

## PS 501-1

Floating Output, 0 V to 20 V

0 mA to 400 mA

Precise Regulation

Low Ripple and Noise

Fixed Output + 5 V at 1 A

3 1/2 Digit Ten Turn Dial

The PS 501-1 features precise regulation and better than 2 mV resolution, (setability) over a 0 V to 20 V range.

### CHARACTERISTICS

**Output** — 0 V to 20 V dc.  
**Maximum Rated Current** — 400 mA to +30°C derating to 300 mA at +50°C.

**Accuracy** — ±(0.5% + 10 mV).

**Current Limit** — <40 mA to 400 mA.

**Line Regulation** — Within 5 mV for a +10% line voltage change.

**Load Regulation** — Within 1 mV for a 400 mA load change.

**Ripple and Noise** — 0.5 mV p-p or less; 20 Hz to 5 MHz.

**Temperature Coefficient** — Typically <(0.01% + 0.1 mV)/°C.

**Minimum Resolution** — Typically 1.6 mV.

**Transient Recovery Time** — ≤20 μs to recover within 20 mV of final output voltage after a 400 mA change in output current.

### ORDERING INFORMATION

**PS 501-1 Power Supply** \$595  
Includes: Instruction manual (070-1301-02).

## PS 503A

Independent + and - Controls

Dual Tracking Voltage Control

0 V to ±20 V at 1 A (in High-Power Compartment)

Fixed Output + 5 V at 1 A

Remote Resistance Programming

Over-Voltage Protection Standard

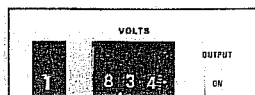
The PS 503A features superior dual tracking performance, over-voltage protection, and remote resistance programming of voltage. When operated in the high-power compartment of a TM 504 or TM 506 mainframe, the PS 503A provides up to 1 A from both 0 V to 20 V supplies.

### CHARACTERISTICS ±20 V FLOATING SUPPLIES

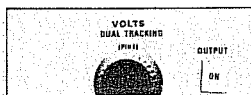
**Outputs** — 0 V to ±20 V dc with respect to the common terminal or 0 V to 40 V dc across the + and - terminals. Outputs can be varied independently or at a constant ratio.

**Maximum Rated Current** — 400 mA (1 A in high power compartment to +30°C derating to 300 mA (750 mA) at +50°C.

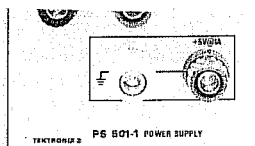
## PS 501-1



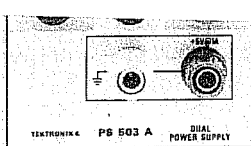
## PS 503A



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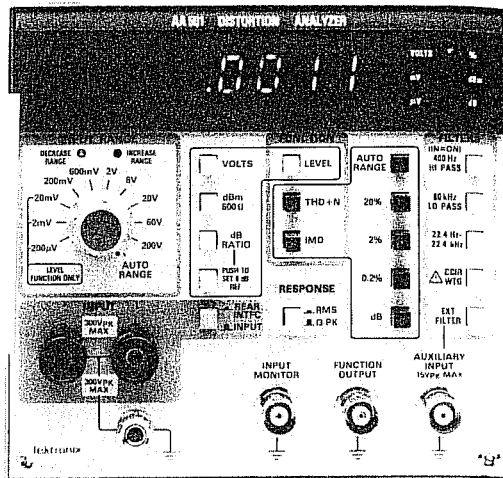


Power Supply



Triple Power Supply

## AA 501 Option 02



Distortion Analyzer

**Tracking Mode Offset Error** — If the two supplies are set independently to any given voltage ratio and then varied by use of the Volts Dual Tracking control, the two supplies will maintain the same voltage ratio as initially set within ±50 mV.

**Current Limit** — Adjustable from <100 mA to 1 A (high-power compartment) or <40 mA to 400 mA (standard compartment) on each supply.

**Load Regulation** — Within 3 mV for 1 A change (high-power compartment) or 1 mV for 400 mA change (standard compartment).

**Ripple and Noise** — 3 mV p-p or less at 1 A load (high-power compartment). 0.5 mV p-p or less at 400 mA load (standard compartment).

**Indicators** — Individual voltage indicators and current limiting indicators for both + and - supplies. Standard compartment (400 mA) indicator.

### ORDERING INFORMATION

**PS 503A Power Supply** \$750  
Includes: Instruction manual (070-1834-01).

### COMMON CHARACTERISTICS (PS 501-1, PS 503A) 20 V FLOATING SUPPLIES

**Primary Power Input** — Determined by mainframe (TM 501, TM 503, etc).

**Output** — Floating, isolated for 350 V dc + peak ac above ground.

**Stability** — Typically (0.1% + 5 mV) or less drift in 8 hrs of constant line, load, and temperature.

**Indicator Lights** — Voltage variation and current limit.

### +5 V GROUND-REFERENCED SUPPLY

**Output** — 5 V nominal, ±0.25 V at 1 A.

**Load Regulation** — Within 100 mV with a 1 A load change.

**Line Regulation** — Within 50 mV for a 10% line voltage change.

**Ripple and Noise (1A)** — 5 mV p-p or less, 20 Hz to 5 MHz.

**Stability** — Typically 30 mV or less drift in 8 hrs.

**Overload Protection** — Automatic current limiting and over-temperature shutdown.

## AA 501

Fully Automatic: No Level Setting, Tuning or Nulling

Level, Total Harmonic Distortion, and dB Ratio Measurements

Total System Harmonic Distortion Plus Noise (THD+N) <0.0025%

<3.0 μV Residual Noise

Digital Readout Plus Analog-Like "Bar Graph" for Peaking and Nulling

IWD to SMPTE, DIN, and CCIF (Option 01)

The AA 501 Distortion Analyzer provides completely automatic measurement of level, total harmonic distortion plus noise (THD+N), and (with Option 01) Intermodulation Distortion. Automatic set level, automatic tuning, automatic nulling of the fundamental, and autoranging of the display all combine to permit completely hands-off operation once the mode is selected. Just apply the signal of interest and read the 3 1/2-digit display. A novel analog-like bar graph simulates an analog meter to assist in peaking and nulling of applied signals.

With Option 01, intermodulation distortion measurements can be made to any of the three common standards: SMPTE, DIN, or CCIF. Internal circuitry automatically identifies the signal being used and selects the proper filtering circuits to perform the measurement.

DB ratio measurements may be referenced either to 774.6 millivolts (1 milliwatt in 600 ohms) or to a selected applied signal. The 0 dB reference memory remembers the selected level, and all subsequent measurements are referenced to that level.

The AA 501 allows readings to be expressed in true RMS or average response, RMS calibrated. Although true RMS is more accurate in most applications, the average response permits comparisons with measurements previously taken with older instrumentation.

The fundamental frequency range is 10 Hz to 100 kHz, with harmonics measured out to 300 kHz.

Any one of four built-in frequency-weighting filters may be switched into the signal paths for preconditioning of the signal to be measured. Provision is also made to permit the use of a user-selected filter as well.

A dc level, which is a function of the display readout, is available at the rear panel of the AA 501.

An Input Monitor connector and a Function Output connector are provided to permit oscilloscope display of the input signal or the result of the filter in the THD+N measurement.

The Option 02 version of the AA 501 is especially designed for use in accordance with CCIR recommendation 468-2 and DIN 45405 (typically used in Europe). In the Option 02 version, the 30 kHz filter and the "A" weighting filter of the standard unit are replaced by a 22.4-Hz-to-22.4-kHz filter and a CCIR-weighting filter, respectively, and the average responding detection circuit is replaced by a quasi-peak detection circuit. The Option 02 also contains the intermod measurement capability of the Option 01.

The AA 501 Distortion Analyzer and the SG 505 Oscillator were designed to be used together as the heart of a state-of-the-art audio analysis system. Used together, the two provide total system harmonic distortion of 0.0025% or less.

It should be noted that the automatic frequency tuning of the AA 501 does not depend upon the manual tuning of a companion oscillator. The AA 501 will automatically tune itself to its input signal whether the signal originates from an SG 505 alongside it in a TM 500 mainframe, or from some other signal source miles away.

### CHARACTERISTICS

The following characteristics are common to the standard AA 501, Option 01 and Option 02 unless otherwise noted:

#### HARMONIC DISTORTION FUNCTION

**Fundamental Frequency Range** — 10 Hz to 100 kHz automatically tuned to input frequency.

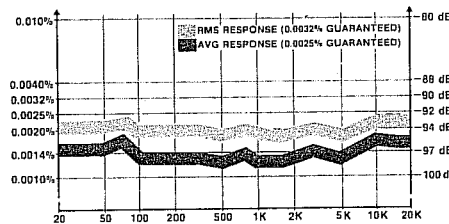
**Distortion Ranges** — Auto (100%), 20%, 2%, 0.2%, and dB (autoranging).

**Accuracy (Readings  $\geq 4\%$  of Range)** — 20 Hz to 20 kHz  $\pm 1$  dB, 10 Hz to 100 kHz  $+1, -3$  dB. (Accuracy is limited by residual THD+N and filter selection.)

**THD** — Complete Automatic Total Harmonic Distortion (THD) measurements to specified accuracy in seven seconds or less.

**AA 501/SG 505 System Residual THD+N** —  $V_{in} \geq 250$  mV, (all distortion, noise, and nulling error sources combined). 20 Hz to 20 kHz:  $\leq 0.0025\%$  ( $-92$  dB) Average Response with 80 kHz filter (standard and Option 01 only).  $\leq 0.0032\%$  ( $-90$  dB) RMS Response with 80 kHz filter. 10 Hz to 50 kHz:  $\leq 0.0071\%$  ( $-83$  dB) RMS Response. 50 kHz to 100 kHz:  $\leq 0.010\%$  ( $-80$  dB) RMS Response.

TYPICAL THD+N



**Typical Fundamental Rejection** — At least 10 dB below specified residual THD+N or actual signal THD, whichever is greater.

**Minimum Input Level** — 60 mV ( $-22$  dBm).

#### NOISE (OPTION 02)

Noise measurements to CCIR recommendation 468-2 and DIN 45405. True RMS or quasi-peak response. Total system THD + N = 0.0032% (90 dB) RMS response. Balanced input.

#### LEVEL FUNCTION

Autoranging digital voltmeter displays input signal level in volts, dBm, or dB ratios.

**Modes** — Volts, dBm (600  $\Omega$ ), or dB ratio with push to set 0 dB reference.

**Level Ranges** — 200  $\mu$ V full scale to 200 V full scale in ten steps, manual or autoranging.

#### Accuracy\*1

Frequency	Volts	dBm or dB Ratio
20 Hz to 20 kHz	$\pm 2\%$	$\pm 0.3$ dB
10 Hz to 100 kHz*2	$\pm 4\%$	$\pm 0.5$ dB

\*1  $V_{in} \geq 100$   $\mu$ V, level ranging indicators extinguished.

\*2 On the 200  $\mu$ V range, accuracy above 50 kHz is  $+4\%, -6\%$  ( $+0.5$  dB,  $-0.7$  dB).

**Bandwidth** —  $\geq 300$  kHz.

**Residual Noise** —  $\leq 3.0$   $\mu$ V ( $-108$  dBm) with 80 kHz and 400 Hz filters.  $\leq 1.5$   $\mu$ V ( $-114$  dBm) with "A" weighting filter.

#### INTERMODULATION DISTORTION FUNCTION (OPTION 01/02)

Fully automatic SMPTE, DIN, and CCIF difference frequency test measurements.

**SMPTE and DIN Tests** — Lower Frequency Range: 50 Hz to 250 Hz. Upper Frequency Range: 3 kHz to 100 kHz. Level Ratio Range: 1:1 to 5:1 (lower:upper). Residual IMD:  $\leq 0.0025\%$  ( $-92$  dB) for 60 Hz and 7 kHz or 250 Hz and 8 kHz, 4:1 level ratio.

**CCIF Difference Frequency** — Frequency Range: 4 kHz to 100 kHz. Difference Frequency Range: 50 Hz to 1 kHz. Residual IMD:  $\leq 0.0018\%$  ( $-95$  dB) with 14 kHz and 15 kHz. Minimum Input Level: 60 mV ( $-22$  dBm).

**Accuracy** —  $\pm 1$  dB.

#### ALL FUNCTIONS

**Detection** — Average or true RMS for waveforms with crest factors  $\leq 3$ .

#### Filters

400 Hz High Pass:  $-3$  dB at 400 Hz  $\pm 5\%$ ; at least  $-40$  dB rejection at 60 Hz.

80 kHz Low Pass:  $-3$  dB at 80 kHz  $\pm 5\%$ .

30 kHz Low Pass:  $-3$  dB at 30 kHz  $\pm 5\%$  (standard and Option 01 only). "A" Weighting: Meets specifications for Type 1 sound level meters (ANSI S 1.4, IEC Recommendation 179) (standard and Option 01 only). Ext: Allows connection of external filters. 22.4 Hz to 22.4 kHz:  $-3$  dB  $\pm 5\%$  (Option 02 only). CCIR WTG: CCIR Recommendation 468-2 and DIN 45405, functional only with Q-PK detector (Option 02 only).

**Input Impedance** — 100 k $\Omega$   $\pm 2\%$ , each side to ground, fully differential.

**Maximum Input** — 300 V peak, 200 V RMS either side to ground or differentially. Fully protected on all ranges.

**Common Mode Rejection** —  $\geq 50$  dB at 50 Hz or 60 Hz. Typically  $\geq 40$  dB to 300 kHz.

#### FRONT PANEL SIGNALS

**Input Monitor** — Provides constant amplitude version of signal applied to input. Output Voltage: 1 V RMS  $\pm 10\%$  for input signals  $> 50$  mV. Source Impedance: 1 k $\Omega$   $\pm 5\%$ .

**Function Output** — Provides a scaled sample of selected function signal (1000 count display = 1 V RMS  $\pm 3\%$ ). Source Impedance: 1 k $\Omega$   $\pm 5\%$ .

**Auxiliary Input** — Provides input to detector circuit when Ext Filter button is depressed. Sensitivity: 1 V RMS  $\pm 3\%$  = 1000 count display. Impedance: 100 k $\Omega$   $\pm 5\%$ , ac coupled.

#### REAR INTERFACE SIGNALS

**Rear INTFC Input** — Front panel selected. Same as main Input except, maximum signal input is limited to 42 V peak, 30 V RMS. (Potential crosstalk at rear interface may degrade noise and distortion on performance).

**Monitor** — Same as front panel Input Monitor.

**Function Output** — Same as front panel Function Output.

**Auxiliary Input** — Same as front panel Auxiliary Input.

**Converter Output** — Dc output of selected response converter. 1 V  $\pm 5\%$  for 1000 count display. Source Z: 500  $\Omega$   $\pm 5\%$ .

**dB Output** — Dc output of logarithmic dB converter. 10 mV  $\pm 5\%$  per 1 dB of display. Source Z: 1 k $\Omega$   $\pm 5\%$ .

#### ORDERING INFORMATION

**AA 501 Distortion Analyzer** **\$2,525**  
Includes: Instruction manual (070-2958-00).

#### OPTIONS

**Option 01** — Intermodulation Distortion. **+\$750**

**Option 02** — CCIR/DIN (Includes Option 01). **+\$1,150**