



AMPLIFIERS

Professional Unit Price*

MODEL 101 AUDIO AMPLIFIER	\$ 83.00
MODEL 103 "ZERO AMP"™ MIXING AMPLIFIER	83.00
MODEL 104 PHONO AMPLIFIER	83.00
MODEL 104H PHONO AMPLIFIER	105.00
MODEL 109 LINE/DISTRIBUTION AMPLIFIER	94.00
MODEL 110 AUDIO AMPLIFIER	89.00
MODEL 110A AUDIO AMPLIFIER	91.00
MODEL 112 PRE-AMPLIFIER	630.00
MODEL 160 MOVING COIL PHONO AMPLIFIER	860.00
MODEL 701 POWER AMPLIFIER	131.00
MODEL 712 POWER AMPLIFIER	905.00
MODEL 712B POWER AMPLIFIER	730.00
MODEL 712/712FPS POWER AMPLIFIER W/SPECIAL FRONT PANEL	920.00
MODEL 712FPS SPECIAL FRONT PANEL W/LED	53.00
MODEL 712WH WALNUT HOUSING	157.00
MODEL 1100 LINE/MICROPHONE AUDIO MIXER	892.00
MODEL 1100-03 LINE/MICROPHONE AUDIO MIXER W/PRE-PHONO AMP (Option 03)	995.00
MODEL 1100-04 LINE/MICROPHONE AUDIO MIXER W/PRE-PHONO AMP (Option 04)	995.00
MODEL 1110 MIXING NETWORK	74.00

EQUALIZERS/FILTERS

MODEL 500 MICROPHONE/PROGRAM EQUALIZER	\$ 210.00
MODEL 501 MICROPHONE/PROGRAM EQUALIZER	94.00
MODEL 502 MICROPHONE/PROGRAM EQUALIZER	310.00
MODEL 505 ELECTRONIC FILTER (SINGLE FREQUENCY)	170.00
MODEL 505 ELECTRONIC FILTER (TWO FREQUENCY)	182.00
MODEL 505 ELECTRONIC FILTER (CUSTOM FREQUENCY)	192.00
MODEL 506 ELECTRONIC FILTER	89.00
MODEL 510 BANDPASS FILTER	168.00
MODEL 520 LOW CUT FILTER	32.00

COMPRESSOR/LIMITER SYSTEMS

MODEL 601 COMPRESSOR/LIMITER	168.00
MODEL 603A GAIN REDUCTION METER AMPLIFIER	80.00
MODEL 605 ATTACK INDICATOR AMPLIFIER	80.00
MODEL 610 'COMPLIMITER'™	1839.00
MODEL 610SI STEREOPHONIC INTERCONNECTION ACCESSORY	27.00

SUPPORT EQUIPMENT

MODEL 201C CARD HOLDER	\$ 280.00
MODEL 202PC (ST) PRINTED CIRCUIT CARD HOLDER	189.00
MODEL 202PC (4BP) PRINTED CIRCUIT CARD HOLDER	189.00
MODEL 202PC (8) PRINTED CIRCUIT CARD HOLDER	189.00
MODEL 202PC-1 (ST) PRINTED CIRCUIT CARD HOLDER	352.00
MODEL 202PC-1 (T) PRINTED CIRCUIT CARD HOLDER	352.00
MODEL 202PC-1 (HT) PRINTED CIRCUIT CARD HOLDER	352.00
MODEL 202PC-2 (ST) PRINTED CIRCUIT CARD HOLDER	492.00
MODEL 202PC-2 (B) PRINTED CIRCUIT CARD HOLDER	492.00
MODEL 202K CUSTOM WIRING KIT	23.00
MODEL 202 FP FRONT PANEL	32.00
MODEL 230 CARD CONNECTOR	4.00
MODEL 305 CARD EXTENDER	13.00
MODEL 362 VU METER (ILLUMINATED)	91.00
MODEL 362 MI METER ILLUMINATION (4 LAMPS) FOR MODEL 362	16.00
MODEL 400RS POWER SUPPLY	315.00
MODEL 403RS POWER SUPPLY	315.00
MODEL 404RS POWER SUPPLY	315.00
MODEL 404RSD DUAL POWER SUPPLY	545.00
MODEL 404RSQ QUAD POWER SUPPLY	1025.00

MODEL 402FP FRONT PANEL	32.00
MODEL 403FP FRONT PANEL	32.00
MODEL 404FP FRONT PANEL	32.00
MODEL 411 REGULATOR	82.00
MODEL 411AC POWER SUPPLY	195.00
MODEL 411RS POWER SUPPLY	315.00
MODEL 412 REGULATOR	157.00
MODEL 412B REGULATOR	157.00
MODEL 412RS POWER SUPPLY	336.00
MODEL T65 LOW LEVEL AUDIO TRANSFORMER	90.00
MODEL T66 HIGH LEVEL AUDIO TRANSFORMER	172.00
MODEL T67 LOW LEVEL AUDIO TRANSFORMER	90.00
MODEL T70 100 WATT POWER TRANSFORMER (70 VOLT LINE)	136.00

SIGNAL GENERATOR

MODEL 800 SIGNAL GENERATOR (FIVE FREQUENCY, SELECTABLE)	\$ 205.00
MODEL 802 SIGNAL GENERATOR (FIVE FREQUENCY, SELECTABLE-BATTERY POWERED)	225.00

ATTENUATORS/CONTROLS

MODEL 901-1 STRAIGHT LINE ATTENUATOR	\$ 74.00
MODEL 901-2 DUAL STRAIGHT LINE ATTENUATOR	86.00
MODEL 901-4 FOUR-GANG STRAIGHT LINE ATTENUATOR	116.00
MODEL 901-ESCUTCHEON	22.00
MODEL 902-1 STRAIGHT LINE ATTENUATOR, WITH ESCUTCHEON	110.00
MODEL 902-2 DUAL STRAIGHT LINE ATTENUATOR, WITH ESCUTCHEON	120.00
MODEL 902-4 FOUR-GANG STRAIGHT LINE ATTENUATOR, WITH ESCUTCHEON	142.00
MODEL 904RP ROTARY PAN CONTROL	69.00

LOUD SPEAKERS

MODEL 3003 MONITOR LOUDSPEAKER (3-WAY FOR THE TRI-AMPLIFICATION)	\$ 1785.00
MODEL 3085H HIGH INTENSITY LOUDSPEAKER (3-WAY FOR THE TRI-AMPLIFICATION)	2965.00

(H = HORIZONTAL ALIGNMENT)

SOUND REINFORCEMENT SYSTEMS

MODEL 3100 PORTABLE, SELF-POWERED SPEAKER SYSTEM	\$ 682.00
MODEL 3100C SELF-POWERED SPEAKER SYSTEM (W ALNUT) (SPECIAL ORDER)	735.00
MODEL 3100M PORTABLE, SELF-POWERED SPEAKER SYSTEM	787.00
MODEL 3100W PORTABLE, SELF-POWERED SPEAKER SYSTEM W/WIRELESS MICROPHONE	1945.00
MODEL 3100WL PORTABLE, SELF-POWERED SPEAKER SYSTEM W/WIRELESS LAVALIER MICROPHONE	1945.00
MODEL 3100ST STAND	130.00
MODEL 3100MP MOUNTING PLATE	28.00
MODEL 3100-12B REPLACEMENT BATTERY	105.00
MODEL 3085 HIGH INTENSITY LOUDSPEAKER SYSTEM, WITH INTEGRATED POWER SUPPLY AND ELECTRONIC AMPLIFICATION QUAD-AMPLIFIED	6935.00

AUDIO CONTROL CONSOLES

PRODUCTION MODELS AVAILABLE UP TO 32 INPUTS and 32 OUTPUTS
CUSTOM CONSOLES DESIGNED AND FABRICATED TO MEET THE SPECIFIC REQUIREMENTS OF EACH CLIENT

RELATED PROFESSIONAL AUDIO EQUIPMENT

TAPE RECORDERS, MICROPHONES, PHONE CARTRIDGES,
TURNTABLES, LOUDSPEAKER SYSTEMS, ETC. Prices on Request

AUDIO DESIGN ENGINEERING, COMPLETE STUDIO DESIGN
LEASE/PURCHASE PLANS Information of Request

*Prices Subject to Change Without Notice

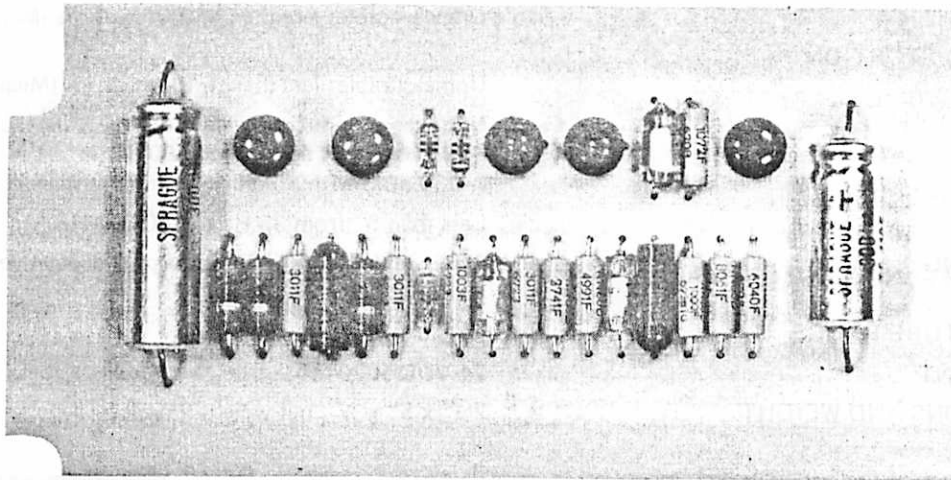
SPECTRA SONICS

LEADER IN ADVANCED TECHNOLOGY





MODEL 101 AUDIO AMPLIFIER*



(Actual Size)

FEATURES

- LESS THAN 1/100th OF 1% THD
- -130 DBM EQUIVALENT INPUT NOISE
- SQUARE WAVE RESPONSE
- ACTIVE ISOLATION TRANSFORMER
- PEAK OVERLOAD PROTECTION
- WRITTEN UNCONDITIONAL GUARANTEE

GENERAL DESCRIPTION

As the most advanced solid-state audio amplifier designed specifically for professional use in the fields of recording, radio, television, motion pictures, and sound reinforcement, the SPECTRA SONICS Model 101 amplifier satisfies all amplifier requirements within an audio control system with a single design, fulfilling the individual specifications of each function with ease. It performs the functions of microphone preamplifier, booster amplifier, mixing amplifier, program amplifier, line amplifier, and other such functions required up to line levels. As the first and only amplifier containing an integral active isolation "transformer," all system ground loop problems are eliminated without the cost, size, and performance compromises associated with transformers. By the elimination of transformers, and by incorporation of other allied advances in "state of the art" engineering, the Model 101 makes possible a size and electronic performance heretofore unachievable in audio control systems. The outstanding operational performance and reliability of the Model 101 Audio Amplifier has been so well established, that it is the first and only amplifier on the professional audio market provided with a written Unconditional Guarantee for a minimum period of two full years.

SPECIFICATIONS

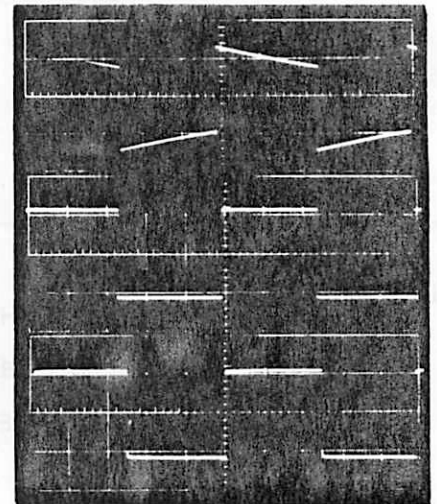
GAIN	40 dB \pm .1 dB (any desired gain from 40 dB to 55 dB by single external resistor change)
SOURCE IMPEDANCE	50 ohms to INFINITY
INPUT IMPEDANCE	600 ohms \pm 1%
OUTPUT LOADING	600 ohms to INFINITY
MAXIMUM UNDISTORTED OUTPUT	+ 18 dBm
OVERLOAD RECOVERY TIME	1 microsecond for up to 1000% overload
FREQUENCY RESPONSE (+18 dBm)	Within .1 dB from 10 Hz to 200 kHz
INTERMODULATION DISTORTION +18 dBm, 60 Hz & 7 kHz, 4:1	Unmeasurable: less than 4/100ths of 1% (Measurement Residual)
TOTAL HARMONIC DISTORTION +18 dBm, 20 Hz - 20 kHz	Unmeasurable: less than 1/100th of 1% (Measurement Residual)
OUTPUT NOISE	Not over an input equivalent of -127 dBm, unweighted 20 Hz -20 kHz, input terminated 600 ohms (-130 dBm with 50 ohms termination)
PHASE SHIFT	Less than 5° from 35 Hz to 100,000 Hz
CAPACITIVE LOADING	Stable under any condition of pure capacitive loading at input and/or output
AMBIENT TEMPERATURE RANGE	40° to 140° F
POWER REQUIREMENT	24 VDC at 20 mA
PHYSICAL DIMENSIONS AND WEIGHT	2½" x 5" x ½", net weight 2 ounces

ACTIVE ISOLATION "TRANSFORMER"*

Circuitry integral within the Model 101 Amplifier provides for electronic decoupling of separated input and output signal ground returns, and allows the amplifier to perform as if terminated by an external isolation transformer at the input. This active isolation circuitry replaces the function of transformers for ground-loop purposes, and performs without any of the compromises associated with transformers, such as: cost, bulk, weight, distortion, frequency discrimination, phase shift, impedance limitations, and ambient hum pick-up.

TRANSIENT RESPONSE AND STABILITY

Utilizing amplifier square wave response as an indication of both transient and stability performance, the oscilloscope photograph illustrates the superior capability of the amplifier. Pictured, from top to bottom, is the amplifier's reproduction of square waves of 20 Hz, 1,000 Hz, and 20,000 Hz. The response at 20 Hz is limited only by the coupling capacitors. Stability of the amplifier is indicated by the absence of any ringing or overshoot.



ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The amplifier shall be a solid-state device and shall contain an integral active isolation "transformer." It shall be in modular (plug-in) printed circuit card form and shall contain all silicon transistors and diodes. Gain shall be 40 dB \pm .1 dB, externally adjustable from 40 to 50 dB. Total Harmonic Distortion at +18 dBm shall not exceed 1/100th of 1%, from 20 Hz to 20 kHz, frequency response shall be within .1 dB from 10 Hz to 200 kHz, noise shall not exceed an equivalent input of -127 dBm unweighted (20 Hz to 20 kHz) with input terminated with 600 ohms, and phase shift shall not exceed 5° from 35 Hz to 100 kHz. The amplifier shall be direct coupled, except for input and output, and shall be capable of reproducing square waves to 50 kHz. Amplifier shall be SPECTRA SONICS Model 101.

SPECTRA SONICS



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3750 AIRPORT ROAD,

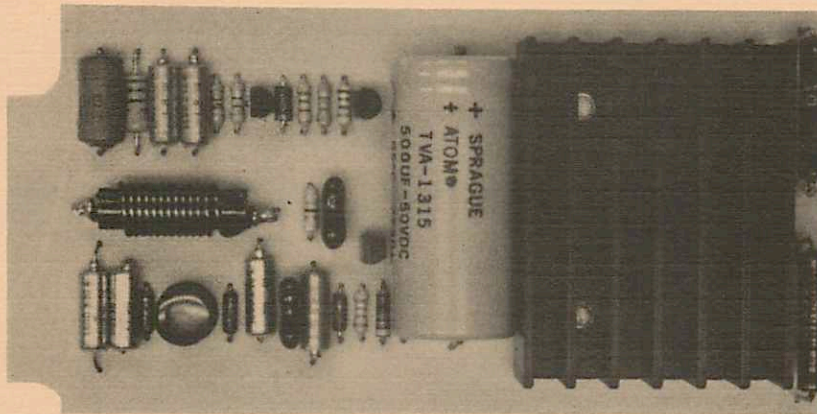
Ogden, Utah 84404

801-392-7531

* Patent Pending



MODEL 109 LINE/DISTRIBUTION AMPLIFIER



GENERAL DESCRIPTION

The SPECTRA SONICS Model 109 Line/Distribution Amplifier is designed to function in the intermediate power range. The advanced design produces 3 watts into impedances from 1 ohm to 50 ohms or 5 watts into impedances from 4 ohms to 70 ohms. The Model 109 assures a line output sufficient for multiple combinations of external isolation transformers as may be used in radio/television audio signal distribution systems. The Model 109 has a number of applications, some of which are:

DISTRIBUTION AMPLIFIER: The Model 109 will provide power for numerous outputs when the Model T66 High Level Audio Transformer is employed at each output. To illustrate, the range of capability for separate isolated sources of 600 ohms and load impedance outputs are: 15 or more outputs, 84dB to 92dB isolation between outputs, +24dBm to 30dBm maximum output and 37dB to 43dB gain for each output.

Application: A common application is the distribution of audio program material to multiple telephone lines as is routinely done in the radio/television broadcast industry. In addition, the Model 109 may be employed in professional systems involving the division of an audio signal into multiple isolated loads.

HIGH OUTPUT LINE OR PROGRAM AMPLIFIER: The Model 109 in combination with the Model T66 High Level Audio Transformer has an overall gain in excess of 43dB and a maximum output of more than 27dBm. If additional outputs are required, they may be readily accommodated by adding a Model T66 for each.

Application: Use to meet the requirements for unusually high average audio line level with added isolated outputs.

LOW OUTPUT POWER AMPLIFIER: The Model 109 is capable of producing 5 watts of power and the capability of accepting an output resistance from one ohm to infinity.

Application: Some typical uses of the Model 109 are to drive a few efficient loudspeakers, galvanometers, and multiple sets of headphones (eg. 24 sets of 8 ohms or 75 sets of 600 ohm headphones).

In all applications, the essentially instantaneous recovery (less than 5 microseconds) for 1000% overload permits full use of the maximum average output for a wide range of dynamic program material.

Operating instructions, which accompany each unit, contain installation notes and suggestions.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The amplifier shall be a solid state device manufactured in modular (plug-in) printed circuit card form. It shall have 40dB \pm .1dB gain with provision to allow additional gain via an isolation transformer step-up. The maximum output shall be 5 watts coupled with an overload recovery time less than 5 microseconds for up to 1000% overload. The amplifier shall have an input impedance of approximately 100K ohms, and an output impedance of less than .02 ohm @ 1KHz. It shall operate over a range of source impedances from 0 to 10K ohms and output loading from 1 ohm to infinity. Frequency response shall be within \pm .1dB from 11Hz to 50KHz (50 ohm load); total harmonic distortion shall not exceed 1/10th of 1% at 5 watt output from 20Hz to 20KHz; output noise shall not exceed an equivalent input of -122dBv, unweighted, 10Hz to 20KHz, input terminated at 600 ohms; and phase shift shall not exceed 15° from 20Hz to 50KHz @ 8 ohms. The amplifier shall be SPECTRA SONICS Model 109.

SPECIFICATIONS

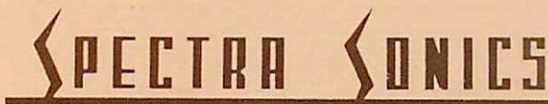
GAIN	40 dB (\pm .1dB). Additional gain available through use of isolation transformers.
MAXIMUM OUTPUT	5 watts into any impedance from 4 ohms to 20 ohms, + 25dBm into 600 ohms
OVERLOAD RECOVERY TIME	Less than 5 microseconds for up to 1000% overload
INPUT IMPEDANCE	Approximately 100K ohms
SOURCE IMPEDANCE	0 ohm to 10K ohms
OUTPUT IMPEDANCE	Equal to or less than .02 ohm at 1KHz Equivalent to a 4 mh inductor with 0.008 ohm, D.C. resistance
OUTPUT LOADING	1 ohm to infinity
FREQUENCY RESPONSE	Within \pm .1 dB from 11Kz to 50KHz (50 ohms load). Within \pm .1 dB from 13Hz to 20KHz (8 ohms load)
TOTAL HARMONIC DISTORTION	Not more than 1/10 of 1% at 5 watts output 20Hz to 20KHz.
INTERMODULATION DISTORTION	Less than 0.2% at 5 watts
OUTPUT NOISE	Not over an input equivalent of -122dBv, unweighted, 10Hz to 20KHz, input termination 600 ohms
PHASE SHIFT	Equal to or less than 12 ^o , 20Hz to 100KHz, 50 ohms. Equal to or less than 15 ^o , 20Hz to 50KHz, 8 ohms
OUTPUT POWER	Not less than 5 watts, 4 to 20 ohms Not less than 4 watts, 2 to 30 ohms Not less than 3 watts, 1 to 50 ohms
POWER REQUIREMENTS	Plus and minus 24 VDC (bi-polar) at 10 mA. Quiescent; 65 mA, 1 watt; 450 mA, 5 watts.
RIPPLE REJECTION	Plus or minus source, at least, 40 dB at @ 60Hz, 43 dB @ 120Hz
PHYSICAL DIMENSIONS	1cm (2.5") x 1.96cm (5") x .44cm (1.125")
WEIGHT	Net Wt. 0.17Kg (6 ounces) Shipping Weight .45 Kg (1 lb.)

OUTPUT ACCESSORIES

Normally, each output employed from the Model 109 will utilize a separate output transformer to provide additional gain, impedance matching, ground isolation etc. as may be required. For most Model 109 applications, the following transformer is suggested:

The Model T66 High Level Audio Transformer is a high quality line to line level audio transformer with 600/250/150/62.5 ohms primary and secondary taps. In addition, it is hermetically sealed, has PC board termination, and provides 45dB case shielding.

Additional hardware and accessories such as card holders, bifurcated connectors, and power supplies are available from SPECTRA SONICS to complete the installation of the Model 109 Line/Distribution Amplifier.

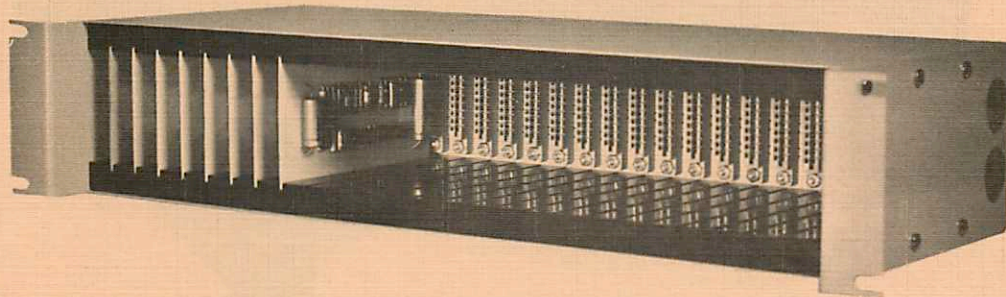


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MODEL 201C CARD HOLDER



GENERAL DESCRIPTION

This card holder offers a complete installation system for SPECTRA SONICS professional audio printed circuit card (2½" x 5 x ½") modules. The Model 201C Card Holder comes with solid phenolic circuit card slides, bifurcated contact circuit card connectors presoldered to a "mother" printed circuit board that provides additional wiring termination points, complete shielding, and contemporary styled front panel incorporating a "power on" indicator. Requiring only a minimum of space, the Model 201C Card Holder may be located directly adjacent to controls (eg. within a console) rack mounted, etc. as required, thereby significantly minimizing wiring.

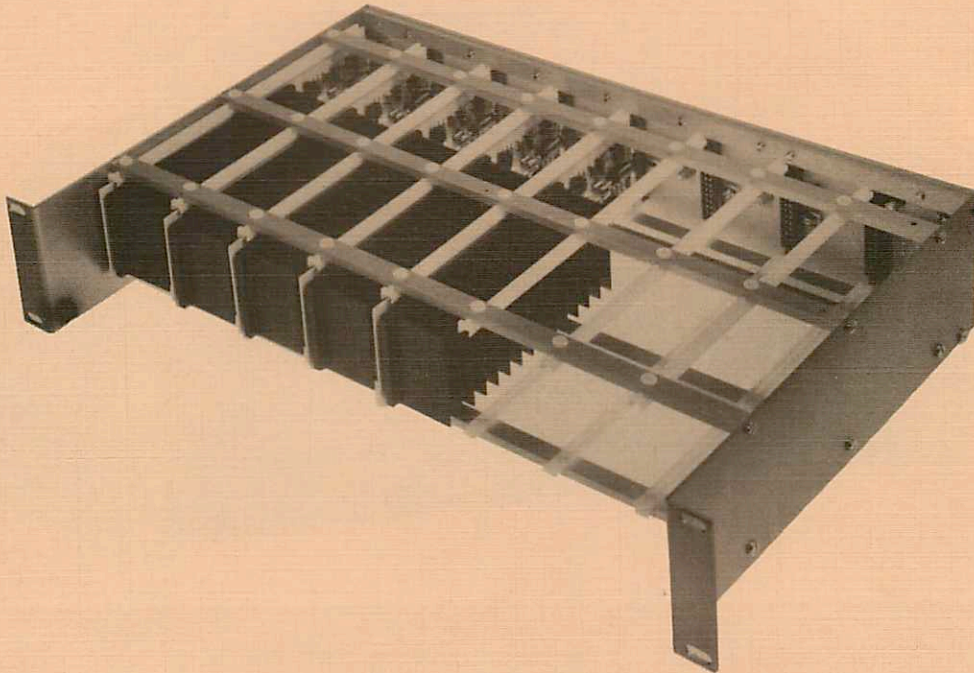
The major advantage of this card holder system is that it assures an unequalled electronic advantage -- a continuous system ground plane right at the printed circuit card modules. In addition, by providing housing, shielding, convenient terminations, etc. for up to 26 modules, the Model 201 Card Holder is a minimum cost per module installation system. A front panel of satin finish anodized aluminum is available as an option.

SPECIFICATIONS

CARD CAPACITY	26 printed circuit card modules, 6.4cm (2½") high x 12.8cm (5") deep x 1.26cm (½") wide
CARD CONNECTORS	10 terminal bifurcated contact edge (Model 230 Card Connector)
SYSTEM GROUND & TERMINATIONS	All connectors presoldered to a card holder printed circuit board system which provides a continuous plated ground plane surface right at the electronic components, B+ and B- busses, and all additional termination points necessary for convenient system interconnections.
PHYSICAL DIMENSIONS	8.89cm (3½") high x 20.5cm (8") deep x 48.5cm (19") wide for standard rack mounting.
WEIGHT	Net, 4.7Kg (10½ lbs.); Shipping 5.8Kg (13 lbs.)



MODEL 202PC CARD HOLDER



GENERAL DESCRIPTION

The Model 202PC Card Holder is a flexible installation system. It is designed to house the Model 505 Electronic Filter and the Model 701 Power Amplifier. The card holder is equipped with nylon card rails, bifurcated contact circuit card connectors; individual balance controls and Model T66 transformers mounted on the printed circuit card are installed for specific configurations, as noted in the specifications. The versatility of this system makes it adaptable to many configurations for a variety of applications, such as; Bi-amplification; stereo, Bi-amplification; Tri-amplification. The Model 202PC design allows power system changes to be made simply and easily. The configurations listed are available, pre-wired for immediate use. An attractive front panel of satin finish, anodized aluminum is an option.

SPECIFICATIONS

CONFIGURATION	CARD CAPACITY	BALANCE CONTROLS	PRE-WIRED BRIDGED PAIRS	TRANSFORMERS	APPLICATION
Model 202PC (ST) Standard	9	0	0	0	Open
Model 202PC (4BP) 4 Bridged Pairs	8	4	4	0	4 inputs; no Crossover Filter
Model 202PC (8) 8 inputs	8	8	0	0	8 inputs; no Crossover Filter
Model 202PC-1 (ST) Standard	8	0	0	1	Open
Model 202PC-1 (T) Tri-Amplified	5	3	1 (Low Frequency)	1	Tri-Amplified with Crossover Filter
Model 202PC-1 (HT) High Intensity Tri-Amplification	8	4	3 (1 Mid Frequency) (2 Low Frequency)	1	Tri-Amplified with Crossover Filter
Model 202PC-2 (ST) Standard	7	0	0	2	Open
Model 202PC-2 (B) Bi-Amplified	7	4	2 (Low Frequency)	2	Stereo, Bi-Amplification with Crossover Filter

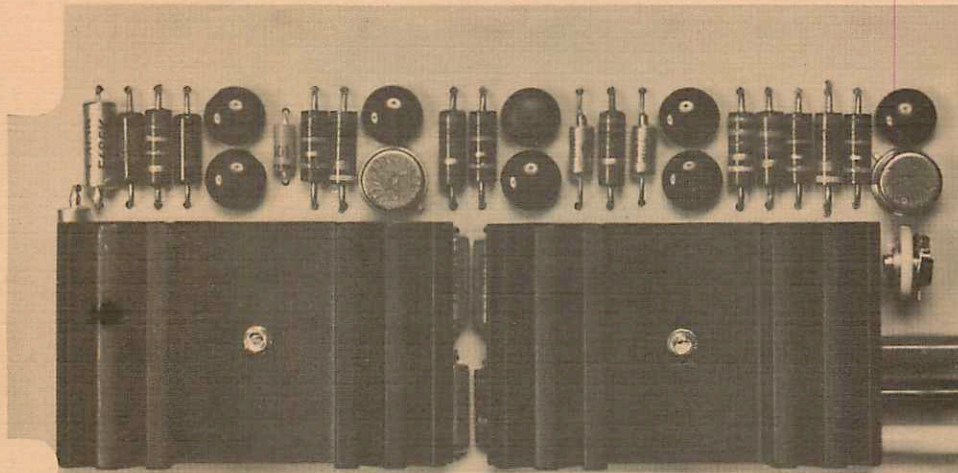
Balance Controls 50K ohms (Screw Driver Type)
 Transformers SPECTRA SONICS Model T66
 Physical Dimensions 8.89cm (3½") high x 31.2cm (12¼") deep x 48.5cm (19") wide (Standard Rack Mounting)
 Weight Net 1.8Kg (4 lbs.) Shipping 2.9Kg (6½ lbs.)

NOTE:

Standard configurations are supplied unless otherwise specified. Model 202K Wiring Kit, which contains all components necessary to assemble any configuration, is an option which is available.



MODEL 411 REGULATOR



(Actual Size)

GENERAL DESCRIPTION

The Model 411 Regulator is designed to provide 48VDC (plus and minus 24VDC) at 1 amp for various solid state amplifiers and electronic filters utilizing bi-polar power. This versatile regulated power supply may be employed as two 24 volt supplies, one positive and one negative, for miscellaneous system power requirements. The Model 411 Regulator is a modular printed circuit card 2-½" X 5" X 7/8" and may be housed within a SPECTRA SONICS Model 201C Card Holder for ease in system wiring, or a ten terminal bifurcated card connector may be utilized. Test points are provided, accessible from the front of card, to measure voltage while the supply is in operation. The output voltage may be adjusted, as required, for operation between 20 to 28VDC maximum. When utilized in conjunction with a SPECTRA SONICS Model 411AC, the hum and noise will not exceed 100uV in the positive supply and 300uV in the negative supply (20Hz to 20kHz).

SPECIFICATION

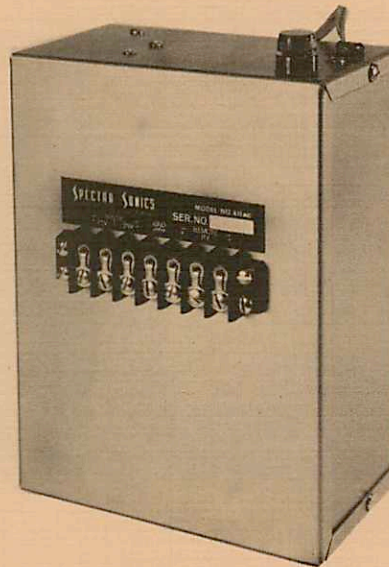
INPUT VOLTAGE	22 to 40 volts maximum filtered DC, plus and minus.
OUTPUT VOLTAGE	Adjustable 20 to 28 volts DC regulated.
OUTPUT REGULATION	Within .3 volt, no load to full load.
OUTPUT CURRENT	1 ampere, maximum.
MINIMUM INPUT TO OUTPUT DIFFERENTIAL	2 VDC.
MAXIMUM INTERNAL POWER DISSIPATION	7 watts at 140° F. ambient (max.). 10 watts at 80° F. ambient (typical).
RIPPLE REJECTION	68 dB minimum (positive supply) 120 Hz. 58 dB minimum (negative supply) 120 Hz.
PHYSICAL DIMENSIONS	Printed circuit card 2-½" X 5" X 7/8".
WEIGHT	3-½ ozs., shipping 6 ozs.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The power supply shall be a bi-polar regulated supply capable of delivering 48VDC at 1 ampere or two supplies, one positive and one negative, 24VDC at 1 ampere each. The output regulation shall be within .3 volt each side, no load to full load. Ripple rejection shall be greater than 68 dB, positive supply, and 58 dB, negative supply, at 120Hz. The power supply shall be modular (plug-in) printed circuit card for ease of service and installation. It shall be a SPECTRA SONICS Model 411 Regulator.



MODEL 411AC POWER SUPPLY



GENERAL DESCRIPTION

The Model 411AC Power Supply is an unregulated supply providing filtered DC of 27 to 40 volts bi-polar (plus and minus) at 1 amp. While it's primary design is supplying filtered DC for the Model 411 Regulator, the Model 411AC Power Supply may be utilized as an auxiliary voltage source for any circuit not requiring regulated DC.

The Model 411AC Power Supply is housed in a metal box 3-1/2" high, 8" deep, and 6-1/2" wide and may be located, as desired as cooling or heat dissipation is not a factor. A standard four foot cord connects the power supply to the 105/125 volts AC required. The DC output voltage and remote control switching facilities connect to a terminal strip located on the top of the power supply housing. In addition to the unique short circuit protection feature designed in the Model 411AC Power Supply, a 1/2 amp slow blow fuse further protects the supply from over load conditions.

SPECIFICATIONS

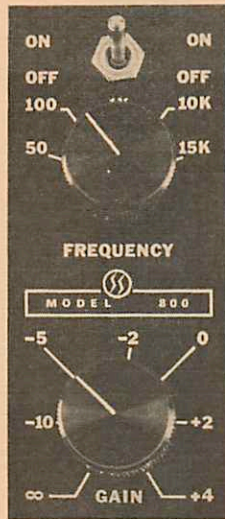
INPUT VOLTAGE	105 to 125VAC, 50/60Hz, 100 watt max.
OUTPUT VOLTAGE	27V (+ and -) at 1 amp, 105 volts input. 40V (+ and -) no load, 125 volts input.
OUTPUT CURRENT	1 amp maximum.
RIPPLE	Less than .25 volt at 1 amp load.
PHYSICAL DIMENSIONS	3-1/2" high, 8" deep, 6-1/2" wide, metal housing.
WEIGHT	Net 5 lbs., shipping 6-1/2 lbs.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The power supply shall be solid state circuitry housed in a metal cabinet 3-1/2" high, 8" deep, 6-1/2" wide. The power supply shall be capable of delivering 27 to 40 volts filtered DC at 1 amp, with less than .25 volts ripple. Remote control switching and short circuit protection shall be designed within the power supply in addition to the protection of an AC current fuse. It shall be a SPECTRA SONICS Model 411AC Power Supply.



MODEL 800 SIGNAL GENERATOR



GENERAL DESCRIPTION

The Model 800 Signal Generator, is a solid state, compact oscillator with five selectable frequencies. The miniature size of the Model 800 makes it practical to install conveniently in audio control consoles or other circuitry which requires a signal generator. All control are mounted on the front panel. An on/off switch activates or deactivates the Model 800; no transients are developed when the Model 800 is switched from on to off. A frequency switch selects any of the five operating frequencies and a gain control allows the level of the output to be varied from infinity (-74dBm) to +4dBm. Installation and operating instructions accompany each Model 800 Signal Generator.

SPECIFICATIONS

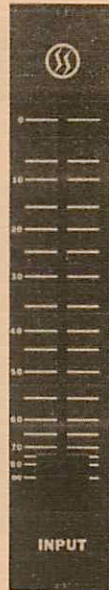
Output Impedance	0 to 1000 ohms, unbalanced.
Output Loading	600 ohms, (essential for calibration).
Output Level	Continuously variable from infinity (-74dBm) to +4dBm; +11dB (unterminated).
Output Calibration	Panel calibrated; infinity -10dBm, -5dBm, -2dBm, 0dBm, +2dBm and +4dBm.
Frequency Selection	50Hz, 100Hz, 1KHz, 10KHz, and 15KHz.
Frequency Tolerance	Within $\pm 10\%$ of frequency selected.
Total Harmonic Distortion & Noise	Less than .05% 100Hz to 15KHz, .1% at 50Hz.
Stabilization Time	Not more than 3 seconds at 50Hz, less than 3 seconds at all other frequencies.
Power Requirement	+24 VDC at 10mA
Physical Dimensions	8.89cm (3 1/2") high x 3.81cm (1 1/2") wide x 7.30cm (2 7/8") deep
Mounting	Attaches to panel by nuts on controls.
Weight22Kg (8 oz.) net, .46Kg. (1 lb.) shipping weight

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The Model 800 shall be a solid state, five frequency signal generator capable of developing frequencies of: 50Hz, 100Hz, 1kHz, 10kHz, and 15kHz, each selectable from the front panel. An on/off switch shall start and stop the signal. The output level shall be continuously variable from infinity (-74dBm) to +4dBm and the front panel calibrated to read seven positions as follows: infinity, -10dBm, 5dBm, -2dBm, 0dBm, +2dBm and +4dBm. The output shall be capable of being terminated into a minimum load of 600 ohms. Frequency tolerance shall be within $\pm 10\%$ of frequency selected. Selected output frequency shall be stable in 3 seconds or less. Total harmonic distortion and noise shall not exceed .1% at 50Hz and not more than .05% throughout the remaining frequencies. It shall be powered by +24 VDC at 10mA. Physical dimensions shall not exceed 3-1/2" in height, 1-1/2" in width and 2-7/8" in depth. It shall be a SPECTRA SONICS Model 800 Signal Generator.



MODEL 901 STRAIGHT LINE ATTENUATOR



GENERAL DESCRIPTION

Straight Line Attenuators are manufactured in two Models, the 901 and the 902. The Model 901 has a stroke length of 3.75 inches; the Model 902, 5.00 inches. Both models are produced in single, two and four gang configurations (indicated by the numbers following the dash; i.e., -1, -2, or -4), and may be ordered with either an audio taper (A) or linear dB taper (L). These Straight Line Attenuators may be installed on 1.5" centers, and are completely enclosed in a metal chassis for protection; the dimensions are noted in the specifications. The continuously variable resistive element is sealed to prevent contaminants from affecting the performance or reliability. Operating instructions are provided with each unit.

SPECIFICATIONS

	Models 901 & 902 (A) Audio Taper	Model 901 & 902 (L) Linear dB Taper
Source Impedance	0 to 100 ohms	0 to 1K ohms
Input Impedance	500 to 2.5K ohms	10K ohms
Termination	600 ohms	100K ohms, minimum
Operating Range	0 dB to 70 dB	0 dB to 90 dB
Insertion Loss	0 dB	0 dB
Cut Off	75 dB	100 dB
Stroke Length	Model 901 (3.75") 9.525cm	Model 902 (5.0") 12.7cm
Chassis Dimensions*		3.75cm (1.4060") wide x 20.7962cm (8.1875") long x 6.985cm (2.75") deep
Weight		.454kg (1 lb.) net; .568kg (1 lb. 4 oz.) shipping
Escutcheon		Black Anodized Plate 3.81cm (1.5") x 20.7962cm (8.1875")

* Printed circuit card extends .933cm (.3675") beneath chassis base. Allow 2.54cm (1") for connector and wiring. Chassis dimensions are identical for all attenuators.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The straight line attenuators shall provide variable attenuation of the audio signal with no degradation and no insertion loss. There shall be a single control which moves along the axis to accomplish selection of the desired degree of attenuation. The slide control shall function smoothly without undue friction. The attenuator shall be available with either audio or linear dB tapers and with either a short 9.525cm (3.75") or long 12.7cm (5.00") control stroke length. The attenuators shall measure 3.81cm (1.5") wide x 20.7962cm (8.1875) long x 6.985cm (2.75") deep. The attenuator shall be SPECTRA SONICS Model 901 (A) or (L) or Model 902 (A) or (L).



MODEL 101 AUDIO AMPLIFIER

Operating Instructions

GENERAL

The Model 101 Audio Amplifier is designed specifically for professional applications requiring both unequalled performance and reliability at a competitive cost. It performs such functions as microphone preamplifier, booster amplifier, mixing amplifier, program amplifier, line amplifier, and other such functions as required up to line levels. This unique amplifier contains an integral active isolation "transformer" which additionally eliminates system ground loop problems without increased cost and performance limitations.

LIMITED WARRANTY

The SPECTRA SONICS Model 101 Audio Amplifier is guaranteed to meet performance specifications for two full years from the date of manufacture. If a malfunction occurs, the amplifier will be repaired or replaced (at our option) without charges for material or labor. The warranty does not cover finish or appearance due to abuse. The unit must be shipped prepaid to SPECTRA SONICS.

TERMINATION

In size and termination the Model 101 Audio Amplifier is similar to other SPECTRA SONICS printed circuit card modules allowing ease in housing, wiring, and grounding as provided by the Model 201 Card Holder. It is placed in operation by insertion into a Model 230 Card Connector (10 terminal bifurcated) or equivalent as contained in the card holder. Bifurcated contact edge connectors should be used for positive contact.

With the connector oriented with "A" terminal to the top and the circuit card shallow key cut-out to the top, wire as follows:

- A Blank
- B Blank
- C Blank
- D Signal Input +
- E Signal Input -
- F Signal Output -
- H Signal Output +
- J +24 VDC (B+)
- K DC Signal Output +
- L Feedback Point (For gain determining resistor or SPECTRA SONICS Microphone/
Program Equalizer)

Power requirement is +24 VDC at approximately 20 mA per amplifier, and any supply with better than -60 dBm noise (less than 1 mV ripple) can be used without adding noise to the output of the amplifier. The amplifier printed circuit card module may be inserted in or withdrawn from the card holder, with power applied, without harm to the amplifier.

Each amplifier possesses an individual input and output ground and these must be wired in accordance with the grounding instructions.

All amplifiers should be allowed to warm-up for approximately 15 minutes prior to any critical measurements, although the performance is instantaneous with slightly increased distortion for the first few minutes.

WARNING: The following details should be carefully checked when utilizing the amplifier otherwise the amplifier may be damaged:

1. Do not accidentally short the DC Signal Output + to ground.
2. Do not terminate the power supply +24 VDC backwards.
3. When applying continuous signals through the amplifier, load the amplifier output with from 600 ohms to infinity.
4. Do not allow an unrestrained oscillation to continue. Typical causes of oscillation are due to improper wiring and grounding practices such as: Capacitive coupling between high and low signal levels in very close proximity (eg. bundled cables) where excessive loop gain from a single or series of amplifiers exists; grounding of input and output signal negatives through common wire to ground plane; etc.
5. Power should not be applied when inserting the amplifier into an unrestrained connector, as misalignment may cause contact shorting.

GAIN

The overall gain of the amplifier is determined solely by the value of one resistor, R_f (in feedback circuit). This resistor is intended to be utilized externally (on the circuit card connector: terminals K and L) thereby allowing all circuit cards to be interchangeable, irrespective of the gain desired in any given amplifier plug-in location. Resistance values for normally employed gains are:

35 dB (34.7) = 5.6 kohm, low noise	$\text{Gain, dB} = 20 \log \left(\frac{R_f \parallel 100 \text{ K}}{100} \right)$
40 dB (40.0) = 10.7 kohm, low noise	
45 dB (44.6) = 20 kohm, low noise	
50 dB (49.6) = 42.2 kohm, low noise	

Any desired gain between the above indicated values may be obtained (using the above gain equation) by an appropriate change in R_f , the feedback resistor. The resistor should be low noise, metal film, for optimum amplifier noise considerations.

FREQUENCY RESPONSE

The high end response of the Model 101 Audio Amplifier may be tailored in the same manner as the gain - and with the same ease and facility. High

frequency cut-off is accomplished by placing a capacitor directly across the signal input terminals of the circuit card connector, again allowing interchangeability of amplifiers irrespective of response differences in various amplifier locations. The extreme stability of the amplifier allows a capacitive shunt without any change to amplifier performance other than high frequency response. With a 600 ohm source impedance to the amplifier, as an example, a .012 MFD capacitor would provide an amplifier response that is -3 dB at 40 kHz. Any desired frequency response below 1 MHz may be obtained in this manner.

IMPEDANCE MATCHING

There exists no requirement to match input and output impedance with the Model 101 Audio Amplifier, since the amplifier is purely resistive in nature.

The amplifier may be terminated with any source resistance, 0 ohms to infinity, with the only performance change being one of noise. Noise output further decreases below the -127 dBm specification as the source impedance decreases (see Noise section).

The output of the amplifier may be loaded with 600 ohms to infinity with no performance change. Loadings 600 ohms or greater should be observed for amplifier maximum power capability considerations (output stage current).

NOISE

Noise output, referred to the input, varies from -132 dB to -125.5 dB for input sources of 0 ohms to infinity, respectively. Typical sources of 50 ohms and 600 ohms give -130 dB and -127 dBm, respectively. In order to maintain the specified noise figure, the amplifier should not be located in or near strong magnetic fields produced by transformers, motors, etc.

As an example, the unequalled low equivalent input noise measurement of -127 dBm is based on: Unweighted response; 20 Hz to 20 kHz bandpass filter; and input terminated with 600 ohm low noise (eg. metal film) resistor.

Note: All measurements specified in dB are measured with respect to 0 dB = 0.775 volts. All data in dBm are with respect to 0 dBm = 1 mW dissipated into a 600 ohm resistive load = 0.775 volts across 600 ohms.

INPUT TERMINATION/MICROPHONE LOADING APPLICATIONS

Microphone loading normally falls into two categories: Power matching and voltage loading. Most American dynamics, etc. fall into power matching and are loaded with their source impedance. Voltage source microphones, such as condenser microphones, however, may not be loaded in this manner or distortion and frequency discrimination will occur. All such microphones should see at least 5 times their source impedance - or operate unloaded.

Termination into the Model 101 Audio Amplifier, therefore, is simply a matter of selecting a transformer tap that reflects the proper loading to the microphone to be used.

If, for example, a condenser microphone is to be used, a 50 ohm source is connected directly to the 600 ohm primary of a 600/600 ohm low level transformer (eg. TRIAD A67J), and the 600 ohm secondary is connected to the Model 101. The microphone will see 600 ohms, which loads the microphone with 12 times its source impedance (ideal loading), while the amplifier sees 50 ohms (1:1 transfer), and gains 3 dB in noise over a 600 ohm loading.

A dynamic microphone (150 ohm source) may be loaded by connecting to 150 ohm/600 ohm transformer, which matches the source load of the microphone and provides 600 ohm source for the Model 101. The step-up of the transformer increases the signal by 6 dB at the input of the amplifier, and in effect, lowers the equivalent input noise at the microphone to -133 dB.

Signal-to-noise ratio for a microphone signal of -50 dB in the above two cases is 80 dB and 83 dB respectively.

ACTIVE ISOLATION TRANSFORMER

The Model 101 Audio Amplifier contains an integral active electronic isolation transformer with 1:1 transfer ratio. This is unique among amplifiers in that the ground is not continuous through the amplifier (see Figure 1).

Two operating conditions of major significance are made possible:

1. Complete single-ended systems without transformers
2. High frequency stability

Since the active isolation transformer contains no band width compromises associated with convention transformers, it does not exclude RF (without capacitor filter), and thus transformers are recommended at the input and output of the system with no transformers within the system.

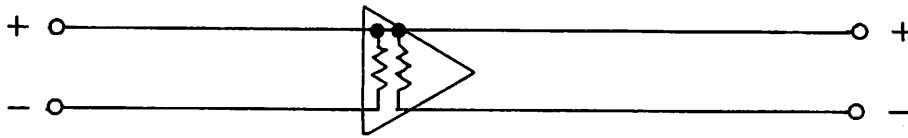
GROUNDING

In order to preclude the output modulating the input as a direct result of input ground potential fluctuations at high frequencies, and thus cause high frequency instability, the length of any lead carrying signal common to both output and input should be as short as possible (see Figure 2). Such an improper termination produces system oscillation at frequencies in the 1-5 M Hz range and injects hum (ambient 60 cycle riding on oscillation carrier) into the system. Where ground returns exceed three feet in length, shielding is recommended (see Figure 3).

Wherever branching ground circuits are designed, the amplifier itself may be employed as an active isolation transformer thus eliminating ground loops that would normally be encountered with conventional amplifiers in single-ended circuitry. Figure 4 illustrates the grounding system required - the only difference being the incorporation of a capacitor to allow high frequency grounding without disturbing low frequency ground isolation. This capacitor (.47 MFD, 10V) should be terminated at the amplifier connector with short leads, and all common path leads to ground in Figure 4 are shown with physical length, for illustration only.

Figure 1

AMPLIFIER INTERNAL GROUND CONFIGURATION



(Internal Ground Not Continuous)

Figure 2

THEORY

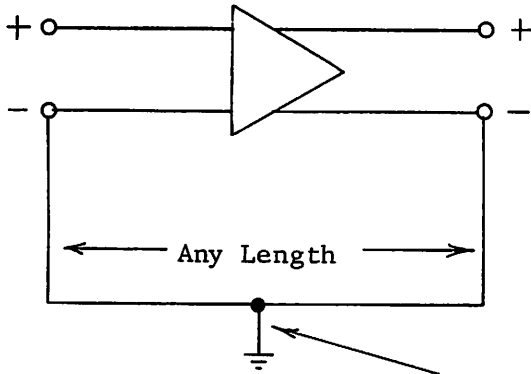


Figure 3

PREFERRED CONNECTION

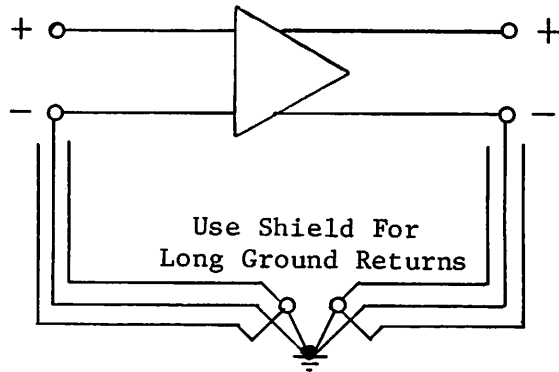
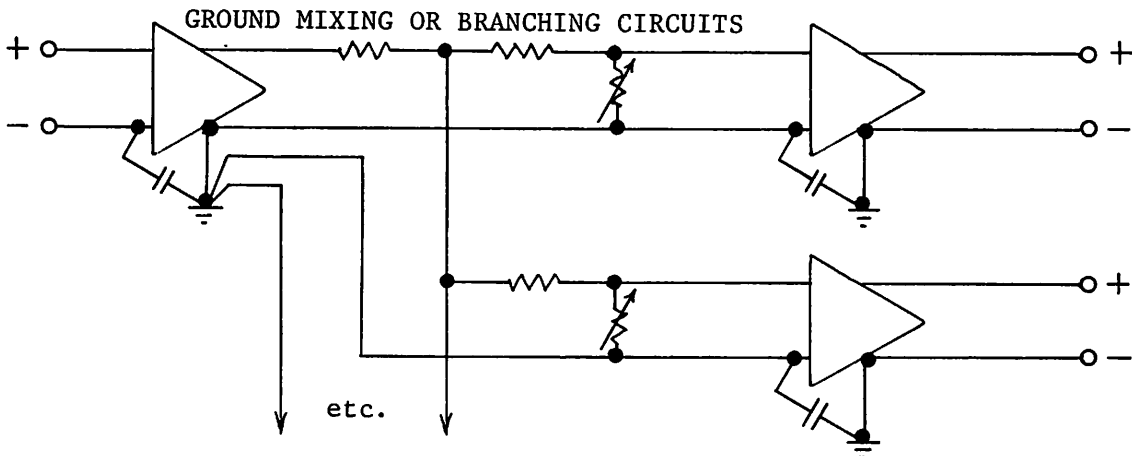


Figure 4



REPAIR/SCHEMATICS

In the event of a malfunction or failure, it is recommended that the Model 101 Audio Amplifier be repaired only at the factory, because of the precise and critical parameter requirements of the components utilized. Arbitrary insertion of standard components can cause catastrophic failure of the amplifier and should not be attempted. It is for this reason that amplifier schematics are not provided. Repaired products are tested to original operating specifications and returned as soon as possible.