

## Spectrum Shaper

Type 5612

### FEATURES:

- Thirty-six 1/3 octave band-pass filters each with its own attenuator
- Frequency range from 11 Hz to 45 kHz
- Filters conform to IEC 225-1966, ANSI S1.11-1966 Class III and DIN 45652
- Single filter notching of approximately 50 dB
- Roll-off attenuation better than 40 dB per octave
- Individual test point on each channel to aid adjustment
- Attenuator slider knobs to give a visual representation of the selected spectrum shape

### USES:

- Signal shaping of acoustic and electro-acoustic spectra

- Band stopping and limiting
- Normalizing system frequency response
- Frequency compensation in non-linear recording and analysis systems
- "Tape Scrubbing"—selectively removing interference from recordings
- Simulation of hearing loss
- Simulation of attenuation characteristics of structural partitions
- Simulation of frequency-dependent transfer characteristics
- Group auditory training and jury listening tests
- Creating special sound effects

The Type 5612 Spectrum Shaper is used to modify the overall frequency response of acoustic and electro-acoustic systems. Its 36 individually regulated, narrow-pass bands with good roll-off attenuation also make it suited for use as a high-pass, low-pass, or a bandpass filter which can be adjusted for many applications.

The input signal is fed into thirty-six parallel channels, each having its own bandpass filter and attenuator. The filters are arranged in contiguous bands one-third octave wide, together covering the frequency range of the instrument. The signal level in each individual band can be attenuated by a sliding potentiometer to give any required spectrum shape. Levels in all bands are summed and the resulting composite signal is presented at the output terminal.

### Input

A simplified block diagram of the 5612 is shown in Fig. 1. The input signal is fed via an impedance-converting amplifier so that the input impedance of the instrument is greater than 100 k $\Omega$ . From the amplifier, the signal is fed to the common inputs of all channels, or it may be fed directly to the output stage via a summing resistor, thus by-passing the filters.

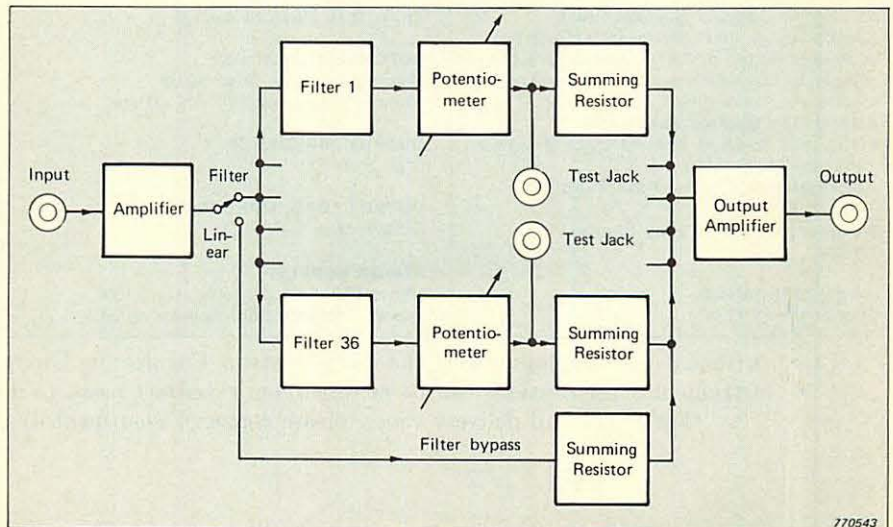
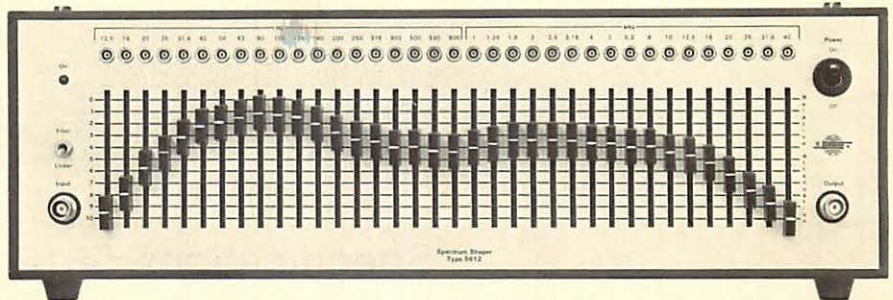


Fig. 1. Block diagram of the Type 5612 Spectrum Shaper

## Filters

All filters are six-pole Butterworth networks. They may be ordered with the center frequencies at 1/3 octaves between 2 Hz and 40 kHz.

Overall characteristics of the filters conform to IEC 225-1966, ANSI S1.11-1966 Class III and to DIN 45652. These are the best classes for third octave filters. Peak-to-valley ripple in the pass band is less than 0.5 dB and rejection is greater than 75 dB at frequencies of five times and one-fifth of the center frequency. Fig. 2 shows the response of a typical filter.

## Attenuators

Each filter channel is followed by a

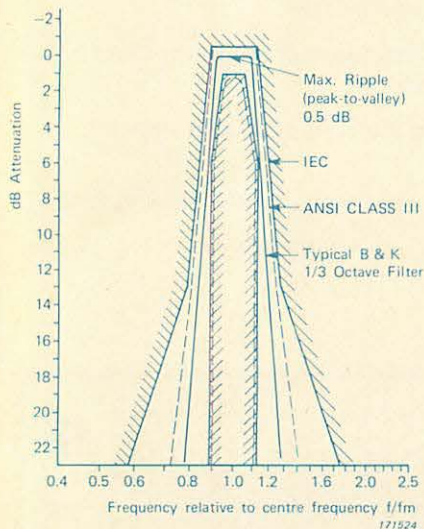


Fig. 2. Response of a typical third octave filter

25 k $\Omega$ , linear-motion potentiometer. The potentiometers are mounted in a row on the front panel of the instrument so that the vertical positions of the slider knobs give an indication of the chosen spectrum shape.

The output from the potentiometer wiper is fed to a summing resistor and is also available at a test jack (one for each channel), where it can be measured directly by an amplifier voltmeter having an input impedance greater than 1 M $\Omega$ . This feature is of particular value when setting up the required spectrum.

Maximum filter roll-off attenuation of the filter's skirts is 40 dB per octave

or better. Fig. 3 illustrates the notch produced when one potentiometer is set to maximum attenuation; this represents the intersection of the adjacent filter skirts.

## Output

The output amplifier gives an output impedance of less than 20  $\Omega$ , and is suitable for a minimum load impedance of 1 k $\Omega$ .

## Power Supply

The Type 5612 can be powered by mains supplies between 100 V and 240 V, 50 to 60 Hz. Power consumption is approximately 10 VA.

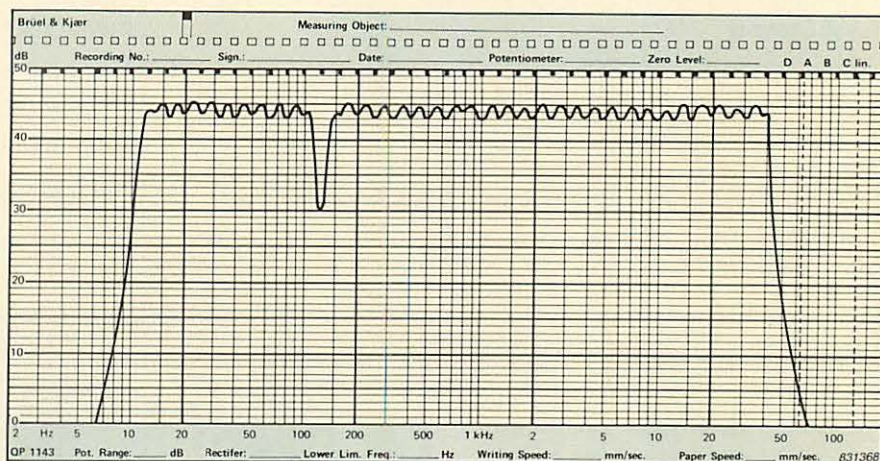


Fig. 3. Notch characteristic with attenuator set on position "10"

## Specifications 5612

### FREQUENCY RANGE:

11 Hz to 45 kHz

### BANDPASS FILTERS:

In accordance with IEC 225-1966, ANSI S1.11-1966 Class III and DIN 45652

The total integrated random white noise power passed by the practical third octave filter is equal to that which would be passed by an ideal third octave filter

### Attenuation Outside Pass Band:

Better than 75 dB at 5 times and 1/5 center frequency

### Attenuation in Central Pass Band:

0 dB  $\pm$  0.5 dB

### Maximum Peak-to-Valley Ripple:

0.5 dB

### INPUT IMPEDANCE:

Greater than 100 k $\Omega$

### INPUT VOLTAGE:

1 V, Crest Factors up to 5  
Maximum 3 V sine

### SIGNAL TO NOISE RATIO:

Better than 50 dB below 1 V

### NOTCH ATTENUATION:

Maximum for one filter: 50 dB  
Attenuator position "10": 12 dB min.

### OUTPUT IMPEDANCE:

Less than 20  $\Omega$

### OUTPUT LOAD IMPEDANCE:

Greater than 1 k $\Omega$

### POWER SUPPLY:

100 to 240 V AC (50 to 60 Hz)  $\pm$  10%

Power Consumption: Approx. 10 VA

### OPERATING TEMPERATURE:

-10°C to +40°C (+14 to +104°F)

### HUMIDITY:

up to 90% r.h. (non-condensing) at 30°C

### DIMENSIONS:

Height: 132.6 mm (5.2 in)

Width: 430 mm (17.0 in)

Depth: 320 mm (12.6 in)

Rack Mounting Kit KS0023 available

### WEIGHT:

8 kg (17.6 lb)

This instrument is a development of the B & K Systems Engineering Group and is not a standard production instrument. Specifications can be modified, on a contract basis, to meet individual requirements.

For prices and delivery times, please contact Department 61 in Nærum, Denmark.