



### THE FERRIS MODEL 18-H MICROVOLT

The Model 18 H Microvolter has a frequency range of from 450 to 950 megacycles, with provisions for 30% internal amplitude modulation at 1,000 cycles.

This instrument employs the Ferris Hinge Type Tuner, which provides a smooth variation of frequency over the range of the instrument.

A variable output from less than one to more than 100,000 microvolts is available. The instrument has a resistance type step attenuator using high frequency resistors and a new variable output box giving continuous variation between steps. This is a new feature which avoids reaction on the oscillator, thereby eliminating frequency shift with output adjustment.

Effective output impedance is 50 ohms from a type "N" receptacle mounted on the output box, which in turn is permanently fastened to the front of the instrument. The output level is established by the output meter reading, multiplied by the setting of the step attenuator and output box control. The meter reading is normally maintained at a fixed value of 1.0 microvolts.

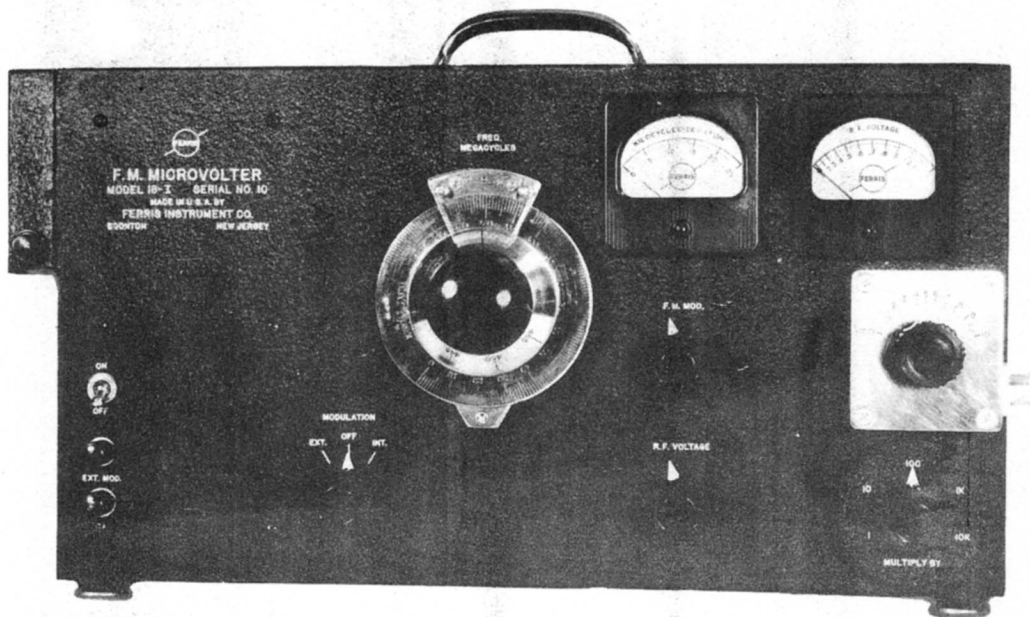
The internal modulation, which has a fixed value of 30% at 1,000 cycles, may be switched on at will. Provision is also made for applying external modulation up to 10,000 cycles.

This instrument employs plate voltage modulation on the oscillator resulting in some degree of frequency variation, as well as amplitude modulation. Data is supplied indicating the amount of frequency modulation present over the range of the instrument.

The frequency range is spread over a 50 division 180 degree dial with a vernier ratio of 100 to 1. Vernier markings on the control knob dial afford a total of 5,000 divisions over the frequency range or about 5 divisions per megacycle at the most crowded section of the dial.

Direct frequency readings on the main dial are furnished in addition to charts, which indicate correct frequencies to  $\pm 0.5\%$ .

The instrument is housed in an aluminum case measuring  $19\frac{1}{4}$  inches wide by  $10\frac{1}{2}$  inches high and 11 inches deep. The net weight is approximately 30 lbs.



### THE FERRIS MODEL 18-I FM MICROVOLTER

The Model 18-I FM Microvolter has a frequency range of from 445 to 475 megacycles, with provisions for internal frequency modulation up to 25 kilocycles deviation at 1,000 cycles modulating frequency.

This instrument employs a resonant line oscillator of high stability encased in a very thick aluminum box to minimize microphonic effects. Tuning over the range is accomplished by capacity variation at the end of the line and uses no moving contacts.

A variable output from less than one to more than 100,000 microvolts is available. The instrument has a resistance type step attenuator, using high frequency resistors and a new variable output box giving continuous variation between steps. This is a new feature which avoids reaction on the oscillator, thereby eliminating frequency shift with output adjustment.

Effective output impedance is 50 ohms from a type "N" receptacle, mounted on the output box, which in turn is permanently fastened to the front of the instrument. The output level is established by the output

meter reading multiplied by the setting of the step attenuator and output box control. The meter reading is normally maintained at a fixed value of 1.0 microvolt.

The FM deviation is read on a separate meter and is continuously variable up to 25 kc. deviation. Provision is made for applying external modulation up to 10,000 cycles.

The frequency range is spread over a 150 division National dial, incorporating a direct reading frequency calibration in addition to the regular vernier scale which can be read to 0.1 division. This is equivalent to approximately 20 kilocycles, or about .005% of the carrier frequency.

Charts are furnished in addition to the direct reading dial calibration for accurate setting of frequency to within 0.1% and the direct reading dial is within 0.3%.

The instrument is housed in an aluminum case measuring 19¼ inches wide by 10½ inches high and 10 inches deep. The net weight is approximately 31 lbs.



### THE FERRIS MODEL 22 G SIGNAL GENERATOR

The Model 22-G Signal Generator is a low frequency instrument covering a range of from 15 kilocycles to 4.0 megacycles. Output levels of from 1 microvolt to 100,000 microvolts are available at 3 ohms output impedance and from 10 microvolts to 1 volt at 15 ohms.

A resistance type decade attenuator is employed in combination with a calibrated four inch output meter. The dual meter scale and step attenuator are marked in both microvolts and db for those who prefer working in decibels.

Incidentally, the Ferris Model 22-D may also be obtained with this dual marking upon special request. As the db figures are based on decibels above a 1 microvolt level, the output arrangement as outlined above is employed.

Internal amplitude modulation up to 50% at 400 cycles is included with provision for external modulation. The percentage modulation is indicated on a separate meter. The total frequency range is covered in six overlapping bands, with a direct reading frequency dial individually calibrated on each instrument.

The Model 22-G employs a modulated oscillator, but at the frequency range of this instrument, any frequency

modulation is negligible. An all aluminum black wrinkle finished case minimizes weight.

#### 22-G Specifications

**Frequency Range:** 15 kilocycles to 4 megacycles in six ranges.

**Dial System:** Each range has an individually hand calibrated scale. Additional slow motion dial for selectivity measurements, giving scale spread of 4 feet in each range.

**Accuracy of Calibration:** Direct reading dial is accurate to 1%.

**Output Voltage:** Continuously variable from 1 microvolt to 1 volt.

**Output System:** Large dual scale output meter, plus Ferris block type decade resistance attenuator with tapped output box on end of three foot cable.

**Modulation:** Internal and external up to 50% with modulation meter calibrated to read percent modulation.

**New Feature:** Output levels calibrated in both microvolts and decibels above 1 microvolt.

**Dimensions:** Width 18¼ inches, Height 10½ inches, Depth 8 inches.

**Net Weight:** 28 lbs.

**Shipping Weight:** 34 lbs. packed in 1 carton.



## THE FERRIS MODEL 24-C CRYSTAL CONTROLLED SIGNAL GENERATOR

The Model 24-C Crystal Controlled Signal Generator is designed to furnish seven fixed crystal controlled frequencies in the range of from 200 to 2,000 kc. for the purpose of accurate alignment of I. F. and R. F. circuits for automobile and standard home broadcast receivers. It also serves as a standard to set manually adjusted fixed frequency signal generators, such as the Ferris Model 20 Microvolter, on exact frequency.

The Model 24-C includes provision for 30% internal amplitude modulation at both 400 and 1,000 cycles, as well as external modulation up to 3,500 cycles. Output levels from 1 to 100,000 microvolts are available at an output impedance of 15 ohms.

Modulation in the Model 24-C is applied to an R. F. amplifier, thereby avoiding frequency modulation. When employing external modulation sources, the percentage modulation may be increased to nearly 100% by the application of sufficient modulating voltage.

Both the crystals and associated coils may be easily changed for various frequencies in the operating range. The crystals are plugged into ceramic sockets and have shunt trimmer capacitors to adjust them to exact frequencies.

Output level on the meter is adjusted by an R. F. control and additional attenuation is obtained by a decade step attenuator. The output appears at the end of a three-foot terminated cable and includes an

output box with binding post for flexible application to either I. F. or R. F. circuits.

The instrument is housed in a black wrinkle finish aluminum case.

### 24-C Specifications

**Frequency range:** Seven spot frequencies from 200 to 2,000 kilocycles.

**Frequency selector:** Single knob with easily read aluminum scale.

**Output voltage:** Continuously variable from 1 to 100,000 microvolts.

**Output system:** Calibrated meter and step attenuator. Output appears at end of 3-foot transmission line cable. High output connection, approximately 0.7 volt, not calibrated.

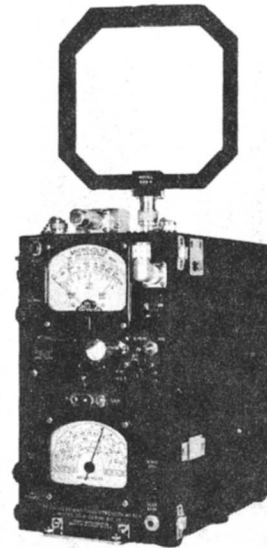
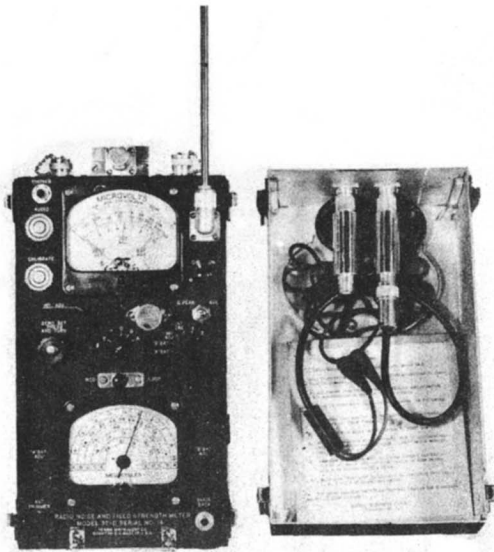
**Modulation:** Internal 400 cycle and 1,000 cycle modulation with provision for external modulation.

**Power supply:** The standard power supply of the regulated type is designed for 115 volt, 60 cycle operation. Supplies for other frequencies and voltages may be secured on special order.

**Dimensions:** Width, 18 inches. Height, 10½ inches. Depth, 8 inches including controls.

**Net weight:** 22 lbs.

**Shipping weight:** 30 lbs. packed in 1 carton.



### THE FERRIS MODEL 32-D RADIO NOISE AND FIELD STRENGTH METER

The Ferris Model 32-D Radio Noise and Field Strength Meter is for the purpose of measuring the intensity of radio frequency fields in space, or it may also be used as a two terminal radio frequency voltmeter to measure levels from 1 microvolt to 1 volt over the frequency range of from 550 kilocycles to 25 megacycles.

For field strength measurements in free space, either the rod antenna furnished with the instrument may be used or any one of five available accessory loops, required to cover the five bands, or complete frequency range of the instrument.

Radio frequency measurements of communication signals may be made with the instrument as well as measurements of various disturbances which may interfere with such communication. These disturbances are often referred to as radio frequency noise and may originate in electrical devices such as ignition systems, motors, dynamotors, electric razors and other appliances. Transmission lines with leaky insulators may also be detected and measured with the instrument.

In order to minimize such interference caused by various electrical devices, it is now customary to measure the intensity of the radio frequency disturbance and apply corrective measures, such as filters or shielding to prevent excessive radiation. The Model 32-D is particularly well suited to this type of measurement and is the result of many years experience with similar instruments, such as the Ferris Models 32-A and 32-B Radio Noise and Field Strength Meters, which have been used extensively by both military and civilian agencies.

For those who have had occasion to use either the Models 32-A or 32-B Noise Meters, the additional features incorporated in the new Model 32-D will be readily apparent. These additional features include the following:

1. Modern miniature type tubes are used throughout.
2. Both filament and plate voltages are indicated, with adjustments provided to keep them constant.
3. The frequency range is continuous from 550 kilocycles to 25 megacycles.
4. Provision is made for the use of either rod or loop antennas, the latter being optional.
5. A separate antenna trimmer permits peaking of either rod or loop antenna.
6. The time constant of the weighting circuit has been changed to 1 millisecond charge time and 600 milliseconds discharge time in the quasi peak position thereby increasing response to certain types of radio noise.
7. Means are provided to read peak voltages by use of an external slideback unit.
8. The audio response has been greatly increased to facilitate peak readings.
9. An audio output control is included with a separate receptacle for attaching a scope in order to observe

the audio envelope.

10. A multivibrator is used for internal purposes, which gives greatly increased readings at higher frequencies, resulting in improved accuracy.
11. Provision is made for attaching a 1 milliampere recorder or remote indicator, which may be used simultaneously with the instrument meter.
12. The deep cover allows room for the following accessories, which are included with the instrument:
  - a. Rod antenna and stub.
  - b. Pair of headphones.
  - c. Dummy antenna.
  - d. Fifty Ohm Matching Impedance.
  - e. Input Cable.
  - f. Calibration Charts.
13. As a two terminal voltmeter, radio frequency levels of from 1 microvolt to 1 volt may be measured using the dummy antenna.
14. Large bias cells having longer life are included in the power supply packs where they are more conveniently accessible.

The Model 32-D is normally supplied with a dry battery pack, making it a completely portable instrument. A Model 32-U4 Rectifier Pack is available as an accessory for use on a 115 volt a.c. power supply. This pack may be clipped on in place of the battery pack and is more economical to use where conditions permit.

Other available accessories include a Model 32-XA9 Slidebacker for measuring peak response and a Model 32-XA12 Loop Probe, two inches in diameter.

#### 32-D Specifications

**Frequency Range:** 550 kc. to 25 mc. in five bands.

**Voltage Range:** 1 microvolt to 1 volt.

**Field Intensity Range:** With rod antenna, 2 microvolts to 2 volts.

**Standard Time Constants:** Charge 1 millisecond. Discharge 600 milliseconds.

**Sensitivity:** 1 to 10 microvolts, 5 to 1,000 microvolts, 100 to 10,000 microvolts and 10,000 microvolts to 1 volt.

Total of 4 ranges.

**Calibrating Source:** Internal multivibrator.

**Power Supply:** Normally supplied with battery pack, with AC rectifier pack or storage battery packs available.

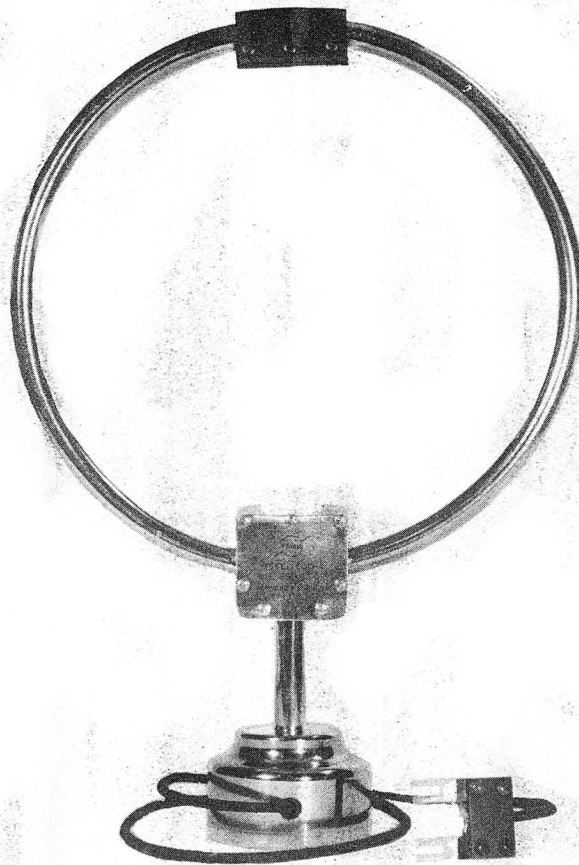
**Accessories:** Supplied with 41 inch telescoping rod antenna plus stub, pair headphones, dummy antenna, 50 ohm matching impedance, input cable, and calibration charts.

**Accessories Available:** AC rectifier pack, storage battery packs, loop antennas, loop probe, and peak reading slidebacker.

**Carrying Dimensions:** Width 7 inches. Depth 14½ inches. Height 17½ inches including cover.

**Net Weight:** 40 lbs.

**Shipping Weight:** 50 lbs. packed in 1 carton.



### THE FERRIS MODEL 500-A SIGNAL GENERATOR LOOP

The Model 500-A Signal Generator Loop is designed for use with any Signal Generator, such as the Ferris Model 16-C, 22-A or 22-D for the purpose of establishing a known field for testing such items as loop receivers, field strength meters, etc.

The loop consists of two turns on a ten inch diameter and double shielded to minimize electrostatic effects. Series resistors in the base of the loop maintain substantially constant current through the loop over its operating range of from 100 KC to 5 MC.

Values are chosen for these resistors such as to establish a field of one tenth of the signal generator output reading at a distance of 24 inches from the center of the loop. Thus, a reading of 10,000 microvolts on the signal generator will create a field intensity of 1,000 microvolts per meter at the loop of a receiver under test, providing the receiver loop is placed 24 inches from the signal generator loop and in the same flat plane.

The field intensity varies inversely as the cube of the

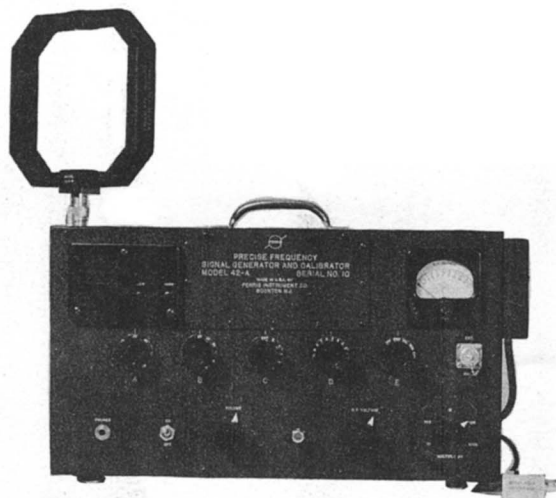
distance between the two loops so the field created at distances other than 24 inches can be readily calculated.

The field intensity is practically constant over the range of from 100 KC. to 2 MC., but falls off to 90% of this value at 5 MC., introducing a 10% error at this highest frequency. For most practical purposes, this error is inconsequential when making field measurements in this region.

The standard Model 500-A Loop is fed from the signal generator by a flexible coaxial cable, with its outer shield grounded to the loop shield and signal generator ground terminal, such as available with standard unbalanced output signal generators.

This cable is supplied with a suitable connection for any specific standard signal generator so it is necessary to specify the model of the generator when ordering the loop.

A heavy base holds the loop in an upright position when placed on a table or other flat surface.



## THE FERRIS MODEL 42-A

### PRECISE FREQUENCY SIGNAL GENERATOR AND CALIBRATOR

#### INTRODUCTION:

The demands for a high degree of radio frequency accuracy are gradually increasing due to the need of making the most effective use of the available spectrum. This is particularly true in the radio communications field where the channel widths are receiving close scrutiny with the thought of further narrowing, possibly with the use of single side band transmission, etc. The secondary crystal controlled standards often require checks against a higher primary standard to maintain the degree of precision required. Radio transmissions from the National Observatories offer the most precise standards available to most laboratories. It is the aim of this new instrument to promote greater use of this primary frequency standard by supplying several keyed frequencies above and below the transmitted signal in a very convenient and useful manner.

#### DESCRIPTION:

The Ferris Model 42-A Precise Frequency Signal Generator and Calibrator employs a new concept of obtaining and maintaining frequency precision by reason of a built in radio receiver tuned to the National Bureau of Standards Station WWV. The instrument may be used in areas where the field strength at 5 megacycles from WWV is 10 microvolts per meter or more, with a signal to noise ratio of at least two to one.

Ordinarily, the signal is picked up by a loop antenna mounted directly on the instrument, although provision is also made to introduce the signal by transmission line from an outdoor antenna when desirable.

The Model 42-A includes a crystal controlled 1 megacycle oscillator, a harmonic of which may be beat with the signal from WWV and the crystal oscillator adjusted for zero beat. The audible beat note may be heard from a loud speaker mounted in the instrument or from plugged in headphones. As a signal generator, the basic 1 mc. crystal frequency, plus various higher harmonics, are available.

These frequencies are metered and attenuated to provide any desired output level from 1 to 100,000 microvolts. The following frequencies are available for use in this manner as a result of multipliers:

1 Megacycle	30 Megacycles
2 Megacycles	40 Megacycles
3 Megacycles	50 Megacycles
4 Megacycles	60 Megacycles
5 Megacycles	80 Megacycles
10 Megacycles	90 Megacycles
20 Megacycles	100 Megacycles

As all of these frequencies stem from the basic 1 mc. crystal controlled oscillator, they have the same percentage frequency accuracy as the crystal which in turn may be kept on exact frequency by zero beating with WWV

Provision is made in the Model 42-A to beat the above fixed frequencies and their harmonics with various external signals for calibration purposes and the resultant beat notes may be heard in the instrument loud speaker or plugged in headphones. This results in a highly accurate calibrator which may be used to establish innumerable fixed frequency points up to 1,000 megacycles or the 10th harmonic of the 100 mc. output.

Thus, the instrument may be used to accurately establish the frequency of a continuously variable signal generator at various intervals which lie close to the desired operating point. Intervals of 0.5 mc. may be identified up to approximately 20 mc. and 1 mc. intervals up to 100 mc., providing the strength of the unknown external signal is 0.1 volt or more. Comparisons of frequencies corresponding to the direct output of the 42-A can be made with external signal levels as low as 1,000 microvolts.

The Model 42-A may also be used as a termination unit to meter and attenuate an external signal source such as from a shielded oscillator, providing the strength of the oscillator is approximately 1 volt or more at 50 ohms load impedance. It can, therefore, be seen that the frequency of such a shielded laboratory oscillator can first be accurately established by the 42-A, and then it may be used as a standard signal generator by employing the termination feature.

For those located in areas not covered by WWV, but served by standard signals of other frequencies, special versions of the Model 42-A may be obtained to order.

#### 42-A Specifications

**Frequency range:** Fourteen fixed frequencies available as a signal generator in range from 1 to 100 mc. Higher harmonics to 1,000 mc. available as calibrator.

**Dial system:** Frequencies selected by switches, except for direct reading dial in range from 50 to 100 mc.

**Output voltage:** Continuously variable from one to 100,000 microvolts.

**Output system:** Variable metered input to resistance type step attenuator with 50 ohm effective output impedance.

**Calibrator range:** 1 mc. intervals to 100 mc. Harmonics produce higher frequencies to 1,000 mc.

**Power supply:** The standard power supply of the regulated type is designed for 115 volt — 50-60 cycle operation. Supplies for other frequencies and voltages may be secured on special order.

**Accessories:** Loop antenna and instruction book.

**Dimensions:** Width 18 inches. Height 10½ inches without loop. Depth 8 inches including controls.

**Net weight:** 26 lbs.

**Shipping weight:** 32 lbs. packed in one carton.



## THE FERRIS MODEL 44-C COMMUNICATIONS F. M. CONVERTER

The Ferris Model 44-C Communications F. M. Converter covers a frequency range of from 200 to 500 kc. and 2 to 55 mc., with F. M. deviation values up to 125 kc. It is designed to operate in conjunction with any suitable external variable oscillator or signal generator capable of supplying approximately 0.7 volt over a frequency range of from 65 to 120 mc. unmodulated.

The Model 44-C is useful in the alignment of the low frequency I. F. transformers and discriminators found in many communication receivers such as those using 290 and 455 kc., as well as other frequencies between 2 and 55 mc. The deviation is sufficient to act as a sweep frequency generator for communication systems and internal modulation frequencies of 60 and 120 cycles are supplied for this purpose. In addition, a variable phase output voltage at 60 cycles is also furnished for the horizontal sweep of the oscilloscope.

Basically, the Model 44-C includes a 5 mc. oscillator frequency modulated by push-pull reactance tubes, giving symmetrical swings each side of a center frequency established by comparison with a 5 mc. crystal controlled oscillator. The 5 mc. F. M. oscillator is multiplied in frequency up to 120 mc., where it is mixed with the variable external source to produce a difference frequency equal to the output of the converter. The output is metered and attenuated to allow levels from 1 to 100,000 microvolts to be selected.

The frequency calibration of the instrument depends upon the calibration of the external variable source as the output frequency is the difference between this source and 120 mc., which is accurately established. Thus, an external source of 115 mc. produces an output frequency, after the built-in mixer, of 120 minus 115 mc. or 5 mc. This mixer output is broadly tuned by the National vernier dial on the converter. Curves are supplied showing the setting of this dial for various output frequencies as well as the correct frequency for the external source.

For difference frequencies below 500 kc., it is important that the external variable oscillator have high stability and complete freedom from hum modulation. A companion unit oscillator having the necessary re-

quirements is available for use with the 44-C. This item, which is known as the Ferris Model 44-D Unit Oscillator, has a frequency range of from 120.0 to 120.5 mc., which produces a difference frequency of from 0 to 500 kilocycles. Of course, when the unit is used with the Model 44-C, the useful F. M. modulated range is from 200 to 500 kc.

### 44-C Specifications

**Frequency range:** 200 to 500 kc. and 2 to 55 mc. in seven bands when used with suitable external generator.

**Dial system:** Planetary drive dial having vernier ratio of 5 to 1. The dial is engraved with 150 divisions over 270 degrees.

**Output voltage:** Continuously variable from 1 to 100,000 microvolts.

**Output system:** Variable metered input to resistance type step attenuator with 50 ohm effective output impedance.

**Modulation:** Internal frequency modulation at 60 and 120 cycles up to 125 kc. deviation, with provision for external modulation up to 10,000 cycles. Both internal and external modulation indicated by meter with dual range.

**Sweep voltage:** Supplies variable phase 60 cycle sine wave for horizontal deflection of scope.

**External generator:** This converter is made for use with a second signal generator or unmodulated oscillator capable of supplying approximately 0.7 volt over the range from 65 to 120 mc. Such a signal may be obtained from Ferris Microvolts such as the Models 18-C, 18-D or 18-FS or sections of the required external signal from the Model 44-D Unit Oscillator.

**Power supply:** The standard power supply of the regulated type is designed for 115 volt, 60 cycle operation. Supplies for other frequencies and voltages may be secured on special order.

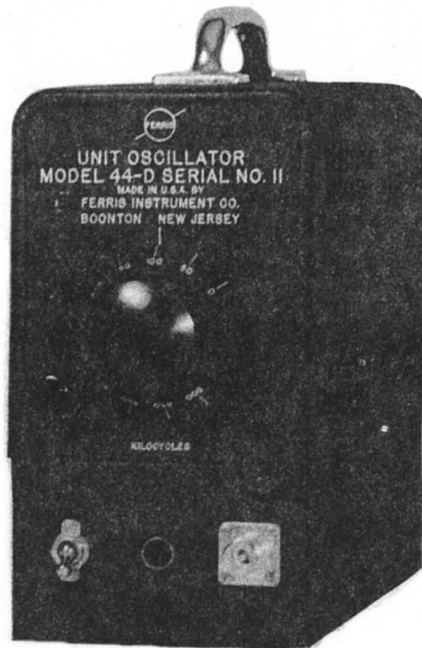
**Accessories:** Mounted calibration charts, calibration curves for each coil range and instruction book.

**Dimensions:** Width, 26 inches. Height, 12½ inches. Depth, 11 inches including controls.

**Net weight:** 40 lbs.

**Shipping weight:** 120 lbs. packed in one wooden case.





## THE FERRIS MODEL 44-D UNIT OSCILLATOR

The Model 44-D Unit Oscillator is particularly designed for use with the Model 44-C Communications F. M. Converter. It has a frequency range of from 120 to 120.5 megacycles which, when mixed with the 120 mc. F. M. signal of the 44-C, produces a difference frequency of from 0 to 500 kc.

A high order of stability and freedom from incidental A. M. or F. M. modulation characterize the Model 44-D Unit Oscillator. This requirement is achieved by the use of an exceptionally well-filtered and regulated plate supply to the type 6AF4A oscillator tube.

Means are provided to "O" set the Model 44-D to exactly 120 mc. by a small knob on the front of the instrument. The main dial then registers the departure or difference frequency up to 500 kilocycles. This range provides frequencies for aligning the intermediate transformers and discriminators of the average communications receiver when the unit is used in conjunction with the Model 44-C Communications F. M. Converter.

The Model 44-D is considerably less expensive than a suitable signal generator for use with the Model

44-C, as well as providing a small compact package. It is furnished with a coaxial cable for connection to the 44-C. Modifications of the Model 44-D for covering frequencies other than from 120 to 120.5 mc. may be obtained on special order.

### 44-D Specifications

**Frequency range:** 120 to 120.5 mc. producing a difference frequency of 0 to 500 kc. when used with the Model 44-C.

**Dial system:** Direct reading planetary type vernier dial calibrated in difference frequencies from 0 to 500 kc.

**Output voltage:** Approximately 1 volt into a 100 ohm load.

**Power supply:** Built-in power supply for use on 115 volts, 50-60 cycles. Other supply voltages and frequencies available on special order.

**Dimensions:** Width, 5 inches. Height, 11 inches. Depth 12 inches.

**Net weight:** 12 lbs.

**Shipping weight:** 17 lbs. packed in one carton.



### FERRIS MODEL 52-D UHF STANDARD SIGNAL GENERATOR

THE Ferris Model 52-D Standard Signal Generator covers the frequency range from 460 to 960 megacycles, and may be used for general purpose testing and development work in this range. It has several features which overcome defects of lower priced instruments and still the cost is less than half that of the so-called precision laboratory class.

For example, the instrument employs a tuned radio frequency amplifier which permits amplitude modulation with negligible frequency modulation, and prevents reaction of the output controls on the oscillator frequency.

Both the oscillator and amplifier operate on fundamental frequencies and each employs a new hinge type tuner of high stability. This tuner affords coverage of the entire range without resort to switching either inductance or capacity.

The output of the Model 52-D is adjustable from 1 to 100,000 microvolts at an output impedance of 50 ohms unbalanced to ground from a type N receptacle on the front panel. Various coaxial type dummy antennas and cables are available, according to customer's specification, if desired.

Internal amplitude modulation at 400 and 1,000 cycles is included with provision for external modulation up to 10,000 cycles. Modulation percentages are read on a separate modulation meter.

The output system includes a four inch output meter with calibrated scale and a decade step attenuator. This attenuator is of special construction and employs coated resistors having excellent high frequency characteris-

tics. Provision is made to check the response of the output meter against a regulated low frequency voltage with means for correction of the meter indication if required on the front panel.

Dual regulated power supplies isolate the oscillator and amplifier with both heater and plate regulation on the oscillator unit. Unless otherwise specified, the Model 52-D is for use on 105-130 volts 60 cycle AC only.

A similar companion instrument, identical in appearance with all the features of the 52-D, but with a frequency range of from 230 to 480 megacycles, is also available. This lower frequency instrument is known as the Ferris Model 52-C Standard Signal Generator.

#### 52-D Specifications

**Frequency range:** 460 to 960 megacycles.

**Tuning system:** New hinge type tuners oscillator and amplifier.

**Dial system:** Worm gear with 100 to 1 ratio with respect to 180 degree main dial.

**Output voltage:** Continuously adjustable from 1 to 100,000 microvolts.

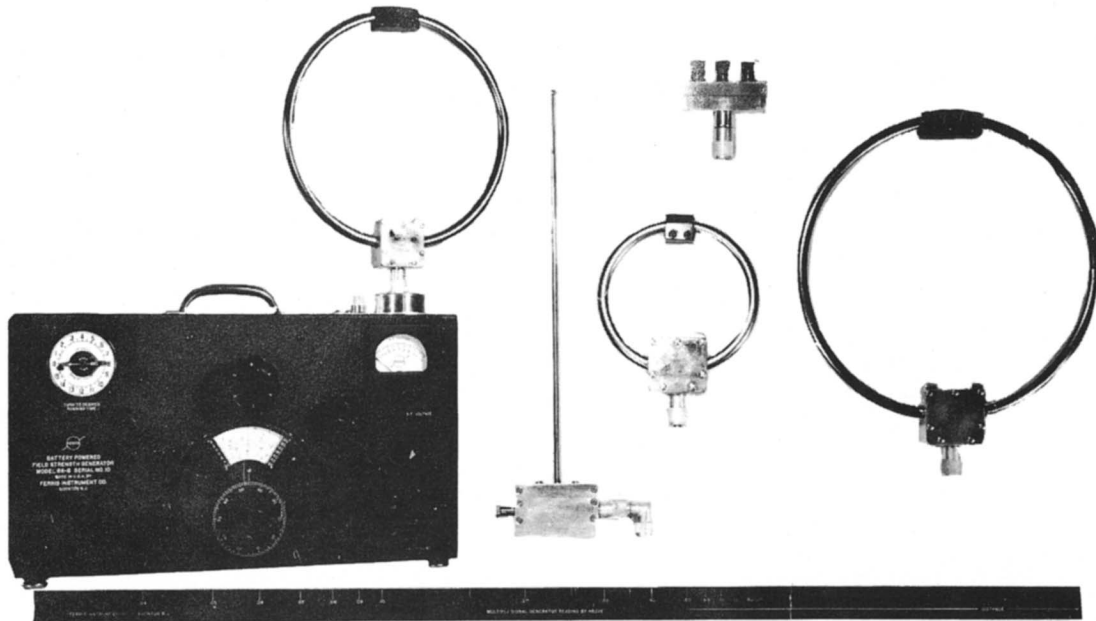
**Output impedance:** 50 ohms unbalanced from type N receptacle on front panel.

**Modulation:** Amplitude modulation up to 50% at 400 and 1,000 cycles with provision for external modulation to 10,000 cycles.

**Power supply:** Built in 105-130 volts at 60 cycles unless otherwise specified.

**Dimensions:** Width 12 inches. Height 16 inches. Depth 21 inches including controls.

Net Weight: 62 lbs



### THE FERRIS MODEL 66-B FIELD STRENGTH GENERATOR

THE Ferris Model 66-B Field Strength Generator is essentially a battery operated signal generator with provision for plugging in various transmitting loops for the purpose of creating a known field strength at established distances. This known field strength may be used for testing the sensitivity of loop type receivers, calibrating field strength meters, and numerous other applications. The instrument has a frequency of from 85 kc to 25 mc, and is capable of establishing known field strengths up to 10,000 microvolts per meter at a distance of 24 inches from the transmitting loops, or 100,000 microvolts at approximately 11 inches.

In addition to the transmitting loops, a three terminal output box is provided, with proper terminating resistors, to form a balanced output signal generator for conductive measurements. When this three terminal box is used, in place of the loops, output levels up to 100,000 microvolts per side are obtainable at an output of 15 ohms to ground from each side of the balanced line. The available balanced output from the two outer terminals ranges up to 200,000 microvolts at 30 ohms.

The use of balanced transmitting loops eliminates the error frequently encountered when a measuring loop is connected to a standard signal generator having an unbalanced output. By making the instrument self contained with an internal battery power supply a truly portable instrument is provided for field use. This arrangement also eliminates error due to a common power supply or ground loop.

A two turn loop with a 10 inch diameter is used to cover the range from 85 kc to 1 mc, and a single loop of 10 inches diameter covers from 500 kc to 5 mc. Another single turn loop with a 5 inch diameter is employed from 4 to 25 mc. All of these loops are double shielded and incorporate proper resistance networks in the base to establish correct current through the loop over its working range.

The loops may be rotated at any angle with respect to the instrument and locked in any desired position. Provision is made to insert a yardstick in the loop to determine the distance between transmitting and receiving loops.

The instrument employs six bands with a direct reading hand calibrated dial with vernier reduction for making selectivity measurements. This reduction results in a spread of approximately 4 feet of scale on the 3 inch vernier dial for each band.

In order to provide the balanced output, two separate step attenuators ganged together and two ganged calibrated potentiometers are employed, thus preserving a balanced output from the oscillator. This arrangement results in a single knob control for the calibrated potentiometer and a single knob for the step attenuator, and for all practical purposes the manipulation of the output adjustment is similar to that of the well-known Ferris Model 22-A Signal Generator.

Only one tube is used in the instrument, which makes for long operating life for the ample size batteries in the instrument. The R.F. control on the plate supply battery uses the minimum of plate current necessary to obtain standard output at any particular frequency. As a further safeguard insuring long battery life, a "Mark Time" switch is incorporated in the instrument, which automatically cuts off battery consumption within 15 minutes in the event that the device is inadvertently left on.

#### 66-B Specifications

**Frequency range:** 85 kilocycles to 25 megacycles covered in six self-contained ranges.

**Dial system:** Each range has an individually hand calibrated scale. Additional slow motion dial for selectivity measurements giving scale spread of 4 feet in each range.

**Accuracy of calibration:** Direct reading dial is accurate to plus or minus 1%.

**Output voltage:** Output balance to ground from 1 microvolt to 100,000 microvolts each side to ground.

**Output impedance:** 15 ohms each side to ground or 30 ohms overall with three binding post attachment.

**Output system:** Calibrated output meter and decade step attenuator.

**Power Supply:** From internal batteries. Requires two 6 volt lantern type batteries and two 45 volt "B" batteries.

**Accessories:** Includes three terminal output box for signal generator use. Three loops required to cover full range as desired.

**Dimensions:** Width 18¼ inches, Height 12 inches without loop. Depth 8 inches including controls.

Net Weight: 26 lbs.