



AP4622 500-Watt Power Amplifier

RAULAND-BORG CORPORATION • 3450 West Oakton Street, Skokie, Illinois 60076-2951 • (708) 679-0900

Table of Contents

General Information	1
<hr/>	
Description	1
Unpacking	2
Hardware Needed	2
240-VAC Conversion	2
Specifications	2
<hr/>	
Installation	3
<hr/>	
Relocating the Level Controls	3
Rack-Mounting	3
Electrical Connections	3
Grounding	3
Input Connections	3
Output Connections	3
Autotransformer Connections for 25 V and 70 V	4
Power Connection	4
Setting the Output Levels	4
Servicing and Troubleshooting	5
<hr/>	
Fuses	5
AC Fuse	5
Channel Output Fuses	5
DC-Supply Fuses	5
Accessing the PCB Components	5
Internal Adjustments	5
Factory Service and Warranty Repairs	5
Drawings	6
<hr/>	
Rear Panel	IL0312
Front Panel	IL0314
Internal Wiring	KC1656B
PC-Board Schematic	KC1657C

General Information

Description

The AP4622 dual-channel amplifier offers high power, low distortion, and high reliability. Each channel delivers 250 watts into four ohms, and the two channels can be

bridged to provide more than 500 watts mono into eight ohms or 625 watts at 70 volts. With the optional Rauland AP4672 Autotransformer, the unit can provide constant-voltage outputs of 200 watts per channel at 25 or 70 volts.

Specifications

Continuous Power Output with both channels driven

(20 Hz-20 kHz, $\leq 0.6\%$ THD):

200 watts per channel into 8 Ω .

250 watts per channel into 4 Ω .

500 watts into 8 Ω (bridged mono).

Optional Transformer Output (100 Hz to 15 kHz, $\leq 1\%$ THD):

200 watts per channel for 25 V or 70.7 V.

625 watts for 70.7 V (bridged mono).

Frequency Response:

20 Hz to 20 kHz (+0, -1 dB).

Signal-to-Noise Ratio (ref. RPO with 30-kHz filter):

>90 dB.

Input Type:

Electronic (balanced or unbalanced).

Channel Isolation:

≥ 60 dB, 20 Hz to 20 kHz.

Output Stability:

$\pm 60^\circ$, 4 Ω or 8 Ω .

Input Sensitivity:

1 V (2.2 dBu).

Input Impedance:

19.5 k Ω balanced, 9.5 k Ω unbalanced.

Input Overload:

9.5 V (21.8 dBu).

Fuses (rear panel):

AC: 8-A, slo-blo.

Speakers (one fuse per channel): 5 A, normal-blow.

Internal DC Power-Supply Protection:

8 A, slow-blow (two fuses per channel).

Dimensions:

19" (48.3 cm) W., 5.25" (13.3 cm) H., 11" (27.9 cm) D.

Weight:

33 lbs (15 kg).

Power Requirements:

1170 watts at 120 or optional 240 VAC, 50 or 60 Hz.

Several features make the unit easy to set up and use. Peak output-level LEDs aid the installer and give warning of potential overdrive conditions. Precision detent level controls are mounted on the rear panel to inhibit unauthorized adjustments, but they can be moved to the front panel for applications requiring easy access. The five-way output binding posts offer versatility for loudspeaker connections, and the output fuses are conveniently located on the rear panel of the amplifier.

Unpacking

This unit was carefully checked at the factory. If it has been damaged, carefully inspect the shipping container for indications of improper handling. Notify the transportation company immediately with any damage claims.

Hardware Needed

The user must supply (1) the hardware for mounting this unit in an enclosure, (2) appropriate interconnecting cables and connectors, and (3) a suitable AC power source.

Mounting Hardware: Each unit needs four sets of the following recommended hardware (Rauland part numbers are given in parentheses): black pan-head Phillips machine screws (B0439), black flat washers (WJ0305), and black fiber washers (WL0315); the fiber washers are recommended to protect the panel finish. If the rack or turret does not have threaded holes, obtain Tinnerman speed nuts (AB3640).

AC Power: The amplifier plugs into a standard 120-VAC or 240-VAC outlet (50 or 60 Hz) that can supply at least 1170 watts of power.

Cables and Connectors: The amplifier's output terminals are five-way binding posts that will accept any of the following: stripped and tinned cable (1) inserted through or (2) wrapped around the post, (3) quarter-inch spade lugs, or either (4) single or (5) dual banana plugs.

Speaker Fuses: Each channel has its own fuse to protect the speakers from excessive power. The amplifier comes with 5-ampere, normal-blow fuses for 4-ohm and constant-voltage installations. However, an 8-ohm load would require 3-ampere, normal-blow fuses, which would have to be obtained separately.

Autotransformer: If a 25-volt or 70-volt output is desired in the dual-channel mode, add an AP4672 Autotransformer for each channel that is to supply this output plus #16-AWG or heavier color-coded wires and suitable spade lugs for connecting the autotransformer. See the "Installation" section, below, for details.

240-VAC Option

The unit is normally factory-wired for a standard 120-VAC power source. Optionally, the factory will wire a unit for a 240-VAC power source if this is requested in the order.

Installation

It may be easier to make a couple of the optional modifications before the amplifier is made less accessible in an enclosure. Moving the level controls to the front panel, described next, entails accessing the inside of the unit. Mounting one or two autotransformers entails accessing the back of the unit (see the "AP4672 Autotransformer" subsection, below).

Relocating the Level Controls

The input level controls come mounted on the rear of the amplifier. Normally, these controls need only be set once to match the rest of the system and thereafter the user will control the system sound levels from the preamplifier. However, the controls can easily be moved to the front panel to make them accessible.

Step 1. Remove the ten screws from the top of the unit, then set them and the top cover aside.

Step 2. Carefully remove and set aside the hole plugs from the front-panel "level" locations. The plugs are press-fit through the front panel.

Step 3. Carefully remove and set aside the level controls' knobs. They are held on the control shafts by friction.

Step 4. When transferring the controls to the front panel, work on one control at a time, to prevent a mix-up. Remove the control nut, then pull the control from the hole. Push it through the corresponding front-panel hole and start the control nut on it. Orient the control so that its terminals point to either side, then tighten the nut.

Step 5. Install the control knobs so that their indicators point straight up when the controls are at the center of their rotations.

Step 6. Push the hole plugs removed in Step 2 into the vacated rear holes, then reinstall the top cover.

Rack-Mounting

The AP4622 requires 5¼ inches of vertical space in a standard 19-inch rack. Allow at least 13 inches mounting depth for the unit and connectors (15 inches if there is an AP4672 output transformer).

The location should not be near a heat source and should afford unimpeded air flow around all sides of the unit. If there is a second power amplifier or other heat-generating component in the same enclosure, separate these units and install a cooling fan.

Do not mount the amplifier immediately above or below low-level audio equipment, such as preamplifiers, mixers, and equalizers, to minimize potential noise pickup. At the very least, allow 3½ inches of vertical space between the amplifier and other equipment.

Electrical Connections

Caution: Do not apply power to the unit until you have completed and checked all the connections.

Grounding

The *ground* switch on the rear of the chassis offers the choice of either connecting the audio signal common directly to the chassis ground or letting it float. It is good practice to tie all the signal commons in the system to a

reliable earth ground at one point only, typically at the preamplifier. To follow this practice, select the floating mode by placing the switch in its "lift" position. However, if the preamplifier does not provide the common-to-earth-ground connection, leave this switch in its "normal" (grounded-common) position.

Input Connections

The screw-terminal block on the rear of the chassis accommodates either balanced or unbalanced inputs. *Balanced* inputs require three separate connections: "+" (high), "-" (low), and "gnd" (shield). *Unbalanced* inputs require a jumper between "-" and "gnd": connect the shield to these terminals and the inner conductor to the "+" terminal.

Dual-Channel and Mono Configuration

For *dual-channel* operation, use both inputs. For *bridged mono* operation, use only the "input 1" terminals.

Note that the *stereo-mono bridge* switch on the rear panel must be in the proper position for the intended mode of operation.

Output Connections

Step 1. Select the output terminals:

Dual-channel operation uses both sets of outputs. The *red* terminal is *high* (+) and the *black* terminal is *common* (-).

Bridged-mono operation uses only the *red* terminals. The *Channel 1* post is *high* (+) and the *Channel 2* post is *low* (-).

Step 2. Prepare the speaker cables for the selected binding posts:

Stripped and tinned cables up to 14-AWG in size can be inserted through the hole in the binding-post shaft or wrapped around the post. Strip enough insulation from the cable for the selected method.

Spade lugs, of a suitable size can be fitted over the terminals' quarter-inch shafts. Connect the lugs to the amplifier end of the cables.

Single or dual banana plugs will fit inside the terminal shafts. Connect the plugs to the amplifier end of the cables.

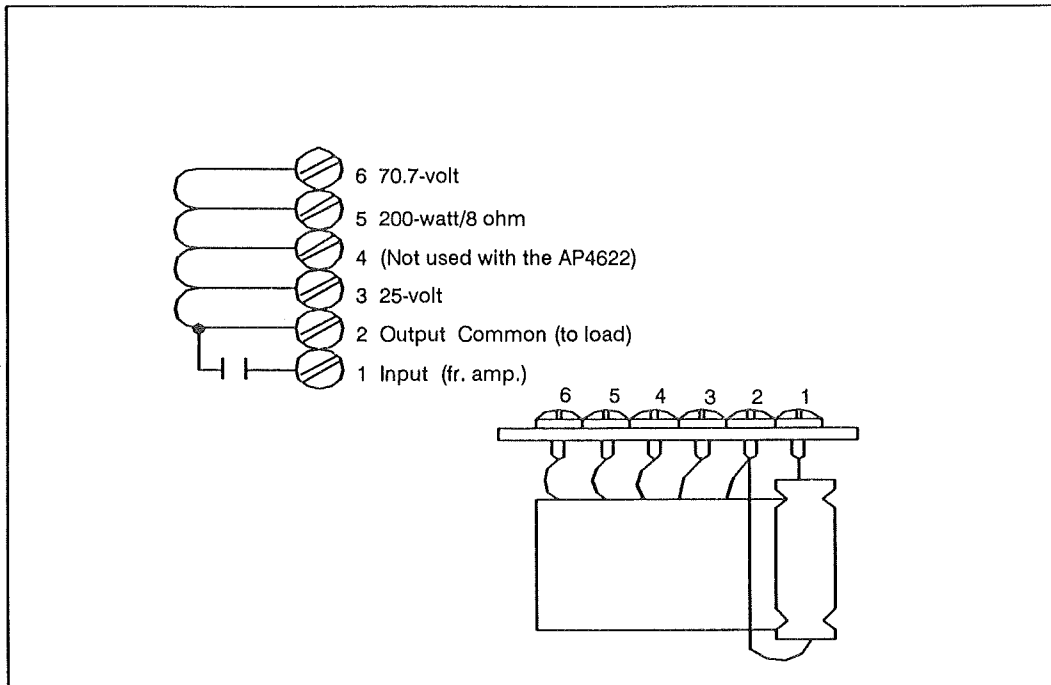
Step 3. Secure the cables to the appropriate binding posts in accordance with the connection method chosen in Step 2:

Insert *banana plugs* into the hollow centers of the binding posts.

For *bare wires* or *spade lugs*, on each selected terminal loosen the post knob by rotating it counterclockwise to expose the shaft. After placing the wire or lug on the shaft, tighten the post knob by rotating it clockwise.

Step 4. Make sure that the *stereo-mono bridge* switch on the rear panel is in the proper position for the intended mode of operation.

Step 5. Make sure that the speaker fuses on the rear panel match the loudspeakers (see the "Fuses" subsection under "Troubleshooting," below).



Autotransformer Connections for 25 V and 70.7 V

Adding an AP4672 Autotransformer enables a channel to supply a constant-voltage output of 25 or 70.7 volts at 200 watts. To use an autotransformer on either channel or both channels, set the amplifier to the dual-channel mode. A channel with the autotransformer must have a 5-ampere fuse for loudspeaker protection.

Follow this procedure for installing each autotransformer. As was noted at the beginning of this "Installation" section, it may be easier to mount the autotransformers and wire them to the output terminals before mounting the amplifier in an enclosure.

Step 1. Align the AP4672 Autotransformer with the four mounting holes on the left or right end of the rear panel: the autotransformer's screw terminals should face the amplifier's output terminals in the middle of the rear panel. Use the four #8 x 1/2" self-tapping screws supplied with the autotransformer to fasten this accessory to the amplifier.

Step 2. Prepare #16-AWG or heavier wires for connecting the amplifier's output to the input of the autotransformer. Use a termination method described in the preceding subsection ("Output Connections") for the amplifier's terminals, and spade lugs that will fit the autotransformer's 6/32" screw terminals.

Step 3. As the above figure shows, Terminal 1 on the autotransformer is connected to the electrolytic capacitors. Connect the amplifier's black post (-) to Terminal 1

of the AP4672, and the amplifier's red binding post (+) to Terminal 5 of the AP4672.

Step 4. Connect the loudspeaker leads directly to the autotransformer's outputs: the common to Terminal 2, and the high (or hot) to either Terminal 3 (25 volts) or Terminal 6 (70.7 volts).

Power Connection

Make sure that the front-panel power switch is off (depressed on the left side) before plugging the unit into a standard three-wire grounded AC receptacle that can provide at least 1170 watts of power.

Setting the Output Levels

Step 1. Turn on the power by depressing the right side of the power switch.

⇒ The front-panel "power" LED should light steadily.

Step 2. Feed an input signal from the preamplifier (this assumes that the signal levels delivered to the power amplifier have been properly set).

⇒ The "peak" LED for each channel may flicker occasionally but should not light steadily. These LEDs show the output levels of the power amplifier. Frequent flickering or a steady glow indicates a clipping condition.

Step 3. If necessary, adjust the input level controls (on the rear panel, unless they were moved to the front).

Servicing and Troubleshooting

Caution

This equipment has no user-serviceable components. Therefore, internal servicing should be performed only by a qualified technician, preferably one from an authorized Rauland distributor. Any attempt at self-servicing may expose the user to electrical shock or cause irreparable damage to the unit and the possible voiding of the equipment warranty.

Fuses

The amplifier has seven fuses: an AC fuse to protect the unit from a power input overload, two fuses per channel to protect the unit from a DC power overload, and one fuse per channel to protect the loudspeakers from overload. The AC and output fuses are easily accessible on the rear panel; the DC fuses are on the amplifier module boards.

AC Fuse

Caution: Use only an MDA-type 8-ampere slow-blow fuse for the 120-VAC or a 4-ampere slow-blow fuse for the optional 240-AC configuration; any other type or rating may create a fire hazard.

Channel Output Fuses

Use only 3AG, normal-blow fuses for the channel outputs (loudspeaker protection). The amplifier comes with 5-ampere fuses; any other value must be obtained separately. Select the fuse to match the loudspeaker power and impedance, as set forth in the following table:

Output (Loudspeaker) Fuses

Power Rating	Fuse Value		
	4 ohm	8 ohm	16 ohm
20W	1.5 A	1 A	0.75A
50W	2.5 A	2 A	1.5 A
100W	3 A	2.5 A	2 A
150W	4 A	3 A	2 A*
200W	5 A	3 A	3 A*
250W	5 A	N/A	4 A*
500W	N/A	5 A*	N/A

* Mono operation only.

Notes: 1. Each channel that is used for 25-volt or 70.7-volt, 200-watt operation requires an AP4672 Auto-transformer and a 5-ampere fuse for its output.

2. Using the bridged-mono operation at 70 volts or 500 watts requires a 5-ampere output fuse in each channel.

DC-Supply Fuses

The DC-supply fuses are inside the unit, on each channel's amplifier board. These fuses protect the unit from an excessive current draw, which could result from an extreme overload or the failure of an output device.

If fuse *F1* should open, check devices D8, Q12, Q14, Q15 before replacing it with the same type (MDA 8A slow-blow).

If fuse *F2* should open, check devices D9, Q13, Q16, Q17 before replacing it with the same type (MDA 8A slow-blow).

Accessing the Amplifier's PC Boards

To access the amplifier's printed circuit boards, pull the unit from the rack, then remove its top cover, which is secured with ten screws. To access the lower output transistors and the solder side of the amplifier boards, remove the bottom cover as well; it is also secured with 10 screws around its periphery.

Internal Adjustments

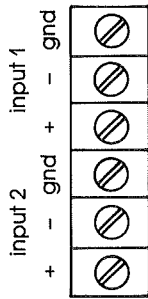
All the internal controls have been adjusted by the factory. They need no further adjustment unless you replace transistors Q12, Q13, Q14, Q15, Q16, or Q17 on an amplifier module board, which may entail readjusting the output-stage bias.

Before adjusting the output-stage bias, make sure that the amplifier is at room temperature. Connect a DC voltmeter between the emitters of Q14 (positive lead) and Q16 (negative lead). Remove any input signal or output load from the AP4622, then turn it on. Adjust the channel's bias potentiometer (R25) to obtain a reading of 7 mV (see Note 1 on KC1657).

Factory Service and Warranty Repairs

The AP4622 uses all solid-state devices and does not require routine service. To obtain factory service for a problem, in or out of warranty, first obtain a return authorization from the factory before sending the unit. This authorization may be obtained by calling the Factory Service Department, Biamp Systems, at (800) 826-1457 or (503) 641-7287. Be ready to provide the unit's serial number, which is on the metallic tag on the outside of the chassis.

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4Ω operation: use 5A NB
8Ω operation: use 3A NB

4Ω operation: use 5A NB
8Ω operation: use 3A NB



speaker fuse 2



speaker fuse 1

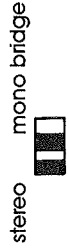
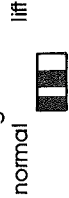
8A SB



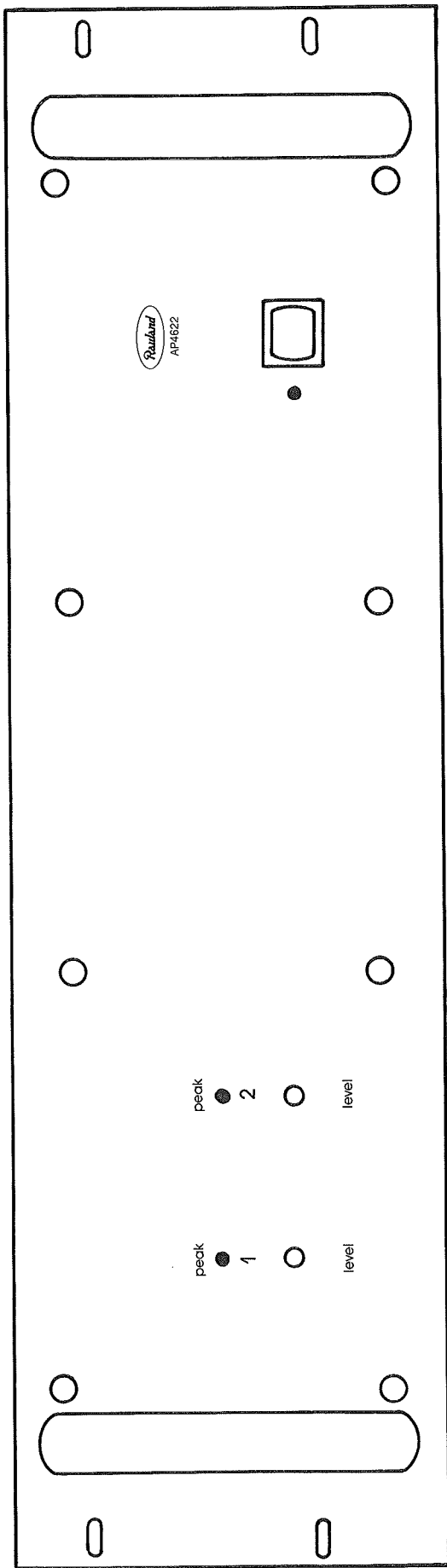
120 VAC



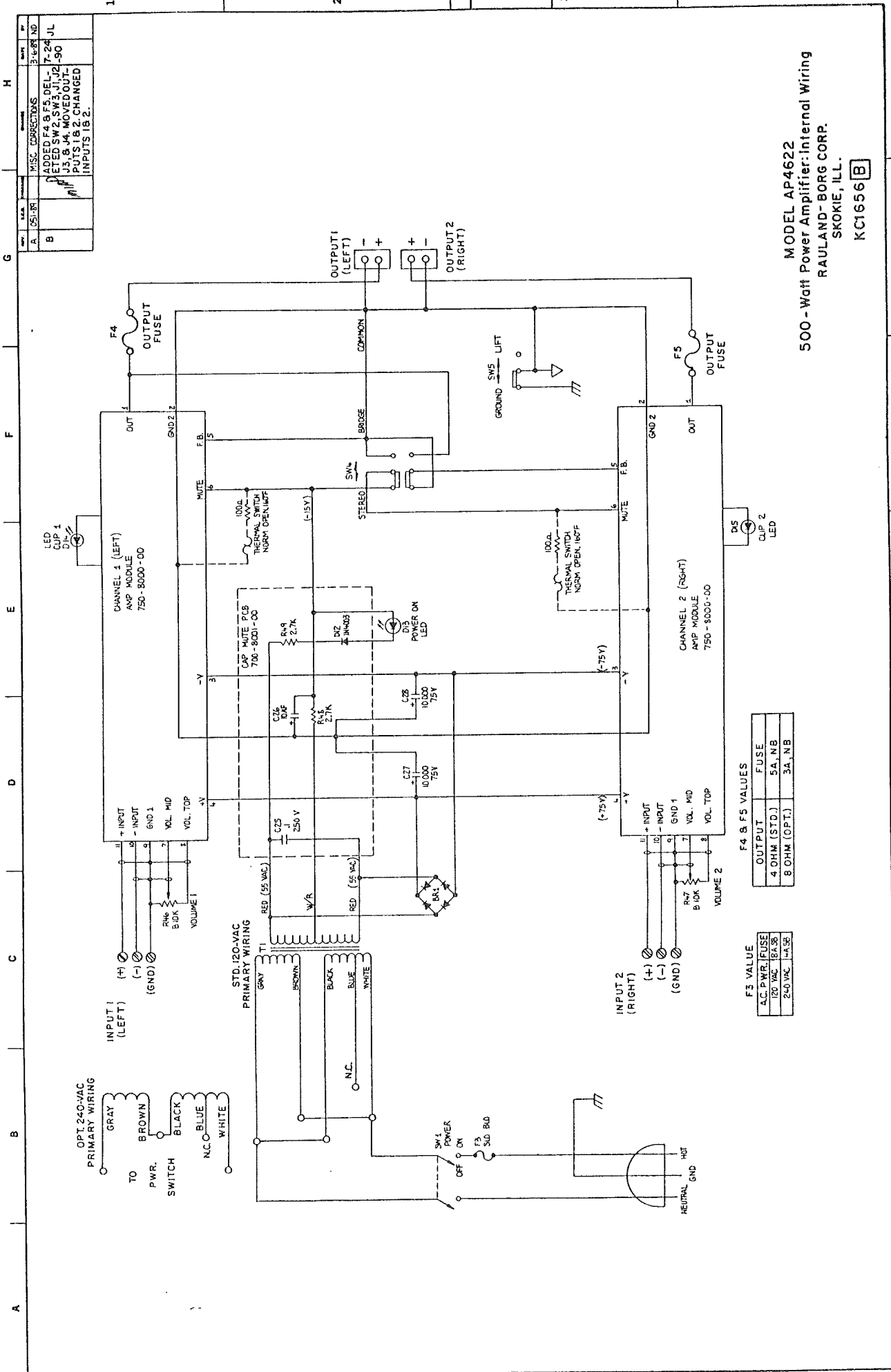
AC Fuse 50/60 Hz 1000 Watts max



ILO312



ILO314



MODEL AP4622
 500-Watt Power Amplifier: Internal Wiring
 RAULAND-BORG CORP.
 SKOKIE, ILL.
 KC16566 [B]

F3 VALUE

A.C. PWR. FUSE	FUSE
120 VAC 18A.35	5A, NB
240 VAC 14A.35	3A, NB

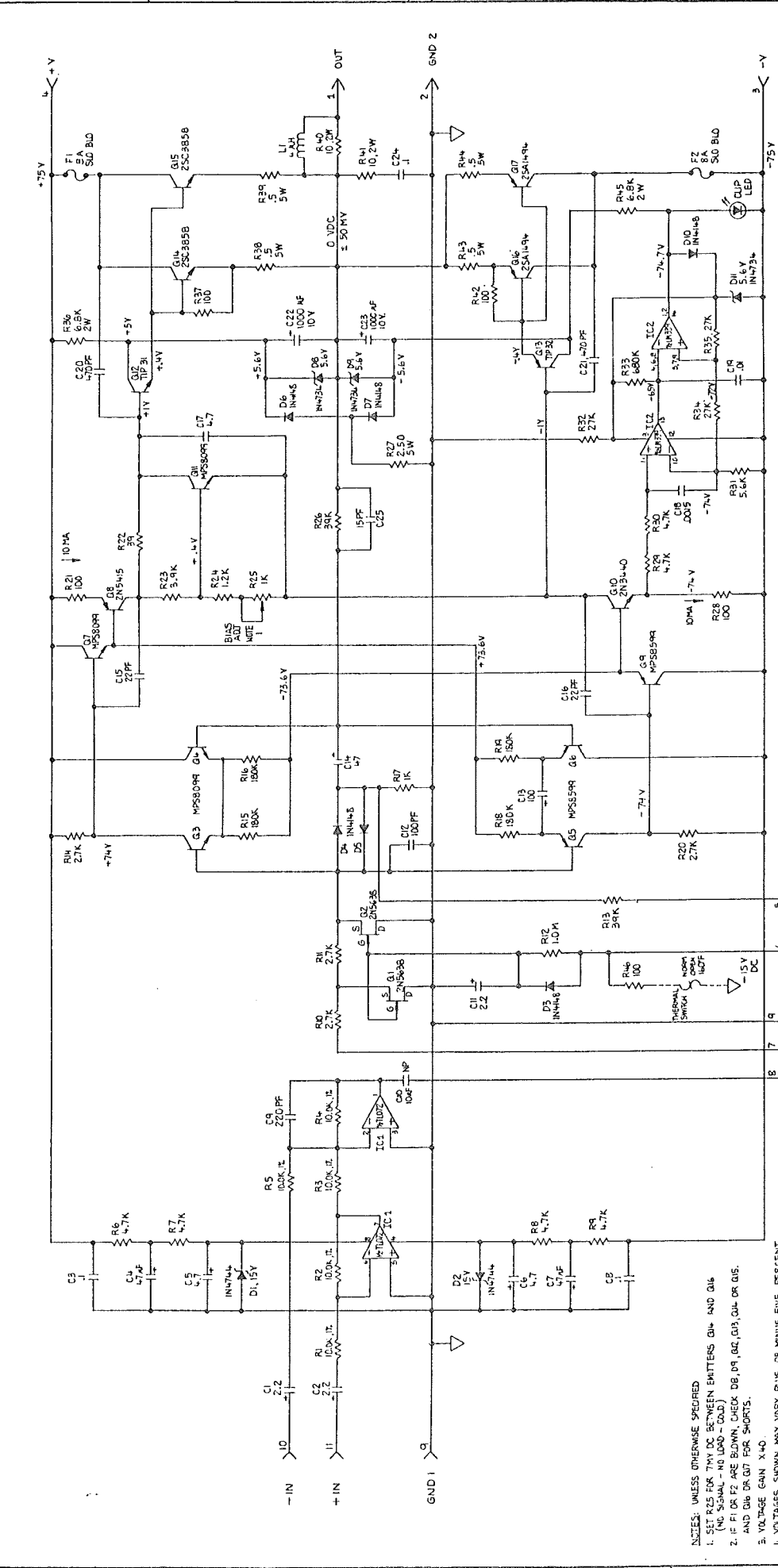
F4 & F5 VALUES

OUTPUT	FUSE
4 OHM (STD.)	5A, NB
8 OHM (OPT.)	3A, NB

MISC. CORRECTIONS

REV.	DATE	DESCRIPTION	BY	CHKD.
B		ADDED F4 & F5, DEL. 7-24 JL RELED SW2, SW3, J1, J2 PINS 1 & 2 CHANGED INPUTS 1 & 2.		

REV.	DATE	BY	CHKD.	DESCRIPTION
A	05-89			ADDED 100 OHM THERMAL SWITCH SMT TO SURF. SMT TO
B	22-91			CHANGED R1, R2, R3, R4, R5 TO 1%
C				ADDED TRACE BE-7-24-JL
				TWENTY EMITTERS OF 90
				G3 BQ4.



MODEL AP4622
500-Watt Power Amplifier Amplifier Module
RAULAND - BORG CORP.
SKOKIE, ILL.
KC1657

LIST
R46
C25
D11
F2
LI
Q17
IC2

NOTES: UNLESS OTHERWISE SPECIFIED
1. SET R25 FOR 75V DC BETWEEN EMITTERS Q3 AND Q4 (NO SIGNAL - NO LOAD - GND)
2. IF F1 OR F2 ARE BLOWN, CHECK Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q34, Q35, Q36, Q37, Q38, Q39, Q40, Q41, Q42, Q43, Q44, Q45, Q46, Q47, Q48, Q49, Q50, Q51, Q52, Q53, Q54, Q55, Q56, Q57, Q58, Q59, Q60, Q61, Q62, Q63, Q64, Q65, Q66, Q67, Q68, Q69, Q70, Q71, Q72, Q73, Q74, Q75, Q76, Q77, Q78, Q79, Q80, Q81, Q82, Q83, Q84, Q85, Q86, Q87, Q88, Q89, Q90, Q91, Q92, Q93, Q94, Q95, Q96, Q97, Q98, Q99, Q100 FOR SHORTS.
3. VOLTAGE GAIN X40.
4. VOLTAGES SHOWN MAY VARY PLUS OR MINUS FIVE PERCENT.

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