

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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TEST SETS

FISHER M SCOPE — PIPE LOCATOR

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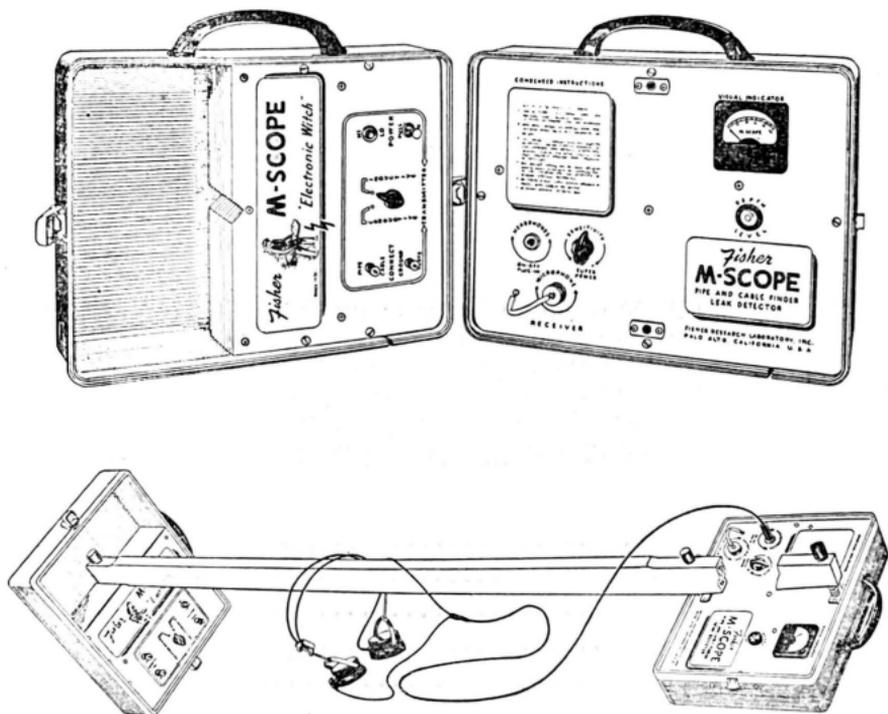
1. GENERAL

1.01 This section describes the Fisher M Scope Pipe Locator.

The Locator is used in locating pipes and cables by the high frequency method, especially in exploring a buried cable route to locate underground metallic structures ahead of the cable plow or trencher. It can also be used to determine the depth of buried cables, buried wire, cable in conduit and metallic gas and water pipes.

2. DESCRIPTION

2.01 The Fisher M Scope, illustrated in the following sketch, consists of a transmitter, receiver, headphones and handle. The transmitter and receiver have self-contained antennas and dry batteries.



2.02 The transmitter is operated by pulling the switch designated PULL-ON. The terminal posts designated PIPE-CABLE and GROUND-PLATE are for use in locating a buried metallic object conductively. The PIPE-CABLE post is connected to the pipe or cable and GROUND-PLATE post to a metal plate inserted in the ground or laid flat on the pavement. The control switch designated CONDUCTIVE-INDUCTIVE is for setting the instrument to the type of pickup desired. The HI-LO switch is for high or low output.

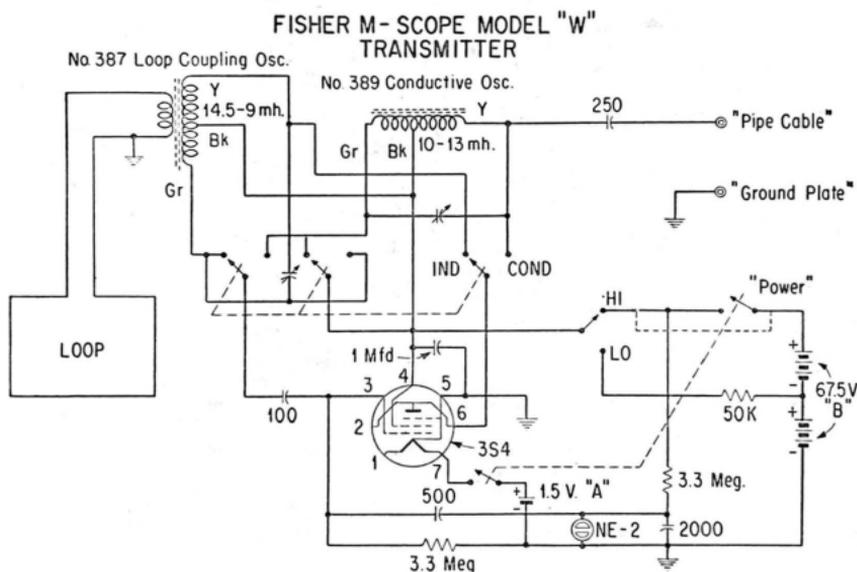
2.03 The receiver is operated by inserting the plug of the headphones into the jack designated ON-OFF PLUG-IN. The receiver also has a volume control (SENSITIVITY), a meter and a depth level indicator.

2.04 When not in use, the headphones should be stored in the compartment provided in the transmitter. The receiver and transmitter should be fastened together, face to face, for carrying and storage.

2.05 The method of using the locator is covered in another section.

3. CIRCUIT DIAGRAMS

3.01 **Transmitter:** The circuit diagram of the transmitter is shown below. It consists of a fixed output 82-kilocycle oscillator. When the control switch is set on **INDUCTIVE**, the oscillator output is radiated from a tuned loop antenna in the set. When the control switch is set on **CONDUCTIVE**, the oscillator is connected through a capacitor to the post designated **PIPE-CABLE**.



VOLTAGE READINGS

	Pin 3	Pin 4	Pin 6	Pin 7
Lo	-10	+35	+35	+1.5
Power	-12 CO	+40 CO	+40 CO	+1.5 CO
Hi	-45	+135	+135	+1.5
Power	-45 CO	+135 CO	+135 CO	+1.5 CO

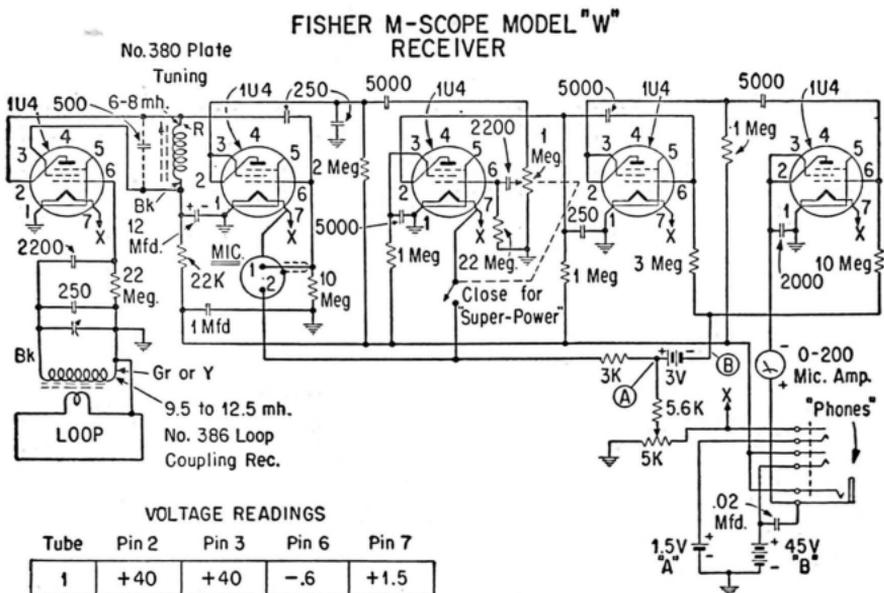
CO = Conductive Operation

Note:-

All readings to ground using Electron Tube Volt Meter with 11 megs. input resistance.

All capacities in mmfd. unless otherwise shown.

3.02 **Receiver:** The circuit diagram of the receiver is shown below.



Note:-

All readings to ground using Electron Tube Volt Meter with 11 megs. input resistance.

All capacities in mmfd. unless otherwise shown.

3.03 When the headphone jack is plugged into the receiver, the filaments of the tubes are connected to the battery, turning the set on. The receiver contains five electron tubes and operates as follows:

(1) The incoming 82-kilocycles signal from the transmitter is picked up by the loop antenna in the set. The radio frequency amplifier, amplifies the signal and passes it through the radio frequency transformer to an electron tube which is the mixer and local oscillator.

(2) At this stage the incoming signal is mixed with output from the local oscillator to yield an audio frequency. The audio frequency output is fed into a three-stage **resistance** coupled amplifier.

(3) The output of the last stage is fed into the headphones through the meter.

(4) The receiver volume control (SENSITIVITY) is a potentiometer in the grid circuit of the first stage of the audio amplifier.

4. BATTERIES

4.01 **Transmitter:** The transmitter requires one 4FH Burgess (1.5 volts) Dry Battery for heating the filament and one Eveready 467 (or Burgess XX45) Dry Battery (67.5 volts) for the plate supply. The filament battery should be replaced when the voltage drops to 0.9 volt and the B battery when the voltage drops to 60 volts.

4.02 **Receiver:** The receiver requires one 4FH Burgess Dry Battery for heating the filament, one Eveready 455P (or Burgess XX30E) Dry Battery (45 volts) for the plate supply and 2 KS-14368 Dry Batteries (1.5 volts) for the bias voltage. The filament battery should be replaced when the voltage drops to 0.9 volt, the B battery when the voltage drops to 37 volts and the bias battery when its voltage drops to 1.4 volts.

5. MAINTENANCE

5.01 Battery replacement may be made by the operator.

5.02 If either the receiver or transmitter becomes defective, the set should be returned for repair in accordance with local routine.

6. REPLACEMENT PARTS

6.01 Batteries:

Battery, Dry, Burgess 4FH

Battery, Dry, Eveready 467 (or Burgess XX45)

Battery, Dry, Eveready 455P (or Burgess XX30E)

Battery, Dry, KS-14368

6.02 Electron Tubes:

Tube, Electron, RCA 1U4

Tube, Electron, RCA 3S5