

TEST AND MEASURING EQUIPMENT

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RCA Field-Intensity Meter
Type WX-1A
50 to 220 Mc



NEW *field-intensity meter*

—for the television and FM bands

SPECIFICATIONS

- Freq. Range 50 to 220 Mc
- Sensitivity 5 microvolts to 20 microvolts/meter, depending on frequency
- I-F Bandwidth 150 kc
- FM Adjacent Channel Selectivity 65 to 1
- FM Band Image Ratio . . 130 to 1
- Power Supply Built-in 6-v, voltage-regulated (a-c power supply also available)
- Weight
 - Meter 43½ lbs.
 - Antenna (including tripod) 15 lbs.
- Size 19" L x 14½" H x 13" D

THE WX-1A meets the strict requirements of FM and TV engineers for a field-intensity meter of laboratory accuracy covering television, FM, and AM services between 50 and 220 Mc. Its high sensitivity permits minimum readings ranging from as low as 5 microvolts per meter at 50 Mc, to 20 microvolts per meter at 200 Mc.

Completely self-contained, the WX-1A includes a very stable superheterodyne receiver. Selectivity characteristic is down 65 to 1 on adjacent FM channels. Image ratio is 130 to 1 at 100 Mc. A 2-stage audio amplifier drives a built-in loudspeaker for continuous audio monitoring of the signals being measured.

Separate output terminals provide for convenient use with the standard Easterline-Angus recorder. The built-in vibrator power supply includes its own voltage regulator. The antenna . . . furnished with each WX-1A...is adjustable for horizontal or vertical polarization.

For accurate data on the service area of any TV, FM, or AM station in the uhf —and for authoritative coverage information for FCC proof-of-performance—the WX-1A is second to none. Complete details are available from your RCA Broadcast Sales Engineer. Or from Dept. 191B, RCA Engineering Products, Camden, N. J.

Field Intensity Meter, Type WX-1A



Features

- High sensitivity—varies from 10 uv per meter at 100 mc to 100 uv per meter at 200 mc—for full scale reading. Better than 10 uv per meter below 100 mc.
- High selectivity—adjacent FM channel down 65 to 1.
- Stable meter reading—unaffected by modulation.
- Image ratio at least 130 to 1 at 100 mc.
- Suitable for AM, FM and TV measurements—frequencies up to 220 mc.
- Built-in vibrator power supply with voltage regulator—provision made for a-c power supply.
- Output for standard Esterline-Angus recorder.
- Built-in speaker eliminates need for headphones.
- Simultaneous measuring and speaker monitoring of all frequencies, including FM.

Uses

The model WX-1A Field Intensity Meter is especially designed to provide an accurate, self-contained, easy-to-operate instrument for the measurement of radio-frequency field intensities in the range of 50 to 220 megacycles. It is suitable for AM, FM and Television measurement use. The frequency range covers those frequencies assigned to black and white television and FM broadcasting—as well as frequencies, lying within the limits of 50 to 220 mc, that are assigned to aeronautical and other public services.

Description

The WX-1A is a very sensitive, stable and selective super-heterodyne receiver equipped with an accurate attenuator and output indication system. Receiver gain is standardized by means of a calibrating oscillator and associated voltmeter. A dipole antenna, furnished as part of the standard equipment, picks up the signal to be measured. The receiver compares the antenna voltage with a standard signal calibrating voltage. Attenuators in both R-F and I-F circuits vary the receiver sensitivity in decade steps and serve as a multiplier for the meter.

Signal levels as low as 5 mv/m at 50 mcs and 20 mv/m at 200 mc can be satisfactorily measured. At intermediate frequencies, minimum measureable signal levels are proportional.

The WX-1A provides an extremely stable meter reading which is unaffected by modulation—a condition often present in instruments of ordinary design where limiters cannot be used and round nosed IF response characteristics result. Consequently, in some systems wide frequency excursions extending beyond the flat portion of the response characteristic result in amplitude modulation of the output. In the design of the WX-1A, precautions have been taken to *eliminate the occurrence of this condition.*

A separate, built-in, thoroughly-shielded calibrating oscillator is provided and a voltmeter is used to indicate its output. Calibration is convenient and reliable throughout the range of frequencies covered by the WX-1A. In this instrument, it is not necessary to adjust the output of the calibrating oscillator to find any fixed value. It is necessary only to adjust receiver gain to a point where the output meter indication remains unchanged when a front-panel push-button switch is actuated, thus providing an easier more rapid procedure than with other methods. During calibration the antenna is automatically disconnected from the receiver and it is possible to calibrate in the presence of strong signals without detuning the receiver or moving antenna to its null.

One stage of amplification at the signal frequency is provided which functions on all ranges of the receiver. This, together with the use of a high intermediate frequency, combines to reduce interference troubles. Without these features, FM measurements would prove increasingly difficult as the band becomes more congested.

The WX-1A is designed for use with a 6-volt storage battery. In mobile use the car battery may be used; in portable use a small motorcycle-type, 6-volt battery (not furnished) provides a convenient source of power. The battery actuates a shielded built-in vibrator power supply which is equipped with a voltage regulator.

The power supply is easily removable to allow the substitution of a 110-volt 60-cycle, a-c supply which is available as extra equipment. This feature facilitates the use of the WX-1A at a fixed location where a-c power is available.

Provision is made for both AM and FM reception. A two-stage audio amplifier feeds a built-in miniature dynamic speaker. This permits continuous audio monitoring of the received signal without the use of headphones. Thus, FM signals may be measured and monitored at the same time.

Provision is made in the WX-1A for convenient use with the Esterline-Angus Model AW instrument for mobile recording without the need for external multipliers or shunts. The Clarke Instrument Corp. Model 110 Mobile Recording assembly is available for driving this recorder from the speedometer shaft of an automobile. Everything needed is provided in the assembly except the recorder which may be obtained from Esterline-Angus. AVC is employed in the receiver for recorder use. As a result, recording is possible over a signal range of 100 to 1 without changing attenuator steps.

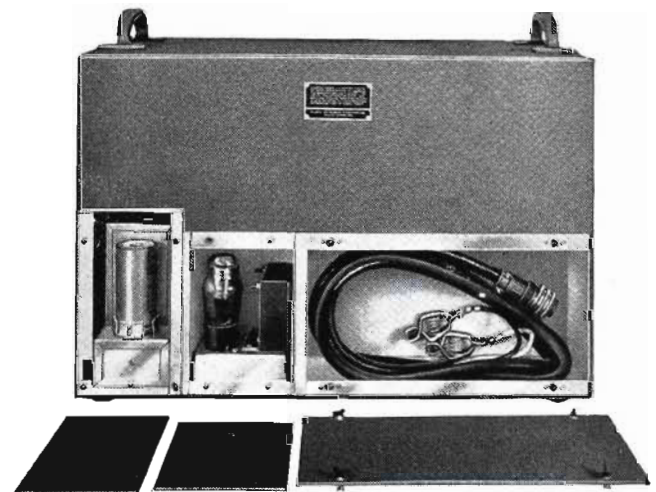
The antenna system furnished consists of a mounting tripod which supports a dipole antenna. Antenna elements are adjustable and may be locked at any desired length. Antenna elements are permanently fastened to the top of the antenna structure and may be folded parallel to the supporting structure while being transported. A calibrated frequency scale for 30 mcs and above is engraved on the support member to facilitate rapid adjustment of elements to the proper length without the use of auxiliary measuring devices. Elements snap into a horizontal position without the aid of fastening devices of any kind. For measurement of vertically polarized signals, an additional support member is furnished. This enables the feed cable to be run at right angles to the axis of the antenna before it is run vertically down to the field strength meter.

Specifications

Frequency Range _____ 50 to 220 megacycles
 Sensitivity _____ 5 uv to 20 uv/meter depending on frequency
 I-F Bandwidth _____ 150 kc
 FM Adjacent Channel Selectivity _____ 65 to 1
 FM Band Image Ratio _____ 130 to 1
 Power Supply _____ Built-in 6 volt, voltage regulated
 (a-c power supply also available)
 Antenna _____ Dipole mounted on tripod for vertically or
 horizontally polarized signals
 Weight:
 Meter _____ 43½ lbs.
 Antenna _____ 15 lbs.
 Size, overall:
 Length _____ 19"
 Height _____ 14½"
 Depth _____ 13"
 Stock Identification _____ MI-30001-A

Accessories Available

- (a) Clarke Instrument Corp. Mobile Recording
 Assembly _____ Model 110
- (b) A-c Power Supply _____ MI-8293



Rear view of WX-1A with cover plates removed. Compartments left to right are: Removable Vibrator Power Supply, Voltage Regulator and Filter, and cable and storage compartment.

RCA Type WX-2C
540-1600 kc.



The new Portable Field-Intensity Meter, RCA Type WX-2C shown one-third actual size. A loop antenna is built right into the lid!

a truly portable Field-Intensity Meter

● Weighing only 12½ pounds—including batteries, here's a small, compact field-intensity meter of high accuracy that carries around like a portable radio . . . and operates almost as simply. You tune in a signal, adjust a *built-in* calibrating oscillator and receiver gain . . . and *read signal intensity directly in microvolts-per-meter*. No charts, curves, or correction factors to worry about. No computations to make.

Designed with a wide sensitivity range of 10 microvolts/meter to 10 volts/meter, Type WX-2C enables you to make field-strength readings anywhere—from the very shadow of your transmitter, to the toughest location "down-in-the-

noise." Plenty of front-end selectivity, too. Loop antenna Q is approximately 100 at one megacycle; An r-f amplifier stage provides a very high order of image rejection.

Power supply; Ordinary flashlight dry cells for the quick-heating tube filaments—and a 67-volt battery of the size used in camera-type radios for the B supply.

A lot easier now to get the facts on your coverage, service area, and antenna efficiency . . . with RCA's new portable WX-2C. Ask your RCA Broadcast Sales Engineer for the facts. Or write Department 19-HB, RCA Engineering Products, Camden, New Jersey.

Field Intensity Meter, Type WX-2C

Features

- Truly portable—Weight, approximately 12½ lbs. including batteries—Size approximately 12" x 8½" x 5½".
- Reads directly in microvolts per meter—No correction factor charts are needed.
- Stable in operation—Calibrates readily in presence of strong fields.
- Wide sensitivity range—10 uv/meter to 10 volts/meter.
- Accurate—Built-in calibrating oscillator.

Uses

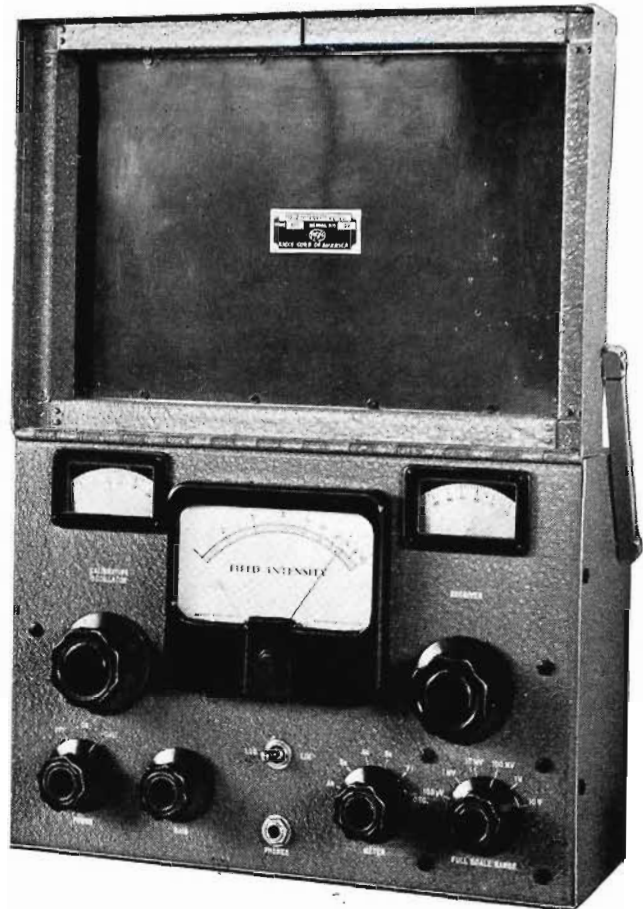
The type WX-2C Intensity Meter is a small, accurate and truly portable instrument, especially adapted for field use by Broadcast Station Engineers and Consultants. Designed for battery operation, it provides for a wide range of measurement (10 v/meter to 10 uv/meter) in conducting broadcast band (540 to 1600 kc) field intensity surveys. It makes possible close-in measurements on high-powered directional arrays, as well as interference studies where very low signal strengths are encountered.

Description

Type WX-2C Field Intensity Meter is direct reading in microvolts per meter without the aid or necessity of charts, curves, correction factors, or computations of any kind. In the WX-2C, a statically shielded, unbalanced loop is used as an integral part of the instrument cover. The loop has only a few turns, thus the natural resonant frequency is very much higher than the highest frequency in the operating range. The high side of the loop is loaded with a high "Q" coil to provide the total inductance required for the operating range. Injection of the calibrating voltage into the loop circuit is by means of a small toroidal-wound inductance. The "Q" of the loop circuit is approximately 100 at one megacycle. This high "Q", plus the use of a stage of radio frequency amplification, results in a very high order of image rejection. This feature is desirable since the large increase in the number of stations in some localities has made the use of field intensity meters having insufficient front-end selectivity impractical. By careful design, other spurious responses, such as IF harmonics, have been greatly reduced. The use of crystal diodes for metering purposes eliminates the meter errors due to varying cathode voltages on thermionic rectifiers. The crystals are used in special circuits which swamp out variations due to temperature, etc. The meter will indicate accurately with filament voltages as low as one volt and plate voltages as low as 45 volts.

Ordinary flashlight cells, obtainable everywhere, are used for the filament. A 67-volt battery of the size in common use in small camera-type radios is used for plate supply. The total plate drain of the receiver is 8 ma. The filament drain is 300 ma. Separate batteries are used for the calibrating oscillator. All batteries are carried in a compartment accessible through a door in the rear of the instrument. Provision is made for checking battery voltages with the same meter as used for field intensity indication.

All tubes are quick-heating filamentary types so that the WX-2C stabilizes within a few seconds, thus it is not necessary to keep the instrument operating between readings.



The direct reading feature of the WX-2C simplifies field intensity measurements and eliminates the needs of the usual attenuator readings, meter readings and multiplication factors. A wide sensitivity range, 10 volts per meter to 10 microvolts per meter, permits maximum flexibility of operation within the range of 540 to 1600 kc.

Despite its small size and compactness, nothing has been sacrificed in the way of quality or workmanship. Components of the highest quality are used throughout. The design is such that all components are accessible. Broadcast Station Engineers and Consultants will find that it offers extreme flexibility in use and fills a long-felt need for a light-weight, portable instrument.

Specifications

Frequency Range	_____	550-1600 kc
Sensitivity	_____	10 uv/m to 10 v/m (all frequencies)
Power Supply	_____	(not supplied with equipment) 2 67½ VB—5 1½ unit cells (RCA VS016)—(RCA VS001)
Antenna	_____	Built in loop with electro-static shield
Weight	_____	12.6 lbs.
Size	_____	9" high, 13" wide, 5¼" deep
Stock Identification	_____	MI-30002-C

Field Intensity Meter, Type 301-B (High Frequency)



Features

- Measures AM and FM carrier strength.
- Range — 18-125 Mc.
- Sensitivity — 10 microvolts per meter at 18 Mc.
- Complete with power supply and antenna.

Uses

The Type 301-B Field Intensity Meter has been designed for measuring field intensities of FM or AM stations operating in the frequency band of 18 to 125 megacycles. It is ideal for checking antenna efficiency, directivity and service range and for research and propagation studies. It provides either linear or logarithmic output and may be used in conjunction with a standard recording meter for making records of variation in signal intensity. It is intended particularly for field use and is arranged for convenient operation and for carrying from one location to another.

Description

The RCA High-frequency Field Intensity Meter consists of three units—the field intensity meter unit—the power supply—and an accessory case.

It contains a local oscillator providing a source of calibrating voltage. Calibration curves on the line and doublet antenna are supplied so that readings may be converted into field intensity values. The frequency range of 18 to 125 megacycles is covered in three bands. The minimum readable field strength varies from 10 microvolts per meter at 18 megacycles to 50 microvolts per meter at 125 megacycles. The output indicating meter is a four-inch instrument and will provide indications which are either linear or logarithmic.

A separate FM detector is provided for identification of FM stations without detuning the instrument.

A recording milliammeter having a sensitivity of 5 milliamperes and a resistance up to 560 ohms maximum may be operated directly from the instrument. A jack is provided for headphones. Noise meter readings may be taken of the noise level to indicate interference which may be encountered from various industrial sources.

The power supply unit contains a storage battery and regulated vibrator system designed to operate continuously for 8 hours.

The accessory case contains an insulated tripod on the top of which is mounted a dipole adjustable in length for the frequency being measured.

Specifications

Field Intensity Meter—Height 13"; width 20 $\frac{3}{8}$ "; depth 9 $\frac{1}{4}$ "; weight 38 lbs.

Accessory Case—Length 39"; height 12"; depth 7 $\frac{3}{8}$ "; weight 24 lbs.

Battery Unit—Height 14 $\frac{3}{4}$ "; width 13 $\frac{1}{4}$ " depth 7 $\frac{1}{4}$ "; total weight 36 lbs.

Frequency Range—18 to 125 megacycles

Field Intensity Range at 18 Mc—10 to 500,000 u.v. per meter

Field Intensity Range at 125 Mc—50 to 2,500,000 u.v. per meter

Output Scales

Linear—10 to 1 or 20 db

Logarithmic—100 to 1 or 40 db

Output

Audio—Phones or noise meter

Recorder—Operates any recorder of 5 ma and 560 ohm maximum resistance

Antenna—Doublet in 6 sections

R-f Transmission Line—Length 30'

Vibrator Power Supply—6 volts at 4 ampere load

TUBE COMPLEMENT

2 RCA 955

1 RCA 954

3 RCA 6SG7

1 RCA 6H6

1 RCA 6R7

Field Intensity Meter, Type 308-B

Features

- Direct readings in microvolts-per-meter.
- An accuracy independent of non-linear detectors and panel-meter scales.
- Wide frequency and amplitude ranges.
- Shielded loops for magnetic pickup.
- Simplified tuning by ganged controls.

Uses

The 308-B, an entirely portable instrument, measures field strengths from 20 microvolts-per-meter up to 20 volts-per-meter. This wide range enables field surveys to be made practically anywhere, from the very shadow of the transmitting antenna to the most "down-in-the-noise" location—a welcome advantage in adjusting directive arrays and exploring radiation patterns.

Description

The 308-B is a sensitive superheterodyne receiver with a built-in calibrating oscillator for standardizing the receiver sensitivity. A shielded, unbalanced loop picks up the signal to be measured.

Due to the design of critical components such as the r-f and i-f attenuators and the mutual-inductance coupler, which couples the calibrating signal to the input circuit of the receiver, measurements can be obtained with an accuracy that is considerably better than has been obtained in the past. For example, it is not necessary to know the exact frequency of the incoming signal in order to measure it accurately; moreover, the instrument can be calibrated on a frequency somewhat removed from that of a very strong, incoming signal, to prevent the strong signal from interfering with the low-level calibrating signal.

A series of readings can be obtained conveniently, with field strength indicated in microvolts-per-meter on the scales of the built-in attenuators; no involved calculations are necessary.

Special precautions have been taken in the RCA 308-B to obtain maximum oscillator stability and effective shielding. In addition, the i-f stages are selective enough to prevent interference from signals on adjacent channels.

The wide frequency range of this instrument is covered in six bands; no plug-in coils are used. Three loop antennas cover the entire frequency range.

Shielded loops are used to minimize distributed capacitance and eliminate "antenna effect", thus further reducing error. The loops require no balancing adjustments.

Specifications

- Frequency Range
(3 loops) _____ 120 kc.-18,000 kc.
- Field Intensity Range—20 microvolts to
20 volts per meter
- Accuracy _____ $\pm 5\%$ at 180 kc.-7,000 kc.
_____ $\pm 10\%$ at any frequency
- Loop Antennas
Loop #1 (Furnished) _____ 120 kc.-350 kc.
Loop #2 (Furnished) _____ 350 kc.-3,000 kc.
Loop #3 (Furnished) _____ 3,000 kc.-18,000 kc.
- Output Indication
Linear and logarithmic scales
(Provision made for standard 5 ma.
recording meter and headphones.)

POWER REQUIREMENTS

"A" Battery Circuit _____ 6 volts, 1.5 amperes
"B" Battery Circuit _____ 135 volts, 45 ma.
"C" Battery Circuits (two) _____ 7.5 volts each

TUBE COMPLEMENT

1 RCA 6L5-G 1 RCA 6J5 1 RCA 6R7
1 RCA 6L7 3 RCA 6S7

Dimensions (loop unmounted) _____ $13\frac{1}{2}$ " x $13\frac{1}{4}$ " x $20\frac{1}{4}$ "

Weight (unpacked) _____ 48 lbs.

Finish _____ Gray wrinkle

Stock Identification _____ MI-8225-E

(Includes Field Meter and 3 Loops less 93-A Power
Supply and storage batteries.)

ACCESSORIES

Type 93-A Power Supply _____ MI-7519-A
(Mounted in case but less storage battery.)

Note: 93-A Power Supply Dimensions are $13\frac{1}{2}$ " x $13\frac{1}{2}$ " x 8"
and its weight with storage battery is 29 lbs.

Storage Battery for 93-A _____ MI-8204-A



Beat Frequency Oscillator, Type 68-B



Features

- Very low distortion—0.2 to 0.3 per cent total arithmetic sum
- Low background level—70 db below maximum output.
- Wide frequency range.
- Electron-coupled oscillators.
- Push-pull detector and amplifier stages.
- Large direct-reading hand-calibrated frequency scale.
- Balanced outputs of 250, 500, 5000 ohms.
- Magic-eye tube for checking calibration.
- Standard double-jack output connections.
- High output level—125 milliwatts (max.).
- Frequency stability.

Uses

The Type 68-B Beat Frequency Oscillator is designed for easy and fast fidelity measurements with laboratory accuracy. This instrument is required for frequency response, audio distortion, noise level, and other measurements which must constantly be made on broadcast station equipment in order to maintain high fidelity transmission.

The Type 68-B plus the 69-C Distortion Meter forms the combination necessary for making all types of fidelity observations. This equipment can be used to advantage by broadcasting stations and laboratories, and serves well in experimental work. Additional applications of these two units are: equalization of lines, receiver measurements, a source of sine waves for oscilloscope work or modulated oscillators.

Description

The Type 68-B BFO employs the usual two r-f oscillators, one fixed and the other adjustable to produce a beat note of the desired frequency. In the 68-B, however, the oscillators are

electronically coupled to obtain the maximum of stability. Push-pull detector and amplifier stages are employed, thereby eliminating the second harmonic distortion frequently found in these stages, and providing linearity.

The instrument has sufficiently good waveshape to supply tone for distortion measurements at all frequencies. It has a range of 20 to 17,000 cycles throughout which optimum performance is obtained, and has useable output of good waveshape down to 5 cycles. The output is flat over the whole audio range, while the distortion content in the output is of the order of 0.2 to 0.3 per cent, total arithmetic sum. Precautions taken in design insure the low background level of -50 vu or 70 db below maximum output.

Output impedances of 250, 500, and 5000 ohms are obtainable from taps on the output transformer, which has a center tap to provide for balanced outputs at all impedances.

Specifications

Frequency Range _____ 20 to 17,000 cycles
(good waveform down to 5 cps)

Output Power _____ 125 mw. (max.)

Output Impedances _____ 250, 500, 5000 ohms

Frequency Characteristics:

5000 ohm tap _____ ±0.5 db

500 ohm tap _____ ±1 db

250 ohm tap _____ ±1 db

Distortion (total arithmetic sum):

Below 100 cycles _____ 0.3%

Above 100 cycles _____ 0.2%

Hum (max. output) _____ -70 db

Power Input _____ 110/120 volts, 25/60 cycles, 70 watts

Tube Complement:

6 RCA-6C5G	3 RCA-6J7
1 RCA-45	1 RCA-874
1 RCA-5Z4	1 RCA-6E5

Dimensions _____ 8³/₄" high, 19" wide, 10" deep

Weight _____ 50 lbs.

Distortion and Noise Meter, Type 69-C



Features

- Wide frequency range for f-m applications.
- Electronic output meter improves stability.
- Wide range distortion measurements.
- New bridging transformer for wider frequency band.
- Noise level measurements from -75 db.
- Direct reading, large-size meter.
- Gain standardized on 1 milliwatt, 600-ohm level.
- Self-contained power supply.

Uses

The Type 69-C Distortion and Noise Meter has wide application in the broadcast field for measuring harmonic distortion, obtaining frequency response characteristics, and measuring background noise levels. It is designed for the accurate measurement of distortion over the entire audio range of 30 to 15,000 cycles, thus enabling the broadcaster to obtain a true picture of the fidelity of his station.

The RCA 69-C is capable of accurately measuring very low level distortions. It gives a precise indication of distortion from 0.3 to 100 per cent, rms.

Modern transmitters have noise levels 60 db below 100 per cent modulation. The Type 69-C can accurately indicate noise levels as low as 85 db below 100 per cent modulation. In addition, background noise levels down to -75 vu can be measured.

Description

The Type 69-C employs a simplified switching arrangement for making distortion measurements over the entire audio range. The input and output fundamental signals from the equipment under test are balanced against one another by means of the amplitude and phase controls on the front panel, leaving the harmonics to be measured by a vacuum tube voltmeter. Noise voltages are measured directly by the voltmeter.

The Type 69-C has three alternative inputs so that measurements can conveniently be made at either the output of the transmitter, any 500 ohm termination in the speech input system, or at any point where no appreciable load may be drawn.

The meter can be connected by means of a patch cord to any point in the speech input system. A linear r-f rectifier stage in the 69-C provides for measurements of overall transmitter distortion. The r-f input terminals may be connected through a twisted pair from a pick-up coil in the transmitter.

Noise levels and distortion percentages can be read directly from the large-size meter.

Specifications

R-F Range _____ 500 to 2000 kc

Frequency Range for

Distortion Measurements _____ 30 to 15,000 cycles
(harmonics to 30,000 cycles using bridging input)
(harmonics to 45,000 cycles using unbalanced high impedance input)

Frequency Response:

30 to 45,000 cycles ± 1 db unbalanced input
30 to 30,000 cycles ± 1 db bridging input

Distortion Measurement Range _____ 0.3 to 100%

Noise Level Measurement Range:

Any level down to 85 db below 100% modulation
Any level down to -75 vu

Input Levels:

Modulated r-f _____ 10 to 80 volts
A-F Level from Oscillator _____ 2 to 4 volts
A-F from System under Test _____
Bridging Input _____ -15 to $+22$ vu
Unbalanced Input _____ 0.12 to 8 volts and 1.2 to 80 volts
by means of high-low taps

Audio Input Impedance:

Bridging Input _____ 20,000 ohms
Unbalanced Input _____ 200,000 and 20,000 ohms
Power Input _____ 50 watts, 105/125 volts, 50/60 cycles

Tube Complement:

2 RCA-6C5G	1 RCA-6F8G	1 Amperite
2 RCA-6SJ7	1 RCA-VR150	Ballast Tube 6-8
2 RCA-6X5G	1 RCA-VR105	

Dimensions _____ $8\frac{3}{4}$ " high, 19" wide, 10" deep

Weight _____ 44 lbs. (net)

Distortion and Noise Meter, Type WM-71A



Features

- Continuous coverage of audio range for distortion, noise and hum measurements.
- Distortion measurements, as low as .1%, quickly and easily made by one tuning adjustment.
- Distortion measurements independent of phase shift.
- Requires no direct connection to audio oscillator.
- Audio oscillator distortion can be measured.
- Can be used as a wide range highly sensitive voltmeter or VU meter.
- Tapped power transformer permits operation on either 105-125 volts or 210-250 volts.

Uses

Distortion and Noise Meter RCA Type WM-71A is a compact precision instrument of new design. It permits continuous coverage of the audio frequency range, indicating directly the percentage of a-f distortion in modulators, speech amplifiers, a-f generators, receivers and other equipment employing audio frequencies. The instrument will give full-scale readings for distortion percentages as low as 0.3%, and is capable of measuring noise components at frequencies from 50 to 45,000 cycles.

Innovations in circuit design permit distortion measurements to be made easily and rapidly. Direct connection to the audio oscillator is not required, making it easy to measure at places remote from the oscillator. Moreover, the flat response and wide frequency range of the internal amplifier make the instrument useful for accurately measuring noise and VU levels.

Description

Essentially, the WM-71A consists of a high-gain amplifier, an r-c interstage coupling unit, a calibrated attenuator for adjusting the sensitivity, and a panel meter to indicate amplifier output.

The r-c interstage coupling unit balances to a sharp null at the frequency to which it is tuned, the null frequency being controlled from the panel. Degeneration is employed to maintain high stability in the amplifier and to provide flat transmission characteristics (except within an octave of the null point).

In measuring distortion, the a-f signal is applied to the instrument and the null point is obtained to balance out its fundamental frequency, leaving only its harmonics and other distortion components which are indicated in percentage directly on the panel meter. When the modulated output of a radio transmitter is to be measured, a linear rectifier is required to produce the audio envelope. Any linear detector system having an undistorted output of 1.5 volts can be used.

A switch on the front panel provides for switching out the null circuit so that the instrument can be used as an extremely sensitive voltmeter for measuring noise and hum levels.

Since the WM-71A has only one tuning control plus a small trimmer, it can be quickly set to any frequency over its range. This is a time-saving feature in making a series of measurements.

Specifications

Audio Frequency Range—50-15,000 cycles (fundamental) for distortion measurements; 50-45,000 cycles for VU and noise measurements.

Distortion Range—100% to 0.1% in six ranges. Full-scale meter deflection for values of 100%, 30%, 10%, 3%, 1%, and 0.3%.

Noise Range—Extends from 0 to -80 db below a reference level of one milliwatt in 600 ohms, in seven ranges; and to -80 db below 100% modulation when at least one volt is available from the modulation monitor at 100% modulation level.

Accuracy—For distortion measurements, accurate to within $\pm 5\%$ of full-scale \pm residual distortion level which will not exceed .05% to .1%. Noise measurements accurate to within $\pm 5\%$ of full-scale (residual noise level is less than -80 db). Effect of line-voltage variations from 105 to 125 volts, negligible.

Input Voltage Range—For distortion and noise, 1.2-30 volts at 100,000 ohms input; 0.8-30 volts at 10,000 ohms (bridging) input.

Input Impedance—100,000 ohms unbalanced; 600 ohms bridging input (10,000 ohms) balanced or unbalanced to ground

Audio Frequency Response—Flat within 1 db from 30-45,000 cycles

Tube Complement—5 Type 6J5, 1 Type 6H6, 1 Type 6X5, 1 Type 6SN7-GT, 1 Type 6K6-GT, 2 Type VR-150-30

Power Requirements—A tapped primary provides for operation on a-c line voltages of 105-125 volts 50/60 cycles, or 210-250 volts 50/60 cycles. Approximately 60 watts is required.

Dimensions—Rack mounting type—height 7", width 19", and depth 12" (approx.)

Weight—35½ lbs.

Finish—Umber gray lacquer

Stock Identification—MI-30071-A

Video Sweep Generator, Type WA-21A

Features

- Sweep or CW signals up to 10 mc.
- Uniform sweep rate—no crowding at either end.
- Entire CW and Marker signal range covered in one continuous band.
- Unusually flat response.
- Built-in output metering circuit.
- Continuous control of output.
- Built-in mixer system eliminates spurious marker signals.

Uses

The RCA Video Sweep Generator, Type WA-21A, is designed to facilitate rapid testing of video frequency networks by permitting visual observation of the frequency response characteristic. It permits direct viewing of the envelope of the output wave of a video circuit while the input signal sweeps through a range from 100 kc to 10 mc, at the rate of 60 complete sweeps per second. It is generally used in conjunction with a suitable detector and oscilloscope to observe the output voltage vs frequency curve. In this use the deflection voltage source provided in the instrument furnishes a convenient system for synchronizing the horizontal deflection of the oscilloscope with the frequency excursion of the video input signal.

The WA-21A also embodies a CW generating section that produces sine wave signals tunable from 100 kc to 10 mc for point-by-point or steady-state tests. The beat-frequency principle is employed, and the entire range is covered in one continuous band. The CW section is also valuable for detailed analysis of a narrow portion of the video frequency spectrum, for example, in adjusting infinite rejection traps in television circuits.

The section of the circuit which produces the CW signal is separate from that which generates the sweep signal, thereby allowing the CW signal to serve as a calibrating marker on the sweep trace. When the marker is employed, a clearly visible "pip" appears on the trace and the frequency at which this pip occurs may be read directly from the dial.

In testing video amplifiers this instrument is useful for adjusting peaking circuits and for checking overall performance. In setting up transmitters, it can be used for adjusting the r-f networks to insure proper frequency response, and can also be used in conjunction with a field intensity meter for checking sideband energy distribution. For special applications, the sweep width may be reduced and the center frequency adjusted (by means of screw-driver adjustments) to permit detailed observation of the response of narrow band-width circuits within the range of 100 kc to 10 mc.

Description

The output of an FM sweep oscillator and a heterodyne oscillator are combined in a mixer to produce a sweep signal covering the range from 100 kc to 10 mc at a rate of 60 complete sweeps per second—when using a 60 cycle power supply. Output is uniform within 1 db of the midrange response over this range. A blanking circuit is provided to eliminate the signal during the return portion of the trace (from 10 mc to 100 kc) if desired, and this feature also furnishes a zero-output base line on an oscilloscope screen.

The CW circuit utilizes two oscillators, the outputs of which are combined in a mixer tube to produce a beat output that can be continuously adjusted from zero to 10 mc.

The CW generator and the sweep generator may be operated simultaneously to produce a fluctuation or pip on the output of the sweep, where it crosses the frequency at which the CW generator is set. In order to produce this marker without any spurious by-products, a special built-in mixer system has been



incorporated. The marker is visible on an oscilloscope screen either when using a video detector or when viewing the video waves directly. The pip is uniform in size over the entire range of adjustment, and the full range from 100 kc to 10 mc is covered by a single dial scale.

The CW output is supplied through the same coaxial line as the sweep signal, while a panel switch permits selection of sweep, sweep plus marker, or CW. The output feeds into a 75-ohm terminated coaxial cable. An output metering circuit is provided to indicate the RMS value of the signal voltage. This circuit consists of a diode VTVM with a step attenuator. Continuous control of the output from 1 millivolt to 1 volt is achieved through the use of a fine control in connection with the step attenuator. Distortion and spurious outputs are less than 5% of the fundamental signal voltages.

A built-in source of supply-frequency voltage is provided for connection to the horizontal deflection circuit of an oscilloscope. This voltage is adjustable in phase. It is useful for synchronizing the oscilloscope sweep rate and phase with the frequency sweep rate of the WA-21A. Stability of the WA-21A sweep signal is insured by use of an electro-mechanical sweep capacitor.

The instrument is designed for either table top or rack mounting. It is normally furnished in a table model cabinet. For rack mounting, suitable protective enclosures are provided, the panel space required is 8¾ by 19 inches, and standard relay-rack mounting slots are provided in the panel.

Specifications

Sweep Frequency Range	100 kc to 10 mc	
CW Range	100 kc to 10 mc	
Calibration Accuracy	2%	
Sweep Frequency Rate	Line frequency	
Marker Accuracy	2%	
Output Voltage	1 millivolt to 1 volt	
Output Impedance	75-ohm terminated coaxial line	
Output Characteristic	Flat within 1 db of mid-range response from 100 kc to 10 mc	
Power Supply	105/120 volts, 50/60 cycles, 180 watts	
Tube Complement:		
	5—6AG5	1—6C4
	2—955	1—6BA6
	1—6SQ7	1—6AS6
	1—VR150	1—6SJ7
	1—5U4-C	

Dimensions:

Cabinet	22" wide, 10½" high, 15" deep
Relay Rack	8¾" high, 19" wide, 13½" deep
Finish	Umber gray
Weight	80 lbs.

Grating Generator, Type WA-3A



Features

- For precise adjustment of scanning linearity in television cameras, monitors, and receivers
- Assures uniform distribution of picture detail
- Mixes standard TV blanking signal with bar signals to produce composite "grating" pattern
- Pattern is adjustable for screen size
- Output voltage may be either positive or negative
- Useful for any video testing system

Uses

The RCA Grating Generator, Type WA-3A, is designed for checking linearity of television deflection circuits in cameras, monitors, and receivers to assure faithful reproduction. This instrument provides a means of determining the linearity of scanning velocity in both the receiver kinescope and the camera pickup tube. Should the scanning beam in either of these devices deviate from the standard rates of speed, the picture on the kinescope will be compressed over some areas and expanded over others. Through use of the Grating Generator, even small degrees of non-linearity may be detected, and adjustment for faithful reproduction of fine detail may easily be made.

For adjusting the linearity of a monoscope camera with monitor equipment, the output of the Grating Generator may be fed into one channel of a distribution amplifier, the monoscope camera fed into another channel, then the output of the two channels together fed into the master monitor. Field equipment can be aligned by this method prior to use for remote pickup. Television camera deflection linearity can be similarly checked and adjusted, by focusing the camera on a test chart. Television receivers may also be tested, either by injecting the composite timing-test pattern signal into the receiver video circuit or by remote pickup of a transmitter modulated with the composite signal. The WA-3A may be employed in any video signal test system for speeding accurate alignment of deflection circuits

Description

The RCA Grating Generator, Type WA-3A, produces a timing signal, which is synchronized by standard television sync pulses, for precise adjustment of scanning linearity. The resultant pattern on the kinescope consists of horizontal and vertical bars, which give the appearance of a grating. The horizontal bars serve for vertical alignment, while the vertical bars serve for horizontal alignment. Equal spacing between bars means perfect linearity. Packing or spreading of the bars indicates non-linearity. Curvature of the bars reveals the effect of stray magnetic fields. Thus the scanning velocity may be conveniently adjusted to produce uniform distribution of picture detail.

The WA-3A generates the test signal as follows: A negative driving pulse of 15,750 cycles is amplified, clipped, and differentiated to synchronize a multivibrator. The pulse output of the multivibrator constitutes the vertical bar signal. It is amplified, then fed to a mixer stage. A negative driving pulse of 60 cycles is amplified, clipped, and differentiated to synchronize another multivibrator. The output is a multiple of 60 cycles. It is fed to a width control circuit, by means of which the pulse width may be adjusted to 10 per cent of the cycle over the entire frequency range. This pulse constitutes the horizontal bar signal, which is mixed with the vertical bar signal. The mixed signals are held to approximately equal levels by a limiter stage. Output is adjustable to provide for control of contrast.

Standard 60 cycle and 15,750 cycle signals from a video sync generator are employed for synchronizing the WA-3A. The standard blanking signal from the sync generator is connected to a polarity control stage, with output taken from either cathode or plate circuit, depending upon desired polarity. Separate tubes having a common load combine the bar and blanking signals. A limiter stage prevents the bar signal from exceeding the blanking signal level.

Separate switches are provided for independent operation of the horizontal, vertical, and blanking signal circuits. The number of bars is adjustable for convenient spacing on different screens. Horizontal bars are adjustable from 12 to 36 bars; vertical bars are adjustable from 10 to 64. Bar width is adjustable to 10 per cent of space between bars. Bar pulse level can be controlled independent of blanking level to give desired degree of contrast. Polarity of blanking signal can be changed to permit use of the WA-3A in any video system.

Specifications

Output:

Horizontal and Vertical Bar Pulses (combined with blanking pulses if desired) _____ 0 to 2 volts peak-to-peak
 Horizontal Bars _____ 12 to 36
 Vertical Bars _____ 10 to 64
 Bar Width _____ Adjustable to 10% of space between bars
 Blanking _____ Polarity changing and mixing
 Impedance _____ 75 ohms (approx.)

Input:

Vertical Sync Signal _____ 60 cycle standard (2 volts min.)
 Horizontal Sync Signal _____ 15,750 cycle standard (2 volts min.)
 Blanking Signal _____ RMA standard (2 volts min.)
 Power Supply _____ 105/125 volts, 60 cycles, 175 watts

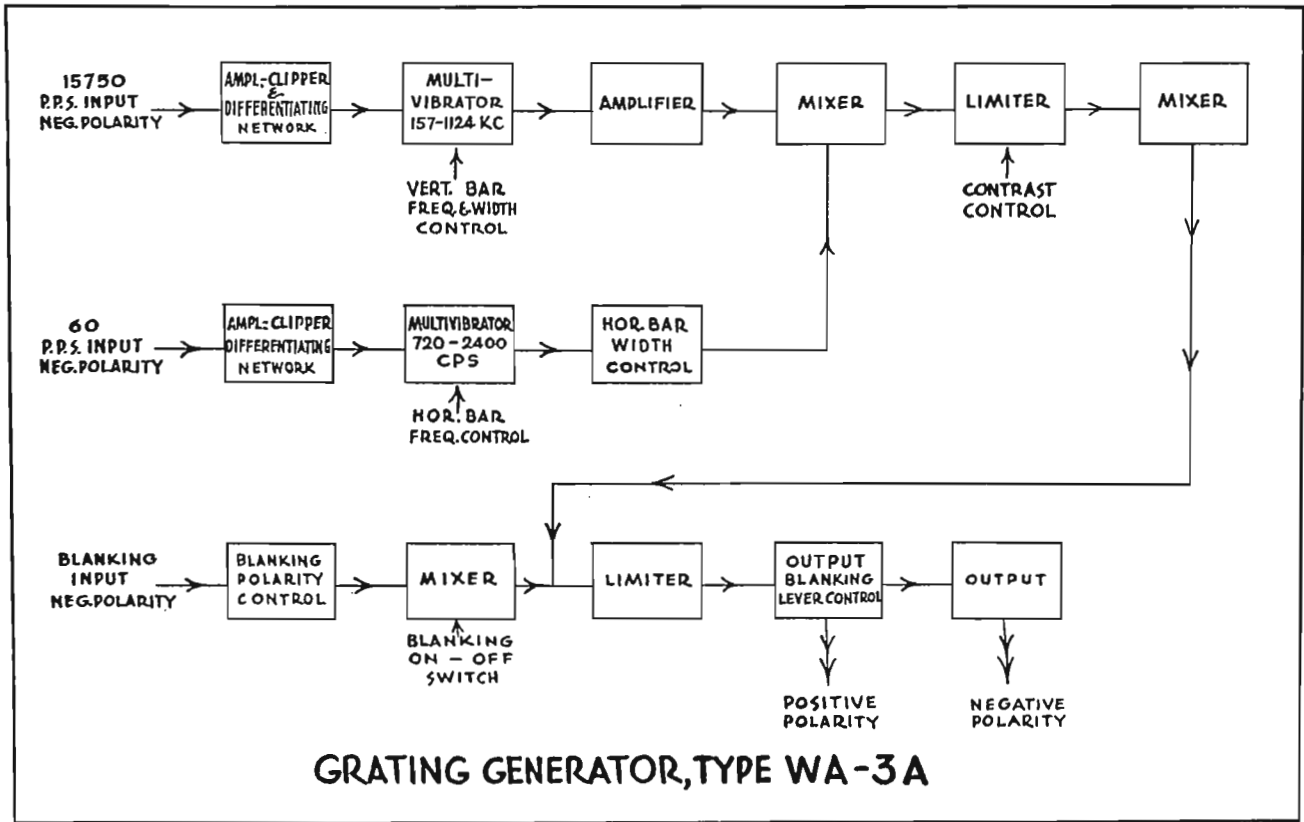
Tube Complement:

5 RCA 6SN7	1 RCA 6AG7
2 RCA 6AG5	2 RCA 6Y6G
2 RCA 6AC7	1 RCA VR-105-30
5 RCA 6SJ7	1 RCA 5R4GY
1 RCA 6J5	

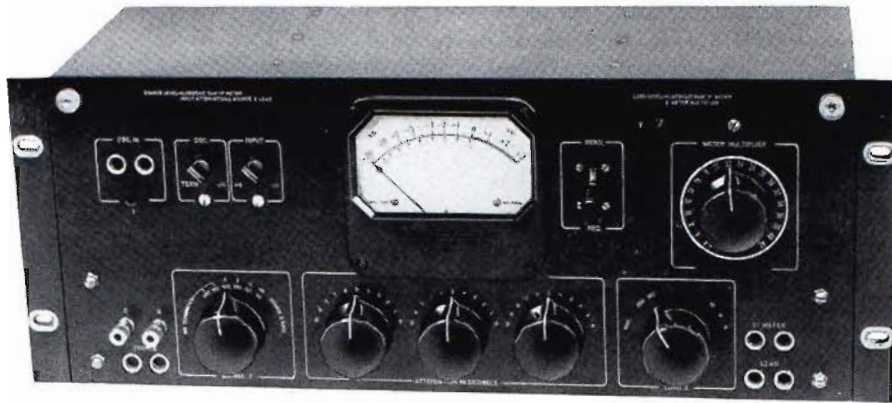
Dimensions _____ 8¾" High, 19" Wide, 14" Deep
 (Standard relay rack mounting)

Weight _____ 42 lbs.

Finish _____ Umber gray



Transmission Measuring Set, BI-11A



Features

- Simplifies fidelity measurements.
- Eliminates lengthy calculations—direct reading.
- ± 0.1 db accuracy (20 cycles to 20 kilocycles).
- Automatic correction for changes in load impedance.
- Output impedance switch for matching.
- Wide range of load levels handled.

Uses

The Type BI-11A transmission measuring set is a simplified, accurate and direct-reading instrument designed for use in the following applications: (1) audio gain measurements; (2) audio loss measurements; (3) measurements of matching and bridging devices; (4) complex circuit measurements; (5) measuring mismatch loss and frequency response measurements.

It facilitates overall system measurements and may be used with the 68-B Beat Frequency Oscillator and the Type 69-C Distortion and Noise Meter. By use of the Type BI-11A Measuring Set, suitable attenuation can be introduced to feed the equipment being measured from the 68-B, Beat Frequency Oscillator. The Type BI-11A eliminates lengthy calculations and intricate setups. It is designed to provide accuracies conforming to FCC regulations and is particularly useful for broadcast stations in the master control room or at the transmitter.

Description

The Type BI-11A consists of a volume indicator meter, input and output attenuators, an impedance matching system and jacks for convenient connections. A meter multiplier, which is geared to the load impedance shaft, provides an automatic correction for changes in load impedance. Convenient switches allow the volume indicator to be connected to the input of

the attenuator system or to jacks for external connection. An output impedance switch allows matching to 600-250-150-16-8-4 ohm circuits.

Level controls, switches, jacks and VI meter are located on the front of a standard 19" rack-type panel. The panel hinges forward to provide ready access to attenuators, jacks, switches and other components. Unit type assemblies (individual sections, such as source, attenuation and load) are readily removable for servicing, if necessary. Each section is a complete assembly with its own jacks and terminal block.

Specifications

Range of Instrument _____ 20 cycles to 20 kilocycles

Accuracy (independent of level from +4 to -110 dbm):

Overall _____ ± 0.1 db, 20 cycles to 20 kilocycles.

Source and Load Impedances for Dial Indicators

Over Entire Range (20 cy. to 20 kc.) _____ Within $\pm 2\%$

Network Resistors _____ $\pm 1.0\%$

Source Characteristics:

Shielded output can be used equally well on either balanced or unbalanced equipment.

Ranges (in steps of 0.1 db) _____ +4 to -110 db
 _____ -10 to -124 db

Range of Impedance:

Internally Terminated _____ 600-150 ohms

Unterminated _____ 600-250-150-30 ohms

Internal isolation network for operating into non-linear devices.

Load Characteristics (resistive load, ungrounded):

Range of Load Levels _____ +4 to +42 VU @ 600 ohms

Range of Impedance _____ 600-250-150-16-8-4 ohms

Dimensions _____ 7" high x 19" wide

Approximate Weight _____ 19 lbs.

Stock Identification _____ MI-11350

Tone Generator, Type WA-26A

Features

- Extremely light in weight—small in size.
- Easily portable—completely self-contained—attractive leatherette carrying case provided.
- Supplies suitable tone (ten frequencies from 30 to 15,000 cycles) for equalizing remote telephone lines.
- Easy-to-read output meter—calibrated in dbm.
- Choice of two outputs 150/600 ohms selected by front panel switch.
- Simple and easy to operate—minimum of maintenance required.

Uses

The new WA-26A Tone Generator is specially designed to meet the broadcaster's needs for a truly versatile and portable instrument. It provides suitable tone for equalizing remote telephone lines, and provides for selection of ten discreet frequencies between the range of 50 to 15,000 cycles. The output meter, which is calibrated in dbm, indicates the true level applied to any load which matches the impedance designated.

Description

The WA-26A Tone Generator is a completely self-contained instrument supplied complete with batteries and an attractive leatherette carrying case. Because of its extremely small size and weight, it offers extreme portability.

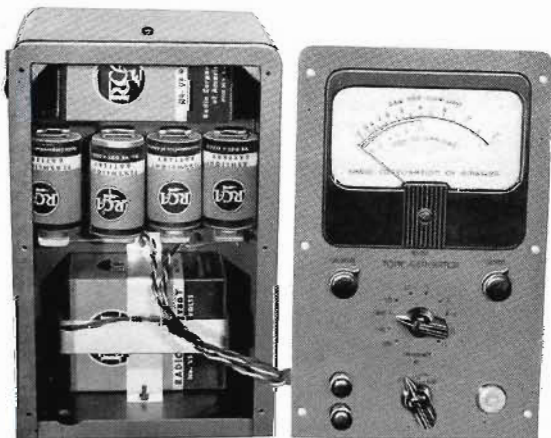
The circuit design is essentially an RC type which provides for 10 frequencies between the range of 50 to 15,000 cycles. Oscillator tubes operate in a resistance-capacitance bridge circuit to provide high stability and very low harmonic content. Frequency determining capacitors are selected by a ten-position rotary switch which is operated by the "Frequency" control knob on the front panel. All adjustments are preset at the factory except oscillator feedback which is quickly and easily adjusted by the "Calibrate" control on the front panel.

Output voltages are conveniently brought out to front panel terminals and may be varied directly by the front-panel "Output" control. Associated with the output circuit is a companion "150/600" ohm front panel selector switch. It connects either a 150-ohm or a 600-ohm impedance into the output circuit, and at the same time connects the output meter. A neon lamp is provided on the front panel to indicate operation. The WA-26A is designed for maximum convenience and ease of operation—requires practically no maintenance except for the usual battery renewal.



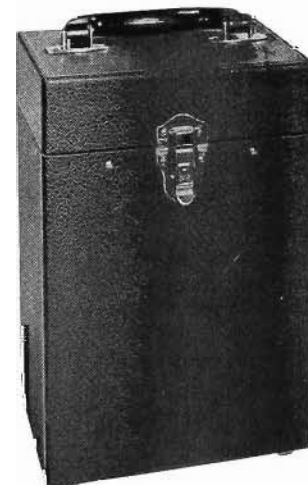
Specifications

Frequencies (cycles per second)	50, 100, 400, 1000, 3500, 5000, 8,000, 10,000, 12,000, 15,000
Frequency Accuracy	±5%
Output Impedance (ohms)	150 and 600
Output Level into 150 Ohms	-6 to +10 dbm
Into 600 Ohms	-10 to +10 dbm
Distortion at Zero dbm Output	Less than 8% at 50 and 100 cycles; 5% above 100 cycles
Dimensions (Approximate), Inches	9½ x 6¼ x 5¾
Weight (Approximate), With Batteries	9 lbs. 4 oz.
Carrying Case	3 lbs., 10 oz.
Stock Identification	MI-30026-A



Removable panel provides easy access to batteries

An attractive leatherette carrying case is provided



Cathode Ray Oscilloscope, Type 715-B

(Laboratory Type)

Features

- Extended frequency range—flat to 11 mc.
- High vertical deflection sensitivity.
- Low input capacity and high input resistance.
- Precisely compensated attenuator for vertical amplifier.
- Calibration meter.
- Triggered sweep.
- Adjustable phase.
- Time base marker.

Uses

The RCA Cathode Ray Oscilloscope Type 715-B fills the need for a laboratory instrument that will permit detailed study of extremely short, sharp-fronted pulses, and other unusual waveforms. Recurring and transient phenomena can both be observed and measured with the Type 715-B; the waveform need not be repeated at regular intervals because even a random recurrence produces a clear, steady trace. It is ideal for trouble-shooting sync generators.

The wide-band amplifier, triggered sweep, blanking, and high accelerating voltage features make this instrument particularly well-suited to the photographic study of transients. Heavy-duty, ball-bearing swivel casters, and a conveniently located front handle make it easy to move the unit.

Description

The 715-B Oscilloscope is a console type instrument especially designed for close examination of high-speed transients as well as regularly occurring phenomena. The cathode ray tube is operated with a high accelerating voltage in order to produce the intense spot necessary for many applications. A removable metal shield prevents direct external light from striking the surface of the cathode ray tube. A peak-to-peak a-c voltmeter is included. It may be used to check signal amplitude by pressing a convenient switch at the probe end of the input cable. The sweep can be triggered either from the signal causing vertical deflection or from an external signal. The speed with which the spot moves is completely independent of the repetition rate, being continuously adjustable by panel controls to give time calibrations from less than 2 microseconds per inch to over 100,000. Thus, pulses almost invisible on a standard oscilloscope can be expanded to reveal their true waveform on the 715-B. The aperiodic circuit will work satisfactorily when triggered by a single isolated impulse, or by pulses having any repetition rate up to 10,000 cps. When desired, a special built-in oscillator will superimpose clear, steady, microsecond peaks on the curve to facilitate the determination of time intervals.

With the control in the PERIODIC position a sawtooth deflection is produced, having the exceptional frequency range of 5 cps. to 100 kc. This can be synchronized with very high frequency signals or with pulses of extremely short duration.

Specifications

VERTICAL AMPLIFIER

Frequency Range—Flat within ± 1 db from 5 cycles to 11 mc
 Deflection Sensitivity:
 With 2600 volts on Second Anode—0.17 rms volts per inch
 With 1500 volts on Second Anode—0.10 rms volts per inch

INPUT IMPEDANCE

Vertical Amplifier:
 With Attenuating Cable—1.1 megohm + 15 mmf
 With Direct Cable—1.0 megohm + 150 mmf
 Horizontal Amplifier—1.0 megohm + 50 mmf
 Sawtooth Frequency Range—5 cps to 100 kc



Triggered Sweep Speed—2 to 100,000 microseconds per inch
 (continuously adjustable)

Time Interval Markers—1.0 microsecond

Blanking—Return line blanked on aperiodic deflection only

Power Requirements—105/125 or 210/250 volts,
 50/60 cycles, 500 watts

Dimensions—50" High, 21" Wide, 27" Deep

Finish:

Cabinet—Two-tone gray enamel
 Panel—Brush chrome

Tube Complement:

9—6AC7	4—6AC7	2—6U6
2—6H6	1—6SJ7	2—6SL7-GT
1—6SH7	1—2X2/879	4—6L6-G
2—VR150-30	2—807	2—866/866A
1—5VP1		

Weight—350 lbs.

TV Signal Demodulator, Type WM-20A

Features

- Produces a video signal for monitoring visual transmitter output.
- Gives zero output indication for percentage modulation measurements.
- Employs coaxial line RF Unit.
- Constant-resistance input.
- Meets all RMA specifications.

Uses

The TV Signal Demodulator, Type WM-20A, is an instrument designed to convert a small amount of r-f energy obtained from the visual transmitter output to a video signal for monitoring purposes. In addition to the video signal which can be displayed on a picture monitor, the WM-20A also produces a keyed signal for indicating the percentage modulation of the visual transmitter.

The WM-20A features a constant-resistance input which aids in maintaining the excellent response of the unit.

Description

The WM-20A Demodulator consists of three units: (1) The Coupling Unit (MI-19057) which samples the r-f power in the transmission line between transmitter and antenna, and delivers this power to the r-f unit; (2) The RF Unit (MI-19056) which consists of two correlated r-f low- and high-pass filters; and (3) The Video Unit (MI-19054) which converts the energy received from the r-f unit to the video signal.

Filters in the RF Unit consist of coaxial line sections which form the filter elements. An important characteristic of the RF Unit is the constant resistance input which aids in maintaining the correct phase and amplitude response of the unit. These filters have an amplitude and frequency response which is an exact equivalent of RMA specifications.



The Video Unit contains the detector, amplifier and power supply. This unit also contains a tuned vibrating relay which can be operated when zero output level indications are required for measuring percentage modulation of the visual transmitter.

The WM-20A is designed for mounting overhead at the rear of the transmitter close to a suitable pickup point on the transmission line. If a Vestigial Sideband Filter is used, the WM-20A can be fastened to the filter.

Specifications

Frequency Range _____ Specified channel
 Output Impedance _____ 70 ohms
 Power Requirements _____ 120 v., 60 cy., 25 w.
 Dimensions _____ 92" long, 6" wide, 8" high
 Weight _____ 75 lbs. (approx.)

Tube Complement

1—6AL5 Diode
 1—6AQ5 Amplifier
 1—5Y3GT Rectifier
 1—0A2 Voltage Regulator

Equipment Supplied

1 Coupling Unit (Pickup Probe) _____ MI-19057
 1 RF Unit (supplied with two 9" x 12" mounting plates) _____ MI-19056
 1 Video Unit (with full tube complement) _____ MI-19054

TV Monitoring Diode, MI-19051

Features

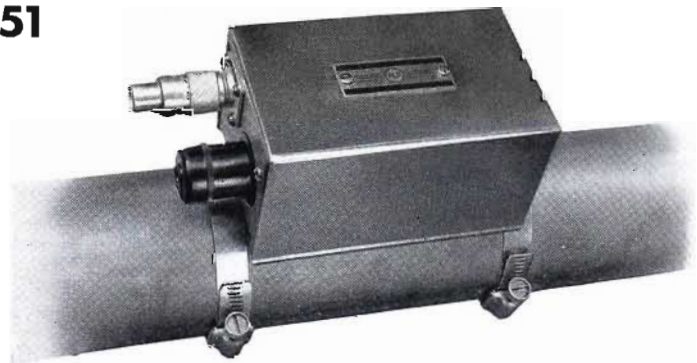
- Requires no external power supply.
- Requires no maintenance or periodic adjustment.
- Will fit either 3 1/8" or 1 5/8" line without changes in unit.
- Input circuit compensated for uniform RF pickup over the 12 VHF channels.

Uses

The Monitoring Diode, Type MI-19051, is a completely self-contained unit designed for mounting on the RF transmission line between the output of the visual TV transmitter and the sideband filter. The video output of the Monitoring Diode when fed to an MI-26135 television master monitor, or equivalent unit, will permit observation of the picture delivered by the TV transmitter. The diode unit has excellent frequency and linearity response and is designed for use on TV channels 2 to 13.

Description

MI-19051 consists of a double section diode whose cathodes are capacity coupled by a probe to the transmission line inner conductor. The plates are connected through a load resistor to the 70-ohm output circuit. Filament voltage for the diode is supplied by a self-contained transformer which requires 115 volts a-c supply. The Monitoring Diode is designed for 3 1/8" O.D. and 1 5/8"



O.D. coaxial transmission line. Two sets of clamps, one for each size line, are provided for securing the unit to the line.

Specifications

Frequency Range _____ Channels 2-13 inclusive
 Output Impedance _____ 70 ohms
 Output Voltage _____ 1.5 v.-2.0 v. (adjustable by varying pickup)
 Dimensions _____ 5" x 3" x 2 1/2"
 Weight _____ 3 lbs. approximate

Tube Complement

1 RCA 6AL5 _____ Diode Rectifier

Phase Monitor, Type WM-30A

Features

- Phase angles can be read to better than ± 0.5 degree.
- No complicated preliminary adjustments.
- Oversize components insure long life.
- Accurate and quick field pattern checking.
- Direct reading phase angle scale.
- Plug-in resistors to match sampling line impedance.
- Instantaneous quadrant indicator.

Uses

The RCA Type WM-30A Phase Monitor provides a simple means of accurately measuring phase differences between currents in the various towers of an antenna array. It is particularly useful in checking directional arrays to insure proper phasing and hence proper field pattern. All phase angles up to 360 degrees at any frequency between 225 and 1800 kc can be measured.

The WM-30A can be used to adjust phase-shifting networks, to measure impedances of arrays, and to facilitate calculation of mutual impedances of antennas. Another important application is the measuring of phase characteristics of television i-f circuits (this requires the use of an i-f signal generator, two mixer stages and a variable frequency oscillator).

The RCA Phase Monitor can be used for remote indication of both relative amplitude and phase of antenna currents in arrays employing up to three elements. Used in conjunction with the MI-8216-C Remote Meter Panel correct relationships can be maintained between phase and magnitude of currents in directive arrays having as many as six elements.

Description

Two identical amplifiers are used to drive the two pairs of plates of the 3-inch Cathode ray tube. One of the amplifiers incorporates a network which permits a manual phase shift of 90 degrees by means of a potentiometer. Thus, if two out-of-phase voltages are impressed on the two amplifier units, it is only necessary to adjust the potentiometer until the ellipse on the tube screen becomes a straight line. Then the two voltages are in phase and their original angular differences can be read directly on the scale.

A unique circuit is incorporated for producing a keying impulse for correct quadrant indication. By means of a push button the proper impulse is selected and modulates the Cathode ray tube so that a spot appears in that quadrant on the screen in which phase balance occurs.

The RCA Phase Monitor can accommodate three self-contained meters for remote indication of antenna currents. The unit is complete with power cord and tubes but does not include sampling coils or meters. It is designed for rack mounting and is finished in RCA umber gray.

The WM 30-A is supplied with three 79-ohm plug-in resistors for each of the three input circuits, to provide termination impedance for the commonly used type of sampling line which has a characteristic impedance of between 70 and 80 ohms. MI-8279 Plug-in Resistors can be ordered separately to match 52-ohm sampling lines.



Remote Meter Panel MI-8216-C



WM-30A Phase Monitor

REMOTE ANTENNA METER PANEL

This unit is designed to give relative indications of the currents in antenna arrays employing up to three elements, thus insuring correct current relationships and proper field patterns. The unit is complete with power cord and tubes but does not include sampling coils or meters. It is furnished with a standard rack mounting panel. (This is the same unit that forms an integral part of the WM-30A Phase Monitor.) Dimensions: 7" high, 19" wide, 5½" deep.

ANTENNA SAMPLING KITS

A single element Sampling Kit is recommended for each tower to be monitored. Two Kits are available, one of which employs a tuned sampling coil, while the other employs an untuned sampling loop. The Antenna Sampling Kit, MI-8217, comprises one Antenna Sampling Coil (MI-8217-A) and one Antenna Current Meter (MI-7184-A-150). The Antenna Sampling Kit, MI-8217-D/MI-7184-A-150, comprises one Antenna Sampling Loop (MI-8217-D) and one Antenna Current Meter (MI-7184-A-150).

Specifications

Frequency Range	_____	225 to 1800 kc
Phase Angle Range	_____	0 to 360 degrees
Monitoring Accuracy—		
For small angles (up to 30 degrees)	_____	± 1 degree
All other angles	_____	± 2 degrees
R-F Input Impedances	_____	79 ohms
R-F Input Voltage Range	_____	3.8 to 12 volts
Power Supply	_____	105/125 volts, 50/60 cycles
Power Consumption	_____	115 watts
Tube Complement:		
4 RCA-6AC7	2 RCA-6AG7	1 RCA-6AB7
1 RCA-2X2A	1 RCA-5R4GY	1 RCA-3AP1A
Dimensions	_____	17½" high, 19" wide, 15" deep*
Weight	_____	.80 lbs.
Stock Identification	_____	WM-30A

* Will not fit 9AX rack but can be used in Type BR-1A rack.

Accessories for Phase Monitor, WM-30A



REMOTE ANTENNA AMMETER, MI-7184-A-150

The Remote Antenna Ammeter is a special high-frequency thermo-milliammeter with a 150 ma. movement designed for use with the WM-30A Phase Monitor. The expanded scale of this meter is calibrated from 0-150 per cent of reference antenna current.

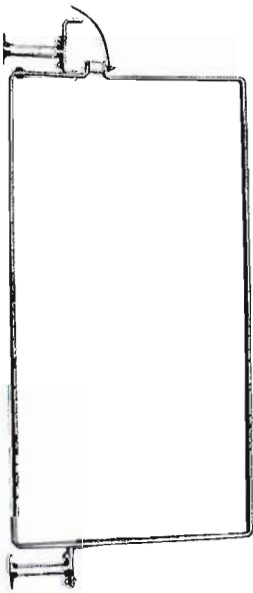
Dimension _____ 4" rectangular case
 Stock Identification _____ MI-7184-A-150



SAMPLING COIL, MI-8217-A

The antenna current and phase Sampling Coil comprises a tuned circuit constructed with an internal double electrostatic shield, so that the user need provide magnetic shielding only. It is normally mounted in the antenna tuner housing or in a separate housing between the tuner and the antenna. This unit feeds a sampling current to the WM-30A Phase Monitor.

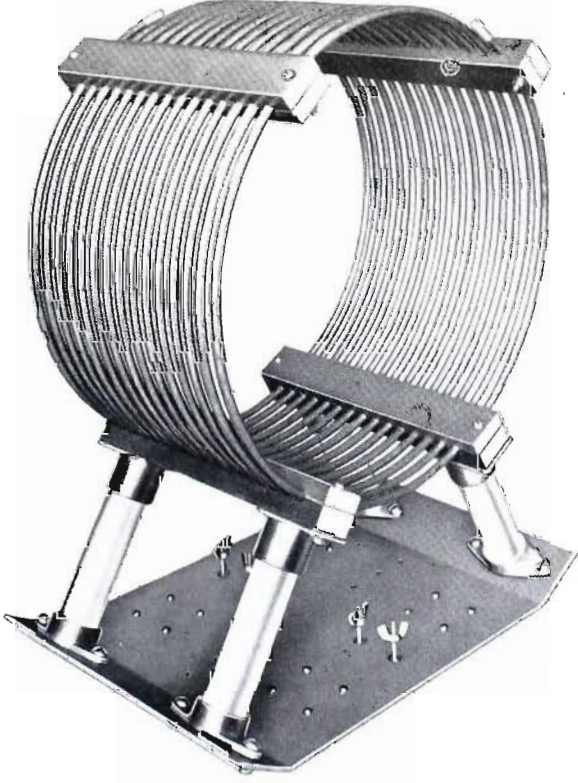
Dimension (clearance) _____ 5" x 5" x 5"
 Stock Identification _____ MI-8217-A



PHASE SAMPLING LOOP, MI-8217-D

The antenna current and phase Sampling Loop is a rectangular copper plated steel loop which is shipped complete with associated mounting hardware. The construction is such that the loop can be rotated so as to provide adjustments in coupling with the antenna tower. This unit is designed to feed a sample of antenna current to a WM-30A Phase Monitor.

Dimensions _____ 2" x 8" x 1/4"
 Stock Identification _____ MI-8217-D



ISOLATION COIL, MI-7327-4

The Isolation Coil is a 110 microhenry coil wound with 3/4" 72 ohm copper concentric line. It is designed to carry the sampling line across the base insulator of the tower, when employing the MI-8217-D Sampling Loop.

Dimensions:
 Base Plate _____ 14 1/4" x 21 1/4"
 Inside Diameter _____ 19 1/2"
 Winding Length _____ 10 1/2"
 Stock Identification _____ MI-7123-t

AM Frequency Monitor, Type WF-48A



Features

- Continuous Reading Deviation Meter.
- Modulation of transmitter does not affect frequency indication.
- Direct connection to transmitter not required.
- Simple pickup antenna supplies r-f excitation.
- Warning Lamp System indicates failure of either transmitter carrier or monitor crystal oscillator.
- Reliable—minimum of attention required from operating staff.

Uses

The RCA Type WF-48A Frequency Deviation Monitor is FCC approved for use in standard broadcast stations. It indicates continuously, and directly in cycles-per-second, the magnitude and direction of any departure of the carrier from its assigned channel frequency.

Description

The elements of the monitor are shown in the accompanying schematic block diagram. Voltages from a temperature controlled piezo-electric oscillator (frequency $f \pm 1000$ cycles) and the transmitter to be monitored (frequency $f \pm \Delta f$) are amplified and fed to a mixer from which their difference frequency ($1000 \pm \Delta f$) is obtained. This audio frequency is

amplified, its peaks are clipped to produce an essentially square waveform, and the square waves are applied to an audio frequency meter.

The indicating element of the frequency meter is calibrated to read zero when the audio beat is exactly 1000 cycles per second. Deviations from 1000 cycles (Δf) are indicated directly as frequency deviation of the transmitter in cycles per second.

The monitor is a-c operated and is mounted on a single relay rack panel. Coupling to the transmitter is obtained from a short length of wire attached to the input terminals to act as an antenna.

Specifications

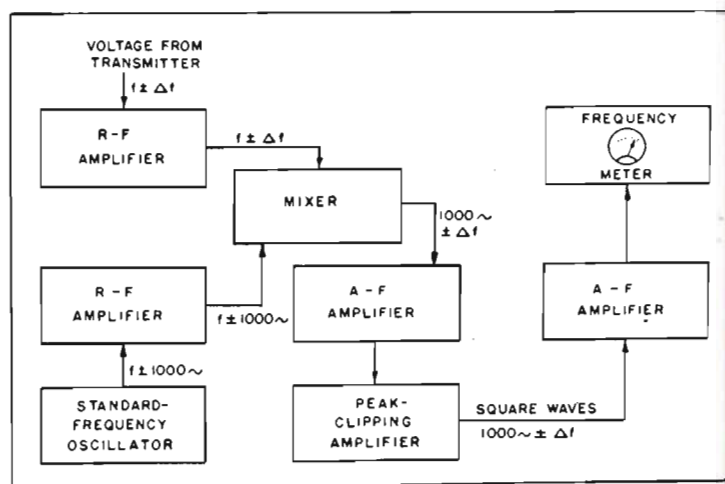
Frequency Deviation Range (readable to 1 cycle) ± 30 cycles
 Carrier Frequency Range _____ 500 to 2000 kc
 Accuracy _____ ± 10 parts per million
 Stability (under normal operating conditions)

Better than one part per million
 R-f Input Voltage _____ Approx. 100 millivolts to 1 volt
 Power Requirements _____ 60 cycles, 105-120 volts or 210-240 volts
 Power Input _____ Heater 25 watts; monitor circuits 100 watts
 Coupling to Transmitter _____ Short antenna

Tube Complement (supplied with instrument):

3 Type 6SJ7	1 Type 5V4-G
2 Type 6AC7	1 Type 6B4-G
2 Type 6H6	1 Type VR-105 (0C3)
2 Type 6SQ7	1 Type 2050
1 Type 6V6-GT	

Dimensions _____ 19" wide x 15 $\frac{3}{4}$ " high x 12 $\frac{1}{2}$ " deep
 Finish _____ Umber gray
 FCC Approval Number _____ 1468
 Stock Identification _____ MI-30048-A



Schematic Block Diagram of Type WF-48A
 Frequency Deviation Monitor

Television Frequency Monitor, Type WF-49B/50A

Features

- Direct indication of frequency drift from assigned channel.
- High sensitivity—requires negligible power from transmitter.
- High stability—temperature controlled crystal oscillator.
- Provision for remote frequency deviation meter.
- Requires no critical adjustments.

Uses

Television Frequency Monitor, Type WF-49B/50A is a complete TV frequency monitor consisting of an RCA Type WF-49B Frequency Deviation Meter and an RCA Type WF-50A Frequency Monitor. Used together, these units, both designed for standard rack mounting, provide a direct indication of the visual transmitter frequency deviation from the assigned channel frequency for TV channels 2-13. Monitoring requirements for the aural channel are met by the Type GR-1170AT described on another page.

Used singly, the Type WF-50A Frequency Monitor has other applications such as frequency monitoring of high frequency AM broadcast, police or aircraft transmitters. Other uses for the Type WF-49B might be in the laboratory where it is useful for measuring audio and supersonic frequencies with any waveform up to 60 kc.

Description

The RCA Type WF-50A Frequency Monitor consists of a temperature controlled crystal oscillator, a harmonic generator, a mixer, and an AF output amplifier. This unit develops a beat frequency with the transmitter carrier frequency which, for TV monitoring purposes, is fed to the Deviation Meter for deviation indications. The Type WF-49B Frequency Deviation Meter consists of AF amplifiers, a clipper, limiting amplifiers and a pulse counter circuit. The beat frequency from the monitor is fed through the amplifiers and clippers to develop a square wave which is then applied to the pulse counter circuit. Unidirectional pulses are applied to a d-c microammeter whose deflection is proportional to the number of pulses per unit time, and hence to frequency. The meter scale for the deviation meter is calibrated in plus and minus deviations about a zero center. In accordance with FCC proposals, two alternative scale ranges are available: 3-0-3 kc for TV channels 2-6 inclusive, and 6-0-6 kc for TV channels 7-13 inclusive. Scale ranges can easily be changed by reversing the meter scales which have alternate calibrations on either side. Spare crystals can be mounted in the rear of the Frequency Monitor and selected by means of a panel switch.

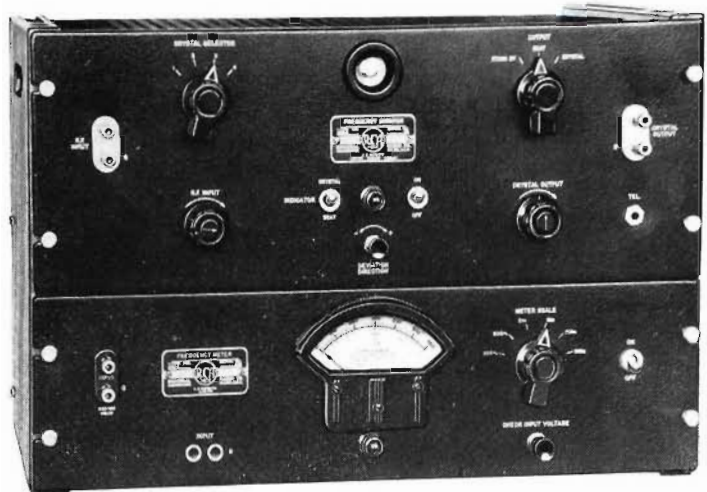
Specifications

TV FREQUENCY MONITOR, TYPE WF-49B/50A

Transmitter Frequency Range _____ 1.6 to 220 mc.

Deviation Range _____ 3-0-3 kc for television channels 2 to 6 inclusive; 6-0-6 kc for channels 7 to 13 inclusive

Accuracy _____ Crystal frequency, when monitor is received, is within ± 10 parts per million (0.001%) of specified channel frequency. Center-frequency reading can be adjusted to bring monitor into agreement with frequency measuring service.



Stability _____ $\pm 0.001\%$

Input Impedance—High-impedance circuits for channels 2 to 6, coaxial line for channels 7 to 13. Complete coupling directions are included in the operating instructions.

Tube Complement:

1—6AC7	1—6BE6
1—6AG7	1—OD3/VR150
1—6E5	1—6SQ7
1—6SN7GT	1—6J5
1—6H6	1—OA3/VR75
2—6SJ7	1—6V6
2—6X5	1—Amperite 3-4

Accessories Supplied—All tubes, connecting cable, and power cords; plug-in filter; one quartz plate

Mounting—19 inch relay rack panel. Walnut end frames are available for table mounting

Dimensions _____ Panel 19" x 12 $\frac{1}{4}$ ", overall; depth behind panel, 11 $\frac{1}{4}$ ", overall

Net Weight _____ 42 lbs.

FREQUENCY MONITOR, TYPE WF-50A

Carrier Frequency Range _____ 1.6 to 220 mc

Power Supply _____ 105/125 or 215/250 volts, 50/60 cycles

Power Input _____ 75 watts (including temperature control)

Mounting _____ Standard 19" relay-rack panel

Finish _____ RCA umber gray

Accuracy _____ (With Type 376-M Quartz Plate) 0.002% (Crystals are supplied separately)

Dimensions _____ Length 19"; depth 11 $\frac{1}{4}$ "; height 7"

Net Weight _____ 22 lbs.

FREQUENCY DEVIATION METER, TYPE WF-49B

Range _____ 25 to 60,000 cycles per second in 6 ranges

Accuracy _____ ± 2 cycles, $\pm 2\%$ of full scale, for all ranges ($\pm 3\%$ of full scale for 60,000 cycles when input becomes less than 0.5 volts)

Input Voltages _____ 0.25 to 150 volts

Power Supply _____ 105/125 or 215/250 volts, 50/60 cycles

Power Input _____ Approximately 50 watts

Mounting _____ Standard 19" relay-rack panel

Finish _____ RCA umber gray

Dimensions _____ Length 19"; depth 11 $\frac{1}{4}$ "; height 5 $\frac{1}{4}$ "

Net Weight _____ 19 $\frac{1}{2}$ lbs.

FM Frequency Monitor, Type GR-1170AT

Uses

The Type GR-1170AT is an FM Frequency Monitor designed to give (1) a continuous indication of center frequency without the necessity for frequency calibration checks; (2) an indication of percentage modulation (positive, negative and full wave) and a flashing lamp indication of over-modulation; (3) a high fidelity output with less than 0.2% distortion for distortion measurements; and (4) a 600-ohm output for audio monitoring. The instrument is designed for TV aural monitoring as well as for FM. (For TV use, specify Type GR-1170AT; for FM use, specify Type GR-1170A.)

Description

The FM Frequency Monitor consists of the RF generator and multiplier stages, a mixer, an IF section, discriminator, and amplifier for high fidelity audio output. The RF generator is a temperature-controlled crystal oscillator. This is followed by an aperiodic buffer and three multipliers. A 150 kc beat between crystal harmonic and the transmitter frequency is produced in a pentagrid converter, fed through the IF section to the discriminator, the d-c output of which is fed to a vacuum tube voltmeter. The instrument meets all FCC specifications.

Specifications

Transmitter Frequency Range—30 to 162 mc with Type 1170-P1 R-F Tuning Unit; 160 to 220 mc with Type 1170-P2 R-F Tuning Unit.

R-F Input Impedance—High impedance, with Type 774 Coaxial Connector. The monitor can be used with standard R.M.A. transmitter monitoring output.

Input Sensitivity—1 volt r-f, or better

Input Level Indicators—A meter for indicating r-f input level is provided at the rear of the chassis. Signal pilot lamp and center-frequency meter pilot are illuminated when input level is adequate and are extinguished when level drops below the usable minimum.

Intermediate Frequency—150 kc

Discriminator—Pulse-counter type linear to better than 0.05% over a range of ± 100 kc (133% modulation).

Center Frequency:

Indication—Meter is calibrated in 100-cycle divisions from -3000 to +3000 cycles per second. No zero set is necessary for each reading and no second crystal is provided.

Accuracy—Crystal frequency within ± 10 parts per million of specified channel frequency. Center frequency indication is accurate to ± 200 cycles per second.

Percentage Modulation:

Indication—Meter is calibrated from 0 to 133%. Additional db scale is provided. Switch selects positive or negative peaks, or full-wave (peak-to-peak) indication. 100% modulation corresponds to 75 kc deviation for f-m bands. Single internal adjustment of meter circuit changes calibration to read 100% at 25 kc deviation, for television audio monitoring. Meter ballistics meet FCC requirements.

Accuracy— $\pm 5\%$ modulation

Overmodulation Indicator—Lamp flashes when predetermined modulation level, as set on a dial, is exceeded. Range of dial is 0 to 120% modulation.

Output Circuits:

1. Distortion and Noise Measurements:

Terminals are provided for connecting a Type 1932-A Distortion and Noise Meter, and a gain control is provided.

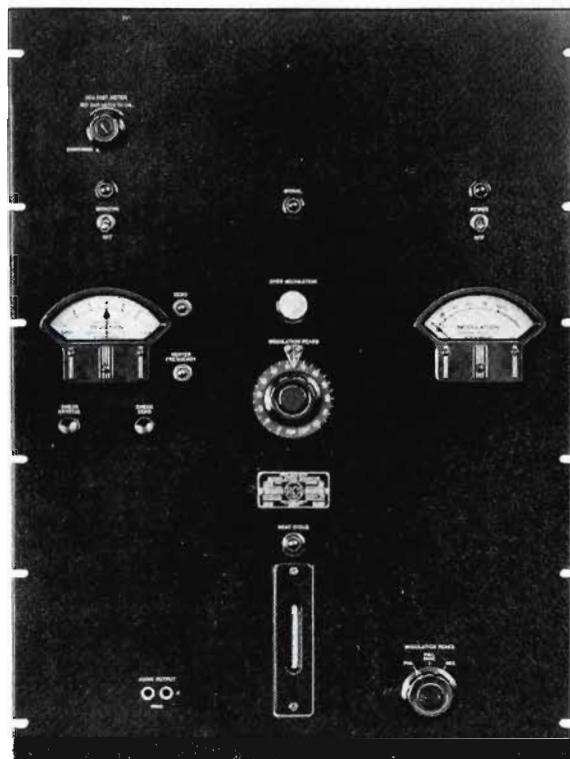
Residual Distortion—Less than 0.2% at 100 kc swing ($\pm 133\%$ modulation).

Response—50 to 30,000 cycles per second $\pm 1/2$ db.

Standard 75 microsecond de-emphasis circuit is included.

Maximum Output—1.5 volts into 100,000 ohms.

Residual Noise Level—-75 db or better referred to 75 kc deviation; -65 db or better for 25 kc deviation.



2. Audio Monitoring Output:

Impedance—600 ohms, unbalanced

Output—Zero dbm at 75 kc deviation (100% modulation)

Response—50 to 15,000 cycles per second $\pm 1/4$ db

Tube Complement

The following tubes are used and are supplied with the monitor:

1—6AK6	1—6SJ7
1—6AB7	4—6SL7-GT
1—6BE6	1—6AS7-C
2—2050	2—6C4
6—6AL5	1—815
1—6SK7	2—OD3/VR150
2—3-4	1—6J6
2—6AG7	1—991
2—6SN7-GT	1—OC3/VR105
1—6AG5	

Accessories Supplied

All tubes, coaxial connector for r-f input, power line connection cord, power supply plug.

Power Supply—105 to 125 volts, 50 to 60 cycles. Power-transformer-primary-connections can be changed to permit operation on 210 to 250 volts.

Power Input—300 watts

Mounting—19" relay-rack panel with dust cover

Dimensions—Panel, 19" x 26 1/4"; depth behind panel, 13 1/4" overall.

Net Weight—88 lbs.

AM Modulation Monitor, Type BW-66E



Features

- Operates at low r-f input power (0.85 watt in 75 ohms).
- Indicates either positive or negative peaks in percentage modulation and in decibels.
- Meets all FCC specifications for modulation monitors.
- Carrier amplitude shift with modulation can be measured.
- High impedance, low distortion output circuit permits use of RCA WM-71A or 69-C Distortion and Noise Meter.
- Low impedance, low distortion output circuit for aural monitoring.
- Terminals for connecting remote percentage-modulation indicator.

Uses

The RCA Type BW-66E Modulation Monitor is designed to give continuous direct reading indications of percentage modulation in the carriers of broadcast or other transmitters operating in the range of 500 to 2500 kc. This modulation monitor performs the following specific functions:

1. Measurement of percentage of modulation on either positive or negative peaks.
2. Overmodulation indication.
3. Program level monitoring.
4. Measurement of carrier shift when modulation is applied.
5. Measurement of transmitter audio-frequency response.

Description

The RCA BW-66E Modulation Monitor consists of three essential elements: (1) A linear diode rectifier which gives an instantaneous output voltage proportional to the carrier envelope, (2) a peak voltmeter which gives a continuous indication of the peak modulation, and (3) a trigger circuit which flashes a light whenever the modulation momentarily exceeds any previously set value.

The linear rectifier is designed for operation at a low power level, which greatly simplifies the coupling to the transmitter. In the output of the linear rectifier is a d-c meter, which indicates the carrier level at which the instrument is operating and also shows any carrier shift during modulation.

In addition, two auxiliary audio output circuits operating from a separate diode rectifier are provided. One of these at 600 ohms, is intended for audible monitoring; the other, a high-impedance circuit, gives a faithful reproduction of the carrier envelope with less than 0.1% distortion. The high impedance output circuit can be connected directly to the RCA WM-71A or 69-C Distortion and Noise Meter, enabling overall fidelity and noise measurements to be made on the transmitter.

Specifications

Carrier Frequency Range _____ 500 to 2500 kc

MODULATION PERCENTAGE RANGE

Negative Peaks _____ 0 to 100%
Positive Peaks _____ 0 to 120%

ACCURACY

At 100% Modulation _____ $\pm 2\%$
At any other percentage _____ $\pm 1\%$

AUDIO FREQUENCY RESPONSE

Meter Indication, 30 to 15,000 cps _____ ± 0.5 db
Meter Circuit, 50 to 15,000 cps _____ ± 0.1 db
Audio Monitoring Output, 30 to 45,000 cps _____ ± 1.0 db
Measuring Output, when used with RCA Type WM-71A Distortion—Noise Meter and Coupling Cable, 30 to 15,000 cps _____ ± 1.0 db

R-f Input Power (over entire frequency range) (approximately 8 volts across 75 ohms) _____ 0.85 watts

R-f Input Impedance, broadcast band, approximately _____ 75 ohms

NOTE: Input impedance increases at higher frequencies. Actual impedance varies with coil position and input tuning.

Power Requirement _____ 110-120 volts, 50-60 cycles, 110 watts

WARNING LAMP CIRCUIT

The overmodulation lamp will flash whenever the negative modulation peaks exceed the setting of the MODULATION PEAKS dial by approximately 2% modulation, for audio frequencies between 30 and 7500 cps. For higher audio frequencies, the percentage overmodulation required to flash the lamp increases slightly.

AUXILIARY OUTPUT

Connections at the rear of the instrument provides a means of connecting:

1. Two remote percentage modulation meters.
2. Line for 600 ohm monitoring (1 volt at 100% modulation).
3. The RCA WM-71A or 69-C Distortion and Noise Meter.

TUBE COMPLEMENT (shipped with instrument)

2 RCA-6AL5	2 RCA-884
1 RCA-6C4	1 RCA-OD3
1 RCA-6AQ5	1 RCA-5V4G
1 RCA-12AU7	

Dimensions _____ Width 19", height 8 $\frac{3}{4}$ ", depth 11"
Weight (unpacked) _____ 37 lbs.
Finish _____ Umber gray
Stock Identification _____ MI-30066-A

Frequency Monitor and Modulation Meter, Type 335-BR



Use

The Type 335-BR Frequency and Modulation Meter monitors FM transmitters reliably, accurately, over long periods of time. No adjustments are necessary during operation, and because the instrument does not depend on a tuned circuit, it is not necessary to re-set the carrier level or re-align circuits. The instrument is specifically designed to operate without adjustment week after week. It gives continuous indication of broadcast frequency and of modulation level at all times, and has F.C.C. type approval.

Description

A low-temperature coefficient crystal, oscillating inside a temperature-controlled oven, provides a reference standard of approximately 5 mc. The output of this crystal oscillator is multiplied 20 times, and mixed with the transmitter frequency to form a 200 kc intermediate frequency. This frequency is fed into electronic counter circuits, which measure the intermediate frequency and thereby indicate the carrier deviation. The linear counter circuits also provide a measurement of percentage modulation as well as an audio output signal for measurement and monitoring purposes. See block diagram.

The electronic counter circuits are unusually stable, are independent of signal level, tube characteristics and tube voltages, and require no adjustment except at long intervals. To check the accuracy of the counter circuits, a crystal-controlled oscillator at 200 kc is provided. This check is operated by a front-panel switch, and is usually only required at one-week intervals.

The 335BR includes provision for operation of a remote modulation meter, as well as remote peak modulation indicator

lamp. The percentage modulation at which the lamp flashes a warning is adjusted on the front panel.

An audio output signal, provided for measurement purposes, has residual distortion of less than 0.25%, and the noise level is at least 75 db below 100% modulation at low frequencies. Frequency response is flat within 0.5 db of standard de-emphasis curve, 20 cps to 20 kc. A demodulated signal for remote or local aural monitoring is also provided at 1 VU level.

Simple to install, compact in size, this new FM monitor can be supplied in a cabinet, or for relay rack mounting. Construction throughout is in accordance with engineering practices proven satisfactory for broadcast equipment. Components are rigidly mounted on bakelite cards; bathtub, mica and oil-filled condensers are used where voltages exceed 50 volts. Instrument is furnished in standard RCA umber gray finish.

Specifications

FREQUENCY MONITOR

Frequency Range_____Any frequency, 88 mc to 108 mc.
Supplied with crystal of frequency matching customer's transmitter.

Deviation Range____+3 kc to -3 kc mean frequency deviation

Accuracy_____Deviation indicator accuracy better than ± 1000 cps ($\pm .001\%$).

Power Required_____Approximately 2 watts. Operates satisfactorily at levels above and below 2 watts.

MODULATION METER

Modulation Range_____Meter reads full scale on modulation swing of 100 kc. Scale calibrated to 100% at 75 kc; 133% at 100 kc.

Accuracy_____Within 5% modulation percentage over entire scale.

Meter Characteristics_____Meter damped in accordance with F.C.C. requirements. Reads peak value of modulation peak of duration between 40 and 90 milliseconds. Meter returns from full reading to 10% of full value within 500 to 800 milliseconds.

Frequency Response_____Flat within $\pm\frac{1}{2}$ db from 50 to 15,000 cps.

External Meters_____Provision is made for installation of remote meter having full scale sensitivity of 400 microamperes. Scale should indicate 100% modulation at 300 microamperes. Extra meters can be supplied with unit.

PEAK LIMIT INDICATOR

Peak Limit Range_____From 50% to 120% modulation (75 kc = 100%). Provision for external peak limit indicators.

AUDIO OUTPUT

Frequency Range_____20 cps to 20 kc. Response flat within $\pm\frac{1}{2}$ db. Equipped with standard 75 microsecond de-emphasis circuit.

Distortion_____Less than 0.25% at 100% modulation.

Output Voltage_____10 volts into 20,000 ohms, at low frequencies. (At 100% modulation.)

Noise_____At least 75 db below audio output level resulting from 100% modulation at low frequencies.

Monitoring Output_____1.0 mw into 600 ohms, balanced, at 100% modulation (at low frequencies).

Size_____Front panel 10½" x 19". 13" deep.

Power_____115 volts 50/60 cps primary power. Requires approximately 150 watts.

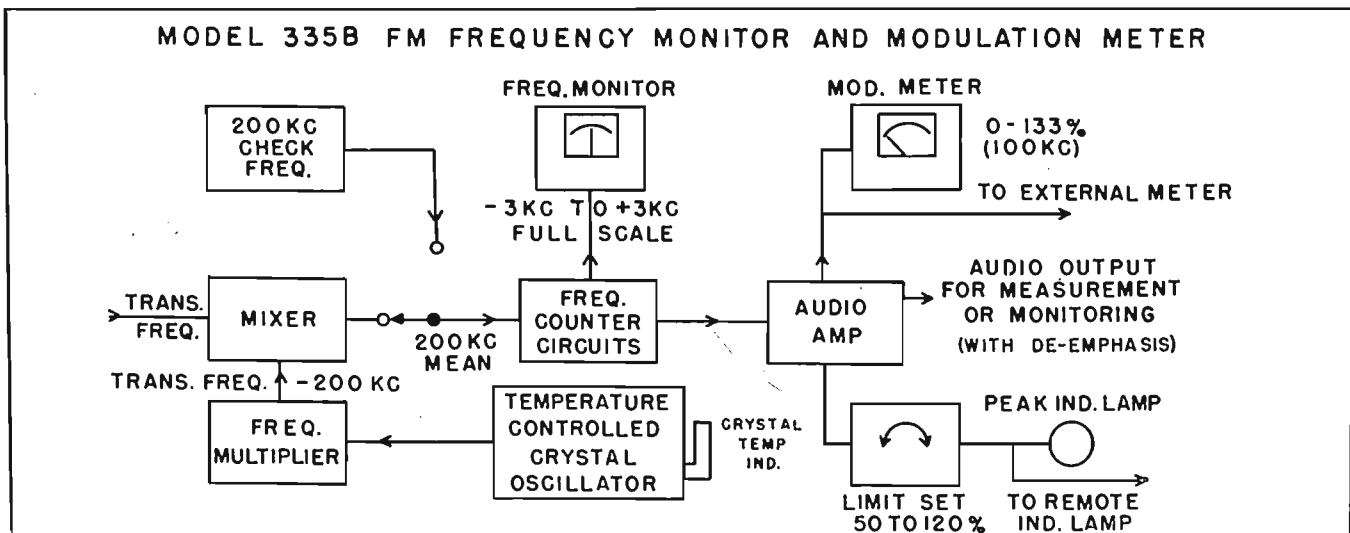
Stock Identification _____ 335-BR

Tube Complement

2-6AC7	1-5R4GY
1-7F8	2-VR-75
6-6V6	1-6Y6G
1-6SL7-GT	1-6SJ7
1-2050	

Available Accessories

Remote Modulation Meter _____ HP-112-13



TV Sweep Generator, WR-59A

WR-59A is a frequency-modulated TV sweep-alignment generator. It generates signals of fundamental frequency on all ranges, which are preset for speed and accuracy. The signals provided include all 13 TV rf channels, picture and sound i-f, video, pre-war picture i-f, the standard FM intermediate, and a spare 25-40-Mc channel. Sweep width is continuously variable, and output level is exceptionally flat in all positions. The output cable termination will match balanced or unbalanced lines; the output level is variable over wide limits by means of a coaxial-type piston attenuator. The unit develops a sweep frequency signal for a scope; a phasing control is provided. An additional feature is return-trace blanking which produces a zero-reference line on the cathode-ray tube for measurement of instantaneous voltages. The unit is complete with rf and i-f/vf output cables. Shipping weight, 35 lbs.



Specifications

Frequency Ranges:
 Pre-war Picture Intermediate, First Band _____ 5-15 Mc
 TV Sound Intermediate _____ 20.25-22.25 Mc
 Picture Intermediate, Second Band _____ 20-30 Mc
 Video Band _____ 100 kc to 10 Mc
 Picture Intermediate, Spare _____ 25-40 Mc (adjustable)
 FM Radio Intermediate _____ 10-11.5 Mc
 Television RF Channels 1-13 _____ 44-50, 54-60, 60-66, 66-72, 76-82, 82-88, 174-180, 180-186, 186-192, 192-198, 198-204, 204-210, 210-216 Mc

Output Impedance:

RF Ranges _____ 150-0-150 ohms (normal load)
 IF and Video Ranges _____ 100-ohm cable termination
 Maximum Attenuator Ratio:
 RF Ranges _____ 20,000/1
 Maximum Amplitude Variation of Sweep
 Envelope _____ All ranges, better than ± 1.5 db
 Horizontal Sweep:
 Phase Range _____ 0-160°
 Frequency _____ 60 cps
 Amplitude _____ 5.6 peak-to-peak (2 RMS) volts

FM Sweep Generator, WR-53A

Speeds up FM receiver alignment . . . regardless of bandwidth requirements. Brings the recognized advantages of the sweep method of alignment to every FM job. Packed with



features which mean speed, accuracy and reliability . . . i-f center frequency 8.3 to 10.8-Mc . . . adjustable i-f sweep width . . . facilities for external frequency modulation . . . rf range continuously variable from 85 to 110-Mc . . . includes step and fine attenuators . . . a scope phase control permits centering of sweep patterns. Provides the signals you need for fast, accurate FM alignment Shipping weight, 17 lbs.

Specifications

Intermediate-Frequency Oscillator:
 Center-Frequency Range _____ 8.3-10.8 Mc
 Scale Accuracy _____ $\pm 2\%$
 Output _____ Adjustable from 1 uv to 0.1 RMS volt
 Sweep Width _____ 0 to ± 200 -kc at 8.3 Mc
 _____ 0 to ± 400 -kc at 10.7 Mc
 Internal Modulation _____ Line frequency
 (External modulation can be applied)
 Radio-Frequency Oscillator:
 Frequency Range _____ 85-110 Mc
 Scale Accuracy _____ $\pm 2\%$
 Output _____ Adjustable from uv to 0.1 RMS volt
 Amplitude Modulation _____ Twice line frequency

D-C Microammeter, WV-84A

Readings _____ 0.001 ua to 1 ma full scale
 Six Ranges _____ 0.01; 0.1; 1.0; 10; 100; 1000 ua
 Voltage Drop at Full Scale (all ranges) _____ 0.5 volts
 Power Supply (batteries) _____ 2-1½ volts "A" RCA VS106)
 _____ 2-2½ volts "B" (RCA VS102)
 Dimensions _____ 6¼" wide; 9½" high; 5¾" deep
 Weight (including batteries) _____ 9½ lbs.

Reads from 0.001 to 1000 microamperes in six separate ranges. Useful for measuring high values of resistance; may be used as high resistance voltmeter. Approaches galvanometer sensitivity. Electronic protected non-burn-out meter. Accuracy, 0.01 range, $\pm 5\%$ of full scale reading; other ranges $\pm 4\%$. Ideal for weak-current measurements in phototubes, multiplier phototubes, etc.



Television Calibrator, WR-39A

The WR-39A is a marker signal generator, a dual crystal standard, and a heterodyne frequency meter with built-in audio amplifier and speaker. The marker VFO operates on fundamentals, and produces strong marker pips on scope traces anywhere within its specified frequency ranges. For regular signal-generator and calibrator applications, the VFO also can be used on harmonic frequencies, thus giving increased coverage. For stagger-tuned alignment work, the VFO can be amplitude-modulated by an audio oscillator. The frequency standard uses a 2.5-Mc primary crystal and a 250-kc modulating crystal. This crystal combination will calibrate any signal source over the range of 250-kc to 250-Mc. The heterodyne frequency meter provides audible beats to identify the 2.5-Mc and 0.25-Mc check points. Unit is complete with signal injection cable. Shipping weight, 22 lbs.

Specifications

Variable-Frequency Oscillator Frequency Ranges
(continuous coverage) _____ 19-110 Mc; 170-240 Mc

Output Voltage _____ Better than 0.28 peak-to-peak volt.
0.1 RMS volt at any frequency

Output Impedance _____ 100 ohms

Attenuator Range _____ 100/1

Impedance at "Mod In" Jack _____ 5000 ohms



Crystal Oscillators:

Primary Standard Frequency _____ 2.5-Mc; accuracy $\pm 0.01\%$
Modulating Standard Frequency _____ 0.25-Mc; adjustable for
exact zero-beat with 2.5-Mc crystal

Heterodyne Detector Input Requirements:

External Signal Beating Against VFO _____ 1 millivolt
External Signal Beating Against Crystals _____ 10 millivolts

Audio Amplifier:

Gain (approx.) _____ 1000; output 0.3 watts max.
Loudspeaker _____ 3-inch cone, Alnico magnet type
Dimensions _____ 10" x 13½" x 7½"

Audio Voltmeter, WV-73A

A sensitive high-impedance a-c VTVM capable of measurements from 0.001 RMS volt to 1000 RMS volts a-c over a range of 20 to 20,000 cycles. Logarithmic scale and overlapping attenuator assure accuracy even when pointer is at either end of scale. In combination with a modulated high-frequency generator and rectifying probe, the WV-73A is especially useful in determining characteristics of coaxial cables and slotted lines. Standing-wave ratios can be read in terms of voltage or db ratios, since the meter is equipped with both scales. The high-fidelity amplifier is externally accessible. Shipping weight, 17 lbs.

Specifications

A-c Voltmeter Ranges (1 millivolt to 1000 RMS volts in
11 ranges) _____ 0.001-0.01, 0.004-0.025, 0.01-0.1, 0.04-0.25, 0.1-1,
0.4-2.5, 1-10, 4-25, 10-100, 40-250, 100-1000 RMS volts.

DB Ranges (0-120 db in 11 ranges) _____ 0 to 20, 30, 40, 50, 60,
70, 80, 90, 100, 110, 120 db

Frequency Response _____ Flat within ± 0.5 db from
20 cps to 20 kc



Input Resistance and Capacitance _____ 1 megohm shunted by
less than 25 puf

Scale Accuracy _____ Better than $\pm 5\%$

Amplifier Gain _____ 2500 (with 25,000-ohm load)

Audio Oscillator, WA-54A

The WA-54A Audio Oscillator is a portable, a-c operated instrument for generating sinusoidal voltages within the frequency range of 20 to 17,000 cycles. It is used to measure the fidelity of radio receivers, frequency response of audio amplifiers, and modulation characteristics of small transmitters. It is useful to determine frequencies and mechanical speeds and to troubleshoot TV deflection, sync and video amplifier circuits. Tapped output transformer makes it possible to match the oscillator output to load impedances most frequently encountered . . . electronic "eye" serves as calibration indicator, output level indicator, and pilot lamp. Frequency settings are read from a large, easy-to-read drum dial. Shipping weight, 19 lbs.

Specifications

Frequency Range (continuous) _____ 20 cps to 17 kc
 Output Impedance:
 High-Level Balanced _____ 250, 500, 5000 ohms
 High-Level Unbalanced _____ 62.5, 125, 1250 ohms
 Low-Level Unbalanced _____ 10,000 min. ohms
 Output Voltage (approx.):
 No Load (high level) _____ 40 RMS volts
 With 5000-Ohm Load _____ 25 RMS volts



With 500-Ohm Load _____ 7.9 RMS volts
 With 250-Ohm Load _____ 5.5 RMS volts
 No Load (low level) _____ 2.5 RMS volts
 Output Voltage Variation (loaded) _____ Less than ± 2 db
 Distortion _____ Less than 5% RMS
 Dimensions _____ 10" x 13½" x 7½"

Test Oscillator, WR-67A

The WR-67A provides speed, accuracy, convenience, and overall dependability in signal injection and alignment work. A range switch allows the quick selection of three fixed frequencies of 1500, 600, and 455 kc . . . band-spread dial provides



continuously variable fundamental frequencies from 100 kc to 30 Mc, plus useful harmonics out to 90 Mc. Add to this—a temperature compensated oscillator . . . special signal-injection probe . . . both step and vernier attenuators . . . double shielding . . . six-band drum dial with easy-to-read, four-foot scale spread . . . scale accuracy of $\pm 2\%$, adjustable modulation level on internal and external modulation positions . . . power-line filter to minimize rf leakage . . . and 400-cycle signal source—more features than can be found in most signal generators. Shipping weight, 20 lbs.

Specifications

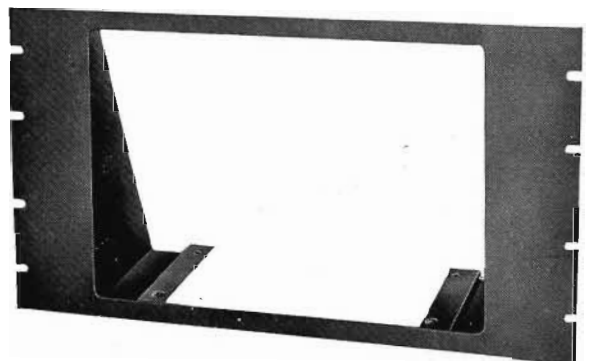
Frequency Range _____ Continuous from 100 kc to 30 Mc
 Band A: 100-260 kc; Band B: 260-650 kc; Band C: 635-1600 kc;
 Band D: 1.6-4.7 Mc; Band E: 4.4-12.8 Mc; Band F: 10.5-30 Mc.
 Scale Accuracy _____ $\pm 2\%$
 Fixed Frequencies _____ 455, 600, 1500 kc
 Output Voltage (RMS) _____ Continuously variable, 5 uv to 1 volt
 Internal Modulation _____ 400 cps; adjustable from 0% to 50%
 External Modulation _____ 2 RMS volts req. for 30% mod.
 Audio Output _____ 25 max. RMS volts across 100,000 ohms
 RF Output Impedance _____ 10-1000 ohms
 (Varies with attenuator setting)
 Dimensions _____ 10" x 13½" x 7½"

Rack-Adaptor Panel, WS-18A

WS-18A Rack Adapter Panel for mounting any of the matched RCA Test Instruments in standard 19-inch relay racks . . . adds convenience and standardization to industrial test setups.

Dimensions _____ 10½" high, 19" wide, ½" thick

Finish _____ Umber gray



VoltOhmyst, 195-A

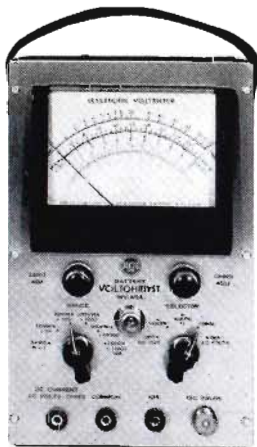
The ideal instrument for radio servicing. In one instrument, at one price, you get 6 testing devices; D-c Voltmeter; Ohmmeter; A-c Voltmeter; A-F Voltmeter; Outputmeter; FM Indicator. New features include diode for a-c measurements, linear a-c scale for all ranges; RCA crystal probe WG-263 (available on request).

Specifications

Electronic D-c Voltmeter Range _____ 0.3; 10; 50; 100; 500; 1000 volts
 Input Impedance _____ 10 megohms constant
 Electronic Ohmmeter Range _____ 0-1,000; 10,000; 100,000 ohms; 0-1; 10; 1000 megohms
 Internal Source _____ 3 volts
 Electronic A-c Voltmeter Range _____ 0.5; 10; 50; 100; 500; 1000 volts
 Power Supply _____ 105/125 volts; 50-60 cycles
 Dimensions _____ 6 $\frac{3}{8}$ " wide, 9 $\frac{5}{8}$ " high, 6 $\frac{3}{4}$ " deep
 Weight _____ 14 lbs.
 Finish _____ Gray wrinkle, brush chrome panel



Battery VoltOhmyst, WV-65A



Portable electronic voltmeter-ohmmeter and ammeter combination for mobile, industrial or rural use. Works anywhere without a-c power source, thereby extending famous VoltOhmyst features to places remote from power lines. Neon panel lamp lights when battery is used. Unusually long battery life with normal use.

D-c Ranges _____ 0.3; 10; 30; 100; 300; 1000 volts
 Input Resistance _____ 11 megohms constant
 A-c Ranges _____ 0.10; 30; 100; 300; 1000 volts
 Sensitivity _____ 1000 ohms per volt
 Ohmmeter Ranges _____ 0-1000; 10,000; 100,000 ohms; 0-1; 10; 1000 megohms
 D-c Ammeter Ranges _____ 0.3; 10; 30; 100; 300 milliamp; 0-10 amp
 Batteries _____ Four 1 $\frac{1}{2}$ volt "A"; two 45 volt "B"
 Dimensions _____ 6 $\frac{1}{4}$ " wide, 9 $\frac{1}{2}$ " high, 5 $\frac{1}{2}$ " deep
 Weight (including batteries) _____ 9 lbs.

Advanced VoltOhmyst, WV-75A

For High-Frequency, FM, TV, UHF and pulse work. Newly-developed diode probe permits peak-to-peak a-c voltage readings to 250 Mc. WV-75A is really 6 instruments: VHF Voltmeter, Audio Voltmeter, A-c Voltmeter, D-c Voltmeter, Ohmmeter, FM Indicator. Meter is burn-out proof. The WV-75A employs a push-pull D-c Vacuum Tube Voltmeter circuit, characterized by excellent linearity and stability.

D-c (6 ranges) _____ 0 to 1000 volts
 A-c (6 ranges):
 Using probe directly _____ 0 to 100 volts
 Using probe and multipliers _____ 0 to 1000 volts
 Frequency Response:
 Using probe directly _____ 30 cycles to 250 Mc
 Using probe and multipliers _____ 30 cycles to 15 kc
 Input Impedance (using probe directly):
 At 1 Mc _____ 625 Kilohms; 15.6 μ f
 Resistance (6 ranges) _____ 0 ohms to 1000 megohms
 Power Supply (a-c) _____ 105/125 volts, 50/60 cycles
 Dimensions _____ 6 $\frac{3}{8}$ " wide, 9 $\frac{5}{8}$ " high, 6 $\frac{3}{4}$ " deep



Master VoltOhmyst, WV-95A

The WV-95A is truly the "master" electronic multimeter. It combines in one case an a-c voltmeter, d-c voltmeter, ohmmeter, d-c microammeter, d-c milliammeter, capacitance meter, and a d-c ammeter. The instrument is a-c line operated. The carefully balanced meter is virtually burn-out proof; it has a full-scale accuracy of $\pm 2\%$, and can be zero-centered for discriminator alignment work. The capacitance measuring circuit includes a polarizing voltage for measurement of electrolytic capacitors. The entire electrical system is insulated from the metal case which may be grounded separately. Accessories available on separate order include a 100-Mc crystal probe, WG-263, and a 250-Mc peak-to-peak diode probe, WG-275. Unit is complete with three test leads and two test cables with plugs and clips. Shipping weight, 17 lbs.

Specifications

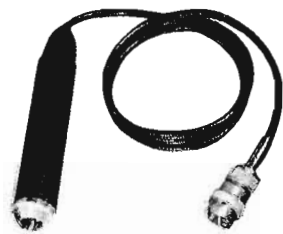
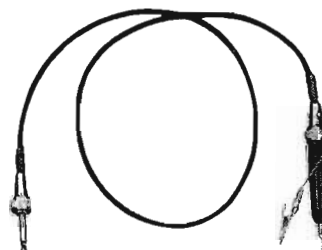
D-c Voltmeter Ranges _____ 0 to 5-10-50-100-500-1000 d-c volts
 Input Resistance _____ 11 megohms on all ranges
 A-c Voltmeter Ranges _____ 0 to 1.5-10-50-100-500-1000 RMS volts
 Frequency Response _____ 30 cps to 20 kc
 Input Resistance and Capacitance _____ 0.5 megohms shunted
 by 125 uuf
 D-c Ammeter Ranges _____ 0-10, 0-100 ua, 0 to 1-10-100 ma,
 0-1, 0-10 amps
 Ohmmeter Ranges _____ 0.1 ohm to 1000 megohms in six ranges
 Center-Scale Indications _____ 10, 100, 1000, 10,000 ohms;
 0.1, 10 megohms
 Capacitance Meter Ranges (4 uuf to 1000 uf in six ranges)
 Center-Scale Indications _____ 100,000 uuf; 0.01, 0.1, 1, 10 uf
 (Note): The following data apply to the WV-95A when used with RCA Diode Probe WG-275 which is supplied on separate order.)



RF Voltmeter Ranges:
 0 to 5-10-50-100 RMS volts from 30 cps to 17.5 Mc
 0 to 5-10-30 RMS volts from 17.5 to 75 Mc
 0-5, 0-10 RMS volts from 75 to 250 Mc
 Input Resistance and Capacitance:
 625,000 ohms shunted by 15.6 uuf at 1 Mc
 32,000 ohms shunted by 14.5 uuf at 10 Mc
 100 ohms shunted by 13 uuf at 250 Mc
 Meter Indications _____ RMS value of sine-wave voltage, 0.354
 peak-to-peak value of recurrent complex-wave voltage
 Dimensions _____ 10" x 13½" x 7½"

Crystal Probe, WG-263

Converts VoltOhmyst Meters 163, 165, 165-A 195, 195-A, WV-65A, WV-75A, and WV-95A into VHF voltmeters for use up to 100 Mc; also used with Chanalysts Types 162, 162-A, 162-B, 162-C and 170-A. Can be used for relative readings to 175 Mc.



Diode Probe, WG-275

The RCA Diode Probe WG-275 is designed to operate in combination with RCA VoltOhmyst Electronic Meter WV-95A; it enables this instrument to read RMS or peak-to-peak voltages at frequencies from 30 cycles to 250 Mc. The probe fits coaxial "T" connectors, and permits direct measurement of voltages in coaxial lines.

High-Voltage Probe, WG-284 (288)

Extends the d-c voltage range of RCA VoltOhmyst and Chanalyst Vacuum-Tube Voltmeters to 30,000 volts. Measures d-c voltages in television sets, X-ray machines, and other high-voltage devices . . . useful in measuring the output voltages of pulse-operated and rf power supplies and other high-resistance voltage sources that require high-resistance measuring instruments. Both probes are identical except for the resistance values of the multiplier resistor. VoltOhmysts 195 and 195-A, and Chanalyst 170-A use probe WG-288. Others use probe WG-284.



3" WO-79B Oscilloscope

Truly a laboratory instrument, the WO-79B 3-inch oscilloscope is outstanding for a wide range of research and industrial applications. It is particularly useful for the observation and measurement of phenomena such as TV synchronizing and deflecting voltages, ignition waveforms, pulses, and radar signals. The WO-79B will accurately display 1- μ s pulses and other waveforms which have extremely steep leading edges, such as are encountered in photo-flash devices and electro-mechanical relays.

The WO-79B features a triggered sawtooth sweep with a delay network, two-to-one trace expansion, flat frequency response from 10 cps to 5 Mc, calibrating meter for voltage measurements, intensifying and blanking amplifier, high voltage for photography of transients, wide-range centering controls, and retractable light shield. It is shipped complete with compensated attenuating cable, and with a direct probe cable.



Specifications

Frequency Range:

Vertical Amplifier _____ $\pm 20\%$, 10 cps to 5 Mc
 Horizontal Amplifier _____ $\pm 10\%$, 10 cps to 500 kc

Deflection Factor: (for 1000 volts at second anode)

Vertical Amplifier _____ 0.18 RMS volt/inch*
 _____ 0.5 peak-to-peak volt/inch
 Horizontal Amplifier _____ 0.46 RMS volt/inch*
 _____ 1.3 peak-to-peak volts/inch

Sweep Frequency Range _____ 20 cps to 250 kc
 Triggered-sweep Repetition Rate _____ up to 50 kc
 Blanking _____ Return trace blanked on triggered deflection
 Power Supply _____ 105/125 volts, 50/60 cycles
 Power Consumption _____ 200 watts
 Dimensions _____ 14 $\frac{1}{2}$ " high, 8 $\frac{1}{4}$ " wide, 18 $\frac{1}{4}$ " deep
 Weight _____ 42 lbs.
 _____ * For Sine Waves.

WO-27A D-C Oscilloscope

Specifically designed for the accurate analysis of extremely low-frequency phenomena in mechanical, hydraulic, pneumatic, electrical, and electronic systems, the RCA WO-27A D-c Oscilloscope has a wide range of applications in the laboratory and industrial plant.



It features triggered sweep and blanking circuits that permit the observation and photographic recording of one-time, high-speed transients. This oscilloscope also shows a-c and d-c simultaneously, providing more information than can be obtained from a simple stroboscope. The 5-inch C-R tube can be readily interchanged from the front with a tube of other persistence characteristics.

Specifications

Frequency Range:

Vertical and Horizontal Amplifiers _____ 0 cycles to 100 kc
 Timing Axis Oscillator _____ 1 cycle to 30 kc
 Blanking Amplifier _____ 30 cycles to 100 kc

Deflection Sensitivity (volts per inch):

	D-c or Peak-to-Peak	RMS Sine Wave
Vertical Amplifier _____	0.084	0.030
Horizontal Amplifier _____	0.105	0.037
(Direct to Deflection Plates)		
Vertical _____	54	19
Horizontal _____	67.5	24

Power Supply _____ 105/125 volts, 50/60 cycles
 Power Consumption _____ 130 watts
 Dimensions _____ 13" wide, 20" high, 25" deep
 Weight _____ 80 lbs.

5" Cathode-Ray Oscilloscope, WO-58A

The WO-58A is a portable wide-band 5 inch oscilloscope especially suited for television receiver servicing. It performs all regular oscilloscope services, and in addition it displays sync pulses, blanking pedestals, and deflection waveforms accurately. Because provision is made for intensity modulation, the scope will substitute for the kinescope, video amplifier and the vertical and horizontal oscillators and amplifiers in television receivers. A calibrating voltage and 3-1 range switch make the instrument a direct-reading VTVM. Sweep circuits include a vacuum tube sawtooth multivibrator and an auxiliary 60-cycle sine-wave source with phasing control. Supplied complete with r-f crystal probe, direct probe, and high-impedance frequency compensating probe.

Vertical Amplifier:

Deflection Factor (direct probe) _____ 0.18 RMS volt/inch
 Deflection Factor (attenuating probe) _____ 1.8 RMS volt/inch
 Input Impedance (direct probe) _____ 1 megohm, shunted by
 62 μ f (approx.)

Input Impedance (attenuating probe) _____ 2 megohms, shunted
 by 9.5 μ f (approx.)

Input Capacitance (crystal probe) _____ 5.5 μ f

Sine-Wave Frequency Response:

Flat within $\pm 20\%$ from 5 cps to 2 Mc
 Flat within $\pm 50\%$ from 1 cps to 4 Mc

Square-Wave Response:

Tilt and overshoot less than 2% from 30-50,000 cps
 Rise time less than 0.15 μ s from 10% to 90% of total rise



Horizontal Amplifier:

Sine-Wave Frequency Response:

Flat within $\pm 10\%$ from 6 cps to 100 kc

Horizontal Sweep:

Frequency Range _____ 10 cps to 100 kc

Z-Axis Sensitivity:

Beam Blanking Voltage (max.) _____ 50 peak volts

Size _____ 13 $\frac{3}{4}$ " x 9 $\frac{1}{2}$ " x 19 $\frac{13}{32}$ "

Shipping Weight _____ Approx. 40 lbs.

Regulated Power Supply, WP-23A

A high-quality unit designed for dependable, continuous service in shop, laboratory, and factory. Output voltage is virtually independent of line-voltage variations as well as load-current variations. Maximum load-current capability increases with the output voltage level. Insulated output terminals permit grounding of either the positive or negative terminal. Primarily intended as an extremely stable "B" supply, the WP-23A also can be used as a low-impedance "C" bias supply. Shipping weight, 25 lbs.

Specifications

Regulated d-c Output:

Voltage Range (continuously adjustable) _____ 0-300 volts

Current Range for 120-300 Volts _____ 0-120 ma

60-120 Volts _____ 0-80 ma

0-60 Volts _____ 0-60 ma

Regulation for Line-voltage Variation of

105 to 125 Volts _____ Less than 1 $\frac{1}{2}\%$

Regulation Above 30 Volts from Zero Load

to Full Load _____ Less than 1%

Ripple Voltage (RMS) _____ Less than 8 millivolts



Auxiliary Unregulated d-c Output:

Voltage (approx.) _____ 600 volts

Current Capability _____ 120 ma

Ripple Voltage (RMS) _____ 0.1 volts

Auxiliary Unregulated a-c Output:

Voltage (RMS) _____ 6.3 volts

Current Capability (RMS) _____ 5 amperes