THE NINE

SUMO ELECTRIC COMPANY LIMITED

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INTRODUCTION

Welcome to the world of SUMO. The NINE is the culmination of many years of audio amplifier research. It contains some of the most advanced circuitry ever incorporated into an audio component and achieves a sonic purity which is simply unapproached by competitive products.

An electronic component as sophisticated as the NINE places certain demands on its owner. Please read this operating manual carefully, so that you may realize the highest level of performance and versatility of which the NINE is capable.

UNPACKING

Immediately upon receiving the NINE, inspect the carton for evidence of mishandling during shipment. Then, carefully unpack the amplifier and inspect it for any sign of damage which might have occurred.

Please save the shipping carton and all the associated packing materials for later use. The shipping materials have been carefully designed to transport your amplifier with a minimum of disturbance.

NOTE: In the event that you discover some damage that has occurred in shipping, please contact your dealer immediately.

PRECAUTIONS

The NINE is a wide-band amplifier with substantial power output capability. Certain precautions must be taken to ensure that the amplifier is operating safely.

1. Be careful when lifting the NINE. The unit weights more than 30 lbs.

2. Never expose the NINE to moisture.

3. Never plug an input cable into the amplifier while the power is on. This may cause extensive damage to loudspeakers.

4. NEVER apply the "thumb test" (touching the hot lead of the input cable with your finger) to the tip of the input cable or 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.

5. Take care to see that a short circuit is not connected to the output of the amplifier.

6. Avoid restricting the airflow around the NINE. Even though it is fan cooled, air circulation around the amplifier is necessary for proper operation.

7. Do not plug the NINE's AC power cord into a preamplifier's convenience outlets, since they are unlikely to be able to manage the amplifier's power requirement.

8. Avoid recycling the NINE's power switch from off to on repeatedly within a short period of time, since doing so may damage the power supply.

9. Make sure that any speakers used with the NINE can handle its power at the corresponding impedance. The amplifier's warranty does not cover damage to loudspeakers with an inadequate power rating.

INSTALLATION

Although the NINE contains forced air ventilation with over 750 square inches of heat dissipating fin area, the cooling system's efficiency can be severely reduced should the air flow to the fins be restricted. Avoid locating the NINE in cabinetry which might block the air flow to the fan intake opening. Provide adequate air vents or ports behind and above the amplifier. Care should be taken to see that the amplifier is not installed near hot air vents, which can impair the effectiveness of the NINE's forced-air cooling system.

When installing these amplifiers into a standard 19" component rack, we recommend that you isolate the chassis and metalwork from the rack so as to insure no electrical contact between the two. Ground loops resulting in audible hum may occur if this precaution is not observed.

ELECTRICAL CONNECTIONS

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 should you attempt to make any input or output connections while the power is on.

A pair of well-shielded audio cables should be used for the input connection to the NINE. The input jacks on the amplifier have been plated to provide low contact resistance, long life, and minimal susceptibility to corrosion. Be sure to use only high quality, shielded coaxial cable with standard RCA-type pin jacks to connect your preamplifier to the NINE.

CAUTION: There is NO ground connection in the output circuit of this amplifier. 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 the phasing of the terminals. The positive output lead will go positive when the 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 dual banana plugs with the amplifier for connections to your speakers.

LOUDSPEAKER CONNECTION

Either dynamic or electrostatic loudspeakers may be connected to the output banana jacks.

All wiring should be done with wire no lighter than 16-gauge. Two-conductor plastic-insulated lamp cord (zip cord), obtainable from any hardware store or high-fidelity dealer, is ideal for this purpose. For distances exceeding 25 feet, 14-gauge wire is desirable to minimize power loss and maintain good electrical damping. For lengths over 50 feet, 12-gauge wire is recommended.

SPEAKER PHASING

To obtain proper stereophonic phasing and correct bass response, it is necessary that the left and right stereo speakers are connected in phase. To make this in-phase connection, observe the wire or cable coding on the cord being used. Most often a ridge or groove can be observed on one edge or on one side of the lamp cord insulation. Sometimes one of the wires is silver-colored, while the other is copper-colored. Another method often used is to provide a thread tracer along one of the wires.

Whatever the method employed, identify the wire lead which is attached to the (-) terminal on the amplifier. Connect the other end to the negative terminal of the loudspeaker system. Finally, attach the remaining wire lead to the (+) terminal on the amplifier and the other end to the positive loudspeaker terminal. Follow the same procedure to connect the other channel to its respective loudspeaker.

Verification of proper phasing is achieved by noting a unity of sound when solo vocalists perform during stereo operation. A more obvious verification can be observed by setting the preamplifier for monaural operation (left and right channels blended) and playing a mono recording. No loss of sound should become apparent when the preamplifier is switched from stereophonic to monaural mode if the speakers are correctly phased.

SPEAKER RATINGS

Because of the NINE's power output it is important to determine the maximum imput rating of the speaker used with it. This rating must equal or exceed that of the NINE at the corresponding impedance to protect the speaker from possible damage. SUMO ELECTRIC CO. LTD. cannot be held responsible for damage to a loudspeaker whose power rating is lower than that of the NINE. Most speakers have either 16, 8 or 4 Ohm impedance ratings. Consult the specifications of the speaker to determine its impedance. If no rating can be found, measure the speaker's impedance with an Ohmmeter. The rating is usually 20% to 30% higher than that indicated by the Ohmmeter.

If two sets of stereo speakers are to be driven simultaneously, the combined impedance can be derived from the following formulae

$$\text{Parallel Connection: } \frac{R1 \times R2}{R1 + R2} = Zp \text{ (Z=impedance)}$$

If the four speakers (two per channel) each have the same impedance, the combined impedance is one-half that of one speaker (for example, two 8-Ohm speakers connected in parallel result in a combined impedance of 4 Ohms).

Series Connection: $R1 + R2 = Z_S$

If the speakers have the same impedance, the combined impedance is twice that of one speaker (for example, two 8-Ohm speakers connected in series result in a combined impedance of 16 Ohms).

For public address applications requiring the use of more than four speakers, it is common practice to use matching transformers with each speaker. Two common techniques used to determine the rating of the needed transformer are based on a 70-Volt system and a 25-Volt system. Because the 70-Volt system would require an additional transformer at the output of the amplifier, the 25-Volt system is recommended. With this lower-voltage system, the speaker line may be fed directly from the amplifier output. Consult your dealer for information regarding selection of transformers and proper connections.

Although both the negative side of an input cable and the negative lead of a speaker terminal are often referred to as "ground," they are not the same in the NINE and must never be connected together. If they are connected, fuse blowing may occur, possibly causing damage to the amplifier. For the same reason, no speaker leads should ever be interconnected with any part of the amplifier chassis or input cabling.

OPERATION

Other than caution concerning the power output capabilities of this amplifier, 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 afterwards. Therefore, protect your speakers by the proper sequencing. The reverse procedure applies 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.

A.C. FUSE

Replace ONLY with 5A SLO-BLO type. Using a higher rated fuse will void the warranty and cause damage to the amplifier.

TESTING

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 procedures.

1. ABSOLUTELY ALL TEST EQUIPMENT MUST BE TOTALLY FLOATING. The 3rd wire ground MUST be TOTALLY disconnected or otherwise bypassed on ALL instruments.

2. The chassis or grounds of ALL test equipment should be isolated from EACH OTHER. DO NOT violate this rule.

3. 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.

4. 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.

5. 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 5A fuses to blow. If blown, replace the fuses with the same type and rating. DO NOT insert the fuses with higher rating since doing so will void the warranty.

6. NEVER test the amplifier with loads of less than 4 Ohms.

7. 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 rule is when using Sound Technology equipment which has true balanced differential inputs. Under these circumstances, the jack on the Sound Tech--labeled chassis--may 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.

CIRCUIT DESCRIPTION

The circuit topology of SUMO power amplifiers benefits from two inherent design advantages. First, all SUMO amplifiers are designed to operate sympathetically with modern loudspeakers. The amplifier and speakers influence the performance of each other to a greater degree than any of the components in an audio system, and it has been the focus of SUMO engineering to insure that its amplifiers perform as well under real-life conditions as they do on a test bench.

Second, the rapid advancement of transistor technology has quite recently developed into a watershed, resulting in solid-state devices of outstanding capability. All SUMO products take full advantage of these new devices so that, even if no feedback were applied, the output stage of the NINE would exhibit a distortion factor of less than 0.05%. SUMO amplifiers, therefore, represent up-to-the-minute engineering.

The SUMO MODEL NINE is DC-coupled from input to output. The output stage is a pure class A, fully complementary, balanced bridge configuration (not the same as a "bridged" amplifier). The positive and negative (push-pull) amplifiers are painstakingly matched to eliminate asymmetrical distortion; then, only enough feedback is applied so that perfect balance from input to output results. The total linearity and stability thus achieved prevents the occurrence of frequency overload and slewing, and also completely eliminates TIM distortion. The NINE rolls off at a perfectly controlled rate of 6dB-per-octave (exactly like a simple R-C network), and cannot be overloaded in the frequency domain.

The class A output circuitry is completely new in SUMO amplifiers, and as such has been awarded U.S. Patent #4229706. The circuit arrangement provides regulation of the value of the quiescent control input current of each of the output devices, which in turn controls the quiescent value of the bias currents of each of the output devices. The result is that the thermal condition of SUMO class A amplifiers achieves unprecedented stability. The NINE cannot thermally run away under <u>any</u> circumstances.

The driving force behind our efforts is James Bongiorno, clearly one of the leading innovators in the audio industry. For the last several years from his Dynaco days, through his stay at S.A.E. culminating with his founding of the Great American Sound Company Inc., his designs have been consistently in the forefront of technology and have been the most copied designs in the industry. His leadership and

creative marketing, aside from scientific achievements, made G.A.S. the fastest growing company in the entire industry in recent years.

SUMO's new products reflect Mr. Bongiorno's continuing efforts in the direction of achieving sonic perfection at a competitive price.

Electrical and Mechanical Specifications:

THE NINE is a 70 Watts per channel pure class **A** power amplifier with extraordinary sonic performance, available to dedicated audiophiles at a price level not even closely approached by any credible audio manufacturer.

Pure class **A** amplification has long been recognized as an *ideal* in state-of-the-art amplifier design. The sonic accuracy of class **A** is the consequence of operating in the linear transfer function region with resultant wide bandwidth and phase integrity. THE NINE is a radically different design which achieves the acknowledged superiority of pure class **A** operation thanks to the unique auto-biasing topology developed by James Bongiorno (U.S. Patent No. 4229706).

That unique circuit employs the latest technology in super-BETA output devices in bridge configuration. With 30 MHz bandwidth they boast 20 times greater gain linearity than typical power transistors. This combination of creativity and up to-the-moment technology results in following cost saving factors:

- Thermal tracking circuitry is not required.
- Conventional bias circuitry is not required.
- Protection circuitry is not required.
- Driver and pre-driver stages are not necessary.
- Power dissipation at idle is reduced by half, cutting the heat dissipation requirement by the same margin.

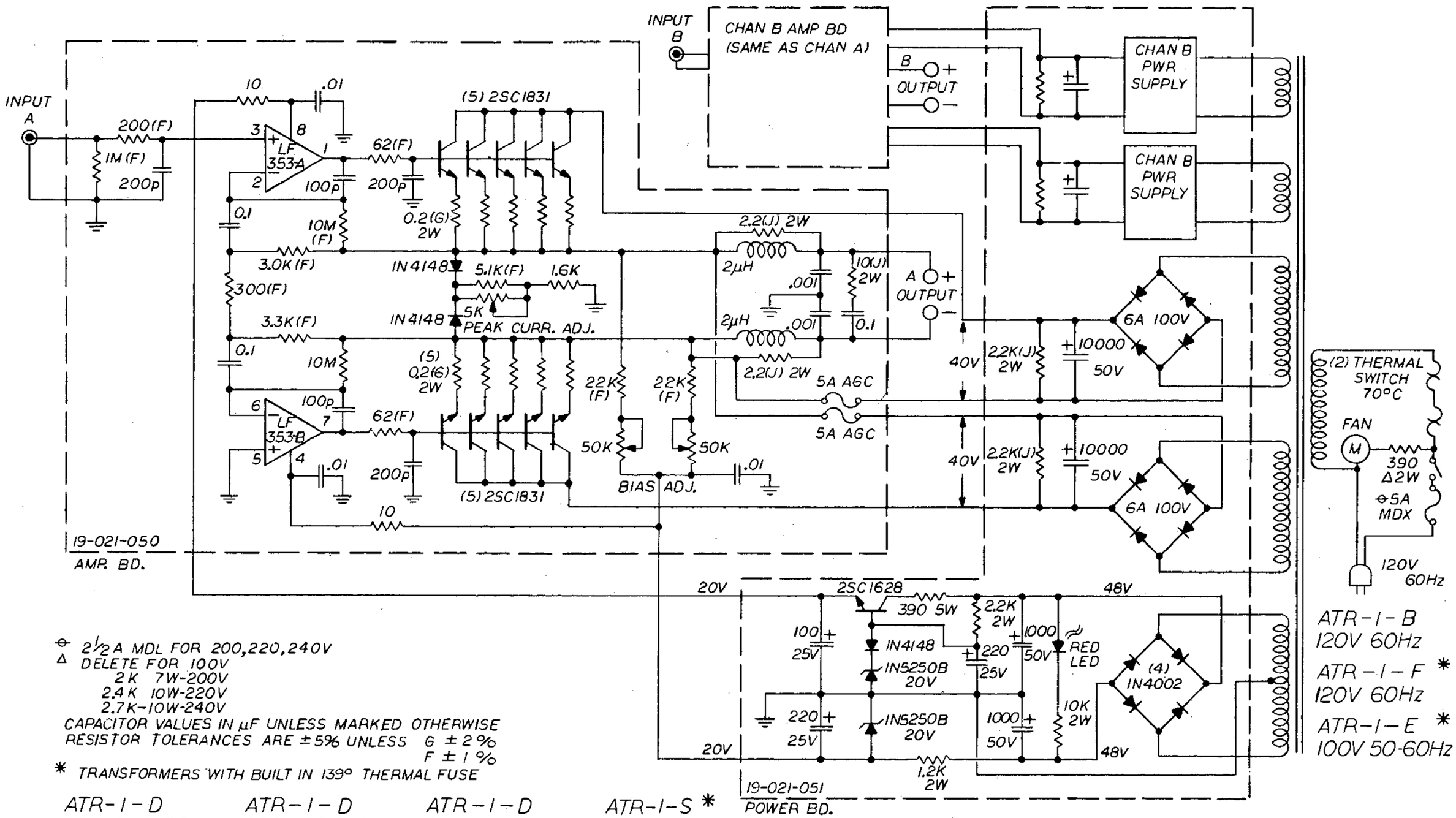
The benefits to an audiophile are manifold:

- Unchallenged sonic excellence and fidelity of pure class **A** operation into all loads.
- Inherent temperature stabilization which makes thermal runaway impossible.
- Safety for associated loudspeaker systems if operated within their power handling limits.
- Reliability for years of trouble-free performance.

The power supply incorporates a 1.4 KW special torroidal transformer with 42,000 μF of computer-grade filter capacitors, resulting in supply voltage regulation better than 3%.
Unique construction with a built-in whisper fan for improved heat-dissipation.
* Standard 19" x 8¾" rack-mount faceplate with custom handles available at extra cost.

Power Output in Watts RMS per channel 20 Hz — 20 KHz	@ 8 Ohms : 70 @ 4 Ohms : 120	@ less than .25% H. dist. @ less than 1 % H. dist.
Total Harmonic, IM and TIM Distortions from .25 Watts to Rated Output at 8 Ohms	Harmonic: 0.25%	IM: 0.25% TIM — None
Hum & Noise below Rated Power	100 dB (Wide Band)	
Input Sensitivity for Rated Output	1.0 Volts RMS	
Frequency Response & Power Bandwidth	—0.25 dB from 20 Hz to 20KHz	
Rise Time at 8 Ohms and Rated Output	3 μ seconds	
Dimensions: W x H x D	14" x 8½" x 7" / 35 cm x 22 cm x 18 cm	
Weight:	Approximately 32 lbs. / 14.6 kg	

CIRCUIT TOPOLOGY COVERED BY U.S. PATENT NO: 4229706



⊖ 2½A MDL FOR 200,220,240V
Δ DELETE FOR 100V
2K 7W-200V
2.4K 10W-220V
2.7K-10W-240V

CAPACITOR VALUES IN μF UNLESS MARKED OTHERWISE
RESISTOR TOLERANCES ARE ±5% UNLESS G ±2%
F ±1%

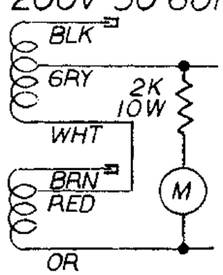
* TRANSFORMERS WITH BUILT IN 139° THERMAL FUSE

ATR-1-B
120V 60Hz

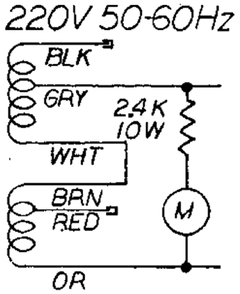
ATR-1-F *
120V 60Hz

ATR-1-E *
100V 50-60Hz

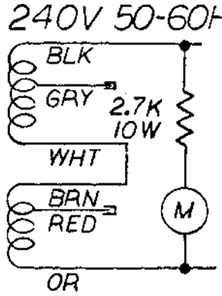
ATR-1-D
200V 50-60Hz



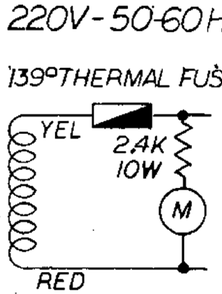
ATR-1-D
220V 50-60Hz



ATR-1-D
240V 50-60Hz



ATR-1-S *
220V-50-60Hz



DATE	SUMO ELECTRIC CO. (213)996-6850			
6-22-81				
	MODEL NINE — DUAL DIFFERENTIAL 70WATTS/CHAN CLASS A AMPLIFIER			
	DRAWN	APPR.	PART NO	
	A Zanke		REV.	B

LIMITED WARRANTY

THIS PRODUCT IS WARRANTEED UNDER THE FOLLOWING CONDITIONS:

1. PRODUCT IS PURCHASED THROUGH AN AUTHORIZED SUMO ELECTRIC CO. LTD DEALER.
2. WARRANTY COVERS NORMAL OPERATING CONDITIONS OF HOME USE.
3. WARRANTY PERIOD BEGINS AS OF DATE OF SALE PROVIDED IT IS REGISTERED BY THE AUTHORIZED SUMO ELECTRIC CO. LTD. DEALER WHERE THE PRODUCT WAS PURCHASED. REGISTRY PERIOD IS 20 DAYS.
4. DELIBERATE MISUSE, MISHANDLING, FAILURE TO REPORT RECEIVING DAMAGED MERCHANDISE, OR UNAUTHORIZED TAMPERING WITH OR MODIFYING OF THIS MERCHANDISE AUTOMATICALLY VOIDS ALL WARRANTIES.
5. WARRANTY PERIOD FOR ALL SUMO ELECTRIC CO. LTD. FACTORY WIRED PRODUCTS IS 3 YEARS COVERING BOTH PARTS AND LABOR. TRANSPORTATION CHARGES TO AND FROM THE DEALER OR FACTORY ARE EXCLUDED.
6. WARRANTY ON ALL SUMO ELECTRIC CO. LTD. PRODUCTS USED IN ANY OTHER FASHION THAN STATED ABOVE SHALL REDUCE THE WARRANTY TIME PERIOD AND OTHER CONDITIONS TO NEGOTIATIONS BETWEEN SUMO ELECTRIC CO. LTD. AND PROSPECTIVE USER.
7. THIS WARRANTY SHALL EXTEND TO EACH SUCCESSIVE OWNER, PROVIDED SUMO ELECTRIC CO. LTD. IS NOTIFIED BY REGISTERED MAIL WITHIN 20 DAYS OF RESALE BY INITIAL OR PRESENT OWNER. THIS NOTIFICATION SHALL CONSIST OF DATE OF SALE, NAME AND ADDRESS OF NEW OWNER.
8. SUMO ELECTRIC CO. LTD. GUARANTEES THAT ITS PRODUCTS ARE FREE FROM DEFECTS IN MATERIALS AND/OR WORKMANSHIP FOR THE REQUIRED WARRANTY PERIOD.
9. THIS WARRANTY IS NOT VALID UNLESS ACCOMPANIED BY SALES SLIP VALIDATION OR PROPERLY STATED INVOICE (COPY).
10. THIS WARRANTY IS VALID ONLY IN THE UNITED STATES. SERVICE IN OTHER COUNTIES WILL BE PROVIDED BY THE EXCLUSIVE SUMO ELECTRIC CO. LTD. REPRESENTATIVE OR HIS AGENTS. BECAUSE OF VARYING GOVERNMENTAL REGULATIONS AND CONDITIONS, THE SERVICE PERIOD MAY DIFFER FROM COUNTRY TO COUNTRY. HOWEVER, IN EVERY INSTANCE, THE SERVICE AGREEMENT CAN BE HONORED ONLY IN THE COUNTRY WHERE THE UNIT WAS PURCHASED.

If your unit requires service, contact your nearest authorized SUMO dealer or factory service department. DO NOT send the unit for warranty service without obtaining factory RETURN AUTHORIZATION.

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