

Model 3901

1Hz to 99kHz Dual Channel Low-Pass/High-Pass Elliptical Programmable Filter

- **Frequency Range:** 1Hz to 99kHz
- **Filter Type:** 7-Pole, 6-Zero Elliptical
- **Rolloff Rate:** 115dB/Octave
- **Input:** Differential or Single-Ended
- **Stopband Attenuation:** >80dB
- **Amplifier Mode**
- **40dB Input Gain/20dB Output Gain**



INTRODUCTION

The Krohn-Hite Model 3901 programmable, two channel Elliptical filter/voltage gain amplifier is one of a family of new programmable filters from Krohn-Hite. It was carefully designed with the user in mind, providing ease of operation, reliability and price competitiveness. All backed with the quality which Krohn-Hite has provided in filters since 1949.

FILTER FEATURES

As an elliptical filter, the Model 3901 has two filter channels that have a tunable cutoff frequency range from 1Hz to 99kHz and a rolloff rate of 115dB/octave. Each channel can be used independently; one as a high-pass filter and the other as a low-pass filter; or the channels can be externally connected for band-pass (series) or band-reject (paralleled) operation. Each filter section has a minimum stopband attenuation of >80dB and a passband ripple of typically 0.22dB.

The 3901 provides either a single-ended or differential input with a common mode rejection of >60dB. Input gains to 40dB in 10dB steps and output gains to 20dB are also provided. The 3901 will

accept input signals of $\pm 10V$ peak at 0dB gain and has selectable ac or dc coupling. The filter is GPIB Bus programmable and is complemented with non-volatile memory for the storage of up to 99 front panel set-ups. Overload detectors are standard and assist the user in detecting excessive input signals or incorrect gain settings.

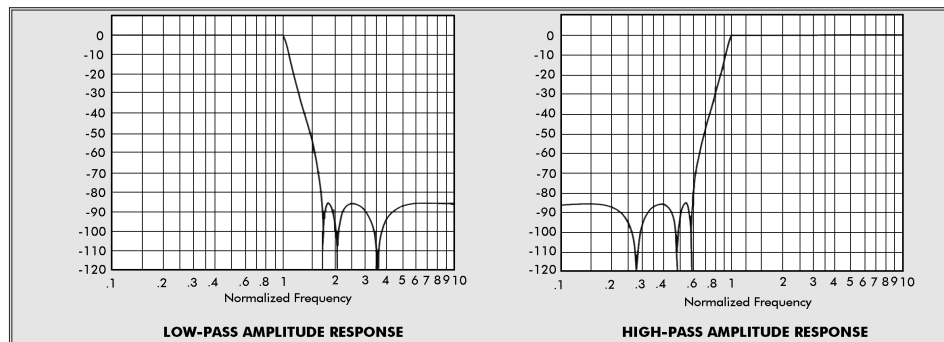
AMPLIFIER FEATURES

The 3901 is also a programmable voltage gain amplifier for applications that require a low noise amplifier. The amplifier has a bandwidth of 1MHz and gains to 60dB, selectable in 10dB steps, and a wideband noise of <100 μ V.

APPLICATIONS

Typical applications for the Model 3901 are: anti-aliasing in digital signal processing, separating specific bandwidths of information, enhancing signal-to-noise ratio, distortion testing, low noise pre-amplification and many more. Models offering other types of filters with different frequency ranges, slopes and number of channels are also available.

SPECIFICATIONS



Specifications apply at 25°C ±5°C.

FUNCTION

Two independent filter channels. Channel 1, high-pass or amplified by-pass; Channel 2, low-pass or amplified by-pass; one channel of band-pass or band-reject with external connections.

FILTER MODE

Type: 7-pole, 6-zero elliptical.

Attenuation: 115dB/octave.

Passband Ripple: 0.22dB typical, 0.4dB max.

Tunable Frequency Range fc: 1Hz to 99kHz.

Frequency Control: Keypad entry or increment, decrement keys.

Bandwidth:

High-Pass: fc to upper 3dB cutoff, >500kHz at 1Vrms with 0dB gain.

Low-Pass: dc coupled, dc to fc; ac coupled, 0.32Hz to fc.

Relative Gain at fc Low-Pass: -0.22dB at 1.01fc nominal; High-Pass: -0.22dB at 0.99fc nominal.

Cutoff Frequency Accuracy: ±2%.

Frequency Resolution: 1Hz, 1Hz to 99Hz; 10Hz, 100Hz to 990Hz; 100Hz, 1kHz to 9.9kHz; 1kHz, 10kHz to 99kHz.

Stopband Attenuation: >80dB.

Stopband Frequency (fs): Low-Pass, 1.7fc; High-Pass, 0.59fc.

Insertion Loss: 0dB ±0.1dB.

Pre-Filter Gain: 0dB, 10dB, 20dB, 30dB, 40dB ±0.2dB.

Post-Filter Gain: 0dB, 10dB, 20dB ±0.2dB.

Input Coupling: ac or dc.

Wideband Noise (RFI): min. gain, 1kHz cutoff, <400µV, 99kHz cutoff, <1mV; Max. gain, <20µV.

Harmonic Distortion: -80dB at 1kHz.

Intermodulation Distortion: -80dB below full scale volts at 70kHz and 90kHz input frequency.

Spurious Components: -80dB below full scale with input source <50 ohms.

DC Stability: Typically ±10mV/°C.

Crosstalk Between Channels: -85dB below full scale with input source <50 ohms.

AMPLIFIER MODE (Each Channel)

Bandwidth: dc coupled, dc to >1MHz min gain, >400kHz max. gain; ac coupled, 0.32Hz to >1MHz min gain, >400kHz max gain.

Insertion Loss: 0dB ±0.05dB.

Gain: 10dB to 60dB in 10dB steps ±0.1dB.

Input: Differential or single-ended +(in phase), -(inverted).

CMRR: >60dB to 10kHz; approximately 50dB at 100kHz.

Sensitivity: 10mV peak with 60dB total gain for 10V peak output.

Maximum Input: ±10V peak at 0dB gain reduced in proportion to gain setting.

Impedance: 1 megohm in parallel with 100pf.

Coupling: ac or dc.

Maximum DC Component: ±100V in ac coupled mode.

Output:

Maximum Voltage (o.c.): 7Vrms to 200kHz; 3Vrms to 500kHz; 1Vrms to 1MHz.

Impedance: 50 ohms.

DC Offset: Adjustable to zero volts.

Harmonic Distortion (1V output): -80dB (0.01%) to 10kHz; -60dB (0.1%) to 100kHz..

Wideband Noise (referred to input, 2MHz BW detector): 100µV min. gain; 20µV max. gain.

DC Stability (RFI): Typically ±10mV/°C.

Crosstalk Between Channels: >85dB below full scale with input source <50 ohms.

GENERAL

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

Overload Modes: Three selectable modes; non-latching, that monitors all channels and displays the first channel to have an overload; latching, that maintains the overload display until it is cleared; and no indications.

Overload Indicators: LEDs for input and output. Gain display flashes when overload occurs on displayed channel.

Input Indicators: Green LEDs to indicate active input BNC.

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: ±100Vdc.

Storage Temperature: -20°C to 70°C.

Input/Output Connectors: BNC, front and rear.

Power Requirements: 90-132/180-264 volts ac, 50Hz-400Hz, 40 watts.

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

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

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

OPTIONS

Rack Mounting Kit: Part No. RK-37, permits installation of the Model 3901 into a standard 19" rack spacing.

Band-Reject Kit: Part No. BR-30, connectors and cables to adapt two channels for series (band-pass) or parallel (band-reject) operation.

Extended 1 Year Warranty: Part No. EW3901.

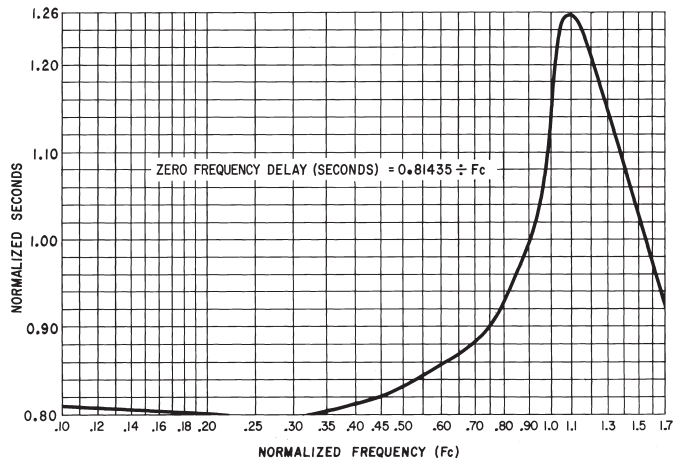
OPTIONAL ACCESSORIES

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

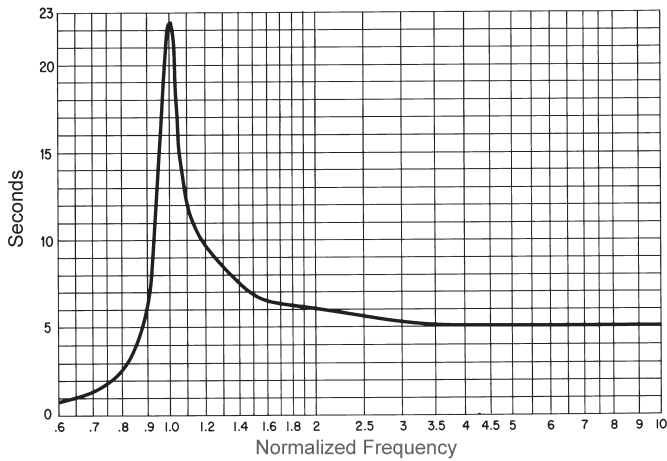
CAB-011: GPIB Cable with Connectors, 1-Meters

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

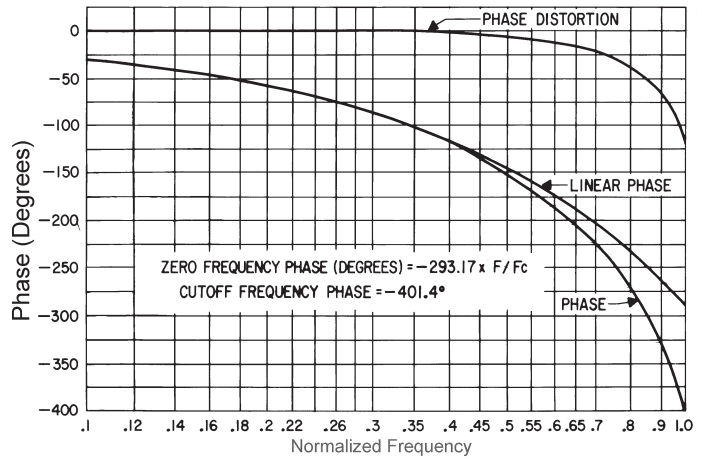
Specifications subject to change without notice.



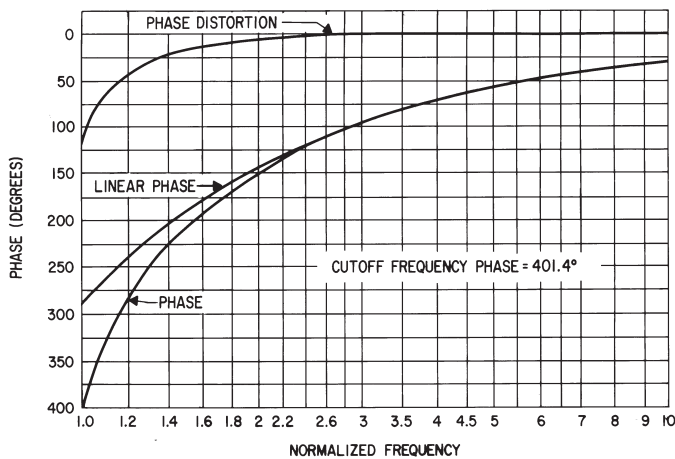
Low-Pass Group Delay



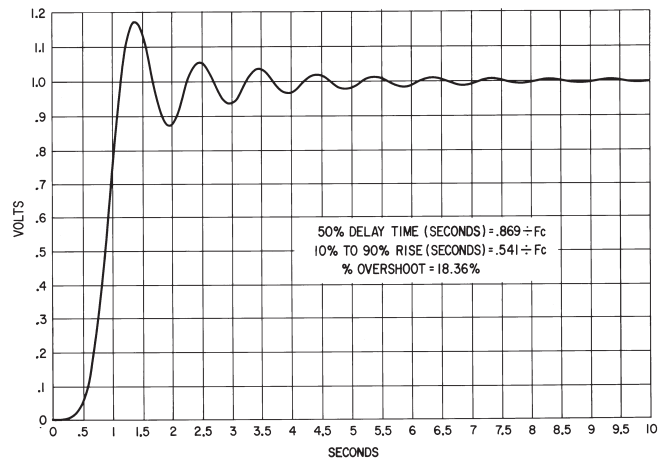
High-Pass Group Delay



Low-Pass Phase Distortion



High-Pass Phase Distortion



Low-Pass Step Response