POTOMAC INSTRUMENTS

SOLID STATE FIELD STRENGTH METERS

Design Features

- 6 POSITION (20 dB PER STEP) ATTENUATOR
- HIGH Q DOUBLE-TUNED RF INPUT FOR MAXIMUM IMAGE REJECTION
- MULTI-POLE HYBRID I.F. FILTER WITH SHAPE FACTOR (6 dB TO 60 dB) OF 2.2:1
- FULLY TEMPERATURE COMPENSATED CIRCUITRY PLUS VOLTAGE REGULATION FOR LONG TERM STABILITY
- FOUR-INCH, MIRRORED SCALE, TAUT-BAND METER WITH INTERNAL LIGHTING
- FRONT PANEL SPEAKER WITH WEATHER-TREATED CONE OR HEADPHONE OUTPUT
- RF COAXIAL INPUT FOR MEASURING TERMINAL VOLTAGE BETWEEN 10 uV AND 10 V
- MECHANICAL "VERNIER" IS INTEGRAL PART OF RECEIVER TUNING CONTROL
- DIFFERENTIAL COMPARISON CIRCUIT FOR BALANCING OSCILLATOR AND RECEIVER OUTPUT FOR PRECISE CALIBRATION
- CAPABLE OF SIGNAL RATIO MEASUREMENTS (INCLUDING HARMONICS) TO −80 dB

Description

The Models FIM-21, FIM-22, and FIM-41 represent a new generation of precision instruments for direct measurement of electromagnetic fields in the 200 kHz to 5.0 MHz frequency spectrum. These units are intended for portable field use and include a laboratory quality receiver, integral shielded loop antenna, precision attenuator, internal calibration source, and voltage regulated battery power supply. With calibration accuracy traceable to the National Bureau of Standards, these instruments are capable of meeting the most exacting requirements of government and industry. Cases are of ruggedized drawn aluminum with a hinged cover containing the loop antenna. With the cover in the vertical position, the antenna terminals are connected to the receiver by maintenance-free gold-plated contacts. An interlock switch prevents inadvertent battery discharge when the cover is closed.

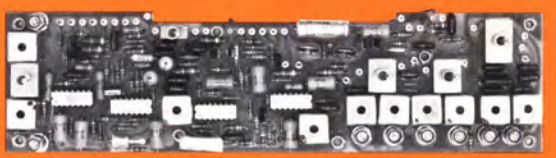
Operation

A simplified calibration procedure assures measurement accuracy. Frequency is easily resolved on an illuminated expanded dial with large numerals. When the receiver is tuned, the calibrating oscillator is simultaneously tuned to within a few kHz of the selected frequency with vernier tuning provided by a separate control. Proper gain calibration is precisely indicated by a sharp null on the meter when the ten turn gain control is adjusted for an exact balance between the detected outputs of the receiver and calibrating oscillator. Field strength is displayed by the front panel meter on a logarithmic scale calibrated in increments from 1 to 10. Full scale meter sensitivity is determined by the attenuator range switch. Signal ratio (i.e., harmonic) measurements are easily resolved using the dB scale of the meter in conjunction with the 20 dB per step range switch. A DC analog voltage proportional to meter deflection is provided for recording purposes.

SPECIFICATIONS — FIM-21

FREQUENCY RANGE	535 kHz to 1605 kHz
FIELD INTENSITY RANGE	10 microvolts per meter to 10 volts per meter
ACCURACY OF CALIBRATION	1 Percent, referenced to NBS Standard Field*
ACCURACY OF RANGE ATTENUATOR	2 Percent over entire FI range and tuning band
SELECTIVITY	
Bandwidth (6 dB)	7 kHz nominal with multi-pole hybrid filter
Bandwidth (60 dB)	15 kHz nominal
IF Rejection	35 dB minimum
Image Rejection	65 dB minimum
IF FREQUENCY	455 kHz
PANEL METER	4" mirrored scale, logarithmic graduations 1 to 10, taut band meter movement, 3% linearity
ANTENNA	Shielded loop, integral part of hinged cover
AUDIO OUTPUTS	Front panel loudspeaker, weather treated cone Headphone jack, high and low Z (disconnects speaker)
RECORDER OUTPUT	0.4 to 4 volts DC proportional to field intensity for each attenuator range, source resistance 2200 ohms
LIGHTS	Frequency dial and meter; panel switch for night use
BATTERIES (6 Required)	Standard 1½ volt C-Z_n "D" cells or 1½ volt Alkaline cells for extended life at very low temperatures
BATTERY LIFE	Greater than 1000 FI readings (reduced life with frequent use of lights and/or high speaker volume)
ENVIRONMENTAL	Continuous exposure -10^0F to $+130^0$F; lower temperature operation practical for "reading time" exposures
DIMENSIONS	8¾ in. high, 11½ in. wide, 5-1/8 in. deep with cover closed; 3-7/8 in. deep with cover open (gripping width)
WEIGHT	Approximately 11½ pounds (includes batteries)
EXTERNAL RF INPUT	535 kHz to 1605 kHz, 10 microvolts to 10 volts
RF INPUT SWITCH	Selects loop antenna (ANT) or panel connector (EXT)
METER SWITCH	Selects normal linear (LIN) or logarithmic (LOG) operation
LOGARITHMIC DYNAMIC RANGE	60 dB compressed input range for FI meter and recorder input

*Calibrated at 220 millivolts per meter



FIM-22	FIM-41
200 kHz to 550 kHz	540 kHz - 5.0 MHz in two bands Band "A" .54 - 1.61 MHz Band "B" 1.58 - 5.0 MHz
10 microvolts per meter to 10 volts per meter	10 microvolts per meter to 10 volts per meter
1 Percent, referenced to NBS Standard Field*	1 Percent, referenced to NBS Standard Field*
2 Percent over entire FI range and tuning band	2 Percent over entire FI range and tuning band
4 kHz nominal with multi-pole hybrid filter 10 kHz maximum 70 dB minimum; 40 dB minimum at 455 kHz 60 dB minimum	7 kHz nominal with multi-pole hybrid filter 15 kHz nominal 35 dB minimum 65 dB (minimum) at 540 kHz decreasing to 45 dB (minimum) at 5.0 MHz
455 kHz	455 kHz
4" mirrored scale, logarithmic graduations 1 to 10, taut band meter movement, 3% linearity	4" mirrored scale, logarithmic graduations 1 to 10 and linear dB scale; taut band meter movement, 3% linearity
Shielded loop, integral part of hinged cover	Shielded loop, integral part of hinged cover
Front panel loudspeaker, weather treated cone Headphone jack, high and low Z (disconnects speaker)	Front panel loudspeaker, weather treated cone Headphone jack, high and low Z (disconnects speaker)
0.4 to 4 volts DC proportional to field intensity for each attenuator range, source resistance 2200 ohms	0.4 to 4 volts DC proportional to field intensity for each attenuator range, source resistance 2200 ohms
Frequency dial and meter; panel switch for night use	Frequency dial and meter; panel switch for night use
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Selects loop antenna (ANT) or panel connector (EXT)	Selects loop antenna (ANT) or panel connector (EXT)
Selects normal linear (LIN) or logarithmic (LOG) operation	Selects normal linear (LIN) or logarithmic (LOG) operation
60 dB compressed input range for FI meter and recorder input	60 dB compressed input range for FI meter and recorder input

ACCESSORIES AND SERVICE

Meter Carrying Case MCC-21

The MCC-21 Meter Carrying Case is an accessory specifically designed for storing and protecting the FIM-21, FIM-22, and FIM-41 Field Strength Meters when in transit. This attractive, dent-resistant case is constructed of hard wood and finished in a clear epoxy, both inside and out. Within the case, foam inserts, cut to the shape of the meter, provide full support and minimize shock. Overall dimensions of the MCC-21 Case, 15 in. wide by 11 in. high by 7½ in. deep, make it convenient for transporting.

Unipod

A particularly useful accessory for Field Strength Meters is the unipod. Equipped with a ¼-20 threaded stud, the unipod easily screws into the mating tri-pod adaptor at the base of the instrument. The telescoping leg is adjustable to any convenient height and becomes a rigid support for the instrument while making field strength measurements. Antenna orientation is easily rotated about a single axis yielding precise calibration.

LENGTH:	
Fully extended	62 in.
Collapsed	25 in.
WEIGHT	1¼ lbs.

Calibration and Repair Service

For the convenience of customers, Potomac Instruments offers a complete factory service program for the following types of Field Strength Meters:

Potomac Instruments	All
RCA	WX-2 Series
Nems-Clarke	All

Service options offered include:

1. ACROSS-THE-BAND ALIGNMENT AND CALIBRATION. This service is intended to restore the field meter to the original factory specified performance. Each unit is refurbished to the extent practicable and the useful service life of the instrument is greatly extended.

2. SINGLE FREQUENCY ALIGNMENT AND CALIBRATION. This service is essentially the same as No. 1 except that the field meter is optimally adjusted for a correction factor of 1.0 at a single customer specified frequency; no other frequencies are calibrated. This service has the advantage of lower cost when across-the-band calibration is not required.

3. INCOMING CALIBRATION. This service consists of calibrating the Field Strength Meter at one or more customer specified frequency. No repairs or adjustments are made nor is the instrument certified to meet the original factory specified performance. An Incoming Calibration is most useful in reaffirming meter accuracy or correcting data previously obtained.

Every Field Strength Meter is returned with a notarized Certificate of Calibration containing the appropriate calibration data. All meters are certified in a Standard RF Field. This field is regularly calibrated by direct comparison with the Primary Standard Field maintained by the National Bureau of Standards.

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