SERVICE MANUAL

ADCOM®

POWER AMPLIFIER

GFA-545 II

TABLE OF CONTENTS

ADCOM®

ADCOM
8551 E. Anderson Dr. Suite 105
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INTRODUCTION

This service manual is intended to assist trained and qualified technical personnel in verifying the performance of, adjusting, and repairing the ADCOM GFA-545II power amplifier. The procedures described here are not intended for persons unfamiliar with the appropriate safety and test procedures.

⚠ WARNING ⚠

THERE ARE POTENTIALLY LETHAL VOLTAGES WITHIN THE GFA-545II AMPLIFIER WHICH WILL BE ACCESSIBLE ONCE ITS TOP COVER IS REMOVED. **DO NOT ATTEMPT FAMILIARIZATION, INSPECTION OR ANY PROCEDURE WHATSOEVER UNLESS YOU HAVE DISCONNECTED THE GFA-545II FROM THE WALL AC OUTLET OR OTHER SOURCE OF AC POWER AND THE POWER-SUPPLY CAPACITORS ARE COMPLETELY DISCHARGED.** PLEASE TAKE NOTE THAT THE POWER-SUPPLY CAPACITORS TAKE AS LONG AS **5 MINUTES** TO DISCHARGE. THESE INSTRUCTIONS ARE PROVIDED FOR USE ONLY BY COMPETENT TECHNICAL PERSONNEL. **DO NOT UNDERTAKE ANY SERVICE PROCEDURES IN THE GFA-545II UNLESS YOU ARE TECHNICALLY QUALIFIED TO DO SO.**

CIRCUIT DESCRIPTION

The ADCOM GFA-545II is a stereo power amplifier rated at less than 0.04% THD from 20Hz to 20kHz with 100 watts into 8 ohms and 150 watts into 4 ohms. The output stage is capable of greater than 40 amps into low impedance loads. The amplifier employs a discrete differential Class-A front- end followed by a Class-A voltage gain stage which amplify the input signal to the voltage required at the output of the amplifier. This high-voltage signal drives the high-current triple-Darlington-follower output stage which amplifies the current by a factor of about 50,000.

Referring to the accompanying schematic, describing the Right Channel only, the input signal passes through network C601, C603, R603, and R607 which provides a 3dB bandwidth of 1.7Hz to 500kHz to the input of the amplifier. C601 is an extremely high quality capacitor and serves to protect the amplifier and the speakers connected to it from DC faults at the output of the preamplifier. **WE DO NOT RECOMMEND THAT C601 BE SHORTED OUT.** Q601 and Q603 form the differential input stage.

Open-loop gain is defined by R615 and the bias current through Q601 and Q603. The small-signal gain is approximately 825/(2x25) = 16. The next voltage gain stage consists of Q613 with Q615 as a current-source load. DC bias is set by R635, D605 and D607. Open-loop gain is defined by R639 and R641, with R651, R653, C609, C613, and C615 providing high-frequency compensation.

Feedback is provided from the output to the base of Q603 by the network R611, R613 and C607. C607 provides a high-frequency roll-off above 150kHz, improving stability by taking high-frequency feedback before the triple Darlington.

The input stage is biased by R619, R623, R625, R627, R629, R631, R633, R635, Q605, Q609, Q615, D601, D603, D605, D607, D609 and the overtemperature LED, D007. Q609 is turned on when the B+ supply is on. A current of about 4mA flows through the thermal breaker on the heatsink and into D605 and D607. If the heatsink overheats, the breaker opens and the current flows through D609 and the THERMAL PROTECTION LED, D007, instead. When the breaker carries the current, D605 and D607 are biased at 1.4V. This creates about 0.7V across R619; Q605 then sources about 2mA to Q601 and Q603, the differential input stage. If the negative supply fails or its fuse opens, Q605 saturates, Q601 turns off, turning off Q613, D613 turns on and Q615 saturates. This holds the input to the triple Darlington to near ground. If the positive supply fails or its fuse opens, Q609 turns off and the bias circuitry is disabled.

Any DC imbalance in the amplifier is corrected by R687, R689, C623, C625, and IC601. Any DC error at the amplifier output is servoed back through IC601 to adjust the DC current through the input transistors. DC-bias is nominally 1.0mA through Q601 and Q603. IC601 provides the DC-bias current to Q601 and can swing from ground to +10V to bring the amplifier into balance.

The bias network of VR601, R643, R645, and Q617 form a temperature- compensated DC-bias voltage to the input of the triple-Darlington-follower output stage. Mid- and high-frequency bypassing is provided by C611.

R693 and C617 provide a load for the amplifier at high frequencies, stabilizing the amplifier under varying load conditions. D611 and D613 provide a high-current return to the power supply for backlash current from the load.

The output stage consists of two sets of 3 parallel transistors operated as emitter followers, driven by another pair of emitter followers. This configuration minimizes distortion caused by varying load impedances. The output transistors have 0.22-ohm ballast resistors to ensure current sharing and bias stability.

TEST PROCEDURES

All tests are performed with a 120V, low-distortion (less then 2%), AC-power source, 8-ohm resistive load (except slew rate), and a signal source of not more than 600 ohms.

Tests are performed after warming up the amplifier at 33 watts into an 8-ohm load for at least 10 minutes.

All grounds during testing are referred to the ground of the black output terminal, **EXCEPT FOR RCA INPUT-JACK GROUNDS AND ANY SIGNAL-GENERATOR GROUND. DO NOT CONNECT RCA INPUT-JACK GROUNDS TO BLACK OUTPUT-TERMINAL BINDING POSTS, DAMAGE TO THE GROUNDING SYSTEM OF THE AMPLIFIER MAY RESULT.**

80kHz low-pass filter is employed during THD distortion measurements.

Signal-to-noise measurements are "A" weighted.

Damping factor is measured by comparing the 20-watt-output voltage with and without an 8-ohm load.

Slew rate is measured with an inductive load, and is derived with a dual-time-based oscilloscope reading the slope of a full-power (80V peak-to- peak) 5kHz square wave. To avoid damaging output networks R693/C617 AND R694/ C618 **DO NOT OPERATE THE AMPLIFIER AT FULL-POWER, SINE-WAVE ABOVE 22kHz OR FULL-POWER (80V PEAK-TO-PEAK) SQUARE WAVE ABOVE 5kHz.**

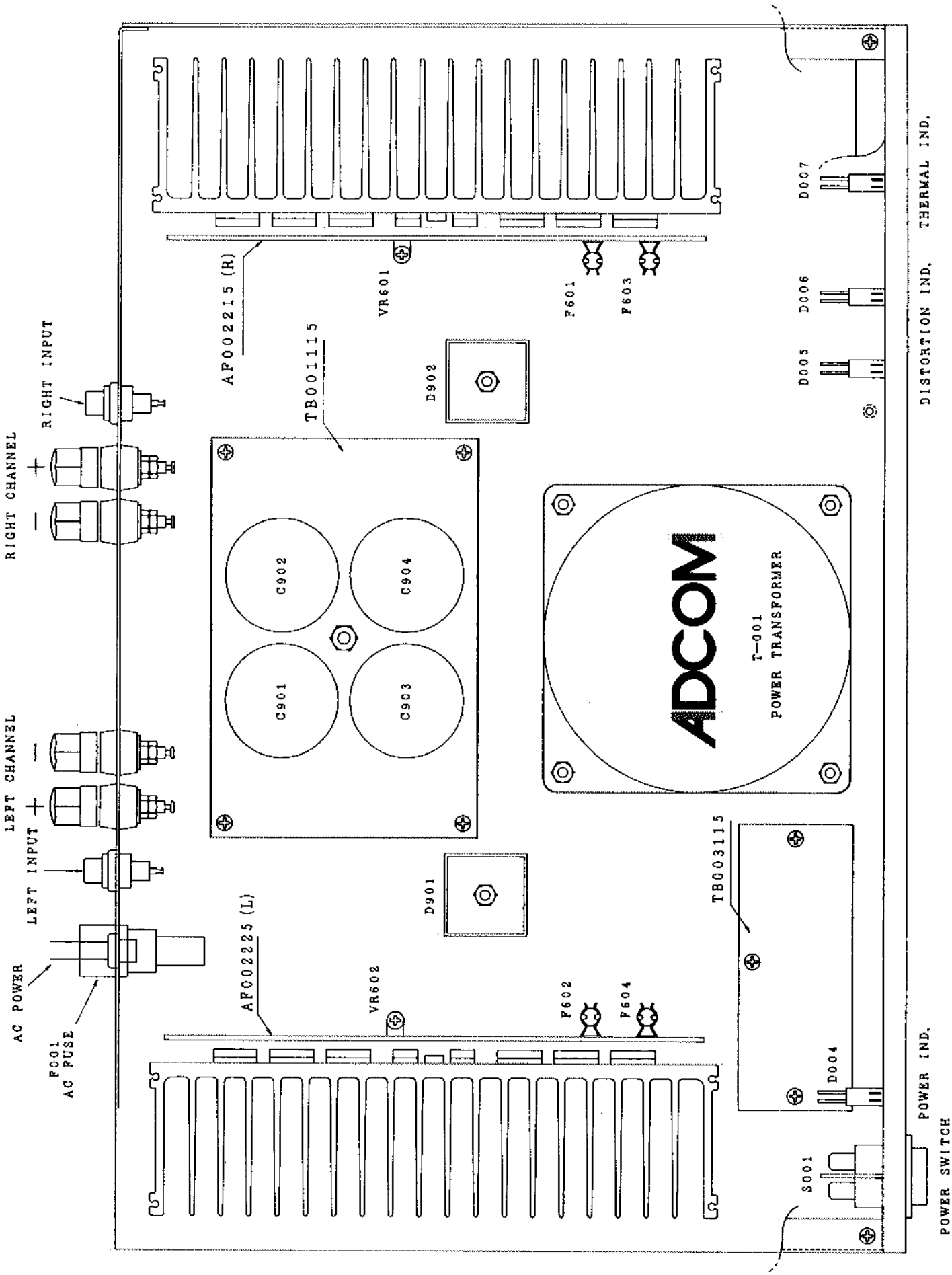
IMPORTANT

BEFORE PROCEEDING WITH ADJUSTMENTS, MAKE SURE AMPLIFIER IS AT ROOM TEMPERATURE.

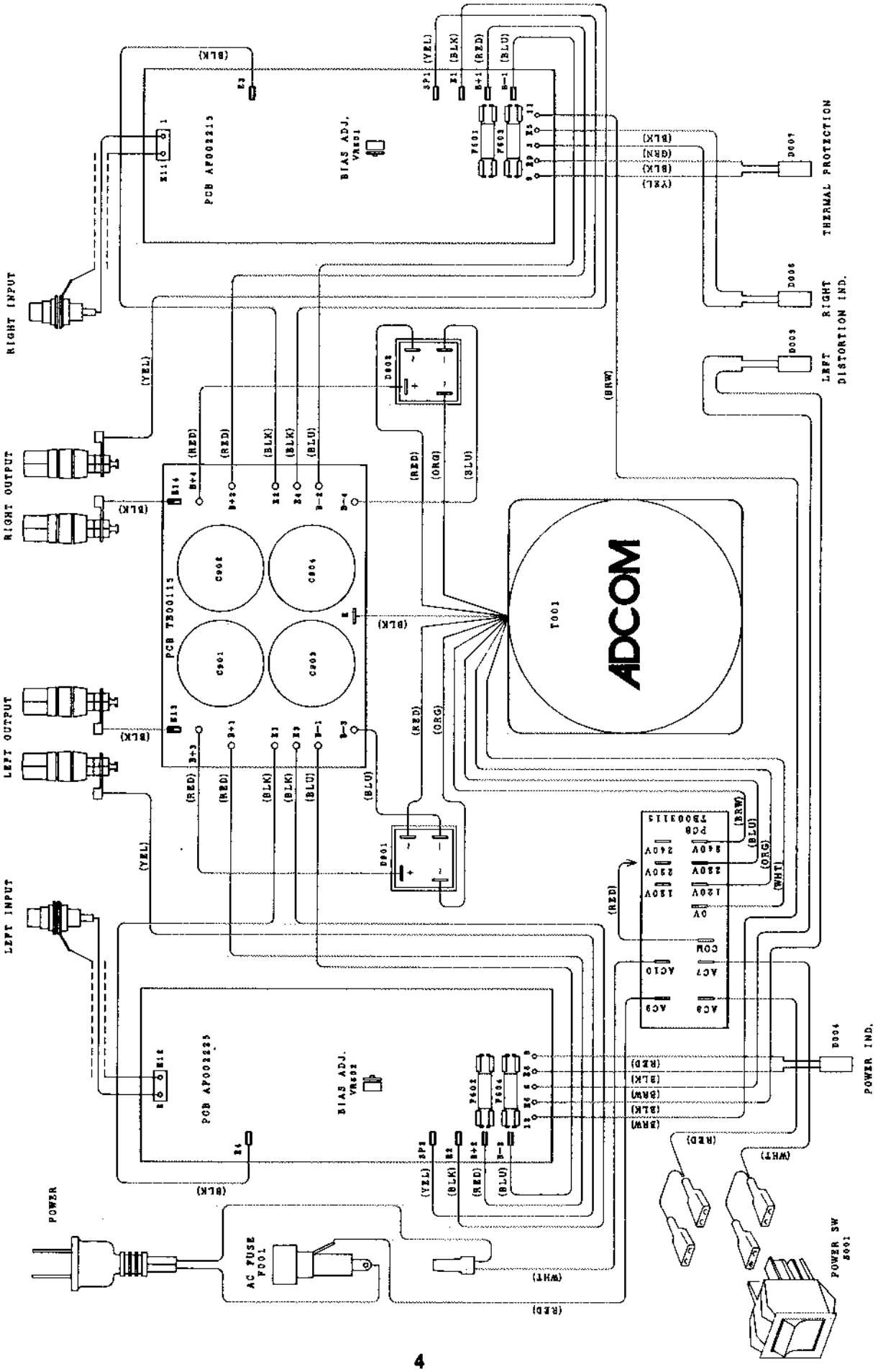
BIAS ALIGNMENT

1. With set-up as per the first paragraph of TEST PROCEDURES and with **NO SIGNAL IN,** set bias controls (VR601 and VR602) to midpoint.
2. Connect a millivolt meter across TP1 and TP2.
3. Turn amplifier on and allow a 3 to 5 minute settling period.
4. Adjust **BIAS** control VR601 to obtain either a + or — 7mV (±1mV) indication on the millivolt meter.
5. Connect a millivolt meter across TP3 and TP4.
6. Adjust **BIAS** control VR602 to obtain either a + or — 7mV (±1mV) indication on the millivolt meter.
7. To check for proper bias setting, remove millivolt meter and apply input signal to obtain 33 watts into 8 ohms for 10 minutes with cover on.
8. Remove input signal and connect the millivolt meter as in Step 2 and step 5. Let amplifier idle until bias stabilizes and readjust to 7mV (±1mV).

GFA-545II CHASSIS LAYOUT



GFA-545II WIRING DIAGRAM



ADCOM GFA-545II SERVICE PARTS LIST

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
AF002215 PCB ASSEMBLY		
R601	054 MK2 001MFECZ	METAL-FILM *
R603	054 MK2 001KFECZ	METAL-FILM *
R605	054 MK2 01M5FECZ	METAL-FILM *
R607,609	054 MK2 100KFECZ	METAL-FILM *
R611	054 MK2 001KFECZ	METAL-FILM *
R613	054 MK2 22K1FECZ	METAL-FILM *
R615	054 MK2 825RFECZ	METAL-FILM *
R617	054 MK2 365RFECZ	METAL-FILM *
R619	054 MK2 301RFECZ	METAL-FILM *
R621	054 MK2 1K82FECZ	METAL-FILM *
R623	054 MK2 47K5FECZ	METAL-FILM *
R625	054 MK2 22K1FECZ	METAL-FILM *
R627	054 MK2 133RFECZ	METAL-FILM *
R629,631	054 MK2 010KFECZ	METAL-FILM *
R633	054 MK2 475RFECZ	METAL-FILM *
R635	054 MK2 133RFECZ	METAL-FILM *
R637	054 MK2 001KFECZ	METAL-FILM *
R639,641	054 MK2 33R2FECZ	METAL-FILM *
R643	054 MK2 1K82FECZ	METAL-FILM *
R645	054 MK2 681RFECZ	METAL-FILM *
R647,649	054 MK2 100RFECZ	METAL-FILM *
R651,653	054 MK2 47R5FECZ	METAL-FILM *
R655,657	054 MK2 001KFECZ	METAL-FILM *
R659	054 MK2 475RFECZ	METAL-FILM *
R661	054 MK2 33R2FECZ	METAL-FILM *
R663,665	054 MK2 010RFECZ	METAL-FILM *
R667,669	054 MPC70-0.22F	CEMENTED WIRE-WOUND
R671,673	054 MK2 010RFECZ	METAL-FILM *
R675,677	054 MPC70-0.22F	CEMENTED WIRE-WOUND
R679,681	054 MK2 010RFECZ	METAL-FILM *
R683,685	054 MPC70-0.22F	CEMENTED WIRE-WOUND
R687,689	054 MK2 4M75FECZ	METAL-FILM *
R691	054 MK2 33K2FECZ	METAL-FILM *
R693	054 RSS2X-4.7F	METAL-OXIDE
C601	044 MKC62-100V105	POLYCARBONATE, 1uF/100V OR ELECTRONIC CONCEPTS 5MC22B105K
C603	044 SRA331J125	POLYSTYRENE, 330pF/125V
C605	044 MKT22-100V105	POLYESTER, 1uF/100V
C607	044 SRA470J125	POLYSTYRENE, 47pF/125V
C609	044 SRA220J125	POLYSTYRENE, 22pF/125V
C611	041 ECEA1HFS4R7	ELECTROLYTIC, 4.7uF/50V
C613,615	044 SRA101J125	POLYSTYRENE, 100pF/125V
C617	044 MKT18-100V104	POLYESTER, 0.1uF/100V
C619,621	041 ECEA2AGE470	ELECTROLYTIC, 47uF/100V
C623,625,627	044 MKT18-100V104	POLYESTER, 0.1uF/100V
C629	041 ECEA1HES4R7	ELECTROLYTIC, 4.7uF/50V
C631	042 P50V103J	MYLAR, 0.01uF/50V
IC601	031 3A	ADCOM 3A
D601,603,605, 607,609	034 1N4148TP-B	
D611,613	034 1N4003	
D615	034 RD12EBT1	DIODE, ZENER
Q601,603,605	032 2SC2362KAA-G	
Q607,609	032 2SA1016KAA-G	
Q611	032 2SA608KAA-G	
Q613	032 2SA1016KAA-G	
Q615	032 2SC2362KAA-G	

Q617		032 2SD1684-RS	
Q619		033 2SC3478T-LK	
Q621		033 2SA1376T-LK	
Q623		033 2SC4381-OY	
Q625		033 2SA1667-OY	
Q627		033 2SC3856-OPY	
Q629		033 2SA1492-OPY	
Q631		033 2SC3856-OPY	
Q633		033 2SA1492-OPY	
Q635		033 2SC3856-OPY	
Q637		033 2SA1492-OPY	
F601,603 §	⚠	AGC-4/250V	BUSSMAN
		3AG312004/250V	LITTELFUSE
		3AG 4A/250V	BEL
S601	⚠	063 C-4270A01	THERMOSTAT, UP62 85°C
VR601		051 SF689A-2.2K	RESISTOR, VARIABLE

AF002225 PCB ASSEMBLY

R602,604	054 MK2 001MFECZ	METAL-FILM *
R606	054 MK2 01M5FECZ	METAL-FILM *
R608,610	054 MK2 100KFECZ	METAL-FILM *
R612	054 MK2 001KFECZ	METAL-FILM *
R614	054 MK2 22K1FECZ	METAL-FILM *
R616	054 MK2 825RFECZ	METAL-FILM *
R618	054 MK2 365RFECZ	METAL-FILM *
R620	054 MK2 301RFECZ	METAL-FILM *
R622	054 MK2 1K82FECZ	METAL-FILM *
R624	054 MK2 47K5FECZ	METAL-FILM *
R626	054 MK2 22K1FECZ	METAL-FILM *
R628	054 MK2 133RFECZ	METAL-FILM *
R630,632	054 MK2 010KFECZ	METAL-FILM *
R634	054 MK2 475RFECZ	METAL-FILM *
R636	054 MK2 133RFECZ	METAL-FILM *
R638	054 MK2 001KFECZ	METAL-FILM *
R640,642	054 MK2 33R2FECZ	METAL-FILM *
R644	054 MK2 1K82FECZ	METAL-FILM *
R646	054 MK2 681RFECZ	METAL-FILM *
R648,650	054 MK2 100RFECZ	METAL-FILM *
R652,654	054 MK2 47R5FECZ	METAL-FILM *
R656,658	054 MK2 001KFECZ	METAL-FILM *
R660	054 MK2 475RFECZ	METAL-FILM *
R662	054 MK2 33R2FECZ	METAL-FILM *
R664,666	054 MK2 010RFECZ	METAL-FILM *
R668,670	054 MPC70-0.22F	CEMENTED WIRE-WOUND
R672,674	054 MK2 010RFECZ	METAL-FILM *
R676,678	054 MPC70-0.22F	CEMENTED WIRE-WOUND
R680,682	054 MK2 010RFECZ	METAL-FILM *
R684,686	054 MPC70-0.22F	CEMENTED WIRE-WOUND
R688,690	054 MK2 4M75FECZ	METAL-FILM *
R692	054 MK2 33K2FECZ	METAL-FILM *
R694	054 RSS2X-4.7F	METAL-OXIDE
R695	054 RSS2X-8.2KF	METAL-OXIDE
C602	044 MKC62-100V105	POLYCARBONATE, 1uF/100V OR ELECTRONIC CONCEPTS 5MC22B105K
C604	044 SRA331J125	POLYSTYRENE, 330pF/125V
C606	044 MKT22-100V105	POLYESTER, 1uF/100V
C608	044 SRA470J125	POLYSTYRENE, 47pF/125V
C610	044 SRA220J125	POLYSTYRENE, 22pF/125V
C612	041 ECEA1HF84R7	ELECTROLYTIC, 4.7uF/50V
C614,616	044 SRA101J125	POLYSTYRENE, 100pF/125V

C618	044	MKT18-100V104	POLYESTER, 0.1uF/100V
C620,622	041	ECEA2AGE470	ELECTROLYTIC, 47uF/100V
C624,626,628	044	MKT18-100V104	POLYESTER, 0.1uF/100V
C630	041	ECEA1HES4R7	ELECTROLYTIC, 4.7uF/50V
C632	042	P50V103J	MYLAR, 0.01uF/50V
IC602	031	3A	ADCOM 3A
D602,604,606, 608,610	034	1N4148TP-B	
D612,614	034	1N4003	
D616	034	RD12EBT1	DIODE, ZENER
Q602,604,606	032	2SC2362KAA-G	
Q608,610	032	2SA1016KAA-G	
Q612	032	2SA608KAA-G	
Q614	032	2SA1016KAA-G	
Q616	032	2SC2362KAA-G	
Q618	032	2SD1684-RS	
Q620	033	2SC3478T-LK	
Q622	033	2SA1376T-LK	
Q624	033	2SC4381-OY	
Q626	033	2SA1667-OY	
Q628	033	2SC3856-OPY	
Q630	033	2SA1492-OPY	
Q632	033	2SC3856-OPY	
Q634	033	2SA1492-OPY	
Q636	033	2SC3856-OPY	
Q638	033	2SA1492-OPY	
F602,604 §	⚠	AGC-4/250V	BUSSMAN
		3AG312004/250V	LITTELFUSE
		3AG 4A/250V	BEL
S602	⚠ 063	C-4270A01	THERMOSTAT, UP62 85°C
VR602	051	SF689A-2.2K	RESISTOR, VARIABLE

TB001115 PCB ASSEMBLY

R901,902,903, 904	054	RSS2X-5.6KF	METAL-FILM
C901,902,903, 904	041	63LAP10000M	ELECTROLYTIC 10,000uF/63V, SELECTED
C905,906,907, 908	044	MKT18-100V224	POLYESTER, 0.22uF/100V

TB003115 PCB ASSEMBLY

C001	⚠ 044	DE7150F472M	SPARK-KILLER
D001	⚠ 034	TNR9G221K	METAL-OXIDE VARISTOR (120V)
D002	⚠ 034	TNR9G391K	METAL-OXIDE VARISTOR (220/240V)
D901,902	⚠ 034	KBPC10-04	BRIDGE RECTIFIER
D004	034	LTL2201A	LED RED, POWER
D005,006	034	LTL2251A	LED YELLOW, INSTANTANEOUS DISTORTION ALERT
D007	034	LTL2201A	LED RED, THERMAL PROTECTION
T001	⚠ 022	T-1033G01	POWER TRANSFORMER, ADCOM
S001	⚠ 061	C-4399A01	POWER SWITCH BLACK, CARLING RGSCC711-R-B-B-0
S001	⚠ 061	C-4300A02	POWER SWITCH WHITE, CARLING RGSCC711-R-W-W-0
F001 (120V) §	⚠	AGC-6/250V	BUSSMAN
		3AG312006/250V	LITTELFUSE
		3AG 6A/125V	BEL
F001 (220V/240V) §	⚠	AGC-4A/250V	BUSSMAN
		3AG312004/250V	LITTELFUSE
		3AG 4A/250	BEL

CHASSIS MOUNTED COMPONENTS

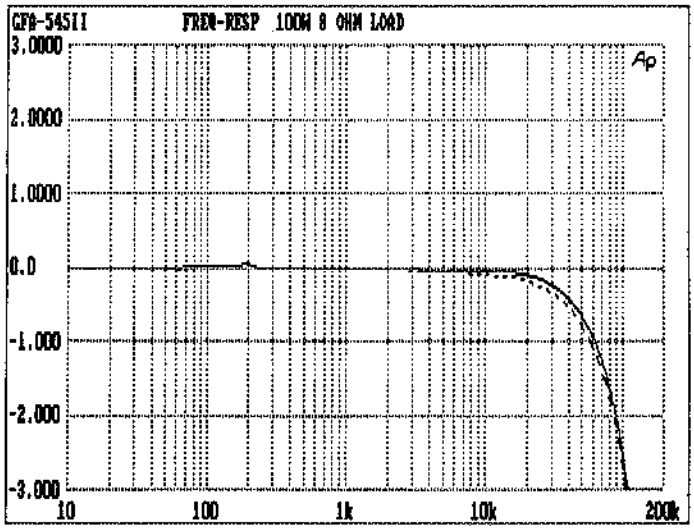
⚠ 072 4TR-670#5	AC POWER CORD UL/CSA
019 SR5KN-4	AC-CORD STRAIN RELIEF
⚠ FH-032	AC FUSEHOLDER
011 C-4389A01	FRONT PANEL BLACK
011 C-4389A02	FRONT PANEL WHITE
014 3TQB-4	TOP COVER
B33729	SPEAKER TERMINAL, BLACK, ADCOM
R33729	SPEAKER TERMINAL, RED, ADCOM
VTW-J5MI	RCA JACKS, ADCOM
072 4TR-2463	AUDIO CABLE, ADCOM
081 PB3-31A02	INNER PACKING, 2 PIECES
081 C-4413A00	CARTON

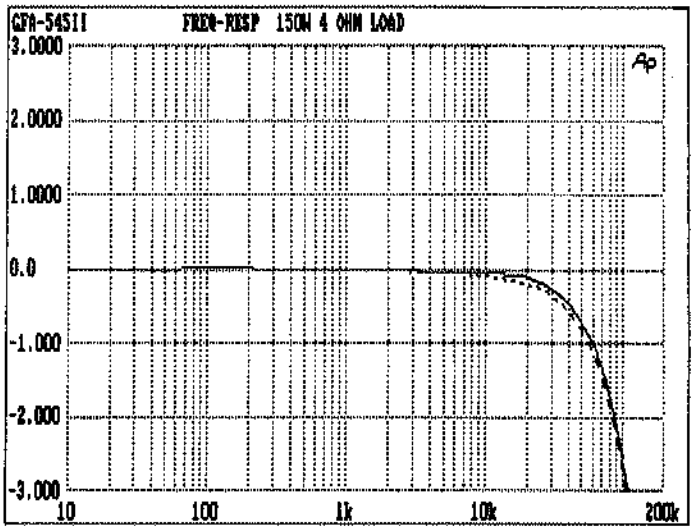
* ROEDERSTEIN 1/4W 1%, ONLY, TO PRESERVE LOW NOISE CHARACTERISTICS

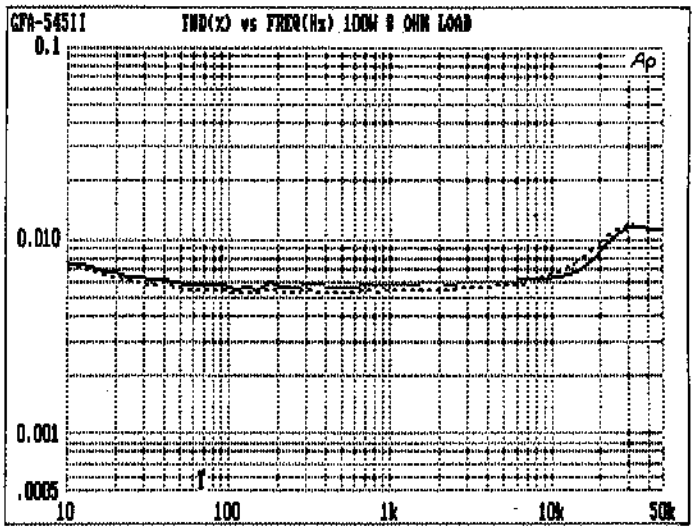
§ The fuses listed, and their time-current blowing points, have been carefully selected and thoroughly tested to deliver optimal performance while still accomplishing their protective functions. Replace these fuses, individually, only with the specific types listed. **DO NOT USE ANY SUBSTITUTE FUSES WITH DIFFERENT RATINGS,TIME-CURRENT CURVES OR VALUES.** Failure to comply may cause serious damage to the amplifier circuits and **MAY CREATE A FIRE HAZARD.**

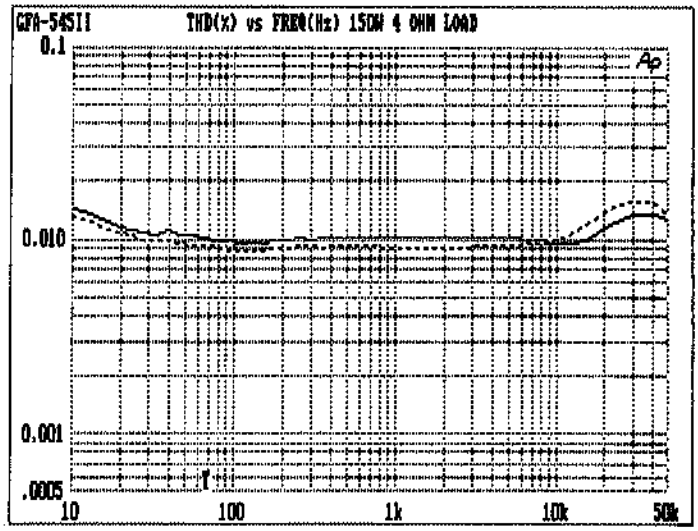
⚠ Because of fire, shock and/or other hazards, parts identified by, and listed with, this sign **MUST** be replaced with the **IDENTICAL FACTORY PART** listed in the SERVICE PARTS LIST. No substitutions with other "equivalent" parts can be made.

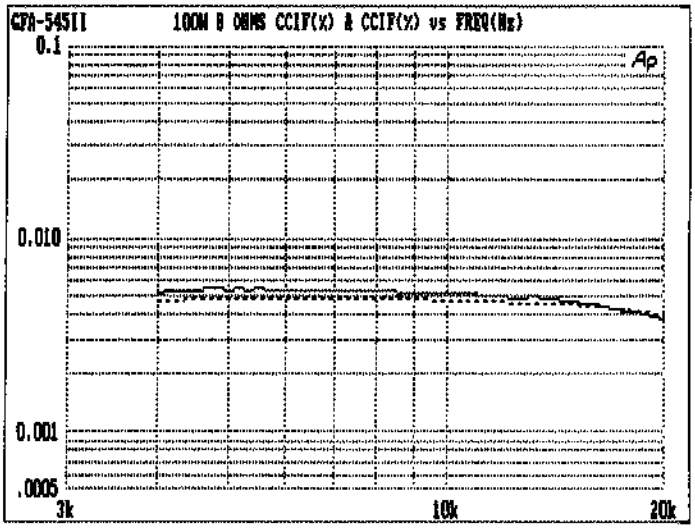
GFA-545II
TYPICAL PERFORMANCE DATA

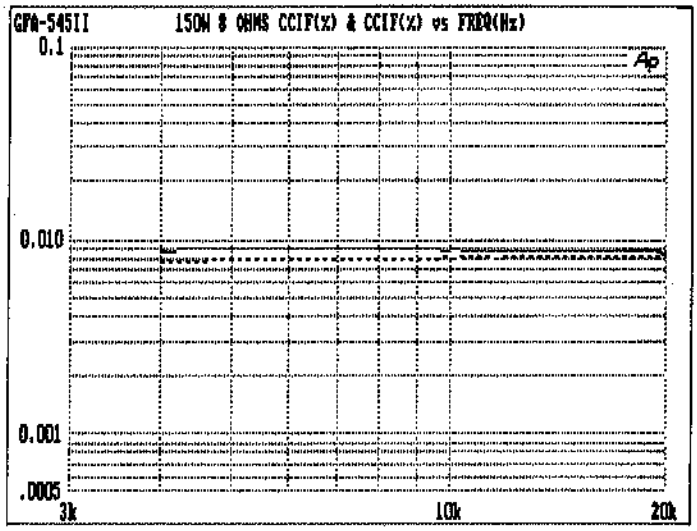












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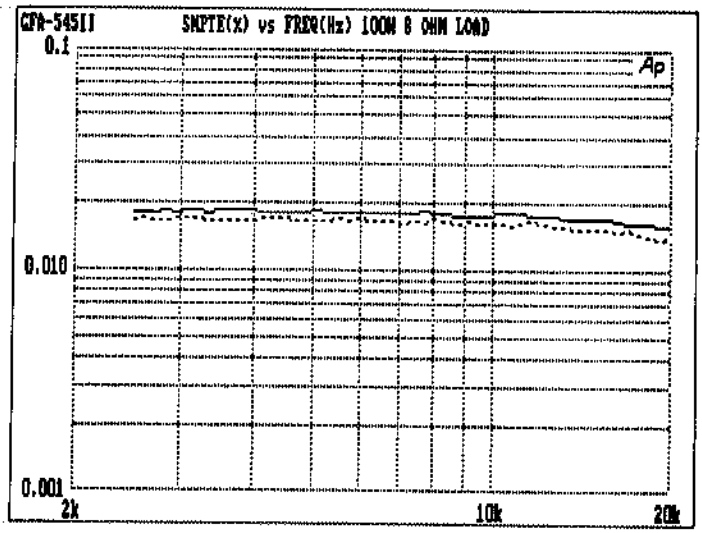
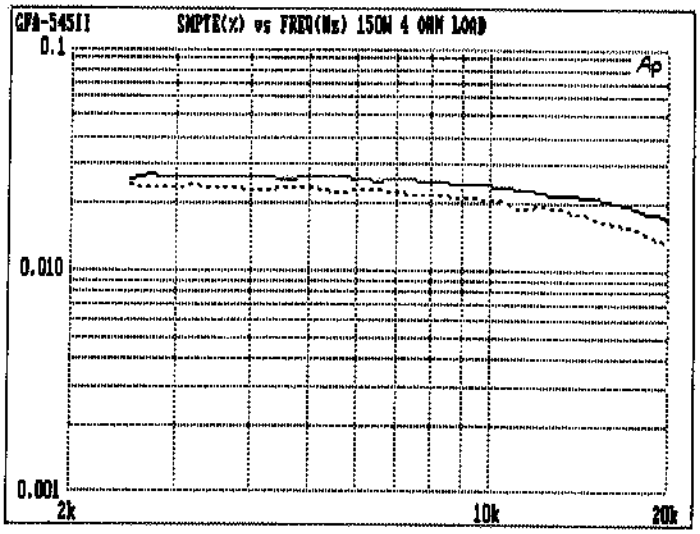
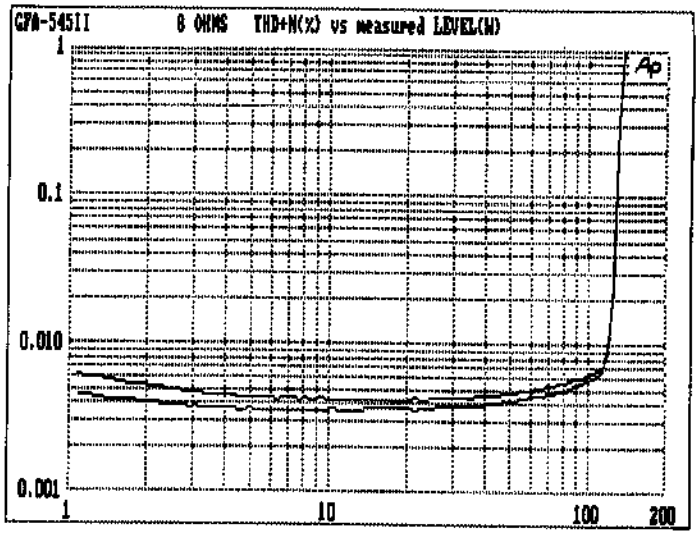
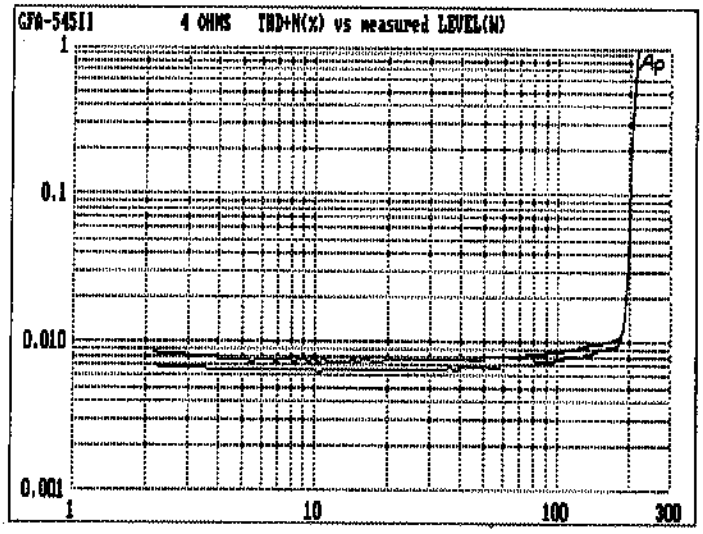
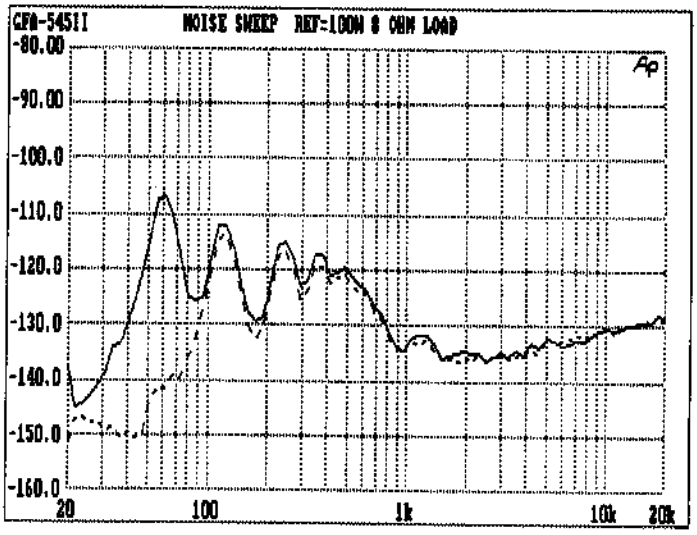
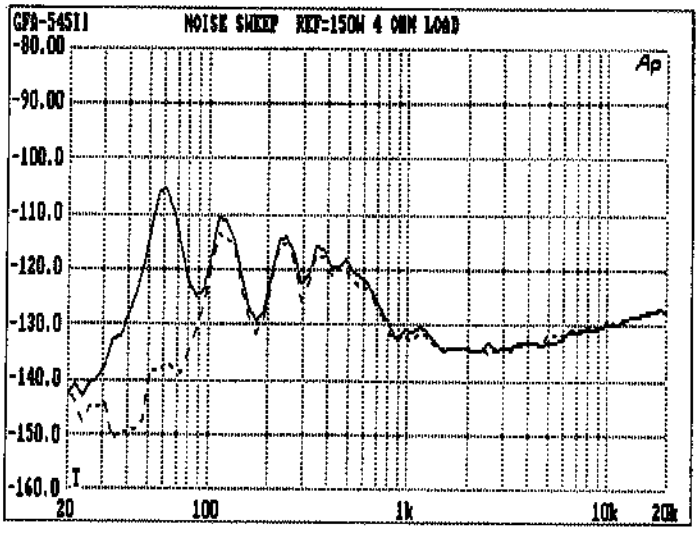












GFA-545II SPECIFICATIONS

Power Rating (To FTC Requirements)

100 watts continuous average power into 8 ohms at any frequency between 20Hz and 20kHz with both channels driven at less than 0.04% THD.

150 watts continuous average power into 4 ohms at any frequency between 20Hz and 20kHz with both channels driven at less than 0.04% THD.

IM Distortion (SMPTE)

1 watt to 100 watts into 8 Ohms	≤0.02%
1 watt to 150 watts into 4 Ohms	≤0.02%

IM Distortion (CCIF, Any Combination from 4kHz to 20kHz)

100 watts into 8 Ohms	≤0.006%
150 watts into 4 ohms	≤0.009%

THD + Noise at 100 Watts into 8 Ohms

20Hz	0.008%
1kHz	0.006%
10kHz	0.008%
20kHz	0.015%

THD + Noise at 150 Watts into 4 Ohms

20Hz	0.015%
1kHz	0.009%
10kHz	0.015%
20kHz	0.025%

Frequency Response @ 1 Watt into 8 Ohms

10Hz to 20kHz	+0, −0.25dB

Power Bandwidth (—3dB)	1.7Hz to 100kHz
Dynamic Headroom into 4 Ohms	2.1dB

Signal-to-Noise Ratio, "A" Weighted

100 watts into 8 Ohms	≥110dB

Gain	27dB
Input Impedance	100,000 ohms

Input Sensitivity

100 watts into 8 Ohms	1.25V rms
1 watt into 8 Ohms	130mV rms

Damping Factor

20Hz to 20kHz	≥400

Rise Time

5kHz,80V peak-to-peak square wave,20% to 80%	2.3 us
Semiconductor Complement	38 transistors,2 zener diodes, 12 diodes,2 ICs,2 diode bridges

Power Consumption (Continuous,Both Channels Driven)

Quiescent	50VA
Maximum	720VA
100 watts into 8 Ohms	325VA
150 watts into 4 Ohms	550VA

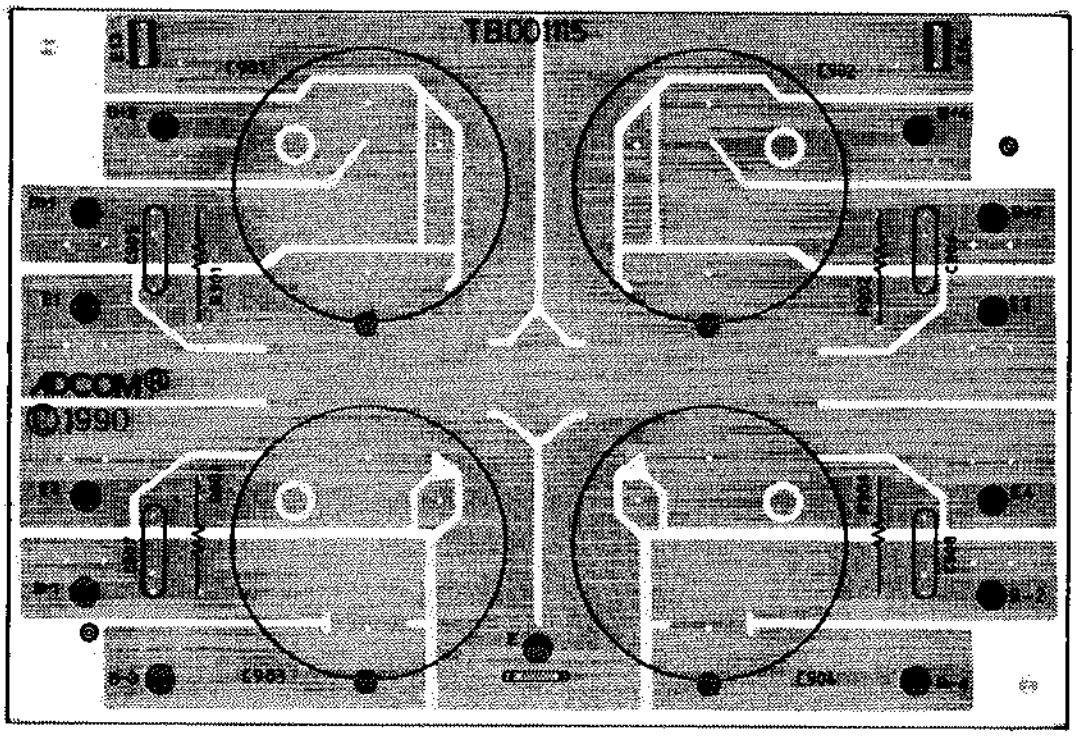
GENERAL

Power (available in 220V or 240V on special order)	120VAC/50-60Hz
Chassis Dimensions	5"(127mm) x 17"(432mm) x 12-3/16"(310mm)
Maximum Dimensions	5-7/16"(138mm) x 17"(432mm) x 12-3/16"(310mm)
Weight	24 lbs.(11kg)
Weight,Packed	29 lbs.(13kg)

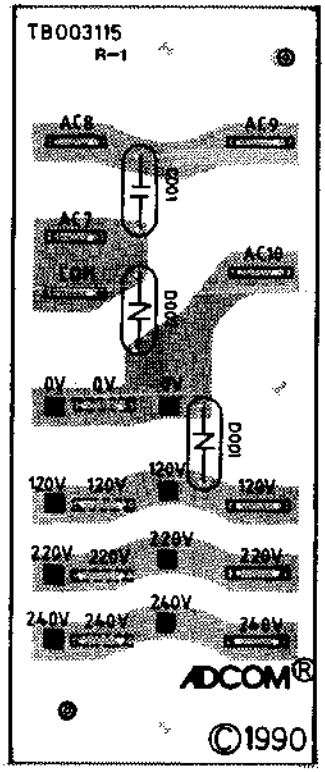
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

ADCOM®
11 Elkins Road
East Brunswick, NJ 08816
Telephone (908) 390-1130
Fax (908) 390-9152

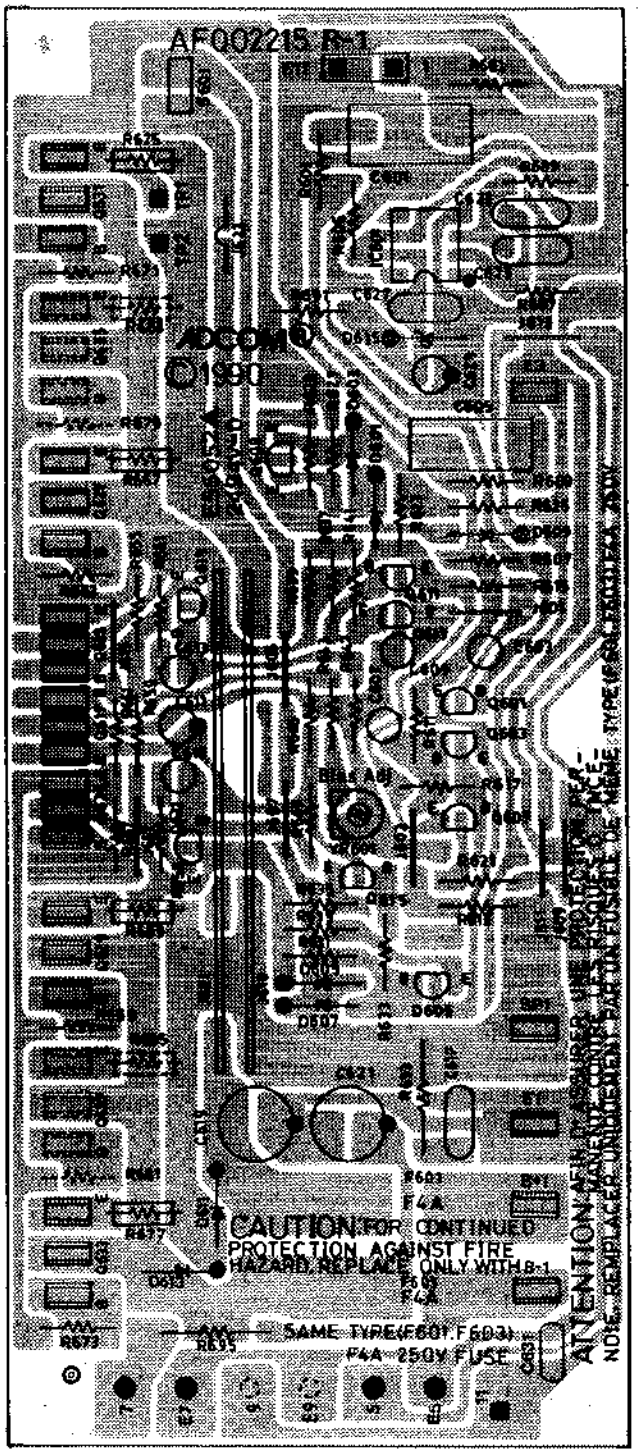
FILTER CAPACITOR PCB ASSEMBLY



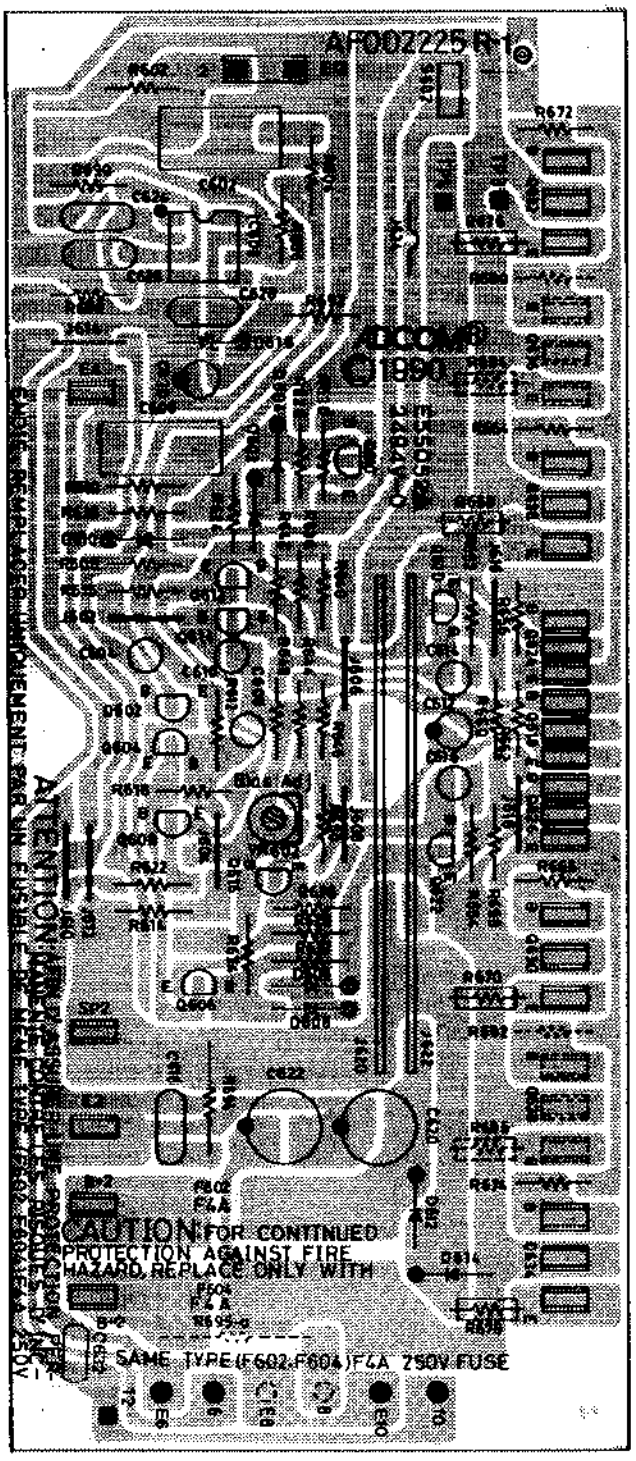
AC INPUT PCB



RIGHT AMPLIFIER PCB

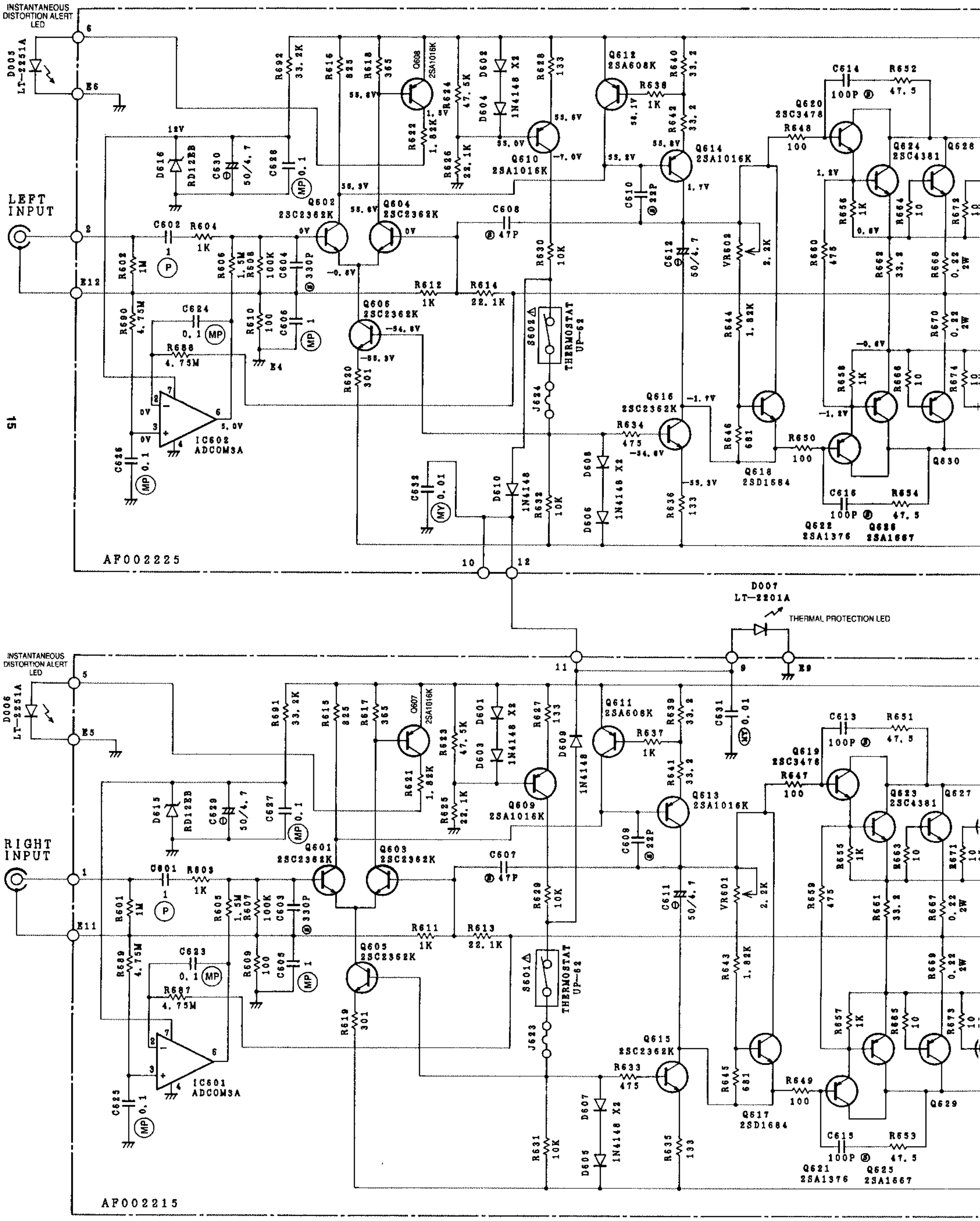


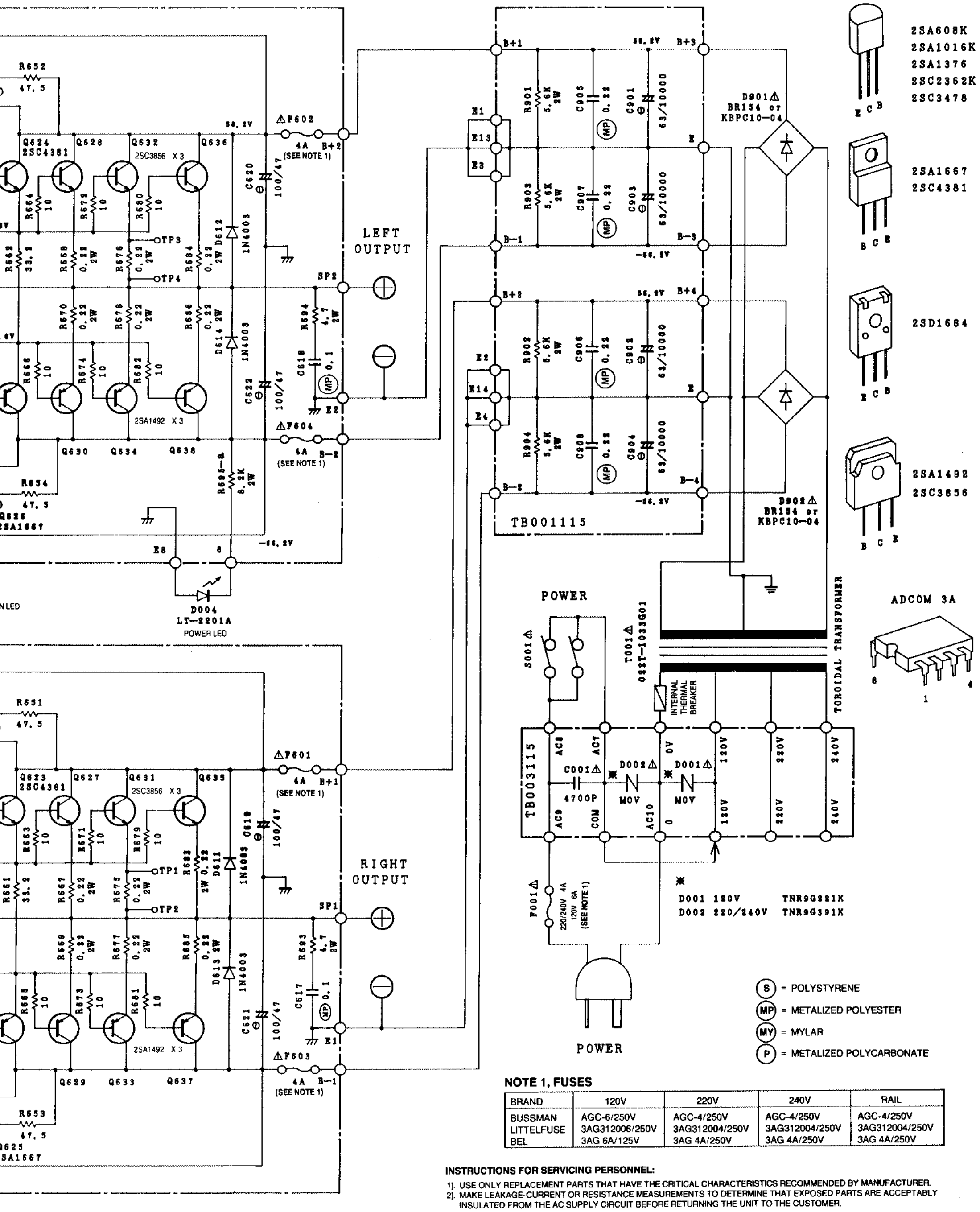
LEFT AMPLIFIER PCB



SCHEMATIC DIAGRAM GFA-545II

NOTE: ADCOM RESERVES THE RIGHT TO MODIFY CIRCUITRY AND/OR CHANGE COMPONENTS TO UPGRADE PRODUCT WITHOUT PRIOR NOTICE OR INCURRING ANY LIABILITY





NOTE 1, FUSES

BRAND	120V	220V	240V	RAIL
BUSSMAN	AGC-6/250V	AGC-4/250V	AGC-4/250V	AGC-4/250V
LITTELFUSE	3AG312006/250V	3AG312004/250V	3AG312004/250V	3AG312004/250V
BEL	3AG 6A/125V	3AG 4A/250V	3AG 4A/250V	3AG 4A/250V

INSTRUCTIONS FOR SERVICING PERSONNEL:

1). USE ONLY REPLACEMENT PARTS THAT HAVE THE CRITICAL CHARACTERISTICS RECOMMENDED BY MANUFACTURER.
2). MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE AC SUPPLY CIRCUIT BEFORE RETURNING THE UNIT TO THE CUSTOMER.