



SUM100 & SUM100-RCA

LINE/SUM/LINE AMPLIFIER

OPERATING AND MAINTENANCE MANUAL



© Copyright 2011, ATI Audio Inc.

DESCRIPTION

The **SUM100** Summing Amplifier is an inexpensive, high performance amplifier that is designed as a line level stereo-to-mono summing amplifier. It is also useful as a gain block, and as an impedance converter and summing amp for IHF (RCA type) signals.

The inputs provide balanced 40Kohm bridging impedance for line levels up to +24dBm. The high input impedance allows the SUM100 inputs to also bridge -10dBu (Hi-Fi, RCA plug) lines without loading.

Front panel, screwdriver adjust, full range gain controls provide 26dB gain at full clockwise rotation, unity gain at twelve o'clock and a smooth audio taper to full off. The output driver is a servo controlled, ground-sensing circuit, which will supply over +24dBm to 600 ohm balanced loads and +20dBu to high impedance, unbalanced loads. The **SUM100** uses rugged XLR type input and output connectors. The **SUM100-RCA** model adds RCA connectors for direct connection of unbalanced lines to both inputs and output.

Loop-through DC connectors allow several NANOAMPS to share a single external 24VDC power supply. Battery packs and DC-DC converters for portable use are also available.

Up to three amplifiers will mount side-by-side in only one rack unit using the available rack mounting kits. SUM100 units may also be neatly stacked or mounted side by- side on your desk with the available angled desk mounting kits.

CIRCUIT DESCRIPTION

INPUT STAGES

The balanced input stages of the SUM100 Line Amplifier utilize a FET input LF347 quad op-amp in a clean, quiet inverting instrumentation amplifier configuration. Input levels up to +24dBm will be handled without clipping, excess levels cause only clean clipping without hang-up or phase reversal. Equal -6dB gains from both HI and LO inputs allow unbalanced sources to be easily accommodated. Bridging impedance is a high 40Kohms with good CMR. Linear panel adjust trimpots for both left and right signals are designed to be operated at their 12 o'clock position for maximum resolution.

SUMMING AMPLIFIER

Left and right signals are combined in an active summing network (A1B) which yields unity gain for each individual signal, three dB gain (RMS summation) for

program audio signals and six dB gain for correlated inputs.

GAIN STAGE

A low noise NE5532 section (A1A) provides 26dB maximum gain. A linear control is used in a unique circuit configuration to provide a wide range logarithmic MASTER gain control characteristic in a variable gain stage with optimum noise performance. Output noise at unity gain is low enough to allow performance to exceed 16-bit digital dynamic range even at -10dBu nominal output. Unity overall gain is achieved at approximately 12 o'clock pot position.

LINE OUTPUT

The balanced output stage of the SUM100 utilizes a unique active balanced output driver IC, the Analog Devices SSM2142, that senses whether the XLR output connected load is balanced and floating or is unbalanced due to either side being grounded. A balanced output load will be driven with equal and antiphase levels on the HI and LO output lines.

An unbalanced (one side grounded) load will cause the driver IC to shut off the signal output to the grounded side of the load and double the output level applied to the other side, thus maintaining equal output to either type of load. The output stage provides 6dB gain and will drive loads of 600 ohms and higher. Nominal output is +4dBm with clipping at +24dBm (12.28Vrms) into 600 ohm balanced loads for 20dB nominal headroom. Maximum output is reduced to +20dBu (7.8Vrms) when driving an unbalanced load since the full output swing of only one driver is available. This still provides a very comfortable 30dB of headroom above the typical -10dBu nominal unbalanced signal.

POWER SUPPLY

The SUM100 requires 24 to 30VDC and is designed to share a common external 24VDC "Wall Wart" type power supply. A pair of loop-thru DC connectors on the rear of each module permits several units to be daisy-chained with P/N20602-1 DC power cables to a single power supply. The WA100-1 and WA100-2 (90-264VAC) are 400Ma supplies. The SUM100 draws 70mA. Any combination of amplifiers, which add up to less than the supply rating, can be powered by a single supply.

INSTALLATION

UNPACKING

Inspect the equipment. If there is any visible damage to the unit or to the box it came in, contact the factory but do not return anything to ATI without prior authorization and shipping instructions. It may be necessary to have the shipping company inspect the unit and the box at your location. Count the pieces! Don't throw out the boxes and packing material until you are sure you have everything that is coming to you. The amplifiers are normally shipped with a WA100-1 120VAC power supply. An optional WA100-2 international 90-264VAC supply and 20602-1 DC Loop-Thru Cable, to share the supply of another amplifier, is available.

Rack and desk mounting hardware may be packed in with the unit even though ordered separately. Power supplies may either be included with the unit or shipped in their own box.

MOUNTING

Single desk mounting kits consist of a pair of angled base plates that mount under the lower front and rear cover screws of a single unit, to raise and to tilt it for easy use. In addition, one or more sets of vertical stacking plates, mounting to the upper front and rear cover screws of the bottom unit, allow multiple units to be stacked. Several units can be desk mounted side-by-side and even stacked side-by-side using horizontal joiner kits together with mounting base and stacker kits. P/N 20617-501 is the angled base kit. P/N 20617-502 is the base plus one stacker kit (two high). P/N 20617-503 is the base plus two stackers (three high). P/N 20617-504 is the stacker kit by itself and P/N 20617-505 is the Horizontal Joiner Kit.

Rack Shelf System P/N 21075-501 mounts three units in one rack. 1/3RU Filler Panels P/N 21097-501 may be used to fill unused Rack Shelf spaces.

WIRING

AUDIO CONNECTIONS

Balanced XLR type inputs and outputs are wired with pin 2 as HI and pin 3 as LOW. Pin 1 is the cable shield and ground connection. Pin 1 is grounded as shipped but may be floated to interrupt a hum producing ground loop by opening the unit and clipping out the GND LIFT jumpers. Unbalanced lines use pin 2 as HI and ground pins 3 and 1, or may be connected directly to the RCA input jacks on SUM100-RCA models.

Active balanced inputs and outputs require a reference ground connection to the

source or receiving device. This ground can be provided by the rack frame or a studio buss connection if it is not carried through by the output cable shield.

GROUNDING

Operation in high RF broadcast environments requires special attention to grounding and shielding. The chassis *must* be grounded directly to a good, low impedance studio ground system. Input and output connections must be properly shielded and free of ground loops. It may even be necessary to add shielding to the DC input leads to avoid RF pickup when operating in high RF environments.

POWER DISTRIBUTION

Multiple amplifiers sharing a single wall-wart power supply should be looped through each other using the DC interconnect cables P/N20602-1. Hum and noise performance of the units can be degraded by poor DC ground connections between units sharing a common supply. Use of the recommended rack and desk mounting kits will assure a good ground connection between units by firmly strapping their chassis together.

CAUTION! The outer shell of the DC interconnect cables is positive relative to the chassis. Do not allow a DC cable plugged into a powered unit to hang loose where it might short against the chassis or rack frame.

OPTIONS

INTERNATIONAL USE

The WA100-2 wall mount power supply accepts 90-264VAC/47-63Hz via an assortment of AC input connectors. This model is available as P/N WA100-2-EXCH when exchanged for the normally-supplied WA100-1 Power Supply.

BATTERY OPERATION

Alkaline battery packs (BBU100-1) and 24VDC converters for operation from 12V belt pack or automotive batteries (DC100-1) power modules are available.

MAINTENANCE

There is no routine maintenance required. If you have a problem, check panel LED indicators to assure that the units have DC power, eliminate by substitution input and output cables, connectors, downstream devices, DC interconnect

cables and wall wart power supplies.

POWER SUPPLY LEVELS

The recommended loaded DC input voltage range is 24VDC minimum to 32VDC maximum over the full range of AC line voltage tolerances. The audio circuits continue to work with reduced headroom below 24VDC. Momentary surges up to 36VDC will cause some increased internal heating, but above 36VDC may cause IC failure.

OPERATING POINTS

An internal reference voltage equal to 1/2 the supply voltage is generated. All audio stage IC inputs and outputs should show a DC level equal to this voltage when measured with a high impedance meter. Audio inputs and outputs are capacitor coupled and ground referenced.

MODIFICATIONS

ADDITIONAL GAIN

If more gain is required for a particular application, increase the values of R25 (left) and R34 (right). 20K ohms adds 6dB, 30K ohms adds 10dB, 62K adds 16dB, 100K adds 20dB. A corresponding decrease in the input clipping level will result.

PERFORMANCE SPECIFICATIONS

Gain	28dB maximum, 0dB at 12 o'clock pot position
Nominal Levels	+4dBu in, +4dBm out to 600 ohm balanced load
Peak Levels	+24dBu in, +24 dBm out to 600 ohm balanced load
Noise 20kHz B.W.	-90dBm maximum output
Harmonic Distortion	.02% Max at Peak Level 20Hz to 20 kHz .005% max at Nominal Level
Frequency Response	+.25dB, 20 to 20,000Hz
Crosstalk	70dB minimum at 10 kHz
Input Impedance	Balanced, 40kohm bridging
Output Impedance	Balanced, 40 ohms maximum Zs
Dimensions	1.5" (3.8cm) H by 5.5" (14cm) W by 5.75" (14.6cm) D
Weight	1.5 lbs. (0.7kg) Net, 3 lbs. (1.4kg) Shipping
Connectors	SUM100 —XLR (balanced input/outputs) SUM100-XLR —XLR and RCA
Power	24VDC @ .07A, connector sleeve is positive
POWER SUPPLIES:	All units require 24VDC power supply; 120VAC unit is supplied. NanoAmps can share a single supply using DC Loop-Thru Cable P/N 20602-1. Do not exceed rated supply current.
WA100-1 (Standard):	Wall mount power supply (UL), 24VDC @ .4 amp, 120VAC/60Hz
WA100-2 (Optional):	International wall mount power supply, 24VDC @ .4 amp, 90-264VAC / 47-63Hz with an assortment of AC input connectors
BBU100-1:	Battery Pack unit houses four 9V alkaline batteries (batteries not included). Four to six-hour life

DC100-1: DC to DC converter powers several units from 12VDC mobile and belt pack batteries. Supplies 24VDC @ .2amp maximum

20602-1: DC power cable assembly for looping the DC power between NanoAmps

DESK MOUNT KITS, RACKS AND FILLER PANELS:

20617-501 Angled Desk Mount Base

20617-502 Angled Desk Mount Base and One Stacker (2 units high)

20617-503 Angled Desk Mount Base and Two Stackers (3 units high)

20617-504 Stacker (2 units high)

20617-505 Horizontal joiners for 2 units (side by side)

21075-501: Rack mount system mounts three units in one 1RU 19-inch rack space

21097-501: 1/3 RU Filler Panel for 21075-501

One Year Limited Warranty

ATI warrants this product to be free from defects in materials and workmanship to its original owner for a period of one year from date of purchase. ATI will repair or replace such product or part thereof, which upon inspection by ATI, is found to be defective in materials or workmanship.

The Proper Return Authorization Number must be obtained from ATI in advance of return. Contact ATI at 856-626-3480 or email sales@atiaudio.com to receive the number and instructions for return of your unit.

A written statement providing the name, address, daytime telephone number and email address of the original owner, together with receipt from the original purchase, and a brief description of any claimed defects, must accompany all returns. Parts or product for which replacement is made shall become the property of ATI.

The customer shall be responsible for costs of transportation and insurance to the factory of ATI, and shall be required to prepay such costs.

ATI shall use reasonable efforts to repair or replace any product covered by this limited warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, ATI shall notify the customer accordingly. ATI reserves the right to replace any product that has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void in the event a covered product has been damaged, or failure is caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, or lightning, power fluctuations and other incidental or environmental conditions. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

ATI DISCLAIMS ANY WARRANTIES, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR USE, EXCEPT AS EXPRESSLY SET FORTH HEREIN. THE SOLE OBLIGATION OF ATI UNDER THIS LIMITED WARRANTY SHALL BE TO REPAIR OR REPLACE THE COVERED PRODUCT, IN ACCORDANCE WITH THE TERMS SET FORTH HEREIN. ATI EXPRESSLY DISCLAIMS ANY LOST PROFITS, GENERAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM BREACH OF ANY WARRANTY, OR ARISING OUT OF THE USE OR INABILITY TO USE ANY ATI PRODUCT.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

ATI reserves the right to modify or discontinue, without prior notice to you, any model or style product.

If warranty problems arise, or if you need assistance in using your product contact us.