

# INSTRUCTION MANUAL



Model No. LM-106

# Lineman

TRANSMISSION LINE TEST SET AND COMMUNICATION INTERCOM



**HELPER INSTRUMENTS COMPANY**

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PHONE (800) 327-9308 ♦ FAX (425) 820-7031

## CONTROLS

**POWER RANGE SWITCH** — The left rotary switch serves as a combination power and meter range switch. Operating power is provided to the instrument in all positions except the "OFF" position. When the switch is in the "+ 10 dBm" position, add 10 dBm to the readings on the meter. When the switch is in the "-10 dBm" position, subtract 10 dBm (algebraic subtraction) from the readings on the meter. When the switch is in the "0 dBm" position, use the meter readings without correction.

Line levels into and out of the LINEMAN™ are indicated by the meter. It is calibrated in dBm with 0 dBm being referenced as 1 milliwatt into a 600 ohm termination. Thus, 0 dBm represents .775 volts.

**FREQUENCY SWITCH** — The frequency switch selects any one of six preset audio frequencies. 404 Hz, 1004 Hz, and 2804 Hz are standard telephone company frequencies used for routine testing of control lines. 1850 Hz, 2175 Hz and 1950 Hz are commonly used frequencies in Tone Remote systems. 2175 Hz is the standard guard tone and is located between the 1850 Hz and 1950 Hz function tones to permit a quick transition from either function tone to the guard tone. The tone frequencies provided by the LINEMAN™ are not precise, but are more than sufficiently accurate for line attenuation measurements.

**BRIDGE-TERMINATE SWITCH** — When this switch is in the "BRIDGE" position the LINEMAN™ presents a high impedance load to the line, so that line levels can be measured without being reduced by the shunting effect of the meter. This position is used when checking levels on a line which is connected to a load (i.e., a remote console or a base station). When this switch is in the "TERMINATE" position, the LINEMAN™ presents a terminating load of 600 ohms across the line being tested. This position is used when measuring lines which are not connected to any load.

**TONE** — The tone push button is a push-on, push-off control. When pushed, the LINEMAN™ sends the selected tone and disables the loudspeaker.

**LEVEL** — This controls the level of the transmitted test tone. It does not affect microphone level.

**TALK** — The LINEMAN™ uses simplex (push to talk, release to listen) communication. An electret microphone is located on the front panel. With the talk button pushed ON, the loudspeaker and tone generating circuits are disabled.

**VOLUME** — This controls the loudspeaker volume.

## USING THE LINEMAN™

**GENERAL** — To listen to signals on a line and to measure levels, clip the LINEMAN's™ test leads to the line, turn the Meter Switch to the “-10 dBm”, “0 dBm”, or “+10 dBm” position, and adjust the Volume Control to a comfortable level. In order to listen on the line, both the “TONE” and the “TALK” buttons must be OFF. If either of these buttons are ON, the loudspeaker will be silenced, and the meter will read the level of signals sent out by the LINEMAN™ and the incoming signals from the line.

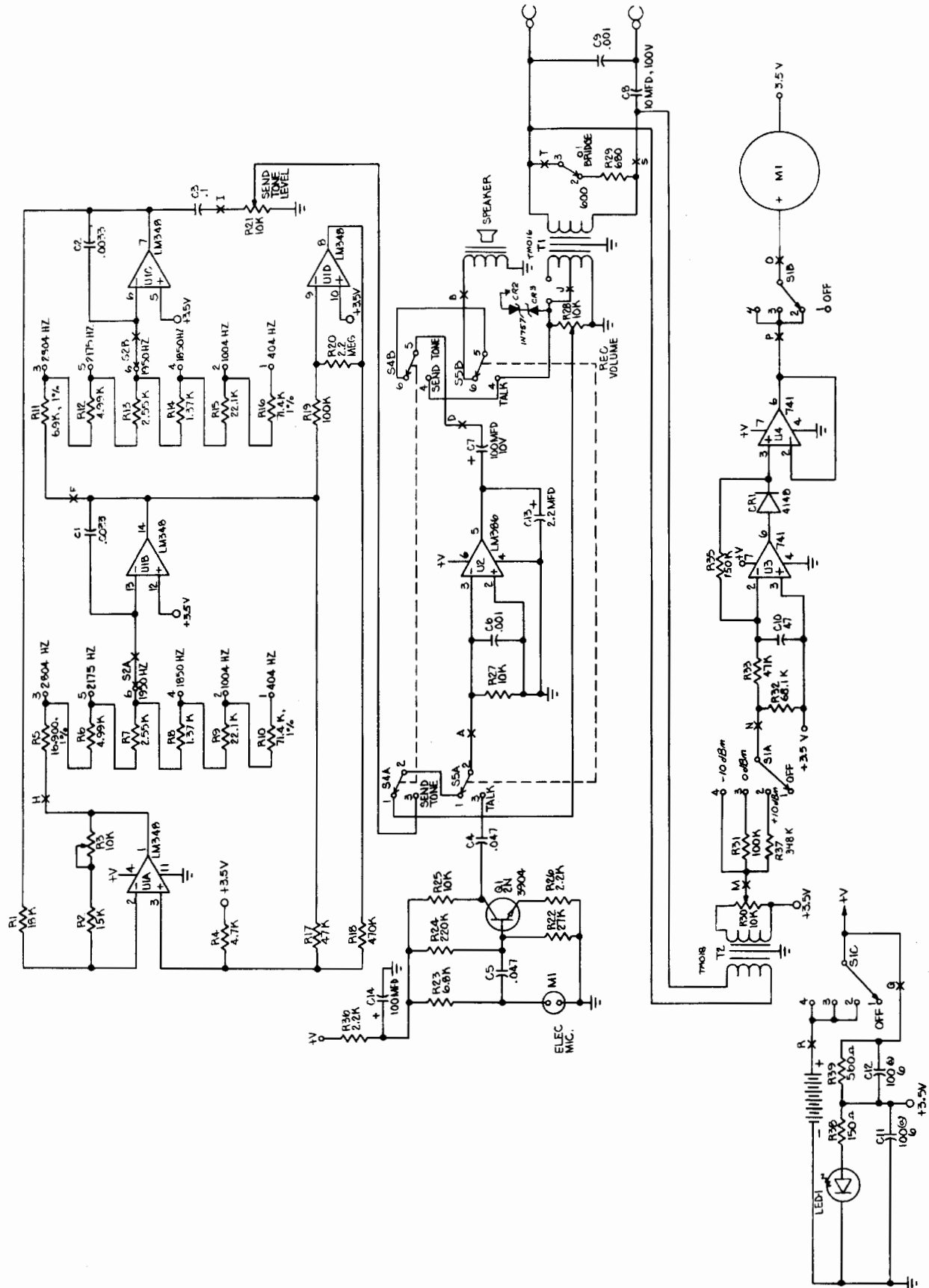
If the line is already terminated into a load (at the end you are testing), put the BRIDGE-TERMINATE switch in the “BRIDGE” position. If the line is not terminated into a load, put the switch in the “TERMINATE” position.

**INTERCOM** — The intercom function of the LINEMAN™ operates in typical simplex fashion. Push the “TALK” button in and talk into the LINEMAN's™ electret microphone (front panel). Your talking level can be observed by noting the swing of the meter. Release the “TALK” button to listen. Receive volume is controlled by the “VOLUME” control. When using the intercom, the TONE button must be OFF. You can use the intercom feature for many purposes: to coordinate testing with LINEMAN™ at the other end of the line, to communicate with the operator of a remote control console at the other end of the line, or to modulate a transmitter after keying it up manually.

**MEASURING LINE ATTENUATION** — To measure line attenuation, it is necessary to send a tone at a known level. Any tone source is satisfactory. A second LINEMAN™ is ideal. Read the received level on the meter. Line attenuation is calculated by simply subtracting the received level from the send level. On non-metallic type circuits, attenuation may not be the same in different directions. Therefore it is necessary to make attenuation measurements in both directions. This should not be necessary on simple metallic type circuits.

We suggest that measurements be made on the tones 404, 1004, and 2804 Hz, because these tones are regularly used by telcos. You will be able to coordinate best with them if your measurements are on these frequencies. Telco test procedures use a tone send level of 0 dBm. If the circuit uses tone remotes, measurements should also be made on the popular Tone Remote frequencies 1850, 2175 and 1950 Hz.

**CHECKING BATTERY CONDITION** — To check the condition of the batteries, switch the Bridge-terminate switch to the “BRIDGE” position, set the range switch to “+10 dBm”, push in the TONE button so the LINEMAN™ is generating a tone, and turn the LEVEL control all the way clockwise. An inability to obtain a meter reading of +12 dBm is an indication of weak batteries.



**LINEMAN™ Model No. LM-106****SPECIFICATIONS****Send Tones:**

TELCO 404 Hz, 1004 Hz, 2804 Hz, TONE REMOTE 1850 Hz, 2175 Hz, (guard), 1950 Hz.

**Meter:**

Measures send and receive from — 30dBm to +12dBm using three scales.

**Intercom:**

Built in electret microphone and speaker. Adjustable volume.

**Line Impedance:**

Switchable — bridging or terminating (600 ohm).

**Test Leads:**

Permanently attached.

**Power:**

6 "C" cells (included), battery "on" lamp.

**WARRANTY**

Helper Instruments Company warrants this test instrument to be free of defects in materials and workmanship for a period of one year from the date of purchase.

Helper Instruments will repair or replace, at their option, any defective instrument which is returned freight prepaid, unless the defect has been caused by obvious abuse, or misuse of the instrument.

In no event shall Helper Instruments Company's liability under this warranty exceed the cost of repairing or replacing such defective instrument, and under no circumstances shall Helper Instruments Company be liable for consequential damages.



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