

Paper Saving Feature

APPROXIMATE PAPER SPEED Without Alternate Transmit and Print

RANGE (feet)	Minimum Paper Speed		Maximum Paper Speed	
	Inches Per Min	Hours Per Roll	Inches Per Min	Hours Per Roll
10-120	1.0	10	3.0	3.3
130-510	0.5	20	2.0	5.0
520-830	0.2	50	1.2	8.3
Below 840	0.2	50	0.75	13.3

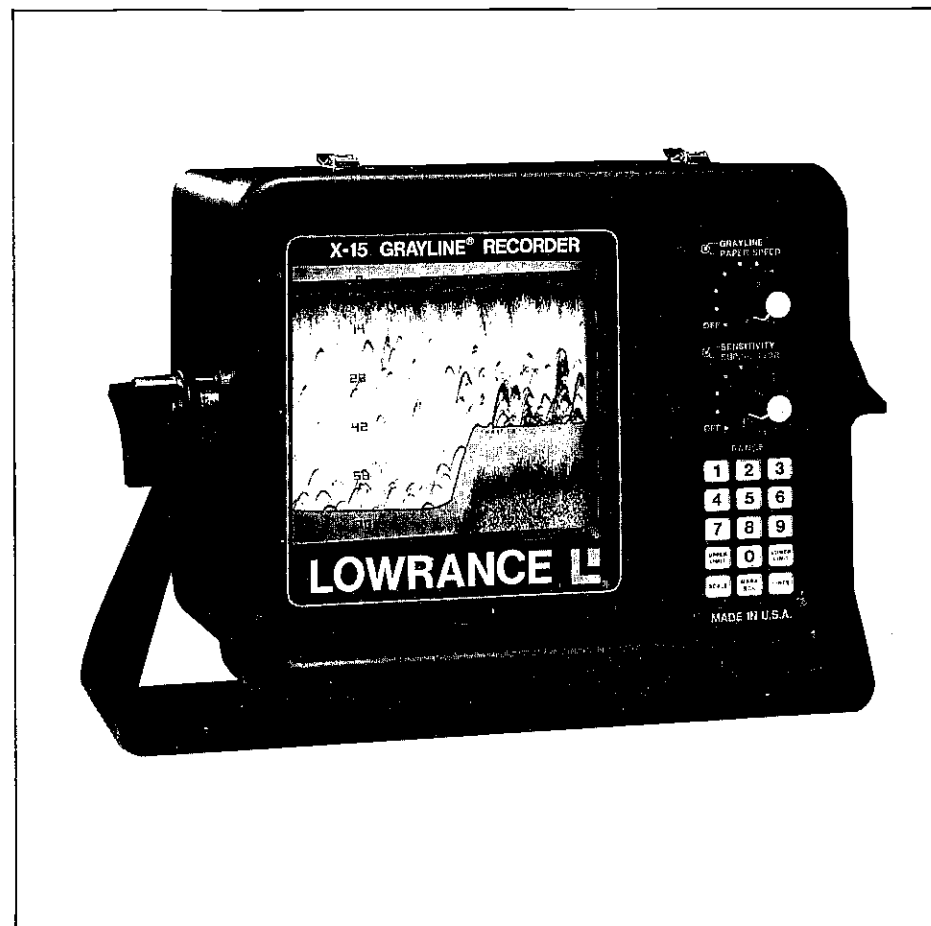
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10-120	0.6	17	2.0	5.0
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520-830	0.2	50	0.75	13.3
Below 840	0.2	50	0.75	13.3

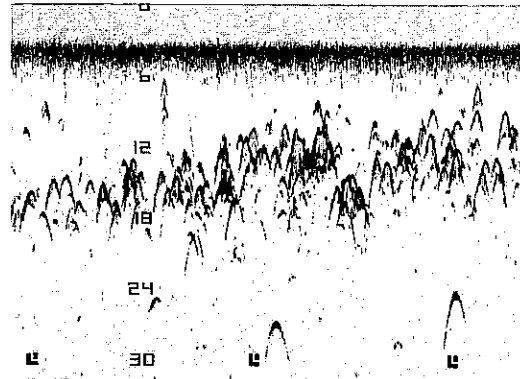
INSTALLATION AND OPERATION MANUAL

MODEL X-15

GRAPH RECORDER



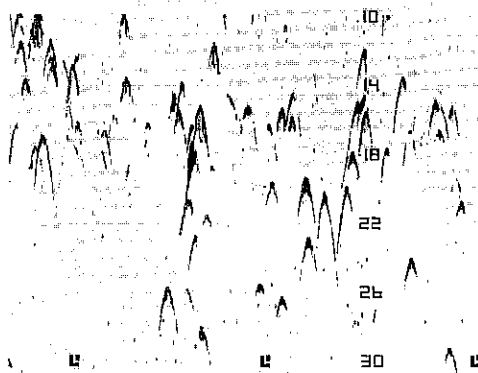
LOWRANCE ELECTRONICS, INC.
12000 E. SKELLY DR., TULSA, OKLA. 74128



RANGE: 10-30 FEET
SENSITIVITY: 3/4
SUPPRESSOR: MINIMUM

PAPER SPEED: 3/4
GRAYLINE: MINIMUM

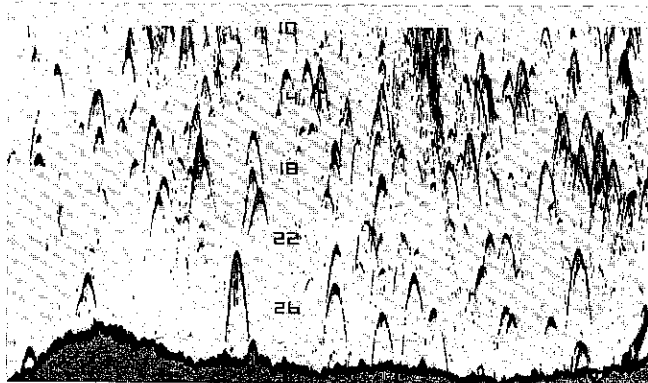
Figure 50



RANGE: 10-30 FEET
SENSITIVITY: 3/4
SUPPRESSOR: MINIMUM

PAPER SPEED: MAXIMUM
GRAYLINE: MINIMUM

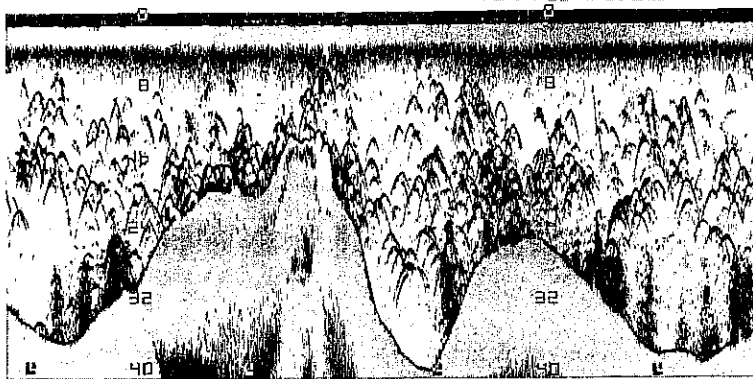
Figure 51



RANGE: 10-30 FEET
SENSITIVITY: MAXIMUM
SUPPRESSOR: MINIMUM

NOTE LARGER FISH ON
& NEAR BOTTOM UNDER SCHOOL
OF SMALLER FISH

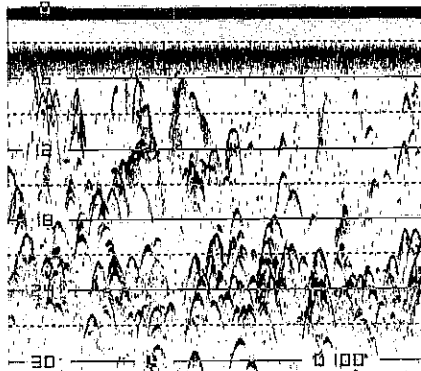
Figure 52



RANGE: 0-40 FEET
 SUPPRESSOR: MINIMUM
 SENSITIVITY: 3/4

LINES: OFF
 PAPER SPEED: 3/4

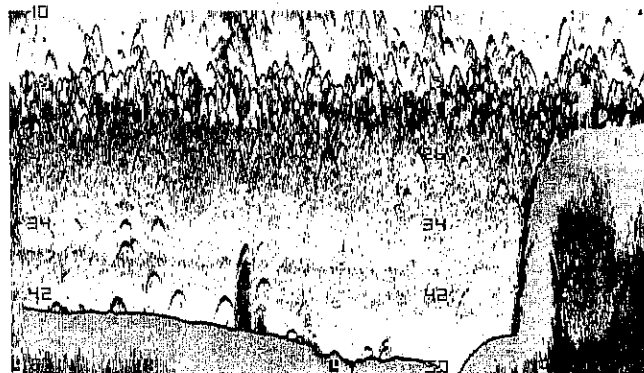
Figure 47



RANGE: 0-30 FEET
 SUPPRESSOR: MINIMUM
 SENSITIVITY: 3/4

LINES: ON
 PULSE WIDTH: 100 MICRO-SECONDS
 PAPER SPEED: MAXIMUM

Figure 48



RANGE: 10-50 FEET
 SENSITIVITY: MAXIMUM
 SUPPRESSOR: MINIMUM

PAPER SPEED: 3/4
 LARGE SCHOOL OF FISH AT
 12 TO 26 FEET

Figure 49

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I INTRODUCTION

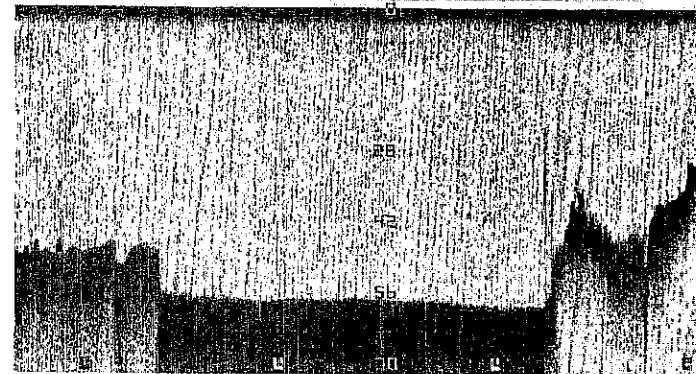
The Lowrance X-15 is a highly sophisticated recording depth sounder. Thanks to a micro-computer, the X-15 can do more than any other depth sounder in its price range. Full control of the system is at your finger tips to meet the changing demands of varying bottom conditions, water depth and boat speed. You can select the unit's sensitivity setting, suppression level, depth range, paper speed, and the degree of "gray line" used to enhance the recorded information. The patented Lowrance variable suppression system not only filters out false signals without distorting the real ones, but is synchronized with the gray line function to provide clear signals under all conditions. The permanent record of what your sonar has "seen" is rolled and stored inside the case.

Small boat sonar systems are routinely used to measure water depth, examine bottom contours, and locate fish. The capability of the X-15 goes far beyond the ordinary. Clues to the composition

of the bottom are given — schools of bait fish are easily distinguished from solitary game fish — there is a continuous display of information about bottom contours and submerged shipwrecks — fish closer together than six inches can be shown separately — concentrations of algae, moss or plankton can be identified — at trolling speeds individual fish are commonly recorded with a characteristic "arched" signature which distinguishes them from their surroundings — layers of water with different temperatures can be detected under good conditions, and vertical movement of fish, (up or down), can be shown.

HOW IT WORKS

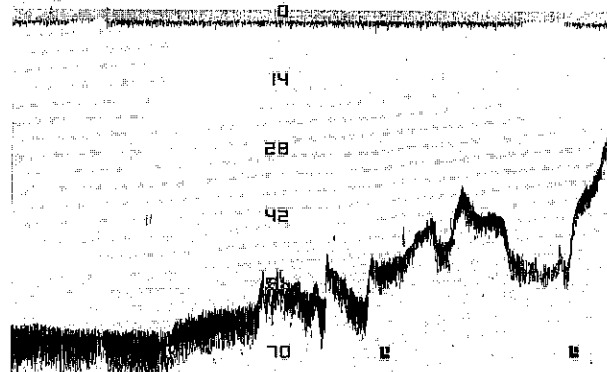
When the unit is turned on, an electronically regulated motor drives a lightweight belt located at the right edge of the recording paper. The marking stylus is attached to this belt. When the stylus is at the top of the paper a small mark is made. This is called the zero mark, and represents the surface of the water.



High Speed (46 M.P.H.)
SUPPRESSION: OFF
SENSITIVITY: ON 1/2 POSITION

NOTE POOR RECORD CAUSED BY NOT USING SUPPRESSION WHEN AT HIGH SPEED.

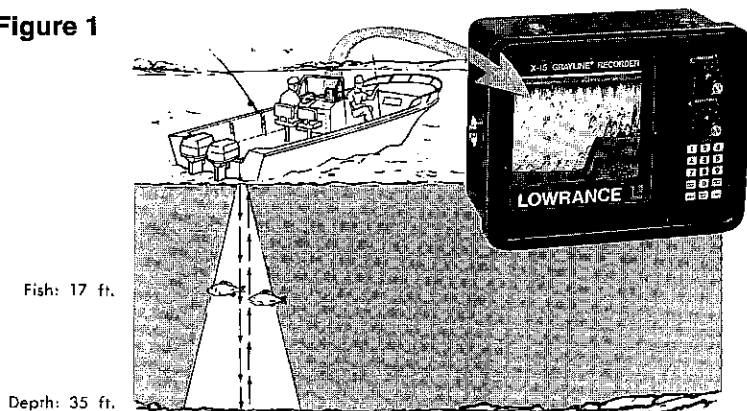
Figure 44



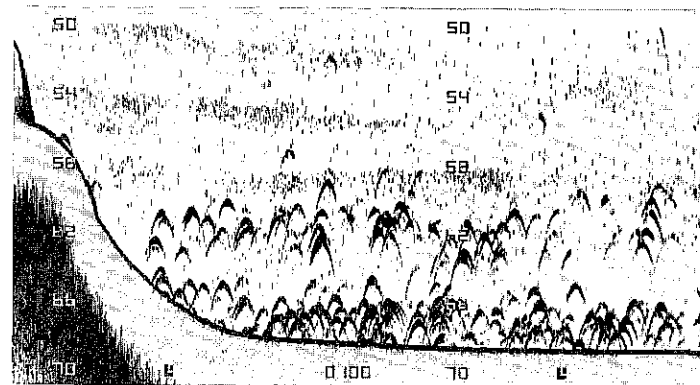
High Speed (46 M.P.H.)
SUPPRESSION: ON - ADEQUATE SETTING
SENSITIVITY: ON - 1/2 POSITION

Figure 45

Figure 1



TRAWLINE RECORDER BOTH SEND AND RECEIVES SIGNALS. RECEIVED SIGNALS ARE INDICATED ON GRAPH PAPER.



RANGE: 50 TO 70 FEET
PULSE WIDTH: 100 MICRO-SECONDS
SUPPRESSOR: MINIMUM

SENSITIVITY: 3/4
LINES: OFF
PAPER SPEED: MAXIMUM

Figure 46

SPECIFICATIONS — X-15

Depth Ranges:

Feet, fathoms, meters.

Operating Frequency:

192 kHz (192,000 cycles per second); accuracy is within 0.6 percent.

Pulse Length:

(duration of pulse): 200-1000 μ s
(30-2000 μ s programable)

Operating Voltage:

Minimum: 10 volts DC
Maximum: 15 volts DC

Operating Current:

0.7 to 1.8 amps depending on printing density and output power.

Output Power:

1600 watts typical peak-to-peak.
(200 watts RMS)

Weight:

8.5 lb. (3.9 Kg)

Dimension:

With Gimbals Mount:

Width - 12 $\frac{1}{4}$ "

Height - 8 $\frac{5}{8}$ "

Depth - 5 $\frac{1}{4}$ "

Instrument Only:

Width - 9 $\frac{1}{2}$ "

Height - 7 $\frac{1}{2}$ "

Depth - 5 $\frac{1}{4}$ "

NOTICE

Periodically wash the Transducer Face with soap and water to remove any oil film that may collect. Oil and dirt on the face

will reduce sensitivity or may even prevent sounding.

GOT A PROBLEM? LET US HELP!

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. Write or call one of our Authorized Service Centers or the Lowrance Electronics, Inc., Customer Service Department in Tulsa, OK. (Toll-free 1-800-331-3889).

Please detail the problem you are experiencing. Our Service Department may be able to save you the inconvenience of returning your unit.

If it is determined that your unit must be returned, full shipping instructions will be provided.

SCHEMATIC DIAGRAM AND PARTS LIST

Should you desire a Schematic Diagram and Parts list for your Lowrance TRUeline RECORDER, send \$1.00 to PARTS LIST, Lowrance Electronics, Inc., 12000 East Skelly Drive, Tulsa, Oklahoma 74128. Be sure and give us the Model Number and Serial Number of your SONAR INSTRUMENT.

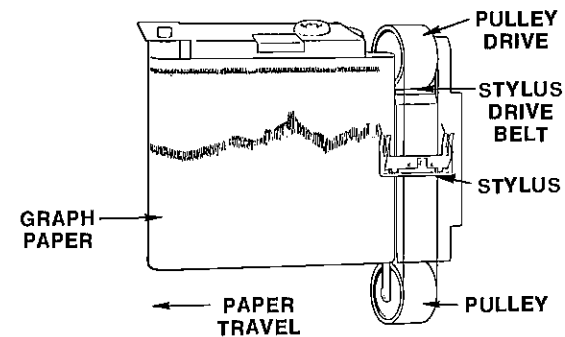


Figure 2

The stylus continues to move down the edge of the paper while the sound pulse is traveling through the water, and when an echo is detected, the stylus makes another mark on the paper. The depth of the object which reflected the echo can be read in feet by comparing its location on the paper to the depth scale printed on the paper.

A variable speed motor drives the paper graph. (The paper is treated so that the stylus will burn it to leave a *permanent* black mark.) During one revolution of the stylus belt, a very narrow mark will be made by the flexible stylus, but the paper will move a small amount before the next revolution. Each mark will blend into the one before, so that a composite "picture" of the target will be made, one tiny mark at a time.

Due to the many features that this unit has, we have split the operation section of this manual into two sections. The first section, Section III, is entitled "Basic Operation" and covers everything that is absolutely necessary to use the X-15 in a wide variety of situations. It will tell you how to use the basic controls — Sensitivity, Suppressor, Paper Speed, Grayline, Range, plus a few special

functions.

This section will be adequate for most situations. However, once you have mastered the basic operation of the X-15 as described in Section III, you may wish to try some of the features described in Section VI — Advanced Operation. This chapter will explain four other features that will enable the serious operator to get the maximum use out of this equipment.

We urge you to read this manual thoroughly and familiarize yourself with the controls. Although this is a very advanced unit, it is easy to use, thanks to the power of the microcomputer and the front panel controls. Should you require extra help, please phone our Customer Service Department toll free at 1-800-331-3889. (Oklahoma residents call collect - 1-918-437-6881). A service representative will be happy to help you.

II INSTALLATION

Mounting —

The depth sounder may be installed in any convenient area, provided the unit can be tilted for the best viewing angle. Four holes in the bracket base allow wood screw or bolt mounting. A wood stiffener may be required on the

back of thin fiberglass panels to support the X-15.

If the desired location is closer than 18" to a magnetic compass, a trial run should be made with the unit in operation to be sure that the compass readings are not affected.

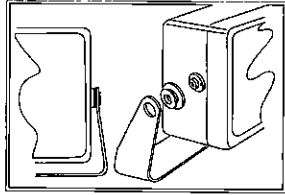


Figure 3

BE SURE to insert the two rubber grommets on gimbal bracket. The larger side (larger diameter) of grommet goes on inside of gimbal bracket so that it is sandwiched between gimbal bracket and sonar instrument (see drawings). The grommets provide friction to hold the unit at the desired angle.

Power Connections —

Twelve volt DC power for the depth sounder should be supplied by the boat's 12-volt electrical system. The power cable may be attached to an accessory or power buss, but if you have problems with electrical interference, the cable should be attached directly to the battery.

If a longer cable is required, use ordinary #18 lamp cord available at any hardware or electronic sup-

ply store. Splices should be soldered. If this can't be done, use crimp-type splices. Tape all splices with electrical tape.

An in-line fuse holder with fuse is supplied with the X-15. Be certain to install this fuse holder as close to the power source as possible. This will protect both the sonar unit and the power cable in the event a short occurs. Crimp connectors are supplied to attach the fuse holder to the power cable. The red or white wire in the power cable is the positive conductor. The black wire is the ground conductor.

The graph is protected from accidental polarity reversals and no damage will occur if the wires are reversed. The unit will not operate, however, until the proper polarity is applied.

Transducer Selection

Lowrance offers you the choice of transducers with either an 8 degree cone angle or 20 degree cone angle that will interchange with any of our 192 kHz sonar units. In other words, any Lowrance sonar instrument can be used with any Lowrance transducer of the same frequency without retuning of any kind, and no loss of performance. However, the use of any other manufacturer's transducer will result in a loss of performance.

Now you can select the trans-

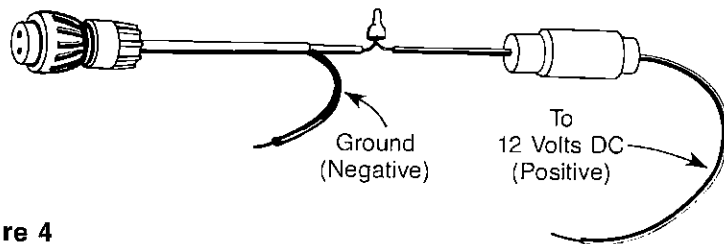


Figure 4

To return the unit to the control of the micro-computer, simply press 0 and then the LINES and SCALES keys at the same time. This will revert the unit back to normal operation.

Example: Set the initial transmitter pulse width to 100 micro-seconds.

Press: 1, 0, 0, then SCALES and LINES together

Result: **Figure 42**

Example: Set the initial transmitter pulse width to 50 μ s.

Press: 5, 0, then SCALES and LINES together.

Result: **Figure 43**

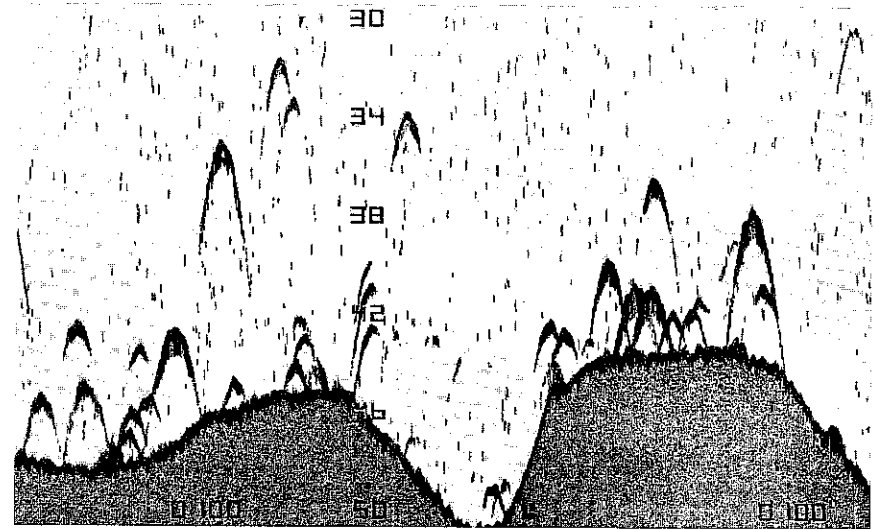


Figure 42

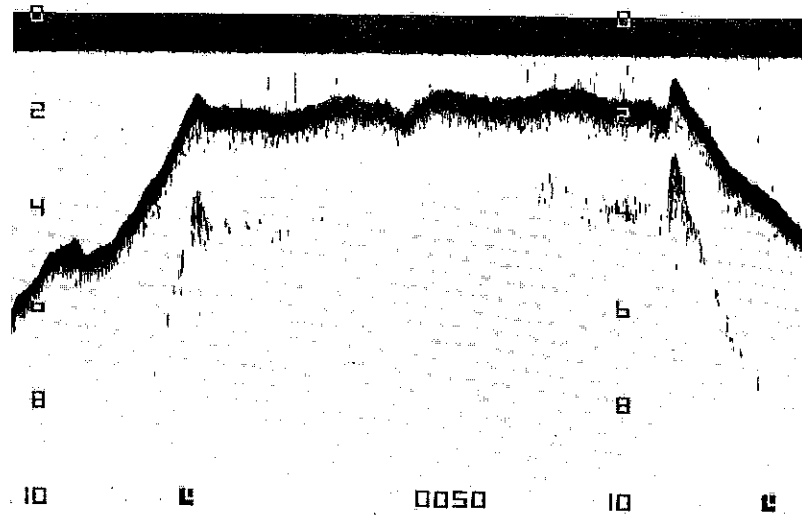


Figure 43

example, with the LOWER LIMIT set to 260 feet, the initial transmit pulse width would be 260 μ s. If the LOWER LIMIT is set to 390 feet, the initial transmit pulse would be 390 μ s. Finally, from 600 feet and below, the initial pulse width remains at 600 micro-seconds.

The transmitter pulse width can be increased from the initial point at any time by rotating the Suppressor control clockwise. The maximum amount of pulse width added to the initial transmitter pulse width is approximately 800 microseconds. In other words, if the LOWER LIMIT is set to 420 feet, and the Suppressor control is rotated to the maximum position, the transmitter pulse width would be 1220 micro-seconds. (420 initial + 800 = 1220.)

Earlier, we talked about the relationship between pulse width and target separation. As pulse width increases, target separation or resolution is degraded. However, if the pulse width is decreased, resolution becomes much better.

The X-15 allows you to take advantage of this fact by making it possible to override the initial transmitter pulse width setting from what the micro-computer selects according to the Lower Limit.

The initial transmitter pulse width can be set from 30 μ s to 2000 μ s by entering it on the keyboard as shown below. By setting the initial transmitter pulse width to 100 μ s, a three-inch resolution can be obtained, 50 μ s is equivalent to an inch and a half, and 30 μ s initial transmitter pulse width is equal to one inch resolution! No other graph in the market today can give you this feature.

After setting the initial transmitter pulse width, the suppressor control can still be used to cancel out noise by increasing the pulse width.

For example, if a 50 μ s initial transmitter pulse width is selected, and the Suppressor control is rotated to maximum, the transmitter pulse width would be 850 μ s. Returning the Suppressor control to minimum will restore the unit to a 50 μ s transmitter pulse width.

The X-15 will display the initial transmitter pulse width at the bottom of the paper when you override the micro-computer. To distinguish the initial transmitter pulse width from the depth scale printed on the paper, a zero is printed in front of the pulse width so that the two will not be confused. For example, a 100 μ s transmitter pulse width will be displayed on the paper as 0100. A 50 μ s transmitter pulse width would be displayed as 0050, while a 50-foot depth will be displayed as 50. To set the initial transmitter pulse width, simply press the amount of pulse width desired on the keyboard, and then press both the LINES and SCALES keys *at the same time*. (Note: If the lines and/or the scales were turned off, this will turn them back on. To turn them back off again, press either the SCALES key or the LINES key independently. Do not press them simultaneously.)

This will override the micro-computer's selection and set the initial transmitter pulse width to the desired setting. (Note: When an initial transmit pulse width is set, this width will be fixed for all depth settings until changed or until control is returned to the micro-computer.)

ducer design and cone angle to best fit your specific needs. Generally, wide cone angle transducers (20 degrees) are ideally suited for operating in shallow water or at medium depths. The 20 degree cone angle allows you to see more of the underwater world. In 15 feet of water the 20 degree transducer covers an area of the bottom that's about 6 feet across. The 8 degree transducer covers only about a 2 foot circle.

Thus, you would use a 20 degree transducer when looking for fish or structure, to easily find drop-offs or reefs, and to see fish that are around you . . . not just below you. However, the 20 degree transducer won't penetrate to greater depths as well as the 8 degree transducer, nor will it show a sharp drop-off as well. In a deep-water environment (100 ft. or deeper) or where you're looking at sharp drop-offs, the narrow cone angle can sometimes be more desirable because it can more accurately detect the location of the drop-off without displaying the fish. In deep water, with the sound energy being concentrated in a smaller area, the 8 degree transducer can reach to greater depths.

Both the 8 degree and the 20 degree Lowrance transducers give accurate bottom readings, even though the bottom signal is much wider on the 20 degree model 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, or drop-offs. The narrow bottom signal of the 8 degree transducer merely reveals less information about the bottom's contours. This



feature is particularly useful when using the X-15 offshore.

1. TPD-1192-20 Wide cone angle (20 degree) for shoot-thru-hull or trolling motor mount.
2. TPD-1192-8 Narrow cone angle (8 degree) for shoot-thru-hull.
3. THS-1192-20 Wide cone angle (20 degree) for high speed transom mount or shoot-thru-hull.
4. TTH-2192-20 Wide cone angle (20 degree) for thru hull mount or transom mount.
5. TTH-2192-8 Narrow cone angle (8 degree) for thru hull mount or transom mount.

III BASIC OPERATION

On-off and Sensitivity Control — Rotate the On/Off knob clockwise to turn the unit on. The Sensitivity knob works much like the volume control on a radio, that is, weaker signals will be detected with

higher settings of the knob. When cruising, or at other times when

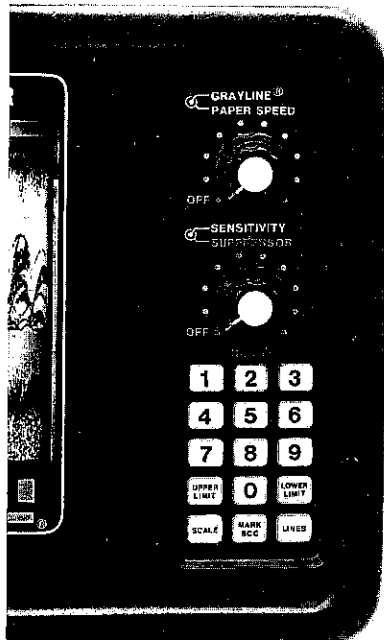


Figure 6

just simple bottom-contour information is desired, the Sensitivity setting can be low. In deep water or over soft, muddy bottoms, (which produce weak echoes), the setting will have to be higher.

When high Sensitivity settings are used, a second bottom echo will appear. This is normal and is

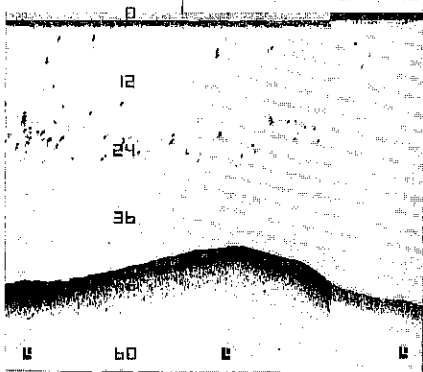


Figure 7 SENSITIVITY: TOO LOW

caused by the returning signal reflecting off the surface of the water, making a second trip to the bottom and back.

When detailed information about brush piles, individual fish or the thermocline is desired, the Sensitivity knob should be set at about $\frac{3}{4}$ point. Refer to the illustration below to see what effect the Sensitivity setting has on the recorded information.

Recording individual fish with an "arched" signature can usually be accomplished at trolling speed with the Sensitivity knob at the $\frac{3}{4}$ point, or higher. Refer to the section "Arched Signatures," on page 10 for more information about this important function of your recorder.

Suppression Control

The Suppression Control is used to reduce interference from noise. Noise, in electronic terms, is any undesired signal. It can be caused by an electrical source, (such as the engine's ignition system), or by air bubbles in disturbed water which is called cavitation noise. In both cases, the noise could produce unwanted marks on the paper. (See Figure 44 & 45.) Fortunately, noise pulses are relatively short in time com-

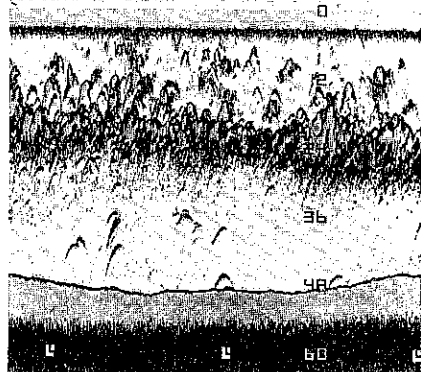


Figure 8 SENSITIVITY: PROPER SETTING

used on all the Lowrance's variable suppression flashers and graphs. Basically, it works on the principle that most noise pulses are of relatively short duration. If the receiver circuit can be adjusted so that it will accept only long pulses, then the short pulses will be cancelled out, and only the desired information (fish, bottom, structure, etc.) will be displayed. Of course, the transmitter's pulse width would have to be increased at the same time so that the return echoes would be accepted by the receiver.

This is exactly what the Lowrance suppression system does. The transmitter's pulse width is increased by the front panel suppression control, and the receiver "tracks" the amount of increased pulse width, cancelling out any narrow noise pulses, and displaying only the return echoes from fish or the bottom, etc. (Note: Receiver sensitivity is not diminished at all by this process.)

The only disadvantage to this system is resolution, or the ability to separate targets, is diminished when the pulse width is increased. A $200 \mu\text{s}$ (micro-second) transmitter pulse width used on the X-15 when power is first turned on, will allow the unit to display two fish or targets that are only 6 inches apart. In other words, if two fish that are six inches apart are displayed on the graph paper, they will show up as two separate arches when the transmitter is operating with a $200 \mu\text{s}$ pulse width. Now, if we increase the transmitter pulse width to $400 \mu\text{s}$, (by rotating the Suppressor control clockwise) those same two fish arches will blend together and show up as one fish or possibly

even a "blob" on the paper.

With a $400 \mu\text{s}$ transmit pulse width, those same two fish will have to be at least 12 inches apart before they will show up as two separate arches on the graph. This is why it is important to leave the Suppressor control turned down to minimum when looking for fish.

However, it is helpful sometimes to have longer pulse widths when noise is not a concern. When using a sonar in deeper water, it is easier for the unit to detect a longer pulse coming back from the bottom or from the fish. This is called "Probability of Echo Detection." The probability of the unit being able to detect an echo returning from deep water is diminished because the further the sound pulse has to travel, the weaker it becomes. By broadening the pulse width, in essence, a larger signal is transmitted and it is easier for the receiver to detect it.

For this reason, the micro-computer in the X-15 automatically increases the initial pulse width of the unit as deeper lower limits are set by the operator. (Note: Initial pulse width is the pulse width of the unit when the Suppressor control is turned to minimum.)

LOWER LIMIT (Feet)	INITIAL TRANSMIT PULSE WIDTH (Micro-seconds)
10	110
20	130
30	160
40-200	200

From 210 feet to 600 feet, the initial pulse width increases at the same rate as the depth. For

mediately be seen. Use only the amount of SCC required to reduce the clutter, as fish signals can be eliminated also.

To turn the SCC function OFF, press 0, MARK/SCC. The SCC value (1, 2, or 3) can be changed or turned OFF at any time.

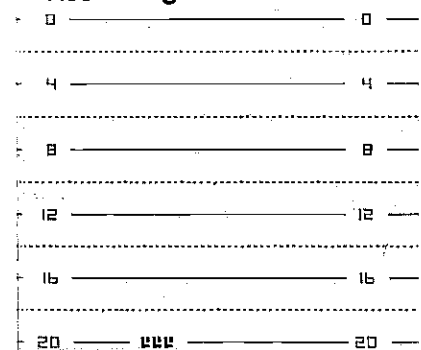
Feet, Fathoms, Meters

The X-15 will display the depth in feet, fathoms, or meters. Although the unit will revert back to the feet mode whenever power is turned off, it is simple to change to any mode you wish by pressing 1 and 3 for feet — 4 and 6 for fathoms, and 7 and 9 for meters. These keys must be pressed simultaneously for this feature to work.

When the unit is in the Feet mode, only one **L** will be displayed at the bottom of the chart paper every few inches. In the Fathom mode two **L**'s will be displayed. Three **L**'s will be printed on the Meter mode.

Example: Display Meters

Press: 7 and 9 simultaneously
Result: **Figure 41**



By looking at the number of **L**'s, one can determine the depth display mode that the unit is in, i.e., Feet - **L**, Fathoms - **LL**, or Meters - **LLL**.

Transmit and Print Alternate

When using the X-15 in deep

water, it may be desirable to slow the paper speed down considerably. However, when doing so, you may get "over print" or very dark, heavy printing over an area that is difficult to read. Much detail can be lost due to this.

A feature that the X-15 makes available is the Transmit and Print Alternate which, when activated, causes the stylus to print every other revolution instead of every revolution. This accomplishes three things:

1. Since the stylus only prints every other revolution, the recorded information is not squeezed together into a very small area. This allows better records at slower paper speeds. Also, the scale numbers are spread out more, so they are more legible.
2. Prevents the possibility of "wrap around". This is the undesirable occurrence of the second or third bottom echo printed on the paper at the top or middle of the page. Many times this can interfere with fish or other targets that you wish to see.
3. Reduces the reverberation effect. This happens mainly on lower frequency units, although it does sometimes show up on high frequency graphs. To use the Transmit and Print Alternate function, press the UPPER and LOWER keys simultaneously. If you wish to turn the function off, simply press the UPPER and LOWER keys again.

Transmit Pulse Width

The noise suppression system in the X-15 is a patented pulse width discrimination suppression circuit, and is the same as the one

pared to real sonar signals. Advancing the Suppression knob will cause the system to reject these unwanted, short pulses without reducing the sensitivity in any way.

This patented design is exclusive with Lowrance. However, with high suppression settings, the graph record becomes coarse and the ability to separate fish from the bottom or from other fish will be decreased. (See Figure 10.)

Therefore, the lower the suppression setting, the better. Advance the knob setting only as far as



Figure 9 PROPER SETTING

necessary to remove the erratic, unwanted noise marks. Most of the time at low or trolling speeds, no suppression will be needed.

Paper Speed Control

This knob adjusts the speed of the chart paper. For good detailed graphs, in shallow to medium depths, turn the paper speed control up to at least $\frac{3}{4}$ when trolling. For best details, turn it up to maximum. This will show proper fish arches at low speeds and keeps high speed information from being compressed. The paper speed should be turned down when using the unit in deep water. This will prevent gaps from appearing in the record. In fact, the microcomputer will automatically slow the maximum speed of the

chart paper when operating in deep water. The chart below gives the points where the maximum speed of the paper is slowed.

RANGE	PAPER SPEED
10'-120'	1 Fastest paper speed
130'-510'	2 Medium fast paper speed
520'-830'	3 Medium slow paper speed
Below 840'	4 Slowest paper speed

The chart paper may be slowed

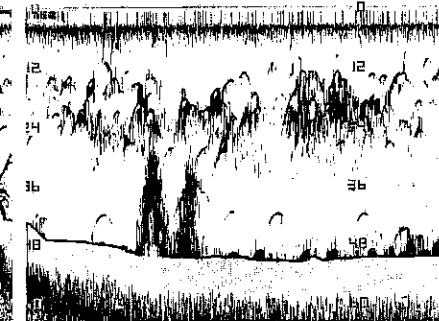


Figure 10 SUPPRESSION: TOO HIGH

even further by adjusting the paper speed control. Remember, if gaps appear in the record, turn the paper speed down until a solid record is achieved. The paper speed may also be slowed when *not* looking for fish or to simply conserve paper.

GRAYLINE® On/Off Knob

The GRAYLINE® function can be used to outline the bottom contour which might otherwise be hidden beneath trees and brush; it can also give clues to the composition of the bottom. A hard bottom returns a very 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. Do not advance the control too far or it will gray

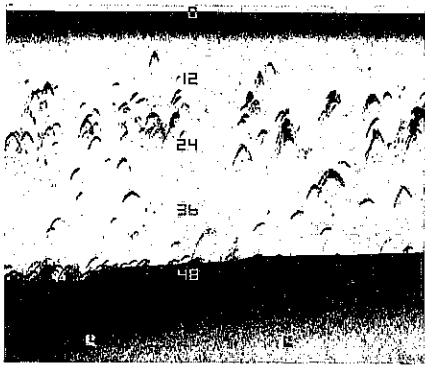


Figure 11 GRAYLINE®: "OFF"

line on the target completely, showing no black, which makes the target difficult to see.

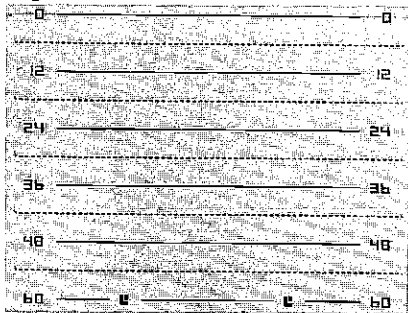
RANGE

The Lowrance X-15 straight line graph has the most advanced range selection capability of any depth sounder in its price range. We urge you to read this section carefully to get the most out of your X-15.

Lower Limit

When you first turn on the X-15, the range will be 0-60 feet.

Figure 13



As you travel, the bottom may descend below 60 feet. To change to a deeper range, simply press the desired depth on the Keyboard, and then press LOWER LIMIT.

Example: Display 0-80 feet.

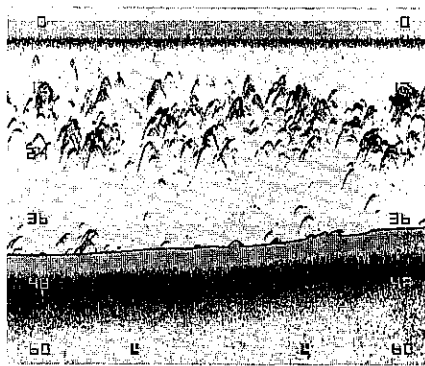
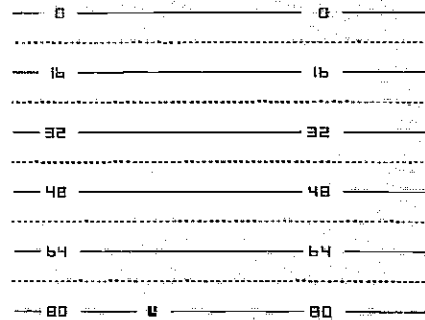


Figure 12 GRAYLINE®: "ON"

Press: 8 0 LOWER LIMIT

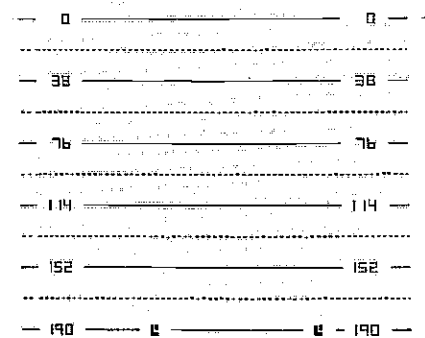
The depth will then be displayed:
Figure 14



Any depth in a multiple of ten (i.e. 10, 20, 30, 150, 320, etc.) may be used as a lower limit at the bottom of the chart paper.

Example: Display 0-190 feet.

Press: 1 9 0 LOWER LIMIT
Result: **Figure 15**



mounted on the transom should be washed periodically with mild soapy water to remove any accumulated road grime or oily film. This is essential to have good contact between the transducer and the water.

Periodically, the rubber roller on the paper drive should be cleaned with a cloth dampened with alcohol, to improve the friction on the drive shaft. (See page 16, Figure 29).

DO SECTION

Do carry a spare fuse, *stylus belt*, and roll of paper.

Do use the tape from a new roll or paper to attach it to the take-up spool.

Do use the empty cardboard core from the last roll of paper on the take-up post.

Do carry a pencil to make notes on the paper.

Do keep the recorded graphs for future reference.

Do clean the stylus belt and wheels with alcohol after every five rolls of paper.

DON'T SECTION

DON'T OPEN THE CASE WHEN THE UNIT IS ON.

Don't pull the platen assembly down when the stylus is at the front.

Don't store any objects inside the case or behind the viewing door.

Don't forget to tape the paper to the take-up core.

Don't rotate the stylus belt up.

Don't use oily cloths, strong solvents or abrasive cleansers.

TROUBLESHOOTING

Symptom

On/Off switch is "ON", but the stylus and paper don't move.

What To Do

Check fuse; check connections

at battery; tighten power cord connector.

Symptom

On/Off switch is "ON", have zero mark, but no echoes or bottom signals.

What To Do

Be sure the transducer is plugged into the unit and the transducer is in contact with the water.

Symptom

The unit is ON, but paper does not move.

What To Do

Tape Paper to cardboard spool on take-up post.

Symptom

Recorder marks are faint or dim.

What To Do

Clean viewing door; replace the stylus; check battery connections.

Symptom

Recorded marks are very heavy; paper is torn by stylus.

What To Do

Bend the stylus slightly to reduce pressure on paper.

VI ADVANCED OPERATION

Surface Clarity Control (SCC)

The surface markings at the top of the chart paper can, at times, extend many feet below the surface. This often interferes with the area that one is trying to graph. Surface clutter is caused by algae and plankton, air bubbles created by wave action or boat wakes, bait fish, or temperature inversions.

The surface clutter can be reduced or eliminated by using the MARK/SCC key on the control panel.

To use the SCC, control, press 1 for minimum effect, 2 for an intermediate control, or 3 for maximum elimination of surface clutter, and then press MARK/SCC. A reduction of the surface clutter will im-

STYLUS BELT REPLACEMENT
CAUTION — High voltage is present in the electronic section when the unit is turned on.

1. **TURN THE UNIT OFF.**
2. Release both catches on the top of the case. Pull out and down on the top of the case front to expose the stylus belt.
3. The stylus belt rides over two wheels located at the right edge of the platen assembly. Refer to Figure 2 on page 3. Move the front of the belt **DOWN** to position the stylus at the center of the platen.
4. Grasp the belt at the stylus holder with the thumb and forefinger and move it gently to the left while pushing the belt off the wheels with the other forefinger. (See Figure 40.)
5. Position the new belt on the wheels by reversing the procedure used to remove the old one. **BE SURE** the fingers of the new stylus are pointed **UP**.
6. Close the front of the case. Latch both catches on the top of the unit.

MAINTENANCE

NOTE: The stylus may be damaged if it is in front of the platen when the platen assembly is pulled down. *Always* move the stylus to the back side of the platen when changing the paper rolls. Remember to move the belt down to remove stylus.

Black carbon dust is created during the recording process. Use a soft, oil-free rag to clean the viewing door and metal platen behind the paper. Low pressure compressed air may be used to blow dust out of the case and away from moving parts *if* the air



Figure 40

is dry and free of oil.

After every five rolls of paper, the stylus belt and the wheels it rides on should be wiped clean with a soft rag moistened with alcohol to remove carbon dust. Strong solvents or abrasive cleaners *should not* be used.

All mechanical connections should be checked periodically to be sure they haven't worked loose. **DO NOT** apply any type of lubricant to the motors or gear trains.

HIGH VOLTAGE is present in the transmitter section when the unit is **ON**. No attempt should be made by any unauthorized person to modify or repair the electronic section.

Corrosion may occur at the power plug, in the fuse holder or power cord splices, or at the battery connections. All electrical connections should be checked periodically and cleaned as necessary.

The face of the transducer, if

Note that the paper speed slows down automatically at this range setting.

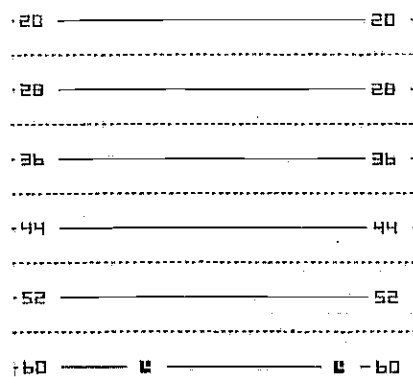
Clear - To clear an entry before hitting the **LOWER** key, press **0** four times. The desired numbers may then be re-entered.

UPPER LIMIT

Many times when you are fishing, it is desirable to "blow up" or expand a section of the water beneath you. This is made possible by the X-15 to show segments of the underwater world on the graph paper. By using the **UPPER LIMIT** key, any depth in multiples of 10 may be displayed at the **TOP** of the chart paper.

Example: Display 20-60 feet.

Press: 2 0 **UPPER LIMIT**
 Result: **Figure 16**



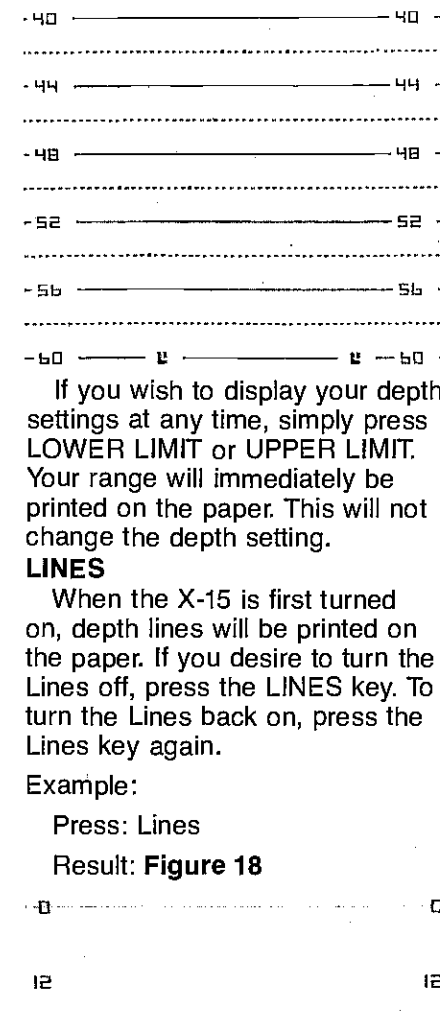
Notice: No surface signal will be displayed.

Example: Display 40 to 60 feet.

Press: 4 0 **UPPER LIMIT**
 Result: **Figure 17**

These ranges can be used in various combinations to show segments from the surface to the bottom. See representative samples of segments on page 23.

Figure 17



If you wish to display your depth settings at any time, simply press **LOWER LIMIT** or **UPPER LIMIT**. Your range will immediately be printed on the paper. This will not change the depth setting.

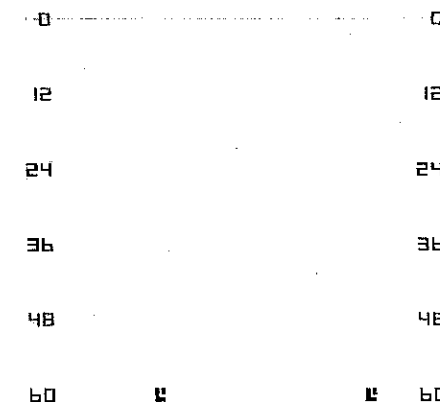
LINES

When the X-15 is first turned on, depth lines will be printed on the paper. If you desire to turn the Lines off, press the **LINES** key. To turn the Lines back on, press the **Lines** key again.

Example:

Press: Lines

Result: **Figure 18**



Marker

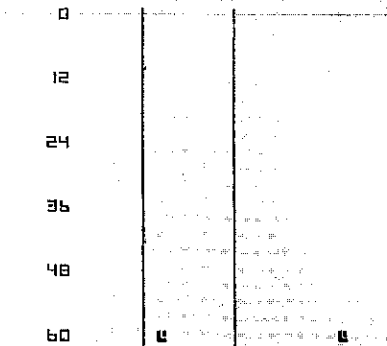
A marker is included in the X-15 so that events may be

marked when desired. To use the marker, simply press the MARK key and a vertical line will be displayed across the entire page. Hold the MARK key down and the unit will print the vertical line for as long as the key is held down.

Example:

Press: MARK

Result: **Figure 19**



Scale

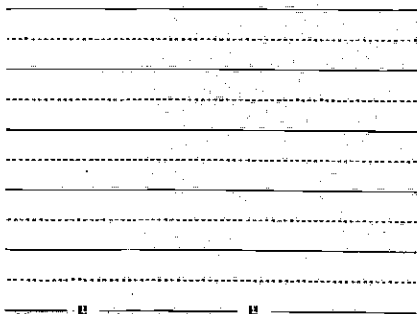
The numbers that indicate the depth or scale may be deleted if desired. Pressing the SCALE key once will stop the printing of the scale numbers. The scale may be displayed again by pressing the SCALE key.

Remember, the scale may be displayed at any time by pressing either the LOWER LIMIT or the UPPER LIMIT key.

Example:

Press: SCALE

Result: **Figure 20**



End-of-Paper Marker

The graph paper used in the X-15 has a red line printed at the bottom of the paper to signify when there is only 2 to 3 feet before the end of the paper.

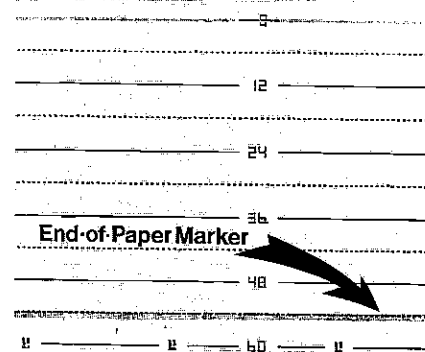


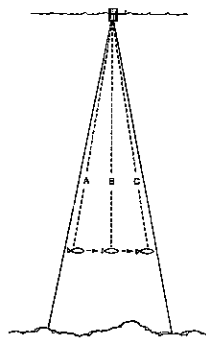
Figure 21

IV HOW TO READ GRAPHS

"Arched Signatures"

A remarkable advantage of the X-15 is that it can record individual fish with a characteristic arched mark 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" in Figure 22. When the fish has moved to the center of the cone, the distance to it will be shorter, (line "B"), and as it moves out of the cone, the distance will increase again as shown in line "C".

Figure 22



STYLUS REPLACEMENT

CAUTION — High voltage is present in the electronic section when the unit is turned on.

1. **TURN THE UNIT OFF.**
2. Release both catches on the top of the case. Pull out and down on the top of the case front to expose the stylus belt. (See Figure 36.)
3. The stylus belt rides over two wheels located at the right edge of the platen assembly. Move the front of the belt **DOWN** to position the stylus at the center of the platen.
4. Hold the stylus belt stationary with one finger, and remove the old stylus by starting at its left edge and moving it out from under the tabs on the stylus holder.
5. Before installing the new stylus, be sure it is bent prop-

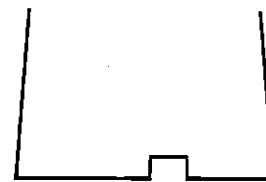


Figure 37

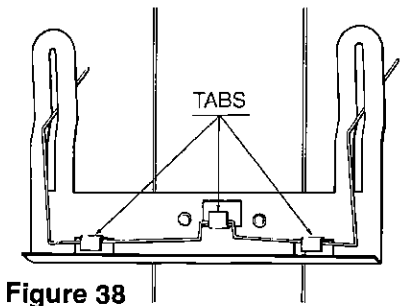


Figure 38



Figure 39

erly by comparing it to Figure 37.

6. Refer to Figure 38 to be sure the new stylus is positioned correctly under the tabs on the holder. Be sure it moves freely in the two slots. If not, bend the stylus away from the edge it is rubbing on until it does move freely.
7. After installing, if the stylus won't print all the way down the paper, (See Figure 39) bend the right leg down so that more pressure is exerted against the stainless steel plate. If it still does not print all the way, bend the left leg down more (but not so far that it digs into the paper).
8. Close the front of the case. Latch both catches on the top of the case.

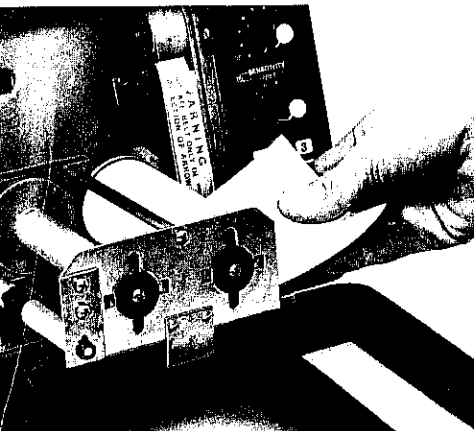


Figure 31

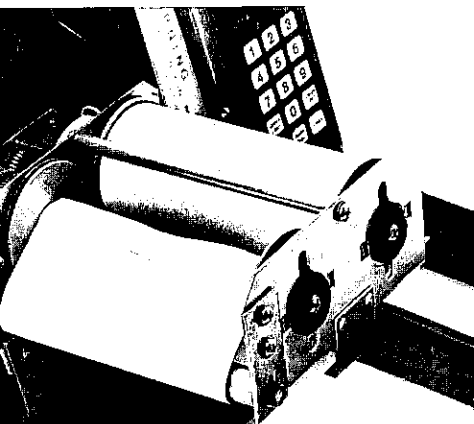


Figure 32

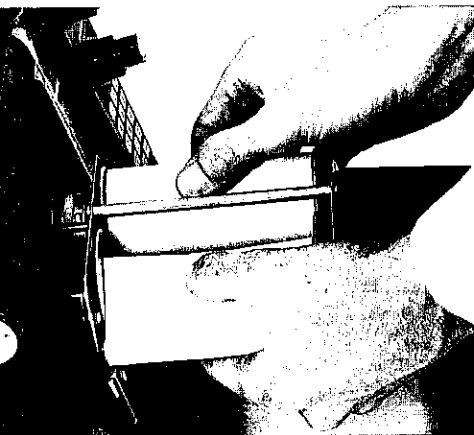


Figure 33

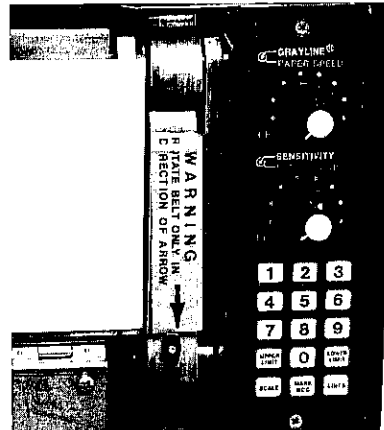


Figure 34



Figure 35

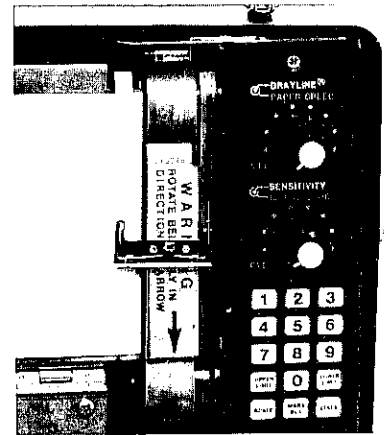


Figure 36

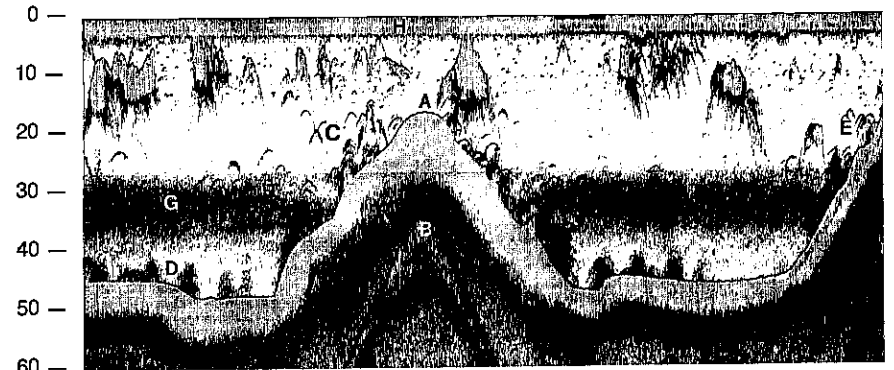


Figure 23

If a partial arch occurs most of the time on your unit (the mark curves up but does not curve back down), it is because the transducer is not aimed straight down.

Sharp, well-defined signatures will occur most often when the Sensitivity knob is set at the $\frac{3}{4}$ point or higher. (See (C), Figure 23). Remember, too, that there must be some movement between the fish and boat to develop the arched mark.

Thermoclines

The temperature of water in the lake is seldom constant from top to bottom. Layers of different temperatures form, and the junc-

tion 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 the fisherman because they are areas which fish are active. Many times bait fish will be above the thermocline while larger game fish suspend just below it. (See (G), Figure 23.)

Your Lowrance Model X-15 can detect this invisible layer in the water, but the Sensitivity knob will probably have to be set at the $\frac{3}{4}$ point, or higher.

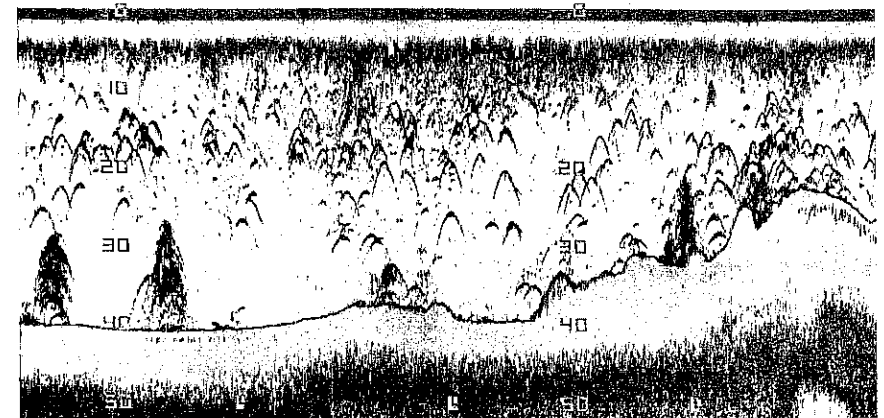


Figure 24

V PAPER LOADING

CAUTION — High voltage is present in the electronic section when the unit is turned on.

1. TURN THE UNIT OFF.

2. Release both catches on the top of the case. Pull out and down on the top of the case front to expose the platen assembly. (See Figure 25.)
3. Move the stylus belt DOWN, (on the right side of the viewing area), to position the marking stylus on the back side of the platen. NEVER move the belt up — the stylus may be damaged. (see Figure 26)

SPECIAL NOTE: The stylus may be damaged if the platen assembly is pulled down *unless* the stylus has been moved to the back side of the platen.

4. Pull out and down on the tab at the top, center of the platen assembly to expose the paper spools. (See Figure 27.)
5. To remove the full take-up roll, push in and rotate the left paper retainer knob until it snaps out. (See Figure 28.) The roll can now be easily removed from the paper spool end caps. (See Figure 29.)
6. Remove the empty supply core from the right side in the same manner. Align the two notches in the core with the tabs on the lower take-up spool. (See Fig. 30) Push the paper retainer knob in and rotate it until it locks into place.
7. Put a fresh roll of paper in position on the centering posts of the paper spool end

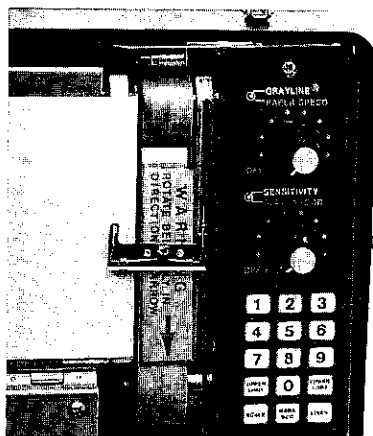


Figure 25

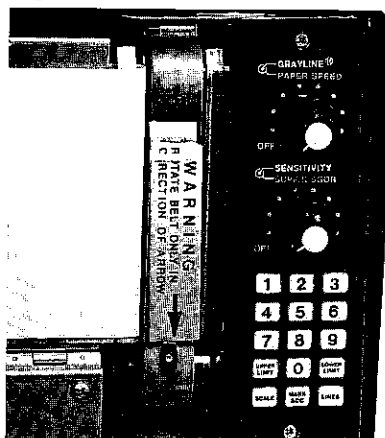


Figure 26

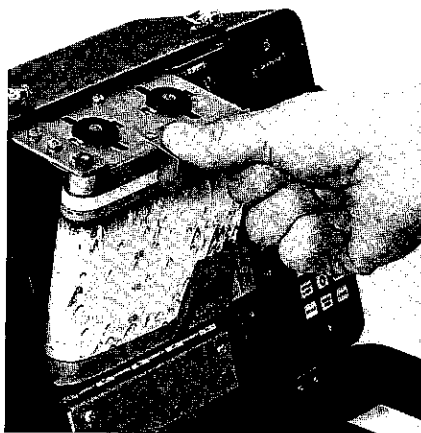


Figure 27

caps on the supply side (right) of the platen assembly. The paper must spool off the bottom of the roll. (See Figure 31.)

8. Draw the end of the paper across the face of the platen, around the friction roller, over the take-up core, and tape it squarely to the take-up core. (See Figure 32.) (Hint: small strips of tape may be stored inside housing.)
9. Hold the take-up spool, and turn the supply spool clockwise to put a small amount of tension on the paper. It should be snug against the platen. (See Figure 33.)
10. Push the platen assembly back to its operating position. Be sure it engages the catch inside the top of the case. (See Figure 34.)
11. Close the front of the case. Latch both catches on the top of the case. (See Figure 35.)
12. Turn the unit on. Move the Chart Speed knob fully clockwise. Watch the paper long enough to be sure it is moving smoothly and evenly across the platen. If the paper flutters or begins to run "up-hill", repeat Step 8.

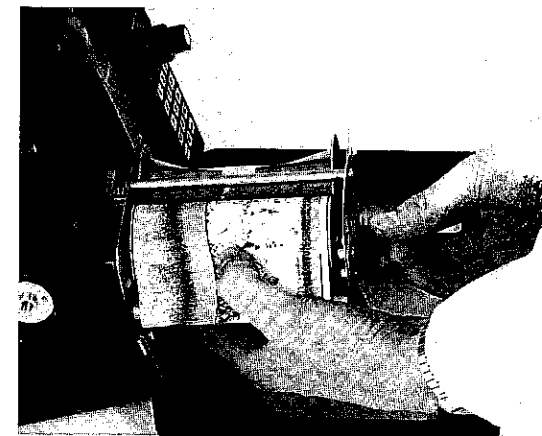


Figure 28

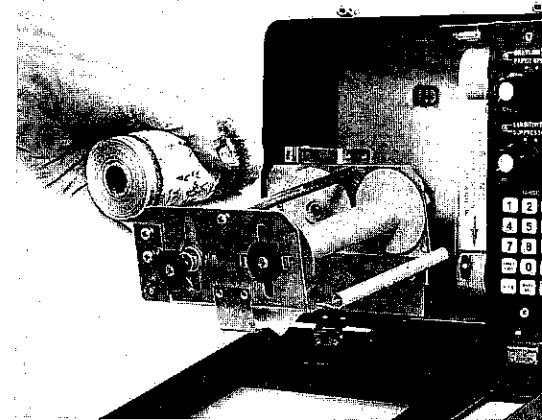


Figure 29

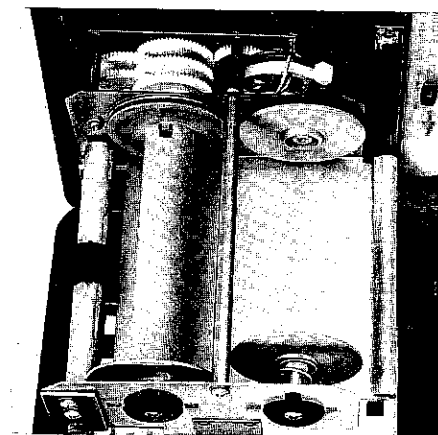


Figure 30