



Type 1013 Beat Frequency Oscillator is a signal generator that covers the frequency range from 200 Hz to 200 kHz. The instrument includes a regulator stage for external feedback, an accurate built-in V.T. voltmeter, an internal generator for variable frequency modulation of the output signal and a 90 dB output attenuator variable in 10 dB steps. The output impedance is variable to give maximum power output (2.5 W) in a load of 6–60–600 or 6000 ohms. It features a true logarithmic frequency scale, a frequency interpolating scale, and a clutch for connection to an external motor drive for automatic tuning. Distortion is less than 0.3% at 10 kHz unloaded. See also combined units Type 3306 and 3328.

Type 1017 Beat Frequency Oscillator is similar to BFO 1013. Frequency range: 2 Hz to 2 kHz. No frequency modulation system. Variable meter damping. Distortion less than 0.25% at 100 Hz unloaded. See also combined units Type 3307 and 3328.

Type 1022 Beat Frequency Oscillator is similar to BFO Type 1013 with the exception of the following. Frequency range 20 Hz to 20 kHz. Output attenuator: 100 dB. The distortion is

less than 0.1% at 1 kHz unloaded. See also combined units Type 3308, 3329 and 3332.

Type 1013 – 1017 – 1022 are available as A-, B- or C-models.

TU 0005 Output Transformer with symmetrical output for use with the BFO Type 1022. Output imp. 600 ohms. Transformer ratio $\sqrt{10} : 1$.

Type 4709 Audio Frequency Response Tracer for production testing and inspection of amplifiers, gramophones, tape recorders, filters, loudspeakers and other electro-acoustic devices. The instrument contains a cathode-ray oscilloscope with a 14", long-persistence screen; logarithmic y-amplifier with three dynamic ranges: 50 dB logarithmic, 25 dB logarithmic or linear.

The horizontal deflection is determined by the frequency of the input signal (logarithmic). Standard frequency ranges: 20 Hz–20 kHz and 200 Hz–5 kHz total horizontal scale. Used in conjunction with B.F.O. Type 1022 frequency sweeps are provided automatically with built-in motor drive.

Sweep speed: variable from 3 oct./sec. to approx. 1/3 oct./sec. Any portion of the frequency range may be scanned automatically. Available as A- or C-model.



Type 1402 Random Noise Generator gives a random noise signal with uniform spectrum density ("white" noise) in the frequency range 20 Hz–20 kHz, within ± 0.5 dB. Symmetrical Gaussian magnitude distribution to more than 4 σ . The Noise Generator has a built-in 3 dB/Octave weighting network. Selectable output impedances, intended for loads of 6, 60, 600, and 6000 ohms. Power output 0.25 watts (instantaneously 4 watts at the noise peak magnitudes). Various output voltages, maximum 40 V R.M.S., 170 V peak. The built-in indicating meter, with selectable integrating times, measures the true R.M.S. of the noise voltage. An output is provided, having a calibrated step attenuator. The signal-to-noise ratio is as high as 70 dB, which ensures Gaussian magnitude distribution, even for narrow bands of noise. Additionally, the Noise Generator is provided with terminals for connection of external filters. When using the B & K Band-Pass Filters Type 1612, 1/3 or 1/1 octave noise bands can be selected successively from the Noise Generator in the range 11 Hz–25 kHz.

See also voltmeter Type 2417. Available as A-, B- or C-model.

Type 3204 Tapping Machine is designed for field and laboratory measurements of impact sound transmission in buildings and other structures. This impact sound generator, which complies with ISO recommendations, produces 10 standard impacts per second. Operates from 50 Hz or 60 Hz supplies. Five hammers are used, each weighs 500 g and falls vertically through 4 cm. Both steel and rubber hammer-heads supplied. Housed in mahogany cabinet, 55 cm X 20 cm X 20 cm. Weight 16 kg (35 lbs.).

Type 1024 Sine Random Generator gives 3 types of signals: sine waves, narrow bands of random noise and wide band random noise. It has output facilities similar to those of Type 1022 for sine waves. For narrow band noise the maximum output power is 0.25 W. The output for wide band noise corresponds to that of the Noise Generator Type 1402. Random noise bandwidth of 10–30–100 and 300 Hz. Logarithmic frequency scale similar to Type 1022 with provision for external sweep drive. Available as A-, B- or C-model. See also combined units Type 3309, 3334, and 3335.



2107 B 1:8



2112 B 1:8

Type 2107 Frequency Analyzer is a frequency selective vacuum-tube voltmeter, continuously variable through six ranges covering the frequencies 20 Hz–20 kHz. Input impedance is 2.2 M Ω . Sensitivity ranges: 100 μ V–1000 V for full deflection. Linear response 2 Hz–45 kHz. Constant percentage bandwidth type, bandwidth variable in steps from 6% to 29%. The internationally standardized weighting networks are built-in and can be inserted at the same time as the band-pass filters. The instrument can be connected via a flexible drive to the Level Recorder Type 2305, and the frequency ranges scanned in synchronism with the preprinted recording paper scales. Frequency analysis can then be carried out automatically. The meter rectifier can be switched to indicate true RMS, average or peak values. Two different degrees of meter damping are included. Linear meter scale calibrated in volts, also dB-scale and percentage scale for absorption measurements in conjunction with Type 4002. Input and power supply socket as described under Type 2603. See also combined units Type 3314 and 3333. Available as A-, B- or C-model.

Type 2112 Audio Frequency Spectrometer is a high-gain, low-noise amplifier with 11 octave filters and 33 $\frac{1}{2}$ -octave band-pass filters for accurate analysis of the frequency spectrum in the range 22 Hz to 45 kHz. Center frequencies from 31.5 Hz to 31.5 kHz and 25 Hz to 40 kHz. Three standardized weighting networks for sound level measurements are included. Used as VTVM the frequency characteristic is linear from 2 Hz to 45 kHz. Input Impedance 2.2 M Ω /30 pF. Sensitivity ranges: 100 μ V–1000 V for full deflection. With a switch for average, peak or true RMS indication the output may be read directly on the built-in VTVM, or the instrument may be conveniently connected to the Level Recorder 2305. Two different degrees of meter damping included. The scale is calibrated in volts, decibels and in % absorption for use in connection with 4002. Input connector and power supply is provided for Cathode Followers, Artificial Ears, Microphones etc. as listed under Type 2603. See also combined units Type 3315, 3332 and 3335. Available as A-, B- or C-model.



1607 B 1:8



1612 B 1:8

Type 1607 Frequency and Distortion Measuring Bridge is a tunable blocking network for more than 60 dB attenuation of any single frequency within the range 20 Hz–20 kHz. 20 dB \pm 1 dB attenuation of frequencies between 2nd and 7th harmonic of the blocked frequency. Input resistance 5.5 k Ω –19 k Ω . The bridge is normally used in conjunction with the VTVM 2409, Amplifier 2603, 2604, Analyzer 2107 or Spectrometer 2112 for measurements of extremely low harmonic distortion. Available as A-, B- or C-model.

Type 1612 Band-Pass Filter Set for complex signal analysis consists of 11 octave and 33 fixed $\frac{1}{2}$ -octave band-pass filters, with center frequencies from 31.5 Hz to 31.5 kHz and 25 Hz to 40 kHz respectively. The internationally standardized weighting networks for sound level measurements are also included. The filters can be manually selected by means of the 50-position switch or automatically scanned when coupled to the Level Recorder 2305. The Amplifier 2603 or 2604 or Frequency Analyzer 2107 are ideally suited for use with the Filter Set for making audio frequency spectrum analysis. Available as A-, B- or C-model. See also combined unit Type 3333.



1620 B 1:8



ZS 0301



ZS 0146 1:12

Type 1620 Extension Filter Set contains three $\frac{1}{2}$ Octave band-pass filters with the center frequencies 12.5, 16 and 20 kHz and one $\frac{1}{2}$ octave filter, center frequency 1.6 kHz. Extends downwards the measuring range of Spectrometer 2112 and Band-Pass Filter Set 1612. Available as A-, B- or C-model.

ZS 0301 Phosphorometer Filter is designed for noise measurement in radio broadcasting audio systems. It should be used with Microphone Amplifier 2603–2604 or Analyzer 2107–2112. Meets the requirements of C.C.I.F. recommendations.

ZS 0146 Filter Chassis is electrically identical to Type 1620 mentioned above, but is delivered without cabinet. For mounting in the combined units Type 3315, 3332, 3333 and 3335.

T1 0001 Input Transformer with symmetrical input for use on Type 2107 – 2112 – 2409 – 2410 – 2603 – 2604 or 2305. Ratio 1:1. Accuracy \pm 0.2 dB in the frequency range 10 Hz–20 kHz. Input impedance 20 kohms or 600 ohms. Low capacity cable AO 0018 included.



3350 1:15

Type 3350 Electroacoustic Transmission Measuring System is designed for objective measurements of reference equivalents of complete subscriber's telephone sets or single parts thereof. It will measure sending, receiving and side tone reference equivalent by indicating the 0.6 or 1st power of the integrated r.m.s. value measured over the 200–4000–200 Hz range varied logarithmic in 1 sec. on a modified Type 1022 B.F.O.

Replaceable scales in dB or N on the Reference Equivalent Meter Type 4901, Frequency response is visualised on Response Tracer 4709 or permanently recorded on Level Recorder Type 2305. Non-linear distortion and noise may be recorded through 1/3-octave Analyzer 2112. Microphone d.c. supply and feeding coils for various impedances, carbon microphone d.c. resistance measurements, sending and receiving impedance in choice of 200–600–900 Ω and weighting for the artificial voice according to S.F.E.R.T. are all built into the Power Supply Type 4902. Compressor regulated Artificial Mouth Type 4216 constantly monitored by Type 2603 and Artificial

Ear are mounted in a Telephone Receiver Test Head Type 4903 holding the handset and allowing various positions of test. The Artificial Ear is based on Condenser Microphone 4132 + 2615 and supplied with 4 cm² (Dr. Braun) and 6 cm² (ASA and NBS) couplers (DB 0597, DB 0598). Regulating system in 4216 based on 4134 + 2615. UA 0095, holder for transmitter inserts, UA 0086, holder for receiver inserts supplied for production testing. Easy calibration procedure; Pistonphone Type 4220 included.

Type 3351 Electroacoustic Transmission Measuring System is designed for production control measurements. It contains the same units as Type 3350 with the following exceptions: Type 4709 is omitted. Type 2305 replaced by KQ 0021 (cabinet for accessories). Type 2112 replaced by Type 2603 and Type 4903 replaced by single holding devices for Artificial Ear, Mouth and Inserts. Incl. transparent covers for the vertical front panels.



2006 B 1:8

Type 2006 Heterodyne Voltmeter is a frequency selective transistorized voltmeter for the measurement of amplitude, frequency, and modulation of radio frequency signals, within 100 kHz–230 MHz in 7 ranges. Dynamic range 1 μ V to 50 V, 75 Ω or high impedance input. Modulation meter 0–80 % AM or 0–80 kHz FM. Bandwidth 2.5 kHz and 200 kHz. The instrument is AC operated or operated by rechargeable batteries. Built-in calibration generator 30 MHz, 2.5 mV. A built-in loudspeaker facilitates quick identification of signals.

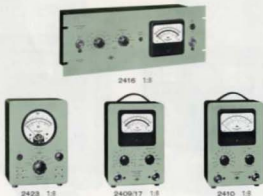
Type 2603 Microphone Amplifier is a low noise amplifier with indicating meter. Amplification adjustable in 10 dB steps from –40 to +100 dB. Sensitivity ranges: 100 μ V–1000 V for full deflection. Input impedance 2 M Ω . Flat response curve from 2 Hz–45 kHz. A switch changes this linear characteristic into



2603 B 1:8

one of the three standardized weighting curves for sound level measurements. Two different degrees of meter damping included. Meter rectifier can be switched to indicate true RMS, average, or peak values. Supplied with a screened coaxial input socket and a 7-pin socket for connecting the Cathode Followers Type 2612–13–14 and 15, the Hearing Aid Test Box Type 4212, the Microphone Selector Type 4408 or the Preamplifier Type 1606. Provision is made for insertion of external filters such as the Band-Pass Filter Set 1612. Available as A-, B- or C-model. See also combined units Type 3329 and 3334.

Type 2604 Microphone Amplifier is similar to Type 2603 except for the frequency response, which is flat from 10 Hz to 200 kHz. Input impedance 1.1 M Ω . Available as A-, B- or C-model.



Type 2409 Electronic Voltmeter is a vacuum tube voltmeter for AC measurements in the frequency range 2 Hz–200 kHz, 11 voltage ranges at full-scale deflection 10 mV to 1000 volts. Built-in reference voltage. Input impedance 10 Megohms. Meter rectifier can be switched to indicate **true RMS**, average, or peak values. Two different degrees of meter damping. The instrument is supplied with output terminals and is also well-suited for use as calibrated amplifier.

Type 2410 RMS Audio Voltmeter for the frequency range from 5 Hz to 50 kHz. Sensitivity for full-scale deflection variable in 10 dB steps from 0.01 to 1000 volts. Input impedance 1.5 Mohms. Quasi RMS indication of all AC signals with crest factor up to 3. Maximum gain 60 dB.

Type 2416 Electronic Voltmeter is similar to Type 2409 but mounted in a steel cabinet with flange for 19" rack mounting (height 7").

Type 2417 Random Noise Voltmeter is meant for measurement of narrow band random noise. Variable time constant from 0.3 sec. to 100 sec. allows measurements on noise bands as narrow as 3 Hz band-width. Frequency Range 2 Hz–20 kHz. Quasi RMS indication of complex signals. DC output for Level Recorder. Input impedance and sensitivities as for Type 2410.

Type 2423 Megohmmeter is designed for resistance measurements in 7 ranges from 0.1 M Ω to 10⁷ M Ω using test voltages of 10 V and 100 V. In addition the instrument can be used as a DC voltmeter covering 10 mV to 2000 V in five ranges with full deflection for 1 Volt, 10–100–1000 and 10000 Volts, and for measurement of DC currents from 10 pico-amp. to 100 μ amp. in 6 ranges. Input impedance 100 M Ω and 100 M Ω . Semi-logarithmic meter scale.

1503-1504
1505-1506 1:8

ZR 1702 1:4



3902 1:8



3930 1:8

MM 0002
1:8

Type 1503 Deviation Bridge is a fast direct-reading instrument for accurately determining the percentage deviation of impedance and phase angle of resistors, inductors and capacitors from an external standard. Test component ranges: Resistance: 1 Ω to 30 M Ω . Inductance: 2 mH to 2000 H, and Capacitance: 500 pF to 5000 μ F. Six interchangeable meter scales included, four calibrated -1.5% to $+1.5\%$, -7% to $+8\%$, -25% to $+35\%$, -50% to $+100\%$ plus two blank scales. Test frequency 100 Hz. A.C. operated.

Type 1504 Deviation Bridge is similar to Type 1503 except for the measuring ranges: R = 10 Ω to 10 M Ω , L = 2 mH to 100 H, and C = 50 pF to 10 μ F. Test frequency 1 kHz.

Type 1505 Deviation Bridge is similar to Type 1503 but covers the measuring ranges: R = 10 Ω to 1 M Ω , L = 0.2 mH to 2 H, and C = 30 pF to 1 μ F. Test frequency 10 kHz.

Type 1506 Deviation Bridge is similar to Type 1503 but for the measuring ranges: R = 10 Ω to 50 k Ω , L = 20 μ H to 20 mH, and C = 20 pF to 0.1 μ F. Test frequency 100 kHz.

ZR 1702 Box for Standard resistors, inductors, or capacitors for Deviation Bridges 1503, 1504, 1505, and 1506. Min. quantity 10 units.

Type 3902 Test Jig facilitates rapid production testing of components in conjunction with Deviation Bridges 1503, 1504, 1505, and 1506.

Type 3930 Complex Modulus Apparatus is designed for dynamic measurement of the complex modulus of elasticity (Young's modulus + internal damping factor) of solid materials and coating desluders. Type 3930 is a precision test jig for clamping sample bars and mounting the two magnetic transducers MM 0002 which are included. Type 3930 operates at temperatures of up to $+250^{\circ}\text{C}$ (480°F). It is designed to be used in conjunction with the combined units Type 3329 or 3332 providing all facilities for accurate measurements in the range 20 Hz–20 kHz. Height 33 cm (13").

MM 0002 Magnetic Transducer is an electro-mechanical transducer of the variable reluctance type which can be used as velocity-sensitive vibration pick-up or as electro-magnetic vibration exciter. Temperature range up to $+250^{\circ}\text{C}$ (480°F). Small high- μ discs to be cemented in front of the transducer are supplied for detection or excitation of non-magnetic structures.



4131/32+2613 1:2



4133/34+2615 1:2



4135/36+UA 0035+2615 1:2



4131/32 1:2



4131/32 1:2



4133/34 1:2



4135/36 1:2

Cartridge Type	6131 6132	6133 6134	6135 6136
Diameter	0.938" 23.77 mm	1.125" 28.58 mm	1.125" 28.58 mm
Associated Cathode Follower	2612 or 2613	2614 or 2615	UA 0035 + 2614 or 2615
Sensitivity at cath. foll. output	3 mV/μbar	1 mV/μbar	0.2 0.1 mV/μbar
Polarization voltage	300 Volts		
Frequency response *)	30 Hz 18 KHz	30 Hz 40 KHz	35 Hz 30 Hz 70 KHz
Flat range (limits)	(1) 18 KHz (2) 7 KHz	20 Hz 15 KHz	20 Hz 15 KHz
Dynamic range **)	13 dB - 148 dB	12 dB - 140 dB	14dB - 140dB
Temperature coefficient	less than ± 0.01 dB/°C between -50°C and +60°C		

*) (1) Free-field normal incidence (0°).
(2) Pressure level random incidence for 4134.

***) From A-weighted noise level to 4% distortion level at 0.002 μbar.

Condenser Microphones designed for precision measurements, and featuring, in particular small ultra-wide frequency and dynamic ranges, and excellent long-term stability. Six

different microphone cartridges with six different associated cathode followers cover all types of measurement at audio and ultrasonic frequencies. The microphone cartridges are screwed directly (or by means of an adaptor Type UA 0035 in the case of the quarter-inch cartridges) onto the associated cathode follower, making a rugged unit well suited for "in the field" use. An individual calibration chart with frequency response plot is delivered with each cartridge. Type 4132 fulfills the requirements of ASA Z 24.8. 1949 (Type L).

The **Cathode Followers** are powered directly from the "Condenser Microphone Input" socket of the B & K instruments.

Cathode Follower Type	2612	2613	2614	2615	2617
Diameter of housing	23.77 mm (0.938")	12.7 mm (1/2")	23.77 mm (0.938")	23.77 mm (0.938")	23.77 mm (0.938")
Connection Type	Goose-neck	2 m-long cable	Goose-neck	2 m-long cable	2 m-long cable
Input Impedance	270 MΩ/3 pF	700 MΩ/3 pF	700 MΩ/3 pF	1200 MΩ/3 pF	1200 MΩ/3 pF
Output Impedance	approximately 750 Ω				



Type 2630 Cathode Follower is similar to Type 2613, but battery driven, (3 X Mallory RM1 cells included) for use with portable equipment. The low output impedance, 300 ohms, makes it suitable for use in conjunction with long cable connections. The dynamic range is approximately 15 dB less than for Type 2613.

UA 0030 Input Adaptor adapts 1/2" microphones to Sound Level Meter or 1" cathode followers.

Type 2617 Insert Voltage Cathode Follower is designed in accordance with the requirements set up in proposed I.E.C. and A.S.A. recommendations for calibration of Laboratory Standard Microphones. It is suitable for calibration of microphone cartridges according to the insert voltage method. Input impedance 1200 MΩ; output impedance 800 Ω. A Junction Box ZH 0007 is included. Type 2617 may also be used as a normal cathode follower for Type 4131/32 microphones down to 2 Hz.

UA 0039 Extension Connector is a flexible rod used to mount 1/2" or 1" microphones remote from 1" cathode followers or sound level meter.

UA 0035 Adaptor for mounting of a 1/4" microphone on a 1/2" cathode follower.

AO 0033 Microphone Extension Cable allows the 1" or 1/2" microphone to be mounted remote from the Sound Level Meter 2203. It has a double screen utilizing the guarding system. Length: 3 meters.

UA 0051 Nose Cone for mounting on Condenser Microphones Type 4131 instead of the protection grill to reduce wind noise and make the characteristics more omnidirectional.

UA 0052 Nose Cone for Type 4133 or 4134.

UA 0053 Nose Cone for Type 4135 or 4136.

UA 0055 Random Incidence Corrector is used in place of the normal protection grid on the microphones and sound level meters, to obtain an omnidirectional characteristic of the 1" microphone.

UA 0056 Rain Cover for 1/2" microphones. For continuous outdoor use. Built-in electrostatic actuator for sensitivity checks.