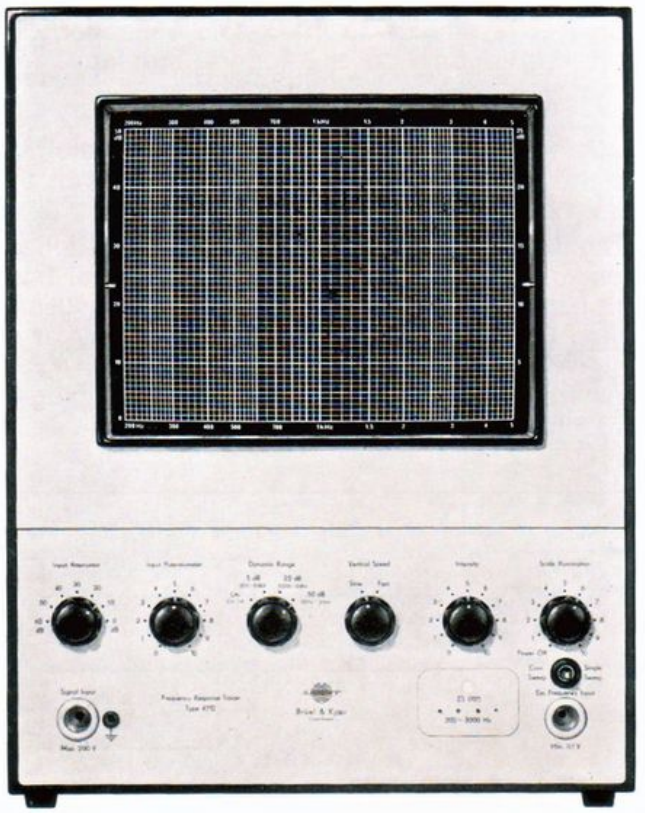
type 4712

frequency response tracer

Features:

- Automatic synchronization to input frequency
- Interchangeable frequency ranges
- Four dynamic ranges, logarithmic or linear
- Single sweep or continuous display
- 14″ screen
- Automatic operation with BFO's 1022 or 1024



Frequency Response Tracer Type 4712

The Frequency Response Tracer Type 4712 is designed to be used in connection with a frequency scanning oscillator for production control testing and inspection of amplifiers, microphones, loudspeakers, audio frequency filters and other electroacoustic devises.

The Tracer is delivered with a sweep motor that fits into the B & K Beat Frequency Oscillators Types 1022 and 1024. Any frequency range from 20 Hz to 20 kHz can be chosen and as the Tracer only requires a single input it is ideally suited for checking the frequency response of communication lines.

Due to its easy operation it is useful also for development and service in the field of electronics and electroacoustics.

The Tracer displays the frequency response of the unit under test on the screen of a 14″ cathode ray tube. The y and x deflections are both controlled by the input signal so that the deflection on the screen corresponds to the amplitude and the frequency of this signal.

The x-deflection is controlled by a frequency sensitive circuit with an output depending exclusively upon the frequency of the input signal, while the y-deflection is controlled by the amplitude through a logarithmic or a linear amplifier.

Uses:

- Rapid frequency response measurements on electronic, electroacoustic and mechanical devices
- Frequency response measurements on complete communication systems
- Frequency response measurements on channel filters in carrier frequency systems
- Educational purposes

Input Circuitry

The input signal is fed first to a 10 dB potentiometer and 60 dB input attenuator (see block diagram). The attenuator is scaled in 10 dB steps, while the potentiometer is continuously variable. Thus, the signal can be adjusted over a wide dynamic range of input levels.

Amplifiers

From the input attenuator, the signal goes to: (1) a linear, and (2) a logarithmic amplifier for signal conditioning. The output signal from either of these amplifiers can be chosen to feed a DC amplifier which drives the y-deflection coils. Switch selection of either linear or log amplification is located on the front panel of the Tracer. Ranges available are: logarithmic 50, 25 or 5 dB F.S.D.; linear 0–1 volt.

Part of the logarithmic, amplified signal is fed into the frequency-to-DC converter. This provides drive voltage to the x-axis deflection circuit proportional to the log of the input frequency.

A major feature of the tracer is that the x-axis deflection is independent of wave form distortion as the frequency-to-DC converter reacts on the zero crossings of the input signal only.

An external frequency input allows the x-deflection to be independent of the signal level from the test device. This feature is particularly useful when the test signal is excessively noisy or of a low voltage level.

The frequency range is controlled by a plug-in unit on the front panel.

The ranges 20 Hz to 20 kHz and 200 kHz to 5 kHz are standard and the corresponding plug-in units are supplied with the instrument. A linear range 150 Hz to 4.15 kHz and empty plug-in units for special adaptation can be supplied on special order.

Interchangeable plexiglass scales for the two standard ranges as well as blank scales for drawing tolerance curves etc. to be inserted over the graduated scales are supplied with the instrument.

The frequency response of the y-deflection is linear up to 200 kHz and by using frequency division of the signal to the "External Frequency" input the frequency range of the x-deflection can be extended up to 200 kHz. This can be used for instance for checking channel filters in carrier frequency systems.

Frequency Scanning

The 4712 can be used for automatic frequency plotting together with a B & K Beat frequency oscillator Type 1022 or 1024.

An electric motor for the drive of the frequency sweep mechanism is supplied with the Tracer, ready for easy installation into the oscillator. The Tracer contains all the controls necessary for automatically stopping, starting and reversing the drive motor, so that any part of the frequency range can be scanned continuously and repeatedly with sweep speeds variable from about one third octave/sec. to three octaves/sec. Manual control for single sweeps is also provided.

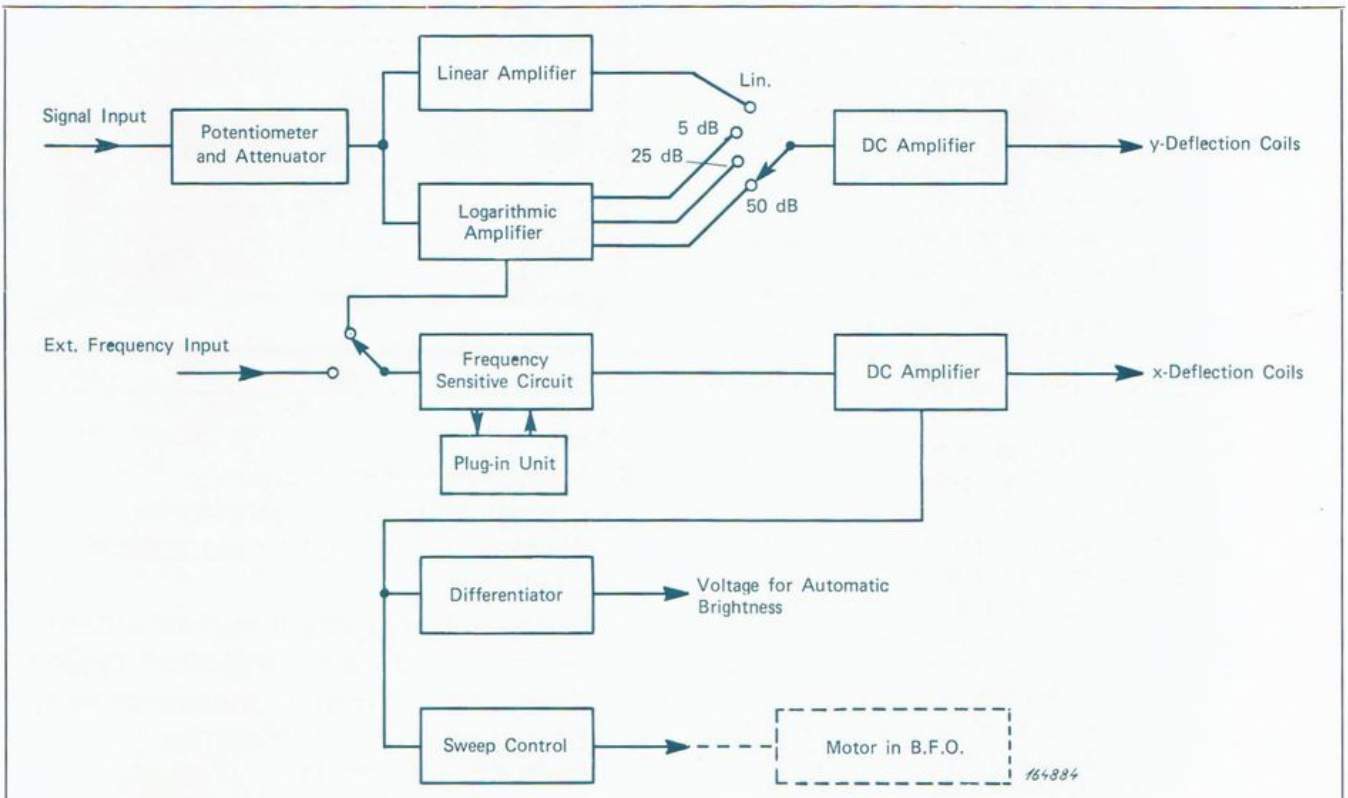


Fig. 1. Block diagram.

Automatic Brightness Control, Blanking Level

The 4712 also features automatic brightness control so that the brightness is reasonably independent of the sweep speed. It can be set to give equal brightness in both directions of sweep, or to extinguish the spot when it moves from right to left. Automatic blanking of the lower part of the screen is provided to eliminate a noisy or irregular low level part of the trace. A potentiometer at the back of the instrument adjusts the blanking level between zero and approximately half scale.

Examples of use

In Figures 2, 3, 4 and 5 are shown typical set-ups with the Frequency Response Tracer Type 4712. The Frequency Response Tracer is ideally suited for frequency response checks on production lines. Used with the Beat Frequency Oscillator Type 1022 or the Sine Random Generator Type 1024 in its sine mode, frequency response curves are displayed automatically. Predrawn tolerance limits will allow very fast determination as to whether the tested item is within allowable tolerance limits. When testing different items at the same time the scales with tolerances limits can easily be changed. If the compressor circuit of the oscillator is not used one oscillator can serve several test stands equipped with the Tracer.

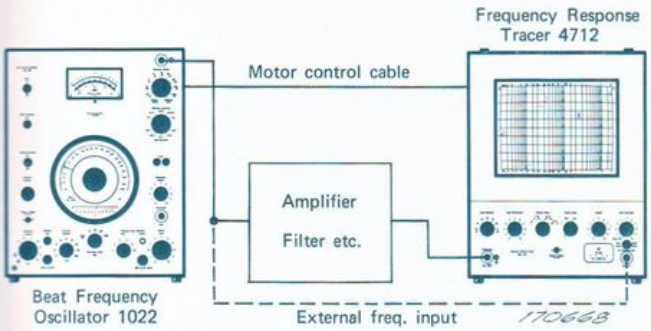


Fig. 2. Set-up for finding the frequency response of AF amplifiers, filters, etc. The external frequency input is only used if the output signal of the tested object is too low for the x-axis control.

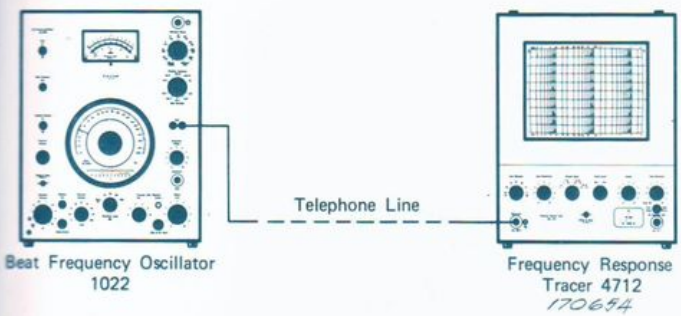


Fig. 4. Set-up for checking the frequency response of telephone lines.

Used for checking the frequency response of telephone and other communication lines one Tracer can be used to give the frequency response of all lines where a swept signal is applied in the other end irrespective of distance and location.

Checking of channel filters in carrier frequency systems can as illustrated be made with the Beat Frequency Oscillator Type 1013 which covers the range 200 Hz to 200 kHz and which has built-in frequency modulation. It may possibly have to be modified in order to cover the desired sweep range. In this case the carrier frequencies are used in a mixer to create the low frequency sweep for the x-deflection.

Other applications are checking frequency responses of grammophones and tape recorders with pre-recorded records and tapes (provided speed is constant enough to give a well defined x-deflection), checking of mechanical frequency responses using vibration excitation and pick-up transducers, frequency response measurements on microphones utilizing the compressor circuit of the BFO to keep the sound level constant. For educational purposes the Tracer gives a fast display of the influence of changes made to circuits etc.

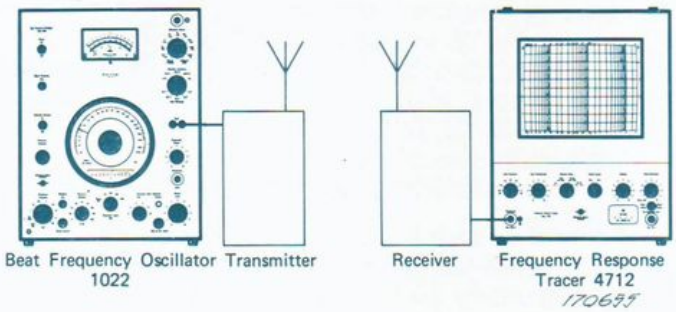


Fig. 3. Set-up for checking the frequency response of radio communication systems.

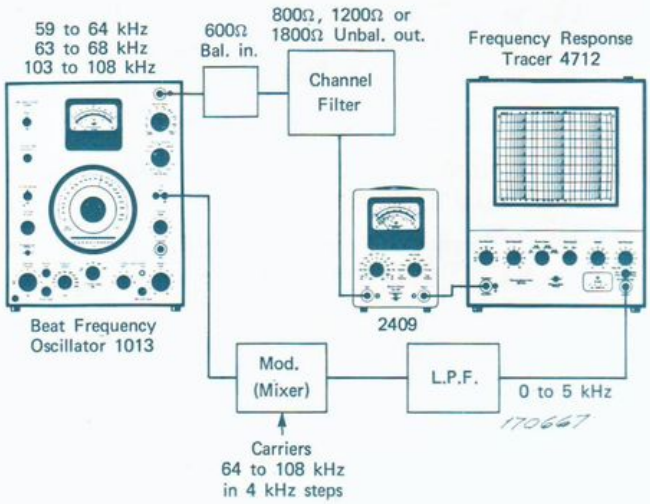


Fig. 5. Set-up for checking the frequency response of channel filters in carrier frequency systems. The frequency sweep is obtained by internal modulation in the BFO Type 1013.

Specifications 4712

Input Impedance: Approximately 100 kΩ.

Vertical Deflection: Arithmetic average signal rectifier calibrated for correct RMS indication of sinusoidal signals. Logarithmic scales 0–50 dB re 10 mV, 0–25 dB re 10 mV and 0–5 dB re 100 mV. Linear scale 0–1 V, linear from 0.1 V.

Frequency Response of Vertical Deflection: Input Potentiometer at maximum. All ranges: within 0.5 dB from 5 Hz to 200 kHz, and within 0.1 dB from 20 Hz to 50 kHz.

Vertical Speed: Chosen by switch.
Approximately 1 dB ripple at 20 Hz with rise time 60 msec, or 1 dB ripple at 200 Hz with rise time 6 msec.

Horizontal Deflection: Frequency sensitive, insensitive to signal amplitude.

Frequency Range: Plug-in units delivered as standard accessories: Logarithmic 20 Hz to 20 kHz. Type ZS 0120 and logarithmic 200 Hz to 5 kHz. Type ZS 0121. Other ranges may be obtained down to one decade, depending on components in plug-in filter unit.

Frequency Input: Internal from vertical amplifier (min. 5 mV amplifier input) or direct from external generator (0.1 to 120 V, input impedance 5 kΩ). Insertion of a plug into the EXT. FREQUENCY INPUT socket activates a switch disconnecting the vertical amplifier input to the frequency sensitive circuit.

Horizontal Speed: Maximum speed at which spot will follow sudden frequency change is approximately 30 mm per period of signal frequency, i.e. in practice no delay in frequency indication.

Cathode Ray Tube: 14″ screen, long persistence.

Rectilinearity: Pure horizontal or vertical deflection follows the calibration lines on the scale with a deviation of less than ± 1 mm.

Scale Accuracies: Better than 1 % of full scale.

Drift: Less than 1 mm over one day after 5 minutes warming-up time.

Frequency Sweep: By motor in BFO, controlled from 4712. Single sweep or continuous.

Sweep Range: Horizontal deflection reverses the sweep at positions chosen by screwdriver operated potentiometers in 4712.

Stability of Sweep Limits: Better than 1.5 mm during a day after normal warming-up time.

Sweep Return Mode: Fast or normal, clockwise or counterclockwise chosen by screwdriver operated switch.

Sweep Return Trace: ″On″ or ″Off″ chosen by screwdriver operated switch.

Blanking: Below a certain level set by screwdriver operated potentiometer. Maximum blanking level at least half scale.

Power Supply: 100 – 115 – 127 – 150 – 220 or 240 V AC, 50–60 Hz. Consumption approx. 75 Watt.

Mains Voltage Variations: Mains voltage variations of ± 10 % will cause less than 1 mm spot movement.

Dimensions (excl. knobs):

Height:	Width	Depth	Weight
48 cm	38 cm	35.5 cm	55 lbs.
19″	15″	14″	25 kg

Cabinet: The Tracer is delivered in a metal cabinet as a Type A or with a frame for 19″ rack mounting as a Type C instrument.

Accessories Included:

2 Screened plugs JP 0101
1 3 pole plug JP 4701
5 Blank Scales SA 0512
1 Scale 20 Hz to 20 kHz SA 0509
1 Scale 200 Hz to 5 kHz SA 0510
1 Drive Motor with accessories UM 1014
1 Scale removing tool QA 0037
1 Plug-in filter 20 Hz to 20 kHz ZS 0120
1 Plug-in filter 200 Hz to 5 kHz ZS 0121
1 Screen Hood SD 0008
Remote control cable AQ 0009
Power Cord and various fuses and lamps

Accessories Available:

Empty plug-in unit ZS 0122
Plug-in filter linear 150 Hz to 4.15 kHz ZS 0124
Scale 150 Hz to 4.15 kHz SA 0511