
# LMS-150GPS

## INSTALLATION AND OPERATION INSTRUCTIONS

LITHO IN U.S.A

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All sonar and GPS screens in this manual are simulated.

Features and specifications subject to change without notice.

**CAUTION**

This GPS receiver (like all GPS navigation equipment) will show the shortest, most direct path to a 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, but will also visually check to make certain a clear, safe path to a waypoint is always available.

**WARNING!**
**USE THIS GPS RECEIVER ONLY AS AN AID TO NAVIGATION. A CAREFUL NAVIGATOR NEVER RELIES ON ONLY ONE METHOD TO OBTAIN POSITION INFORMATION.**

**CAUTION**

As of this writing, the Department of Defense (DOD) has not declared the GPS navigation system as operational. The system is still in a testing phase. Satellites can be turned off or accuracy degraded at will by the system operators. Remember that the LMS-150GPS, or any GPS receiver is only as accurate as the system it's using.

## NOTES:

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## INTRODUCTION

The LMS-150GPS represents one of the best values in sportfishing sonar today. It rivals other sonar units costing much more in features and performance. With its menus, the LMS-150GPS offers easy-to-use operation at the touch of a button. The CLEARVISION™ screen shows the underwater world with high resolution and detail. The LMS-150GPS also displays boat speed, surface water temperature, and distance travelled (distance log). The GPS module gives you a full featured GPS receiver, complete with plotter and waypoint navigation capabilities.

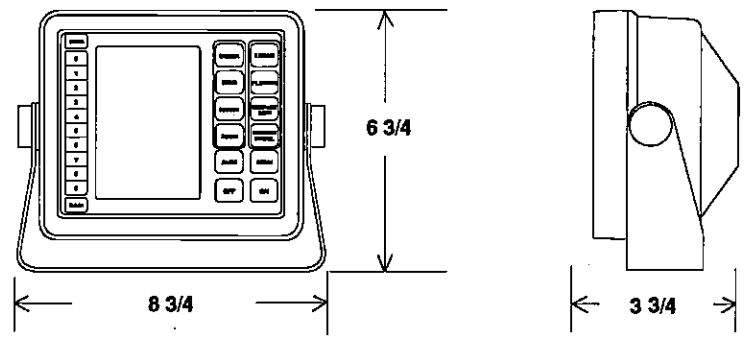
Although the LMS-150GPS has many features and functions, the "soft key" menu system makes it easy to use. Above all, don't be afraid to try different features and functions on the unit. You can't hurt it by pressing buttons!

## MOUNTING

You can install the LMS-150GPS in any convenient location, provided there is clearance behind the unit. Place it in position first and tilt it for the best viewing angle. Then mark the holes in the bracket base. You can use wood screws or through-bolts to attach the bracket to the boat. You may need to place a piece of plywood on the back of thin fiberglass panels to secure the mounting hardware. Make certain there is enough room behind the unit to attach the power and transducer cables.

The smallest hole that will pass one power or transducer plug is one inch. After drilling the hole, pass the transducer connector up through the hole first, then pass the power cable down through it.

After routing the cables, fill the hole with a good marine sealing compound. Offset the bracket to cover the hole.



## POWER CONNECTIONS

The LMS-150GPS works from a twelve-volt battery system only. 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. If the cable is not long enough, splice #18 gauge wire onto it. 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.

The power cable has three wires, red, white, and black. Red is the positive lead, black is negative or ground. The white wire is used for the NMEA interface. To use this feature, attach a shielded, twisted pair cable from the autopilot or other marine equipment's NMEA interface to the white wire on the LMS-150GPS's power cable. Solder the twisted pair's ground wire and shield wire to the black wire on the LMS-150GPS's power cable. Do not connect the shield wire to the autopilot. See your autopilot's manual for more instructions. If you're not going to use this feature, cut and tape the white wire to prevent a short.

The LMS-150GPS has reverse polarity protection. No damage will occur to the unit if the power wires are hooked up backwards. However, it won't work until the wiring is connected properly.

Minimize electrical noise by routing the power cable away from other possible sources of electrical interference. One of the largest noise generators is the engine's wiring harness. For best results, keep the power and transducer cables away from the engine wiring.

Attach the speed/temp sensor's and GPS module's cable to the LMS-150GPS's power cable. Tags on the cables identify both the GPS and the speed/temperature sensor's connector.

## GPS MODULE INSTALLATION

The GPS module can be installed on a flat surface or (with the supplied adapter) on a pole. Mount the module in an area that guarantees a clear view of the sky at all times. In order for the module to receive the signals from the satellites, it must not be obstructed. An ideal location is on a cabin roof, or deck. The gunnels also make a good location. Attaching the pole mounting adapter lets you install the module on a one inch mast. A high location is preferred. However, for lightning protection, the antenna shouldn't be the highest part of the boat.



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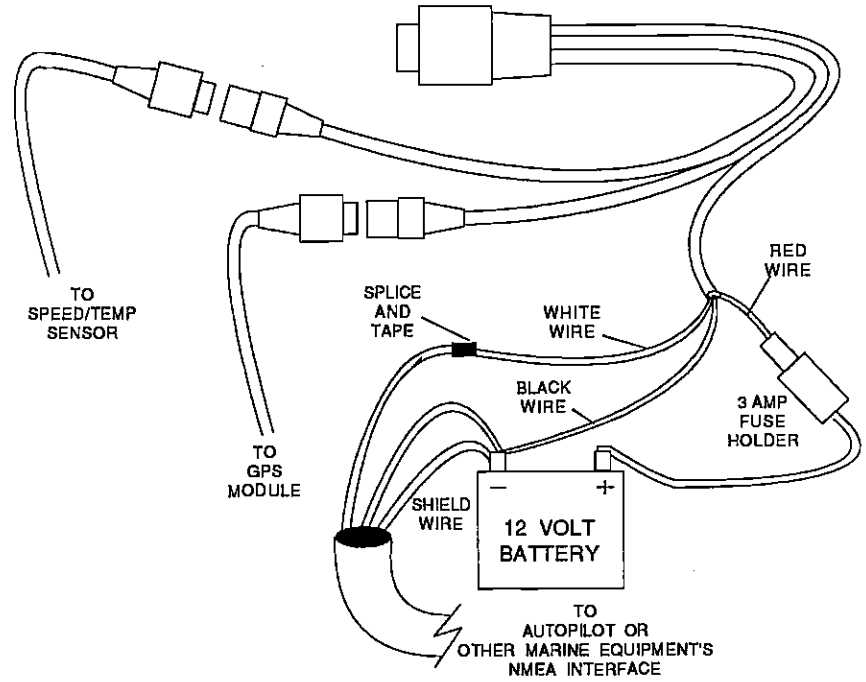
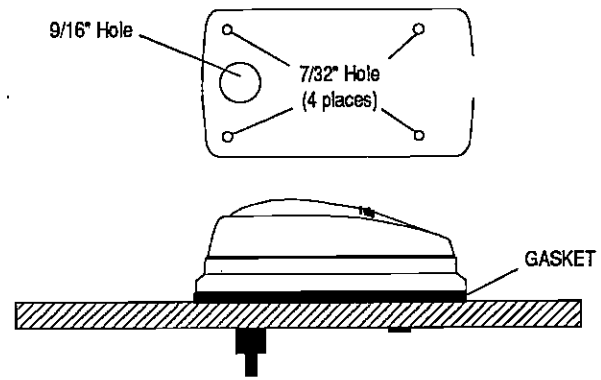


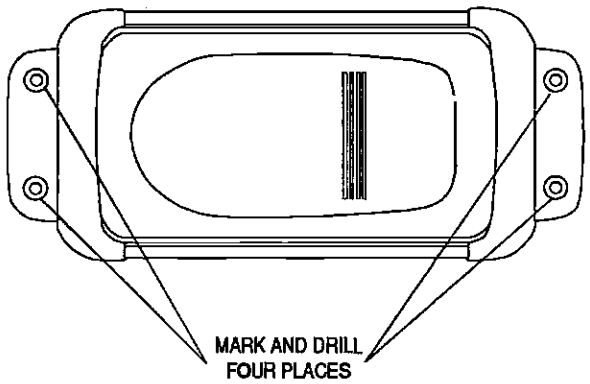

**Surface Mounting - With Access**

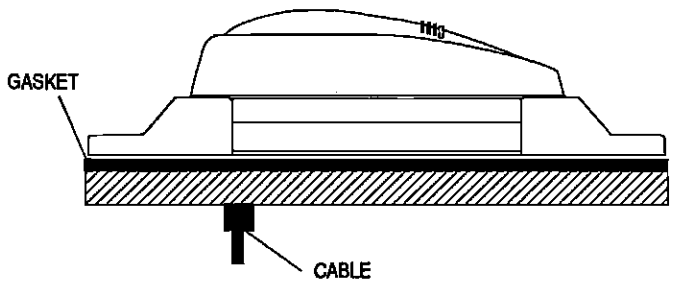
If you have access underneath the mounting surface, use the gasket supplied with the GPS module as a template. Mark and drill four 7/32" holes for the mounting screws and one 9/16" hole for the module's cable. Attach the cable to the module and pass it down through the hole in the gasket and the mounting surface. Use #10-32 machine screws (not included) to fasten the GPS module to the mounting surface. Route the 25' GPS cable to the LMS-150GPS.



## Surface Mounting - Without Access

If you don't have access to the back side of the mounting surface, use the "cleats" supplied with the LMS-150GPS. (Note: This is assuming you can "snake" the module's cable to a location that is accessable. A hole will still need to be drilled in the mounting surface for the cable.) Using the gasket as a template, mark and drill the 9/16" hole for the cable. Attach the cable to the module and drop the other end of the cable through the gasket and down the hole. Place the module on the gasket. Slide the "cleats" onto each end of the module and (using the cleats as templates) mark four holes for #10 mounting screws. Drill the holes, then replace the cleats on the module and fasten them to the mounting surface with #10 screws. Route the cable to the LMS-150GPS display unit.






**SELECT UNITS OF MEASURE**
**TURN BACKLIGHT ON**
**SET SPEAKER VOLUME**
**ADJUST DISPLAY CONTRAST**

These menus are duplicates of the ones found in the sonar menus. See the sonar section for more information on these features.

### LMS-150GPS SONAR SPECIFICATIONS

| | |
|---|---|
| LMS-150GPS Dimensions | 6.75"H x 8.75"W x 3.75"D |
| Input Voltage | 10 -15 vDC |
| Current | 600 ma (lights off) |
| | 750 ma (lights on) |
| Transmitter | |
| Frequency | 192 kHz and 50 kHz |
| Output Power | 3000 watts (peak-to-peak) |
| (typical) | 375 watts (RMS) |
| Display Size | 4.0"H x 2.5"W |
| Pixels | 200 H x 128 W |
| | 25,600 Total |

### LMS-150GPS RECEIVER SPECIFICATIONS

| | |
|---|---|
| GPS Module Dimensions | 2.5"H x 4.1"W x 7" D |
| Channels | Five Parallel |
| | Four continuous for position |
| | All satellites in view tracked |
| Update rate | One second |
| Accuracy | Maximum accuracy achievable with |
| | Standard Positioning Service |
| Position: | 25 meters CEP |
| Velocity: | 0.25 meters/sec RMS |
| | Without SA PDOP<6.0 |

### NMEA 0183 SENTENCES

| | |
|---|---|
| RMB | Minimum Recommended Sentence, Part B |
| RMC | Minimum Recommended Sentence, Part C |
| GLL | Present Position - Latitude/Longitude |
| APA | Autopilot Steering Data |
| DBK | Water Depth |
| MTW | Water Temperature (oC) |
| VHW | Speed Through Water (KPH) |
| VLW | Distance Travelled/LOG (NM) |

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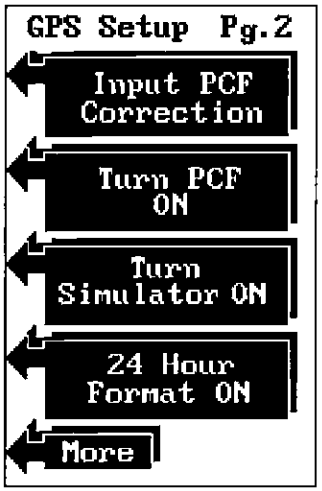
## TIME FORMAT

The LMS-150's time format can be either 12 (AM or PM) or 24 hour (2:00 pm = 14:00). When the unit is first turned on, or after it's preset, the time format is 12 hour. To change to 24 hour format, press the MENU key, then press the key adjacent to the "CHANGE GPS SETUP" label. Now press the key next to the "MORE" label until the "24 Hour Format ON" label appears. Press the key next to that label. The unit will show the time in 24 hour format on all screens with a time display. To switch back to 12 hour format, repeat the above steps. The menu now reads "12 Hour Format ON". Press the key next to that label for 12 hour format.




## MAN OVERBOARD

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 try all standard safety measures to try and rescue the person. If you lose sight of the person, you can use the LMS-150GPS to initiate a search pattern.

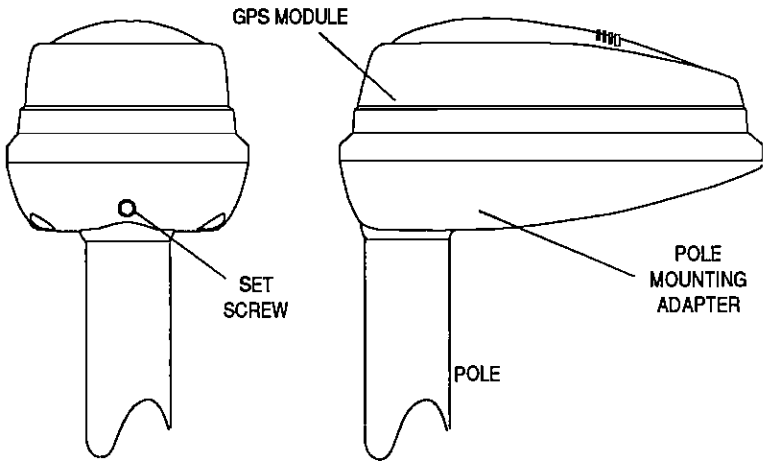
Once you're back at the helm after initial rescue efforts have failed, press the LMS-150GPS' Waypoint Save key. Now press the key next to the "SAVE AS #" label. This instantly stores your present position in memory. Now press the Waypoint Recall key. The position you just saved is displayed on the screen. Now press the key adjacent to the "ENTER" label. This recalls the waypoint you stored, causing the LMS-150GPS to show navigation information back to that waypoint. The Arrival alarm will sound since you're within it's radius, either ignore it or press the CLEAR key to mute it. Using the unit in this manner lets you start a search pattern for the victim from a known location. Switching to the plotter makes it easier to see your position relative to the accident area.

Remember, saving the victim is the primary goal. Try all options to rescue the person immediately after the accident happens. Training and education are also good accident preventatives. The Coast Guard has excellent safety courses. Instruct all members on board your boat on safety procedures before leaving the dock. Make certain all on board know what to do before any emergency occurs.



## Pole Mount

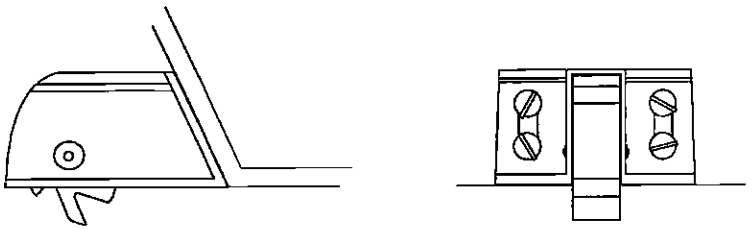
First attach the GPS module's cable to the module. Next, pass the cable through the pole mounting adapter and attach it to the GPS module. Using the four stainless steel screws supplied with the LMS-150GPS, attach the pole mounting adapter to the GPS module. Now pass the cable through the mounting pipe. The mounting adapter is threaded for standard 1"-14 machine thread. (Not pipe thread.) Thread the mounting pipe onto the GPS module/pole adapter assembly. After tightening the threads, install the supplied set screw into the front of the pole mounting adapter and tighten it. This should prevent the GPS module from unscrewing from the pole. Route the cable to the LMS-150GPS display unit.



## SPEED/TEMPERATURE SENSOR INSTALLATION

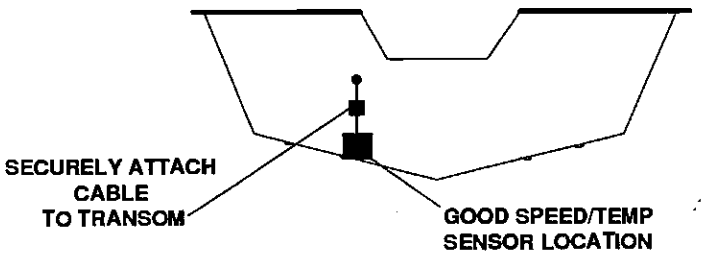
Mount the speed/temp sensor on the boat's transom in a location where the flow of water is smoothest. There should be a minimum amount of turbulence and air bubbles in the chosen location. The port (left) side of the transom is preferred, however the starboard (right) side can be used if necessary. Do not mount the speed sensor behind strakes, ribs, or thru-hull fittings that will disturb the flow of water to the speed sensor. In a typical installation, the speed sensor is mounted six to twelve inches from the centerline of the boat. The sensor must be in the water at all times to function properly. Make certain the chosen location is in the water even at high speed or when the boat is on plane.

Once the proper location has been determined, place the sensor on the transom with the bottom of the sensor flush with the bottom of the hull. Mark the transom in the center of each slot and drill a 5/32" mounting hole. Mount the sensor to the hull with #10 stainless steel screws (not included). Use a good grade of caulking compound to seal the screws. Adjust the sensor so it is flush with the underside of the hull and tighten the screws.



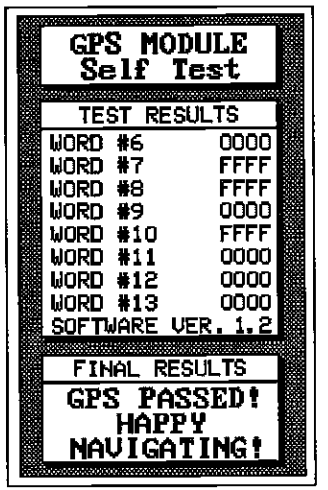
If the base of the transom has a radius, fill the gap between the transom and the sensor with caulking compound to insure a smooth water flow.

Route the sensor cable to the in-line connector on the sonar unit's power cable and attach it.




## GPS MODULE SELF-TEST

This feature tests the GPS module and returns a special code. This code is of interest only to the service department. However, the LMS-150GPS interprets this code and displays a status message, either "GPS PASSED" or "GPS FAILED". The current software version number also appears at the bottom of the test results box. Contact the factory customer service department if the module fails the self test.

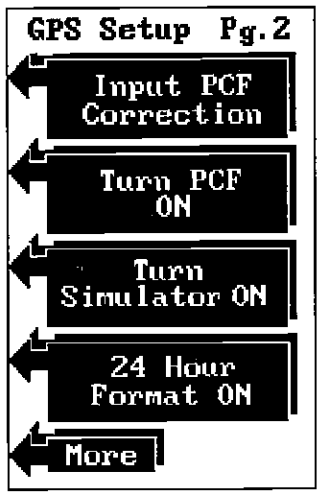



To use the self test feature, press the MENU key, then press the key adjacent to the "CHANGE SETUP" label. Now press the key next to the "MORE" label until the "GPS Module Self Test" label appears. Finally, press the key adjacent to that label. The screen at right appears.

## GPS SIMULATOR

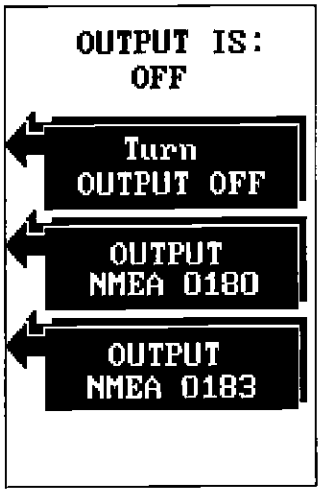
This feature places position and navigation data on all screens, including the plotter. The unit "navigates" a closed course. It shows bearing and distance to go, course over ground, and other information. A recurring message appears, alerting you to the fact that the simulator mode is enabled. **Don't navigate when the simulator is on!**

To turn the simulator on, press the MENU key, then press the key adjacent to the "CHANGE SETUP" label. Now press the key next to the "MORE" label until the screen shown below appears. Press the key next to the "TURN SIMULATOR ON" label. The simulator mode starts immediately. To turn the simulator off, either press and hold the OFF key or repeat the above steps to get the menu shown below. The label now reads "TURN SIMULATOR OFF". Press the key next to that label.



## NMEA COMMUNICATION

The LMS-150GPS sends data out the white wire on the power cable according to standards set by the NMEA (National Marine Electronics Association). This allows the LMS-150GPS to send position, depth, and navigation information to "listener" units, such as charting instruments, autopilots, and other marine instruments. The LMS-150GPS uses the following NMEA data protocols: NMEA 0180 and 0183. NMEA 0180 sends steering information only. It's useful mainly for autopilots. NMEA 0183 sends depth, position, steering, speed, and more. In order to use this feature, the white wire on the power cable must be connected to the NMEA data input on the other instrument. See the installation section for wiring connection information.




Once the wiring is connected properly, the LMS-150GPS must be told which data format to use. Consult the owner's manual of the "listener" equipment to see the which format it needs. Then set the LMS-150GPS as follows:

First, press the MENU key while a GPS or plotter screen is displayed. Next, press the key next to the "Change Setup" label. Now press the key adjacent to the"More" label until the "SELECT NMEA OUTPUT" label appears. Press the key next to this label. The screen shown above appears.

The data format currently in use shows at the top of the screen. Press the key adjacent to the desired data output. The LMS-150GPS will return to the last used GPS or plotter screen, and send NMEA data out the white

## PRESET

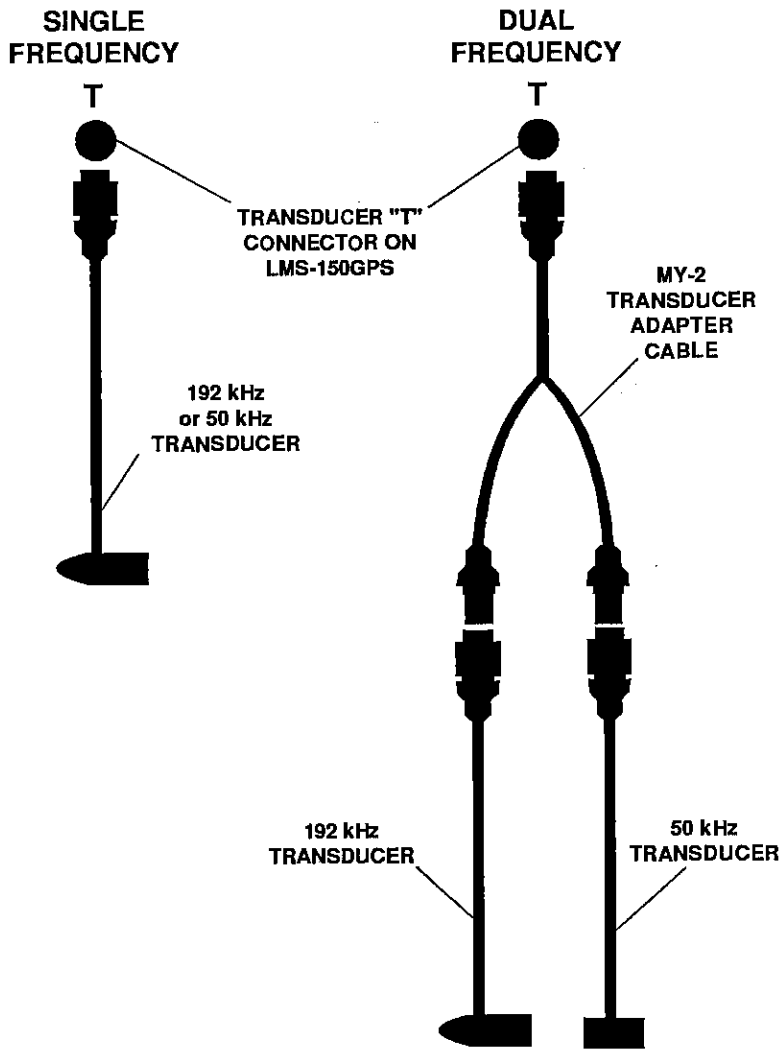
The Preset feature returns all sonar and GPS units to their original factory settings. This resets the units of measure, speaker volume, automatic mode on the sonar side, display contrast, and more. This doesn't erase any waypoints or routes, however. The GPS will have to be initialized and all navigation to a waypoint or route will be cancelled.

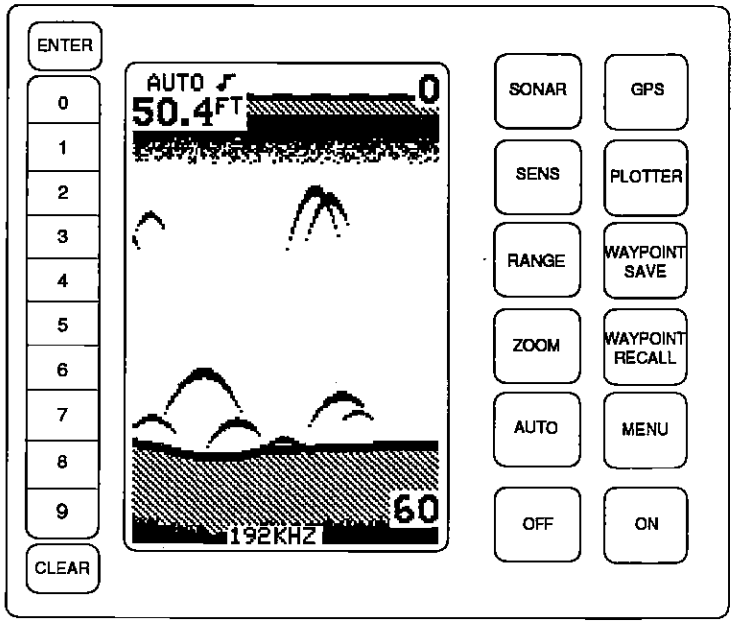
To preset the unit, press the MENU key until the "PRESET UNIT" label appears. Press the key adjacent to that label. The menu screen disappears and the LMS-150GPS returns to the GPS position screen. All units will be returned to their factory settings.

## TRANSDUCER CONNECTIONS

The LMS-150GPS has dual frequency capability. It can operate from 192 kHz or 50 kHz. It will display echoes from either transducer, separately or at the same time in an unique split screen mode. The connection diagram below shows the proper method to attach the transducers to the LMS-150GPS. Note: If dual frequency operation is desired, a MY-2 Transducer Adapter Cable must be used.

See your transducer owner's manual for installation instructions.






## KEYBOARD

The keyboard has keys arranged in three vertical columns. The keys in the far left column are used for menu selections and numeric entry. The keys in the middle column are for the basic sonar functions. The keys on the right select the GPS, plotter, and waypoint features.

## SONAR KEYS:

SONAR - Pressing this key switches the LMS-150GPS to the sonar display from the GPS or Plotter screens. It also displays the frequency select menus.

SENS - Press this key to adjust the unit's sensitivity and GRAYLINE.

RANGE - This key lets you adjust the range when the unit is in the manual mode.

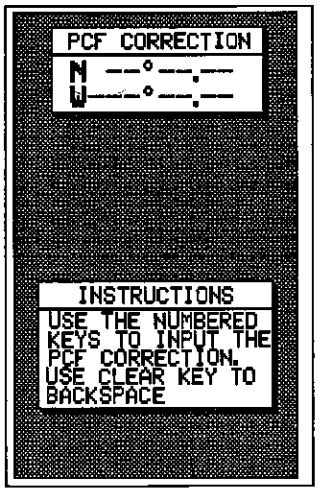
ZOOM - The LMS-150GPS gives you 2X and 4X zoom capability with this key.

AUTO - This turns the Sonar's automatic feature off and on.

ALARM - Activate and adjust the sonar alarms through this key.

will add the change you made to all positions. This makes it more closely match the datum used by the chart. For this reason, you should be careful when entering the PCF Offset. This is saved in memory. It does not change when the unit is turned off.

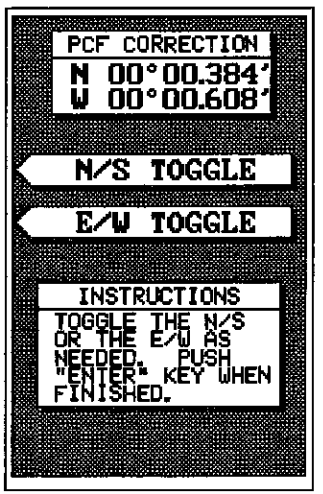
To use the PCF Offset, first subtract your current position from the location on the chart you wish to match. For example, if your location is N 32°10.220', W 80°12.106' and the chart's position is N 32°10.604', W 080°12.714', then the position offset is N 00°00.384', W 00°00.608'. Press the MENU key, then press the key adjacent to the "CHANGE SETUP" label. Now press the key adjacent to the "MORE" label until the "ENTER PCF OFFSET" label appears. Press the key adjacent to that label. The screen shown at right appears.



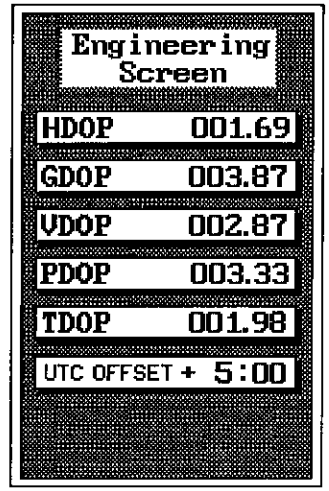

Now enter the difference between your position and the chart's location in latitude and longitude. The screen shown below appears next.

Press the keys adjacent to the N/S or E/W Toggle labels to switch the latitude and longitude to south or east, respectively. When the position at the top of the screen is correct, press the key adjacent to the "Finished" label. The LMS-150GPS now adds the correction factor to all position displays.

To turn the PCF off without changing the offset, press the MENU key, then press the key next to the "Change Setup" label. Now press the key next to the "More" label until the "PCF OFF" label appears. Press the key next to that label to turn the PCF off.



GDOP stands for Geometric Dilution Of Precision. This is a crossing angle indicator. It shows the combination value of horizontal (HDOP), vertical (VDOP), and Time (TDOP). The smaller the GDOP number is, the better the crossing angles are. The GPS receiver selects satellites based on GDOP, therefore it always tries to use satellites that will result in good crossing angles. The best way to use GDOP is to anticipate system problems. In other words, if the crossing angles are decreasing, then the satellites could be moving out of your viewing range. Therefore, the system may become unusable if more satellites don't appear shortly.




The HDOP display shows the 2D, horizontal crossing angle. Again, the smaller the number is, the better the crossing angles are. Typically, 1-4 is good, 5-10 is fair, and anything over 10 is poor for all displays on this page. The UTC OFFSET is the number of hours difference between your time and UTC time (GMT) in Greenwich, England.

## PCF OFFSET
## (Position Correction Factor)

The GPS navigation system relies on complex mathematical calculations to determine your position based on satellite data and other factors. One factor is the Earth's shape. Since the Earth is not a true sphere, variations in the calculations have to be made to accommodate deviations. To make matters more complex, not everyone uses the same data to determine what the deviations are. The size and shape of the ellipsoids that are used to approximate the earth's surface are improved often. This can lead to errors if your navigation device uses one ellipsoid, while your chart uses a different one. The term used for these ellipsoids is "datum."

To reduce the error factor between datum, the LMS-150GPS gives you the capability to move or "offset" the position shown on the display to match one shown on the chart. The unit adds this offset to all position displays.

For example, suppose you are anchored at a location that is accurately marked on a chart. Your LMS-150GPS displays a longitude position that is .010 degrees less than the one on the chart. Using the Position Correction Factor (PCF) Offset feature, you make the LMS-150GPS read the same as the chart. If you raise anchor and move, the LMS-150GPS

## GPS KEYS:

GPS - Press this key to switch to the GPS displays.

PLOTTER - This key switches the LMS-150GPS to the plotter display.

WAYPOINT SAVE - Press this key to save waypoints.

WAYPOINT RECALL - This key activates the waypoint recall menus.

## OTHER KEYS:

ENTER - This key is used to enter selections from menus.

CLEAR - Use this key to erase a previous keystroke or menu.

ON - The ON key turns the LMS-150GPS on.

OFF - The Off key turns the LMS-150GPS off.

NOTE. You must press and **hold** the OFF key to turn the unit off.

**MENU KEY** - This key activates the first menu screen for each of the three modes - sonar, GPS, and plotter. For example, if you press the MENU key while the sonar screen is displayed, the first sonar menu appears. Pressing the MENU key while the plotter is displayed brings up the first plotter menu screen.

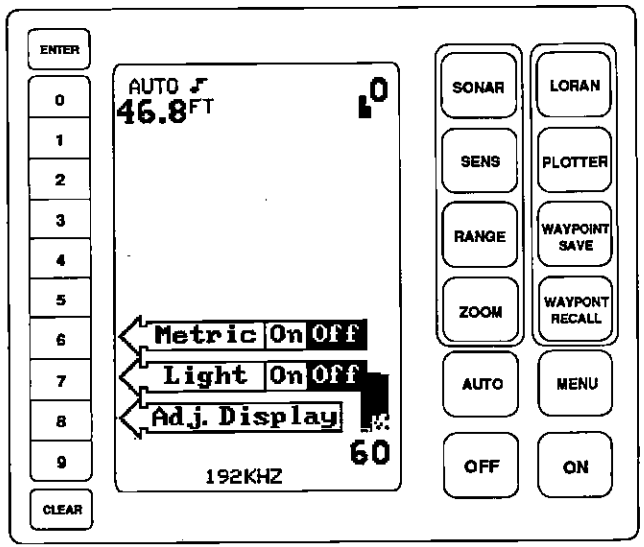
## DISPLAY - General

The lights are on for about ten seconds when you first turn the LMS-150GPS on. Menus appear at the same time. To keep the lights on, press the key adjacent to the Light label. (See the picture on the next page.) It controls the backlighting used on the display and keyboard. If you don't want the lights on, wait ten seconds and the lights automatically turn off. The menus also disappear after ten seconds. You can turn them off at any time by pressing the CLEAR key.

The Metric menu works the same way. Press the key adjacent to the Metric label to change the depth from feet to meters. This also changes the temperature display to degrees Celsius, speed to knots, and log to nautical miles.

The ADJ Display label lets you adjust the display's contrast for the best viewing angle. Pressing this key gives you the contrast adjust menu. See the Display Contrast section for more information on this feature.

After the menus clear, the display appears similar to the one on the next page. The word "AUTO" in the display's upper left corner indicates the automatic feature is on. A small note symbol next to the "AUTO" indicator means the alarm speaker is enabled. The digital bottom depth displays immediately beneath the AUTO indicator.



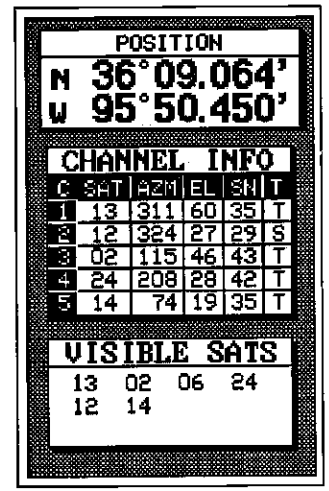

## MEMORY-PRESET

The LMS-150GPS saves all settings such as sensitivity, chart speed, alarm settings, and more in battery backed-up memory. This memory is retained, even if the LMS-150GPS is removed from the boat.

To erase the settings, and return the LMS-150GPS to the factory settings, turn the unit off, then press *and hold the CLEAR key* and press the ON key at the same time. Hold the CLEAR key until you hear the starting beep, then release it. The LMS-150GPS will restart using the factory default settings. Note: This doesn't erase any waypoints or routes. There is also a menu selection that resets the LMS-150GPS. See the Menu - Page 7 "Preset SONAR & GPS" on page 40 for more information.

To turn the battery-backup feature off, see page 37.

## SATELLITE INFORMATION SCREEN




The Satellite Information screen shows technical data about each satellite in the viewing range. Up to 5 satellites can be used by the LMS-150GPS at one time. To view the satellite data, press the MENU key, then press the key adjacent to the "More" label until the "SATELLITE INFORMATION" label appears. Press the key adjacent to that label. The screen shown at right appears.

This screen shows the following information: present position, receiver channel number (C), satellite number (SAT), azimuth (AZM), elevation (EL), signal-to-noise ratio (SN), channel status(T), and visible satellites.

The LMS-150GPS has a five-channel receiver. The channel number appears at the display's left in the "CHANNEL INFO" box.

The satellite number (SAT) in use by the channel shows to the right of the channel number. Azimuth is the direction of the satellite from your present location. Elevation is the height of the satellite above the horizon. SN is the signal-to-noise ratio. The higher the SN, the better. Channel status has three possible modes: Idle (-), Searching (S), or Tracking (T). If the channel is not using a satellite, then it is idle and dashed lines appear in the displays for that channel. If it is searching for the satellite, the (S) appears. Once it's locked on to the satellite, then the (T) appears. The example screen on this page has channels 1,3,4 and 5 tracking, 3 is searching.

Beneath the Satellite Info display is the list of satellites that are visable from your location. They are listed by their satellite number.

## ENGINEERING SCREEN

The LMS-150GPS lets you view the Dilution of Precision for the horizontal (HDOP), geometric (GDOP), vertical (VDOP), position (PDOP), and time (TDOP). These are displayed on the Engineering Screen.

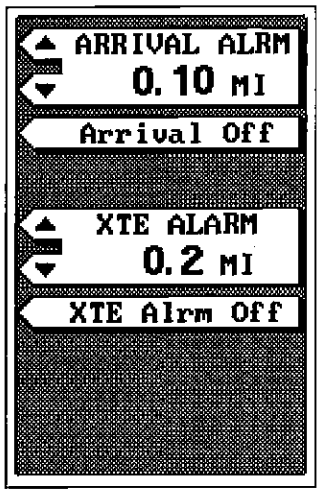
To view this screen, press the MENU key , then press the key next to the "More" label until the "Engineering Screen" label appears. Press the key adjacent to that label. The screen shown at the top of the next page appears

## GPS ALARMS

The LMS-150GPS has two GPS alarms. One is an arrival alarm that sounds when you come within a preset distance to a waypoint. The other is a C.D.I. alarm that sounds when you move off course more than the alarm's setting.

## ARRIVAL ALARM

The arrival alarm sounds a tone when your position is within the alarm's radius of a waypoint. For example, the alarm sounds if you come within .1 nautical mile of a recalled waypoint if the arrival alarm's setting is .1 nautical mile. It's adjustable from zero to 9.99 miles.




To adjust the arrival alarm, press the MENU key, then press the key adjacent to the GPS ALARMS label. The screen shown at right appears. When the LMS-150GPS is turned on for the first time, the arrival alarm is preset to .1 nautical mile. To increase the arrival alarm radius, press the key adjacent to the up arrow. To decrease the alarm radius, press the key adjacent to the down arrow. Pressing the key adjacent to the "ARRIVAL OFF" label turns it off.

Press the CLEAR key to exit the alarm menu.

## XTE ALARM and RANGE

Changing the XTE alarm also changes the XTE range on the steering screen. To change the XTE alarm settings, first press the MENU key. Then press the key adjacent to the "GPS ALARMS" label. This screen appears.

The XTE alarm adjustment menu is in the middle of the screen. Press the key adjacent to the up or down arrow to increase or decrease the XTE alarm. The alarm is adjustable from 0.1 to 9.9 miles.

The XTE Alarm sounds a tone when your cross track error is more than the alarm setting. For example, suppose the XTE alarm is set to 0.1 nautical mile. If you move to the left of course by more than 0.1 nautical mile, the XTE alarm sounds an alert tone.

After you've finished with the settings on this page, press the CLEAR key to return to the GPS screen.



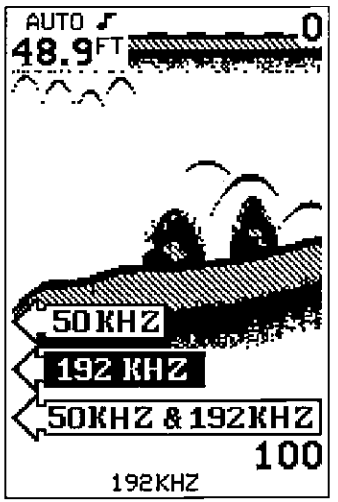
## FREQUENCY SELECT

Lowrance offers both 50 and 192 kHz transducers for the LMS-150GPS. The 192 kHz frequency typically has superior target resolution, showing fish, structure, and bottom definition better than 50 kHz. However, the 192 kHz doesn't penetrate water as well as 50 kHz, therefore it won't go as deep. Also, 192 kHz cone angles are typically narrower than the 50s. You can draw a few conclusions from these statements.

1. Use 192 kHz (especially in shallow water) with a wide (20 degree) cone angle for the best resolution and target definition. Use a 192 kHz narrow cone angle transducer (8 degree) when operating in medium to deep depths.

2. Use the 50 kHz in deep water or where a very wide cone angle is desired. Using 50 kHz when fishing with downriggers generally lets you see the downrigger weights display on the screen. Lowrance offers both a 30 degree and 45 degree cone angles for 50 kHz.

The LMS-150GPS has the capability to operate at 192 kHz or 50 kHz. It can display echoes from either transducer or both at the same time in an unique split-screen mode. Once the transducers are connected to the LMS-150GPS (see the Transducer Connections section for more information), turn the unit on and press the SONAR key. A screen similar to the one shown at right appears.




Press the key adjacent to the desired frequency or press the key adjacent to the 50 kHz & 192 kHz label to display echoes from both transducers at the same time.

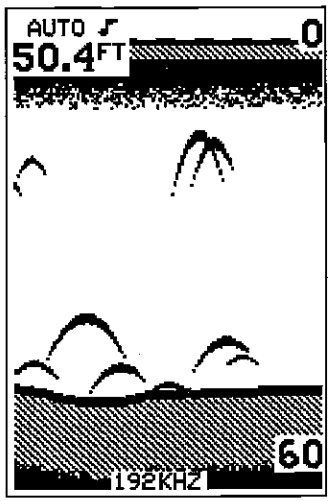
Anytime you wish to switch frequencies, simply press the SONAR key. This will cause the frequency switch menus to appear. They will disappear after a few seconds or you can press the CLEAR key to erase them.

## AUTOMATIC

When the LMS-150GPS is first turned on, the Automatic feature is on. This is shown by the word "AUTO" at the top of the screen. The Automatic feature adjusts the sensitivity and range so the bottom signal always shows in the lower half of the screen.

To turn Automatic off, simply press the AUTO key. The word "MANUAL" appears, showing the unit is in the manual mode. To turn Automatic on, press the AUTO key again.

AUTOMATIC MODE ON




## SENSITIVITY

The sensitivity key on the LMS-150GPS controls the unit's ability to pick up echoes. A low sensitivity level excludes much of the bottom information, fish signals, and other target information. High sensitivity levels enables you to see this detail, but it can also clutter the screen with noise. Typically, the best sensitivity level shows a good solid bottom signal with GRAYLINE® and some surface clutter.

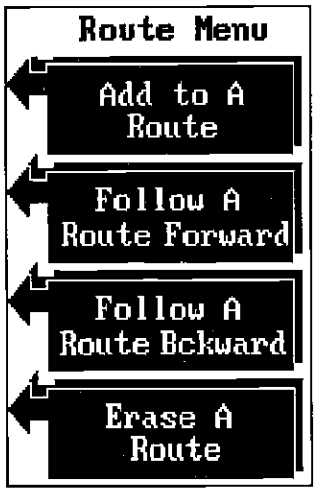
The LMS-150GPS adjusts the sensitivity when it's in the automatic mode. This keeps a solid bottom signal displayed, plus the capability to show fish and other detail.

However, situations occur where it becomes necessary to increase or decrease the sensitivity. This typically happens when you wish to see more detail. The procedure to adjust it is the same whether the unit is in the automatic or manual mode.



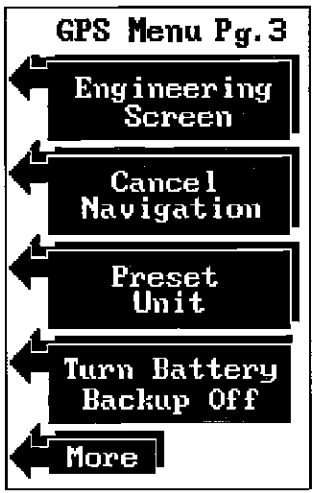
## ERASING A ROUTE

To erase a route, press the MENU key until the "ROUTES" label appears, then press the key next to that label. The route selection screen shown on the previous page appears. Press the keys adjacent to the "Inc RTE#" or "Dec RTE#" arrows to view a different route number. When the desired route shows on the display, press the ENTER key. The route menu screen shown at right appears. To erase the selected route, press the key adjacent to the "ERASE A ROUTE" label. The LMS-150GPS returns to the last used GPS or plotter display. The route is now erased.




## CANCEL NAVIGATION

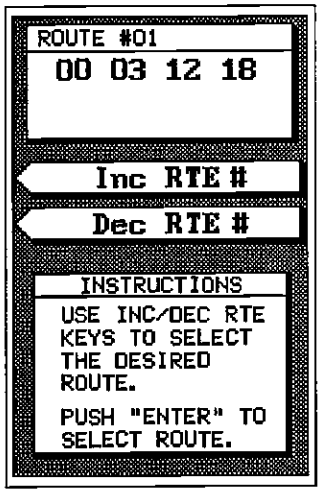
To stop the LMS-150GPS from navigating on a route or to a waypoint, use the Cancel Navigation feature. To do this, simply press the MENU key until the "CANCEL NAVIGATION" label appears. Now press the key adjacent to that label. The LMS-150GPS immediately stops showing navigation information to the waypoint. It also cancels the route, if it was in use. However, it doesn't erase the waypoint or route.



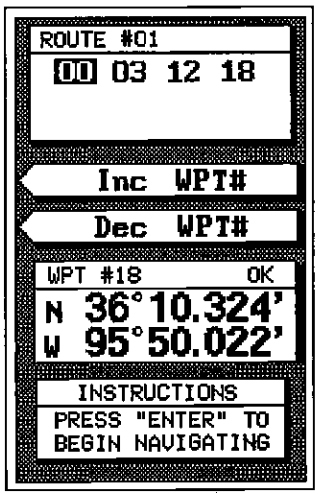
As each waypoint is selected, it's number appears beneath the route number in the box near the top of the screen. After all of the waypoints have been selected, press the CLEAR key . This stores your route in memory.

## FOLLOWING A ROUTE

To follow a route, press the MENU key until the "ROUTES" label appears, then press the key next to that label. The route selection menu shown at right appears. The route number appears at the top of the screen. Waypoints stored in the route show in the box immediately beneath the route number. Press the keys adjacent to the "Inc RTE#" or "Dec RTE#" arrows to view a different route number. When the desired route shows, press the ENTER key. The route menu screen shown on the opposite page appears.




To travel forward through the route (i.e., from the first waypoint on the list to the last), press the key next to the "FOLLOW ROUTE FORWARD" label. To travel backward through the route, press the key adjacent to the "FOLLOW ROUTE BACKWRD" label. The screen shown below appears. Now select the starting waypoint. If the first waypoint on the list is the one you wish to travel to first, simply press the ENTER key. However, if you wish to start with a waypoint in the middle of the route, press the key adjacent to the "Inc WPT#" or "Dec WPT#" arrows to move through the waypoint list.

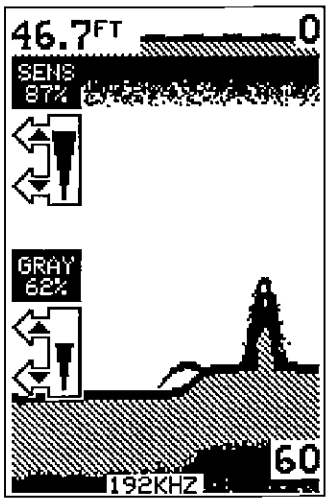



When the box surrounds the desired starting waypoint near the top of the screen, press the ENTER key. The LMS-150GPS returns to the last used GPS or plotter screen showing navigation data to the first waypoint in the route. After you arrive at that waypoint, the LMS-150GPS automatically switches to the next waypoint in the route. This repeats until you've travelled to all of the waypoints in the route.

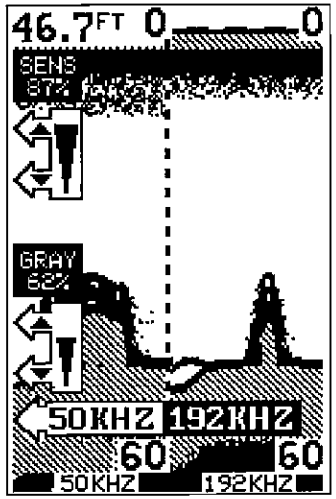


To adjust the sensitivity, press the SENS key. The sensitivity adjust menu appears on the left side of the screen. The GRAYLINE® adjust menu is immediately beneath it.

The sensitivity menu has up and down arrows, plus a vertical bar graph. The graph gives an indication of the sensitivity level. The number above the up arrow shows the percentage of sensitivity in use.




SENSITIVITY ADJUST MENU
(Single Frequency)




SENSITIVITY ADJUST MENU
(Dual Frequency)

To increase the sensitivity level, press the key adjacent to the menu's up arrow on the left side of the unit. As you press the key, the menu's bar graph will grow taller and the percentage will increase in value. You can also see the difference on the chart record as it scrolls. When the sensitivity is at the desired level, release the key.

To decrease the sensitivity level, press the key adjacent to the down arrow. The bar graph and percentage will decrease. When the sensitivity is at the desired level, release the key.

When you reach either the maximum or minimum limit, the speaker will sound an alert tone.

To turn the menus off, press the key adjacent to the CLEAR key at the bottom left side of the unit.

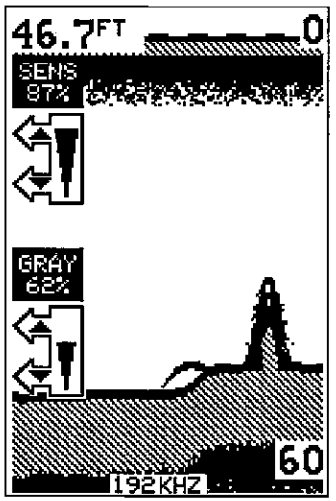
When using the LMS-150GPS in the dual frequency mode, a new menu appears that lets you adjust the sensitivity and GRAYLINE for both frequencies. Simply press the key adjacent to the 50kHz/192 kHz label to adjust each side.

## GRAYLINE®

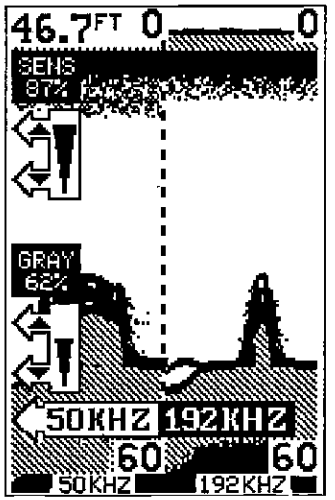
GRAYLINE® lets you distinguish between strong and weak echoes. It "paints" gray on targets that are stronger than a preset value. This allows you to tell the difference between a hard and soft bottom. For example, a soft, muddy or weedy bottom returns a weaker signal which displays with a narrow or no gray line. A hard bottom returns a strong signal which causes a wide gray line.

If you have two signals of equal size, one with gray and the other without, the target with gray is the stronger signal. This helps distinguish weeds from trees on the bottom, or fish from structure.

GRAYLINE® is adjustable. Since GRAYLINE® shows the difference between strong and weak signals, adjusting the sensitivity may require a different GRAYLINE® level, also. The level chosen by the LMS-150GPS at power on is usually adequate for most conditions. Experiment with your unit to find the GRAYLINE setting that's best for you.




**GRAYLINE®ADJUST MENU (Single Frequency)**

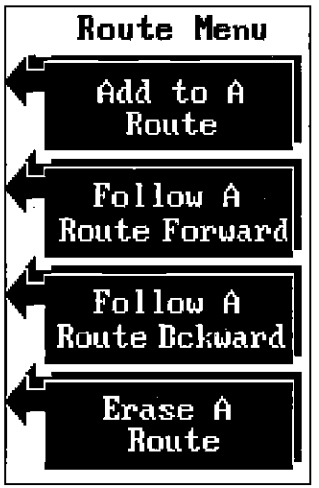


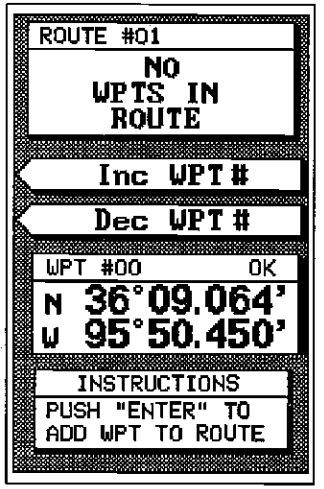

**GRAYLINE®ADJUST MENU (Dual Frequency)**

To adjust GRAYLINE®, press the SENS key. The sensitivity menu appears in the upper left side of the display, while the GRAYLINE®label appears immediately beneath it. Now press the key adjacent to the GRAY up arrow to increase the gray level. Press the key adjacent to the down arrow to decrease it. The percentage of GRAYLINE®in use changes as you press the arrow keys. The bar chart also gives a graphical indication of the GRAYLINE® level.



arrows until the desired route number appears at the top of the screen. If there are waypoints stored in the route, they will appear beneath the route number. Once the desired route number displays at the top of the screen, press the ENTER key. The screen shown at right appears. Now press the key next to the "ADD TO A ROUTE" label. The screen shown below appears.

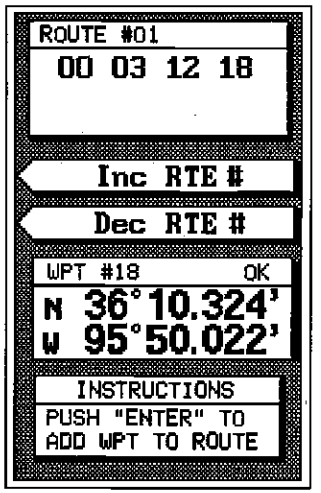


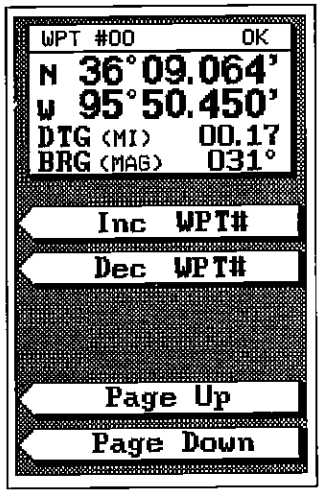

This is the waypoint selection menu. This lets you choose which waypoints are to be placed in your route. The first waypoint's number and location appears in the center of the screen. Use the keys adjacent to the "Inc WPT#" or "Dec WPT#" arrows to move through the waypoint list. To add a waypoint to the route, simply press the ENTER key.

**IMPORTANT!**

You must select waypoints in the order they're to be used in the route. In other words, suppose you want a route that consists of waypoints 1, 3, and 5. But you wish to travel to 3 first, then 1, and finally 5. In this case, you must select waypoint 3, 1, and 5 in that order when creating the route.



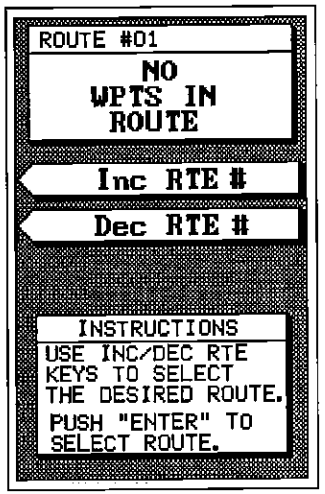
Waypoint (BRG) also show on this page. Across from the waypoint number is the status display. It reads "OK" if the waypoint position data is valid. If there is anything wrong with the memory storage, the STAT message will read "CHECKSUM". **Do not use this waypoint if a checksum error message is displayed!** Erase it and re-enter the location. To navigate to the displayed waypoint, simply press the ENTER key. The LMS-150GPS will return to the last used GPS or Plotter screen with navigation data for the recalled waypoint displayed. To exit this menu without recalling a waypoint, press theCLEAR key.




## ROUTES

The LMS-150GPS gives you the ability to travel to several waypoints in a row. This feature is called Routes. When you run a route, the LMS-150GPS gives you navigation information to the first waypoint in the route's list. When you come within the arrival alarm's radius at the first waypoint, the arrival alarm sounds, and the LMS-150GPS automatically switches to the next waypoint in the route. The process repeats until all of the waypoints in the route have been reached.

There are two steps necessary to create a route. First select the route's number (from 1 to 20). Then pick the waypoints to use in the route. To follow a route, you simply select the route and determine which waypoint in the route to start with. Then tell the unit if you're going to travel forward through the route or backward. After completing these steps, the LMS-150GPS will show navigation information to the first waypoint in the route.




## CREATING A ROUTE

To create a route, first press the MENU key, then press the key next to the "More" label until the "ROUTE PLANNING" label appears. Now press the key adjacent to that label. The screen shown at right appears. This is the route selection screen. Press the key next to the "Inc RTE#" or "Dec RTE#"



You can see the change on the screen (both on the menu and on the chart record) as you press the keys. After you've made the adjustment, press the key adjacent to the CLEAR key to erase the menu.

## RANGE - Automatic

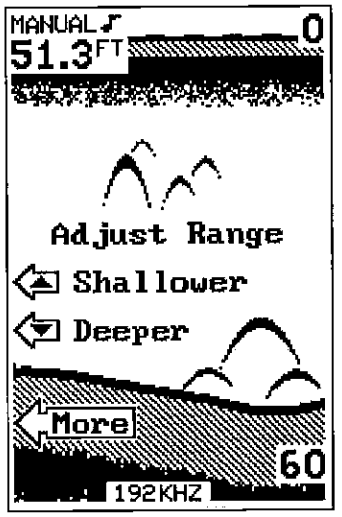
When first turned on, the LMS-150GPS automatically places the bottom signal in the lower half of the screen. This is called Auto Ranging and is part of the automatic function. You cannot change the range while the unit is in automatic.

## RANGE - Manual

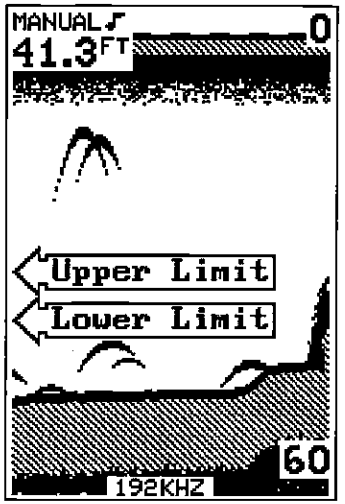
The LMS-150GPS gives you control over the range when it's in the manual mode. Both the lower and the upper limit are adjustable.

To change the range, first make certain the LMS-150GPS is in the manual mode. If necessary, press the AUTO key to switch to the manual mode. Next, press the RANGE key. Two arrows appear in the lower left corner of the display. These are the range adjust arrows. Press the key corresponding to the Shallower or Deeper arrow to decrease or increase the range. The available ranges are 0-5, 10, 20, 40, 60, 100, 150, 200, 300, 500, 800, 1000, 1500, 2000, 3000, and 5000 feet. (Metric ranges are 3, 5, 10, 15, 20, 30, 40, 60, 100, 150, 250, 300, 400, 600, 1000, and 1500 meters.) After you've set the desired range, press the CLEAR key to erase the range arrows.

RANGE ADJUST MENU (MANUAL MODE ONLY)



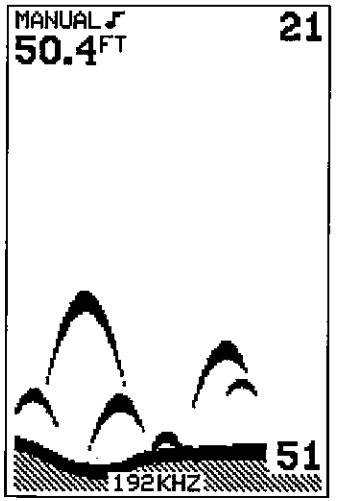
To adjust the upper or lower limit, press the key adjacent to the "More" label. The menus shown below appear. To adjust the upper limit, press the key adjacent to the "Upper Limit" arrow. A new menu appears: "Enter Upper Limit." Using the number keys at the display's left side, enter the desired upper limit. In this example, we used 21 feet. If you make an error, press the CLEAR key and start again. Now press the ENTER key. The LMS-150GPS changes the upper limit to the new value.



UPPER/LOWER LIMIT MENU

UPPER LIMIT ENTRY MENU

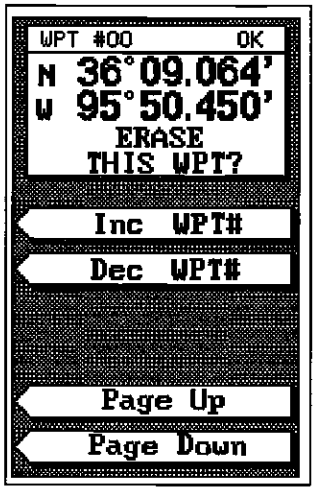
30 FOOT WINDOW (21 FEET TO 51 FEET)




west to east. If the position shown at the top of the screen is correct, press the key next to the "FINISHED" label. The LMS-150GPS returns to the last used position, navigation, or plotter screen. If you use any navigation or plotter screens, the LMS-150GPS will show navigation information to the location you entered.

## Erase a Waypoint

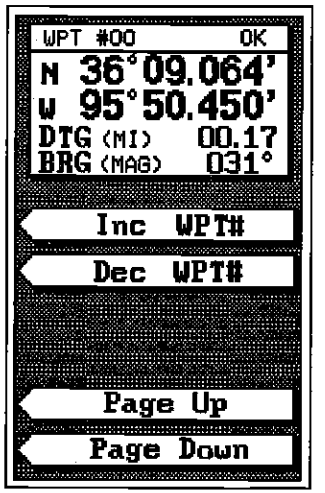
Although you can store a location under a waypoint number that has already had a location assigned to it, the Waypoint Quicksave feature won't. It only assigns empty waypoint numbers to locations. Therefore, the Waypoint Erase feature lets you erase positions from the waypoint table.




To erase a waypoint, first press the WAYPOINT SAVE key, then press the key adjacent to the ERASE A WPT label. The screen shown at right appears. The last saved waypoint appears first. To erase this location, simply press the ENTER key. To erase the location from a different waypoint number, press the key adjacent to the "Inc WPT#" label to increase the waypoint number (i.e. from waypoint number 1 to 2). Press the key adjacent to the "Dec WPT#" label to decrease the waypoint number. When you've finished erasing waypoints, press the CLEAR key. This will return the LMS-150GPS to the last used sonar, position, plot, or navigation screen.

## HOW TO RECALL A WAYPOINT

You must recall a waypoint in order to navigate to that position with the LMS-150GPS. To recall a waypoint, first press the WAYPT RECALL key. The screen shown at right appears.

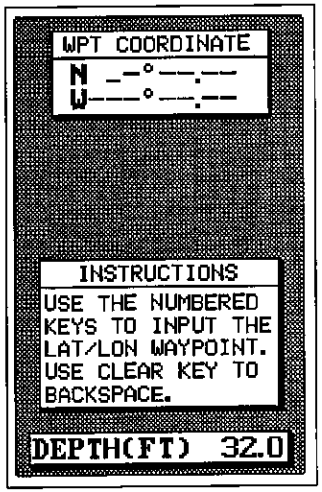



The last-saved waypoint appears first. If this isn't the waypoint you desire, press the key adjacent to the up or down arrows. This moves the list of waypoints up or down. The latitude/longitude stored in this location shows directly beneath the waypoint number. Distance To Go (DTG) and Bearing to

screen. If you wish to save this location under this waypoint number, simply press the key adjacent to the ENTER label. To exit without saving the location, press the CLEAR key. The unit will return to the last used position, plot, or navigation screen.

## Enter New Waypoint

To save a location other than your present position, press the WAYPT SAVE key, then press the key adjacent to the "INPUT LL WPT" label. The screen shown at right appears. Using the numbered keys, enter the location you wish to save. Use the CLEAR key as a backspace if you make a mistake. (In other words, pressing the CLEAR key erases the last number entered.) Notice that the position entered is in degrees, minutes, and thousandths of a minute. (Not seconds!) After you've entered the last number, two new arrows automatically appear. Press the key adjacent to the "N/S TOGGLE" to switch the latitude from north to south. Press the key adjacent to the "W/E TOGGLE" to switch the longitude from west to east. If the position shown at the top of the screen is correct, press the ENTER key. The View/Save Waypoint screen shown above appears next. The last saved waypoint in the list appears at the top of the screen. The position you just entered is in small numbers next to the "SAVE:" message. Now move through the list of waypoints as described in the View/Save Waypoint section on the previous page. When the desired waypoint number appears at the top of the screen, press the ENTER key. This saves the position under the waypoint number you selected.




## Go To Lat Lon

If you wish to simply go to a location, but not save it as a waypoint, use the Go To Lat Lon feature on the Waypoint Save menu. After pressing the key adjacent to the Go To Lat Lon label, the screen shown above appears.

This screen works identically to the "Enter New Waypoint" screen. Using the numbered keys, enter the location's latitude/longitude position. Use the CLEAR key as a backspace if you make a mistake. After you've entered the last number, two arrows automatically appear. Press the key adjacent to the "N/S TOGGLE" to switch the latitude from north to south. Press the key adjacent to the "W/E TOGGLE" to switch the longitude from



The lower limit is adjustable in the same manner. You can choose any upper limit between zero and 4995 feet. The lower limit can be any range between 5 and 5000 feet.

The smallest "window" or distance between the upper and lower limit is five feet. For example, an upper limit of 21 feet and a lower limit of 51 feet gives a window of 30 feet. Upper and lower limits can be set in various combinations to show windows from the surface to the bottom and anywhere in between.

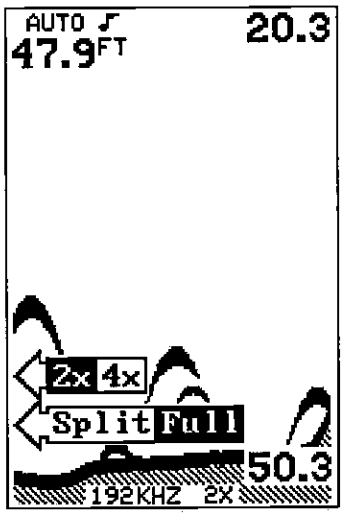
NOTE: The depth capability of the LMS-150GPS depends on the transducer installation, water and bottom conditions, and other factors. You can expect to read depths more than 350 feet in both fresh and salt water.

## ZOOM

Enlarging or "zooming" the picture is a common method used to show small detail and fish signals. The LMS-150GPS gives you two different zoom sizes, plus a split screen zoom option. The zoom operation and adjustment is different in the automatic and manual modes.

## ZOOM - AUTOMATIC MODE

To zoom the display in the automatic mode, first press the ZOOM key. All targets on the display are enlarged four times normal size automatically. The menus shown at right also appear.

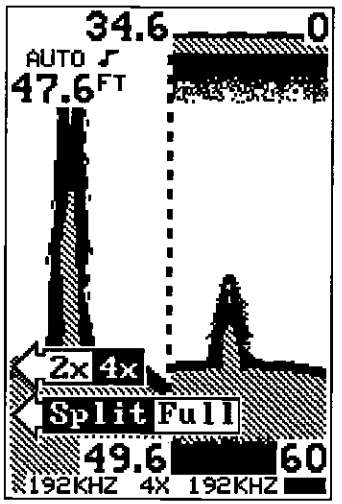



ZOOM MENUS (AUTOMATIC MODE)

To switch targets between twice their normal size and four times normal, press the key adjacent to the "2X/4X" label.

To switch between the split screen zoom and full screen zoom, press the key adjacent to the "SPLIT/FULL" label. The screen instantly splits into two sections. All targets on the left are shown at four times the size of the ones on the right. If you switch to the 2X zoom mode, echoes on the left side of the screen are shown at twice the size as the ones on the right. The echoes that scroll across the screen are the exact same echoes on both sides of the screen. They're simply enlarged on the left side. This feature tracks the bottom, always keeping it on the display while the automatic feature is on. Once you've set the zoom as desired, press the CLEAR key to erase the menus.

SPLIT-SCREEN ZOOM (AUTOMATIC MODE)




To turn the Zoom feature off, press the RANGE key.

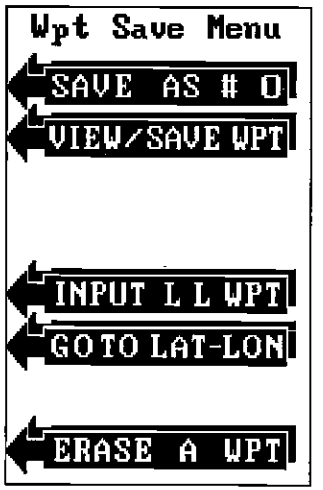
## ZOOM - MANUAL MODE

When you press the zoom key while the unit is in the manual mode, the screen shown at the top of the next page appears. The 4X zoom mode automatically appears. For a 2X zoom, simply press the key adjacent to the 2X/4X label. For a split screen zoom, press the key adjacent to the SPLIT/FULL label. Remember, the LMS-150GPS won't track the bottom signal while it's in the manual mode.



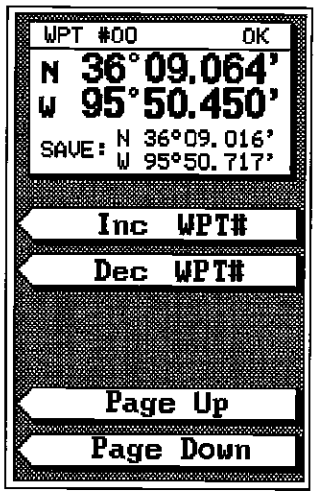
SAVE key. Now press the key adjacent to the "SAVE AS #" label. The LMS-150GPS takes the present position and assigns the first available waypoint number to it. The number assigned to the waypoint shows in the "SAVE AS #" label. The number automatically goes to the next available waypoint each time you save a waypoint. Once you've stored the waypoint, the unit returns to the last used sonar, GPS, or plotter screen.

## Saving Present Position - View and Save Method



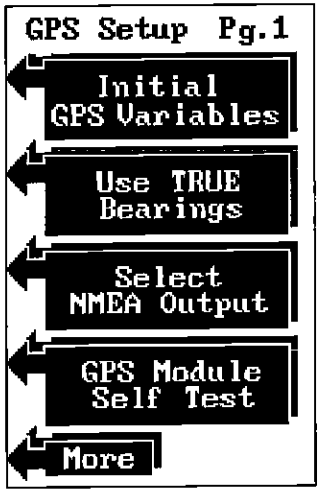

The "Quick Save" feature doesn't let you select the waypoint number. You have to use the next available number when using that method. The View and Save method lets you pick the waypoint number that your present position is stored in. (Note: You can store a position under a waypoint number that already has a position assigned to it using this method.) To save your present position, press the WAYPOINT SAVE key. The menu shown at right appears. Now press the key adjacent to the "VIEW/SAVE WPT" label. A screen similar to the one below appears.

The last-saved waypoint number in the list appears at the top of the page. The letters "OK" next to the waypoint number means the position is properly stored in memory. If the letters "CHKSUM" appear, do NOT use the waypoint! Erase it and re-enter the position. The position stored in that number appears directly beneath the waypoint number in large numbers. The position you wish to save is shown in small numbers. Press the key next to the "Inc WPT#" label to increase the waypoint number in the list. Press the key next to the "Dec WPT#" to decrease the waypoint number. This lets you view any waypoint in the list. You can also press the key next to the "Page Up" or "Page Down" labels to jump through the list by ten. In other words, if you're on waypoint number 22, and you press the key next to the "Page Up" label, the LMS-150GPS will jump to waypoint number 32. Using the keys in this manner, move through the list of waypoints until the desired waypoint number appears at the top of the



## TRUE and MAGNETIC POSITION

Most people realize there is a difference between true and magnetic north. True north is the top of the world. It's where all lines of longitude converge. Magnetic north is the location our compasses point. It lies several hundred miles to the south of true north, at a location in Canada. Charts are usually laid out according to a Mercator projection which uses true north. If you plot a course on a chart using the Mercator projection, you'll either have to convert magnetic readings to true or use true readings.




The LMS-150GPS can display navigation information in magnetic or true. When it's turned on for the first time magnetic is used. To switch to true, press the MENU key, then press the key adjacent to the "CHANGE GPS SETUP" label. Now press the key adjacent to the "USE TRUE BEARING" label. This cause all navigation displays to show information in degrees true. To switch back to magnetic, repeat the above steps. The menu now reads "USE MAGNETIC BEARING". Press the key adjacent to this menu for magnetic data.

## WAYPOINT NAVIGATION

## HOW TO SAVE A WAYPOINT

Waypoints are locations on the earth's surface that you wish to go or return to. Waypoints are useful for marking shipwrecks, hot fishing spots, and other fishing or navigational locations. Storing waypoint's in the LMS-150GPS's memory makes it easy to return to virtually any point in the world simply by pressing a few buttons. The LMS-150GPS can store up to 100 waypoints. You can store your present position as a waypoint or enter latitude/longitude positions as waypoints.

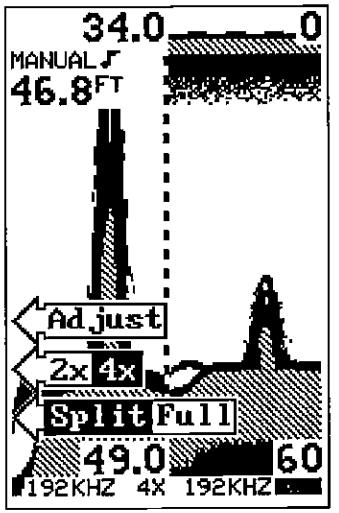
### Saving Present Position as a Waypoint

**(Save as # Feature)**

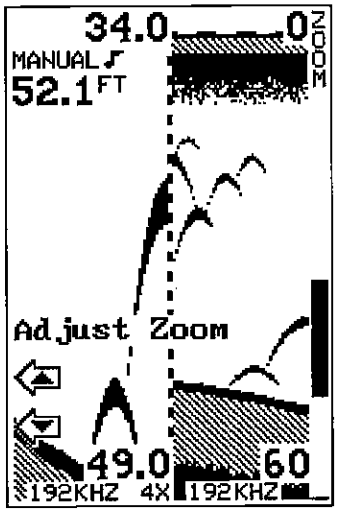
The LMS-150GPS lets you save your present position as a waypoint with only two key presses. This "Quick Save" feature lets you save the position of a wreck or other locations quickly and easily.

To save your present position as waypoint, first press the WAYPOINT






SPLIT-SCREEN ZOOM (MANUAL MODE)




ZOOM ADJUST MENU (MANUAL MODE)

To adjust the zoom, press the key adjacent to the ADJUST label. A screen similar to the one at the upper right appears. A zoom bar appears at the top right side of the screen and adjust arrows appear at the bottom left. The echoes on the left side of the screen are the same ones that appear between top and bottom of the zoom bar. Press the keys adjacent to the arrows to move the zoom bar up or down. As you adjust the zoom bar, the echoes move on the left side of the screen at the same time. The zoom adjust menus and zoom bar automatically erase a few seconds after you've pressed the last key.

To keep the zoom bar on the screen, press the MENU key while the unit is in the manual mode. Next, press the key adjacent to the "More" label two times. The "Display Zoom Window Bar" menu appears at the bottom of the screen. This menu only appears when the LMS-150GPS is in the manual mode. Press the key adjacent to this menu to display the zoom bar. Repeat these steps to turn the zoom window bar off

## MENUS

The LMS-150GPS uses menus extensively to guide you through the functions and features of the unit. The menu key accesses many of these features, allowing you to customize the unit to your particular needs and water conditions. If you ever get lost in a menu, simply press CLEAR key. This returns the LMS-150GPS to the last used screen. There are seven menus on the sonar side. All of the following features are available through the menu key.

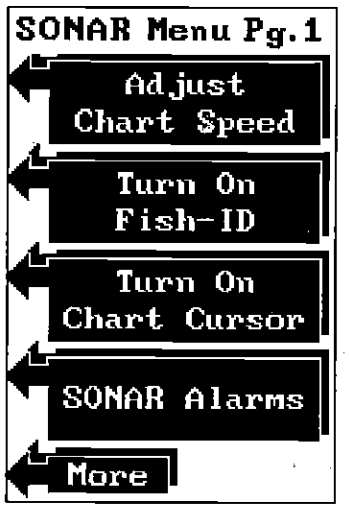
## MENU - PAGE 1

### CHART SPEED

Chart speed is the rate echoes scroll across the screen. It's adjustable by first pressing the menu key, then pressing the key adjacent to the "ADJUST CHART SPEED" label. The chart speed menu appears on the left side of the screen. Increase the chart speed by pressing the key adjacent to the up arrow. Decrease it by pressing the key adjacent to the down arrow. The percentage of chart speed in use changes as the arrow keys are pressed. The bar chart also gives a graphical indication of the chart speed. You can see the change on the screen (both on the menu and on the chart record) as you press the keys. After you've made the adjustment, press the key adjacent to the CLEAR key to erase the menu.

The chart speed is preset to maximum when the LMS-150GPS is first turned on.

To stop the chart, press the key adjacent to the "START/STOP" label. Repeat this step to start the chart again. If desired, the chart can be stopped, then the CLEAR key pressed to erase the menus from the screen. This gives a clear view of the display.




MENU-1st PAGE

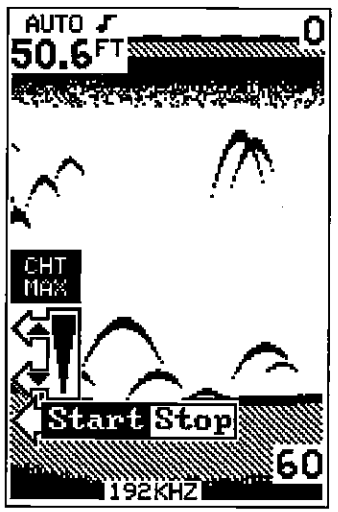


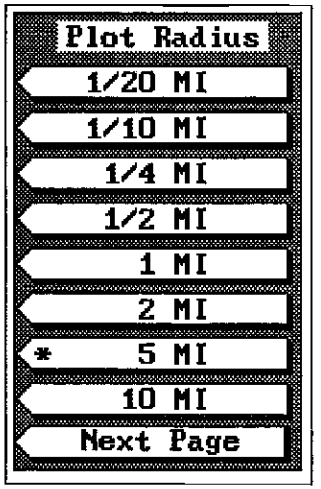

CHART SPEED ADJUST MENU



navigation data. The unit returns to the plotter screen after the key is pressed. Repeat the above steps to switch back to position data.

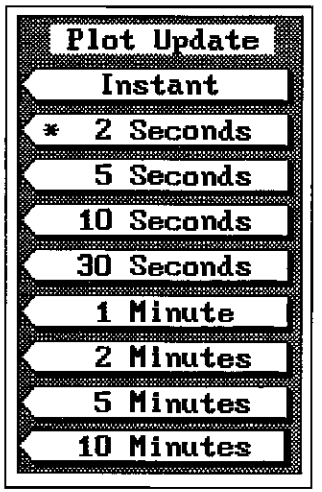
### Plot Radius

Use this menu to change the plotter's radius. The plot radius is .05 statute miles when the LMS-150GPS is turned on for the first time. The available plot radii are 1/20, 1/10, 1/4, 1/2, 1, 2, 5, 10, 20, 50, and 100 miles (or nautical miles). This lets you "zoom in" to see small variations in your course or "zoom out" to see your starting position, present position, track, course, and destination.




### Plot Update

The plotter shows your track by drawing a solid line behind your present position. The position is updated once every two seconds when the unit is turned on for the first time. To change it, use the "Select Plot UPDATE RATE" label on the plotter menu. The available plot update times are Instant, 2, 5, 10, and 30 seconds. 1, 2, 5, and 10 minutes. Simply press the key adjacent to the desired update time. The LMS-150GPS immediately returns to the plotter screen using the new time.

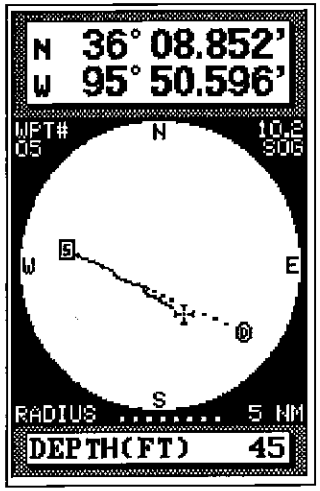



### Clear Plot

To clear or erase the solid track line from the screen, use the "Clear PLOT TRAIL" menu selection. The plotter will continue to draw your track after this key is pressed, however your present position will be centered on the screen.

## PLOTTING WITH A WAYPOINT

Using the plotter with a recalled waypoint or route is an easy way to see the effects of wind and current on your boat. It also simplifies navigation to a fixed point. To use the plotter in this manner, first recall a waypoint or start a route. (See the Waypoint Recall section for more information.) Then press the PLOTTTER key. A screen similar to the one at right appears.




The "S" is your starting location. This was your position when you recalled the waypoint. The flashing cross is your present position, and the "D" is the destination (recalled waypoint). If you are using a route, it's the first waypoint in the route. The dotted line is the shortest, most direct course from the starting point to the destination. Follow this line to get to the waypoint.

The destination waypoint number displays in the screen's upper left corner. In this example, waypoint number 05 is the destination. Your present position shows at the top of the screen. You can switch from present position to Distance to go (DTG) and Course over ground (COG) from the plotter menu. Speed Over Ground (SOG) shows in the upper right corner of the plotter screen.

The arrival alarm automatically sounds a tone when you come within a preset distance to the destination. See the section on alarms for more information about the arrival alarm.


## PLOTTER MENUS

Pressing the MENU key while the plotter displays gives you a new set of menus; shown at the top of the next page. All of the items on the first menu page pertain only to the plotter.

### Show NAV Data

This menu switches the display at the top of the plotter screen from present position to Distance to go (DTG) and Bearing to waypoint (BRG). Press the key adjacent to the "Show NAV Data" label to show the

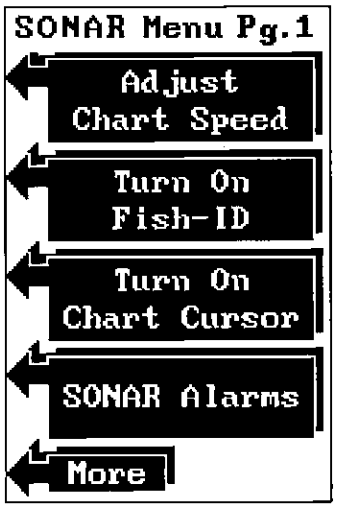


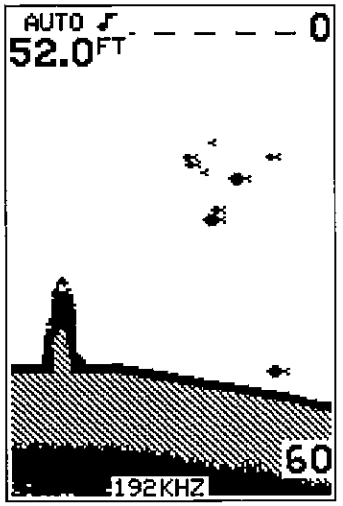
## FISH I.D.

The Fish I.D. feature identifies targets that meet certain conditions as fish. The micro-computer 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 symbols on the screen in place of the actual fish echoes. There are four fish symbol sizes: tiny, small, medium, and large. These show the relative size between targets. In other words, it displays a small fish symbol when it thinks a target is a small fish, a medium fish symbol on a larger target, etc.

The micro-computer 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 I.D. symbols on the screen when actually, there are no fish. Practice with the unit in both the Fish I.D. mode and without to become more familiar with the Fish I.D. feature.

When the LMS-150GPS is turned on, the Fish I.D. feature is off. To turn the Fish I.D. feature on, first press the MENU key. Now press the key adjacent to the "Turn On Fish-ID" label. The menu immediately disappears and the sonar screen returns. Echoes will continue to scroll across the screen, however, the surface clutter no longer shows. Any




FISH I.D. ON

targets the micro-computer determines are fish show as fish symbols. To turn the Fish I.D. feature off again, first press the menu key. Next, press the key adjacent to the "Turn Off Fish-ID" label. Or press the AUTO key. This turns the Fish I.D. feature and automatic off at the same time.

Remember, you can't use the Fish I.D. feature when the LMS-150GPS is in the manual mode. If you turn the Fish I.D. feature on when the LMS-150GPS is in manual, the micro-computer will turn the automatic feature on. If you turn automatic off when the Fish I.D. feature is on, the Fish I.D. feature will be turned off also.

## CHART CURSOR

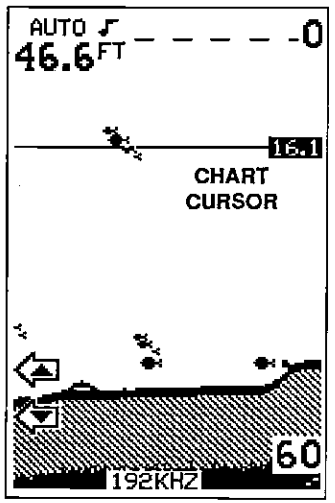
The LMS-150GPS has a chart cursor that allows you to pinpoint a target's depth. The cursor is simply a horizontal line that extends across the display from left to right. A depth box at the end of the line on the right side shows the line's depth. In the example below, the cursor (line) is at 16.1 feet.

To display the chart cursor, press the MENU key. Now press the key adjacent to the "Turn On Chart Cursor" label. A screen similar to the one below appears.

Use the keys adjacent to the up and down arrow to move the cursor up or down to the desired depth.

To turn the chart cursor off, press the MENU key. Now press the key adjacent to the "Turn Off Chart Cursor" label. The LMS-150GPS returns to the sonar screen without the chart cursor.

NOTE: You can't use the Chart Cursor when FASTRAK is on.

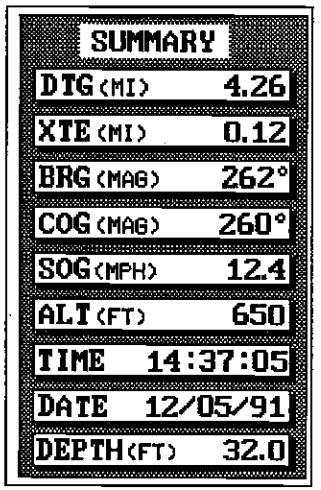





This display shows Distance To Go (DTG), Cross Track Error (XTE), Bearing to Waypoint (BRG), Course Over Ground (COG), Speed Over Ground (SOG), Altitude (ALT), time of day (TIME), today's date (DATE), and water depth (DEPTH).

NOTE: Time always displays in 24 hour format on the Navigation Summary Screen.

No altitude displays if the LMS-150GPS is in the 2D position mode.



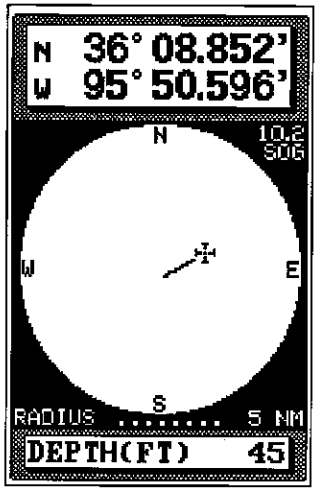

NAV. SUMMARY SCREEN

## PLOTTER

The plotter lets you see your course and direction of travel on the screen. If you've recalled a waypoint, the plotter shows your starting location, present position, and destination. However, you do not have to recall a waypoint to use the plotter.

To use the plotter, simply press the PLOTTER key. A screen similar to the one at right appears.

The flashing cross is your present position. The solid line is your track, or path you have just traveled. The circle is a compass rose marked with North, South, East, and West. The circle's radius displays at the top of the screen. This is the distance from the center to the edge of the circle. Your present position is shown at the top of the screen.

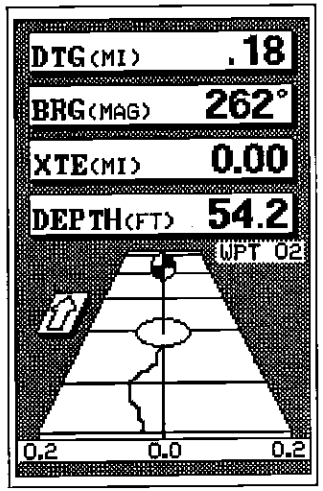



PLOTTER SCREEN

If your present position starts to move outside of the circle, the LMS-150GPS clears the display, then re-draws your present position closer to the center of the screen. Your present position will always be displayed on the plotter.

To clear the plotter screen, see the Plotter Menus section.

As you approach the waypoint, the two circles will move closer together. If you travel past the waypoint, the waypoint's circle will move to the bottom of the display.

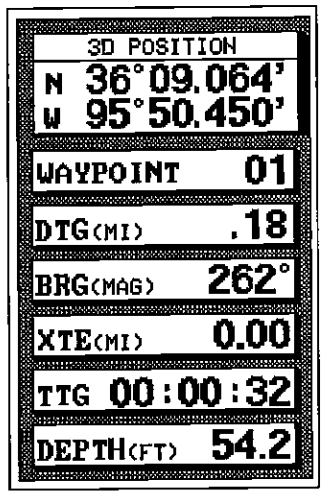



The numbers immediately below the CDI are the CDI range in miles. This gives you an idea of how far off course you are. For example, if the circle is halfway between the course line and the outside line and the CDI range is 0.2 miles, then your cross track error is 0.1 miles. The CDI range is the same as the CDI alarm setting. See the section on GPS alarms to change the CDI range.

Using the digital displays at the top of the screen along with the graphical display at the top lets you accurately steer to a waypoint.

## NAVIGATION SCREEN

The navigation screen is used when you're navigating to a waypoint. It shows your present position, destination waypoint number, distance to go (DTG), Bearing to Waypoint (BRG), Cross Track Error (XTE), Time To Go (TTG), and water depth (DEPTH). To use the navigation screen, first recall a waypoint, then press the MENU key. Next, press the key adjacent to the "NAV. SCREEN" label. A screen similar to the one at right appears.




NAVIGATION SCREEN

## NAVIGATION SUMMARY SCREEN

The Navigation Summary screen shows more information than the Navigation screen. This is the Navigation Summary screen. Again, it's used when navigating to a waypoint. To use it, first press the MENU key, then press the key next to the "More" label. Now press the key next to the " SUMMARY SCREEN" label. The screen shown at the top of the next page appears.



## ALARMS

The LMS-150GPS has three different types of alarms. The Fish Alarm sounds when the Fish I.D. feature determines a group of echoes is a fish. Another alarm is the Zone Alarm which consists of a bar. Any echo that appears inside this bar triggers the alarm. The last alarm is the Bottom Alarm. Only the bottom signal will "trip" this alarm. This is useful as an anchor watch, a shallow water alert, or for navigation.

All of the alarms have a visual and audio signal. If desired, the audio signal can be turned off through the ALARM menu.

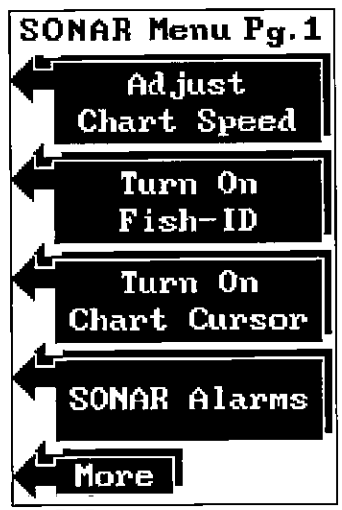
### Depth Alarms

The Depth Alarms are only triggered from the bottom signal. No other echo will "trip" this alarm. The shallow alarm sounds a warning tone when the bottom signal goes shallower than the alarm set point. The deep alarm sounds when the bottom signal goes deeper than the alarm set point. Use the shallow alarm to warn you of shallow water. Use the deep alarm to alert you to deeper water, such as a drop-off.

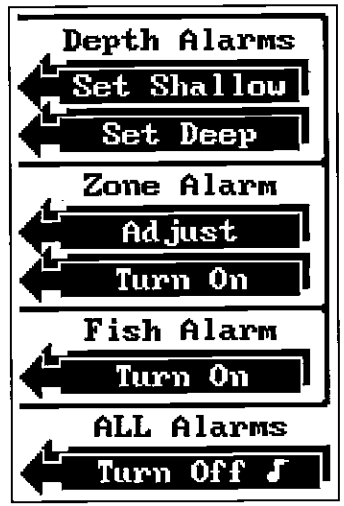
### Shallow Alarm

To use the Shallow Alarm, first press the MENU key. Now press the key adjacent to the "Sonar Alarms" label. The screen below right appears.

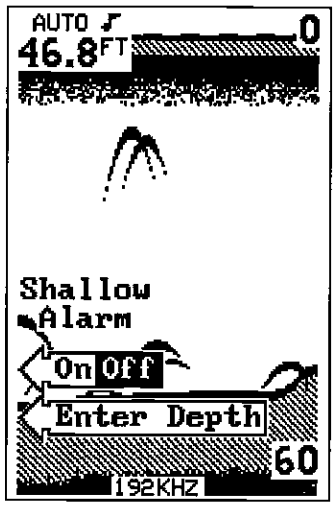
The Shallow and Deep Alarm menus are at the top of this screen. Now press the key adjacent to the "Set Shallow" label. The screen similar to the one shown at the top of the next page appears.




ALARMS MENU



Now press the key adjacent to the "Enter Depth" arrow. A new menu appears "Enter Shal Alarm", as shown above right. Now simply enter the desired shallow alarm depth using the keys on the left side of the screen.



SHALLOW ALARM MENU

SHALLOW ALARM ENTRY MENU

This example uses a shallow alarm setting of ten feet. If the bottom depth goes shallower than ten feet, the alarm will sound. Now press the Enter key. The menu automatically erases and the words "SHAL ALARM" appear in the screen's lower left corner. This automatically turns the shallow alarm on. When the bottom signal triggers this alarm, a tone sounds and the words "SHAL ALARM" flash on the display. An arrow appears with the word "MUTE" inside. Pressing the key adjacent to this arrow temporarily turns the alarm's sound off. The next time the alarm trips, the tone will sound again.

To turn the shallow alarm off, first press the MENU key. Now press the key adjacent to the "Sonar Alarms" label. Then press the key adjacent to the "Set Shallow" label. Now press the key adjacent to the ON/OFF label. Another way to turn the shallow alarm off is to simply set the shallow alarm depth to zero

## Deep Alarm

The deep alarm adjusts and activates exactly like the shallow alarm except the initial setting. When you first set the deep alarm, the initial setting is 5000 feet. Setting the deep alarm to 5000 feet turns it off. The only other difference is the sound the deep alarm makes when the



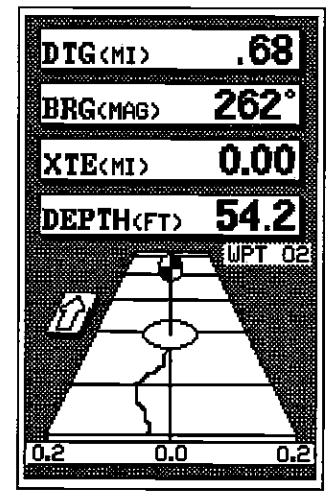
grees, 9.064 minutes north latitude. The longitude is 95degrees, 50.450 minutes west. Below the present position is course over ground (COG). This is expressed in degrees true or magnetic, depending on the mode the LMS-150GPS is in. Course over ground is the direction the boat is travelling. In other words, if the COG is 180 degrees, then the boat is heading due south.

Speed over ground (SOG) displays beneath the COG. This is your boat speed calculated from GPS coordinates. The time display is your local time in either 12 or 24 hour format. Beneath the time display is the fix quality. Fix shows how well the latitude/longitude filter in the receiver is working. The best fix number is nine (9), the worst is one (1). As the fix number decreases, the position's "jitter" increases. Jitter is the small position changes around a location. In other words, if you place a GPS receiver on the ground and turn it on, you'll see the position "jump around." Very small position changes will constantly occur. This is called jitter; it's normal and happens in all electronic navigation devices. If the fix number and HDOP numbers are good, then the latitude/longitude position shown on the display should also be good, excluding the effect of S/A (selective availability). Also see the Engineering Screen section.

Water depth shows at the bottom of the screen. This is the depth of water from the face of the transducer to the bottom.

## STEERING SCREEN

The steering screen shows a pictorial view of your boat and course travelled. This is called a Course Deviation Indicator or CDI. This screen also shows Distance To Go (DTG), Bearing to Waypoint (BRG), Cross Track Error (XTE), and water depth (DEPTH).

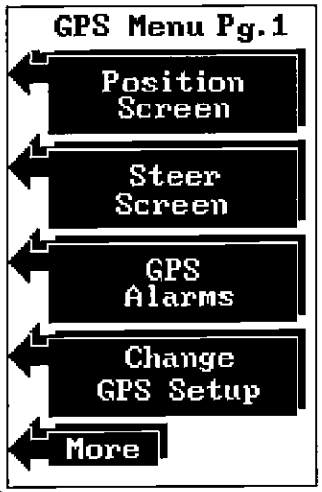


STEERING SCREEN

Your present position is shown by the circle with an arrow inside. The arrow shows the direction the boat is heading relative to the waypoint. In theory, if you steer the boat with the arrow always pointing towards the waypoint, then you will arrive at the waypoint. The solid line extending from the circle is your track. To travel directly to a waypoint, try to keep the circle on the center line. The waypoint is depicted by another circle at the top of the CDI display. (If it's within range.)

## MENUS

The LMS-150GPS uses menus to guide you through the unit's functions and features. Pressing the MENU key accesses these features, allowing you to customize the unit to your needs. There are several menu "pages" which are accessed by repeatedly pressing the menu key. For example, to see the second menu page, simply press the MENU key two times. To exit the menus, simply press the CLEAR key.



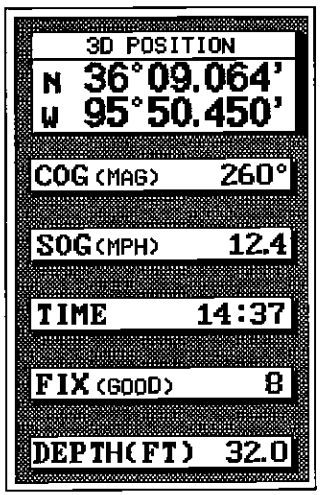

## POSITION/NAVIGATION DISPLAYS

The LMS-150GPS has a position screen, two navigation screens, a plotter, and a steering indicator screen. These displays were carefully designed to show the most important data in large digits. Each of these screens (except the Plotter screen) is available by first pressing the MENU key, then pressing the key adjacent to the desired screen label. The Position, Steer, and Navigation screen selections are on the first menu screen. The Navigation Summary screen selection is on the second menu screen. Simply press the Menu key twice to see the second menu page.

A detailed description of each screen follows.

## POSITION SCREEN

The position screen automatically appears after the LMS-150GPS is initialized. The position display shows your present position, course over ground (COG), speed over ground (SOG), time, satellite fix (FIX), and water depth (DEPTH). The position display at the top of the screen shows if you have a 2D (latitude/longitude only) or 3D fix (latitude/longitude plus altitude).




POSITION SCREEN

Your present position displays at the top of the screen in latitude/longitude coordinates. This is expressed in degrees, minutes, and thousandths of a minute. For example, on this page, the present position is 36 de-



bottom goes deeper than the alarm depth. This tone is different so you can tell by the sound which alarm was triggered.

## Zone Alarm

To activate the Zone Alarm, first press the MENU key. Now press the key adjacent to the "Sonar Alarms" label. Next, press the key next to the Zone Alarm's ADJUST label. The words "ZONE ALARM" show at the screens top right side, signifying the Zone Alarm is active. The zone bar shows immediately beneath it. Any echo that appears between the top and bottom of this bar will trigger the alarm. This alarm will sound on fish, structure, bottom echoes, etc.

To adjust the zone alarm bar press the key adjacent to the up or down arrows. To adjust the top of the bar shallower or deeper, press the key adjacent to the Set Shal/Deep label until the word Shal is highlighted.

ZONE ALARM MENU


To adjust the bottom of the zone alarm bar, press the key until the Deep label is highlighted. Now simply press the key adjacent to the up arrow to move the end of the bar up. Press the key adjacent to the down arrow to move it down.

Once you've made the adjustments, press the CLEAR key to erase the menus.

## Fish Alarm

Use the fish alarm for a distinctive audible alarm when the Fish ID feature detects fish or other suspended objects. To use the Fish Alarm feature, first press the MENU key. Next, press the key adjacent to the "Sonar Alarms" label. Now press the key adjacent to the "Turn On" label in the Fish Alarm section. The screen will clear. Each time a fish symbol displays on the screen, a tone will sound. This will also turn the Fish I.D. feature on if it was off.

To turn the Fish Alarm off, again press the ALARM key. Now press the key adjacent to the "Turn Off" label. The alarm is now disabled.

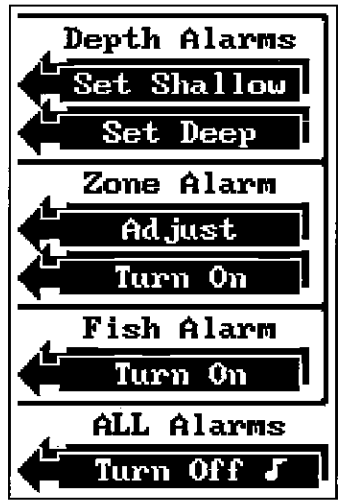
## Audio Alarm On/Off

When the LMS-150GPS is first turned on, a note symbol at the top of the screen shows the audio alarm is enabled.

To tum the audio alarm on or off, press the MENU key. Now press the key adjacent to the "Sonar Alarms" label. Next, press the key adjacent to the "Turn Off" label in the "All Alarms" section. To turn the audio alarm on, press the ALARM key again. The label that was used to turn the sound off now reads "Turn On." Press the key adjacent to this label to turn the sound on.

**NOTE:**

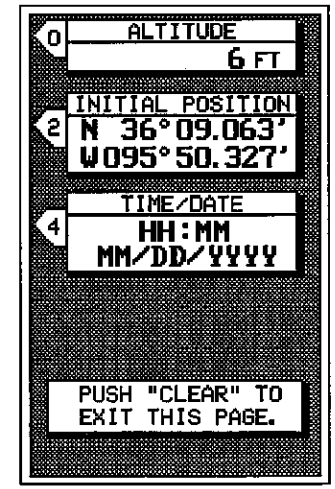
The words corresponding to the alarm in use will still flash at the display's side when the alarm is triggered even if the speaker is turned off. For example, the words "ZONE ALARM" flash when the zone alarm trips.






## TIME/DATE

The Time/Date screen needs your local time and present date. First press the key next to the TIME/DATE label. With the numbered keys, enter the present time first, using 24 hour time (2:00 pm = 14:00, etc.). Next, enter the present date in the month/day/year format. For example, October 4, 1991 is entered as 10/04/1991. Make certain to enter the entire year, i.e. 1991 (not 91.) After entering the time and date, press the ENTER key. This completes the time and date entries.

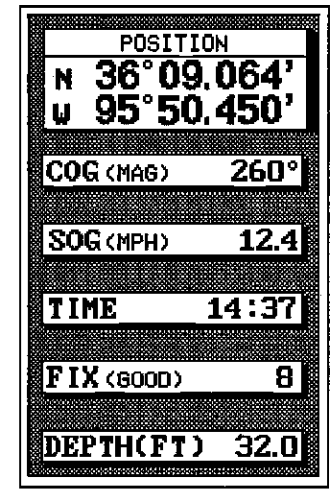



After the LMS-150GPS has been initialized, press the CLEAR key. The position screen appears. The present position display at the top of the screen flashes, indicating that the unit has not locked onto the satellites and calculated your latitude/longitude. When the flashing stops, the unit is ready for navigation.

**WARNING!**

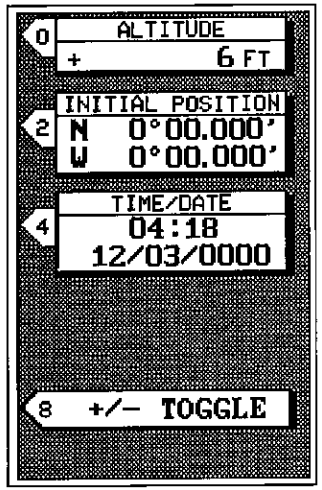
Never navigate with this unit when the position screen flashes the latitude/longitude! This means the unit is not usable for navigation. Always use more than one method to navigate.

If you move a long distance with the unit turned off from the last time you used the LMS-150GPS, you may need to re-initialize the unit. If you preset the LMS-150GPS, you will definitely need to re-initialize the unit. The initial setup page as shown on the previous page appears automatically after a preset. The "Initial Setup" menu selection on the GPS' second menu page returns you to the initial setup menu, when needed. Otherwise, you shouldn't need to repeat these steps.



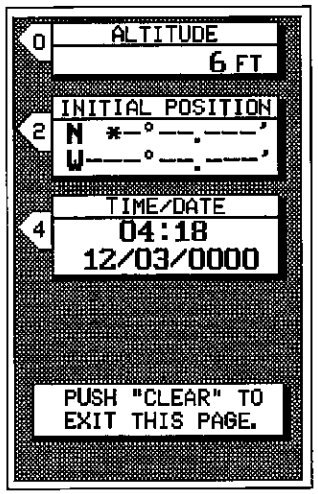

POSITION SCREEN

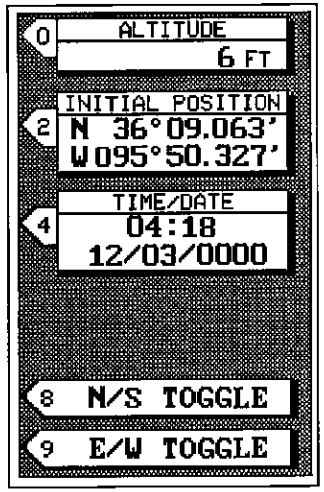
enter your altitude data. Press the ENTER key when you're done. A new label appears at the bottom of the screen: (+/- TOGGLE). Press the key adjacent to this label to switch the altitude you entered from positive to negative. For example, suppose you're in Death Valley and the spot you're standing in is 35 feet below sea level. You would need to enter the numbers "35", then press the key adjacent to the +/- label to change it to -35 feet. After this step is completed, press the ENTER key. This completes the Altitude entry.




## INITIAL POSITION

Press the key next to the "INITIAL POSITION" label. The screen shown below left appears. Now enter your present position in Latitude/Longitude in degrees, minutes, and thousandths of a minute. (Not seconds!) Use the CLEAR key to as a backspace key. After you've entered the last number, two labels automatically appear at the bottom of the screen. Press the key adjacent to the "N/S TOGGLE" to switch the latitude from north to south. Press the key adjacent to the "W/E TOGGLE" to switch the longitude from west to east. If the position shown in the "INITIAL POSTIION" box is correct, press the ENTER key. This conpletes the Initial Position entry.



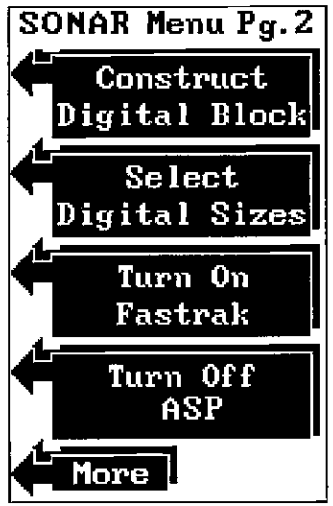





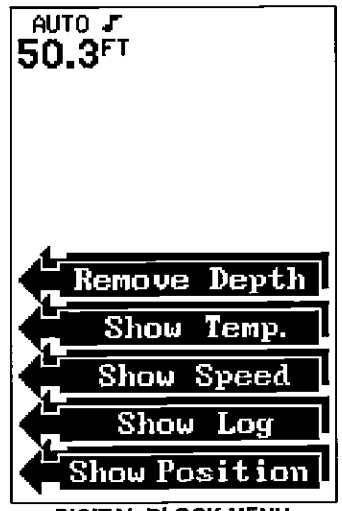

## MENU - PAGE 2

## CONSTRUCT DIGITAL BLOCK

The LMS-150GPS can display the depth, speed, surface water temperature, distance log, and present position on the upper left portion of the screen. When the LMS-150GPS is first turned on, only the digital depth shows. You can turn each digital display on or off as desired. The battery backup will retain these settings.




MENU - 2nd PAGE



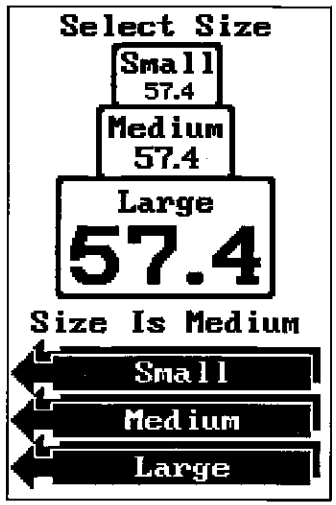

DIGITAL BLOCK MENU

To select the digital displays, first press the menu key, then press the key adjacent to the "More" label. Next, press the key adjacent to the "CONSTRUCT DIGITAL BLOCK" menu at the top of the screen. A screen similar to the one above appears.

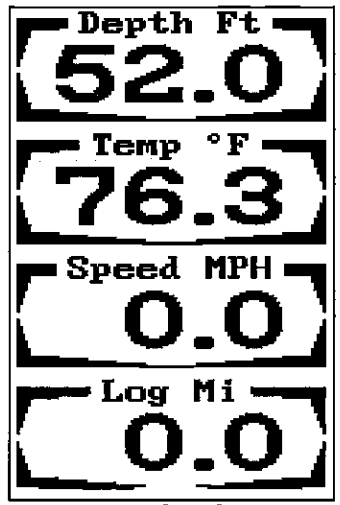
Now press the key adjacent to the desired display. For example, to turn the temperature display on, press the key adjacent to the "Show Temp." label. Once you do this, the display will show the temperature and read "Remove Temp." You can turn each display on or off individually.

To show the present position, press the key adjacent to the "Show Position" label. Note: If DTG and BRG is displayed on the GPS side, then this label will say "Show DTG/BRG" instead.

Press the CLEAR key to exit from this menu or wait about ten seconds and the menus will automatically clear.




DIGITAL SIZE MENU




ALL DIGITAL DISPLAY
(LARGE DIGITAL SIZE)

## SELECT DIGITAL SIZES

The digital displays can show in three different sizes - small, medium, or large. When the LMS-150GPS is turned on, the digital depth shows in the medium digital size. To change the size of the digital display, first press the MENU key. Next, press the key adjacent to the "More" label. Now press the key adjacent to the "Select Digital Sizes" menu. The screen at the top of this page appears.

A sample of the digital sizes appears at the top of the display.

Now simply press the key adjacent to the desired label. For example, if you press the key adjacent to the "SMALL" label, the digital displays show in small numbers.

The large digital selection erases the chart and shows the digital displays in large numbers as shown above right. Pressing the menu key gives only one menu page which is different from other menus. This menu lets you go back to chart information, placing the digital display back in the medium size. It also lets you select digital displays and adjust the depth alarm. Returning to the chart restores the normal menu operation.

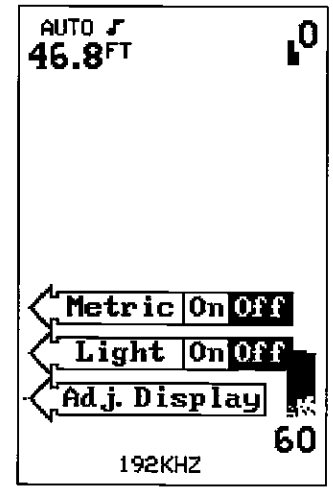


## GETTING STARTED

### Initialization - Power On

The LMS-150GPS must be initialized or "told where it is" the first time it's turned on. This initialization process is usually done only once and requires the following data:

1. Present position in latitude/longitude
2. Elevation above sea level (altitude)
3. Today's date and time

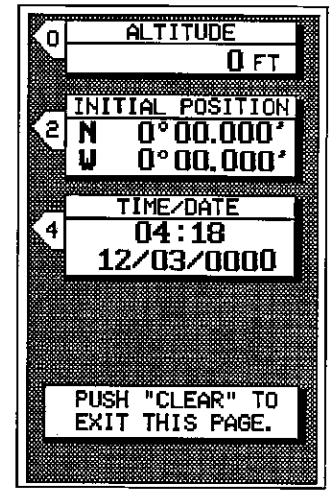



After the power cable and GPS antenna module are installed, press the ON key. The screen shown at right appears. To switch the unit into the metric mode (Altitude and depth in meters, distance in nautical miles, speed in knots), press the key adjacent to the "Metric On" label. To adjust the display contrast, press the key adjacent to the "Adj Display" label. A new menu appears, letting you use the keys on the left side of the screen to adjust the contrast. To keep the display and keyboard lights on, press the key adjacent to the "Light On" label. To remove this menu, simply press the "CLEAR" key. Now press the GPS key. The screen shown below appears next.

**NOTICE! DON'T INITIALIZE THE UNIT WHILE THE LMS-150GPS'S GPS SIMULATOR IS ON!**

### Initialization Screen

This is the Initialization screen. Use this screen to enter the data the LMS-150GPS needs to start. Normally this is done only once. After the unit finds it's location, it stores the position, time, date, and altitude data in memory. This screen will not appear the next time you turn the unit on.




To initialize the unit, first press the key adjacent to the "ALTITUDE" label. The LMS-150GPS needs to know your elevation above sea level. (Not your height above the ground.) An approximate altitude is usually sufficient. Use the numbered keys to

## ACCURACY

You may have heard tales of extraordinary accuracy from GPS receivers. The DOD requires accuracy of 10 to 15 meters from the satellite system. However, only the military gets this precision. The military keeps us and other unauthorized people from using the more precise system by encoding the signal. In other words, the data coming from the satellites is encrypted. Civilian GPS receivers use what's known as "C/A Code." It's accuracy is intentionally worse than the military's "P Code." In this manner, civilian users worldwide can benefit from good position fixes. Meanwhile, the military keeps the most accurate system away from potential enemies. Theoretically, C/A code can give accurate position fixes up to 15 meters. This is more than adequate for most people.

However (as of this writing), the military isn't satisfied with C/A's potential accuracy in the hands of the world. So, it's degrading it further with what's called "Selective Availability" or SA. This is small, random errors intentionally added to the system so your accuracy will typically be within 100 meters. Of course, accuracy also depends on the angle of the satellite above the horizon, signal-to-noise ratio, the number of satellites tracked at one time (the more the better), and other factors. The smaller ranges on the plotter may not be usable at high SA levels, since your present position will move off the screen, even if you're sitting still.

GPS by nature has much faster updates than other systems (such as Loran), and typically is much easier to use. Acuracy, even with SA on is still better than most other navigation systems. You've purchased one of the finest navigation instruments on the market today. We hope you'll enjoy it for many years to come.

NOTE: The altitude display is also affected by SA and the ellipsoid used by the GPS receiver to calculate both position and altitude. Errors in the altitude display can be caused by variations in the SA and the ellipsoid. See the PCF section in this manual for more information on the ellipsoids.

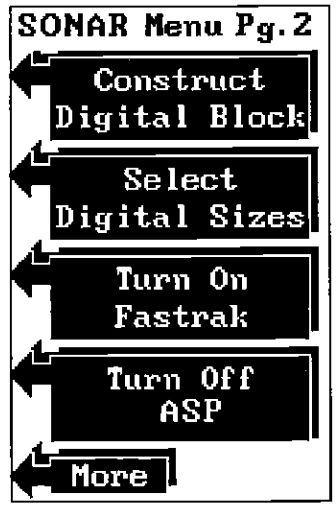
## The LOWRANCE GPS Module

This GPS receiver (manufactured by Rockwell) currently is used in all Lowrance GPS receivers. It's small, rugged, and fast. The five channel design lets it acquire and track up to five satellites at one time. It transmits position information to the LMS-150GPS once every second. By incorporating Rockwell's GPS receiver technology with Lowrance's state-of-the-art design and manufacturing capabilities, Lowrance brings to the consumer the most advanced line of GPS marine navigation systems available .



## FASTRAK

This feature converts all echoes to short horizontal lines on the display's far right side. The graph continues to operate normally. FASTRAK 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.




MENU -2nd PAGE


FASTRAK ON

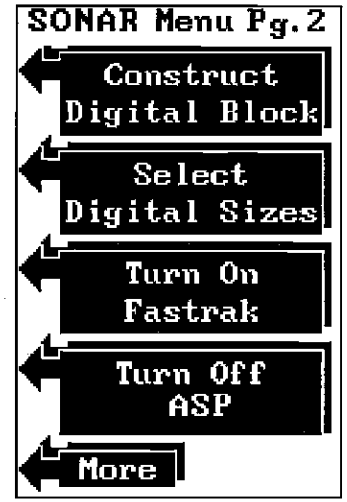
Since the boat is not moving, fish signals are long, drawn out lines on a normal chart display. FASTRAK converts the graph to a vertical bar graph that, with practice, makes a useful addition to fishing at a stationary location.

NOTE: Fish I.D. is automatically turned off when FASTRAK is on.

To turn FASTRAK on, press the menu key, then press the key adjacent to the "More" label. Now press the key adjacent to the "Turn On Fastrak" label. To turn it off, repeat the same steps. The "Turn Off Fastrak" label appears instead of the "Turn On Fastrak" label.

## ASP (Advanced Signal Processing)

The LMS-150GPS has ASP, a proprietary method of noise reduction. This advanced system effectively reduces or eliminates noise displayed on the screen. When the unit is turned on for the first time, ASP is enabled. To turn it off, press the MENU key, then press the key adjacent to the More label until sonar menu number 2 appears as shown above. Now press the key adjacent to the "Turn Off ASP". The screen will clear and return to the sonar display. To turn ASP on again, simply repeat the above steps. The screen will now show "Turn ON ASP".



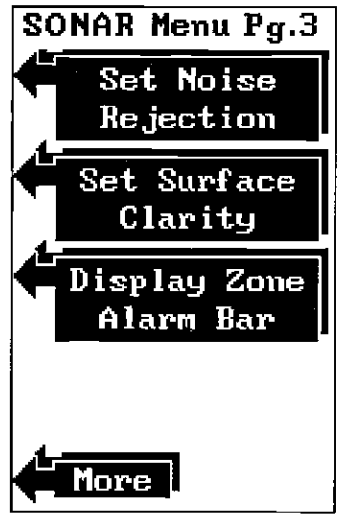

## MENU - PAGE 3

## NOISE REJECTION

The LMS-150GPS's noise rejection 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 produces unwanted marks on the display.

The LMS-150GPS has a two step noise rejection system. When the unit is turned on, the noise rejection is normal. If you have noise problems (identified by random lines or dots on the display), try changing the noise rejection level to high.

To do this, first press the MENU key, then the key adjacent to the "More" label two times. The screen at right appears. Now press the key adjacent to the "Set Noise Rejection" label. The screen at



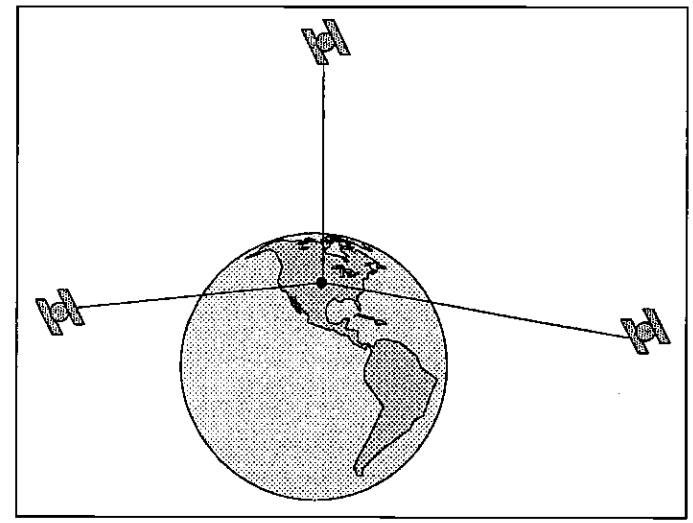

**MENU - 3rd PAGE**
**(AUTOMATIC ON)**
**(FISH ID OFF)**



## GPS - HOW IT WORKS

The Global Positioning System (GPS) is the newest, most high-tech approach to navigation yet devised. Conceived by the Department of Defense (DOD) and the United States military, the GPS system is an answer to their needs of 24 hour global positioning, 365 days a year.

Basically, the system works by using a constellation of satellites orbiting Earth 11,000 miles in space. There will be 21 satellites in orbit when the system is fully operational. Three more satellites will act as spares, for a total of 24. When all satellites are in place, at least four of them will be in view nearly anywhere on Earth twenty-four hours a day. The GPS receiver requires at least three satellites to give a "2D" fix. (A 2D fix is your position in latitude/longitude. A 3D fix is your latitude/longitude plus altitude.) When it locks on to at least four satellites, it displays a 3D fix.



It takes three satellites to determine position.

As the receiver locks on to each satellite, it calculates the distance from the satellite by measuring the length of time it takes the radio signal to reach it. Each satellite has an extremely accurate clock which tells the receiver when the radio transmission started. The receiver compares that time against its own clock, thus it knows how long it took the radio signal (travelling at the speed of light!) to reach it. If you know time and speed, then you can calculate distance. Once you have this from three satellites, then the receiver can determine position.

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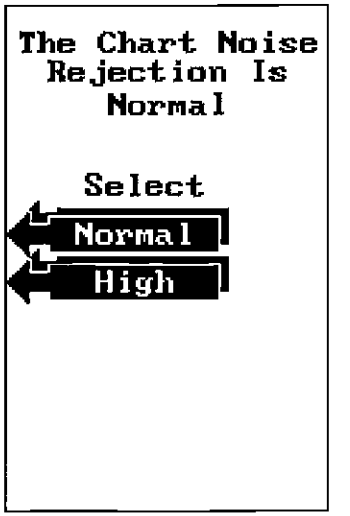
right appears. Now press the key adjacent to the "High" label. The screen will clear and return to the chart screen. The noise should clear from the display as new echoes scroll across the screen. If it doesn't, you may have a problem with electrical wiring, engine, or transducer installation. Check with your local dealer, Lowrance service center, or the Lowrance factory customer service department for help.



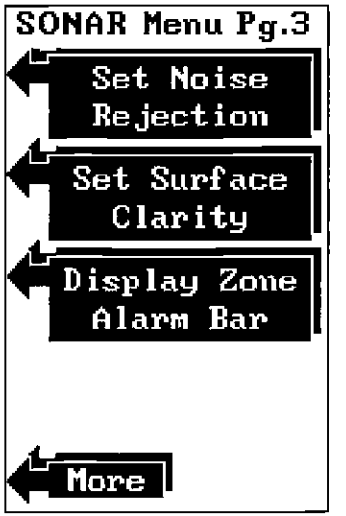

**NOISE REJECTION MENU**

## SET SURFACE CLARITY (SCC)

The markings extending downwards from the zero line can extend many feet below the surface. These markings are called surface clutter and are caused by wave action, boat wakes, temperature inversions, or other activity.

Surface Clarity Control (SCC) reduces or eliminates undesired signals from the display. SCC varies the sensitivity of the receiver, decreasing it near the surface and gradually increasing it as the range increases. Typically, the maximum depth that SCC affects is 75% of the range. For example, on a 0-60 foot range with maximum SCC, surface clutter is reduced from the surface to about 45 feet.

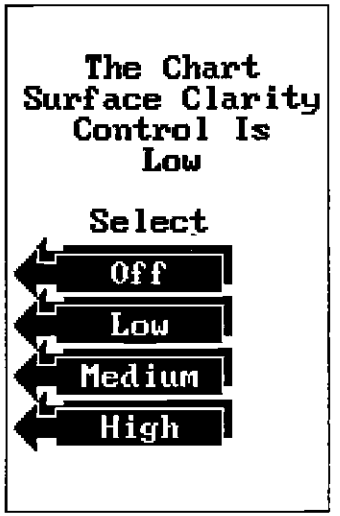
There are three levels of SCC; low, medium, and high. Note that SCC is not available when the Fish I.D. feature is on. The SCC menu doesn't show until the Fish I.D. feature is turned off.




**MENU - 3rd PAGE (AUTOMATIC ON) (FISH ID OFF)**

To adjust the SCC level, first make certain that the Fish I.D. feature is off. Now press the MENU key, then the key adjacent to the "More" label two times. Now press the key adjacent to the "Set Surface Clarity" label.

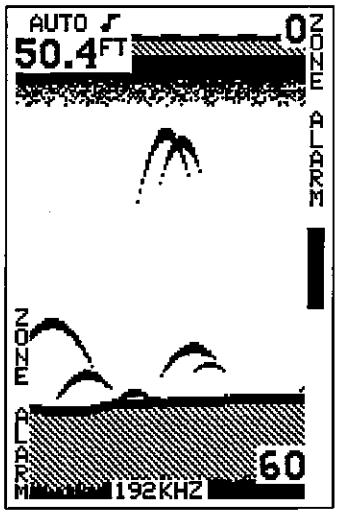
The menu shown at right appears. Simply press the key adjacent to the desired SCC level, either Off, Low, Medium, or High. The LMS-150GPS clears the display, and returns to the chart mode using the SCC level you entered.




SCC ADJUST MENU

## DISPLAY ZONE ALARM BAR

The bar used in the zone alarm normally disappears after setting the alarm. You can turn it on continuously, if desired. To turn the zone alarm bar on, press the MENU key, then the key adjacent to the "More" label three times. Now press the key adjacent to the "DISPLAY ZONE BAR" label. The menu screen disappears and the zone alarm bar displays on the screen's right side. This will also turn the zone alarm on if it wasn't already on. Repeat these steps to turn the zone alarm bar off or use the ALARM menu. Turning the Zone Alarm bar off also turns the zone alarm off.




ZONE ALARM ON



# LMS-150GPS GPS OPERATION

**WARNING!**

USE THIS GPS RECEIVER ONLY AS AN AID TO NAVIGATION. A CAREFUL NAVIGATOR NEVER RELIES ON ONLY ONE METHOD TO OBTAIN POSITION INFORMATION.

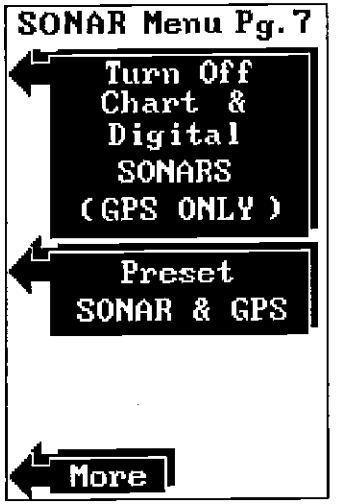
**CAUTION**

This GPS receiver, (like all GPS navigation equipment) will show the shortest, most direct path to a 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 travelling to a waypoint, but will also visually check to make certain a clear, safe path to the waypoint is always available.

**NOTICE!**

As of this writing, the Department of Defense (DOD) has not declared the GPS navigation system as operational. The system is still in a testing phase. Satellites can be turned off or accuracy can be degraded at will by the system operators. Remember that the LMS-150GPS, or any GPS receiver is only as accurate as the system it's using.

## Sonar Menu - Page 7




### SUSPEND SONAR OPERATION

The unit's digital and chart sonar operation can be stopped, if desired. This turns the LMS-150GPS into a GPS navigation only device. To stop the sonar operation, first press the MENU key, then press the key adjacent to the "More" label until the seventh sonar menu page appears. Now press the key adjacent to the "Turn Off Chart & Digital SONARS (GPS ONLY)" label. This stops the chart and digital sonar at the same time.

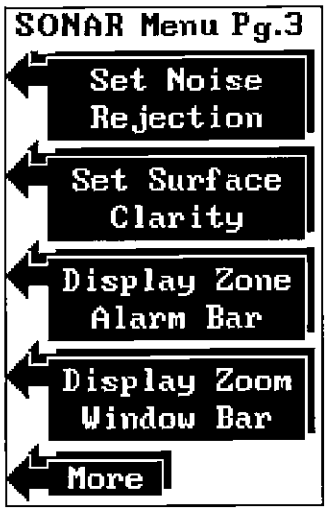
To turn the sonar operation on, repeat the above steps. The label at the top of page 7 now says "Turn On Chart & Digital SONARS". Press the key adjacent to this label.

### PRESET SONAR and GPS

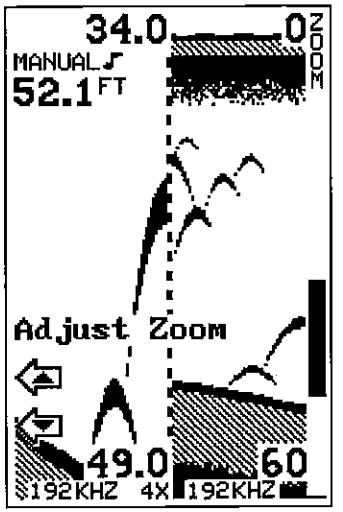
The settings stored in the LMS-150GPS's battery backed-up memory can be erased and reset to the factory defaults. However, this doesn't erase any wayponts or routes.

Presetting the LMS-150GPS will reset the GPS to the factory settings. This stops the GPS from navigating. You will have to re-initialize the GPS after a preset.

To reset the LMS-150GPS, press the MENU key, then press the key adjacent to the "More" label until Sonar Menu, Page 7 appears. Now press the key adjacent to the "Preset SONAR & GPS" label.



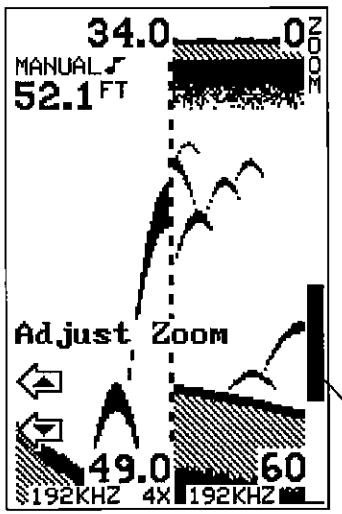

MENU - 4th PAGE
(AUTOMATIC OFF)




ZOOM ADJUST MENU
(MANUAL MODE)

### DISPLAY ZOOM WINDOW BAR

The bar used to adjust the zoom window in the manual mode normally disappears after setting the zoom window. You can turn it on continuously, which keeps the unit in the split screen zoom mode. To turn the zoom window bar on, first make certain the LMS-150GPS is in the manual mode. Next, press the MENU key, then the key adjacent to the "More" label two times. Now press the key adjacent to the "DISPLAY ZOOM WINDOW BAR" label. The menu screen disappears and the zoom window bar displays on the right side of the screen. Repeat these steps to turn the zoom window bar off.



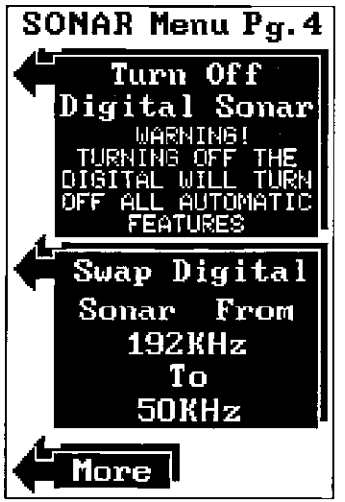
## MENU - PAGE 4

### DIGITAL SONAR

When the LMS-150GPS is turned on for the first time, the digital depth display shows at the screen's top left corner. This display comes from a separate digital sonar built into the LMS-150GPS. It displays only the bottom depth. If it loses the bottom, the last known depth will flash on the display. When the digital finds the bottom, it will automatically display the bottom depth again.

You can turn the digital sonar off, however this also turns all automatic features off also, such as auto sensitivity, auto ranging, and Fish I.D.

To turn the digital sonar off, press the MENU key, then the key adjacent to the "More" label three times. Now press the key adjacent to the "TURN OFF DIGITAL SONAR" label. Repeat the same steps to turn it on again.




### DIGITAL SONAR FREQUENCY

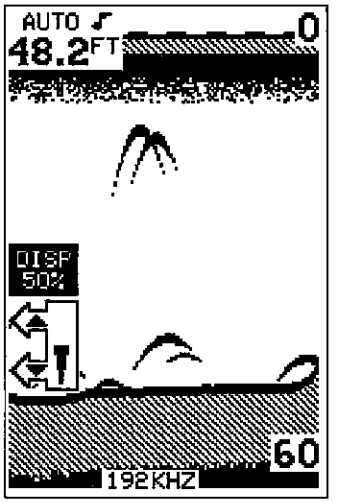
The digital sonar can operate at 50 or 192 kHz if both 50 kHz and 192 kHz transducers are connected to the LMS-150GPS. Using the 50 kHz frequency for the digital sonar allows the LMS-150GPS to reach greater depths. However, typically the 50 kHz doesn't work as well as the 192 kHz at high speed. The LMS-150GPS lets you switch between frequencies, using the best one for conditions.

To change the digital sonar's frequency, press the MENU key, then press the key adjacent to the "More" label until Sonar Menu 4 appears. Now press the key adjacent to the "Swap Digital Sonar From 192 kHz To 50 kHz" label. The digital sonar will immediately use the 50 kHz frequency and transducer. To switch back to 192 kHz, simply repeat the above steps and press the key adjacent to the "Swap Digital Sonar From 50 kHz To 192 kHz" label.



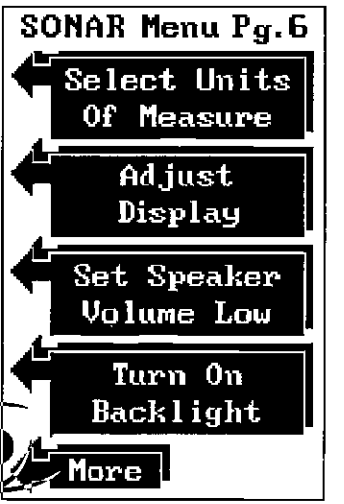
### DISPLAY CONTRAST

The unit's display contrast is adjustable to suit different lighting or viewing angles. To adjust it, press the MENU key, then press the key adjacent to the "More" label until "Sonar Menu Pg. 6" appears. Now press the key adjacent to the "Adjust Display" label. The display contrast arrows appear on the left side of the screen. To increase the contrast, press the key adjacent to the up arrow. To decrease it, press the key adjacent to the down arrow. Press the CLEAR key to erase the menu, or wait about ten seconds and it will automatically clear.




### SPEAKER VOLUME

The speaker volume has two steps - low and high. The speaker volume is high when the unit is first turned on. To change it, first press the MENU key, then press the key adjacent to the "More" label until "Sonar Menu Pg. 6" appears. Now press the key adjacent to the "Set Speaker Volume Low" label. To switch back to the high volume, repeat the above steps.




CVISION TECHNOLOGIES MENU - 6th PAGE

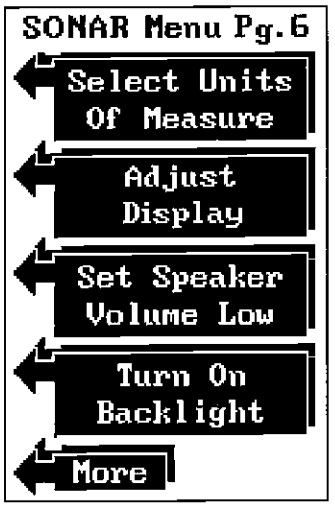
### BACKLIGHTS

The LMS-150GPS has internal lights for the display and keyboard. To turn these on, first press the menu key then press the key adjacent to the "More" label until "Sonar Menu Pg. 6" appears. Now press the key adjacent to the "TURN ON BACKLIGHT" label. To turn the backlights off, repeat the same steps.

## MENU - PAGE 6

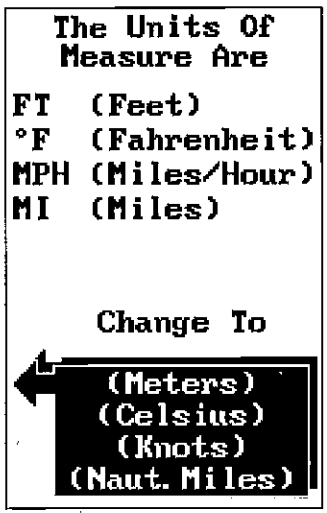
### SELECT UNIT OF MEASURE

The LMS-150GPS can display the water depth in feet or meters, and surface water temperature in degrees Fahrenheit or Celsius. It also shows speed in miles per hour or knots and distance (log) in miles or nautical miles. This menu switches all displays to the metric/nautical versions and back again. You cannot switch each display individually.




MENU - 6th PAGE

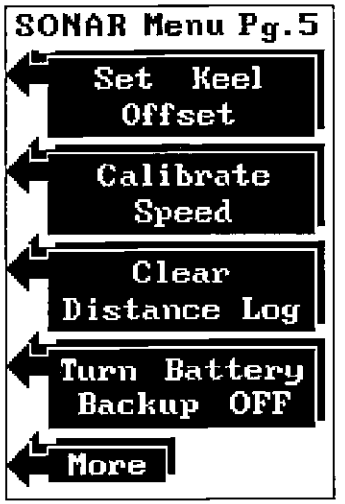
To change the units of measure, first press the MENU key, then press the key adjacent to the "More" label until the sixth sonar menu appears. Next, press the key adjacent to the "SELECT UNITS OF MEASURE" label. The menu shown below appears.




Now press the key adjacent to the "Change To Meters, Celsius, Knots, Naut. Miles" label. The unit of measure will change to the metric equivalent. Repeat the same steps to switch the units of measure again.



## MENU - PAGE 5

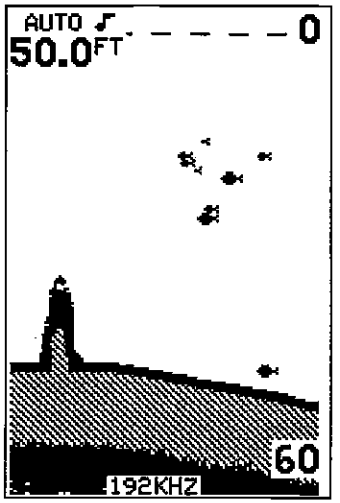



### KEEL OFFSET

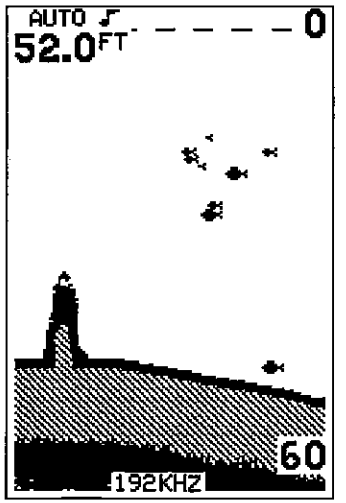
Keel Offset is a term used to describe the difference between the digital depth reading and the actual bottom water depth. All depth sounders (including the LMS-150GPS) measure the water depth from the face of the transducer to the bottom of the lake, river, or ocean. There is both a postive and a negative Keel Offset. The positive offset is used to correct the small error between the face of the transducer and the water's surface. For example, if the face of the transducer is two feet below the surface of the water, *adding* two feet to the digital bottom depth reading will give you the actual water depth. The negative offset is used to show the distance between the lowest part of the boat and the bottom. For example, if the rudder of the boat is two feet deeper that the face of the transducer, *subtracting* two feet from the digital bottom depth reading will give you the actual distance from the bottom of the boat to the bottom. This can be useful if you operate much of the time in shallow water.

To set the Keel Offset, press the MENU key, then press the key adjacent to the "More" label until the Sonar Menu Pg. 5 appears as shown above. Then press the key adjacent to the "Set Keel Offset" label. The menu shown at right appears.


Use the numbered keys on the left side of the screen to enter the desired keel offset. Press the AUTO key to switch from negative to positive. In this example, a positive keel offset of 2.5 feet is used. When the desired keel offset is shown in the window, press the ENTER key to activate the selection. The LMS-150GPS's digital sonar shows the keel offset. In other words, if the digital bottom depth was 50 feet, and a positive keel offset of




BEFORE
KEEL OFFSET



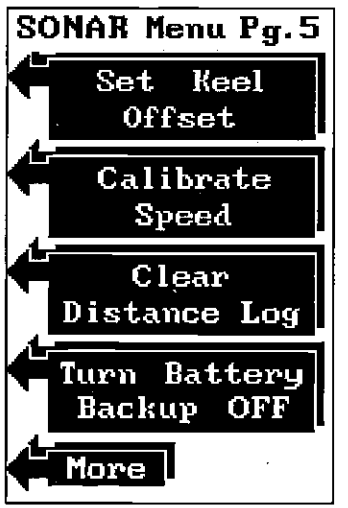

2 FEET POSITIVE
KEEL OFFSET

2 feet was entered, the new digital depth reading would be 52 feet. The chart scales are not affected by the keel offset.

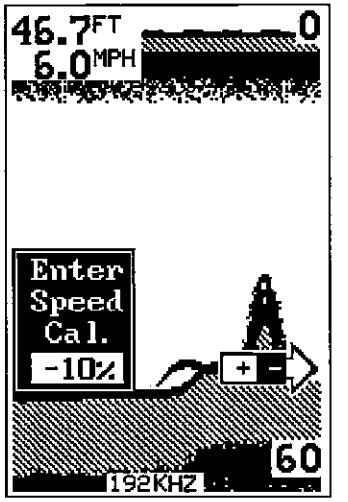
## CALIBRATE SPEED

Due to many factors, such as placement of the speed/temp sensor and boat shape, the LMS-150GPS's speedometer may not be accurate. The Calibrate Speed menu selection on the fifth sonar menu page lets you compensate for any inaccuracy.

To adjust the speedometer, press the MENU key, then press the key adjacent to the "More" label until the fifth sonar menu page appears. Now press the key adjacent to the "Calibrate Speed" label. A screen similar to the one at the top of the next page appears.






Now enter the desired percentage change to the speedometer's display using the numeric keys on the left side of the screen. For example, if your boat speed is actually ten miles per hour, but the LMS-150GPS is displaying 11 miles per hour, then it is reading 10% high. Enter a speed calibration of -10% to correct the LMS-150GPS's speedometer. To change from + to - , press the AUTO key.

After entering the desired speed correction, press the ENTER key. The LMS-150GPS will adjust the digital speedometer by the amount you entered.

## CLEAR DISTANCE LOG

To reset the distance log to zero, press the MENU key, then press the key adjacent to the "More" label four times. Now press the key adjacent to the "Clear Distance Log" label. This resets the distance log and returns to the chart display.

## TURN BATTERY BACKUP OFF

The battery backup feature stores all settings. When the unit is turned off and back on again, it returns to the last used screen, complete with range or zoom settings, position and alarm settings, etc. This feature is on when the LMS-150GPS is turned on for the first time. To turn the battery-backup feature off, press the MENU key, then press the key adjacent to the "More" label until the "Turn Battery Backup OFF" label appears on sonar menu #5. Press the key adjacent to this label. To turn it on again, repeat these steps. The label now reads "Turn Battery Backup ON". Press the key adjacent to this label to turn the battery backup feature on.