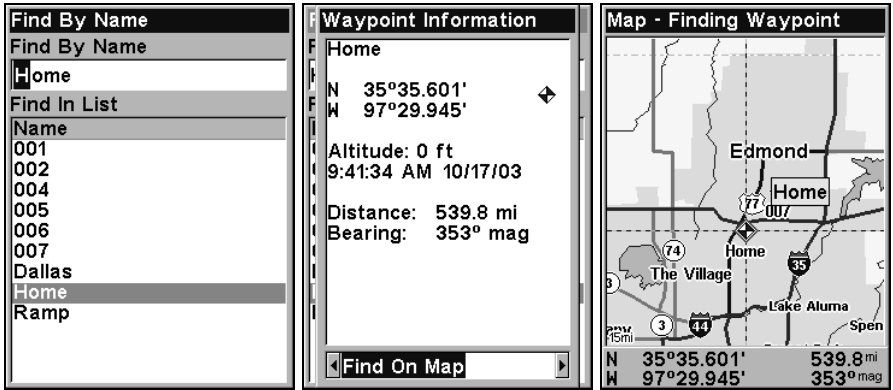
B. **To find** the waypoint, press \rightarrow to **FIND ON MAP|ENT**. The Map Page appears with the cursor highlighting the found waypoint.



Waypoint Information screens with the Go To Waypoint command selected, left, and the Find on Map command selected, right.

To clear these menus and return to the previous page, press **EXIT** repeatedly.

5. **If you're looking by name**, There are two options: **A.** You can **spell out** the name in the top selection box. Press \uparrow or \downarrow to change the first letter, then press \rightarrow to move the cursor to the next letter and repeat until the name is correct, then press **ENT|ENT**. **B.** Or you can jump down to the lower selection list by pressing **ENT**, then press \uparrow or \downarrow to select a waypoint from the list, then press **ENT**. The Waypoint Information screen appears.



Find By Name menu, left. Waypoint Information screen, center. At right, the found waypoint is highlighted by the cursor on the Map Page.

A. *To navigate* to the waypoint, press **ENT**. (The Go To Waypoint command is already highlighted.) The unit will show navigation information to the waypoint.

B. *To find* the waypoint, press **→** to **FIND ON MAP** | **ENT**. The Map Page appears with the cursor highlighting the found waypoint.

To clear these menus and return to the previous page, press **EXIT** repeatedly.

Section 11: Supplemental Material

Datums Used by This Unit

WGS 1984 Default	Zaire, Zambia and Zimbabwe	Australian Geodetic 1984 - Australia & Tasmania
Adindan Mean for Ethiopia, Sudan	Arc 1950 - Botswana Arc 1950 - Burundi	Ayabelle Lighthouse - Djibouti
Adindan Burkina Faso	Arc 1950 - Lesotho Arc 1950 - Malawi	Bellevue (IGN) - Efate & Erromango Islands
Adindan Cameroon	Arc 1950 - Swaziland	Bermuda 1957 - Bermuda
Adindan Ethiopia	Arc 1950 - Zaire Arc 1950 - Zambia	Bissau - Guinea- Bissau Bogota Observatory - Colombia
Adindan Mali	Arc 1950 - Zimbabwe	
Adindan Senegal	Arc 1960 - Mean for Kenya, Tanzania	Bukit Rimpah - Indo- nesia (Bangka & Be- litung Islands)
Adindan Sudan	Ascension Island 1958 - Ascension Island	Camp Area Astro - Antarctica (McMurdo Camp Area)
Afgooye Somalia	Astro Beacon E 1945 - Iwo Jima	Campo Inchauspe - Argentina
Ain el Abd 1970 Bahrain	Astro DOS 71/4 - St. Helena Island	Canton Astro 1966 - Phoenix Islands
Ain el Abd 1970 Saudi Arabia	Astro Tern Island (FRIG) 1961 - Tern Island	Cape - South Africa
Anna 1 Astro 1965 Cocos Islands	Astronomical Station 1952 - Marcus Island	Cape Canaveral - Bahamas, Florida
Antigua Island Astro 1943; Antigua (Lee- ward Islands)	Australian Geodetic 1966 - Australia & Tasmania	Carthage - Tunisia
Arc 1950; Mean for Botswana, Lesotho, Malawi, Swaziland,		Switzerland
		Chatham Island Astro 1971; New Zealand (Chatham Island)

Chua Astro Paraguay	European 1950 England, Channel Islands, Ireland, Scotland, Shetland Islands	L.C. 5 Astro 1961 Cayman Brac Island
Corrego Alegre Brazil		Leigon Ghana
Dabola Guinea	European 1950 Finland, Norway	Liberia 1964 Liberia
Djakarta (Batavia) Indonesia (Sumatra)	European 1950 Greece	Luzon Philippines (Exclud- ing Mindanao)
DOS 1968 New Georgia Islands (Gizo Island)	European 1950 Iran	Luzon Philippines (Min- danao)
Easter Island 1967 Easter Island	European 1950 (Sicily)	Mahe 1971 Mahe Island
European 1950 Mean for Austria, Belgium, Denmark, Finland, France, West Germany, Gi- braltar, Greece, Italy, Luxembourg, Neth- erlands, Norway, Portugal, Spain, Sweden, Switzerland	European 1950 Malta	Massawa Ethiopia (Eritrea)
	Ireland 1965 Ireland	Merchich Morocco
	ISTS 061 Astro 1968 South Georgia Is- lands	Midway Astro 1961 Midway Islands
	ISTS 073 Astro 1969 Diego Garcia	Minna Cameroon
European 1950 Mean for Austria, Denmark, France, West Germany, Netherlands, Swit- zerland	Johnston Island 1961 Johnston Island	Minna Nigeria
European 1950 Mean for Iraq, Israel, Jordan, Lebanon, Kuwait, Saudi Arabia, Syria	Kandawala Sri Lanka	Montserrat Island Astro 1958; Montser- rat (Leeward Islands)
	Kerguelen Island 1949 Kerguelen Island	M'Poraloko Gabon, Nahrwan, Oman (Masirah Is- land)
European 1950 Cyprus	Kertau 1948 West Malaysia & Singapore	Nahrwan Saudi Arabia
European 1950 Egypt	Kusaie Astro 1951 Caroline Islands	Nahrwan United Arab Emirates

Naparima BWI Trinidad & Tobago	North American 1927 Canada (Alberta, British Columbia)	Old Hawaiian Mean for Hawaii, Kauai, Maui, Oahu
North American 1927 Mean for Antigua, Barbados, Barbuda, Caicos Islands, Cuba, Dominican Republic, Grand Cayman, Jamaica, Turks Islands	North American 1927 Canada (Manitoba, Ontario)	Old Hawaiian Hawaii
North American 1927 Mean for Belize, Costa Rica, El Sal- vador, Guatemala, Honduras, Nicaragua	North American 1927 Canada (New Brunswick, New- foundland, Nova Scotia, Quebec)	Old Hawaiian Kauai
North American 1927 Mean for Canada	North American 1927 Canada (Northwest Territories, Sas- katchewan)	Old Hawaiian Maui
North American 1927 Mean for CONUS (Continental United States)	North American 1927 Canada (Yukon)	Old Hawaiian Oahu
North American 1927 Mean for CONUS (East of Mississippi River) including Lou- isiana, Missouri, Min- nesota	North American 1927 Cuba	Oman Oman
North American 1927 Mean for CONUS (West of Mississippi River)	North American 1927 Greenland (Hayes Peninsula)	Ordinance Survey Great Britain 1936 - Mean for England, Isle of Man, Scotland, Shetland Islands, Wales
North American 1927 Alaska	North American 1927 Mexico	Ordinance Survey Great Britain 1936 - England
North American 1927 Bahamas (Except San Salvador Island)	North American 1983 Alaska, Canada, CONUS	Ordinance Survey Great Britain 1936 - England, Isle of Man, Wales
North American 1927 Bahamas (San Sal- vador Island)	North American 1983 Central America, Mexico	Ordinance Survey Great Britain 1936 - Scotland, Shetland Islands
	Observaorio Metereo 1939; Azores (Corvo & Flores Islands)	Ordinance Survey Great Britain 1936 - Wales
	Old Egyptian 1907 Egypt	Pico de las Nieves Canary Islands
		Pitcairn Astro 1967 Pitcairn Island

Point 58		Tokyo
Sweden	South American 1969 Chile	Mean for Japan, Korea, Okinawa
Santo (DOS) 1965 Espirito Santo Island	South American 1969 Colombia	Tokyo Japan
Sao Braz Azores (Sao Miguel, Santa Maria Islands)	South American 1969 Ecuador	Tokyo Korea
Sapper Hill 1943 East Falkland Island	South American 1969 Ecuador (Baltra, Galapagos)	Tokyo
Schwarzeck Nambia	South American 1969 Guyana	Okinawa
Selvagem Grande Salvage Islands	South American 1969 Paraguay South American 1969 Peru	Tristan Astro 1968 Tristan da Cunha
SGS 85 Soviet Geodetic System 1985	South American 1969 Trinidad & Tobago	Viti Levu 1916 Fiji (Viti Levu Island)
South American 1969 Mean for Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad & Tobago, and Venezuela	South American 1969 Venezuela	Wake
South American 1969 Argentina	South Asia	Eniwetok 1960
South American 1969 Bolivia	Singapore	Marshall Islands
South American 1969 Brazil	Tananarive Observatory 1925; Madagascar	Wake Island Astro 1952 Wake Atoll
	Timbalai 1948 Brunei, East Malaysia (Sabah, Sarawak)	WGS 1972 Global Definition
		Yacare Uruguay
		Zanderij Suriname

FCC Compliance

This device complies with Part 15 of the U.S. Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Note:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the factory customer service department for help.

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Lowrance Pub. 988-0152-031

Printed in USA 102203

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