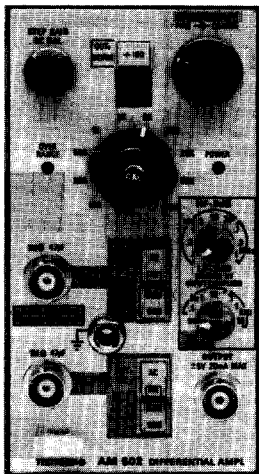
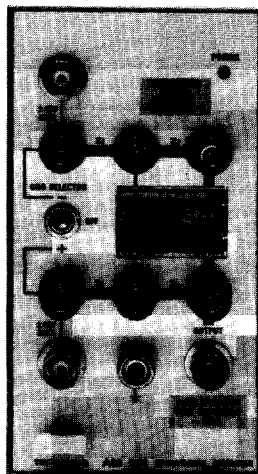


AM 502



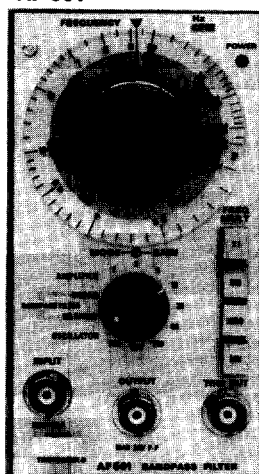
Differential Amplifier

AM 501



Operational Amplifier

AF 501



Bandpass Filter/Amplifier

AM 502

- 1 to 100,000 Gain
- 100 dB Cmrr
- Selectable Upper and Lower -3 dB Points
- Dc to 1 MHz Maximum Bandwidth
- Adjustable Dc Offset

The AM 502 Differential Amplifier features wide bandwidth; high cmrr; and selectable calibrated gain and filtering. Well-suited for general-purpose or laboratory work, it can drive oscilloscopes, monitors, chart recorders, displays, or processing devices. In the unity gain mode, it can be used as a signal conditioner. Input dc offsetting to ± 1 V is provided.

AMPLIFIER

- Gain** — 100 to 100,000, 1-2-5 sequence, accurate within 2%. 1X gain obtained by 100X attenuation.
- Hf -3 dB POINT** — Selectable in 9 steps (1-3 sequence) from 100 Hz to 1 MHz. Upper -3 dB point reduces to 500 kHz at 50 k gain, 250 kHz at 100 k gain.
- HF -3 dB POINT** — Selectable in 6 steps from 0.1 Hz to 10 kHz; ac coupling limits -3 dB point to 2 Hz or less.
- Dc Offset** — At least ± 1 V.
- Normal-Mode Cmrr** — At least 100 dB, dc to 50 kHz, range, ± 5 V.
- ÷ 100 Mode Cmrr** — At least 50 dB, dc to 50 kHz, range, ± 50 V.
- Max Input Voltage** — Normal mode dc coupled: 15 V (dc + peak ac), ÷ 100 Mode dc coupled: 350 V (dc + peak ac). Ac coupled: 350 V (dc + peak ac) with coupling capacitor precharged.
- Input R and C** — 1 M Ω paralleled by approx 47 pF. Input impedance can be increased to a FET input via a simple internal jumper change.

OUTPUT

- Max Output** — ± 5 V, ± 20 mA, output resistance is 5 Ω or less.
- Min Load Impedance** — 250 Ω .
- Input Gate Current** — Typically 50 pA at 25°C.
- Max Noise** — ≤ 25 μ V or less (tangentially measured) referred to input NORM mode.
- Overage** — Front-panel lamp indicates most over-range conditions.
- Max Voltage Drift** — 100 μ V/°C referred to input NORM mode.

Order AM 502 Differential Amplifier . . . \$975

AM 501

- ± 40 V, 50 mA Output
- Open Loop Gain 10,000
- 50 V/ μ s Slew Rate
- Symmetrical Differential Design

The AM 501 Operational Amplifier features high input impedance (FET), high slew rate, a wide range of input and output voltage, and high output current. Applications include: amplification; impedance transformation; integration; differentiation and summing. It is well-suited as a post-amplifier or offset-generator for signal sources, including the TM 500 Modules. Components may be added externally or internally making it ideal for teaching operational amplifier theory.

OPERATIONAL AMPLIFIER

- Open Loop Gain** — At least 10,000 into 800 Ω load.
- Unity Gain Bandwidth** — At least 5 MHz into 800 Ω load.
- Common-Mode Rejection Ratio** — At least 10,000 to 1 at 60 Hz.
- Slew Rate** — At least 50 V/ μ s into a 800 Ω load.

INPUT

- Common-Mode Input Voltage Range** — At least ± 40 V.
- Input Leakage Current** — Less than 500 pA at 20°C.
- Equivalent Input Drift** — Less than 100 μ V/°C.
- Equivalent Input Noise** — Less than 10 μ V RMS.
- Max Differential Input Voltage** — 80 V.

OUTPUT

- Voltage Range** — At least ± 40 V.
- Current Limit** — At least ± 50 mA.
- Open Loop Output R** — Approx 150 Ω .

Order AM 501 Operational Amplifier . . \$490

OPTIONAL ACCESSORY

- Terminal Accessory Adapter Kit (013-0146-00) . . . \$22**

AF 501

- Tunable Bandpass Filtering to 35 kHz
- Signal Amplification to 50 kHz
- Sine-wave Generation to 35 kHz
- Strobe Trigger Synced to Oscillator or Filter Output
- Dial Readings in Hz or Cycles per Minute

The AF 501 is a Bandpass Filter/Amplifier, ac-coupled amplifier and sine-wave generator. Used alone or in conjunction with other TM 500 Instruments, the AF 501 is a highly versatile and accurate signal analysis tool. Developed primarily for the mechanical measurement domain, the AF 501 can be used as a manual-sweep spectrum analyzer for complex sound and vibration signals. Single-frequency tuning facilitates isolation of 1X rpm signals in dynamic balancing, or viewing higher order disturbances on a CRT monitor. An output pulse, synced to the filter or oscillator output signal, is available for triggering a stroboscope or oscilloscope and for frequency counting.

BANDPASS FILTER

- Center Frequency Range** — 3 Hz to 35 kHz in 4 decade steps.
- Frequency Dial Error** — $< 5\%$ dial setting between 3-20, $< 10\%$ dial setting between 20-30.
- Frequency Multiplier** — X1, X10, X100, X1 k.
- Phase Shift** — $< 10^\circ$ at tuned frequency below 5 kHz.
- Dial Range** — 3 to 40 Hz/180-2400 cpm.
- Max Filter Attenuation** — > 70 dB.
- Filter Selectivity** — Broad: Q = 5 ± 1 .
Narrow: Q = 15 ± 5 .

Bandwidth at Half-power Points —

- $\Delta F_{-3dB} = \frac{\text{center frequency}}{Q}$
- Gain Range** — 1-500; 1-2-5 sequence.
- Gain Accuracy** — ± 3 dB (Broad), ± 5 dB (Narrow).
- Input Impedance** — 1 M Ω $\pm 1\%$ paralleled by ≈ 47 pF.
- Max Dc Input Voltage** — ± 100 V.
- Output Voltage** — 20 V p-p (max freq times amplitude = 400 V kHz).
- Output Current** — 20 mA p-p max (at 20 V p-p).
- Output Impedance** — < 1 Ω .

AMPLIFIER

- Gain** — 1 to 500; 1-2-5 sequence.
- Gain Accuracy** — $\pm 3\%$.
- Bandwidth** — < 0.5 Hz to > 50 kHz (at 3 dB point).
- Input Impedance** — 1 M Ω $\pm 1\%$ paralleled by ≈ 47 pF.
- Noise** — < 25 mV rms (referred to output).
- Output Voltage** — 20 V p-p (max freq times amplitude = 400 V kHz).

OSCILLATOR

- Sine Wave Out Range** — 3 Hz to 35 kHz.
- Dial Range** — 3 to 40 Hz/180-2400 cpm.
- Output Amplitude** — 1, 2, or 5 V p-p $\pm 20\%$, depending on gain position.
- Waveform Distortion** — $< 3\%$.
- Output Current** — Max 50 mA p-p.
- Output Impedance** — < 1 Ω (within 50 mA output current limit).

TRIGGER OUTPUT

- Pulse Amplitude** — > 10 V.
- Pulse Duration** — 10 ± 5 μ s.
- Min Signal Required** — 500 mV, p-p
- Rise and Fall Time** — < 1 μ s.
- Output Impedance** — ≈ 50 Ω .

Order AF 501 Bandpass Filter/Amplifier . . . \$775