SERVICE MANUAL

ADCOM®

POWER AMPLIFIER

GFA-555

TABLE OF CONTENTS

ADCOM®

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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-555 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-555 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- 555 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-555 UNLESS YOU ARE TECHNICALLY QUALIFIED TO DO SO.**

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 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 500kHz. 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 providing local feedback for open loop gain control. The next amplification is provided by Q7. Q8 is used to limit the possible current flow when the voltage drop across R8 exceeds 0.6 volts, or about 20 milliamps. The signal is present on 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 thus providing additional stability.

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

The gain stages of Q1, Q2, and Q7 are biased into single-ended Class-A mode by the circuitry R10, R11, R13 through R16, D3 through D6, and Q3, Q4, and Q6. 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 Q6 sources about 1 milliamp through thermostat T1. This current biases the diodes D5 and D6 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, Q10 and the associated resistors to take bias feedback from 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°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 insure current sharing and bias stability.

TEST PROCEDURES

All tests are performed with a 120V, low-distortion (less than 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 66 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.

80kHz low-pass filter is employed during THD 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 (120V peak-to-peak) 5kHz square wave. To avoid damaging output networks R22/C6, **DO NOT OPERATE THE AMPLIFIER AT FULL-POWER, SINE-WAVE ABOVE 22kHz OR FULL-POWER (120V 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 (P1) to midpoint.
2. Connect a millivolt meter across any of the output emitter resistors for the channel under alignment.
3. Turn amplifier on and allow a 3 to 5 minute settling period.
4. Adjust BIAS control P1 to obtain either a + or — 16mV (±1mV) indication on the millivolt meter.
5. Connect a millivolt meter across any of the output emitter resistors for the other channel under alignment.
6. Adjust BIAS control P1 to obtain either a + or — 16mV (±1mV) indication on the millivolt meter.
7. To check for proper bias setting, remove millivolt meter and apply input signal to obtain 66 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 16mV (±1mV).

ADCOM GFA-555 SERVICE PARTS LIST

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
1. AUDIO INPUT/DRIVER PCB ASSEMBLY		
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	1N4148	
CAPACITORS:		
C1	100V/300pF	SILVER MICA
C2	100V/20pF	SILVER MICA
C3	100V/47uF	ELECTROLYTIC
C4	100V/39pF	SILVER MICA
C5	63V/4.7uF	ELECTROLYTIC
C6	100V/0.1uF	FILM
C7	100V/1uF	FILM
RESISTORS, METAL-FILM, 1%:		
R1	1/4W/1k ohms	
R2	1/4W/22.1k ohms	
R3	1/4W/33.2 ohms	
R5	1/4W/1k ohms	
R6	1/4W/22.1k ohms	
R7	1/4W/825 ohms	
R8	1/4W/33.2 ohms	
R9	1/4W/475 ohms	
R10	1/4W/47.5k ohms	
R11	1/4W/682 ohms	
R12	1/4W/2.74k ohms	
R13	1/4W/22.1k ohms	
R14	1/4W/332 ohms	
R15	1/4W/475 ohms	
R16	1/4W/130 ohms	
R17,R18	1/4W/68.2 ohms	
R19,R20	1/4W/4.75k ohms	
R21	1/4W/100 ohms	
R23	1/4W/22.1k ohms	
R22	2W/5.1 ohms	OXIDE, METAL-FILM, 5%
RESISTORS, VARIABLE:		
P1	1k ohms	41-7105
THERMOSTAT:		
T1	⚠ 81-7005	UP62, 85°C
SWITCH:		
S1	81-315	B-22JV
JACK, RCA:		
J1	82-2130	T5762AA

2. OUTPUT PCB ASSEMBLIES

TRANSISTORS:		
Q11	2SB595, O, Y or 2SA1011,E	
Q12	2SD525, O, Y or 2SC2344,E	
Q13 THROUGH Q16	2SB554, O, R	
Q17 THROUGH Q20	2SD424, O, R	
DIODES:		
D1,D2	DSC30E or 1N5405	
CAPACITORS:		
C8,C9	500V/68pF	CERAMIC
RESISTORS:		
R24 THROUGH R31	2W/0.82 ohms	OXIDE, METAL-FILM, 5%
THERMISTOR:		
T2	1k ohms	TD5-C210
FUSES:		
F1,F2*	⚠ AGC-6/250V	BUSSMAN
	3AG312006/250V	LITTELFUSE
	CES14-6A/250	SOC

3. CHASSIS-MOUNTED COMPONENTS

AC POWER SWITCH:		
S01	⚠ 12005C	BLACK, CARLING
	⚠ 12005CW	WHITE, CARLING
POWER TRANSFORMER:		
T01	⚠ 23-2035-0	ADCOM
CAPACITORS:		
C01	400V/0.01uF	SPARK-KILLER
C02 THROUGH C05	100V/15,000uF	ELECTROLYTIC, ADCOM
CO6 THROUGH C09	100V/0.1uF	FILM
SILICON RECTIFIERS:		
D01,D02	⚠ 200V/25 AMPS	KBPC 2502
RESISTORS:		
R01 THROUGH R04	2W/3.9k ohms	OXIDE, METAL-FILM, 5%
SPEAKER TERMINALS:		
J02,J03	B33729	RED, ADCOM
JO4,JO5	B33729	BLACK, ADCOM
FUSE HOLDER:		
FH01	⚠ 84-420	
FUSES:		
F01 (120V)*	⚠ AGC-10/250V	BUSSMAN
	3AG312010/250V	LITTELFUSE
	3AG 10A/125V	BEL
	CES6-10A/125V	SOC
F01 (220V-240V)*	⚠ AGC-5/250	BUSSMAN
	3AG312005/250	LITTELFUSE
	CES14-5A/250V	SOC

LEDs:

L1	LTL-2251A 3F	YELLOW, INSTANTANEOUS DISTORTION ALERT
L01	LTL-2201A 3F	RED, POWER INDICATOR

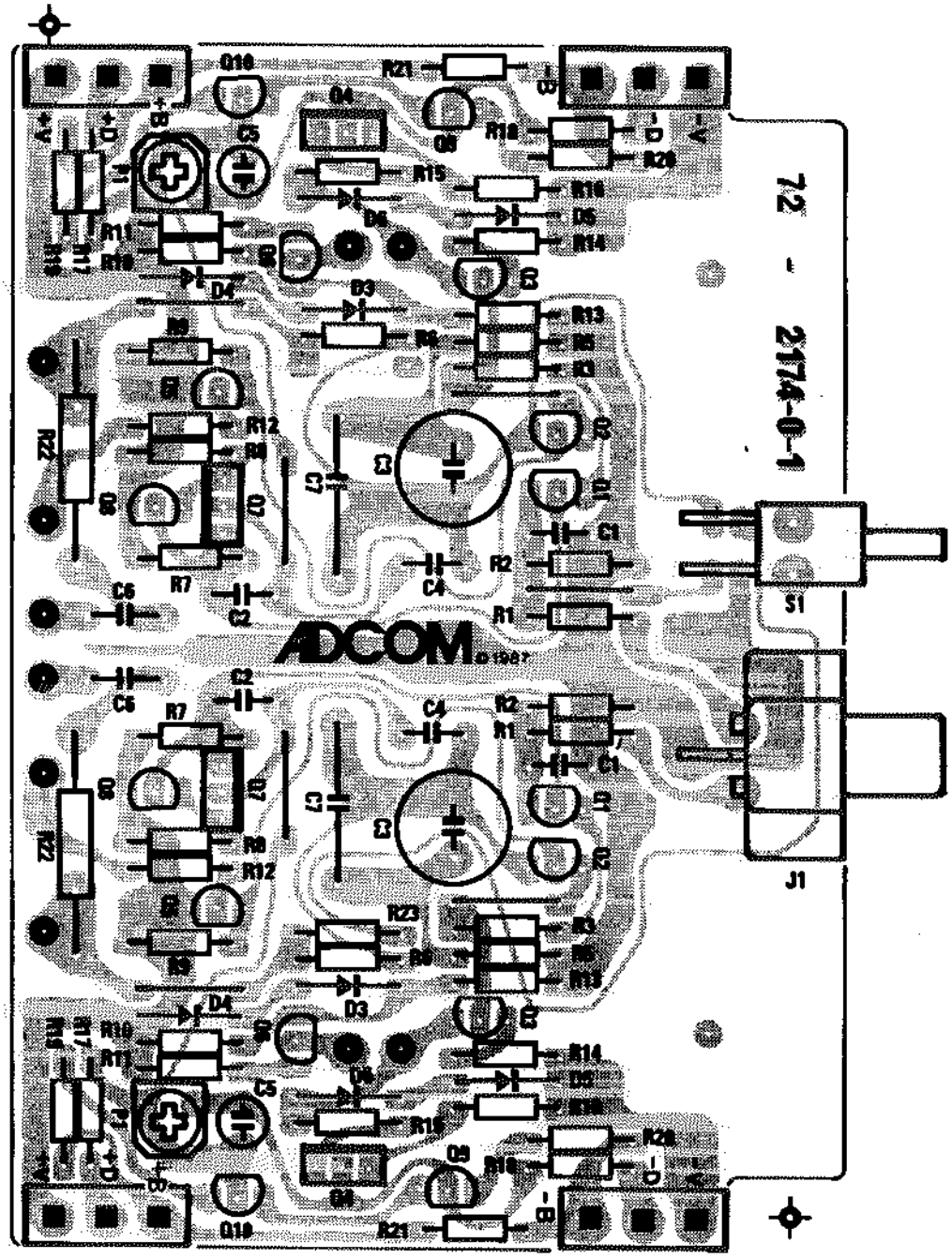
LED SOCKET:

	84-213	WIRE HARNESS W/SOCKET

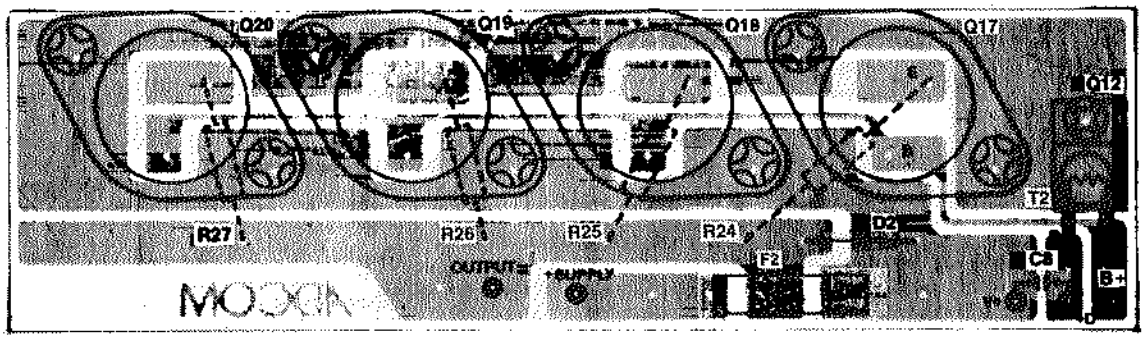
* The fuses listed, and their time-current blowing points, have been carefully selected and thoroughly tested to deliver optimal performance while still accomplishing their protective functions. Replace these fuses, individually, only with the specific types listed. **DO NOT USE ANY SUBSTITUTE FUSES 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.

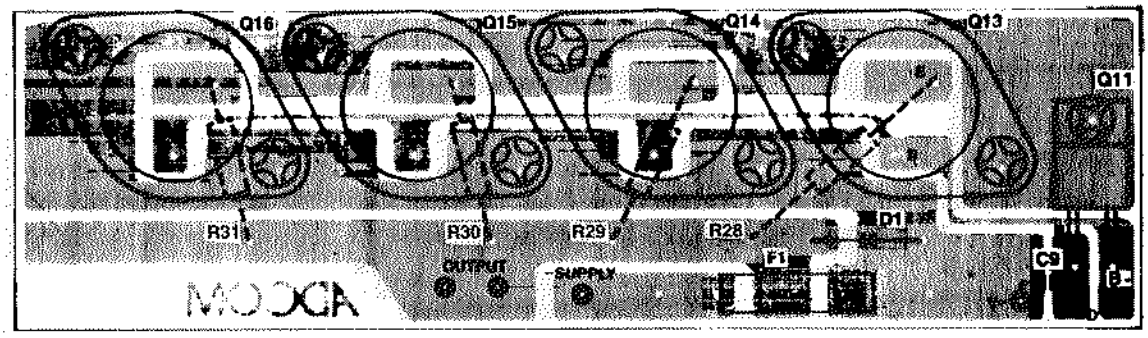
GFA-555 AUDIO INPUT PCB



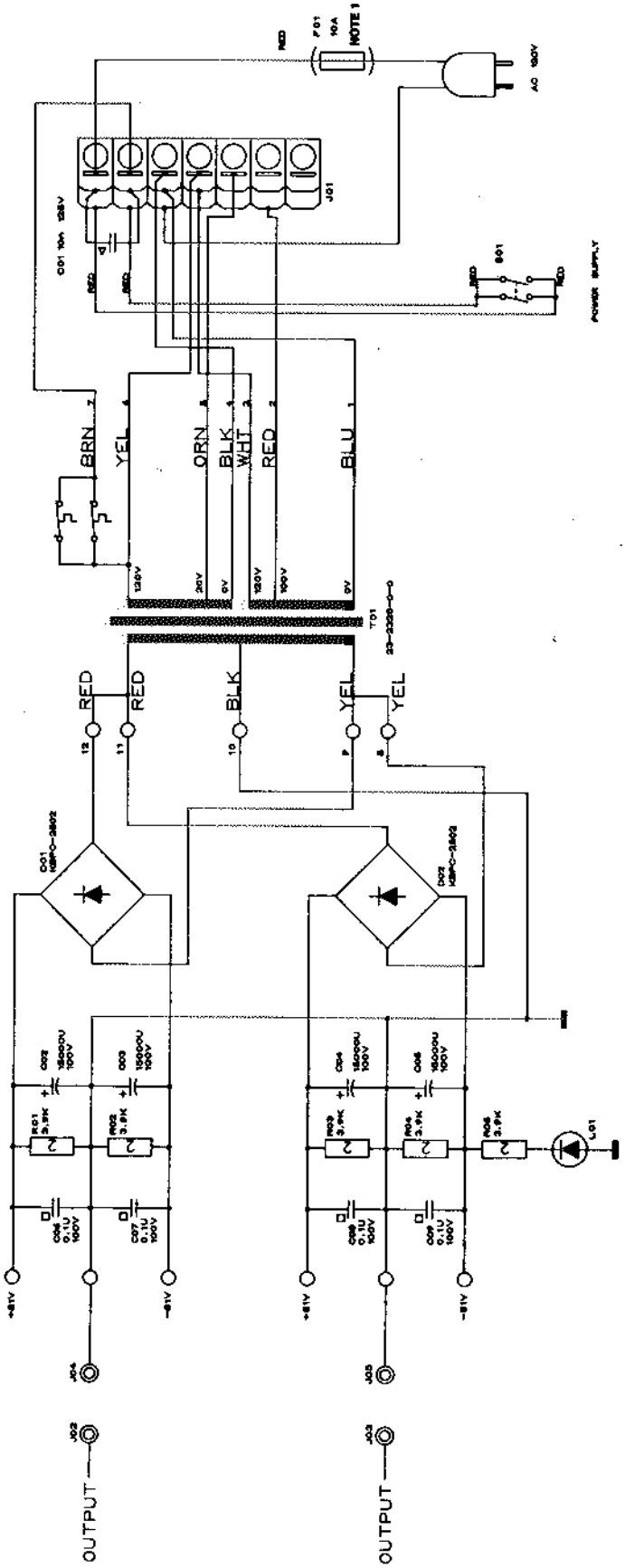
GFA-555 NPN OUTPUT PCB



GFA-555 PNP OUTPUT PCB



GFA-555
POWER SUPPLY SCHEMATIC DIAGRAM



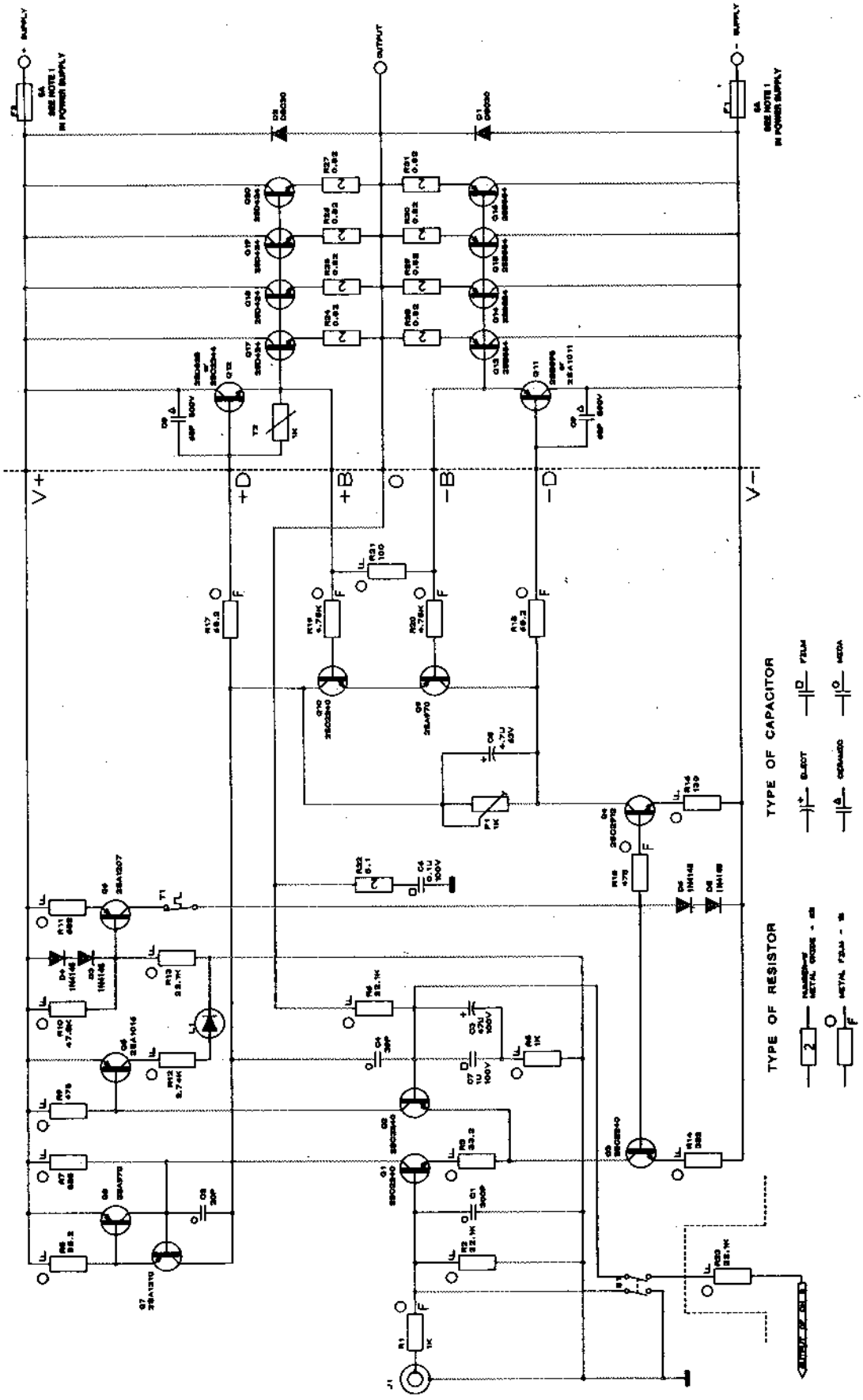
NOTE 1, FUSES

BRAND	120V	220V	240V	RAIL
BUSSMAN	AGC-10/250V	AGC-5/250V	AGC-5/250V	AGC-6/250V
LITTELFUSE	3AG312010/250V	3AG312005/250V	3AG312005/250V	3AG312006/250V
BEL	3AG 10A/125V	3AG 5A/250V	3AG 5A/250V	—
SOC	CES 6-10A/250V	CES 14-5A/250V	CES 14-5A/250V	CES 14-6A/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.

GFA-555 AMPLIFIER SCHEMATIC DIAGRAM
(ONE CHANNEL SHOWN)



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