

X-40

LIQUID CRYSTAL GRAPH

INSTALLATION AND OPERATION MANUAL

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LITHO IN U.S.A.

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TRANSDUCER - The element of a sonar system that converts the electrical energy from the transmitter into ultrasonic sound waves. When a return echo strikes the transducer, it converts the sound waves into electrical energy which is received and displayed by the sonar unit.

TRANSOM MOUNT - A method of mounting transducers or other sensors on the transom of the boat.

UPPER/LOWER LIMIT - These are the range limits displayed on the sonar screen or paper. The upper limit is shown at the top of the display, while the lower limit is at the bottom. For example, a 20 to 30 foot range has 20 feet as the upper limit and 30 feet as the lower limit.

VIDEO GRAPH - A sonar unit that uses a CRT or television type display.

WINDOW - A segment of the depth range. For example, an upper limit of 20 feet and a lower limit of 50 feet creates a 30 foot window.

ZOOM - A feature that enlarges targets on the display.

a 60 foot range has zero for the upper limit and 60 for the lower limit.

REMOTE - An intelligent "repeater" unit that receives depth information from another sonar unit. A remote doesn't have a transmitter or receiver. However, it does have its own features that are adjustable and operate separately from the master.

RESOLUTION - The ability of a sonar unit to separate targets from each other or the bottom.

RMS - A standard rating of transmitter power output.

SCALE - The markings on a sonar unit's display. To determine the depth of a target, simply compare the target's location to the location of the scale markers on the display.

SECOND ECHO - Another echo that registers at roughly twice the depth of a target echo. This is caused by the sound waves reflecting off the bottom, striking the surface of the water, travelling to the bottom again, and returning to the surface.

SECOND FUNCTION KEY - A button that converts the functions of the primary keys on the keyboard. Sonar units with a second function key have other keys with two functions. You can switch functions with the second function key.

SENSITIVITY - The ability of a sonar unit's receiver to display targets. Increasing the sensitivity allows weaker targets to be displayed. Also called "gain".

SCROLL SPEED - See CHART SPEED.

SHOOT-THROUGH-HULL - A transducer installation which allows the sonar signals to pass through a fiberglass hull without cutting a hole in the hull.

SUPPRESSION - A method used in some sonar units to eliminate interference or noise.

SURFACE CLARITY CONTROL - Reduces or eliminates undesirable signals displayed near the water's surface. Also called "SCC".

THERMOCLINE - A layer of water caused by the meeting of warm and cool layers of water. The thermocline provides the temperature most fish prefer.

INTRODUCTION

Welcome to the world of sportfishing sonar. Your Lowrance X-40 is a high quality sonar designed for both professional and novice users. The X-40 automatically finds and displays the bottom depth, fish, and structure by just by turning it on. As you become familiar with your X-40, try some of its remarkable features. "Fine tune" the unit to the surrounding conditions to get the most from your sonar.

You can program the X-40 to sound alarms when the boat goes shallower or deeper than a preset depth. An alarm will also sound when a fish enters an alarm zone. Zoom in and separate fish from structure and each other.

Only Lowrance gives you the power to adjust a sonar unit to its maximum potential.

To get started with your X-40, first read the installation section. This is where it all begins, and improper installation can cause problems down the road. After you've read these instructions and installed your X-40, read the rest of this manual in detail. The more you know when you get to the water, the more your X-40 will do for you. Take this manual for reference when you head to the lake.

INSTALLATION

Mounting

Install the X-40 in any convenient location, provided there is clearance when tilted for the best viewing angle. Holes in the bracket base allow wood screw or through bolt mounting. Attach the bracket to aluminum panels with sheet metal screws. 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.

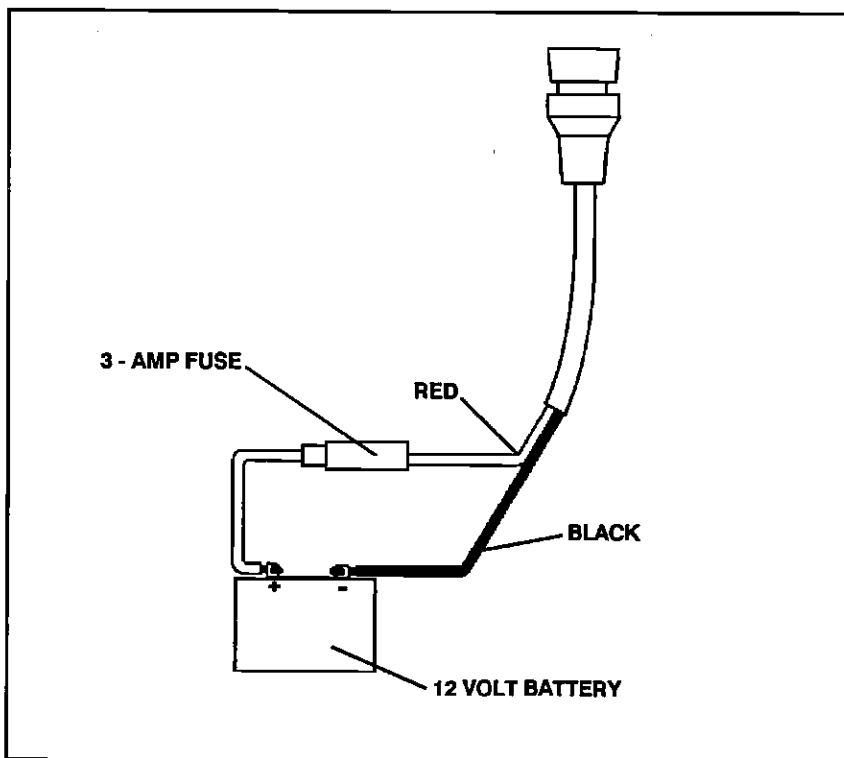
You can route the power and transducer cables through the 7/8" hole in the base of the gimbal bracket. Then pass them through a hole in the mounting surface. The smallest hole that will pass one connector through is 3/4". Pass the transducer connector and cable up through the hole and gimbal bracket. Then push the power cable wire down through the bracket and dash. After routing the cables, fill the hole with silicone rubber adhesive (RTV). Offset the bracket to cover the majority of the hole.

Power Connections

The X-40 operates from a 12 volt battery system. Attach the power cable to an accessory or power buss. If you have problems with electrical interference, then attach the cable directly to the battery. Electrical interference shows as random dots on the display whenever the boat's engine or an accessory is on.

The power cable has two wires, red is the positive lead and black is negative or ground. Attach the in-line fuse holder to the red wire on the power cable with the crimp connector. The other end of the fuse holder attaches to the battery or accessory buss. If the cable is not long enough, splice ordinary #18 gauge wire onto it. Be certain that the fuse holder is as close to the power source (battery or accessory buss) as possible. This protects the power cable and your X-40 in the event of a short. Use a 3-amp fuse.

The X-40 has reverse polarity protection. No damage will occur if the wires are reversed. (However, the unit will not work until the wires are attached correctly.)



on the screen. Signals weaker than the GRAYLINE setting are displayed in black, stronger targets are gray. It also gives clues to the composition of the bottom. In other words, you can tell if the bottom is soft or hard. A hard bottom returns a strong signal causing a wide gray line. A soft, muddy or weedy bottom returns a weaker signal which is emphasized with a narrow gray line.

IN-DASH - A sonar unit installed through a hole in the boat's dash. Usually, the face of the sonar is flush or nearly so with the dash.

kHz - Kilohertz. A measurement of frequency. Your Lowrance sonar operates at 192 Kilohertz. (192,000 cycles per second).

LCD - Liquid crystal display. The screen or display of a Liquid Crystal Graph sonar instrument.

LCG - Liquid Crystal Graph.

NOISE - Any undesired signal. Electrical noise is caused by engine ignitions systems, radios, etc. Acoustic noise is caused by the vibration of the engine or other mechanical sources. It appears on the display as random dots or lines.

OPERATING FREQUENCY - Frequency that the sonar unit's transmitter and receiver are tuned to.

OUTPUT POWER - The amplitude of electrical energy transmitted from the sonar unit to the transducer. Measured in watts, the higher the output power, the deeper a sonar unit can read, and more detail can be displayed.

PEAK-TO-PEAK - A measurement of the transmitter's power output.

PIXEL - The small dots or squares on a liquid crystal display or Crt.

PIXEL DENSITY - The number of pixels per square inch on a liquid crystal display. The best resolution is obtained when a high number of pixels are in the vertical.

PULSE LENGTH - The amount of time that the sonar transmits. This is measured in micro-seconds. The shorter the pulse length, the better the resolution. For example, a 30 micro-second pulse length is equal to a one inch resolution.

RANGE - The section of water shown on the sonar display. For example,

GLOSSARY

ANCHOR WATCH - A setting of the sonar unit's alarm. The alarm activates when the boat drifts into shallower or deeper water than the alarm set points.

BACK-LIGHTED - A display or keyboard illuminated from behind by a light. Back-lighted displays and keyboards are essential when night fishing or navigating.

CAVITATION - Air bubbles created by the high speed movement of a boat or transducer through water.

CHART SPEED -(1) The speed of the chart paper on a paper graph recorder. (2) The speed of an image across the screen of a liquid crystal graph. (Also called "scroll speed").

CONE ANGLE - Width of the transducer's cone of sound. Lowrance has transducers with cone angles from 8 to 45 degrees to suit the varying needs of fishermen.

CRT - Abbreviation for Cathode Ray Tube. See Video Graph.

DEFINITION - The ability of a sonar unit's display to show detail. A high resolution display can show more detail than a low resolution one.

DISCRIMINATION - A feature that allows the sonar to eliminate noise and display only true target information. Discrimination on Lowrance products cuts out false signals from other sonar, noise, thermoclines, and more.

FISH ALARM - An alarm that activates when a fish is detected.

FISH ARCH - A sonar with good resolution displays fish signals with an upside down "V" or arch. This distinguishes fish signals from other targets.

FLUSH MOUNT - A transom mount transducer that is installed with the bottom of the transducer flush with the bottom of the hull.

GIMBAL BRACKET - A bracket used to install a sonar unit permanently. The sonar unit can rotate in the bracket for the best viewing angle.

GRAYLINE - This function shows the relative strength of signals displayed

NOISE

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 that runs from the engine to the instrument panel. This harness usually contains a wire for the tachometer which radiates RF (radio frequency) energy. For best results, keep the power and transducer cables away from the engine wiring. Also, bilge pump wiring can sometimes radiate noise so try to keep the X-40's cables away from those wires.

VHF radio antenna cables radiate RF energy at higher power levels than even the engine's wiring harness. It is important to keep the X-40's power and transducer cables as far away as possible from VHF radio cables.

If interference begins at slow boat speeds, worsening as the boat speed increases, then a probable cause is acoustic noise, or cavitation. This noise is not electrical, but rather mechanically induced noise from the transducer. Stop the boat, put the engine in neutral, and increase the rpm. If the noise does not increase on the display, then it is cavitation. Usually, air bubbles passing over the face of the transducer create acoustic noise. The faster a boat travels, the more air bubbles increase and generate noise on the display. To eliminate this problem, read the transducer owner's manual for proper mounting techniques.

TRANSDUCER

Installation instructions for the transducer are with the transducer in a separate package. Please read the instructions carefully before you install the transducer.



KEYBOARD BASICS

This section gives a brief explanation of the keyboard. Read the Operation section for a detailed description of each key's operation.

GRAYLINE SET Press this key to adjust the grayline level.

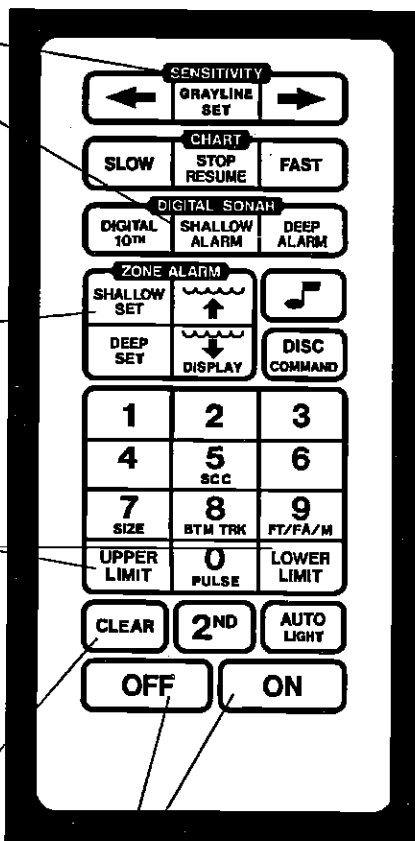
DIGITAL SONAR The X-40 is really two sonars in one housing. The most obvious is the graph, designed to show all return echoes. The other sonar is the digital, designed for only one purpose: to show the bottom depth. These keys turn the digital display off or on and the the digital alarm functions.

ZONE ALARM KEYS This group of keys controls the X-40's zone alarm. It's commonly used as a "fish alarm." A target (such as a fish or school of fish) will set off the alarm if it enters the alarm zone.

UPPER LIMIT

LOWER LIMIT The Upper and Lower Limit keys allow you to select different depth ranges. Enter the desired depth and then press the appropriate upper or lower limit key. The Upper Limit key sets the depth for the top of the display. The Lower Limit key determines the depth displayed at the bottom.

CLEAR The CLEAR key erases the last entry. It can also erase other features, as you will see later.



ON OFF These keys turn the X-40 on and off. To turn it on, simply press the ON key. To turn it off, press the OFF key.

Pressing any key generates a tone or "beep." This is the X-40's way of telling you that it has accepted a command.



SPARE PARTS

The following is a list of the most commonly needed parts. To order, simply write the list of parts required on a slip of paper and mail it to the above address.

(Note: Price subject to change without notice.)

Part Number	Description	Price
151-0071-00	Power Cable	6.75
003-2249-00	Gimbal Knobs (w/washers, 2 ea.)	3.95
003-2045-00	Gimbal Bracket	7.75
003-2181-00	Fuse Holder (w/3 amp fuse)	3.95
988-0105-09	Owner's Manual	2.50

SPECIFICATIONS

Dimensions	5 3/4"H x 8 3/16"W x 2 5/8"D
Weight	1 3/4 pounds
Transmitter	
Frequency	192 kHz
Output Power	600 watts peak to peak typical 75 watts RMS
Receiver Sensitivity	> 85 db temperature stabilized
Operating Current	200 ma (lights off) 500 ma (lights on)
Operating Voltage	9-15 vdc
Number of pixels	192 x 64 (vertical x horizontal) 12,288 Total
Depth Capability	300'-500' typical (with 20 degree transducer) 500'-700' typical (with 8 degree transducer)

BAIT FISH

The importance of bait fish to successful fishing can't be over-emphasized. They are the principle food of all game fish in most waters.

Bait fish are the plankton feeding forage fish, such as minnows and shad. Bait fish can also be the young of game fish, such as crappies, bluegill, and bass.

Most bait fish concentrate within five feet of the surface where sunlight promotes the growth of the plankton on which they feed. One method of fishing is to use the X-40 to find the bait fish first. A school of bait fish will look like a "cloud" on the X-40's display. Usually, game fish will be nearby, often directly beneath the school of bait fish.

HOW TO OBTAIN SERVICE

If you have a problem with your sonar unit, please give us a chance to help before sending it in for repair.

Assistance can often be extended by telephone or letter. Call the Authorized Customer Service Center nearest to you. If there isn't a service center near you, call the factory customer service department at 1-800-331-4105, toll free. Oklahoma residents call 918-437-6881, collect.

Please detail the problem you are experiencing. The service department may be able to save you the inconvenience of returning your unit.

If the unit must be returned, pack it carefully so it won't be damaged. It is advisable to insure the unit in case it's lost or damaged during transit.

SCHEMATIC DIAGRAM AND PARTS LIST

If you desire a schematic and parts list for your Lowrance sonar, send \$1.00 to the address below and the information will be mailed to you promptly. Be sure to include the model and serial number of your Lowrance sonar unit.

Mail To:
Lowrance Customer Service
12000 E. Skelly Dr.
Tulsa, Oklahoma 74128

SENSITIVITY These keys control the graph's sensitivity. (The digital automatically adjusts its sensitivity.) The receiver sensitivity has 32 steps, allowing adjustment over a wide range of conditions. The left arrow key decreases the sensitivity, the right arrow key increases it.

KEYBOARD BASICS

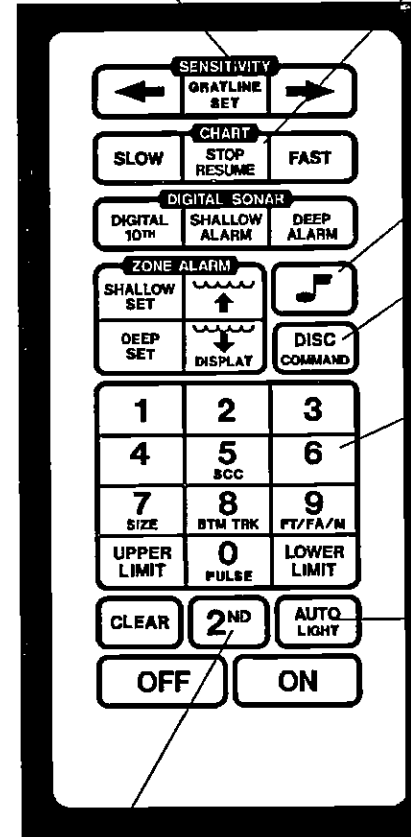
CHART The CHART group of keys controls the chart speed. The X-40 has 10 chart speeds, ranging from very slow to FAST. Pressing the FAST key speeds up the chart speed. The SLOW key reduces it. The STOP/RESUME key stops and restarts the chart display.

NOTE KEY This key turns the audible alarm off or on.

DISC Discrimination is an adjustable noise rejection system. The levels of adjustment are 0 through 10.

0 - 9 These keys allow the entry of numbers 0 through 9. Some of these keys have more than one function. Use the 2nd function key to use the other functions. Pressing a numeric key displays the number in a window near the top center of the display.

AUTO The AUTO key switches the X-40 in or out of the automatic mode. The X-40 automatically adjusts the sensitivity and range selection at power on. Pressing the AUTO key allows you to take control of the X-40, making manual adjustments as desired. When the X-40 is in the automatic mode, the word "AUTO" displays immediately below the sensitivity bar.



2nd This allows keys to have more than one function. Notice that some of the keys have a small word printed in white below its primary function label. The white lettering designates a 2nd function. Activate a 2nd function by first pressing the "2nd key." Then press a key which has the second function printed in white. For example, the AUTO key also has the word "LIGHT" printed on it. "LIGHT" is the AUTO key's second function. Press the 2nd key, then the AUTO key to turn the lights on.

Note: The X-40 has many more features than the ones just discussed. For a detailed look at the X-40's features and operation instructions, read the Operation section of this manual.

DISPLAY INTERPRETATION

Now let's look at the display. First, we'll turn on the X-40 by pressing the ON key. The lights will flash for six seconds. The chart scrolls the return echoes across the screen and the digital searches for the bottom depth. It's flashes 0 until it finds the bottom. Once it finds the bottom, the depth is displayed.

Here the X-40 has found the bottom at 48 feet. The range is zero to 80 feet. It automatically chooses a lower limit that places the bottom signal near the bottom of the display.

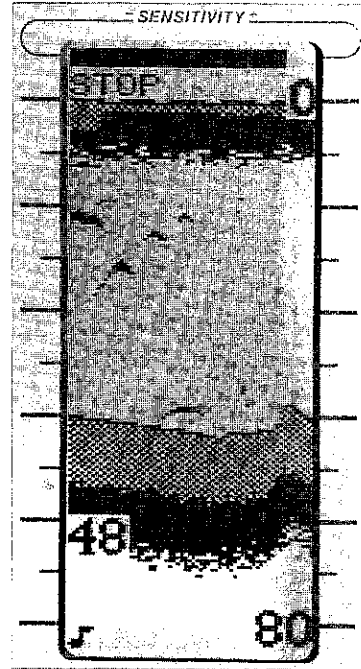
The bar at the top of the display is the sensitivity bar. It shows the sensitivity in use. The bar extends from left to right. A very short bar indicates minimum sensitivity. Setting the sensitivity to maximum causes the bar to run completely across the top of the display.

The word STOP indicates the X-40's chart is stopped.

The top line of the chart is always a dashed line. It moves from right to left, showing the chart is moving. As the chart speed increases or decreases, the dashed line changes speed accordingly. Stopping the chart causes the line to flash on and off.

The range is both an upper limit and a lower limit at the top and bottom of the display, respectively. In this example, the range is 0 - 80 feet. Scale markers printed on both sides of the display help determine the actual depth.

For best results, read the Operation section of this manual. It explains in detail all of the functions that are in this section, plus other features not discussed here.



The temperature of water in the lake is seldom constant from top to bottom. Layers of different temperatures form, and the junction of a warm and cool layer of water is a thermocline. The depth and thickness of the thermocline can vary with the season or time of day. In deep lakes there may be two or more at different depths. Thermoclines are important to fishermen because they are areas where fish are active. Many times bait fish will be above the thermocline while larger game fish will suspend in or just below it.

The X-40 can detect this invisible layer in the water, but the sensitivity will probably have to be turned up to see it.

A knowledge of the water temperatures various fish prefer, and in which they usually remain, helps you get the most from your X-40.

SURVEYING A LAKE

The most successful anglers on any body of water are those who fish it day after day and year after year. Eventually, they learn the hot spots that produce fish consistently. They discover through experience where, and at what depth, they can expect to find the fish they want at any season. And they realize that these productive areas change throughout the year depending on water level, temperature, food, and other factors.

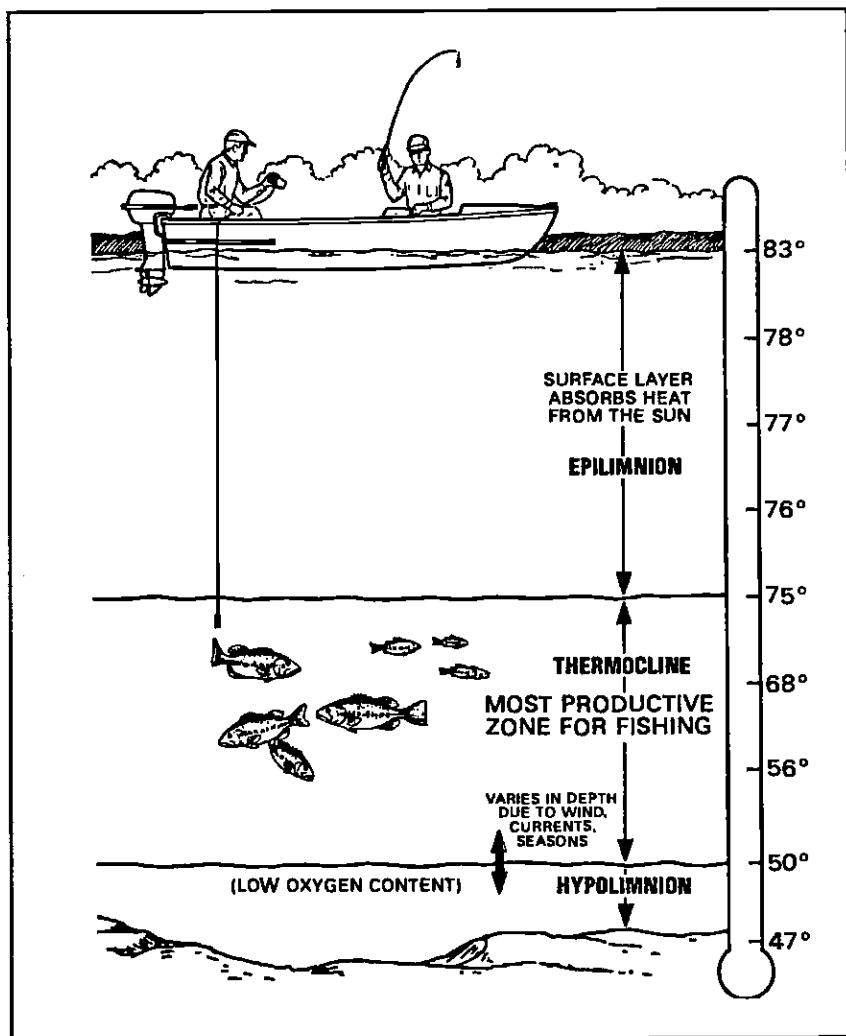
With the X-40, anyone can eliminate guesswork and concentrate on the areas where fish are likely to be. Even if it's the first time on the lake!

The most efficient way to become acquainted with a body of water is to survey it with your X-40. Start with a map of the lake, if possible, and indicate the promising spots in relation to landmarks on shore.

As you go about your survey, your X-40 will tell you the depth and type of bottom. It will also reveal suspended fish. Multiple signals on the dial usually indicate a good school of fish and it's worth it to stop and fish for them. You may not get any further.

Keep a few Lowrance Fish-N-Floats in the boat, ready to toss overboard. When the X-40 indicates a school of fish, throw the buoy out. The string will unwind until the sinker hits bottom. Then, because of the marker's flat shape, it won't unwind any further. With the school thus marked, you can make your turn and come back to fish in exactly the right spot. This is essential when you're far from shore on a big lake. Unless you mark the school of fish when you're over it, you may not be able to find it again.

Most fish don't spawn unless the water temperature is within rather narrow limits. To find the different temperatures, a surface temperature meter, such as the LDT-3000 is a valuable aid to your boat. This unit provides an extremely quick response to identifying the desired surface water spawning temperatures for various species. Trout can't survive in streams that get too warm. Bass and other fish eventually die out when stocked in lakes that remain too cold during the summer. While some fish have a wider temperature tolerance than others, each has a certain range within which it tries to stay. Schooling fish suspended over deep water lie at the level that provides this temperature. We assume they are the most comfortable here.



OPERATION

When the X-40 is first turned on, it automatically finds and displays the bottom depth, and adjusts the sensitivity to the proper level. It also sets the scales to a range that will keep the bottom signal on the display, plus much more. Using the X-40 in this mode is simple and allows you to concentrate on fishing. However, virtually every function of the unit is manually adjustable so it can be "finetuned" to the surrounding conditions. Take this manual with you as a reference guide.

ON

ON

The ON key is located in the lower right corner of the keyboard. It's easily found in this location - even at night. To turn the X-40 on, press the ON key. An audible beep reflects the key press. The chart lights will begin flashing, then stop after six seconds. The Lowrance logo will flash for a few seconds as the chart scrolls across the display. The digital bottom depth display will flash "0" until it finds the bottom. Then it displays the digital depth.

OFF

OFF

To turn the X-40 off, press the OFF key.

2ND

2nd

The X-40 has many different functions, but only a limited space for keys. Therefore, some of the keys have more than one function. Each key's primary function is in one color, while it's second function is white. To access the second function on a key, press the "2nd" key first, then press the appropriate key. For example, the AUTO key also has the label "LIGHT." Pressing the AUTO key by itself takes the X-40 out of the automatic mode. However, pressing the 2nd key, then the AUTO key, turns the X-40's lights on. The 2nd key just reassigned the meaning of the AUTO key from AUTO to LIGHT.

CLEAR

CLEAR

If you make a mistake, and press a key other than what you wanted, wait six seconds. The X-40 will automatically erase the entry.

For example, if you wish to turn on the lights, the proper keys to press are 2nd,AUTO. However, suppose you accidentally pressed the 0 key instead of the 2nd key. Pressing the CLEAR key erases the 0, allowing you to start over. The CLEAR key also erases or turns off other functions

of the X-40 including SCC, Discrimination, and Upper Limit. When other functions are described in this manual, the CLEAR key's operation will be explained in detail.

AUTO



Turning the X-40 on enables the automatic mode. To switch to the manual mode, press the AUTO key located above the ON key. Pressing the AUTO key erases the word AUTO at the top of the display. This cancels auto sensitivity and ranging, giving you complete manual control of the unit. Return the X-40 to automatic at any time by pressing the AUTO key again.



SENSITIVITY

When first turned on, the X-40 is in the AUTO SEARCH mode. The micro-computer automatically adjusts the sensitivity and range to find and lock onto the bottom. You can leave the sensitivity in the automatic mode or manually adjust it to suit conditions.

A horizontal bar at the top of the screen displays the sensitivity level. When the sensitivity is at its minimum level, the bar is very short. Increasing the sensitivity causes the bar to travel to the right, increasing in length correspondingly. Setting the sensitivity to maximum will cause the bar to extend across the top of the display. (There are 32 steps of sensitivity available.)

To place the X-40 in manual mode, press the AUTO key once. This turns auto sensitivity off. The word AUTO at the top of the display will disappear, signifying that the X-40 is in the manual mode. To increase the sensitivity, press and hold the right arrow key until the sensitivity is at the desired level. The left arrow decreases sensitivity in the same manner. Notice how the sensitivity bar moves as you change settings. When you press the right arrow key, the bar moves to the right, indicating an increase in sensitivity. Pressing the left arrow key moves the bar to the left, showing the sensitivity has decreased accordingly. You'll also see the change on the display.

The photo on the next page shows a graph with too little sensitivity. On the right, the graph has a proper sensitivity setting. A fish along with higher surface clutter are now visible, and the bottom signal has widened.

If a partial arch occurs most of the time on your unit (the mark curves up, but not back down, or vice-versa) it could be the transducer is not pointing straight down. Adjust a transom mounted transducer until the fish show the distinctive arch. This may take some trial and error until you achieve the correct mounting.

Remember, there must be some movement between the boat and the fish to develop the arch. Usually, this means trolling at very slow speeds with the main engine in gear at a minimum throttle setting.

The depth of the water will affect the size and shape of the fish arch due to the cone angle diameter. For example, if the cone passes over a fish in shallow water, the signal displayed on the X-40 may not arch at all. This is due to the narrow cone diameter and the resolution limitations of the display.

Compared to a paper graph, a X-40 cannot show as fine of detail. The reason for this is the pixels (dots on the screen) are much larger than a paper graph's markings. Therefore, the X-40 cannot show fish arches as well as a graph. Plus, it requires a bit more work initially to read and interpret the screen than a paper graph.

Very small fish probably will not arch at all. Medium sized fish will show a partial arch, or a shape similar to an arch if they're in deep water. Large fish will arch, but turn the sensitivity up in deeper water to see the arch. Because of water conditions, such as heavy surface clutter, thermoclines, etc., the sensitivity sometimes cannot be increased enough to get fish arches.

One of the best ways to get fish arches is to expand or "zoom" a segment of the water. For example, 40 to 60 feet. The smaller the segment, the better the screen resolution will be. Then, turn up the sensitivity as high as possible without getting too much noise on the screen. In medium to deep water, this method should work to display fish arches.

WATER TEMPERATURE AND THERMOCLINES

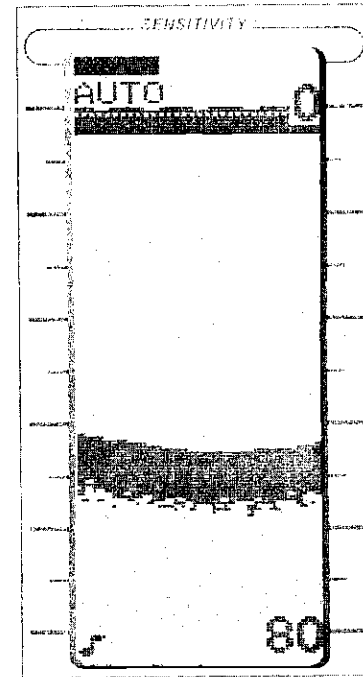
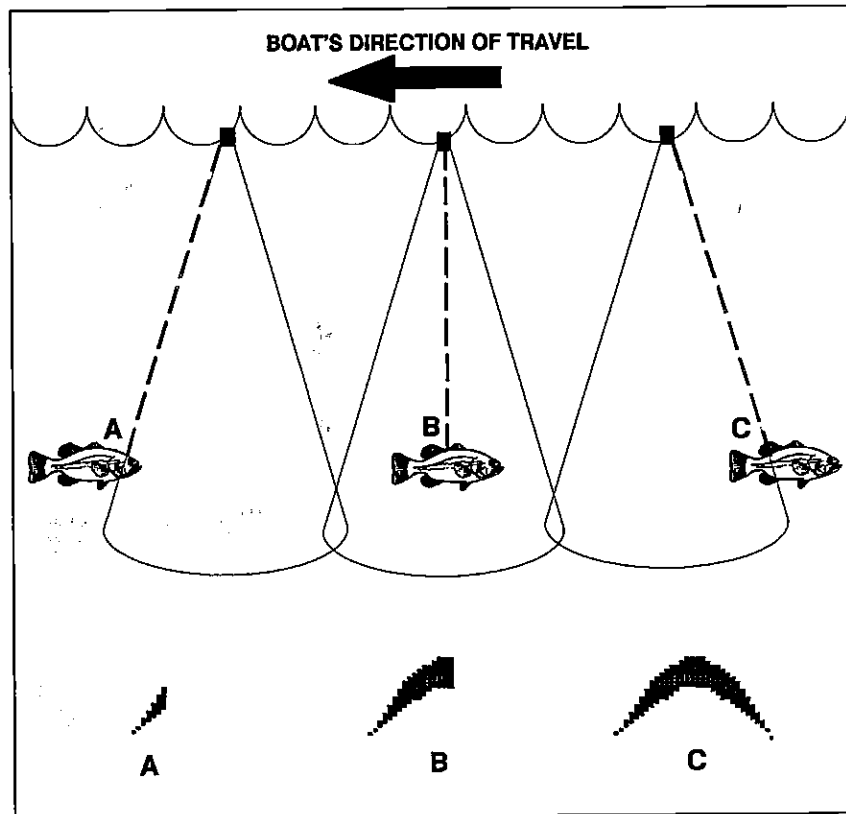
Water temperature has an important-if not controlling-influence upon the activities of all fish. Fish are cold blooded and their bodies are always the temperature of the surrounding water. During the winter, colder water slows down their metabolism. At this time, they need about a fourth as much food as they consume in the summer.

Brush usually lies on the bottom and shows up as clumps rising above the bottom signal. Brush signals look similar to large rocks, however their signal is not as strong as rock.

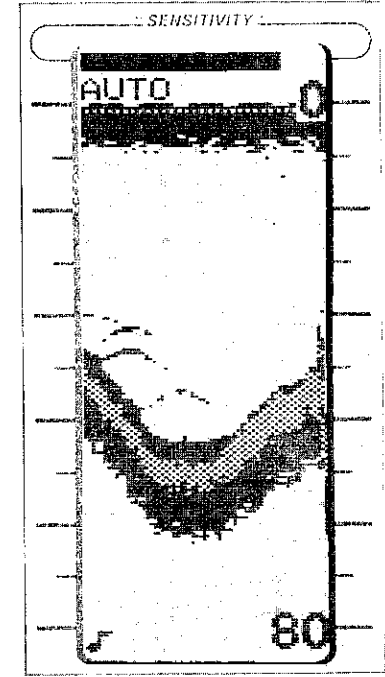
FISH SIGNALS

The signals displayed on the X-40 by fish are identified by various shaped markings in certain patterns, as opposed to random marks created by noise. Or the solid, continuous markings made by the bottom.

Typically, fish are identified by a characteristic arch that separates them from their stationary surroundings. The reason for this is shown below. The distance to a fish when it moves into the sonar's cone of sound is shown as "A" below. When the fish has moved into the center of the cone, the distance to it will be shorter, "B". As it moves out of the cone, the distance will increase again as shown in "C".



SENSITIVITY: TOO LOW



SENSITIVITY: PROPER

When the horizontal bar reaches the far right hand side of the screen, the sensitivity level is at maximum. With high sensitivity settings, a second bottom echo (second echo) may appear. This is normal. It's caused by the returning signal reflecting off the surface of the water. Then it makes a second trip to the bottom and back again.

To turn Auto Sensitivity back on, press the AUTO key. Remember, pressing the AUTO key turns both automatic sensitivity and auto ranging functions on and off at the same time.

AUTO SENSITIVITY ADVANCED OPERATION

When the X-40 is in the automatic mode, the receiver's sensitivity automatically adjusts to the surrounding conditions. The micro-computer places it at a level slightly above the minimum required to pick up the bottom signal.

Changing the sensitivity level while the X-40 is in the automatic mode is possible. This may be desirable if the sensitivity level is not enough to show fish or other small detail. The X-40 will increase the sensitivity to

pick up the bottom signal, then add in the level you programmed. If desired, you can add sensitivity up to the maximum.

To adjust the sensitivity while the X-40 is in the automatic mode, simply press the right arrow key to increase it. Press the left arrow key to decrease the sensitivity. As you press the arrow key, the sensitivity bar will move right or left, according to the sensitivity level chosen.



CHART SPEED

At power on, the chart speed scrolls at a pre-determined speed. For a higher speed, press and hold the FAST key in the CHART section of the keyboard. When the scroll speed reaches the desired speed, release the FAST key. To slow the display, press and hold the SLOW key. Pressing either of these keys causes the sensitivity bar at the top of the display to change to a dashed line. The letters "CHT" will appear near the top of the display. This bar represents the chart speed. If you press and hold the FAST key for example, the bar will start moving to the right. This signifies that the chart speed is increasing. There are 10 steps of chart speed. Holding either the FAST or SLOW keys, the display can be speeded up or slowed down. When the horizontal bar reaches the far right side of the screen, the chart speed is at its maximum value. The X-40 will sound a tone indicating maximum chart speed.

To view the chart speed without changing it, press 2nd, FAST or 2nd, SLOW.

At times it is desirable to stop or "freeze" the display to examine an echo before it scrolls off the screen. Pressing the STOP/RESUME key once will freeze the display. The word "STOP" appears near the top of the display. Press STOP/RESUME again to start the display moving at the last chart speed setting. If the digital sonar is on, the bottom depth is continually displayed. The digital does not stop when the chart is in the "freeze" mode.



The 20 degree transducer is almost always the best to use in fresh water, the 8 degree mostly in salt water. In a deep water environment, (300 feet - fresh water, 100 feet - salt water) the narrow cone angle is more desirable. Since the sound energy is concentrated in a smaller area, it can penetrate to much deeper depths.

Both 8 degree and 20 degree transducers give accurate bottom readings, even though the bottom signal is much wider on the 20 degree model. This is because you are seeing more of the bottom. Remember, the shallow edge of the signal shows you the true depth. The rest of the signal tells you whether you are over rocks, mud, etc.

Paint transducers on salt water boats with a thin coat of anti-foulant paint to prevent organisms from growing. If unchecked, barnacles and other marine growth will cause a decrease in the transducer's sensitivity. Do not use a metal based anti-foulant paint as it will decrease the transducer's sensitivity. There are special anti-foulant paints specifically designed for transducers. They're readily available at most marine dealers.

SIGNAL INTERPRETATION

Since your X-40 is both extremely sensitive and powerful, it gives an accurate picture of the bottom that your boat is passing. A bottom of firm sand, gravel, shell, or hard clay returns a fairly wide signal. If the automatic sensitivity is off and the signal narrows down, then it means that you have moved over a mud bottom. Mud absorbs the sound wave and returns a weak signal. Turn up the sensitivity. If you have the automatic sensitivity turned on, watch the sensitivity bar. As the boat passes over the mud bottom, the X-40 will automatically increase the sensitivity to maintain a good bottom signal. The sensitivity bar will help you in determining if the bottom is soft or hard. If it increases while in the same depth of water, then the boat has moved over a soft bottom. If it decreases, then it is over a hard bottom. Of course, as the water depth increases or decreases, the sensitivity will also change.

Big rocks or stumps on a smooth bottom send back signals above the bottom level signal. The height of the signal depends on the target's height. As you pass over a post, it will be clearly visible as a short line extending above the bottom signal.

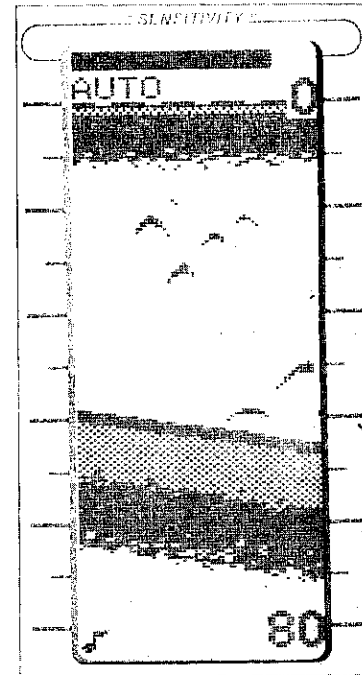
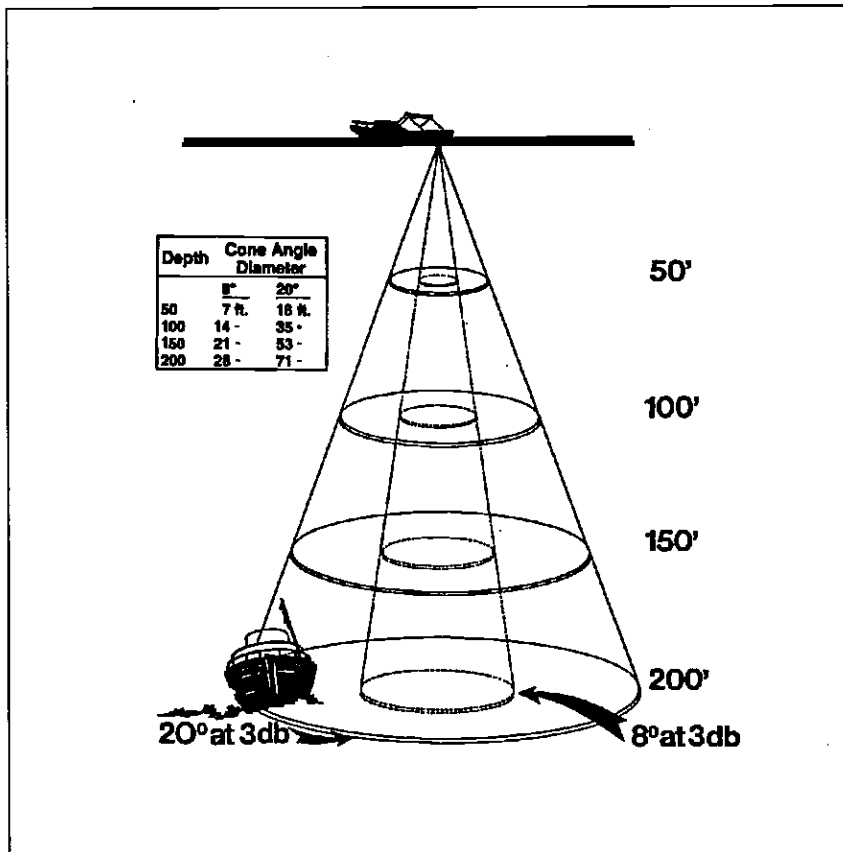
A steep slope returns a wide signal, the steeper the wider. Signals returned from a high underwater cliff are usually the widest of all.

TRANSDUCERS AND CONE ANGLES

The sound waves from the transducer spread out into the water in a cone shaped beam. This looks much like the beam from a flashlight. The angle between the outside edges of the cone is the cone angle.

Lowrance offers a choice of transducers with either an 8 or 20 degree cone angle. These will interchange with any of the 192 kHz sonar products. In other words, use any Lowrance sonar instrument with any Lowrance transducer of the same frequency with no loss of performance. However, the use of any other manufacturers' transducer will result in a loss of performance.

Typically, wide cone angle transducers (20 degrees) are ideal for operating in shallow to medium water depths. The 20 degree cone angle allows you to see more of the underwater world. In 15 feet of water the 20 degree cone covers an area about six feet across. The 8 degree transducer covers only about a two foot circle.



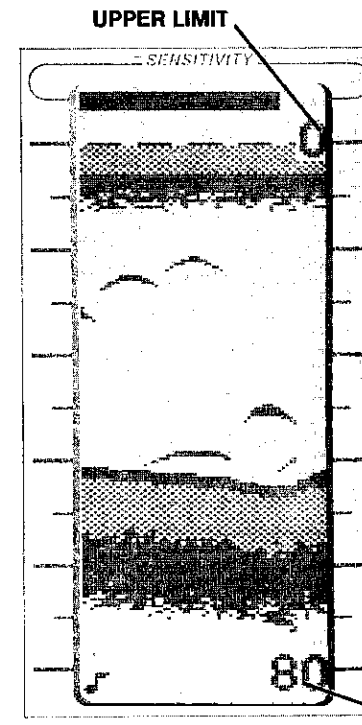
SCALE

There are ten scale markers printed on both sides of the display. This helps to determine the depth of a target. For example, if the range is 0 to 60 feet, then each mark is equal to six feet. If a target (such as a fish) is next to the 5th line, then it is 30 feet deep. (5 lines times 6 feet = 30 feet.) To make it easier to use the depth scale, use ranges in multiples of ten, i.e. 10, 20, 30, etc.

SCALE MARKERS

RANGE

When the X-40 is in automatic, the ranges change to keep the bottom signal on the display as the bottom depth varies. At times, however, it may be desirable to expand the range or zoom in on a target. The upper limit adjusts from 0 to 9989 feet and the lower limit from 10 to 9999 feet. Any combination of the two limits is allowed except the lower limit cannot be closer than ten feet to the upper limit. Entering a segment less than ten feet causes the X-40 to sound an alert. The range will then remain at the previous setting.



LOWER LIMIT

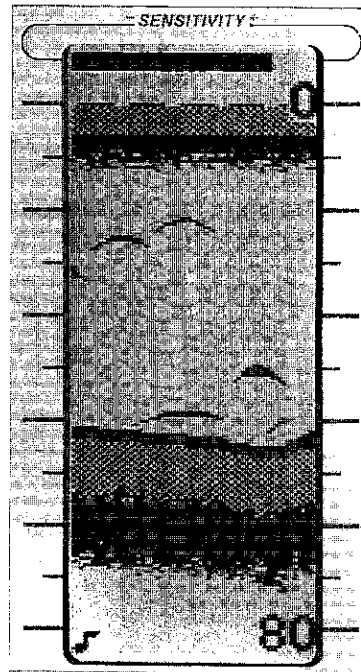
NOTE: The maximum depth capability of the X-40 depends on water and bottom conditions plus the quality of the transducer installation. See the specifications for typical bottom depth capability.

LOWER LIMIT

LOWER
LIMIT

To change the lower limit, first make certain the word "AUTO" is off at the top of the screen. This indicates that the automatic mode is off. (Note: This also disables the automatic sensitivity function.) If the automatic mode is on, press the AUTO key once to disable it. Next, press the lower limit desired from 10 to 9999 feet and press the LOWER LIMIT key. The display will immediately change to the new depth range and display the new lower limit at the bottom of the screen.

For example, to set the range from 0 to 80 feet, press 8,0,LOWER LIMIT.



NOTE: The maximum lower limit the X-40 can display is 9999 feet. However, the actual depth that it can reach is dependent on water and bottom conditions, plus the quality of the transducer installation.

When the X-40 changes ranges while in the automatic mode, the lower limit selected will always be a multiple of ten. In other words the lower limit will be a number that ends in zero such as ten, twenty, forty, one hundred, etc.

UPPER LIMIT

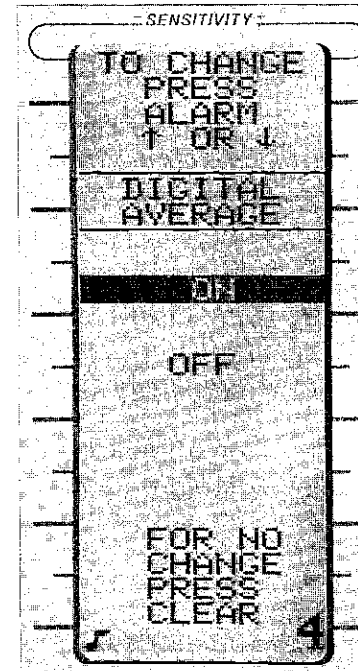
UPPER
LIMIT

Often it's desirable to expand or "ZOOM" a section of the display to show more detail. You can do this on the X-40 by using the Upper Limit feature. To change the display's upper limit, first make certain that AUTO is off. Then simply press the desired depth (any number between 0 and 9999 feet). Next, press the UPPER LIMIT key. The only restriction on the upper limit is that it must not be closer to the lower limit than 10 feet. In other words, setting the lower limit to 81 feet prevents the upper limit from being closer than 71 feet. It requires a ten foot or larger segment. Remember, you cannot change the upper limit if the X-40 is in automatic.

Set upper and lower limits in various combinations to show segments anywhere between the surface and the bottom. This permits a scale expansion or "zoom" of a portion of the display.

MENU #4 - DIGITAL AVERAGING

The digital sonar used in the X-40 is a highly sensitive device that gives rapid updates of the water's depth. Under most conditions, the bottom contour changes so quick that the display appears to "jitter". In other words, the display will change so quickly that it can be difficult to determine the actual bottom depth. To minimize this condition, the X-40 averages the bottom readings and displays the result. When the X-40 is first turned on, averaging is enabled. To disable it, press 2nd,COMMAND until menu 4 appears, or press 4,2nd,COMMAND. Next, press the up or down arrow in the ZONE ALARM section of the keyboard to turn it off or on. Wait six seconds for the display to clear or press the CLEAR key to resume operation.



MENU #5 - PULSE WIDTH - page 22

MENU #6 - SCC - page 20

MENU #7 - ZOOM SIZE (AUTOMATIC BOTTOM TRACKING) - page 13

MENU #8 - FEET/FATHOMS/METERS - page 21.

These functions are printed in white on keys on the keyboard. For example press 2nd, 0 for the pulse width menu. However, they were included in the Command section since they are available by pressing the COMMAND key. You can also press the menu number, then the 2nd key, then the COMMAND key. For example, press 5, 2nd, COMMAND for the Pulse Width menu. Since these functions have been explained previously, please refer to the page numbers listed above for instructions.

2ND**0**
PULSE

PULSE

There is a relationship between resolution and transmitter pulse length. Resolution, in this case, is the ability of a sonar to separate targets. The shorter the pulse length, the better the sonar's ability to separate targets. However, in deep water, the shorter the pulse length, the less likely a return echo will be received. In fact, the X-40 automatically increases the pulse length as the range increases. In shallow water, a narrow pulse length is beneficial, since the probability of echo detection is high. For even better target separation, the X-40 gives you the capability to narrow the pulse length further than normal. Combine the narrow pulse length with a ten or twenty foot segment or "zoom" and the X-40 displays small detail far better than other liquid crystal graphs.

To change to a narrow pulse, press 2nd, 0. Use the arrow keys in the ZONE ALARM section to change to the short pulse or normal pulse. Press the CLEAR or wait several seconds for the display to clear your selection.

COMMAND

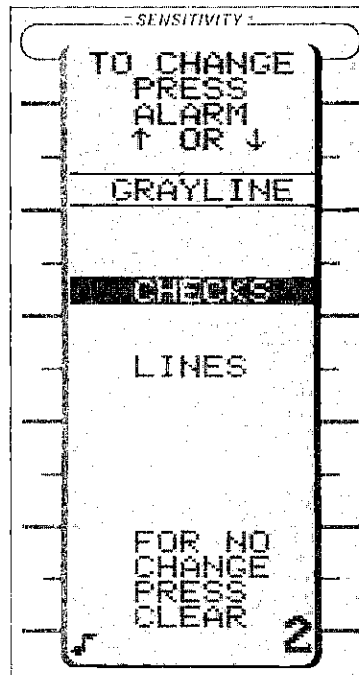
2ND**0**
COMMAND

The X-40 has "menus" of commands to access the unit to your needs. There are 8 pages of menus accessed with the COMMAND key. Press the COMMAND key until menu 2 appears. As you can see on the next page, the number "1" at the bottom of the screen indicates the menu number. Press the COMMAND key again to access menu 3.

To change menu selections, use the ZONE ALARM section of the keyboard. Once you

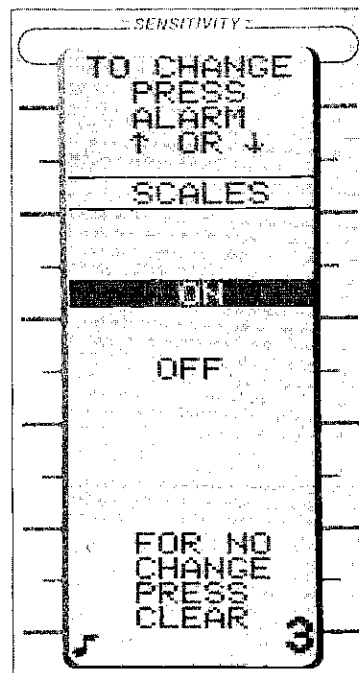
MENU #2 - GRAYLINE CHECKS OR LINES

This menu changes the Grayline from a checkered pattern to lines. To change, press 2nd, COMMAND, COMMAND until menu 2 appears, or press 2, 2nd, COMMAND. Next, press the up or down arrow in the ZONE ALARM section of the keyboard for checks or lines. Then press CLEAR to activate the selection and return to the chart display. Or wait several seconds and the display will automatically clear.



MENU #3 - SCALES

Turn the upper and lower limit display off or on with this menu. Press 2nd, COMMAND until this menu appears, or press 3, 2nd, COMMAND. Use the arrow keys in the ZONE ALARM section to switch the numbers off or on. Press CLEAR to activate your selection or wait several seconds and it will automatically activate.



Example: Set the range from 40 to 80 feet. Press: 4, 0, UPPER LIMIT, 8, 0, LOWER LIMIT.

When changing the upper or lower limits, remember the minimum distance between the two is ten feet. For example, the upper limit is 10 feet, with a lower limit of 20 feet. Changing the lower limit to 11 feet will cause the X-40 to sound an alert. The upper and lower limits won't change.

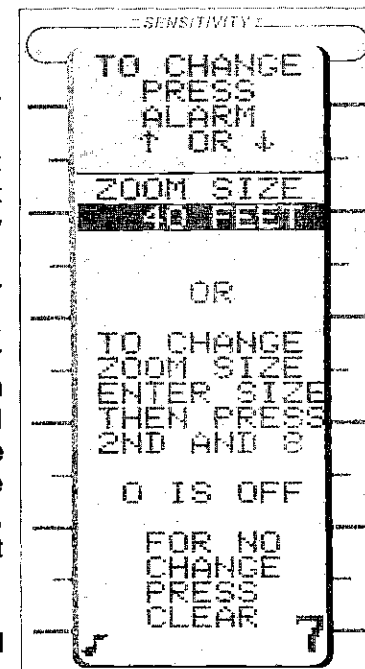
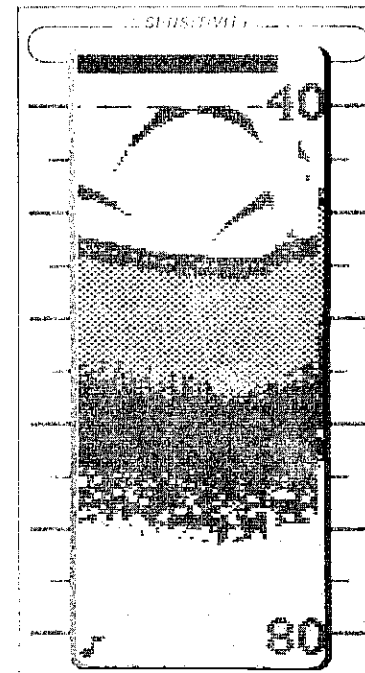
2ND**8**
BTM TRK

AUTOMATIC TRACKING

The lower limit will change as the bottom depth changes. When Automatic Bottom Tracking is activated, auto sensitivity and tracking are also turned on. To zoom in on the bottom and track it as its depth changes, follow the steps below.

To use this feature, first choose a zoom window. For example, let's use a 40 foot zoom window. This means that the X-40 will keep the upper limit 40 feet above the lower limit. Automatically placing the bottom signal in this window, the X-40 tracks it as it moves shallower or deeper. Now press 4, 0, 2nd, BTM TRK. The X-40 will choose an upper and lower limit that will place the bottom signal in the 40 foot window. The bottom will always be inside this window. If the segment size is 40 feet or greater, the window limits will end in zero (10,20,30, etc.). Otherwise the limits are in one foot increments.

If you simply press 2nd, BTM TRK, the X-40 displays a screen describ-



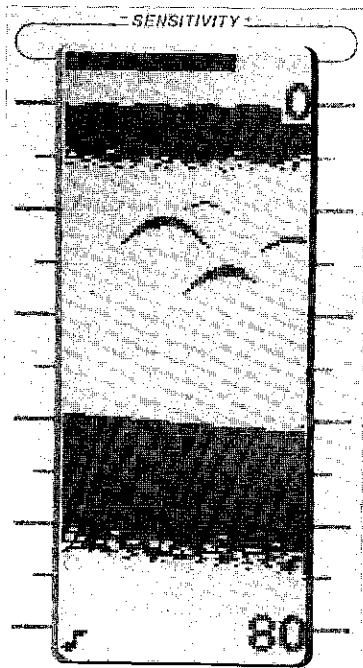
ing how to activate the Automatic Bottom Track Bottom Tracking is on, press the up or down arrow. For example, if the window size is currently 20 feet, press the up arrow in the ZONE ALARM section, the window size in 2 fathom steps. If it's in meters, in 4 meter steps with each press of the arrow key.

To exit from this function, press 0, 2nd, BTM TRK. Or press the AUTO key to turn off the function.

GRAYLINE

The GRAYLINE function tells the receiver what is displayed on the screen. It also gives clues about the bottom. In other words, you can tell if the bottom returns a strong signal causing a wide grayline or a weak bottom returns a weaker signal which is narrow.

GRAYLINE: OFF

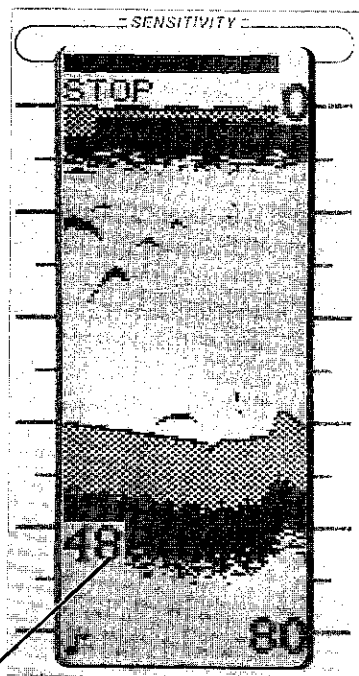


10th

The digital sonar normally displays the bottom depth in whole numbers. Display the bottom depth in tenths of a foot in water less than 100 feet by pressing 2nd, 10th. If the bottom depth goes deeper than 99.9 feet, the digital sonar will automatically display in whole numbers again. If the chart is in the freeze mode, the digital display will continue to show the bottom depth as it changes. It does not freeze when the chart does. Thus, you can distinguish shallow water warnings from fish alarms.

Press 2nd, 10th to turn tenths on.

DIGITAL BOTTOM DEPTH



ALARMS

The X-40 has two different alarms, a zone alarm and a digital depth alarm. The zone alarm consists of a bar that displays on the left side of the screen. The alarm sounds an alert whenever the X-40 detects an echo inside the boundaries of the zone bar.

The depth alarm has user selectable upper and lower limits. Unlike the zone alarm, this alarm only sounds on the bottom signal. It alarms with a high pitched tone when the bottom echo is detected at or shallower than the alarm's upper limit. It sounds with a low pitched tone when the bottom echo is detected at or deeper than the alarm's lower limit.

NOTE KEY



The note key turns the audible tone off and on. Turning the alarm on enables the audible tone. The note display at the bottom of the screen is on, also. To turn the audible tone off, press the note key on the keyboard once. The note display will turn off. To turn it back on, press the note key again. This does not change any alarm settings, it merely turns the sound off.

pressing a key and it will automatically erase.

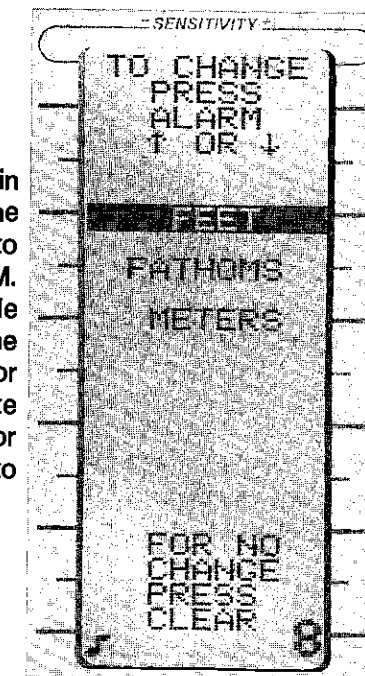
To view the SCC level without changing it, simply press 2nd, SCC.

To turn SCC off, press 0, 2nd, SCC or CLEAR, 2nd, SCC.



FEET-FATHOMS-METERS

The X-40 can display the depth in either feet, fathoms, or meters. At first, the display reads in feet. To change it to fathoms or meters, press 2nd, FT/FA/M. A menu appears with the current mode highlighted. Use the arrow keys in the zone alarm section to switch to meters or fathoms. Press the CLEAR key to activate the selection or wait several seconds for the menu to disappear. The X-40 reverts to feet when it's turned off.



Discrimination desired, (0 through 10). Then press the DISC key. There should be an immediate change in the noise displayed on the screen.

Turn Discrimination off by pressing 0,DISC or CLEAR,DISC.

To view the Discrimination setting without changing it, press the DISC key.

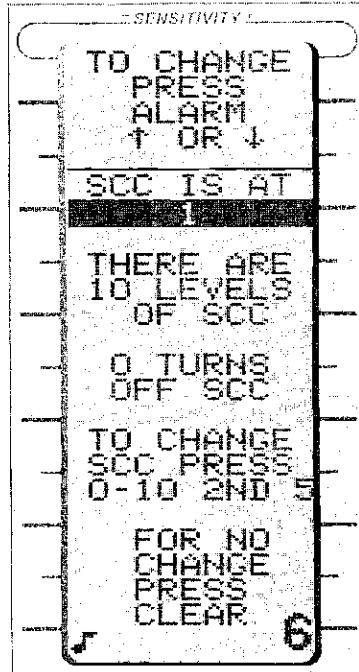
2ND

5
SCC

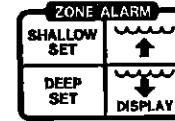
SURFACE CLARITY CONTROL

The markings—or noise—at the top of the display can at times extend many feet below the surface. This can interfere with fish signals or other targets. These markings are Surface Clutter and are caused by wave action, boat wakes, bait fish, temperature inversions, and other reasons.

Use Surface Clarity Control (SCC) to reduce or eliminate surface clutter. SCC varies the gain of the receiver between each transmit pulse, while the receiver is "listening" for the return echoes. The gain is the lowest for echoes near the surface. It gradually increases as the depth increases. The maximum depth that SCC will affect is one-half of the selected depth range. For example, with maximum SCC, on a 0 to 60 foot range, SCC would have an effect from the surface to 30 feet.



SCC has ten levels of adjustment. Turning the X-40 on automatically sets SCC to level 1. To change to a different level, simply enter a number from 0 to 10, then press 2nd, SCC or simply press 2nd, SCC. The SCC menu appears with the level of SCC currently in use. Use the arrow keys in the keyboard's zone alarm section to increase or decrease the SCC level. Press the CLEAR key to erase the menu or wait several seconds after



ZONE ALARM

To set the Zone Alarm, press the SHALLOW SET key in the ZONE ALARM section of the keyboard. The letters "ZA" display in the lower left corner of the screen. A vertical bar also displays on the left side of the screen for six seconds. This is the Zone Alarm's "window." Any echo that appears on the right side of the screen between the top and bottom of this bar will sound the alarm. Adjust both the shallow and deep ends of this bar to make a smaller or larger alarm "window."

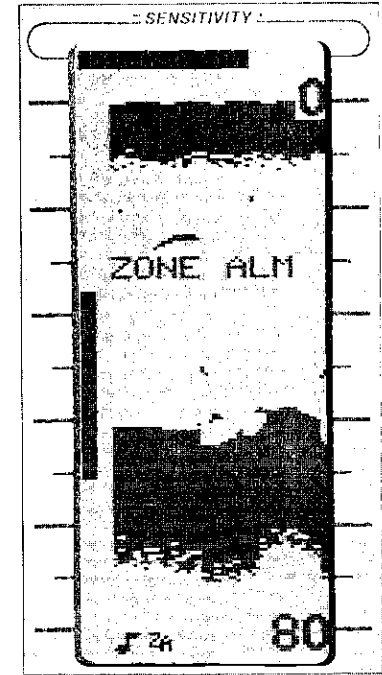
To adjust the shallow (top) alarm, press the SHALLOW SET key. The letters "ZA" display on the screen. A vertical bar also displays on the far left side of the screen. This is the zone alarm's "window". Any echo that appears between the top and bottom of this bar will sound the alarm. To adjust the top of the bar press the up arrow key to move the top of the alarm window up, or the down arrow key to move the top of the bar deeper. The longer you hold the arrow key, the faster the end of the zone alarm bar will travel. Release the key and in six seconds the zone alarm bar will disappear. However, the zone alarm is still activated as you can see by the letters "ZA" in the lower portion of the screen.

The bottom of the zone alarm bar is adjusted in the same manner. Just press the DEEP SET key first, then the arrow keys to set the bottom of the bar to the desired depth.

If you wish to view the zone alarm bar continuously, press 2nd, DISPLAY. To turn it off, press 2nd, DISPLAY again. This won't affect the zone alarm settings. It doesn't turn the alarm off, just the alarm bar.

When the zone alarm is triggered by an echo, the alarm will sound and the words ZONE ALM will appear on the display.

If the range is changed, the zone alarm settings may need to be changed also, since they don't track the range settings.



To turn the Zone Alarm off, press CLEAR, SHALLOW SET or DEEP SET. All of the Zone Alarm settings will remain in memory until the X-40 is turned off. Pressing either shallow or deep set keys will turn the Zone Alarm back on with the previous settings.

DEPTH ALARM.



The depth alarm is actually two alarms. The shallow alarm gives a warning when you're in water shallower than the alarm set point. The deep alarm gives a warning in water at or deeper than the alarm set point. The bottom signal is the only echo that will trigger either the shallow or deep alarm.

NOTE: In order to use the depth alarms, either the digital or automatic must be on.

Setting both the shallow and deep alarms at the same time allows a "window" to be positioned between the surface and the bottom. If the boat goes into water that is shallower than the shallow alarm's setting, the alarm will sound. A different tone will sound if the bottom goes deeper than the deep alarm setting. This makes a useful anchor watch. It is also convenient when navigating through a channel.

To use the shallow alarm, enter the desired depth on the 10-key pad, then press the SHALLOW ALARM key. For example, to set the shallow alarm to 15 feet, press 1,5, SHALLOW ALARM. The number 15 displays on the screen as it's entered, then disappears. The letters "DA" appear in the lower portion of the screen to indicate it is activated. Now if the boat moves into water fifteen feet deep or less, the alarm will sound and the words "SHAL ALM" will flash on the display.

The deep alarm is used in the same manner. Enter the desired depth, then press the DEEP ALARM key. For example, to set the deep alarm to 50 feet, press 5, 0, DEEP ALARM. If the boat moves into water 50 feet deep or deeper, the alarm will sound. The words "DEEP ALM" also flash on the display.

To view the settings of the shallow or deep alarms, press the SHALLOW ALARM or DEEP ALARM keys.

To turn each alarm off, press 0, SHALLOW ALARM or 0, DEEP ALARM. The CLEAR key can be used in place of the 0 key, if desired. If both shallow and deep alarms are turned off, the letters "DA" will disappear from the display.

LIGHT

2ND

AUTO LIGHT

A light is allows operation of the X-40 at night. At first, turning the unit on causes the lights to flash for six seconds. Press the 2nd, LIGHT keys and the lights will stay on. To turn the lights off, press the 2nd, LIGHT keys again. The lights will also go out when the X-40 is turned off.

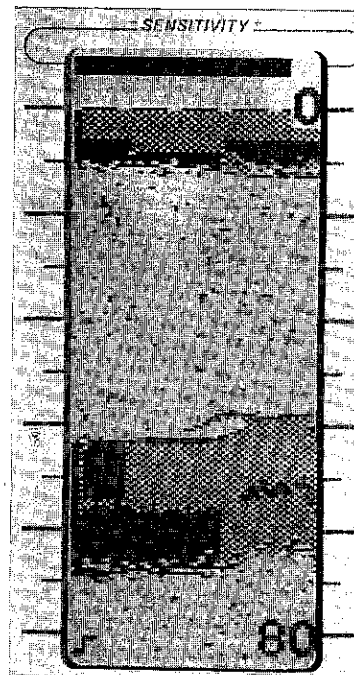
DISCRIMINATION

DISC COMMAND

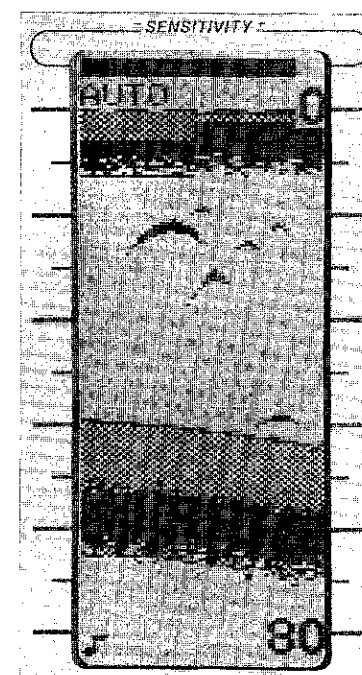
Unwanted noise on the display is a fairly common complaint. Noise is any undesired signal. It can be caused by either an electrical or acoustic source, or a combination of the two. In both cases, the noise can produce unwanted marks on the display.

The X-40 has Discrimination which is effective in combating noise signals. It processes all incoming echoes from the receiver, determines which ones are noise and eliminates them, displaying only the legitimate echoes. Discrimination has ten levels - 0 through 10. 0 is off, 10 is the highest level. Turning the X-40 on automatically sets Discrimination to level 1. If too much noise is present on the display, press the level of

DISCRIMINATION: OFF



DISCRIMINATION: PROPER SETTING



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