



HELPER INSTRUMENTS COMPANY

Radio Test Instrumentation

**Dependable performance for the Radio Engineer
with innovative Test Equipment concepts**

SPEED UP RECEIVER TEST AND ALIGNMENT WITH A **sinadder™**

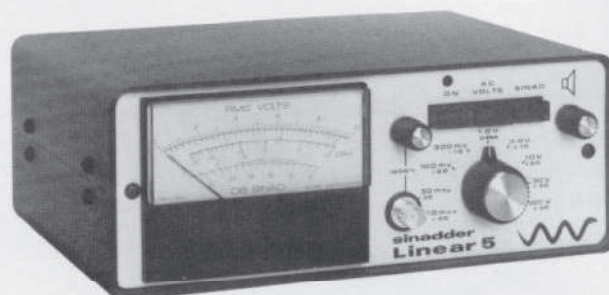
sinadder Linear 5™

*Send for your copy of "Everything
You Need To Know About SINAD."*

SPECIFICATIONS:

Panel Controls:	POWER/AC VOLTS/SINAD Switch; RMS VOLTS Range Switch; 1 kHz tone output level control; internal speaker level control.
Input:	Permanently affixed shielded test cable w/miniclips.
SINAD Input Level:	20 mV. to 10 Vrms
SINAD Input Impedance:	100 K ohm
Notch:	Audio frequency band rejection filter per RS 204C, Paragraph 6.1.1 (a) (b) (c)
SINAD Accuracy:	± 1 dB @ 12 dB
SINAD Scale Range:	LINEAR 0 to 32 dB, 12 dB point is located at 60% of full scale
Distortion Scale Range:	2.5 to 10% (@ 1000Hz)
AC rms Voltmeter Ranges:	Nine RMS Ranges: 10 mV, 30 mV, 100 mV, 300 mV, 1 V, 3 V, 10 V, 30 V, 100 V full scale
AC Voltmeter Input Impedance:	1 Megohm
AC Voltmeter Accuracy:	±3% of full scale ± 0.25 dB, 100 Hz to 20 kHz
Audio Amplifier:	In SINAD Mode, AGC controlled constant level with volume control. In VOLTMETER Mode, range switch and front panel volume control.
Tone Generator:	0.5 V, 1 kHz ± 1Hz, low impedance transformer isolated.
Power:	110/120 V or 220/240 V VAC Strap selectable, 50/60 Hz 13.5 VDC ± 15%
Dimension:	8.75" W x 3.25" H x 7" D 22cm W x 9cm H x 17.5cm D
Weight:	4 lbs. (1.82 Kg)
	Serial #'s above 6000

Model SL-105



In the SINAD mode, it's an RMS measuring SINADDER™, the revolutionary automatic distortion meter for real time measurement of SINAD sensitivity. Simplifies and speeds alignment procedures, saving hours of shop time.

The Linear 5 complies with EIA RS-204C, which specifies RMS type metering and width of the 1,000 Hz notch.

AUDIO SIGNAL TRACER: Use the internal speaker and speaker amp to listen to audio in speech amplifiers and transmitter speech processors while measuring the level. Track down audio distortion, locate defective audio stages.

MEASURE 1000 HZ AUDIO DISTORTION in receivers, amplifiers, transmitters, systems, using the new distortion scale.

RMS AUDIO VOLTMETER: Nine ranges from 10 mv full scale to 100 volts full scale. You can check audio circuits all the way down to microphone levels.

sinadder 3™



Same dependable quality and features as the LINEAR 5, with the following exceptions: Metering is by RMS calibrated, average activated circuits. SINAD scale is logarithmic with 12 dB to the left of center. 1,000 Hz output is not transformer isolated. No 1,000 Hz distortion scale. Thousands are in daily use.

Model S-103

sinadder 1™



The original Sinadder™. It revolutionized receiver test and alignment back in 1975, and is still prominent on thousands of service benches. When ordering specify 117 or 240 VAC.

Model S-101

sinadder™ FOR CELLULAR RADIO

The testing specifications for cellular radio require the use of a noise weighting filter when making SINAD measurements. In the United States, a "C Message Weight Filter" is specified. In Europe a "Psophometric" filter is used.

Models CML-1 (U.S. specs) and PML-1 (European) are adaptations of the Model SL-105 (shown at left). Specifications for the CML-1 and PML-1 are the same as for the model SL-105, except for the addition of the appropriate filter. A front panel switch removes the filter for non-cellular applications. 1000 Hz Audio Distortion can be made with or without filter.

**Send for your copy of
"SINAD Alignment for
Optimum Performance"**

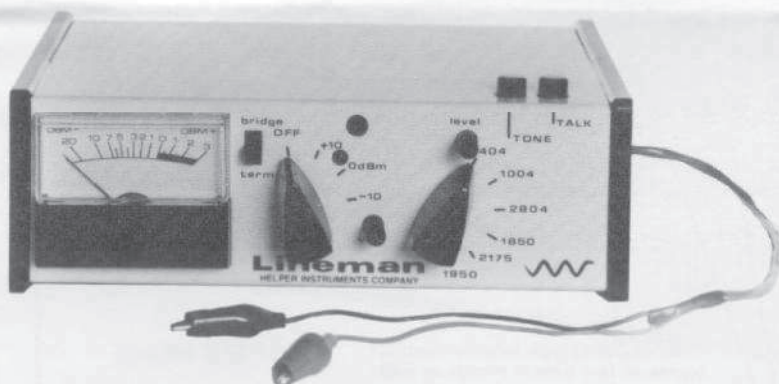


Model CML-1
(with C Message Weight Filter)

Model PLM-1
(with Psophometric Filter)



IF YOU USE TELEPHONE CONTROL LINES,
YOU NEED A **LINEMAN™**
TRANSMISSION LINE TEST SET AND COMMUNICATION INTERCOM



Model LM-106 Lineman™



Model CCL-1, carrying case

- LISTEN TO THE LINE
- COMMUNICATE WITH THE DISPATCHER FROM THE BASE STATION
- MEASURE LINE LEVELS
- MEASURE TONE REMOTE LEVELS
- USE AS A PAIR FINDER

SPECIFICATIONS:

Send Tones:	TELCO: 404 Hz, 1004 Hz, 2804 Hz TONE REMOTE: 1850 Hz, 2175 Hz (guard) 1950 Hz
Meter:	Measures send and receive levels from -30 dBm to +12 dBm, 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
Dimensions:	2 1/2" H x 7 1/4" W x 6 1/2" D 6.4cm H x 18.4cm W x 16.5cm D
Weight:	3 lbs. (1.36 Kg)

**Call Helper for your free copy of
"Line Measurements Speed
Control System Troubleshooting"**

Tone remote systems can be a headache. A little moisture on the phone lines and the high frequency attenuation goes up even though speech sounds normal. If you have inadequate margin for the high frequency tones the transmitter won't key. It's good practice to record tone levels and see that you have at least 6 dB margin.

The LINEMAN™ is a low cost, handy instrument for making these checks.

SINAD Input, for accessing built-in SINADDER.TM

SCOPE Connector for those times when you want to look at modulation wave shapes.

GEN-MEAS switch provides manual selection or the Generate of Measure mode. Instrument automatically switches to Measure mode when transceiver input senses over 1/2 watt of R.F. energy.

WATTMETER provides full scale readings of 10 and 100 WATT watts of RF power, with useable readings down to 100 milliwatts. MICROVOLTS METER provides meter reading of generated signal.

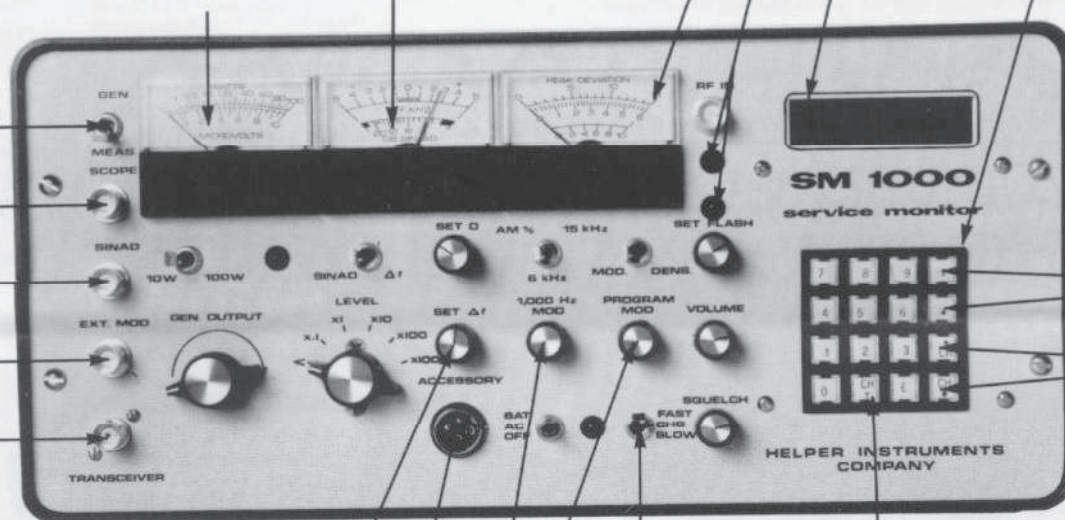
Modulation Flashers: Normally set at 5 KHz and 4.5 KHz to provide rapid go-no go setting of deviation control in 5 KHz systems. Setting adjustable by SET FLASH control.

Modulation meter indicates peak deviation using AUTOPEAKTM circuit, which automatically indicates greater of positive or negative peaks. This meter also indicates Modulation Density.

Delta F meter shows amount that generated or received frequencies differs from channel shown in digital display.

LCD CHANNEL FREQUENCY READOUT shows the RF channel in use, with its memory number. 50 Channels may be held in memory along with the CTCSS or other tone frequency associated with the channel. In Generate mode, readout shows the tone frequency being generated. In receive mode, readout shows the measured frequency of any tone modulation on the received channel.

Keypad permits entry of channel frequencies in 500 Hz intervals, and permits entry of associated tone frequencies up to 5,000 Hz, including CTCSS tones. Up to 50 channels with associated tone frequencies can be placed in memory.



Transceiver input can accept up to 100 watts of RF power.

EXT. MOD Connector to accept external modulation sources. Functions perfectly with digital paging and digital squelch formats. Modulation is true FM, and modulating frequencies down to DC can be accommodated on special order.

Delta F control permits operator to swing generated frequency plus and minus 5 KHz to check receiver passband.

ACCESSORY CONNECTOR provides connection and power for future accessories, such as DTMF microphone, ACSB simulator, and RF power amplifier.

FAST-SLOW charge selection permits choice of fast battery charge or maintenance charge rate. Internal battery charger functions when unit is plugged into external battery or into AC mains.

1,000 HZ MOD controls modulation level from 1,000 Hz internal source. PROGRAM MOD controls modulation level from variable tone generator (frequency of variable tone is set by keypad). Both AM and FM.

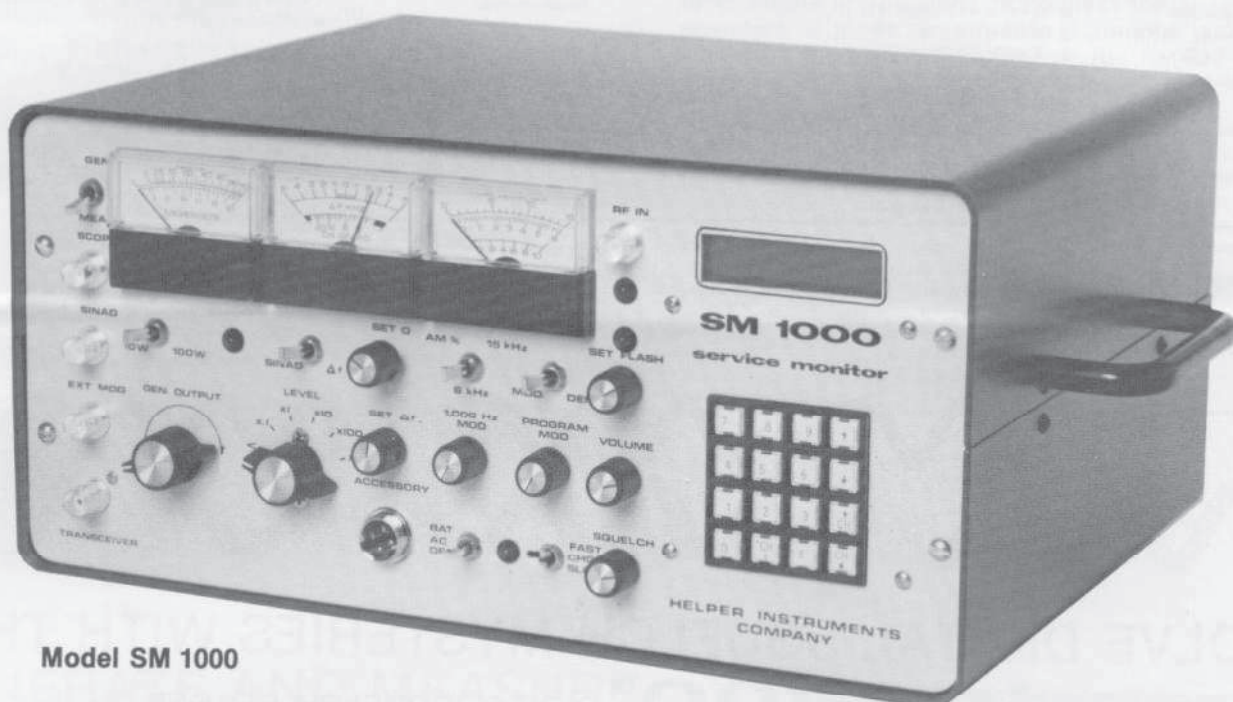
Switches between display of channel or tone frequency.

Steps Channel up or down to next channel in memory.

Steps channel frequency up or down in 2.5 KHz steps, when display is in channel mode. Steps tone frequency up or down in .1 or 1.0 Hz steps when display is in tone mode.



The SM 1000 SERVICE MONITOR



Model SM 1000

SPECIFICATIONS:

Frequency Coverage:	100 KHz to 1,000 MHz
Generator Output Level:	.1 to 10,000 microvolts at frequencies above 1 MHz
Input Sensitivity:	2 microvolts @ 50 ohms at frequencies 1 MHz to 1,000 MHz
RF Power Measurement:	Two meter scales cover range from 100 milliwatts to 100 watts at frequencies of 1 MHz to 1,000 MHz.
Frequency Display:	Liquid crystal displays channel frequency to nearest one half KHz. Display also indicates tone frequency being generated or received.
Frequency Memory:	Up to 50 channel frequencies, with associated tone frequencies can be held in non-volatile memory.
Frequency Accuracy:	$\pm .00005\%$ (.5 PPM) from + 10 C to + 40 C
Channel Frequency Increments:	Channel frequency can be changed by keypad increments of 500 Hz. Analog control permits swinging channel frequency ± 5 KHz from channel center.
Frequency Modulation:	Up to 15 KHz peak deviation.
Amplitude Modulation:	Up to 90%
Internal Modulation Sources:	(1) 1 KHz fixed oscillator with 1 PPM frequency accuracy. (2) Digitally controlled oscillator with .1 Hz increments up to 1,000 Hz and 1 Hz increments up to 6,000 Hz.
External Modulation Provisions:	Panel connector accepts external modulation source up to 5,000 Hz. Frequency modulation is possible with

Peak Modulation Metering:

Modulation Density:

FM Peak Flashers:

RF Power Measurement:

SINAD:
Power supply:

Dimensions:

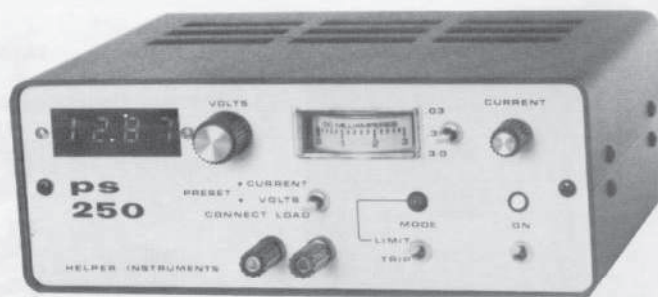
Weight:
Accessories Supplied:

modulating frequencies down to near zero, permitting use of digital squelch and digital paging formats. Analog meter displays FM peak deviation on a 6 KHz range and a 15 KHz range, AM a single 100% range. Analog meter displays Modulation Density (average modulation). A red LED flashes on 5 KHz (presettable by operator), and a yellow LED flashes at 90% of preset value. Two scales provide power measurement from .1 watt to 100 watts over a frequency range from 1 MHz to 1,000 MHz. Built-in SINADDER™
(1) 110/220 V or 220/240 V, 50/60 Hz., selectable from rear panel.
(2) 13.6 V. vehicular, negative grounded vehicular system.
(3) Internal battery. Internal battery can be charged from AC power line or external battery.
13.5" W x 6.8" H x 11.5" D
(34.3 cm W x 17.3 cm H x 29.3 cm D)
16 lbs (7.3 kg)
Carrying case, Antenna

THE **ps 250**TM PRECISION POWER SUPPLY

Troubleshooting a portable radio on its own battery is hazardous to the portable. One slip and you can smoke an expensive PC board. The PS-250TM has both current limit and current trip protection. Even though you have your head buried in the job, the PS-250TM will beep you when the current setting is exceeded.

The PS-250TM is more than a power supply. It is an important test instrument! The PS-250TM has a digital voltmeter for accurately determining voltage at which the portable fails. It has an analog current meter for use in PA tuning to obtain optimum power efficiency for good battery life.



Model PS-250

SEND FOR YOUR COPY OF "TROUBLESHOOTING WITH YOUR POWER SUPPLY"

SPECIFICATIONS

Serial #'s above 6436

Output Current:	3 Amperes, 50% duty factor
Output Voltage:	0 to 19 VDC output. DC isolated from ground.
Voltage Regulation:	@ 19 volts: 0-2.5 amps .1% @ 10 volts: 0-3 amps .1% @ 5 volts: 0-3 amps .2%
Ripple and Noise:	Less than .2 millivolts RMS measured at 12 volts, 3 amperes.
Load Protection:	Choice of current limiting or current trip-out Audible and visual alarm on limit and trip-out. Voltage and current limit can be set prior to connecting output to panel terminals. Low capacitance output

Internal Protection:

Self limiting circuitry and power devices prevent internal damage.

Power Requirements:

110/120 or 220/240 V. 50/60 Hz, as chosen by transformer taps

Dimensions:

3 1/2" H x 8 3/4" W x 6 15/16" D
(90mm H x 225mm W x 180mm D)

Weight:

6.5 lbs. (14.3 Kg)



SOLVE DIGITAL SQUELCH MYSTERIES WITH THE **dsr 100**TM DIGITAL SQUELCH READER

SPECIFICATIONS:

Code Capability:

Functions with the popular systems of digitally coded squelch having the following characteristics: 23 Bit continuous code stream. 3 Digit Octal ID Number. Data rate of 134 Bits per second, turn-off code of 134 Hz, such as marketed by Motorola, Ferritronics and E.F. Johnson

Indication: Three digit LED readout, with turn-off code indicator

Input Impedance: 100,000 ohms

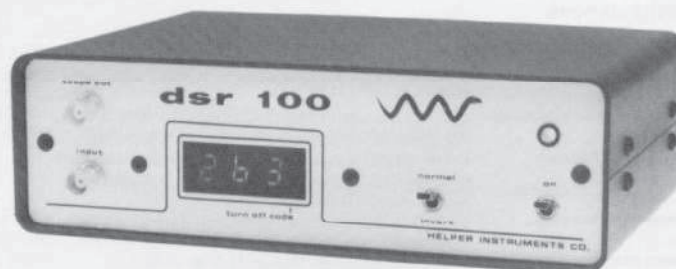
Input Voltage Range: 20 millivolts to 4 volts Peak to Peak

Output: Scope output provided with synchronization pulse for direct viewing of digital pulse train

Power Requirements: 110/120 V. 220/240 V. 50/60 Hz as chosen by transformer taps or 13.5 VDC

Dimensions: 2 1/8" H x 8 1/4" W x 6 1/8" D
(73mm H x 225mm W x 178mm D)

Weight: 2.7 lbs. (1.2 kg)



Model DSR-100

- Decodes digital squelch signals
- Reads out 3 digit code number
- LED indicates turn off code
- Will operate from scanner or Service Monitor Demod jack. Ideal for use with SM-1000 or receiver.

SOLVE THOSE TONE SQUELCH PROBLEMS WITH A **toner**TM FROM HELPER

FAST TONE MEASUREMENTS WITH A **toner II**TM

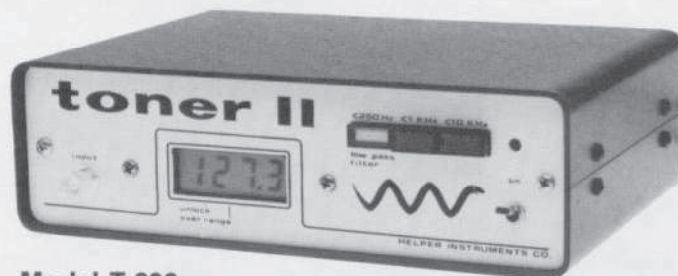
Frequency errors are the usual cause of tone squelch problems, and accurate measurement of tone frequencies is essential to professional servicing of tone squelch systems.

The measurement accuracy required is about .1 Hz. An ordinary counter takes ten seconds to achieve this resolution. The Toner IITM makes a new measurement and gives a new readout every 1/2 second.

An extremely effective AGC System permits the Toner IITM to operate on inputs anywhere from 5 millivolts to 10 Volts RMS.

SPECIFICATIONS:

Frequency Measurement Range:	50 to 9,999 Hz in three ranges: 50 to 250 Hz, 50 to 999 Hz, 500 to 9,999 Hz.
Accuracy and Resolution:	0.1 Hz or frequencies below 1,000 Hz. 1.0 Hz for frequencies above 1,000 Hz.
Input Impedance:	100,000 ohms in parallel with test cable capacitance.
Input Voltage Range:	5 millivolts to 10 volts RMS automatically accommodated by AGC Amplifier voltages.



Model T-202

The input leads can be connected almost anywhere in the tone system of the radio, and the tone on off-the-air signals can be measured by connecting to the discriminator output.

Instructions are provided to connect the Toner IITM to scanners. It plugs directly into the scope jack of the MM-901 modulation monitor or the SM-512 Service Monitor, and will operate from the "demod" jack of any Service Monitor.

Input Filtering:	Six pole low pass filter on the 50 to 250 Hz scale reduces noise and speech interference for measuring CTCSS tones.
Indication:	Four digit, LCD readout reads frequency directly in Hz.
Power Requirements:	110/220 V or 220/240 V, 50/60 Hz, as chosen by transformer taps. Also operable from 13.5 V. negative ground automotive supply
Dimensions:	2 7/8" H x 8 3/4" W x 6 7/8" D (73mm H x 225mm W x 178mm D)
Weight:	2.6 Lbs. (5.7 Kg.)



GENERATE AND MEASURE TONES WITH THE **toner III**TM

- All of the counter features of the TONER IITM (above)
- PLUS a low distortion tone generator
- Switch selects front panel display if incoming tone or generated tone.
- Continuous adjustment of generated frequency permits testing decoders for proper bandwidth.
- Margin test switch permits momentary reduction of generated level by 6 dB - to be sure a decoder isn't just "barely" working.
- Built-in nickel cadmium battery.
- An ideal companion to the SM-512 Service Monitor
- Squelch tones, "Beep" Tones

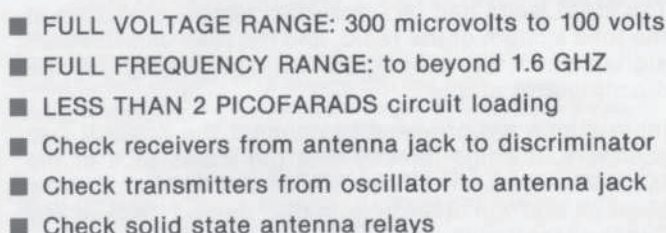


Model T-203

SPECIFICATIONS, same as Toner II, with the following exceptions and additions:

Frequency Generation Range:	50 to 5,000 Hz
Generate Level:	Up to 1 volt RMS @ 600 ohms
Generate Accuracy:	Same as TONER II
Generate Resolution:	Same as TONER II
Dimensions:	3 1/2" H x 6 3/4" W x 6 7/8" D
Weight:	4.0 Lbs. (1.8 Kg)

rf millivolter™



**NOW EVERY TEST BENCH CAN HAVE A FULL RANGE R.F. VOLTMETER WITH
TRADITIONAL HELPER QUALITY AND SERVICE**

SPECIFICATIONS:

Voltage Range:

1 millivolt to 3 volts (full scale). Lowest useful reading 300 microvolts. Measures to 100 volts with 50 dB adaptor (supplied)
(As measured with 50 ohm terminating BNC Adaptor)

Accuracy:

20 kHz to 520 MHz: 1.0 dB
520 MHz to 1000 MHz: 1.5 dB
1000 MHz to 1600 MHz: 3.0 dB
Useable as Indicator to 3 GHz

Probe Input Impedance:

50 dB Adaptor Input

Impedance

100,000 ohms. In parallel with 2 pf

1.2 p!

Calibrated in RMS volts and dBm True RMS
reading on bottom four scales

Power Requirements:

110/120 V or 220/240 V, 50/60 Hz as chosen by transformer taps. Also operable from 13.5 V. negative ground automotive supply.

Dimensions:

3" H x 8 1/2" W x 6 1/8" D
(76mm H x 216mm W x 175mm D)

Weight:

4.2 Lbs (1.9 kg)

Accessories Supplied:

Probe with 5' Cable
Low inductance grounding probe cap
50 dB Adaptor
Teflon™ probe nose extension
Protective grounding lead
50 ohm Terminating BNC Adaptor
12 volt plug

Optional Accessories:

Unterminated BNC Adaptor

R.F. VOLTMETERS.

Direct Tel: (407) 777-1440
In U.S.A.: (800) 327-9308
FAX (407) 777-1447
TELEX 362837 (HELPER UD)