

SERVICE MANUAL

ADCOM[®] POWER AMP GFA-555

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ADCOM GFA-555 Service Manual

Introduction

This repair manual is intended to assist qualified technical personnel in verifying performance, adjusting, and repairing the ADCOM model GFA-555 power amplifier. The procedures described here are not intended for consumers or persons not familiar with the appropriate safety procedures.

Warning: Procedures described herein require working with hazardous voltage potentials, and are intended for qualified personnel only.

Circuit Description

The ADCOM GFA-555 is a stereo power amplifier rated at 200-watts-per-channel into 8 ohms and capable of greater than 20-amps output into low impedance loads. The amplifier employs a discrete Class-A voltage-gain stage (front end) which amplifies the input signal up to the voltage required at the output of the amplifier. This high-voltage signal drives the high-current Darlington-follower output stage which amplifies the current by a factor of about 2,000.

Referring to the accompanying schematic, the input signal passes through network R1 and C1 which provides a radio-frequency rolloff above 500 kHz. R2 provides a DC source impedance in the absence of any signal source. Input amplification and feedback occur in Q1 and Q2, a standard differential pair input stage, with R3 and R4 providing local feedback for open loop gain control. The next amplification is provided by Q7 and Q8 used to limit the possible current flow when the voltage drop across R8 exceeds 0.6 volts, or about 20 milliamps. The signal comes out of the collector of Q7 at full output voltage. C2 is used to balance the slew rate of the positive swing to the rate of the negative swing, and C4 provides a secondary high-frequency feedback loop to the input stage, allowing the input stage to ignore the output stage lag at very high frequencies, providing additional stability.

Feedback is provided from the output to base of Q2 by the network R6, R5, and C3. C3 provides rolloff below 3 Hz.

The gain stages of Q1, Q2, and Q7 are biased into single-ended Class-A mode by the circuitry of R10-11, R13-16, D3-D6, and Q3, 4, and 6. D3 and D4 forward-bias transistor Q6 at 1.3 volts from current provided through R13. This creates about 0.6 volts across R11 so that Q6 sources about 1 milliamp through thermostat T1. This current biases the diodes D5-6 to 1.3 volts, causing 2 milliamps constant current sourced from Q3 for the input pair, and 4 milliamps constant current sourced from Q4 for the secondary gain stage of Q7. Between the collectors of Q4 and Q7 is the bias network which biases the

output stage into Class AB.

This bias network uses Q9-10 and the associated resistors to take bias feedback off the emitters of drivers Q11 and Q12 to form a constant voltage bias across R21. Unlike the standard voltage source, this configuration eliminates bias variations due to thermal and other changes in the driver transistors. P1 is used for adjustment, and T2 is a thermistor mounted on the case of Q12 providing thermal compensation for the output transistors.

Transistor Q5 and resistors R9 and R12 provide an error detection system which senses an over-worked feedback loop and lights LED L1 when the amplifier is overdriven.

Thermostat T1 opens at temperatures above 85 degrees C, shutting off the bias to the amplifier. Fuses F1 and F2 will accomplish the same effect when blown by over-current.

R22 and C6 provide a load for the amplifier at high frequencies, stabilizing the amplifier under varying load conditions. D1 and D2 provide a high current return to the supply for backlash current from the load.

The output stage consists of two sets of 4 parallel transistors operated as emitter followers, using 0.82 ohm ballast resistors to ensure current sharing and bias stability.

Test Procedures

All tests are performed with 120-volts, low-distortion AC power source, 8-ohm resistive loads (except slew rate), and a 600 ohm signal source.

Tests are performed after warm-up at 66 watts into 8 ohms for at least 15 minutes.

All grounds during testing are referred to the ground of the input terminals.

80 kHz low-pass filters are employed during THD distortion measurements. 400 Hz high-pass filters are employed for distortion measurements at frequencies above 1 kHz.

Noise measurements unweighted from 20 Hz to 20 kHz.

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

Maximum output current measured single pulsed into 1 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 5 kHz square wave. To avoid damaging output network R22 and C6, do not operate the amplifier at full power sine wave above 22 kHz or full power square wave above 5 kHz.

Important: Before proceeding with adjustments make sure amplifier is cool (room temperature).

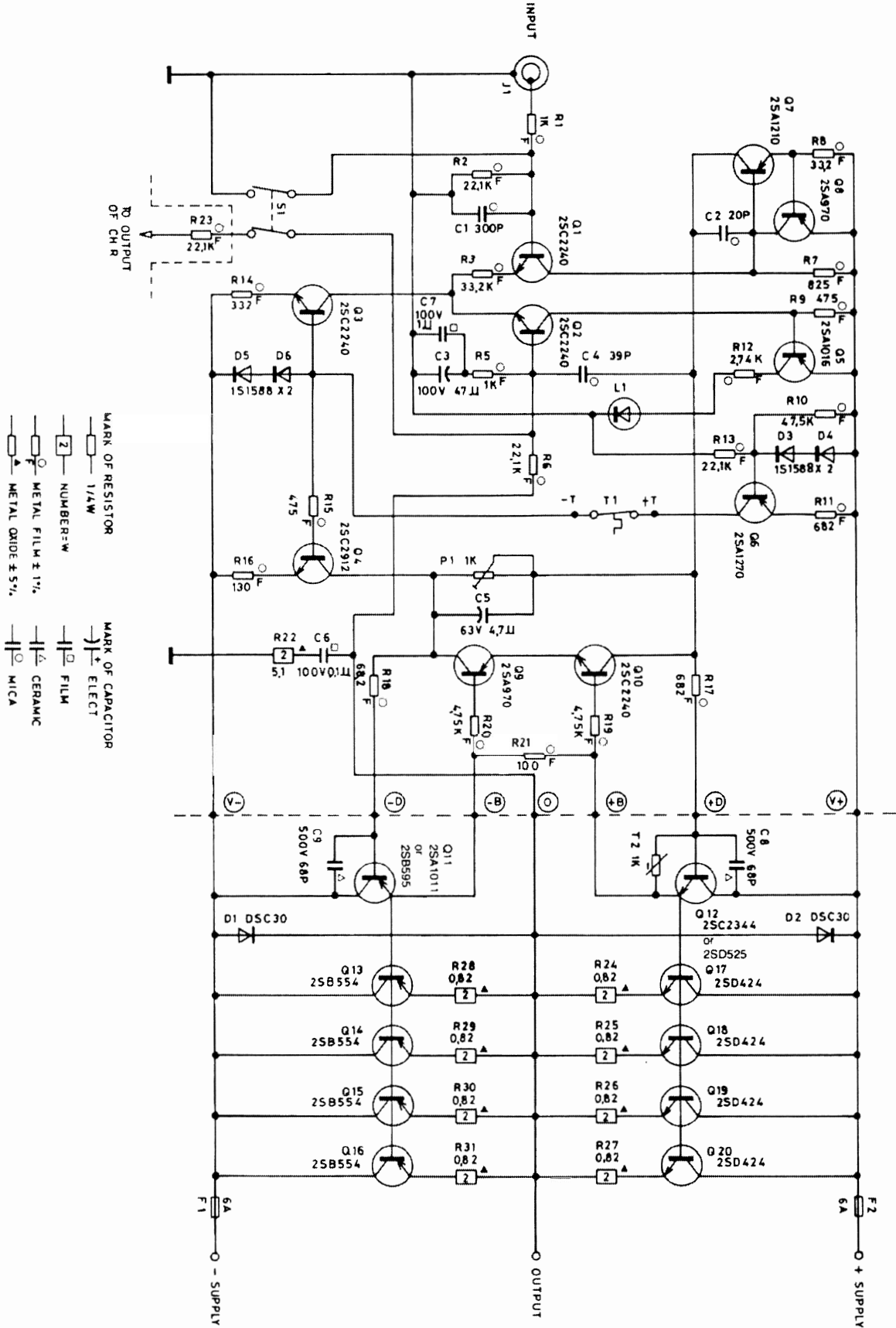
Bias Alignment

1. With set-up as per the first paragraph of Test Procedures and with NO SIGNAL IN, set bias control(s) R1 to midpoint.
2. Connect a mV meter across any of the output emitter resistors (R24-31) for the channel under alignment.
3. Turn amplifier on and allow a 3 to 5 minute settling period.
4. Adjust BIAS control to obtain either a + or - 16mV indication on the millivolt meter.
5. To check for proper bias setting and tracking operation, remove mV meter and apply input signal to reach 66 watts into 8 ohms for 10 minutes with cover on.
6. Remove input signal and quickly connect mV meter as in step 2. Meter shall indicate 50 to 60 mV, decreasing as amplifier cools down.
7. Compliance with step 6 indicates proper bias alignment. If not, unplug amplifier, allow to cool down, and repeat procedure.

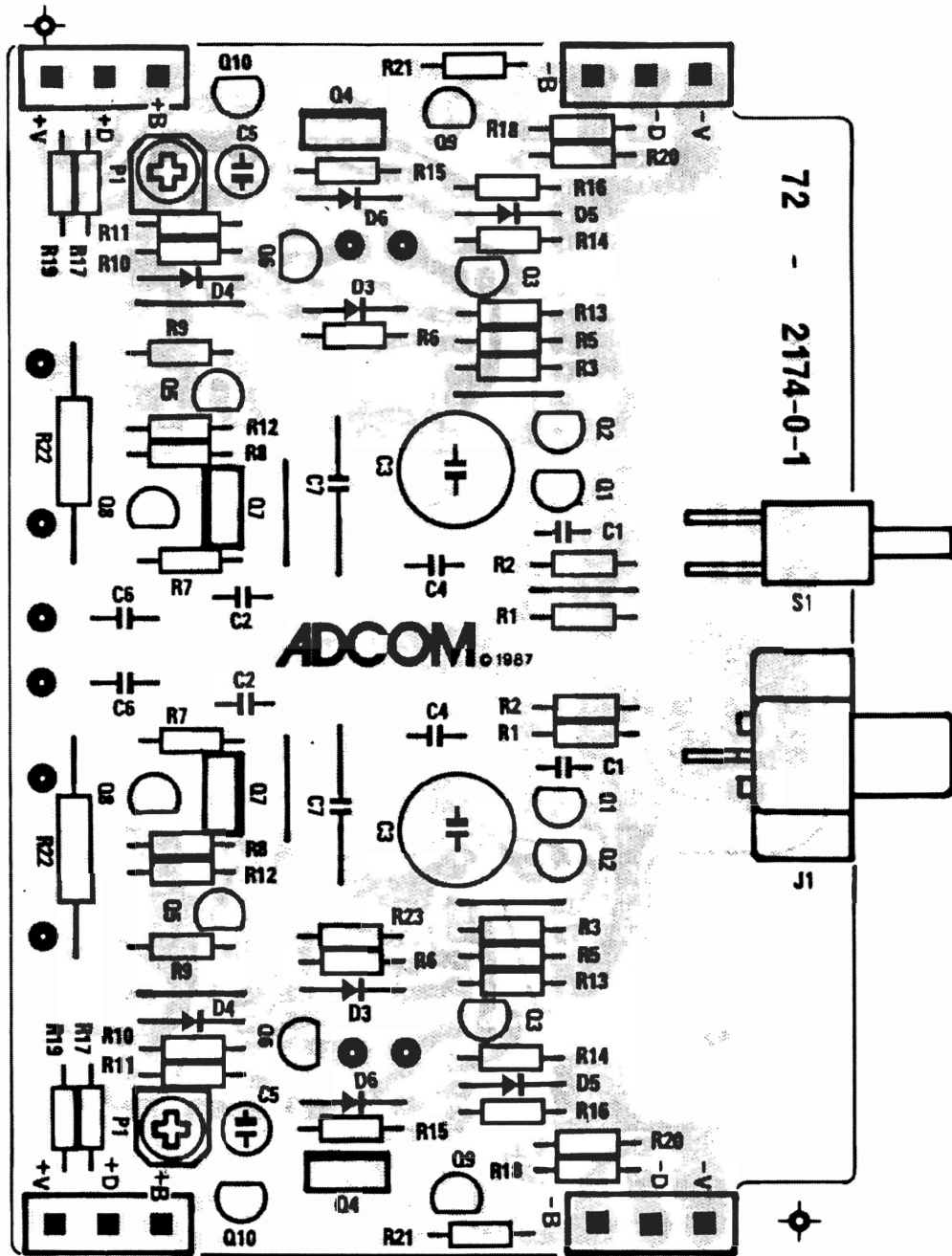
Specifications

Distortion: < 0.09% THD @ 200 Watts into 8 ohms 20-20,000 Hz.
Frequency response: -3dB @ 4 Hz.
-3dB @ 150 kHz.
Noise: < 200 Microvolts unweighted (-106dB @ 200W)
Offset: < 100 Millivolts
Gain: 27dB
Input impedance: 22,000 ohms, 300pF
Damping Factor: 200 @ 20 Hz @ 8 ohms
Maximum Current: 20 amps peak @ 1 ohm
12 amps RMS @ 2 ohms
Bridged Power: 600 Watts RMS @ 20-20,000 Hz @ 8 ohms @ .25% THD
4-ohm Power: 2 x 300 Watts/channel @20-20,000 Hz @.25% THD
Power Bandwidth: -3dB @ 50,000 Hz @ 8 ohms @ 1% THD

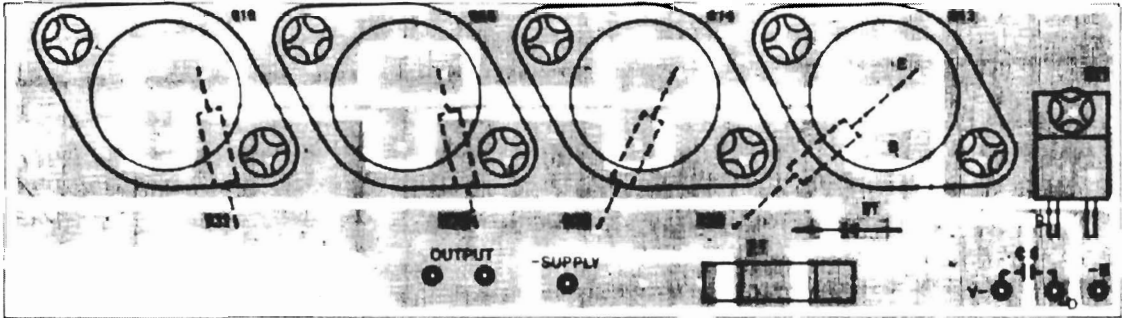
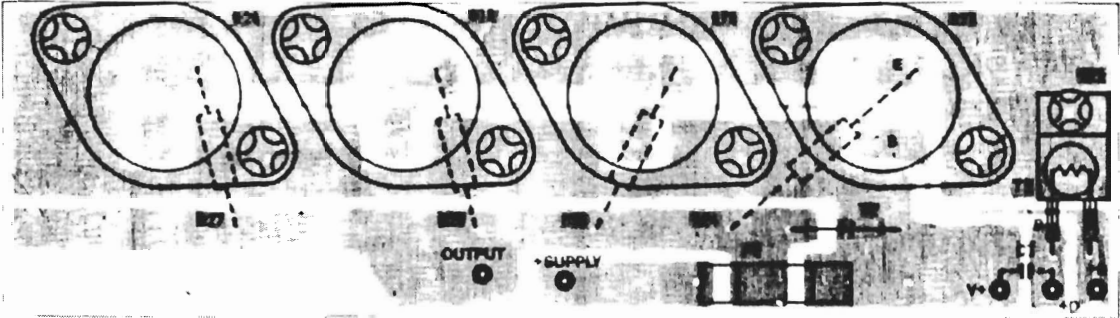
Schematic Diagram GFA-555 (one channel shown)



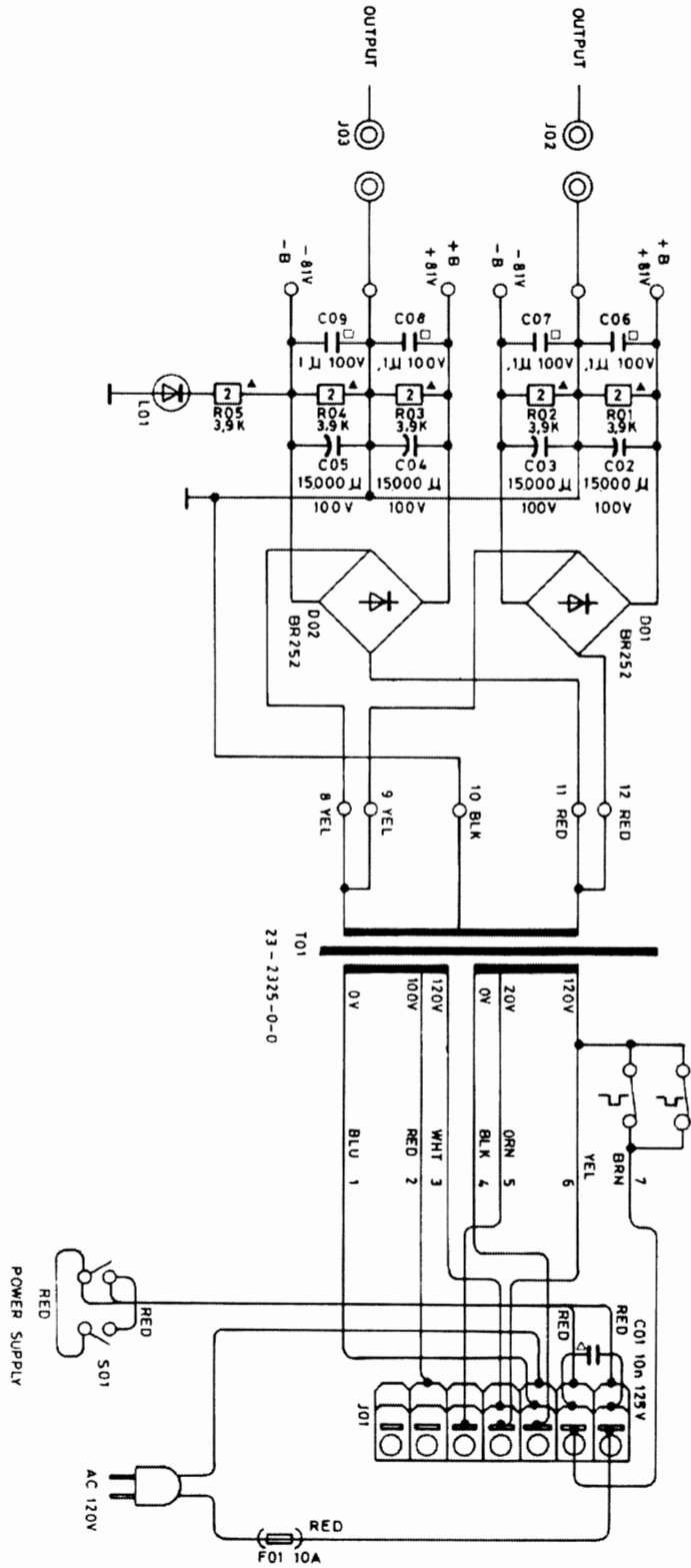
Front End Printed Circuit Board GFA-555



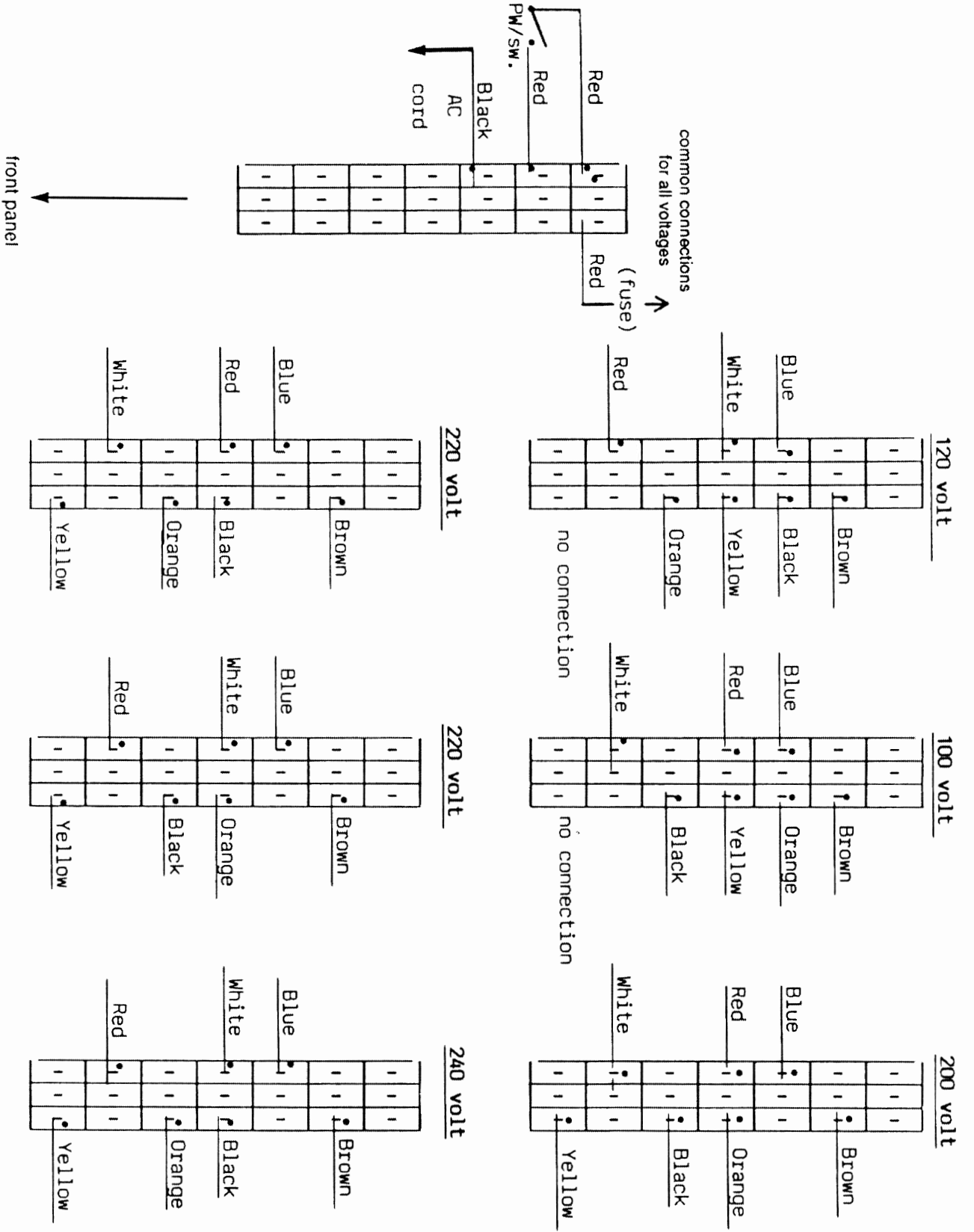
Output Printed Circuit Boards GFA-555



Power Supply Schematic Diagram GFA-555



Multi-Voltage Transformer Strapping Diagram GFA-555



Repair Parts List GFA-555

Input/Driver P.C. Board (A020 A)

(per channel)

Transistors:

Q1, Q2, Q3: 2SC2240, GR or BL
Q4: 2SC2912, R or S
Q5: 2SA1016, F or GR
Q6: 2SA1207, R or S
Q7: 2SA1210, R or S
Q8, Q9: 2SA970, GR or BL
Q10: 2SC2240, GR or BL

Diodes:

D3, D4, D5, D6: 1S1588 or 1N4148

Potentiometer:

P1: 41-7105, 1K ohm B.

Thermostat: 85°C

T1: 81-7005, UP 62

Capacitors:

C1: 300pF/100V Silver Mica
C2: 20pF/100V Silver Mica
C3: 47mF/100V Electrolytic
C4: 39pF/100V Silver Mica
C5: 4.7mF/63V Electrolytic
C6: 0.1mF/100V Film
C7: 1.0mF/1000V Film

Toggle Switch:

S1: 81-315, B-22JV

RCA Jack:

J1: 82-2130, T5762AA

Resistors: 1/4 Watt Metal Film (unless otherwise noted)

R1: 1K ohm
R2: 22.1K ohm
R3: 33.2 ohm
R5: 1K ohm
R6: 22.1K ohm
R7: 825 ohm
R8: 33.2 ohm
R9: 475 ohm
R10: 47.5K ohm
R11: 682 ohm
R12: 2.74K ohm
R13: 22.1K ohm
R14: 332 ohm
R15: 475 ohm
R16: 130 ohm
R17, R18: 68.2 ohm
R19, R20: 4.75K ohm
R21: 100 ohm
R22: 5.1 ohm (2 Watt) Oxide Metal Film
R23: 22.1K ohm

Output P.C. Board I

(per channel)

Transistors:

Q12: 2SC2344, E or 2SD525
Q17-Q20: 2SC424, O

Diode:

D2: DSC 30 E or 1N5405

Ceramic Capacitor:

C8: 68pF/500 volts

Resistors: 2 Watt Oxide Metal Film

R24-R27: 0.82 ohm

Thermistor:

T2: TD5-C210, 1K ohm

Fuse:

F2: 6 amp/125 volt (AGC)

Output P.C. Board II

(per channel)

Transistors:

Q11: 2SA1011, E or 2SB595
Q13-Q16: 2SB554, O

Diode:

D1: DSC 30 E or 1N5405

Ceramic Capacitor:

C9: 68pF/500 volts

Resistors: 2 Watt Oxide Metal Film

R28-R31: 0.82 ohm

Fuse:

F1: 6 amp/125 volt (AGC)

Parts Mounted on Chassis

Toroidal Transformer: 23-2035-0

Power Switch: 15 amp/250 volt, 81-314-0
S1: 12005N

Capacitors:

C01: 0.01mF/400V Spark Killer Capacitor
C02-C05: 15000mF/100V Storage/Filter
Capacitor

Bridge Rectifier: 25 amps/200 volts
B1, B2: KBPC 2502

Miscellaneous:

LED (Red): SR 531D
LED (Yellow): SY 431D
LED Socket: 84-213
Film Capacitor: 0.1mF/100V
Oxide Metal Film Resistor: 3.9K ohm 2 Watt
Fuse 3AG or AGC Type: 10 amp/125 volt
Fuse Holder: 84-420
Speaker Term (Black): 86-212-0
Speaker Term (Red): 86-212-1