SERVICE MANUAL

2 CHANNEL POWER AMPLIFIER

GFA-5002

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10 Timber Lane
Marlboro, NJ 07746
USA
Tel: 732-683-2356
Fax: 732-683-9790

Web: http://www.adcom.com

INTRODUCTION

This service manual is intended to assist trained and qualified technical personnel in verifying the performance of, adjusting, and repairing the ADCOM GFA-5002 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-5002 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-5002 FROM THE WALL AC OUTLET OR OTHER SOURCE OF AC POWER AND THE POWER-SUPPLY CAPACITORS ARE COMPLETELY DISCHARGED**. THESE INSTRUCTIONS ARE PROVIDED FOR USE ONLY BY COMPETENT TECHNICAL PERSONNEL. **DO NOT UNDERTAKE ANY SERVICE PROCEDURES IN THE GFA-5002 UNLESS YOU ARE TECHNICALLY QUALIFIED TO DO SO.**

TEST PROCEDURES

- All tests are performed with a 115V, low-distortion (less than 2% THD), AC-power source, 8-ohm resistive load (except slew rate), and a signal source of not more than 600 ohms.
- An 80kHz low-pass filter is employed during THD distortion measurements.
- Signal-to-noise measurements are “A” weighted.
- Damping factor is measured by comparing the 1 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 5kHz square wave. **DO NOT OPERATE THE AMPLIFIER AT FULL-POWER SINE WAVE ABOVE 22kHz OR FULL-POWER SQUARE WAVE ABOVE 5kHz.**

IMPORTANT

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

CORRECT BIAS ADJUSTMENT IS CRITICAL TO THE PERFORMANCE OF THIS AMPLIFIER. MAXIMUM OUTPUT POWER, MINIMUM THD AND HEAT DISSIPATION ARE AFFECTED BY THE BIAS SETTING AND MUST BE CORRECT TO MAINTAIN THE SONIC QUALITY AND LONGEVITY OF THE AMPLIFIER.

BIAS ALIGNMENT

Prior to performing BIAS ALIGNMENT turn unit on and allow to idle with rated output (8 ohm) for approximately **5 MINUTES** before attempting adjustments

Step	Coupling		Adjust	Adjust For
	Plus Lead	Minus Lead		
1	TP3	TP1	VR603	DC Voltmeter reads 10mV
2	TP4	TP2	VR604	

a GFA-5002 SERVICE PARTS LIST

Amplifier PCB
AF705514 and AF705524

Schematic Location	Part Number	Description	
C603, C604	12001260	Capacitor	2.2µF 100V
C607, C608	12001400	Capacitor	1µF 100V
C609, C610	12005470	Capacitor	47µF 100V Electrolytic
C611, C612	12001420	Capacitor	22pF 125V
C613, C614	12003070	Capacitor	39pF 125V
C615, C616	12005325	Capacitor	4.7µF 50V Electrolytic
C617-C620	12003080	Capacitor	68pF 125V
C621, C622	12001450	Capacitor	0.22µF 100V
C623, C624	12001170	Capacitor	0.1µF 100V
C625,C626	12001450	Capacitor	0.22µF 100V
C901-C904	12005450	Capacitor	6800µF 63V Electrolytic
D001,D002	16001254	Distortion LED (Yellow)	LTL-1254
D003,D004	16001204	Thermal LED (Red)	LTL-1204
D601-D608	16004148	Diode	1N4148
D610-D613	16003001	Diode	DSC30TC
D801,D802	16004148	Diode	1N4148
D901,D902	16008030	Bridge Rectifier	PBPC903
F601-F604	19009400	Fuse	4A 250V
Q601-Q606	33002362	NPN Transistor	2SC2362K
Q607,Q608	33001016	PNP Transistor	2SA1016F-T
Q609,Q610	33001376	PNP Transistor	2SA1376L-T
Q611,Q612	33009700	PNP Transistor	2SA970B-T
Q613,Q614	33001376	PNP Transistor	2SA1376L-T
Q615,Q616	33003478	NPN Transistor	2SC3478L-T
Q617,Q618	33006000	NPN Transistor	2SD600KE
Q619,Q620	33003478	NPN Transistor	2SC3478L-T
Q621,Q622	33001376	PNP Transistor	2SA1376L-T
Q623,Q624	33003902	NPN Transistor	2SC3902
Q625,Q626	33001507	PNP Transistor	2SA1507
Q627,Q628	33001047	NPN Transistor	2SD1047
Q629,Q630	33008170	PNP Transistor	2SB817
Q631,Q632	33001047	NPN Transistor	2SD1047
Q633,Q634	33008170	PNP Transistor	2SB817
Q801,Q802	33001016	PNP Transistor	2SA1016F-T
R603,R604	27004260	Resistor	2.74KΩ 1%MF
R605,R606	27004135	Resistor	4.99KΩ 1%MF
R607,R608	27004050	Resistor	1KΩ 1%MF
R609,R610	27004120	Resistor	22.1KΩ 1%MF
R611,R612	27004420	Resistor	33.2Ω 1%MF
R613,R614	27004350	Resistor	825Ω 1%MF
R615,R616	27004225	Resistor	475Ω 1%MF
R617, R618	27004140	Resistor	332Ω 1%MF
R619,R620	27004160	Resistor	47.5KΩ 1%MF
R621,R622	27004120	Resistor	22.1KΩ 1%MF
R623,R624	27001550	Resistor	121Ω 1%MF

R625,R626	27004330	Resistor	5.62KΩ 1%MF

Schematic Location	Part Number	Description	
R627,R628	27004225	Resistor	475Ω 1%MF
R629,R630	27004420	Resistor	33.2Ω 1%MF
R631,R632	27004260	Resistor	2.74KΩ 1%MF
R633,R634	27004540	Resistor	499Ω 1%MF
R635-R638	27004235	Resistor	68.1Ω 1%MF
R639-R642	27004320	Resistor	47.5Ω 1%MF
R643-R650	27004170	Resistor	10Ω 1%MF
R651,R652	27004140	Resistor	332Ω 1%MF
R653,R654	27004120	Resistor	22.1KΩ 1%MF
R655,R656	27004610	Resistor	22.1Ω 1%MF
R657-R664	27001500	Resistor	0.33Ω
R665,R666	27003035	Resistor	5.1Ω (2W)
R667,R668	27004650	Resistor	750Ω 1%MF
R669,R670	27004455	Resistor	133Ω 1%MF
R671,R672	27004120	Resistor	22.1KΩ 1%MF
R673,R674	27004200	Resistor	10KΩ 1%MF
R675,R676	27003105	Resistor	1Ω (1W)
R801,R802	27004670	Resistor	100Ω 1%MF
R803, R804	27004120	Resistor	22.1KΩ 1%MF
R805,R806	27004320	Resistor	47.5Ω 1%MF
R807,R808	27004090	Resistor	121KΩ 1%MF
R901-R904	27001590	Resistor	5.6KΩ (1W)
S601,S602	32005400	Thermal Breaker	B-1002B
VR603,VR604	35001090	Bias Pot	SFKPV220R

Protection PCB AF705534

Schematic Location	Part Number	Description	
C801	12005100	Capacitor	10μF 50V Electrolytic
C802-C804	12005610	Capacitor	33μF 50V Electrolytic
C701, C702	12005640	Capacitor	0.22μF 50V Electrolytic
C703	12005610	Capacitor	33μF 50V Electrolytic
C704	12005020	Capacitor	100μF 25VElectrolytic
C705	12002020	Capacitor	0.01μF 50V
C706	12005610	Capacitor	33μF 50V Electrolytic
C707	12005610	Capacitor	33μF 50V Electrolytic
C905, C906	12005070	Capacitor	1000μF 35V Electrolytic
C907, C908	12005130	Capacitor	220μF 25V Electrolytic
C909	12005360	Capacitor	100μF 50V Electrolytic
C910	12005700	Capacitor	4700pF 250V
D701-D706	16004148	Diode	1N4148
D707	16004003	Diode	1N4003
D803	16004003	Diode	1N4003
D804	16004148	Diode	1N4148
D903	16001530	Bridge Rectifier	W-02G
D904	16004148	Diode	1N4148

D905	16004003	Diode	1N4003
F902	19009100	Fuse	1A 250V

Schematic Location	Part Number	Description	
IC701,IC702	21004558	Dual Op-Amp	NJM4558DD
IC703	21005550	Timer IC	NJM555D
IC801	21001237	Protect IC	UPC1237H
IC901	21007912	Regulator IC	NJM7912
IC902	21007800	Regulator IC	NJM7812
PT902	24005002	Standby Transformer	TT-345-U
Q701,Q702	33005360	NPN Transistor	2SC536G-T
Q703	33006000	NPN Transistor	2SD600KE
Q704	33003399	Digital NPN Transistor	2SC3399-T
R701,R702	27004200	Resistor	10KΩ
R703,R704	27004210	Resistor	100KΩ
R705,R706	27004630	Resistor	221KΩ
R707,R708	27004400	Resistor	1.82KΩ
R709-R711	27004210	Resistor	100KΩ
R712,R713	27004465	Resistor	909KΩ
R714,R715	27004200	Resistor	10KΩ
R716	27004210	Resistor	100KΩ
R717	27004070	Resistor	2.21KΩ
R718	27004530	Resistor	1.21KΩ
R719	27004600	Resistor	4.75KΩ
R720,R721	27004120	Resistor	22.1KΩ
R809	27004290	Resistor	18.2KΩ
R810	27001590	Resistor	5.6KΩ (1W)
R811	27004485	Resistor	82.5KΩ
R812	27003150	Resistor	820 Ω (1W)
R813	27004210	Resistor	100KΩ
R905	27003095	Resistor	33Ω (1W)
RY801	28001140	Relay	VB-24SMCU-E
RY901	28001150	Relay	G4W-1112P-VD

Input PCB AF705544

Schematic Location	Part Number	Description	
C601, C602	12001390	Capacitor	125V 330pF
JP601, JP602	22001020	RCA Jack	4TR-2709-3
R601,R602	27004050	Resistor	1KΩ
SW601	37001350	Bridging Switch	SX4TR-2886
VR601,VR602	35005002	Input Level Pot	4TR-3379

DC Trigger Board AF705554

Schematic Location	Part Number	Description

JP701	22001570	DC Trigger Input Jack	YK-5103A
SW901	37005006	Ground Switch	SS004-P022

Other Hardware

Schematic Location	Part Number	Description	
	30005002	Speaker Binding Post	4TR-3357
	19000500	Fuse - 115V Models (U.S.)	5A 125V
	19008250	Fuse - 230V Models (Euro)	2.5A 250V
	24005003	Transformer	TT-342-U
	37005002	Vacation Switch	R19-33FM2-2N
	16002249	POWER/STANDBY LED	VRPY3349S
	25001060	AC Inlet	4TR-2786
	13005004	Printed Rear Chassis	TRP-750A
	13001020	Foot	4TR-2823#1 24FX14H
	47005002	Alum. Shield Board	4TR-3400
	13005002	Front Panel	3TOZ-1 TFP-824
	11005002	LED Ring (for Power LED)	4TR-2209B#1 9F
	13005003	Top Cover	3TQA-5
	15001110	AC Power Chord 115V (U.S.)	4TR-3403 SJT AWG16

a GFA-5002 Voltage Conversion

115V to 230V

1) Unplug the power cord and remove the top cover.
2) Locate the standby transformer, PT902, on the circuit board in the middle of the unit.
3) Near PT902, cut jumpers J1, J2, J4, J5 - see figure 1 below.
4) Make jumpers J3 and J6 - see figure 1 below.
5) Change the rear panel fuse to 2.5A 250V and place a 2.5A sticker above the fuse holder so that the new value is indicated.

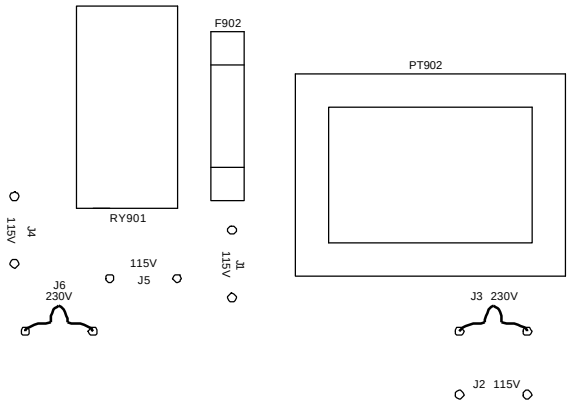


Figure 1: Jumper position for 230V operation. Main fuse is 2.5A 250V.

230V to 115V

1) Unplug the power cord and remove the top cover.
2) Locate the standby transformer, PT902, on the circuit board in the middle of the unit.
3) Near PT902, cut jumpers J3 and J6 - see figure 2 below.
4) Make jumpers J1, J2, J4 and J5 - see figure 2 below.
5) Change the rear panel fuse to 5A 250V and place a 5A sticker above the fuse holder so that the new value is indicated.

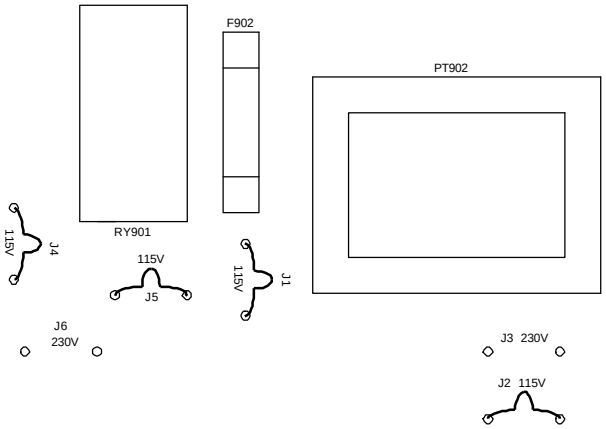


Figure 2: Jumper position for 115V operation. Main fuse is 5A 250V.

a GFA-5002 SPECIFICATIONS

Power Rating (To FTC Requirements)

50 watts continuous average power per channel into 8 ohms at any frequency between 20Hz to 20kHz with all channels driven at less than 0.05% THD

75 watts continuous average power per channel into 4 ohms at any frequency between 20Hz to 20kHz with all channels driven at less than 0.05% THD

Bridged Power: 175 watts continuous average power (one channel) into 8 ohms at any frequency between 20Hz to 20KHz with less than 0.09% THD

IM Distortion (SMPTE)

1 watt to 50 watts into 8 ohms ..... ≤ 0.05%
1 watt to 75 watts into 4 ohms ..... ≤ 0.05%

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

50 watts into 8 ohms ..... ≤ 0.01%
75 watts into 4 ohms ..... ≤ 0.01%

Frequency Response @ 1 Watt into 8 ohms (10Hz to 20kHz) ..... +0, -0.25dB

Power Bandwidth (-3dB) ..... 5Hz to 130kHz

Dynamic Headroom into 4 ohms ..... 1.8 dB

Signal to Noise Ratio, "A" Weighted (50 watts into 8 ohms) ..... ≥ 100dB

Gain 29dB

Input Sensitivity ..... variable

Input Impedance 17kΩ

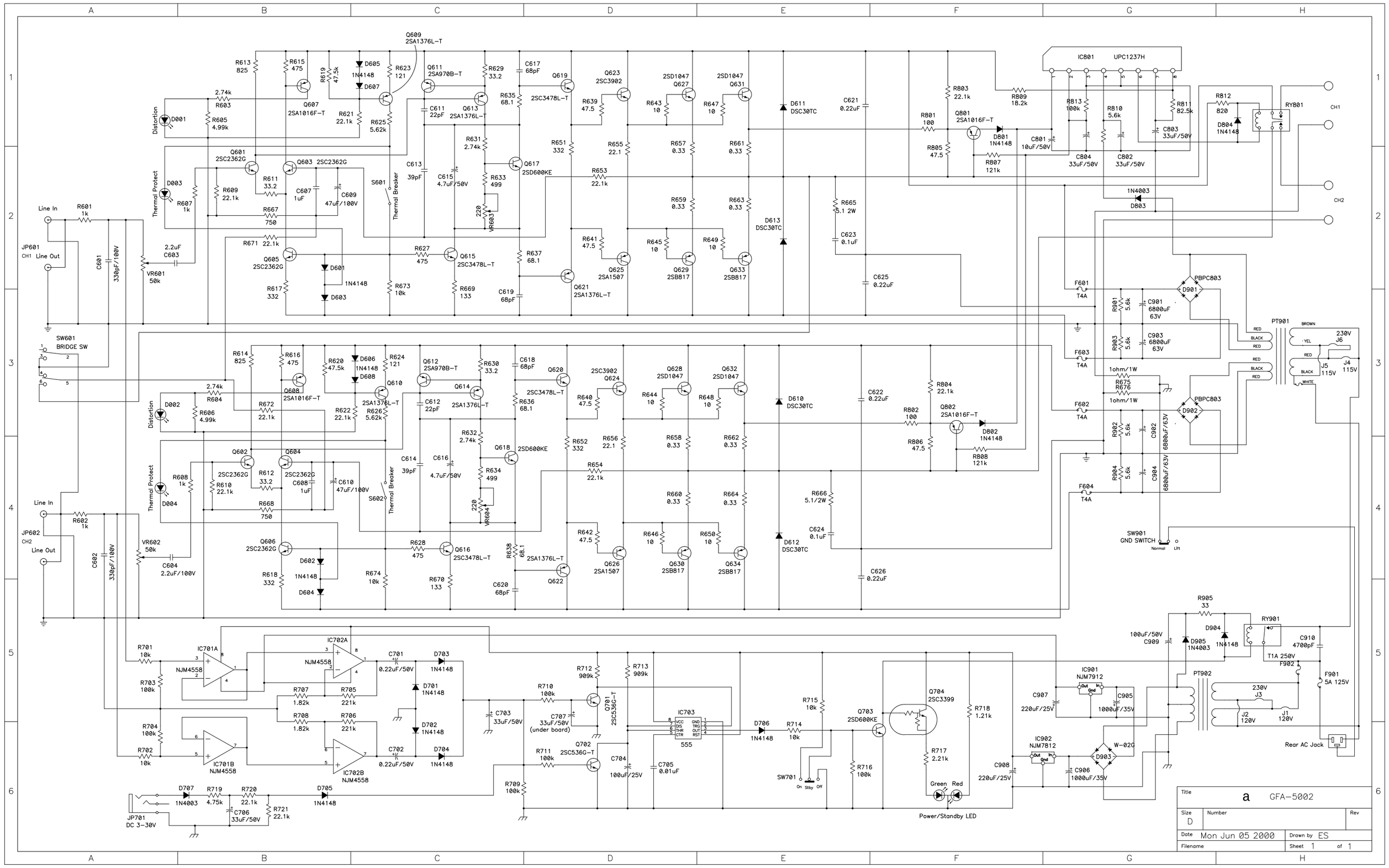
Damping Factor (20Hz to 20kHz) ..... ≥ 400

Rise Time (5kHz, 90V, peak-to-peak square wave, 20% to 80%) 2.7μS

Power Consumption (Continuous, All Channels Driven)

Quiescent 30VA
Maximum 600VA

Power (Available in 230VAC on special order) ..... 115VAC - 50/60Hz
Chassis Dimensions ..... 3" x 17" x 11.5"
Maximum Dimensions ..... 3.5" x 17" x 12.5"
Weight 18lb
Weight, Packed 21lb


Q609 2SA1376L-T
R613 825
R615 475
R619 47.5k
D605 1N4148
D607
R623 121
Q611 2SA970B-T
R629 33.2
C617 68pF
Q619
2SC3478L-T
Q623 2SC3902
2SD1047 Q627
2SD1047 Q631
D611 DSC30TC
C621 0.22uF
IC801 UPC1237H
R803 22.1k
R809 18.2k
R812 820
RY801
CH1
CH2
D804 1N4148
R813 100k
R810 5.6k
R811 82.5k
C803 33uF/50V
R801 100
Q801 2SA1016F-T
D801 1N4148
C801 10uF/50V
C804 33uF/50V
C802 33uF/50V
R805 47.5
R807 121k
1N4003 D803
2.74k R603
R605 4.99k
Q607 2SA1016F-T
R621 22.1k
R625 5.62k
C611 22pF
Q613 2SA1376L-T
R635 68.1
R639 47.5
R643 10
R647 10
R651 332
R655 22.1
R657 0.33
R661 0.33
R653 22.1k
R659 0.33
R663 0.33
D613 DSC30TC
R665 5.1 2W
C623 0.1uF
C625 0.22uF
Distortion
D001
Thermal Protect
D003
Q601 2SC2362G
Q603 2SC2362G
R609 22.1k
R607 1k
R611 33.2
C607 1uF
C609 47uF/100V
R667 750
C613 39pF
C615 4.7uF/50V
R631 2.74k
Q617 2SD600KE
R633 499
220 VR603
S601
Thermal Breaker
Line In
JP601 CH1 Line Out
R601 1k
C601 330pF/100V
2.2uF C603
VR601 50k
R671 22.1k
Q605 2SC2362G
D601 1N4148
D603
R617 332
R627 475
Q615 2SC3478L-T
R673 10k
R669 133
R637 68.1
C619 68pF
Q621 2SA1376L-T
R641 47.5
Q625 2SA1507
R645 10
Q629 2SB817
R649 10
Q633 2SB817
C622 0.22uF
R804 22.1k
R802 100
Q802 2SA1016F-T
D802 1N4148
R808 121k
R806 47.5
D610 DSC30TC
C626 0.22uF
R666 5.1/2W
C624 0.1uF
D612 DSC30TC
F601 T4A
F603 T4A
F602 T4A
F604 T4A
PBPC803 D901
PBPC803 D902
R901 5.6k
C901 6800uF 63V
R903 5.6k
C903 6800uF 63V
R902 5.6k
C902 6800uF/63V
R904 5.6k
C904 6800uF/63V
1ohm/1W R675
1ohm/1W R676
PT901
BROWN
RED
BLACK
WHITE
230V J6
J5 115V
J4 115V
SW901 GND SWITCH
Normal
Lift
SW601 BRIDGE SW
R614 825
R616 475
R620 47.5k
D606 1N4148
D608
R624 121
Q612 2SA970B-T
R630 33.2
C618 68pF
Q620
2SC3478L-T
2SC3902 Q624
2SD1047 Q628
2SD1047 Q632
D610 DSC30TC
C622 0.22uF
2.74k R604
R606 4.99k
Q608 2SA1016F-T
R672 22.1k
R622 22.1k
Q610 2SA1376L-T
R626 5.62k
C612 22pF
Q614 2SA1376L-T
R632 2.74k
Q618 2SD600KE
R634 499
220 VR604
R640 47.5
R644 10
R648 10
R652 332
R656 22.1
R658 0.33
R662 0.33
R654 22.1k
R660 0.33
R664 0.33
R642 47.5
Q626 2SA1507
R646 10
Q630 2SB817
R650 10
Q634 2SB817
Distortion
D002
Thermal Protect
D004
Q602 2SC2362G
Q604 2SC2362G
R610 22.1k
R608 1k
R612 33.2
C608 1uF
C610 47uF/100V
R668 750
C614 39pF
C616 4.7uF/50V
R638 68.1
2SA1376L-T Q622
C620 68pF
R674 10k
R670 133
Q606 2SC2362G
D602
D604
R618 332
R628 475
Q616 2SC3478L-T
S602
Thermal Breaker
Line In
JP602 CH2 Line Out
R602 1k
C602 330pF/100V
VR602 50k
C604 2.2uF/100V
R804 22.1k
R802 100
Q802 2SA1016F-T
D802 1N4148
R808 121k
R806 47.5
R905 33
D904
1N4148
RY901
100uF/50V C909
D905 1N4003
C910 4700pF
T1A 250V F902
F901 5A 125V
PT902
230V J3
J2 120V
J1 120V
Rear AC Jack
IC901 NJM7912
C907 220uF/25V
C905 1000uF/35V
IC902 NJM7812
C908 220uF/25V
W-02G D903
C906 1000uF/35V
IC702A NJM4558
IC701A NJM4558
IC701B NJM4558
IC702B NJM4558
R701 10k
R703 100k
R704 100k
R702 10k
R707 1.82k
R705 221k
R708 1.82k
R706 221k
C701 0.22uF/50V
C702 0.22uF/50V
D703 1N4148
D701 1N4148
D702 1N4148
D704 1N4148
C703 33uF/50V
R712 909k
R713 909k
R710 100k
C707 33uF/50V (under board)
Q701 2SC536G-T
Q702 2SC536G-T
R711 100k
R709 100k
C704 100uF/25V
C705 0.01uF
IC703 555
D706 1N4148
R715 10k
R714 10k
SW701
On Stby Off
Q703 2SD600KE
Q704 2SC3399
R716 100k
R718 1.21k
R717 2.21k
Green Red
Power/Standby LED
D707 1N4003
R719 4.75k
R720 22.1k
C706 33uF/50V
R721 22.1k
D705 1N4148
JP701 DC 3-30V
Title
a GFA-5002
Size D
Number
Rev
Date Mon Jun 05 2000
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Filename
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