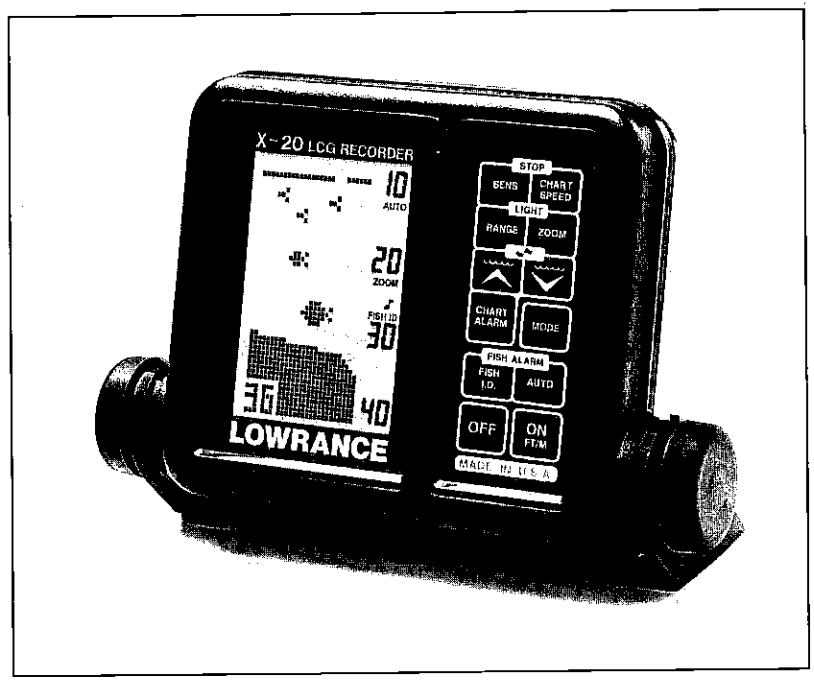

CVISION TECHNOLOGIES

X-20

INSTALLATION AND OPERATION INSTRUCTIONS

LOWRANCE ELECTRONICS, INC.
12000 E. SKELLY DR., TULSA, OK 74128

LITHO IN U.S.A.

988-0105-17

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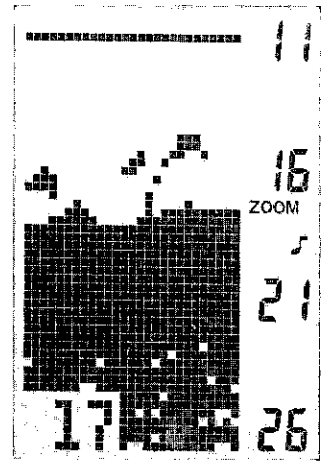

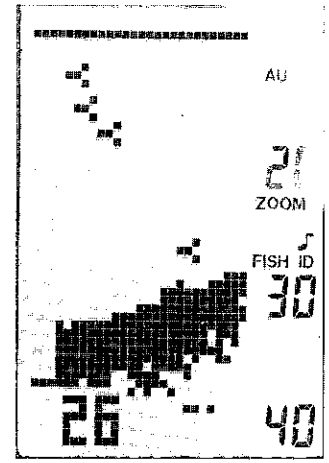

ACTUAL UNRETOUCHED PHOTOGRAPHS
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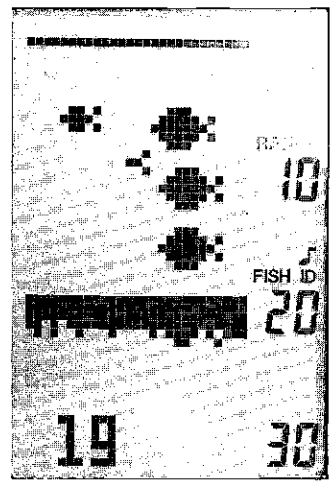
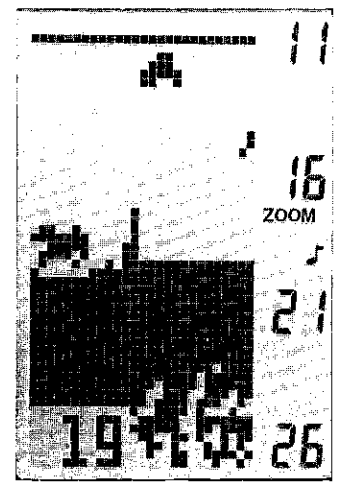




SENSITIVITY - The ability of a sonar unit's receiver to display targets. Increasing the sensitivity allows weaker targets to be displayed. Also called "gain".

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 help 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.

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 vertical 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 and shows greater detail.

INTRODUCTION

Welcome to the world of sportfishing sonar. Your Lowrance X-20 is a high quality sonar designed for both professional and novice users. These units have an automatic feature that finds and displays the bottom depth, fish, and structure. As you become familiar with your X-20, you can "fine tune" the unit to the surrounding conditions to get the most from your sonar.

You can program the X-20 to sound an alarm when a fish or other suspended object enters an alarm zone. You can zoom in and separate fish from structure and other targets.

To get started with your X-20, 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-20, read the rest of this manual in detail. The more you know when you get to the water, the more your sonar unit will do for you. Take this manual for reference when you head for the water.

INSTALLATION

Mounting

Install the X-20 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. Place a piece of plywood on the back of thin 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 one inch hole in the base of the gimbal bracket. Then pass them through a hole in the mounting surface. First 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.

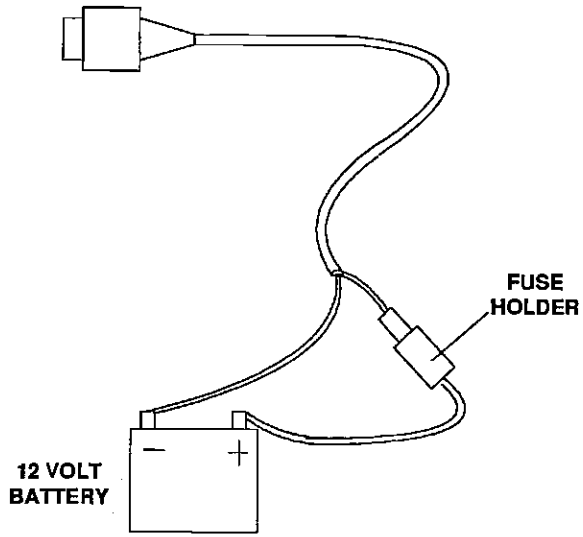
Power Connections

The X-20 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-20 in the event of a short. Use a 3-amp fuse.

The X-20 has reverse polarity protection. No damage will occur if the power wires are reversed. (However, the unit will not work until the wires are attached correctly.)



OPERATING FREQUENCY - Frequency of a sonar unit's transmitter and receiver. (See kHz.)

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.

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. Typically, the greater number of vertical pixels, the better the resolution.

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, 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 it's 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 from the bottom.

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 to other functions.

The Discrimination feature on Lowrance sonar units removes many false signals from other sonars, acoustic and electrical sources, and more.

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

FISH ARCH - A sonar with good resolution and definition can display suspended targets as upside down "Vees" or arches. These signals are typically fish, hence the name "Fish Arch". See page 20 for more information.

FLUSH MOUNT - A 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 feature shows the relative strength of signals displayed 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. Noise appears on the display as random dots or lines.

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-20's cables away from those wires.

VHF radio antenna cables typically radiate RF energy at higher power levels than the engine's wiring harness. It is important to keep the X-20's power and transducer cables as far away as possible from VHF radio cables.

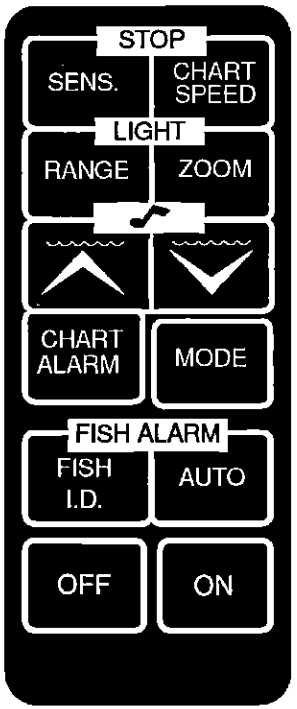
If interference begins at slow boat speeds, worsening as the boat speed increases, then a probable cause is acoustic noise, or cavitation. This noise is not electrical, but rather mechanically induced noise from the transducer. Stop the boat, put the engine in neutral, and increase the Rpm. If the noise 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 installation section for proper mounting techniques.

TRANSDUCER

Transducer installation instructions are packaged separately with the transducer. Please read the instructions carefully before you install the transducer.

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

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



KEYBOARD BASICS

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

ON OFF
These keys turn the unit's power 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 tells you that the unit has accepted a command.

UP and DOWN ARROWS
These keys are used to adjust virtually every feature and function on the unit. Use these keys to adjust the sensitivity, chart speed, range, zoom and chart alarm.

Operating Current	200 ma (lights off) 500 ma (lights on)
Operating Voltage	9-15 vdc
Number of pixels	50 x 27 (vertical x horizontal) 1350 Total
Display Scroll Speed	.5" per minute (minimum) 32" per minute (maximum)
Maximum Chart Range	180 feet
Maximum Digital Range	400 feet

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 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 - Angle of the transducer's cone of sound. Lowrance has transducers available 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 display with high definition can show more detail than one with low definition.

DISCRIMINATION - A feature available on Lowrance L.C.G.'s and paper graphs that separates false echoes from true target information.

BAIT FISH

The importance of bait fish to successful fishing can't be over-emphasized. They are the principal 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 unit to find the bait fish first. A school of bait fish will look like a "cloud" on the unit'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. Call or write the Factory Customer Service Department at 1-800-331-3889, extension 401, toll free. Oklahoma residents call 918-437-6881, extension 401, collect.

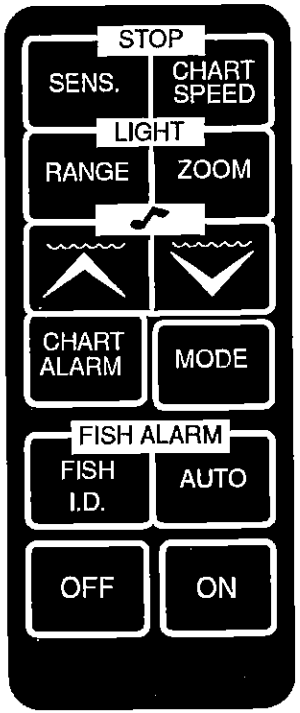
Please detail the problem you are experiencing. The service department may be able to save you the inconvenience of returning your unit.

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.

Mail To: Lowrance Customer Service
12000 E. Skelly Drive
Tulsa, OK 74128

SPECIFICATIONS

Dimensions	5 7/8"H x 7 3/4"W x 3 7/16"D
Weight	1 3/4 pounds
Transmitter frequency	192 kHz
Output Power (typical)	275 watts peak to peak 34.4 watts RMS
Receiver Sensitivity	82 db temperature stabilized

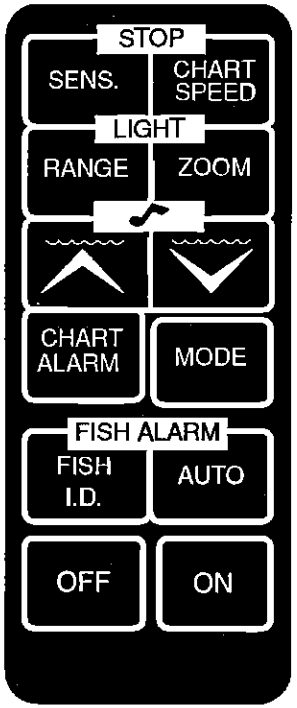


SENS.
This key and the arrow keys adjust the graph's sensitivity. (The digital's sensitivity is adjusted by the unit automatically.) The receiver has 32 steps of adjustment.

CHART SPEED
Vary the speed of the chart with this key and the arrow keys. There are 5 steps of chart speed adjustment.

RANGE
The depth range is changed with this key and the arrow keys. The ranges vary from 0-5 feet to 0-180 feet.

CHART ALARM
Using this key activates the chart alarm. A bar appears on the left side of the display when the chart alarm is adjusted. Any target that appears on the screen between the top and bottom of the chart alarm bar triggers the alarm.



MODE
The X-20 has five different "screens" or modes of operation. Use this key to switch between modes.

FISH I.D.
This key turns the Fish I.D. feature off and on.

FISH ALARM
Press both the Fish I.D. and the AUTO key at the same time to activate the Fish Alarm. This is an audible fish alarm.

AUTO
Turning the unit on enables the automatic mode. To switch to the manual mode, press the AUTO key. You can return the unit to automatic at any time by pressing the AUTO key again.

stay. Schooling fish suspended over deep water lie at the level that provides this temperature. We assume they are the most comfortable 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 called 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-20 can detect this invisible layer in the water, but the sensitivity will probably have to be turned up to see it.

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-20, 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 unit. Start with a map of the lake, if possible, and indicate the promising spots in relation to landmarks on shore.

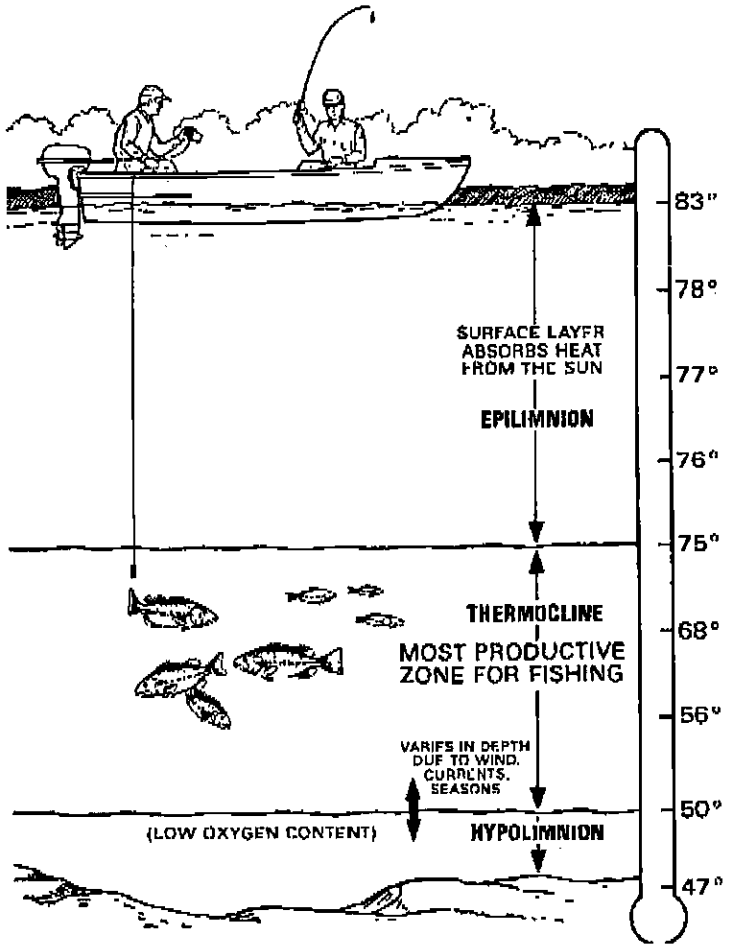
As you go about your survey, your unit will tell you the depth and type of bottom. It will also reveal suspended fish.

Keep a few marker buoys in the boat, ready to toss overboard. When the unit indicates a school of fish, throw the buoy out. 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.

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.

Most fish don't spawn unless the water temperature is within rather narrow limits. A surface temperature meter such as Lowrance's LDT-3000 helps identify 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



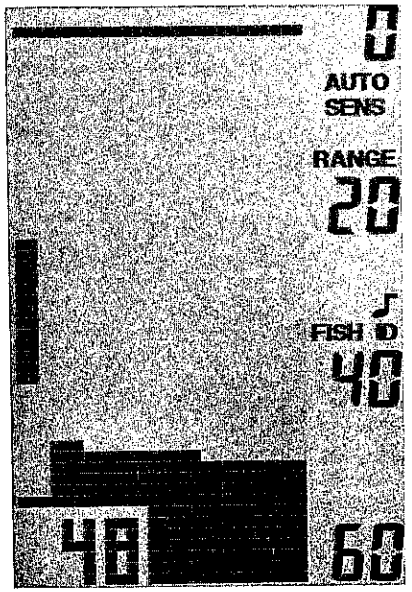
OPERATION

SENSITIVITY

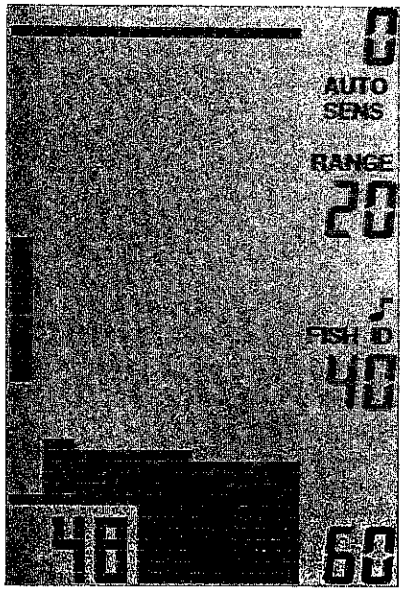
When first turned on, the X-20 is in the AUTO SEARCH mode. The micro-computer automatically adjusts the sensitivity and range to find and lock onto the bottom. The digital depth flashes "0" until it finds and locks onto the bottom. You can leave the sensitivity in the automatic mode or manually adjust it to suit conditions.

You may need to increase the sensitivity to show fish symbols when the unit is in automatic. To do this, first press the SENS. key. The letters "SENS" will flash on the right side of the display. A vertical bar appears on the left side of the screen. (See below.) This indicates the sensitivity level. To increase the sensitivity, press and hold the up arrow key until the sensitivity is at the desired level. The down arrow key decreases sensitivity in the same manner. Notice how the sensitivity bar moves as you change settings. It will move up when the sensitivity is increased. You'll also see the change on the display. After you've finished setting the sensitivity level, the letters "SENS" and the sensitivity bar will disappear after eight seconds.

When the Fish I.D. feature is off, the sensitivity can be increased more, even if the unit's automatic feature is on. This will help display fish and other small detail. When automatic is turned off, the sensitivity level can be increased to its maximum level.



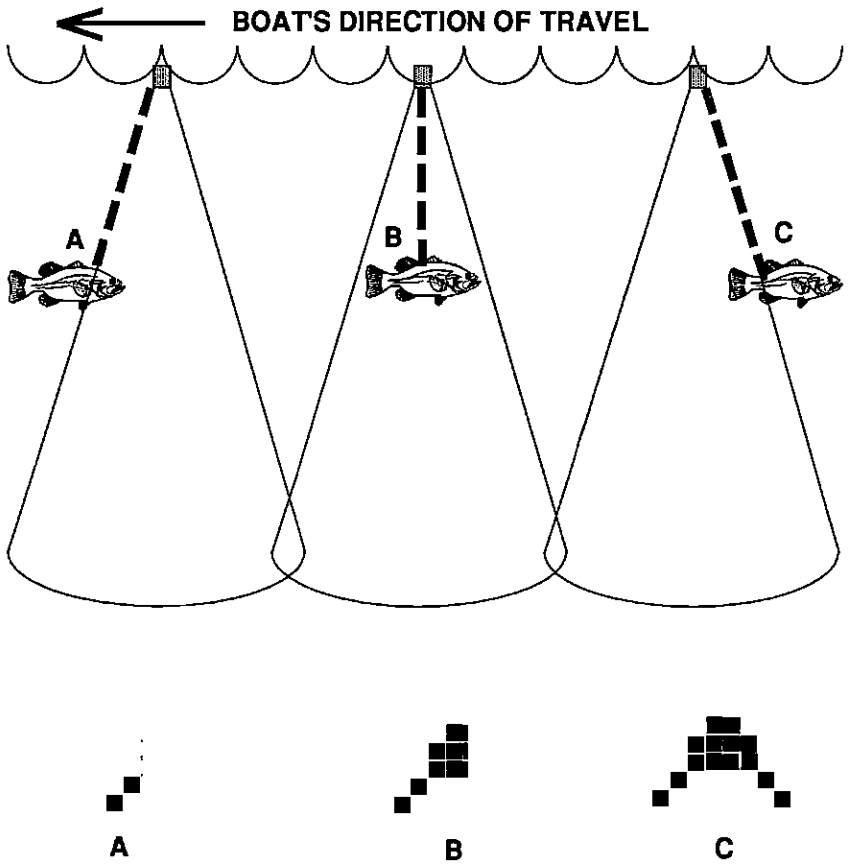
With high sensitivity settings, a second bottom echo (second echo) may appear. This is normal. It's caused by the returning signal reflecting off the surface of the water. Then it makes a second trip to the bottom and back again.



Remember, when the unit's automatic feature is on, the receiver's sensitivity automatically adjusts to the surrounding conditions. The microcomputer places it at a level slightly above the minimum required to pick up the bottom signal. However, it's possible to change the sensitivity level while the unit is in automatic. This may be desirable if the sensitivity level is not high enough to show fish or other small detail. The unit will increase the sensitivity to pick up the bottom signal, then add in the level you programmed.

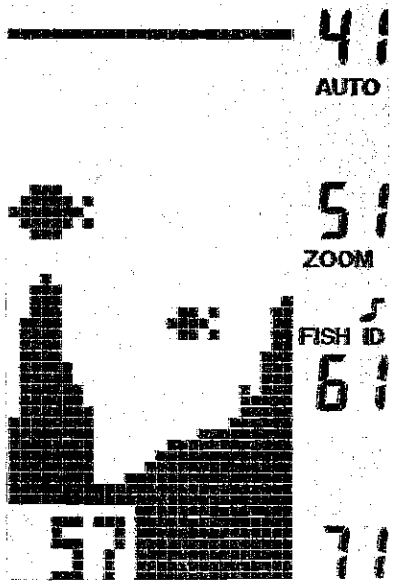
To adjust the sensitivity while the unit is in automatic, simply press the SENS. key. Then press either the up arrow key to increase it, or the down arrow key to decrease it. As you press the arrow key, the sensitivity bar moves up or down, according to the sensitivity level chosen.

You can adjust the sensitivity in the same manner when the unit is in the manual mode.



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, from 45 to 60 feet. The smaller the segment, the better the screen resolution will be. For the best results, turn the sensitivity up 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.



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 should 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.

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.

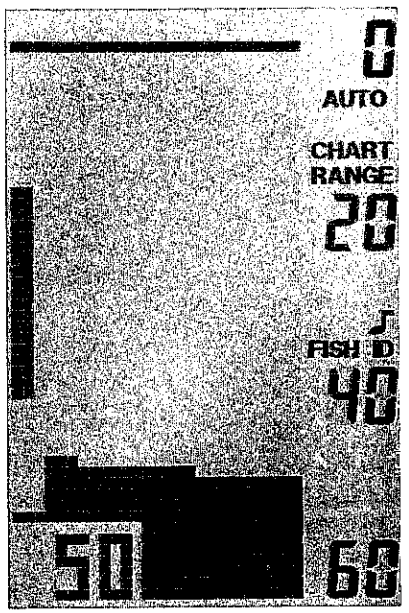
FISH ARCHES

Fish arches are created when the cone of sound passes over a fish. The distance to a fish when the cone first strikes it is shown as "A" on the next page. When the center of the cone strikes the fish, the distance is shorter, as shown in "B". As the cone leaves the fish, the distance increases again as shown in "C".

When the Fish I.D. feature is off, 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 unit may not arch at all. This is due to the narrow cone diameter and the resolution limitations of the display.

CHART SPEED

At power on, the chart speed scrolls at a preset speed. To change the speed, press the CHART SPEED key. The word "CHART" will flash on the right side of the display. A vertical bar will also appear on the left side of the screen. This indicates the current chart speed. Next, press the up arrow key if you wish to increase the chart speed. Press the down arrow key to decrease it. When the chart reaches the desired speed, release the key. There are five steps of chart speed. When the chart speed reaches its maximum or minimum level, the unit will sound a tone.

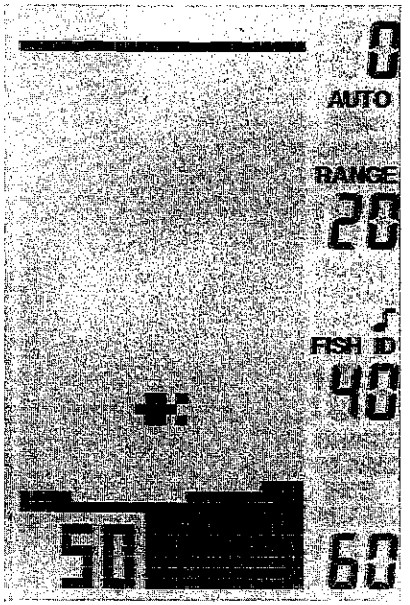


To view the chart speed without changing it, press the CHART SPEED key. The chart speed bar will appear for eight seconds.

At times it is desirable to stop or "freeze" the display to examine an echo before it scrolls off the screen. Pressing the SENS. and CHART SPEED keys at the same time will freeze the display. Press the SENS. and CHART SPEED keys again to start the display moving at the last chart speed setting. If the digital sonar is on, the bottom depth will still be displayed. The digital does not stop when the chart is in the "freeze" mode.

RANGE

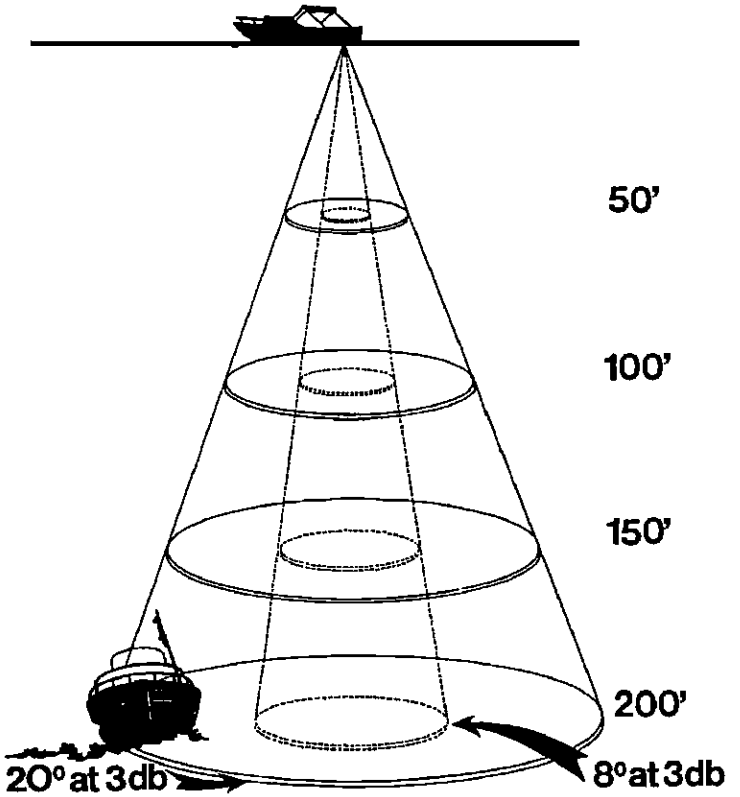
The range automatically changes to keep the bottom signal on the display when the unit is in automatic. The range cannot be manually changed when the unit is in the automatic mode. The range can be changed in manual mode. There are six ranges available: 0-5, 15, 30, 60, 120, and 180 feet. To change the range, first make certain the word AUTO is off. Then press the RANGE key. The word RANGE will flash on the right side of the screen. Next, press the up arrow key to switch to a shallower range or press the down arrow key for a deeper range. The range annunciator will stop flashing eight seconds after the last key was pressed.



ZOOM - Automatic operation

Press the ZOOM key to double the size of the targets on the display. It works by enlarging the bottom half of the selected range. For example, if the range is 0 - 60 feet and the zoom key is pressed, the new range will be 30 - 60 feet. If the unit is in automatic, the bottom will be tracked in this 30 foot window. There are two exceptions to this rule: 1) If you're on the 0-15' range and press the zoom key, the new range will be 10-15'. 2) There is no zoom on the 0-5' range.

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.



SIGNAL INTERPRETATION

Your unit gives an accurate picture of the bottom that your boat is passing. A bottom of firm sand, gravel, shell, or hard clay returns a wide bottom signal. If the automatic feature is off and the bottom signal narrows , 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 to see a better bottom signal.

MODE 5 - All chart, High Speed Scroll. In this mode the chart scrolls at high speed. The chart speed can be adjusted with the CHART SPEED key if desired.

a) Chart uses full screen.

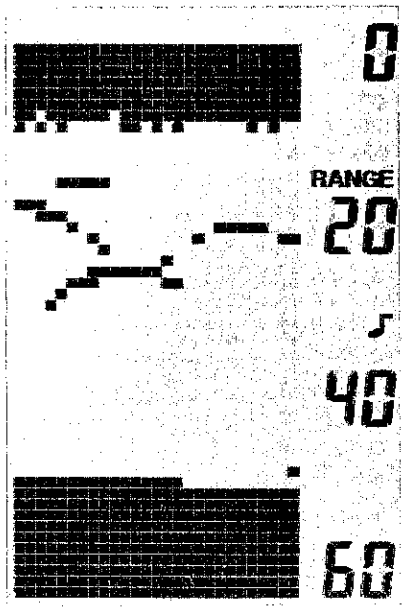
b) No digital depth indicator.

c) No FASTRAK.

d) No automatic operation allowed.

e) No Fish I.D. feature or Fish Alarm

f) Chart alarm is allowed.



TRANSDUCERS AND CONE ANGLES

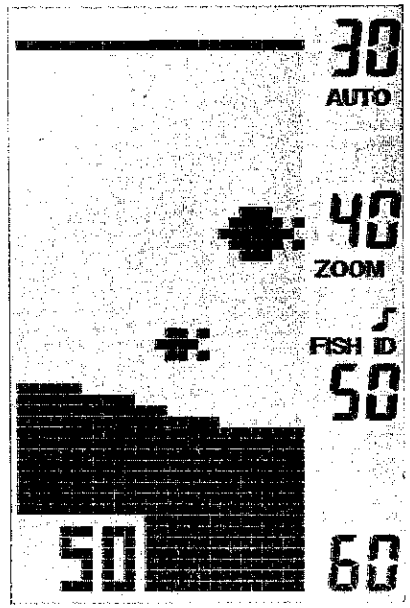
The sound waves from the transducer spread out into the water in a cone shaped beam. This looks much like the beam from a flashlight. The angle between the outside edges of the cone is the cone angle.

Lowrance offers a choice of transducers with either an 8 or 20 degree cone angle. 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.

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.

ZOOM - Manual Mode

Zoom operates differently when the unit is in the manual mode. The range doesn't change when the zoom key is pressed. Instead, press the down arrow key to shift the range down in one foot increments. The up arrow key shifts the range up in one foot increments. For example, if the unit is on the 0-60 foot range, and the manual mode is on, pressing the zoom key, then the down arrow key once will move the 0-60' range to 1'-61'. The best way to use this feature is to change the range to a smaller one, then press the zoom key, shift the range until the area is displayed that you want zoomed. For example, if the bottom depth is 50 feet, and you wish to enlarge the area immediately above it, first change the range to 0-15 feet. Now press the zoom key. Finally, press the down arrow key until the bottom appears. Now you have a fifteen foot zoom window around the bottom signal.



DIGITAL

Built inside the X-20 is a complete digital sonar. It works automatically to discriminate between the valid bottom echoes and false echoes from fish, thermoclines, or other signals. The digital display will show only the bottom depth.

At power on, the digital will flash "0" until it has "locked on" to the bottom signal. Once it has acquired the bottom depth, it will display it in the lower left side of the display.

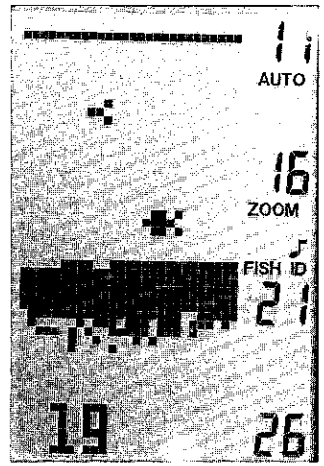
FISH I.D.

The Fish I.D. feature is automatically on when the unit is first turned on. The computer inside the unit analyzes all echoes, filtering out unwanted signals. It helps eliminate surface clutter, thermoclines, and other undesirable signals. The remaining suspended targets are usually fish. Targets that are identified by the unit as fish are displayed as small, medium, or large fish symbols on the display. These symbols are shown according to the relative size of the fish as seen by the unit. The Fish I.D. feature can only be used in automatic. If you wish to turn it off, or back on again, press the FISH I.D. key. If you press the FISH I.D. key when the unit is in manual, it will put it in automatic and enable the Fish I.D. feature.

To show fish symbols, you must be traveling at a slow trolling speed. There should be some movement of the boat for the Fish I.D. feature to work properly.

If you have difficulty showing fish symbols, try increasing the sensitivity.

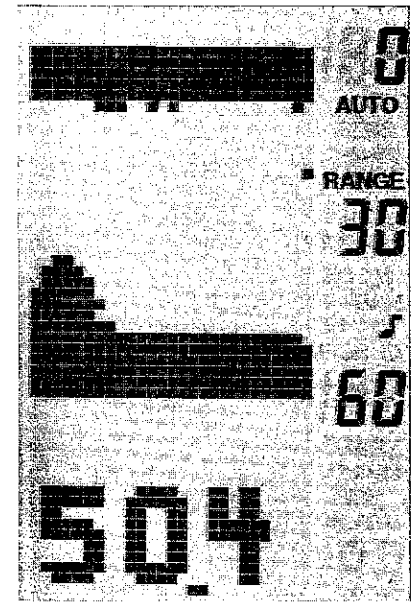
NOTE: The Fish I.D. feature cannot distinguish between fish and other suspended objects such as turtles, tree branches, trotlines, submerged floats, or other inanimate objects. The micro-computer in this unit is sophisticated, but it can be fooled. The most difficult challenge is individual tree branches extending out from groups of branches. These can be mis-identified as fish by the Fish I.D. feature. Also, large amounts of noise can fool the Fish I.D. feature. This is usually caused by a poor transducer installation. Although the Fish I.D. feature isn't perfect, it can be a valuable aid to the fisherman.



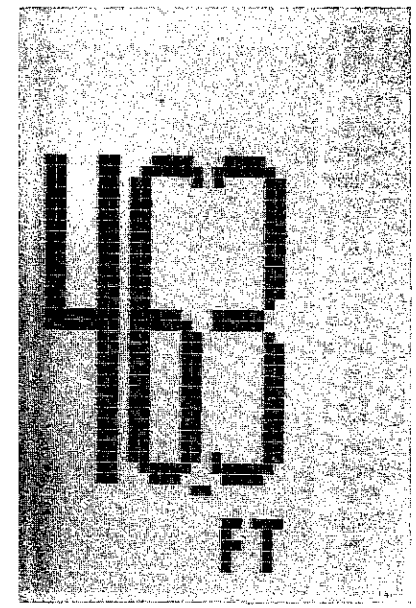
MODE 3 - Big digital.

a) The digital depth numbers use the lower quarter of the display. The depth is displayed in tenths of a foot to 99.9 feet, then it is displayed in whole numbers.

b) No FASTRAK



MODE 4- - Depth only displayed in large digits. No chart is displayed.



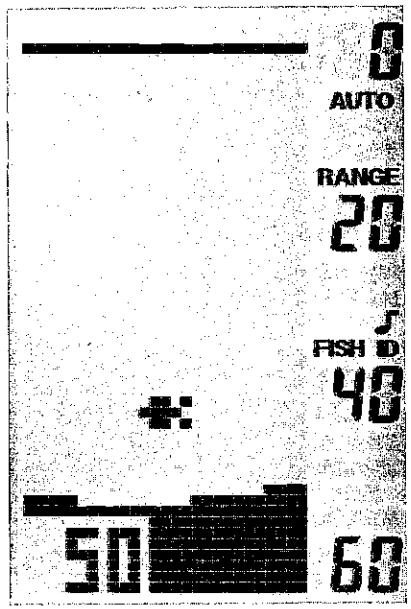
MODE

The X-20 has five different screen modes. To change modes, press the MODE key. Keep pressing the MODE key until the desired screen appears. A summary of the different screen modes follows.

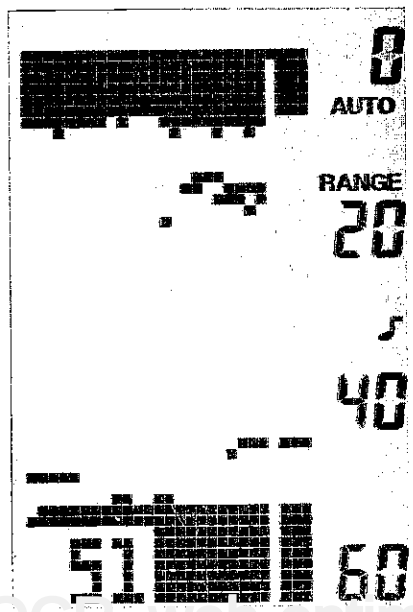
MODE 1 - This is the default mode used when the unit is first turned on. It has the following features:

a) Small digital depth display in lower left corner. It does not show tenths of a foot. Normal chart display.

b) No FASTRAK.

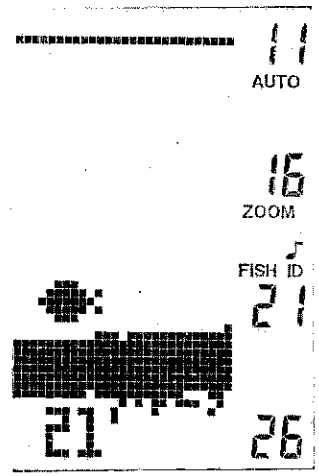


MODE 2 - This is the same as mode 1 except it has FASTRAK. This displays on the right side of the screen. It converts all echoes to horizontal bars when they first appear on the screen. This gives a rapid update of conditions directly under the boat. Echoes are also scrolled normally across the display. The Fish I.D. feature is not available with this mode.



AUTO

When the unit is first turned on, the automatic feature is enabled. It works automatically to find and display the bottom depth. The sensitivity and range are also adjusted to keep the bottom signal on the screen at all times. To turn the automatic feature off, simply press the AUTO key once. The word "AUTO" will disappear from the display, signifying the automatic sensitivity and chart range features are off. This also turns the Fish I.D. feature off at the same time. The digital remains on. To return the unit to the automatic mode, press the AUTO key again. This will reset the sensitivity, so you may wish to increase it to see fish or other detail. This will not turn the Fish I.D. feature on. You will have to press the Fish I.D. key to turn it on.



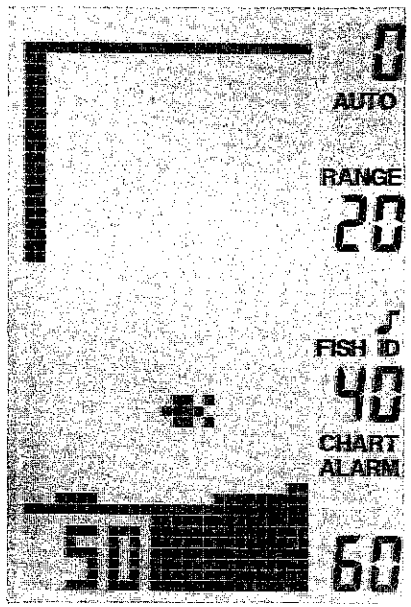
ALARMS

The unit has two different alarms, a chart alarm and Fish Alarm. The chart alarm consists of a bar that displays on the left side of the screen. The alarm "chirps" whenever the unit detects an echo inside the boundaries of the bar.

Fish Alarm sounds an audible alarm when fish or other suspended objects are detected. It works in conjunction with the Fish I.D. feature. To separate the alarms, the fish alarm's tone sounds different than the chart alarm. Both alarms may be used at the same time.

CHART ALARM

To set the Chart Alarm, press the CHART ALARM key on the keyboard. The words " Chart Alarm" flashes in the lower right corner of the screen. A vertical bar also displays on the left side of the screen. It will stay on the screen for eight seconds or for eight seconds after you have finished adjusting it. This is the Chart Alarm's "window." Any echo that appears between the top and bottom of this bar will sound the alarm. Adjust deep end of this bar to make a smaller or larger alarm "window." The shallow end is automatically adjusted by the unit so it won't be triggered by surface clutter or other false signals. Next, press the down arrow to move the bottom of the bar deeper, or press the up arrow to move it shallower. Eight seconds after the last button is pressed, the alarm bar will disappear.



When the "Chart Alarm" signal is on, the alarm is active. If you wish to view the Chart Alarm bar, simply press the CHART ALARM key. The bar will be displayed for eight seconds. Any target that appears on the left side of the screen in the area covered by the chart alarm bar will trigger the alarm.

If the range is changed, the Chart Alarm may need to be changed also since it does not track range settings.

To turn the Chart Alarm off, press the CHART ALARM key, then move the bottom of the bar all the way to its shallowest position using the up arrow key.

FISH ALARM

Use the FISH ALARM for a distinctive audible alarm when fish or other susupended objects are detected by the FISH I.D. feature. Press the FISH I.D. and the AUTO keys at the same time. The words "FISH ALARM" displays at the bottom right side of the screen. The audible alarm sounds each time the Fish I.D. feature detects a fish or other suspended object. There is a different tone for each fish symbol size.

To turn the Fish Alarm off, press the FISH I.D. and AUTO keys at the same time.

SPEAKER

The speaker can be turned on and off by pressing the up and down arrow keys at the same time. The speaker is represented by a note symbol above the arrow keys. Whenever it is enabled, a note symbol appears on the right center side of the display. The speaker is enabled when the unit is turned on. NOTE: This applies to the alarms only. The unit will still sound a tone when a key is pressed and the speaker is turned off.

LIGHT

A light allows operation of the unit at night. Turning the unit on causes the lights to flash for six seconds. Press the RANGE and ZOOM keys at the same time and the lights will stay on. To turn the lights off, press the RANGE and ZOOM keys again. The lights will also go out when the unit is turned off.