FISHER RESEARCH LABS

QUALITY

Fisher detectors are renowned for their quality.
Each detector is hand crafted in the USA with pride

PERFORMANCE

The worldwide underground utility industry relys on Fisher.
Our instruments are durable, dependable, and locate deeper.

REPUTATION

Fisher produced the first patented metal detector in 1931. For over 80 years, the Fisher logo has been a mark of excellence.

2 - YEAR LIMITED WARRANTY

Fisher believes in the products we produce and backs this belief with a 2 year limited warranty.

Proof of purchase is required to make a claim under this warranty.

NOTE TO CUSTOMERS OUTSIDE THE U.S.A.

This warranty may vary in other countries, check with your distributor for details.
Warranty does not cover shipping costs.

According to FCC part 15.21 Changes or Modifications made to this device not expressly approved by the party responsible for compliance could void the users authority to operate this equipment.

SERVICE

Fisher is committed to providing you, our valued customer, with superior service. Each and every instrument is rigidly tested and carefully inspected during assembly and before shipment.
Should you have any questions or problems, contact:

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FISHER RESEARCH LABS

TW-8800

Multi-Frequency Digital Line Tracer

Operating Manual

FISHER RESEARCH LABORATORY

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DESCRIPTION

The TW-8800 Multi-Frequency Line Tracer consists of a transmitter, receiver, ground-plate/ground-rod assembly, a carrying case, and an operators manual. The TW-8800 has both active and passive locating features.

Active locating utilizes both the transmitter and the receiver. By applying a signal with the transmitter, the operator can trace the path of the utility with the receiver. Different utilities respond better to different frequencies, and the TW-8800 has three frequencies the operator can choose from: 82 kHz, 8.2 kHz, and 820 Hz.

There are three methods of active locating that an operator can use to trace a utility. The conductive method is the most preferred method, since a strong transmitter signal is transmitted through the intended target. The operator can choose any of the three frequencies to trace the utility. The type of utility being traced would be the determining factor as to which frequency to choose. The inductive method is the easiest method to use, but may not yield the best results. When a direct connection is not available, but the operator has good knowledge of where one point of the utility may be, the operator can place the transmitter over the utility making sure that the arrow on top of the transmitter is parallel to the path of the utility. Inductive locating can be done at the 82 kHz and the 8.2 kHz frequencies. The third method of active locating involves using the coupling clamp accessory. The coupling clamp is used when the utility is exposed, but a direct connection is not available. The clamp jaws are opened and placed around the utility. The clamp never makes a direct connection with the utility; that is, the utility can move freely with the clamp around it. This method can only be used at the 82 kHz frequency.

The passive locating method utilizes only the receiver. This method of locating uses signals that are inherently associated with the utility. The TW-8800 has two modes for passive locating: 50Hz/60Hz (power) and 14 kHz to 30 kHz (radio). The power mode senses the electromagnetic fields on energized electrical lines. The radio mode senses the re-radiated radio waves that are occasionally associated with utilities. Often these signals are weak, so to assist the operator, we added a feature that oscillates the signal, thus allowing the signal to be heard.

The features of the TW-8800 make it a very versatile and practical instrument in today's world of underground locating.

SPECIFICATIONS

Subject to improvement or modification without notice.

RECEIVER

Depth Accuracy ..... ±1 inch per foot in nominal conditions
Readout Units ..... Inches or cm (factory preset)
Left/Right Guidance ..... Audio: continuous tone=Left, pulsed tone=Right. VCO (varying pitch) output for easy over target location. Visual: Left/Right/Over Target messages
Signal Strength ..... Digital Numeric Readout (0-99%) & Bar Graph
Sensitivity Adjust ..... Automatic
LCD Backlight ..... Included
Battery Test ..... Automatic Low Battery alert Push button readout
Battery Type ..... Six "C" cells
Battery Life ..... 80 Hours
Weight ..... 6.0 lbs.
Operating Temp ..... -4^0 to $+140^0$F (-20^0 to $+60^0$C)

TRANSMITTER

Output Frequencies 82kHz, 8.2kHz, 820Hz
Output Power (nominal) ..... 82kHz: .7Watts, 8.2kHz: 7.0Watts 820Hz: 7.0Watts
Battery Test ..... Yes
Battery Type ..... Two 6 Volt lantern batteries
Battery Life ..... 80 Hours at 82kHz
Weight ..... 7.8 lbs.

DEPTH ACCURACY

Depth measurement is a feature of the TW-8800. Accuracy is defined on an ideal target; that is, one that is continuous, a good conductor, and not surrounded by other utilities. There are several factors that can cause the operator to question the accuracy of the utility being traced.

Inductive Transmitter Setup

Inductively, only a small portion of the signal attaches itself to the utility. With a weakened signal, trace should be accurate, but depth may not. The conductive method will yield better results.

Low Receiver Signal Strength

When the signal strength falls below 20 – 25%, depth readout may not be accurate. It would be beneficial to move the transmitter to a closer point of contact.

Nearby Utilities

Close, nearby utilities may have some influence on the accuracy of the Depth readout. This is more prone to happen in the higher frequencies where signals can jump to nearby utilities. Switching to a lower frequency can give better results.

Moisture

Ground that is too dry or overly saturated may skew the depth readout.

"T's", elbows, or splits in the utility can distort the transmitted signal in that general area.

TW-8800 TRANSMITTER

Transmitter

Located on the transmitter are the power mode and the frequency selector. The power mode enables the operator to turn the transmitter on or off, and to check the condition of the batteries. When checking the batteries, a reading of 50 or greater on the display meter indicates that batteries are usable. Battery usage is dependent upon the frequency that is being used. The higher the frequency, the longer the battery life. The frequency selector is used to select the transmitted frequency. Only one frequency can be selected for transmission.

Other items on the transmitter include the plug-in socket for the ground plate/ground rod assembly, and for the coupling clamp. There is a Red LED that blinks when the transmitter is on. The batteries are located underneath the lid on top of the Transmitter housing.

WARNING: Do not handle output leads unless power is off. **ELECTRIC SHOCK HAZARD:** Servicing to be performed by qualified personnel only.

WARNING: Do not connect output leads to a live (energized) utility. Please prevent shock hazard and equipment damage.

The TW-8800 Transmitter.

TW-8800 RECEIVER

Receiver

The receiver includes the control keys and a large display screen.

Controls

Mode
Allows the operator to change frequencies. By depressing this key, the receiver will cycle through the active and the passive frequencies. The selected mode is shown on the left side of the display screen.

Power On/Off
Turns the receiver on or off.

Light
Lights up the display for usage in dark areas. When the display is backlit, LIGHT is shown on the bottom left hand side of the display screen.

Bat
Press and hold this pad to check the battery level of the receiver. A bar graph on the right side of the display will give status of the batteries. When the graph shows 1 bar, it is time to replace the batteries. Additionally, as the operator uses the Receiver, if the batteries get low, REPLACE BATTERIES will appear in the lower area of the Display screen.

Vol(up)/Vol(down)
Increases or decreases the volume of the speaker.

Depth
After determining the centerline of the utility, set the blade of the receiver on the ground, press and hold this pad to get the depth to the center of the target.

Tracing
After locating the point(s) where the signal strength was the highest, return to that spot and start tracing your utility. This is where the LEFT/RIGHT indicator is very helpful. Swing the Receiver from left to right and listen for the change of tone. When the target is to the RIGHT of the receiver, the signal is pulsed tone. As the receiver gets closer to the target, the pitch gets higher. When the target is to the LEFT of the receiver, the signal is a continuous tone. As the receiver gets close to the target, the pitch also becomes higher. When the receiver is over the target, OVER TARGET is showed on the display screen, and the tone is at its highest peak sound.

Depth Measuring
When an OVER TARGET response is displayed, position the blade of the receiver directly over the utility. Place the tip on the ground, hold the receiver steady, and press and hold the DEPTH pad. Depth will be measured to the center of the utility.

8.2 kHz

A very versatile frequency. Can be used both conductively and inductively. Can be used on continuous utilities – wire or pipe. The signal has a better chance of not inducing onto nearby utilities. This frequency may work better if the utility is grounded.

820 Hz

This frequency is mainly used on grounded wires or cables. It can give the longest trace distance of the three active modes.

INITIAL SCAN

In the passive mode, set up a defined search pattern. The pattern should include both north/south and east/ movement. Even though a signal may be encountered, be sure to scan the entire area.

In the active mode, setup the transmitter either inductively or conductively.

Inductive

Be aware of air coupling, the transmitted signal travelling to the receiver via the air, not the utility.

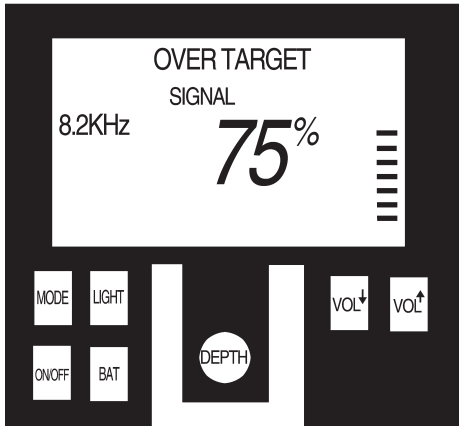
Conductive

Connect the ground plate/ground rod assembly to the transmitter. Connect the red lead to the non energized utility. Connect the black lead to the ground rod/ground plate. Place the plate/rod at a 90-degree angle in reference to the utility. Be sure not to place the wires over any other utility.

After the transmitter is setup, move away from the point of connection (or Induction) about 25 feet (8 meters). Sweep a circle around the point of connection. Initially, disregard the LEFT/RIGHT indicator and rely on the signal strength readout. Make note of the high readings. These are areas that need to be traced/examined in more detail.

WARNING: Do not handle output leads unless power is off. **ELECTRIC SHOCK HAZARD:** Servicing to be performed by qualified personnel only.

WARNING: Do not connect output leads to a live (energized) utility. Please prevent shock hazard and equipment damage.



Display

Frequency Modes

The frequency at which the receiver is operating.

<< Left/Over Target>/Right>>

Indicates where the receiver is in relation to utility.

Numeric Display

Serves a dual function:

- Relative signal strength of the transmitted signal (% shown). Responds in conjunction with the bar graph.
- Depth to the center of the target (when DEPTH pad is pressed - IN or CM shown)

Light

Indicates the display is lit (activated by pressing LIGHT pad).

Bar Graph

Serves three purposes:

- Responds in conjunction with signal strength.
- Visual indicator for battery test (when BAT pad is pressed).
- Volume loudness indicator (when VOL(up)/ VOL(down) is pressed.

Replace Batteries

When the receiver batteries fall below a nominal level, REPLACE BATTERIES will be displayed.

No Signal

When no signal is received by the receiver, NO SIGNAL will display. This response may be due to the transmitter not being turned on, or the transmitter and receiver not be set at the same frequency.

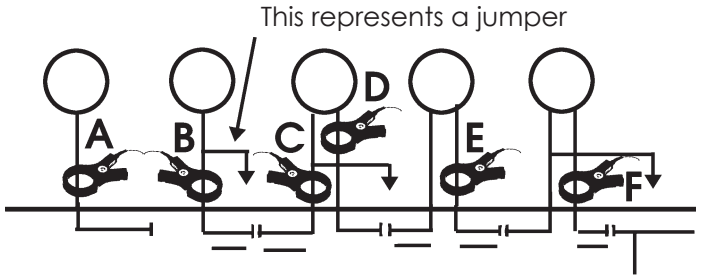
ACCESSORIES

Coupling Clamp

The coupling clamp is useful when the utility is exposed, and a direct connection is not possible. It is plugged into the same plug-in socket as the ground-plate/ground-rod assembly. The coupling clamp only operates at the 82 kHz frequency. The coupling clamp will fit around utilities that are 3-¼ inches in diameter or smaller. The length of the cable is approximately 10 feet.

Coupling Clamp Applications Diagram

A. The coupling clamp is for all tracing applications with conductors exposed; exception, an open circuit at line's termination.
B. A ground must be provided for the proper current flow when the coupling clamp is used at a termination.
C. The coupling clamp must be used between the grounding and where the line goes underground.
D. Trace signal will return to ground when incorrectly coupled.
E. Signal will be transmitted in both directions when connecting is midway in a long conductor.
F. Drop lines or laterals divide the signal strength in half at each junction.



Headsets

Fisher Research Laboratory has a variety of headsets available.

- Ultra-quiet deluxe Fisher Phones. High quality sound while reducing the outside noise.
- Standard Stereo Headphones
- Single Earpiece Headset. Enables the operator to effectively listen to the TW-8800 and remain aware of noise in close proximity.

OPERATING INSTRUCTIONS

The following instructions are designed for safe and effective methods of line tracing and utility avoidance. Some of the steps may not be applicable in all situations. The underlying guideline is that operator safety must be maintained at all times. Use of safety equipment, extra personnel, and up to date as-built plans should be considered when necessary.

The TW-8800 gives the operator many tools in one easy to use package. The following information can serve as guidelines to assist the operator in using the TW-8800.

METHOD OF LOCATING

Passive Mode

(The passive modes have no visual readout on the display. Increasing the volume will give both an audio and a tactile response.)

50 Hz/60 Hz (Power) Mode

Ideal for scanning an area to locate energized electrical cables. Caution: Lower power may not give a clear, strong response.

Radio Mode

Another scanning mode. Some telecommunications will give a response in this mode.

Active Mode

82 kHZ

A good easy to use frequency. This frequency can be used conductively, inductively, or with the coupling clamp.
Ideal situations include utilities that are noncontinuous, poor conductors, not grounded, or where a direct connection is not available. Examples of these would include water mains with gaskets at the joints, telecommunication cables where a direct connection is not available, and wire in conduit that is non-continuous through out. High frequencies have a tendency to induce signal onto other utilities if nearby