



## Model 3940

### 3Hz to 2MHz, High-Pass/Low-Pass Butterworth/Bessel Programmable Filter

- **Frequency Range:** 3Hz to 2MHz
- **Filter Types:** Butterworth or Bessel
- **Attenuation Slope:** 24dB/Octave/Channel
- **Input Gain:** 0dB or 20dB
- **Output Gain:** 0dB or 20dB
- **Stopband Attenuation:** >95dB
- **By-Pass Mode**

### DESCRIPTION

The Krohn-Hite Model 3940 programmable, dual channel, Butterworth/Bessel filter offers a programmable or benchtop filter covering a cutoff frequency range from 3Hz to 2MHz. It has a frequency response characteristic of maximally flat (Butterworth) for clean filtering in the frequency domain, or linear phase (Bessel) to provide pulse signal filtering. The passband gain is unity, and the attenuation slope is 24dB/octave per channel. The 3940 will accept input signals of  $\pm 4.5V$  peak and provides input and output gains of 0dB or 20dB which can be selected via the front panel keyboard or over the GPIB bus.

### CONFIGURATIONS

The filter can be programmed to operate in low-pass, high-pass, band-pass or band-reject modes, or the two channels can be interconnected to achieve 48dB/octave high-pass or low-pass slopes.

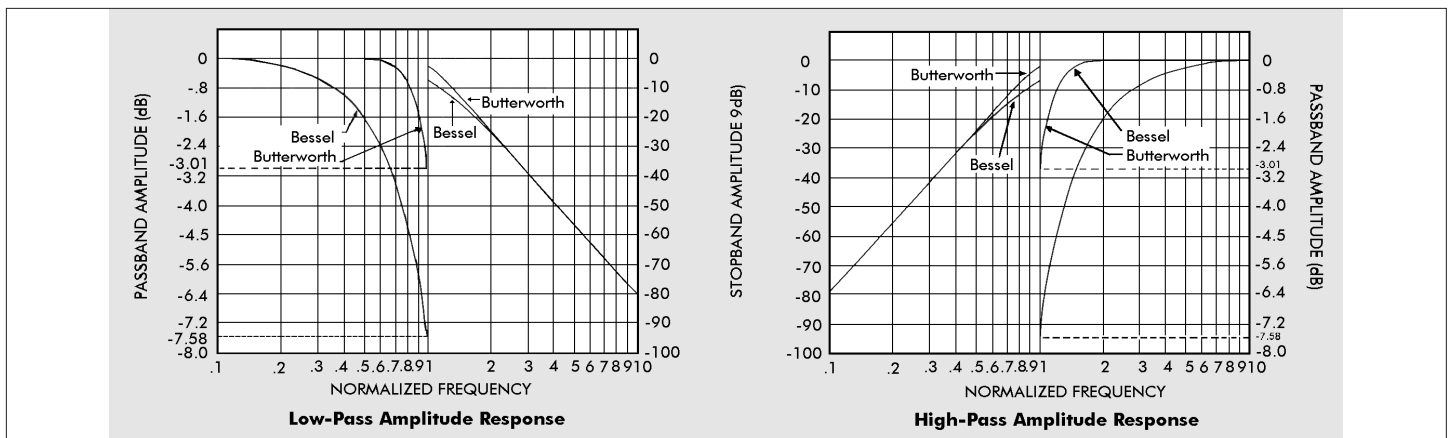
### STORING SET-UPS

The Model 3940 offers to the user 99 groups of non-volatile memory for storage of front panel set-ups, which are stored in battery-backed CMOS. Set-ups can then be recalled with a simple command.

The 3940 also provides a self-test diagnostics upon power-up of its internal memory to insure the unit is operating properly. If a failure occurs, the display will indicate which ROM or RAM has failed.

### APPLICATIONS

Applications for the Model 3940 are anti-aliasing, random noise testing, sound measurements, sound recording, suppressing interference in audio communications circuits and many more.



**SPECIFICATIONS**

Specifications apply at 25°C ±5°C.

**FUNCTIONS:** Two independent channels of low-pass, high-pass or by-pass; one channel of band-pass or band-reject.

**FILTER CHARACTERISTICS (Each Channel)**

**Type:** 4-pole Butterworth (maximally flat) or Bessel (linear phase).

**Frequency Range (fc):** 3Hz to 2MHz.

**Frequency Control:** Keypad entry or increment, decrement keys.

**Frequency Resolution:** 1Hz from 3Hz to 1kHz; 10Hz to 2kHz; 100Hz to 100kHz; 1kHz to 1MHz; 10kHz to 2MHz.

**Frequency Accuracy (fc):** ±2% or least significant digit (which ever is greater) 20Hz to 500kHz; ±5% to 2MHz.

**Relative Gain at fc:** Butterworth, -3dB; Bessel, -7.58dB.

**Bandwidth:** dc to fc, dc coupled; 0.2Hz to fc, ac coupled (low-pass); fc to 10MHz (high-pass).

**Attenuation:** 24dB/octave per channel.

**Stopband Attenuation:** >95dB.

**Insertion Loss (0dB, Input/ Output gain):** ±0.5dB to 2MHz.

**INPUT CHARACTERISTICS**

**Gain (pre-filter):** 0dB or 20dB ±0.2dB.

**Coupling:** ac or dc.

**Impedance:** 1M ohm in parallel with 100pf.

**Maximum Signal (at 0dB gain):** ±4.5V peak at fc <1MHz; ±4V peak at 2MHz.

**Maximum DC Component:** ±200V in ac coupled mode.

**OUTPUT CHARACTERISTICS**

**Impedance:** 50 ohms.

**Gain (post-filter):** 0dB or 20dB ±0.2dB.

**Maximum Voltage:** ±6.5V peak into <sup>3</sup> 500 ohms; ±1.3V peak into greater than or equal to 50 ohms.

**Maximum Current:** ±25mA.

**Distortion:** -80dB at 1kHz at 1Vrms.

**Noise:** <200µV with 2MHz bandwidth detector.

**DC Offset:** adjustable to 0V.

**DC Stability:** ±0.5mV/°C typical; ±1mV/°C max.

**GENERAL**

**Memory:** 99 selectable groups; memory is non-volatile battery-backed CMOS.

**Self-Test Diagnostics:** MPU checks unit upon power-up. Display indicates failure mode.

**Displays:** 7 segment, green, LED; 0.3" high.

**Remote Programming:** IEEE-488.1 interface. Subsets: SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT0, C0, E1.

**Operating Temperature:** 0°C to 50°C.

**Isolation to Chassis:** ±200Vdc.

**Storage Temperature:** -20°C to 70°C.

**Input/Output Connectors:** BNC, front and rear.

**Power Requirements:** 90-132/180-264 volts ac, 50Hz-400Hz, 25 watts.

**Dimensions:** 3.5" (9cm) high, 8.5" (21.8cm) wide, 18" (46.2cm) deep.

**Weights:** 12 lbs (5.4kg) net; 14 (6.3kg) lbs shipping.

**Accessories:** 6 foot, 3 terminal line cord, operating manual.

**OPTIONS**

**002:** Lower frequency cutoff range to 0.3Hz to 200kHz.

**Rack Mount Kit:** Part No. RK-37, permits installation of the Model 3940 into a standard 19" rack spacing.

**Extended 1 Year Warranty:** Part No. EW3940.

**OPTIONAL ACCESSORIES**

**CAB-010:** GPIB Cable with Connectors, 2-Meters

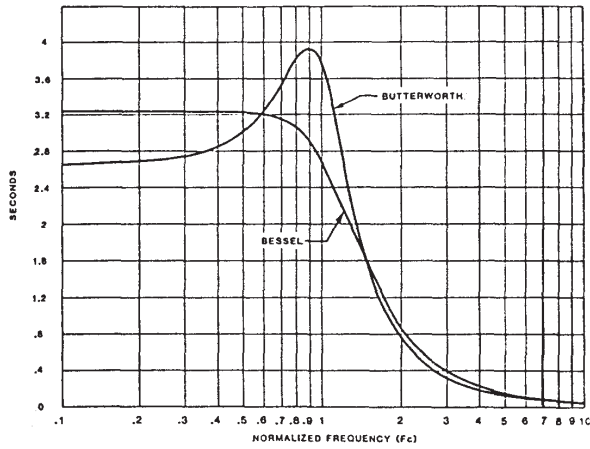
**CAB-011:** GPIB Cable with Connectors, 1-Meters

**CAB-025:** Cable, BNC, 3ft, Low Noise

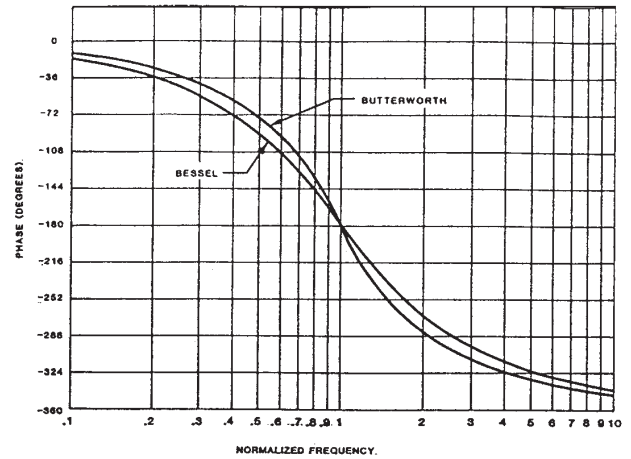
Specifications subject to change without notice.



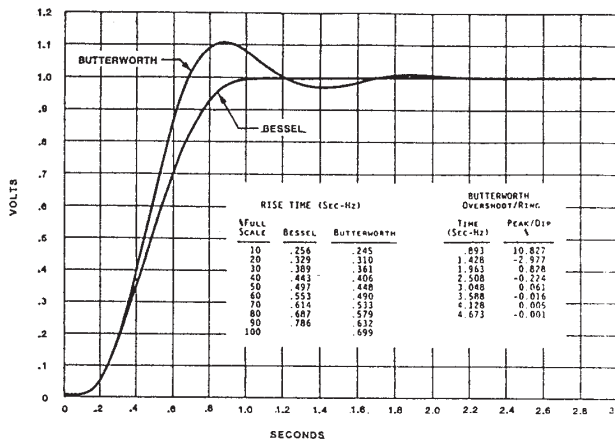
3940 Rear Panel View



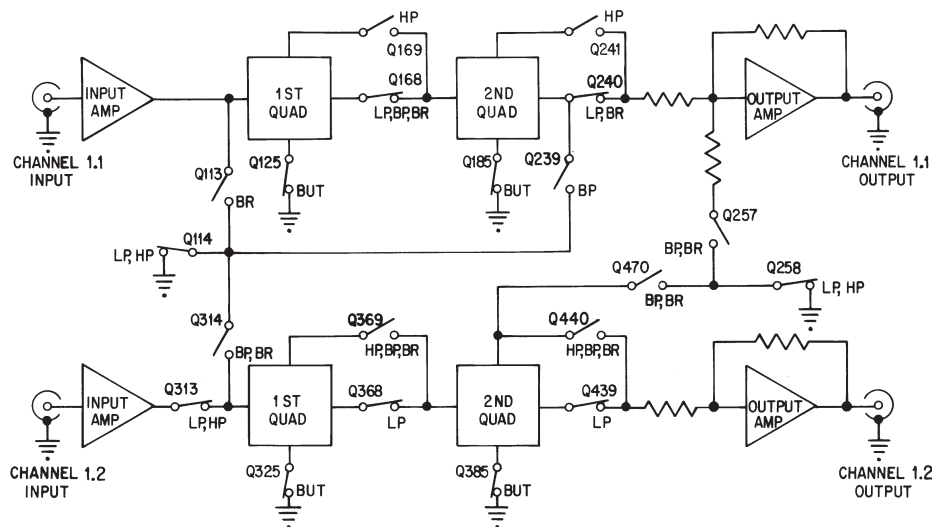
Group Delay



Phase Response



Transient Response



Model 3940 Simplified Block Diagram