

# FISHER RESEARCH LABS

## TW-82

### DIGITAL LINE TRACER



## Operating Manual

FISHER RESEARCH LABORATORY

# CONTENTS

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<b>Introduction .....</b>	<b>pg. 3</b>
<b>Transmitter .....</b>	<b>pg. 4-6</b>
<b>Receiver .....</b>	<b>pg. 7-9</b>
<b>Specifications .....</b>	<b>pg. 10</b>
<b>Warranty .....</b>	<b>pg. 11</b>
<b>Accessories.....</b>	<b>pg. 12</b>

# INTRODUCTION

The TW-82 Digital Line Tracer components include a Transmitter, Receiver, ground-rod assembly, carrying case (soft or optional hard case) and an operator's manual. The TW-82 is a single frequency line tracer.

The TW82 is an active locating line tracer. There are three locating methods that an operator can use to trace a utility.




1. The **conductive** method is the preferred method, as a strong signal is transmitted directly through the utility line. A conductive trace is accomplished by making a direct electrical connection to the utility with a clamp.
2. When a direct electrical connection is not available, but the operator has some knowledge of where one point of the utility may be, the transmitter can be placed on the ground over the utility. With this **inductive** tracing method, the signal is transmitted through the ground and couples magnetically on to utilities in close proximity.
3. A third method is also inductive, but uses the optional **coupling clamp**. A coupling clamp can be used when a utility is exposed, but a direct electrical connection is not possible. By fitting the coupling clamp around the utility, the signal transmits through the air and couples magnetically on to the utility.



*Never make direct contact with electrical or communication lines that are in service. To trace such lines in service, perform an inductive trace, either with or without the coupling clamp.*


# TW-82 TRANSMITTER



TW-82 Transmitter

The Transmitter has two controls:  &  .  
The  Button has a dual function:

1. When the Transmitter is powered on,  switches the device between normal (1/4 watt) and high (1.0 watt) output.
2. With the Transmitter powered off:
  - A. Press-and-hold  to program the **Auto Power-Down** feature.

Successive presses of  will show a flashing battery indicator, followed by a blank screen or the illuminated battery indicator.

- An illuminated battery indicator means that **Auto Power-Down** is activated.
- A blank screen means that **Auto Power-Down** is deactivated.

- B. After you release , the transmitter power will turn on.

With the **Auto Power-Down** feature activated, the Transmitter will automatically turn off 60 minutes after the last key-pad press by the user. This is a battery saving feature. The Transmitter will warn of power-down as described on the following page.

## Low Battery Power-Down Warning

When the Transmitter batteries are near the end of their useful life, the Transmitter will warn the operator before shutting down.

Five minutes before shutting down, the Transmitter will alternately stop and start transmitting at approximately one-second intervals. The operator using the Receiver, even at a distance from the Transmitter, will notice the signal turning on and off before the power turns off completely.

## Accessory Output

1. Flip up the black protective cover to expose the Accessory Output.
2. Plug in the Cable Jack for conductive tracing.

When the conductive tracing cable is connected, Signal Current will be displayed. The Signal Current Bar Graph shows the quality of the connection.

Automatic Load Impedance Matching adjusts output to provide full rated power over a wide range of loads (e.g. utility types and conditions). It is tolerant of both dry (high resistance) and shunted (low resistance) ground connections.

The Transmitter has a built-in antenna for inductive locating. When the Cable Jack is not connected, the inductive antenna automatically engages and begins transmitting. When locating inductively, the Signal Current Bar Graph will not be displayed, as there is no conductive trace load to be measured.



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

**NEVER** connect conductive cables to an energized power line.

## INDUCTIVE LOCATING

Inductive locating is most effective with the Transmitter straddling the utility as illustrated, with the utility perpendicular to the Transmitter's batteries.

If the utility direction is unknown, place Transmitter on the ground, power on, and sweep the Receiver a complete 360° around the Transmitter, keeping at least a 25-foot (8-meter) distance between the Transmitter and Receiver. If unsuccessful, move the Transmitter to another location. When located, the Receiver's azimuth indicator will show the direction of the utility.

In inductive mode, the Transmitter's LCD will not display Signal Current. When the ground rod is plugged in, the Signal Current display will illuminate.



## CONDUCTIVE LOCATING

1. Connect the Ground Rod assembly to the Transmitter.
2. Push the Ground Rod into the earth at a 90° angle to the direction of the utility.
3. Connect the red clamp to the non-energized utility.
4. Connect the black clamp to the Ground Rod.

Be sure not to place the wires over any other utility.

5. Move at least 25 feet (8 meters) away from the connection point.
6. Sweep the Receiver in a circle around the connection point.
7. Using information provided on the display, find the areas that need to be traced and analyze the situation in more detail to find the buried utility.



# TW-82 RECEIVER



TW-82 Receiver

## SINGLE BUTTON OPERATION

- Power-Up: Press Button to turn ON
- Volume Control: Tap the Button to adjust volume
  1. Mute
  2. Very Low
  3. Low
  4. Medium
  5. HighContinued presses of the button cycles back to setting #1.
- Power-Down: Press-and-Hold Button to turn OFF

## DISPLAY

**1. Signal Strength:** Indicates your proximity to the center of the electromagnetic field emitted by the utility.

999: maximum value

0: minimum value

You may find different locations where the Signal Strength value is high. Use this reading as a relative indicator as to where the utility is located. Signal Strength is strongly influenced by the depth of the utility.



Display - Continued

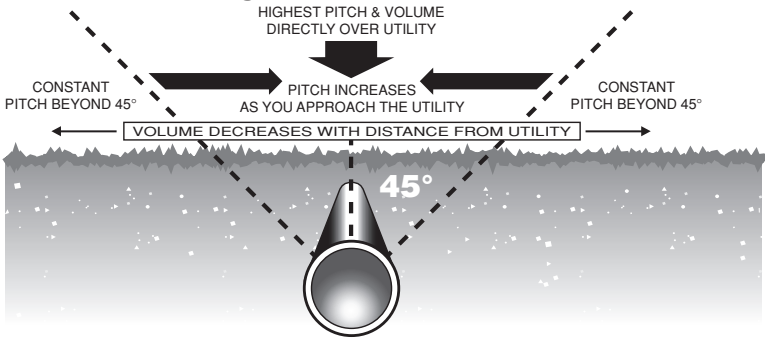
**2. Battery Strength:** When battery life declines to less than 1 hour (estimated) of operation the battery indicator outline will be illuminated with no segments. When the batteries reach the end of their useful life, the screen will go blank and the battery icon will flash before the Receiver shuts off. Expect about 60 hours of battery life from a set of two D-cell alkaline batteries.



**3. Left/Right & Over-Target:** These indicators show your position relative to the center of the electromagnetic field.

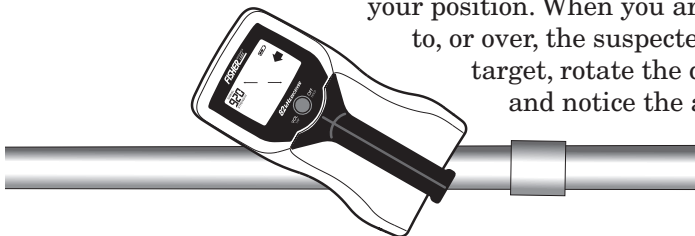


Audio: When you move within a 45° angle of the center of the electromagnetic field, the audio pitch will change. The pitch increases as you approach the utility and is highest over the top of the utility. Outside the 45° zone, the pitch and volume do not change.



When you are standing to the right of the utility, you will hear a constant tone, and to the left, a pulsating sound.

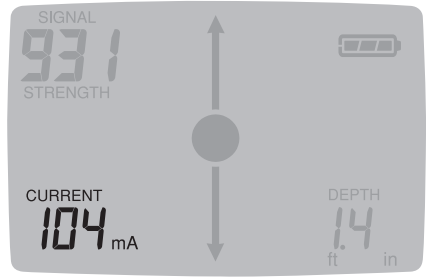
**4. Azimuth:** These arrows indicate the utility's path relative to your position. When you are close to, or over, the suspected target, rotate the device and notice the arrows.



## 5. Current Measure:

mA (miliAmperes) of current flowing on the conductor.

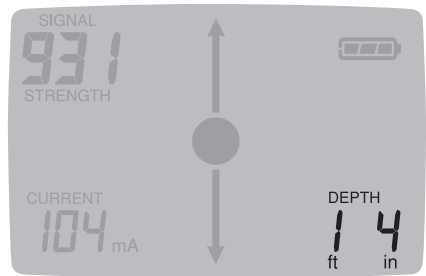
Use Current Measure as an aid for distinguishing utilities in close proximity. The Current Measure will generally be the highest on the utility you are connected directly to, regardless of the utility's depth.



## 6. Depth

Depth reading is only accurate if the electromagnetic field is perfectly round.

The electromagnetic field must have enough energy for the device to accurately calculate the depth. The weaker the signal strength, the less reliable the depth indicator. For this reason, depth readings for inductively located utilities will tend to be less accurate than conductively located ones.



The depth reading is the distance between the tip of Receiver blade and the *center* of the electromagnetic field. The center of the electromagnetic field is generally the *center of the utility*. The only 100% reliable method for determining depth is to hand-excavate.

## AUTO POWER-DOWN, RECEIVER

When 90 minutes have passed without the operator pressing the control button, the Receiver will automatically power down.

- Lower left of the display will indicate "OFF".
- Lower right of the display will count down from 10 to 0.
- The Transmitter will then turn off.

To stop Auto Power-Down, press the button once.

# SPECIFICATIONS

## RECEIVER

Frequency .....	82.175 kHz
Left/Right Guidance.....	Audible and visual
Azimuth Indicator .....	Visual
Over-Target Indicator .....	Visual and audible
Battery Status .....	Visual
Signal Strength Indicator .....	Numeric display & audible
Signal Current Measurement .....	Numeric display, automatic
Depth Measurement .....	Numeric display, automatic
Battery Type.....	Two D-cell batteries (included)
Battery Life .....	60 hours, approximate
Weight, with batteries.....	3.60 lbs

## TRANSMITTER

Output Frequency .....	82.175 kHz
Output Power (nominal) .....	Normal Setting = 0.25 watt High Setting = 1.0 watt
Conductive Tracing .....	[ 2 to 3,000 ohms, normal power-6dB 2 to 8,000 ohms, high power-6dB
Magnetic Strength .....	
Inductive Tracing .....	[ 15 Vm <sup>2</sup> , normal power 25 Vm <sup>2</sup> , high power
Magnetic Strength .....	
Battery Type.....	Four D-cell batteries (included)
Battery Life .....	Over 100 hours in normal power mode
Weight, with batteries.....	4 lbs

## ENVIRONMENTAL

Ingress Protection Rating.....	IP65 (stands up to water jets)
Operating Temperature Range.....	-4°F to 140°F (-20°C to +60°C)
Relative Humidity.....	0 to 95% noncondensing
Shipping Weight (packaged).....	17.5 lbs
Field Carry Weight, w/accessories...	15.5 lbs*

*\*Includes Carry Case, Batteries, Ground Rod and Conductive Tracing Cables*

**Fisher Research Laboratory does not warrant suitability to specific use. Fisher Research Laboratory shall in no event be liable for any direct, incidental, consequential or indirect damages.**

# **FISHER** RESEARCH LABS

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## **P E R F O R M A N C E**

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## **R E P U T A T I O N**

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**

**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.

Factory warranty follows the channel of distribution.  
Warranty does not cover shipping costs.

## **S E R V I C E**

**Should you have any questions or problems, contact:**

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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.

Not to be used with conductive tracing cables longer than 6.5' ( 1.98 m)

