Manual

THE GOLD

THE POWER

SUMO ELECTRIC COMPANY LIMITED

CAUTION!!!

These and all other SUMO amplifiers are full differential balanced amplifiers, with COMPLETELY floating outputs. As such, special precautions must be observed to effect proper operation.

Listed below are absolute caveats that should NEVER be circumvented.

NEVER attempt using common grounds of ANY KIND in the amplifier output connections. Shutdown will occur.

NEVER attempt to "bridge" these amplifiers under any circumstances as NO increase in power will result. All SUMO amplifiers are already operating in bridge fashion.

NEVER attempt to test these amplifiers without first reading THOROUGHLY, the section in this manual on testing.

NEVER plug an input cable into the input jacks with the AC power switch in the ON position and speakers connected. SUMO ELECTRIC CO. LTD. WILL ABSOLUTELY NOT BE RESPONSIBLE under any circumstances for destroyed loudspeakers due to consumer neglect.

CONTENTS

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TURN-ON DELAY and SURGE RELAY

The amplifier and your speakers are totally protected from any possible inrush current surges. However, it is possible that there might be some turn on thump before the relay is engaged. This is because initially, the bridge is not balanced and the servos must seek balance. There is ABSOLUTELY no possibility of speaker damage when and if this surge occurs.

* * *

CLEANING THE BOTTOM AIR VENT

Dust may collect in the cover of the bottom air vent. This dust MUST be blown out as often as necessary. Frequency of cleaning will vary depending upon dust content in the area of the amplifier but should be at least once a month--preferably every couple weeks. Disregarding this procedure may lead to frequent over-heating of the amplifier. This overheating may cause repeated thermal shutdown and future problems.

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POWER OUTPUT

16 ohms--minimum	65 watts/channel 20Hz-20kHz--The GOLD 225 watts/channel 20Hz-20kHz--The POWER
8 ohms--minimum	125 watts/channel 20Hz-20kHz--The GOLD 400 watts/channel 20Hz-20kHz--The POWER
4 ohms--minimum	200 watts/channel 20Hz-20kHz--The GOLD 750 watts/channel 20Hz-20kHz--The POWER
2 ohms--minimum	400 watts/channel 20Hz-20kHz--The GOLD 1000 watts/channel 20Hz-20kHz--The POWER

TOTAL T.H.D. and I.M. DISTORTION

8 and 16 ohms--less than .05% at any frequency or combination of frequencies, and at any power level to peak.

2 and 4 ohms---less than .25% at any frequency or combination of frequencies, and at any power level to peak.

INPUT IMPEDANCE and SENSITIVITY

1.35 volts across 1 megohm for 400 watts into 8 ohms--The POWER.

.75 volts across 1 megohm for 125 watts into 8 ohms--The GOLD.

2.70 volts across 10k ohms* balanced--The POWER.

1.50 volts across 10k ohms* balanced--The GOLD.

FREQUENCY RESPONSE and POWER BANDWIDTH AT RATED POWER or ANY LEVEL LESS THAN RATED

8 and 16 ohms--Better than $\pm$ .1 dB, 20Hz to 20kHz.

2 and 4 ohms--Better than $\pm$ .2 dB, 20Hz to 20kHz.

RISE TIME AT 8 OHMS

Better than 2 microseconds at full power.

Note: For those of you who wish to interpret this spec as a slew rate, per se, it is EQUIVALENT to 80 volts per microsecond. We do not, however, consider this valid as any amplifier that is slewing at all is IMPROPERLY compensated. In this respect, SUMO amplifiers do not slew at all, but rather, respond in a totally exponential manner to a step input function. (See notes later, on testing.)

STABILITY

100% stable into any load angle 0 to 90 degrees, capacitive or inductive, regardless of waveshape.

DAMPING FACTOR

Greater than 300 at 20Hz.

NOISE

Better than -100dB relative to full rated power into 8 ohms.

PROTECTION (See notes later, on testing.)

State variable processor completely eliminates the need for limiters of any kind. The state of the input and output is monitored at all times and will completely shut down the amplifier when any non-allowable condition exists. In addition, the thermal shutdown is also tied into the processor. Acquisition time is less than 1/2 signal cycle or 100 nanoseconds, whichever is longer.

B^{+} fuses for catastrophic failure, A.C. line fuse, relay surge fuse.

* Can be changed to 600 ohms balanced. Contact the factory.

Welcome to the world of SUMO. The amplifier that you have just purchased is undoubtedly and unquestionably the finest amplifier ever produced in the audio industry. We realize that this is a strong statement and of course all other manufacturers also make the same claim. We at SUMO are absolutely confident in our ability to back up each claim that we make on a direct comparison basis with any other competitive product, whether construction and materials, workmanship, sonic quality or reliability. In the next few paragraphs we will explain these items so you can feel confident and proud of your investment.

First, the warranty: Ten (10) years parts and Five (5) years labor. No other manufacturer would dare to commit to this kind of extended warranty. We have decided that only military grade components shall be used in our products. Such as all 1% tolerance metal film resistors throughout. Even to the point of using metal film trimmers--never before used in an audio product. All semi-conductor sockets are of the individually turned turret type pins that are only used in aerospace and computers. The output transistors are a new type specially manufactured for SUMO exclusively and are not available to other manufacturers. They are a larger square die in a package of solid copper. They have characteristics previously unobtainable in semiconductor technology: enormous safe area capability (100% greater than any previously known device), 50 megaherz ft, greatly improved linearity, etc.. These amplifiers have a total of 40 output devices yielding a total dissipation capability of 10,000 watts. How's that for being conservative.

The construction design of these amplifiers is all monocoque. The entire amplifier is virtually built on the power transformer as a foundation instead of the usual chassis approach. In other words, the top cover, bottom cover, rear panel, and front panel can all be completely removed yet the entire amplifier still remains intact and fully operable. Ninety-nine percent of all interconnections are made through interlocking P. C. board connectors that are all gold plated. The only wiring is associated with the power transformer and the lights. In order to maintain quality control and workmanship, we manufacture our own power transformers entirely in house. This is also a further aid to keeping the costs down. Due to the monocoque construction technique, the manufacturing time per unit is drastically reduced, which reduces errors to an absolute minimum. Furthermore, all products are burned in for 7 days to insure absolute reliability. In addition, an enormous amount of money is spent on the dual shipping containers in order to guarantee safe arrival of the product. We consider reliability to be a key factor and are absolutely, totally confident that you will experience years of trouble-free performance--for which end, nothing was spared.

It has long been known that the sonic performance of an amplifier is strongly dependent upon the loudspeaker that it is driving. For all practical purposes most loudspeakers look and act like a motor as far as the amplifier is concerned. The amplifiers ability to absolutely control this motor is a great factor in its sonic thumbprint, so to speak.

While most loudspeakers do not necessarily have the tremendous resolving ability that planar types have, this resolving ability is further impaired by the amplifier in all cases. All SUMO amplifiers are a major step forward in advancing the state of the art in this respect. This new level of performance is achieved by a totally new concept in circuit design and utilizes a full wave, four-quadrant, differential balanced-bridge topology. Inherent in this concept is the use of full four-quadrant quadrature feedback to all four corners of the balanced bridge. What this means simply pyt, is that the amplifier provides control of the loudspeaker by four independent push-pull feedback loops FROM EACH SIDE OF THE LOUDSPEAKER AT ALL TIMES.

The resulting control that is maintained over the speaker is truly awesome. Also, since there are no limiters of any kind in SUMO amplifiers, there can be no problematic activation which has plagued amplifiers in the past.

Both our Class AB and Class A amplifiers are identical in every way except for the output stages. This is where they differ and therefore, must be two separate units. The cosmetics are also different enabling easy identification between units. We believe that is is necessary for the consumer to have a choice in order to achieve the best performance for his system. Our Class A amplifiers are very unique and are totally unlike any other pure Class A units ever produced before. They are subject to patents because of the unique concept of operation. Our Class A amplifiers are TRUE,REAL CLASS A UNITS not to be confused with some other manufacturers who have referred to their amplifiers as being Class A when indeed they are not. The biggest drawback that has plagued designers until now has been in the area of trying to achieve absolute bias stability in the output stages. All schemes used to date have resulted in less than optimum results and we believe that this is the reason why only a very few true Class A amplifiers have ever been produced.

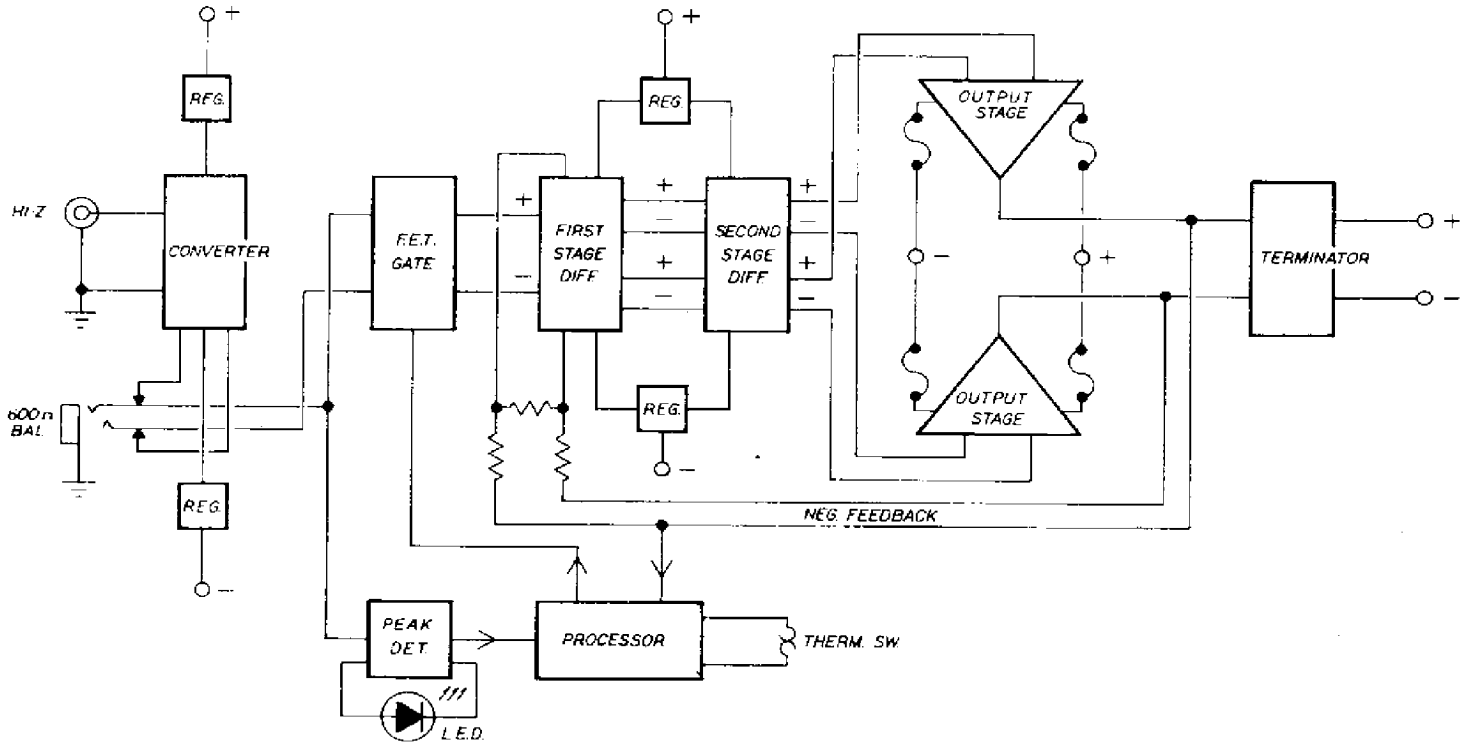
The uniqueness of SUMO Class A amplifiers has solved the bias stability problem forever. There are NO bias circuits of any kind, no thermal tracking networks of any kind, and NO active sensing networks of any kind used in SUMO Class A amplifiers. Bias stability is maintained passively and is absolutely inherently stable and also inherently linear. The proof of this lies in the fact that our amplifiers have less than .05% distortion at any frequency and at any power level up to clipping (20Hz to 20kHz) with absolutely NO feedback around the output stage at all. We use only enough feedback in the final result to tie down certain parameters such as gain, noise and damping.

We at SUMO have done extensive listening evaluations and have found that our Class A amplifiers are most suited to planar, electrostatic and ribbon types of speakers. Of course, they can be used on any and all types of speakers. However, we feel they achieve their maximum performance while used with the aforementioned speaker types. Our Class AB amplifiers,on the other hand, are most suited to standard electro-mechanical speakers. The main reason for this is the fact that these devices have huge motors and are capable of tremendous reverse energy characteristics and as such, they need the tremendous control and power capabilities of a Class AB amplifier. The choice, however, is entirely yours as only you can select the product that you feel meets and satisfies your needs.

CIRCUIT DESCRIPTION

Although the concepts of balanced bridge operation are not new, previous attempts have not been very rewarding due to lack of understanding of all of the parameters in the applications of these concepts. With the exception of the input stage single-ended to balanced converter, all the circuits in these amplifiers are 100% completely balanced utilizing push-pull quadrature feedback from EACH side of the speaker load. The complete block diagram is shown in Figure A.

The first stage single-ended audio signal into a fully balanced to ground signal with two opposite phase outputs. The performance of this stage is at least an order of magnitude better than the following main amplifier, which insures no signal degradation. The bandwidth of this stage exceeds 5 MHz.. The output of this stage goes through the balanced input jacks and is automatically disconnected when a standard balanced signal is inserted into the balanced input jack. Obviously, a balanced signal can be sent directly to the main amplifier and needs no conversion.



From the balanced input jack the signal goes to the FET gates. These gates are arranged as on-off switches in series and shunt and are activated by the protective processor in order to protect the amplifier against non-allowable states. Under normal operating conditions the gates are fully on and have been carefully designed in order to add no degradation to the audio signal. The distortion of the gates is at least an order magnitude below that of the main amplifier.

From the FET gates the balanced signal goes directly to the ± inputs of the first stage of the main amplifier. This stage comprises two complete differential amplifiers with two out of phase inputs, four (4) balanced outputs and four balanced feedback ports. In addition, these two stages are completely degenerated in order to have exceptionally wide bandwidth and vanishing low distortion BEFORE THE ADDITION OF OVERALL FEEDBACK.

The outputs of the first stage are direct coupled to the next stage which is again a pair of completely degenerated differential amplifiers which in turn provide the output stages with four isolated differential balanced signals. Up to this point, both amplifiers (Class AB and Class A) are exactly identical. The output stages, however, are different. The Class AB amplifier has what can be described as a more traditional topology. In each of the four corners of the bridge, there are four output devices. These are driven by four Class A driver stages which are made up of a slightly unusual compound pair. Therefore, all stages in the Class AB amplifier operate in pure Class A up to the output devices.

The Class A output stages are bootstrapped with two floating power supplies which are cross-coupled and independent of the previous drive stages' power supplies or ground reference. Since the power supplies are totally independent and not referenced to any common point, the driver can be operated in the current drive mode rather than the voltage drive mode. This is the subject of our patents which provide us with a means of totally eliminating the stability problems that have heretofore plagued pure Class A amplifiers. Simply put, there are no bias networks of any kind, no thermal networks of any kind, nor any active sensing circuits of any kind.

Bias is achieved through a totally passive means which banishes thermal runaway forever. As a matter of fact, our new circuits are so stable and so linear that the open loop distortion without feedback is less than .05% at any frequency (20Hz to 20kHz) and at any power up to clipping.

The output transistors are arranged as two arms of a balanced bridge with nine (9) paralled devices in each arm. The two floating power supplies act as the other two arms of the bridge. Due to thermal considerations, the Class A output stage has an idle dissipation of 450 watts per channel which maintains full Class A power (225 watts RMS) into a load of 5.5 ohms, which represents a close approximation to the MG-II Magneplanar--rated at 6 ohms.

The output stages of the bridge are powered by two independent supplies in either version. In both versions there are two independent regulators per channel for the input and driver stages. There are also two regulated supplies for the convertor stages. In all, there are ten (10) regulated supplies and four (4) unregulated supplies in each amplifier.

The protection circuits in the Class AB amplifier are rather unique. Due to the inherent safety of the Class A design, there is no need for protection circuits. The power supply of the AB amplifier can supply over 50 amperes per channel and therefore, a rather unique protection circuit was designed in order to have total reliability and immunity to failure modes. Yet, at the same time we demanded NO limiters that might otherwise limit performance. Also, it was decided that inadvertant shorts or overloads should NOT cause a fuse to blow which is a pain to replace.

Very simply put, the protective processor continuously monitors the inputs and outputs at all times both for voltage, current AND phase. The detection points of the processor are arranged so that no conceivable NORMAL operating condition will trigger the processor yet, any non-allowable condition will completely shut down the amplifier in less than 100 nanoseconds. Also, the thermal cutouts are connected so that over heating (past 70 degrees centigrade) will inhibit operation. It must be stated at this point that virtually ALL other manufacturers of power amplifiers are playing a very dangerous game, in our opinion, in the sense that most other amplifiers are allowed to operate up to 100 degrees Centigrade before activating their thermal cutouts. We feel that this is absolutely stupid and is certain to cause shortened life and/or early failures. Due to the unique design of our heat chimney, the maximum temperature rise with a 4 OHM load is 58 degrees Centigrade at the worst hot spot. We defy any company in the world to come even close to this figure.

The processor will select and detect high frequencies above 20kHz low frequencies below 2Hz, blown fuses (for whatever reason), and of course, direct short circuits. However, the processor will allow total reactive energy to be delivered without being activated. Special care must be used in testing this amplifier in order to understand the protection mechanisms. (See section on Testing)

The overload peak indicators light when the output is driven into clipping. They are also part of the protection circuit and when the processor activates the latch, they will glow in accordance with the incoming signal level. It must be remembered at this point that activation of the peak lights is the equivalent of approximately 1000 WATTS of peak energy into an 8 ohm load and approximately 1800 WATTS of peak energy into a 4 ohm load.

HEADPHONES

We do not recommend the use of headphones with these amplifiers for obvious reasons of too much power. In addition, the amplifiers outputs are TOTALLY BALANCED and DO NOT HAVE A COMMON GROUND CONNECTION. Any attempt to connect standard 3-wire headphones will ALWAYS activate the protective processor and the amplifier will shut down.

If you must, there are two ways that headphones can be used.

Method #1:

Most headphones come with some sort of connection box. We STRONGLY urge that you DO NOT attempt to use the speaker switching facilities in the headphone box. Use the box ONLY for the headphones and hook up a SEPARATE HEAVY DUTY SWITCH FOR YOUR SPEAKERS. The rear terminals of the headphone switching box will have four (4) terminals for connection to the amplifier. These will be two (2) "hot" or plus (+) terminals and two (2) negative (ground) or (-) minus terminals. Connect 2 wires from the (+) plus outputs of the amplifier to the 2 plus (+) terminals on the box. Connect ONLY ONE wire from either negative (-) or ground terminal on the box, to a CHASSIS SCREW on the amplifier. This connection is not critical. UNDER NO CIRCUMSTANCES SHOULD YOU CONNECT THIS SINGLE WIRE TO either of the minus (-) terminals of the amplifier.

Method #2:

Virtually all headphones are independently wired and the common ground connection is only made in the 3-wire phone plug itself. If you remove the phone plug (unsoldering ALL four wires) you will have two complete sets of independent wires. One set for each of the left and right headphones respectively. These may then be connected directly to the (+) and (-) outputs of the amplifier.

NOTE: PLEASE be careful as it doesn't take much to blow the phones and your ears. We strongly suggest inserting at least a 150 ohm, 5 watt power resistor in series with each earphone.

ELECTROSTATIC HEADPHONES

Most electrostatic headphones are rather more complex than normal dynamic headphones and as such the internal wiring is much more elaborate inside the headphone box. In order to use electrostatic phones you must use Method #1 in order to hook them up. We strongly urge that you contact your dealer and his service department or the SUMO ELECTRIC CO. LTD. factory in order to aid yourself in hooking up your phones. Since these types of headphones are much more expensive than dynamic types we urge you in these cautions, as SUMO ELECTRIC CO. LTD. WILL NOT be responsible for damaged phones.

THIRD WIRE GROUND

Do not believe all you hear about grounding as most of the information passed around is totally incorrect. There is only ONE correct method of grounding. This is through the 3rd wire on the power amplifier and we strongly urge that you do not use another method and/or ignore its use altogether. The AC 3rd wire from the amplifier is the ONLY true earth ground that should exist--PERIOD. Please note also, that if the 3rd pin (ground) on the AC plug of any SUMO ELECTRIC CO. LTD. amplifier is cut off or removed in any way, the warranty is voided.

NO EXCEPTIONS

INPUT CABLE CONNECTIONS

NEVER, NEVER, NEVER plug in a cable to the input of these amplifiers with the power switch on. Loudspeaker destruction is almost CERTAIN. SUMO ELECTRIC CO. LTD. WILL NOT BE RESPONSIBLE for destroyed loudspeakers due to negligent owners.

THE "THUMB" TEST

NEVER, NEVER, NEVER apply the "thumb" test (touching the hot lead of the input cable with your finger) to the tip of the input cable or hot input jack of the amplifier. R-F rectification and/or hum will almost surely damage your speakers. Also, you may blow one or more of the internal fuses which will require dismantling of the amplifier to replace. Please note again: SUMO ELECTRIC CO. LTD. WILL NOT BE RESPONSIBLE for damaged loudspeakers due to improper use of its equipment.

LOW IMPEDANCE LOADS

Although the amplifier cannot be damaged by low impedance loads, fuse blowing can be a very trying experience. The fuses are purposely located INSIDE the amplifier away from experimenters. You should not experience any fuse blowing on loads down to and including 2 ohms. Loads lower than 2 ohms most assuredly will cause the fuses to blow. If you have any questions, please consult the factory or your dealer.

AIRFLOW and VENTILATION

Since the airflow from the chimneys face to the rear, installation is not at all critical with the following exceptions. The port intake slot on the bottom of the amplifier should not be blocked. The mounting feet provide adequate space. However, if for any reason the installation requires removal of the mounting feet (such as in a rack) this intake space should be allocated in such installation. It should be understood that with the Class AB amplifier, worst case average power dissipation will probably be in the area of 200 watts total. However--CAUTION--the Class A amplifier exhausts about 900 WATTS of constant heat out of the chimneys at the rear of the amplifier. DO NOT--REPEAT--DO NOT place this amplifier too close to walls or other fixtures that could be affected by heat. SUMO ELECTRIC CO. LTD. WILL NOT BE RESPONSIBLE FOR PROPERTY DAMAGE RESULTING FROM CONSUMER NEGLECT.

Note: For operation under adverse conditions and/or extreme environmental conditions, higher speed fans are available. In order to prevent voiding the warranty, please consult your dealer or the factory as to specific recommendations.

A. C. CONVENIENCE OUTLETS

UNDER NO CIRCUMSTANCES should you ever attempt to power these amplifiers from the convenience outlets on the back of ANY other piece of equipment, REGARDLESS of what these other manuals or information may tell you. It is certain that none of the associated wiring, power switches, etc. will be able to withstand or supply the power requirements of these amplifiers. FURTHERMORE, a definite safety hazard may exist in attempting to provide this kind of power in this manner. YOU HAVE BEEN WARNED.

You MUST use the 3rd wire ground in order not to void the warranty. If you live in an older house or apartment, then we strongly recommend that for your own safety, you rewire your system to provide this necessary safety system. If you experience hum from this connection, then SOMETHING ELSE in your system is grounded improperly and should be corrected.

TOP COVER /BOTTOM COVER REMOVAL

When removing the top and/or bottom cover or both, it should be understood that they are both INTEGRAL with the FRONT PANEL. The allen head button screws on the SIDES of the covers HOLD ALL THREE PIECES (top and bottom covers, front panel). When removing either one, RE-INSTALL the button head screws to secure the front panel BEFORE removing the other cover. This will prevent damage to the front panel, power switch, and/or cosmetics. Also, be careful not to damage the grill attached to the vent cover on the bottom of the amplifier as this is the main air intake vent and prevents dust buildup inside the unit.

UNPACKING

Upon receiving your new amplifier, inspect the carton for evidence of shipping damage. If no visible external damage is observed, proceed to unpack the unit carefully. DO NOT DAMAGE OR DESTROY THE SHIPPING CARTONS. These containers have been very carefully designed to transport your instrument with total immunity to shipping damage however, they are extremely expensive. A new set of cartons costs $50.00. Occasionally, a shipper is extremely rough which, however unfortunate, is beyond our control. Therefore, save and store the containers for future use such as moving, repairs, etc.. If you discover that there is hidden damage, please contact your dealer immediately.

INSTALLATION

These amplifiers are extremely heavy and may require more than one person to help with the installation. Rack handles have been omitted from the design as it is impossible for anyone to pick up this much weight in this fashion and was considered an unnecessary expense.

Install the amplifier in a well ventilated area so as not to restrict the airflow around the intake vents (located on the bottom of the unit at the front) or the rear exhaust chimneys. Other than these precautions, mounting is not critical with the exception that the mounting fixture be adequate to support the weight of the amplifier. Up to three (3) amplifiers can be stacked one on top of the other without stress to the metalwork or chassis. We do not recommend more than three (3) units stacked in this fashion.

When installing these amplifiers into a standard 19" rack panel, we recommend that you isolate the chassis and metalwork from the rack so as to insure NO electrical contact between the two. Ground loops may occur if this precaution is not observed. UNDER NO CIRCUMSTANCES should you attempt to isolate the grounds by defeating the 3rd. Wire ground on the AC plug. For commercial installations, high speed fans are available and can be easily changed without disassembling the amplifier. All that is entailed is the removal of the front panel (first removing the knob on the power switch) which then provides immediate and easy access to the fans.

In order to have the wiring concealed, all electrical connections are made in the rear of the unit. CAUTION: All connections should be made with the AC power cord UNPLUGGED and the power switch in the off (down) position. UNDER NO CIRCUMSTANCES sould you attempt to make any input or output connections while the power is on.

SPEAKER CONNECTIONS

There are no restrictions as to the type of loudspeaker that can be used with these amplifiers other than a warning to use caution as the amplifiers are capable of COMPLETELY DESTROYING your valuable loudspeakers under adverse conditions.

CAUTION: There is NO ground connection in the output circuit of these amplifiers. The outputs are completely balanced and floating and SHOULD NOT UNDER ANY CIRCUMSTANCES be wired into any system that has a common ground. Please note that we are referring ONLY to the outputs. The inputs are, of course, conventional so as to be driven from all existing equipment.

Although the output terminals are labeled (+) and (-), this does not mean that negative is ground but rather, shows you the PHASING of the terminals. The positive output lead will go positive when the Hi-Z (or + tip of the balanced input) input is driven positive--meaning that the input and positive output (+) are in phase with each other (non-inverting). Note that there are no binding posts or terminal strip connections for the outputs but rather, totally recessed banana jacks. You MUST use the dual banana plugs supplied with the amplifier for connections to your speakers.

Do not under any circumstances use a wire gauge smaller than #16 as you will not be able to benefit from the damping factor of the amplifier. Ordinary zip cord (16 gauge) can be obtained at virtually any hardware store or electrical supply shop. Please note that the zip cord is coded that is, one lead is usually ribbed and the other smooth. Use the rib as the negative (-) reference in order to keep your speakers in proper phase.

CAUTION-PLEASE NOTE: Do not ever attempt to touch either both the positive (+) output lead of one channel and the negative (-) lead of the other channel at the same time with your fingers. The available output voltage across these opposite phase terminals can approach 120 VOLTS RMS under certain circumstances which is equivalent to the AC wall outlet.

ELECTROSTATIC SPEAKERS

While both amplifiers (The Power and The Gold) are fully capable of driving electrostatic speakers, we feel that the Gold is more suited to this kind of application. Also, please be aware that "The Power" may have far too much output VOLTAGE potential under certain circumstances with most electrostatic devices. Such would be the case for example, in attempting to drive the Quad electrostatics. Under NO CIRCUMSTANCES sould you ever attempt to use either of these amplifiers to drive the Quads as virtual destruction is assured for the speaker. We feel that due to its restricted output voltage capabilities, the forthcoming "NINE" 70 watt Class A amplifier will be ideally suited for driving the Quad.

SPEAKER LEVEL CONTROLS

Under NO CIRCUMSTANCES should you attempt to use speaker level controls with The Power. Under certain circumstances The Gold may be used with these controls. However, it is our feeling that any use of these devices will certainly degrade the performance that you paid a lot of money for. If you absolutely must have some form of attenuation control, then we strongly urge you to install a very high power capability switch for the speakers and then an external INPUT level control. Due to the 1 megohm input impedance of our amplifiers, any value of control up to 250k ohms will be acceptable, keeping in mind however, that proper shielding must be used as well as proper cables in order to minimize hum pickup and high frequency attenuation.

INPUTS and OUTPUTS

In accordance with accepted industry practice, the left channel is "A" and the right channel is "B". Color coded cables will help you with positive identification at all times.

A.C. POWER CORD WIRING

UNDER NO CIRCUMSTANCES should you ever attempt to plug either amplifier into a convenience outlet on the rear of any other piece of equipment. Aside from the possibility of causing severe motorboating and/or oscillations, this practice is downright dangerous and unsafe. A most definite fire hazard could result. ALWAYS plug the A.C. line cord DIRECTLY into the A.C. wall receptacle. If you must use an extension cord, bear in mind that these amplifiers are capable of drawing easily over TWO THOUSAND (2000) watts off the line. Use a 3-conductor 12 gauge (minimum) HEAVY DUTY air conditioner type extension cord and DO NOT defeat the 3rd wire ground. DO NOT UNDER ANY CIRCUMSTANCES use a 3 to 2 pin AC plug adapter without connecting the ground cable (green) to the wall socket grounding screw. Furthermore, DO NOT ASSUME THAT THE SCREW IS GROUNDED. A great deal of the time, the mounting screws on the receptacle plate merely go only to the moulding behind and DO NOT NECESSARILY make a true earth ground.

This can be checked by using one of the inexpensive neon check probes that are available in most electronic parts stores. Check each side of the socket with the other end of the probe on the mounting screw. If NEITHER connection lights the neon, then the screw is NOT grounded. It is therefore, necessary for you to contact an electrician to have the situation remedied. Remember, the use of these amplifiers without a true earth ground violates and invalidates the warranty.

GROUNDING

Once again, a final reminder that although the input circuits have a common ground connected to the power supply, NEITHER OUTPUT IS IN ANY WAY COMMON TO THE INPUT GROUND. Do not ever attempt any kind of common connections in the output leads.

If you experience hum, it is almost a sure bet that you have some connections that are wrong. Make sure that the third wire ground on the A.C. plug IS NOT defeated, then thoroughly check through your system component by component to find the source of the ground loop. WARNING: ALWAYS shut off the amplifier BEFORE disconnecting or shutting off any associated piece of equipment.

OPERATION

Other than caution concerning the power output capabilities of these amplifiers, there are no special notes on operation. ALWAYS turn on the complete system FIRST--waiting at least 30 SECONDS before turning on the amplifier. A great many pieces of associated equipment emit LARGE transients at turn-on and continue to do so several seconds after turn-on. Therefore, protect your speakers by the proper sequencing. The reverse would be true when turning off the system. ALWAYS turn the amplifier off FIRST, waiting at least 15 seconds for the power supply to discharge. Then turn off the rest of the system.

These amplifiers have a delay relay in the primary circuit to prevent huge inrush currents which would surely blow your wall fuses or circuit breakers. The time constant is a few seconds and the action of the relay circuit is AUDIBLE. You may experience some hum from the speakers for a second or two before the relay closes. PLEASE BE ASSURED THAT THIS IS NORMAL AND IS IN NO WAY DANGEROUS TO YOUR SPEAKERS. At turn-on before the power supplies come up to full charge, the servos are unbalanced and during the turn-on sequence they seek to find balance. However, during this period the power supplies are restricted in current capacity by a LARGE series line resistor. You will notice that when the relay contacts click in, this hum disappears INSTANTLY. Note also, that the relay does indeed chatter as the cycle progresses. This is because we are dealing with A.C. power instead of D.C. power. We chose not to add the additional circuitry because of the increase in costs and the feeling that there would be no benefit derived. One final note about the turn-on cycle is in order. This is the fact that the LED's might flash during this period and this is normal.

It is important to make sure that the volume control on the preamp is ALWAYS turned all the way off (down) during the turn-on process in order to eliminate false triggering of the protective processor. Triggering of the protective processor would mean that the amplifier has shut down. When this occurs, the complete turn-on process must be repeated.

FALSE TRIGGERING (PROTECTIVE PROCESSOR)

There are several signal modes which may induce shutdown action of the protective processor. The main ones that you may experience will probably result from the following:

1. Scanning the the tuning dial on your tuner. Mute circuits are notoriously unreliable in their ability to completely and totally eliminate interstation noise and related components. These high frequency transients (above 20kHz) will almost certainly trigger the protective processor and shut down the amplifier. We recommend that you turn the volume control WAY DOWN during tuning.
2. Switching transients: When using the tape, selector, filter, etc., functions on your associated equipment, high frequency switching components sometimes occur. These glitches are caused by inadequate design of the associated equipment and are of course, not the fault of the amplifier. Again, please turn the volume control way down during these intervals.
3. Power on and off: If for any reason the power switch on the amplifier is shut off during program material, it will be necessary to turn the level control ALL THE WAY DOWN before attempting to turn the amplifier back on again. If the level control is up and program material is still going to the input of the amplifier, the protective processor will almost surely be activated.

4. Preamp turn-on thumps: If for any reason the preamp is turned on AFTER the amplifier, and there is any D.C. offset occuring at the preamp output during this period, the protective processor will probably be activated. It will then be necessary to turn the amplifier off again and wait for a few seconds before turning the unit on again. REMEMBER--With an amplifier of this magnitude of power output capability, this protective processor is an absolute must, in order to try to make your situation completely goof-proof.

A.C. FUSES

There are two A.C. line fuses on the rear of the amplifier. One is the surge fuse and the other is the main fuse. The surge fuse is used to PREVENT blowing circuit breakers or fuses in your house wiring because of the tremendous potential inrush current that would otherwise occur. UNDER NO CIRCUMSTANCES should you install a larger fuse into the surge fuse holder. If this fuse should continue to blow when power is supplied, then it is certain that something is wrong INSIDE the amplifier. THIS AMPLIFIER IS NOT USER SERVICEABLE and must therefore be taken to your dealer. ANY ATTEMPT to replace this fuse with a higher fuse may cause MUCH GREATER DAMAGE to the amplifier and will of course void the warranty.

The main A.C. fuse will blow when the SUSTAINED power drawn off the A.C. line exceeds 2000 watts. You must remember that this amplifier runs at approximately 50% efficiency while driving low impedance loads. Therefore, when the TOTAL power into the load exceeds 1000 watts (sustained) R.M.S., the fuse will blow. Replace ONLY with a 15A MDL type (10A MDL-The Gold). Any replacement with a higher rated fuse will void the warranty.

PLEASE NOTE that most older homes and apartments have fuses that are rated at 10 to 15 amps (1200 to 1800 watts). If you are causing these fuses or circuit breakers to blow--THEN YOU MUST CONTACT AN ELECTRICIAN. Your house wiring is probably inadequate to handle the power requirements and MAY BE DANGEROUS. Overheated wiring can cause severe fire hazards and we strongly urge you to make positively sure that you are protected.

If you are contemplating more than one of these amplifiers then it is ABSOLUTELY MANDATORY that you have an electrician examine your house wiring. We cannot over-emphasize this important necessity. Further, note the fact that the Class A version is more critical as to the CONSTANT power drain of about 900 watts.

SPEAKER FUSES

While we don't necessarily like speaker fuses because they degrade the damping control that the amplifier has over the speaker cone, we feel that you should be thoroughly aware of the possible destructive force that these amplifiers possess. One mishap can result in the INSTANT AND COMPLETE destruction of your loudspeakers. Under these circumstances SUMO ELECTRIC CO. LTD. WILL NOT BE RESPONSIBLE FOR DESTROYED LOUDSPEAKERS. Please use caution and consult either your dealer or the loudspeaker manufacturer for their recommendations.

Since all SUMO ELECTRIC CO. LTD. amplifiers are unique in the sense of having totally balanced outputs, YOU CANNOT TEST THESE AMPLIFIERS IN THE NORMAL,TRADITIONAL WAY. PLEASE READ THE FOLLOWING CAREFULLY, in order to fully understand the required proceedures.

1. ABSOLUTELY ALL TEST EQUIPMENT MUST BE TOTALLY FLOATING. The 3rd wire ground MUST be TOTALLY disconnected or otherwise bypassed on ALL instruments.
2. ONLY the amplifier's 3rd wire ground should be connected to a true ground.
3. The chassis or grounds of ALL test equipment should be ISOLATED from EACH OTHER. DO NOT violate this rule.
4. The generator output ground must NEVER be connected IN ANY WAY TO ANY OTHER PIECE OF TEST EQUIPMENT other than the input ground of the amplifier under test.
5. Since the outputs of the amplifier are TOTALLY floating AND TOTALLY isolated from each other(channel to channel), you can only measure ONE CHANNEL at a time.
6. Do not test the amplifier at or near full power into 4 ohm loads for extended periods of time as this will cause the internal 10A fuses to blow. Changing the internal fuses is a headache, so be cautious.
7. NEVER test the amplifier AT 2 OHMS ABOVE 100 WATTS as the internal fuses will certainly blow. Replacement of these fuses with any larger fuses will ABSOLUTELY void the warranty.
8. DO NOT ever attempt to connect either of the output terminals to chassis or any of the test equipment chassis' grounds.
   NOTE: The sole exception to the is rule is when using the Sound Technology equipment which has true balanced differential inputs. Under these circumstances, the jack on the Sound Tech--labeled chassis--should be connected to, or under a screw on the rear of the amplifier chassis. DO NOT connect this lead to the minus (-) output terminal or the input ground.
9. DO NOT drive the amplifier into clipping at high frequencies (past 10kHz), as the protective processor is very sensitive and will shut down the amplifier. Please note that although no damage would result from high frequency testing, the processor prevents high frequency disturbances such as spikes, oscillations, etc., from getting through the amplifier and damaging your speakers. Note also, that there is NO processor on the Class A amplifier and these restrictions do not apply. Even though the amplifiers are designed for very high frequency safety, it is not good practice or advisable to apply these tests as unnecessary fuse blowing may result.
10. SQUARE WAVE TESTING: Attempting to measure square waves may prove frustrating as the protective processor is most sensitive to the leading edge of the square wave. These amplifiers have a rise time of approximately one (1) microsecond at all power levels and therefore, square waves at a power level above approximately 50 watts R.M.S. will trigger the protective processor. ABSOLUTELY NO ATTEMPT SHOULD BE MADE TO DISABLE THE PROCESSOR. Any attempt to do so will invalidate the warranty. Secondly, the sophistication of the circuitry in the protective processor is far beyond the capability of any technician or most engineers.

    Since the Class A version has no processor, it may be tested for square wave performance with none of the previously mentioned restrictions. Care should be taken however, to prevent the blowing of fuses which will require dismantling of the amplifier.

BALANCED INPUTS

The balanced inputs on the rear of the amplifier are for applications in the professional field such as broadcasting, studios, etc.. Plugging in a stereo phone plug wired for balanced operation AUTOMATICALLY disconnects and bypasses the standard HI-Z unbalanced to balanced convertor stage. The balanced inputs therefore go directly to the main differential amplifier inputs (+). The impedance of these inputs is 10,000 ohms balanced to ground. A simple resistor change will convert them to 600 ohms balanced to ground.

UNDER NO CIRCUMSTANCES should you attempt to drive the balanced inputs with an unbalanced signal. Although no damage will result, the gain to each half of the input differential amplifiers will be UNEQUAL resulting in less than optimum performance.

USE OF BRIDGING ADAPTORS

With the sole exception of the SUMO "MOAT", NO other bridging adaptors can be used with these or any other SUMO amplifiers--PERIOD.
SUMO AMPLIFIERS CANNOT BE BRIDGED, as they are already full wave bridge differential amplifiers. In order to use the SUMO "MOAT", please consult the operating manual of the "MOAT" for complete details and required connections.

We realize that this is a rather exhaustive manual for a power amplifier. However, we believe that a product such as this--with its level of sophistication--has never before been made available. We at SUMO ELECTRIC CO. LTD. sincerely hope that you realize the full potential of this product in providing you with the fullest enjoyment possible.

If you have any further questions, please feel free to contact the technical department of SUMO and we will try to provide whatever assistance that is possible.

LIMITED WARRANTY

SUMO ELECTRIC CO. LTD. warrants its products to be free from defects in materials and/or workmanship under the following conditions:

1. Products are used specifically for their designed applications.
2. Products are not subjected to abuse by mishandling, adverse weather conditions, shipping damage.
3. Products are not altered or tampered with in any way.
4. Products are used only with the specified fuses as printed on the unit or in the manual.
5. No UNAUTHORIZED personnel have attempted repair or modifications.
6. All shipping charges to or from the factory and/or its representatives, dealers, warranty stations, etc., shall be paid for by the customer.
7. The warranty on parts shall be 10 years EXCLUSIVE of LED's, lights and fuses.
8. The warranty for labor shall be 5 years.
9. The warranty is transferable and extends to the subsequent owners only if a copy of the sales receipt to the new owner is mailed to SUMO ELECTRIC CO. LTD. within 20 days of the sale or transfer.
10. This warranty is exclusive of cartridges and/or stylus assemblies.
11. This warranty must be registered to SUMO ELECTRIC CO. LTD. within 20 days of the original sale date, accompanied by a copy of the sales document. This is the dealer's responsibility.

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